APMP
Sample Examination
Questions and Answers

Based on
The APM Body of Knowledge 5th Edition
&
The APMP Syllabus 3rd Edition
Document History

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<td>October 2006</td>
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Disclaimer:
The questions set within this booklet reflect the learning objectives of the APMP Syllabus 3rd Edition associated with the 5th Edition of the APM Body of Knowledge. The answers given are not model answers, rather they are sample answers which if submitted in an examination would, in the opinion of the author result in a good pass. However, no liability whatsoever will be accepted for a candidate’s success, or otherwise, in the examination, by the author.
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Section 1 Introduction

This booklet is aimed at helping all those intending to take the APMP Examinations. The booklet has been written to support the syllabus based on the APM's 5th Edition of the Body of Knowledge.

David Atkinson is a project management professional specialising, for the last ten years, in training and consultancy. Prior to that his career encompassed a wide range of projects implementing telecoms and data systems in the UK and overseas, specialising in structured cabling systems design and installation.

A member of the APM since 2000 David holds the APM’s Practitioner Qualification and regularly acts as an Assessor or Facilitator at the PQ Assessment Centres. He is a Registered PRINCE2™ Practitioner and former examiner and holds the Practitioner qualification for MSP (Managing Successful Programmes).

The questions set within this booklet reflect the learning objectives of the APMP Syllabus 3rd Edition associated with the 5th Edition of the APM Body of Knowledge. The answers given are not model answers, rather they are sample answers which if submitted in an examination would, in the opinion of the author result in a good pass. However, no liability whatsoever will be accepted for a candidate’s success, or otherwise, in the examination, by the author.

The booklet is designed to be used by the candidate as part of her/his preparation for the examination, be that attending a recognised APMP training course or through a period of self study. It is also expected that the candidate will have studied the syllabus and APM’s 5th Edition of the Body of Knowledge.

Each section of The Body of Knowledge (BoK) contains a list of “further reading”. Whilst it is not necessary for candidates to have studied all the cross-references some further reading is encouraged.

Section 2 of this booklet contains some hints and tips on examination technique and also defines the key examination words (such as list or explain). Section 3 contains the text from the syllabus for each relevant section of the BoK and the exam style questions for that topic. Section 4 contains the sample answers.

There is a considerable amount of information available that can be downloaded from the APM’s website relating to the examination and the syllabus. The web address is: www.apm.org.uk

It only remains to wish you “Good Luck with the examination!”
Section 2 Examination Guidance

The Examination

The APMP examination is a three-hour closed book examination. The paper contains 16 questions, each related to one of the 37 syllabus topics. You must answer 10 of them. There will be a maximum of two and a minimum of one numeric question(s) on any paper. All topics are examined equally. It is unlikely that you will have to draw a network diagram. However, you may have to interpret one and draw a Gantt chart, histogram and “S” curve.

Each question is worth 50 marks giving a total score of 500.

To gain a pass you must achieve an aggregate score of 55% - i.e. 275 marks from 500.

If you have any special requirements contact either the APM Qualifications and Accreditation Department, or your training provider, in plenty of time so that the appropriate arrangements can be made. Remember that in some cases a medical certificate may be required.

If you are studying for the APMP qualification but have PRINCE2 then you may be completing the APMPPL course in which case the examination is 2 hours and 6 questions must be answered from 10. The pass mark is 55% - i.e. 165 from 300)

Key Words

When setting examination questions the APM have standard definitions for these four words: list, state, describe and explain, described below.

- List.
  When a question starts “List four....” you are expected to make a simple list of four items. You don’t have to expand, give an explanation, or discuss the list you have made. If the question asks for a list of four things then give no more than four, if it asks for six, give a list of no more than six. If you give more than the required number they will not be marked.

- State.
  When a question starts “ State..” you are expected to write a single sentence to summarise the point being made. For example if the question was “State 4 benefits of using a Product Breakdown Structure” your answer might be (for one of the benefits): “A PBS helps to defined the scope of the project; if a product is mentioned it is within scope, if it isn’t then it won’t be part of the project – i.e. it would be out of scope."

- Describe.
  When a question starts “Describe...” you are expected to write a short paragraph summarising each point made. The APM state that this would be more than one sentence. So I would expect you to write 2 or 3 sentences.

- Explain.
  Questions starting with “Explain...." require you to write a detailed explanation of the topic in question. The APM state that this requires 2 or more sentences for each point made. I would therefore expect you to write a paragraph consisting of 2 to 5 sentences perhaps including a relevant example of the point being made. It may be useful to draw a
diagram to help with the explanation. If there are specific points within the
marking scheme for a diagram this will be stated in the question, e.g.
“include an appropriately labeled diagram in your answer”.

There are occasions where the question asks you to “list” and then “describe”. In this case the best way to answer the question is to make the list first and then describe them in separate paragraphs. Remember to reference each paragraph to the relevant point in the list.

Hints and Tips

Taking an examination is, for most people, a nerve racking and stressful experience especially when one’s job or promotion prospects rely on a successful outcome. This is often the case for candidates sitting APMP.

The following is a list of hints and tips that I have been passing on to my students over the years with some success. They are not listed in any particular order and if you don’t like them, or it goes against your own writing or examination style – ignore them. This is not the time to change your writing style.

Be prepared

This means do any pre-course reading sent to you by your training provider. This may be extensive but we send it for a purpose. So often I have heard the cry “I’ve not had time”, “I’ve been very busy at work”, “I only received it yesterday” – the latter may be forgiven but on the whole these excuses are just that – excuses.

There is a huge amount of knowledge to absorb for the examination and whilst you may already have some experience there are bound to be some areas where your knowledge is lacking in part or in full.

I would recommend that you spend 30 – 60 minutes each day for 3 weeks before the examination studying the material you have received.

Make yourself a revision plan and stick to it. If you are having a break between your course and the examination use the time wisely.

Revision

It may go without saying but the point of revision is to learn and study that which you don’t know. This is a difficult and sometimes depressing activity. I have seen and heard people continually practising the topics they can do well, for example, constructing a network diagram and Gantt chart. Whilst this is very comforting it won’t help you in the exam if you haven’t revised the topics you don’t know.

If you find one topic is just too hard then give it up and move on to another. You will be examined on 16 topics from 37 and you need to know about 10 of them, so you can realistically expect to ignore a couple of topics completely. For example, many of my students have no experience of Earned Value Analysis. As such they find it a difficult subject to master and it involves some mathematics and formulae, which some people find scary in itself. In this instance my advice is to ignore the topic but word extra hard elsewhere.

Remember every time you say “I won’t bother with this topic” you are saying to yourself “I’ve got to answer 10 from 15, or 14 or 13 or 12 etc”, depending how many you ignore.
Try to spend between 1 and 2 hours a day revising. This may mean altering the family arrangements for a short period but it will be worth it in the end.

Time management in the examination

Within the 3 hours you have to complete 10 questions and that equates to 15 minutes per question plus 30 minutes reading and planning time.

A common failing in an examination is to run out of time. You must discipline yourself to spend a maximum of 15 minutes on each question. When I marked examination papers I noticed that the first page usually scored very well with the candidate getting down all the good stuff s/he knows. Page two was usually about half as good as page one; candidate running out of steam now. Subsequent pages, if any, scored very little; the candidate had nothing left to say and was waffling, repeating him/herself or summarising, none of which actually scores. It is far better to move on after page 2 and score lots of marks on a new question.

If the question asks for an explanation that requires 5 points to be made then that equates to 3 minutes per point made.

If the question has two or more parts then the marks will be split between them and each 10 marks is worth 3 minutes of your time.

Thus answering the questions will take 2.5 hours. The remaining 30 minutes should be used firstly to read the paper thoroughly and select your ten questions – say 10 minutes. Use a further 10 to read through your answers, which leaves 10 minutes for anything you like!

How good do I have to be?

Remember 100% or 55% still result in a pass. It is not graded. There is no need to get every question 100% correct, neither should you aim for the bare minimum. I would recommend that you aim for the 75% mark. This is a good pass and is “comfortable”, that is, you can still drop a few marks and pass. This relates closely to the next tip – choosing your questions.

Choosing your questions

I recommend the “tick, tick, query, query” system or “✓ ✓ ??”

Firstly read the paper thoroughly and when you read a question that you just know you can do well put a “✓ ✓” against it.

On the second pass put a “✓” against your second choice.

Third time around put a “?” against the question you would have a go at if you were really pushed.

That leaves the rest as “??” – those you wouldn’t try under any circumstances.

By now with any luck you will have 4 – 5 question with a “✓ ✓” where you can hope to score about 80% each; 2 or 4 with a “✓” where you can hope to score about 60% and 1 – 4 with a “?” where you can hope to score about 45% each.

If you total that up on the optimistic side you should have:

5 at 80%, 4 and 60% and 1 at 45% giving an overall score of around 68%.

Pessimistically you’ll have:

4 at 80%, 2 at 60%, 4 at 45% giving an overall score of around 62%.
In other words you don’t have to be brilliant all round!

If you are really struggling and you have to choose a couple of “??” from your paper do a little mental arithmetic on the marks and go for the one where you think you will score best.

**Answering the Questions**

It is not necessary to write volumes to pass but you must take note of the guidance issued by the APM, given above in Key Words. On average each question will cover between 1.5 to 2 sides of paper, about 15 to 20 sides in all.

Start each answer or part answer on a new page, it makes it easy to mark and keeps you on track.

Don’t keep writing! Each point you make should be a new paragraph and that means leaving 2 or 3 lines gap between the paragraphs. This stops you waffling on about a single point, keeps you on track, and makes it easy to mark (no bad thing if you need the benefit of the doubt!)

Make sure any diagrams have a title, are clearly labelled and have a key if appropriate (e.g. on a network diagram). If you have drawn a graph, clearly label each axis and state the scale you have used.

Be as neat as you can but don’t waste time. Use a ruler when appropriate. Freehand boxes are perfectly acceptable on a network diagram, for example, but keep them neat; using a ruler wastes valuable time.

Use short sentences and simple words. Avoid all use of jargon and acronyms. If you are tempted to use them then explain what they mean. Remember the examiner can only mark what you have written – s/he does not know that you meant something else as well. If your statement means more than one thing explain them all.

Avoid using “etc”, if there is something to say, say it.

Use your own experience when answering the questions. For example, there are as many project life-cycle definitions, as there are industries and organisations. They all have a beginning, middle and end but will be phased differently to suit the organisational needs. So you could start your answer to a question such as “State the purpose of a divided life-cycle and give an example” by stating something like:

“I work for ABC Company and our life cycle has the following phases: inception, definition, delivery, handover, benefits realisation”. This enables……

Finally, answer your “✓ ✓” questions first, you will gain confidence and you may realise that one of your “?” is in fact a “✓”.

**Lists of things**

One of the most difficult things to do under examination conditions is to make a list, especially if the list is greater than five. I call this the “seven dwarf syndrome”. Ask anybody to name the Seven Dwarfs (from Disney’s Snow White and the Seven Dwarfs) and most people will easily get to four. After that they just go into a loop and come up with the same names again. If the person then thinks about something else the brain carries on working, somewhere in the subconscious and later on more names will pop into the consciousness. It’s also like trying to remember you PIN at the cashpoint. The harder you try the worse it gets.
For example there may be a question such as “list and briefly describe ten sections of the project management plan”. Questions that ask for a list are easy, but only if you can remember the list! Questions on the PMP are relatively easy to answer but it is hard to make such a long list; five is a lot easier, so I suggest that you read the exam paper – there will be topics in the paper that will have an entry in the PMP, e.g. there may be a question on stakeholders leading to stakeholder management strategy and communications plan; there may be a question on risk and that leads to a risk management strategy and so forth.

Carry on with your list until you can think of no more entries and then move on to answer the other questions. As things come to you add them to the list and by the time you come to answer the question the list will be complete (or almost so). If you can only get to nine don’t worry – that’s 90% if you answer it properly.

(By the way the dwarfs were called – Dopey, Doc, Bashful, Happy, Grumpy, Sleepy and Sneezy!)

Final Point

Remember to READ THE QUESTION. So many times I have seen people answer the question they thought they had been asked and I’ve done it myself, even though for years I’ve been saying: “read the question carefully”!

Read the question at least twice and analyse its content. They should be clear, and it should be obvious what is required.

Good luck!
Section 3 Sample Questions

Project Management - BoK Topic 1.1

What the syllabus says

Topic Coverage

- Compare and contrast projects versus business-as-usual type activities within an organisation.
- The benefits of using project management.
- The challenges of using project management within an organisation.
- The difference between project management processes as used throughout the project (such as starting, defining, monitoring and learning) and the phases of the project life cycle.

Learning Outcomes

- Distinguish between project management and business-as-usual.
- Explain benefits of project management.
- Explain challenges that organisations face when using project management.
- Distinguish between project management processes and the phases of the project life cycle.

Section 1.1 Q1

Explain five differences between Projects and Business as Usual.

Section 1.1 Q2

a) State the objectives of the four project management processes.

b) For each phase of the project life cycle explain how the project management processes are used.
Programme Management - BoK Topic 1.2

What the syllabus says

**Topic Coverage**

- The characteristics of programme management.
- The differences between project management and programme management.
- Programme management and its links to strategic change.
- The role and responsibilities of a programme manager.
- The benefits of using programme management.
- The challenges in using programme management within an organisation.
- The differences between programme management and portfolio management.

**Learning Outcomes**

- Distinguish between programme management and project management.
- Describe the role and typical responsibilities of the programme manager.
- Explain benefits of programme management.
- Explain challenges that organisations face when using programme management.

**Section 1.2 Q1**

Explain five typical responsibilities of the Programme Manager throughout the programme life cycle.

**Section 1.2 Q2**

Explain five challenges that an organisation will face when using programme management.
Portfolio Management - BoK Topic 1.3

What the syllabus says

**Topic Coverage**
- How portfolio management assists in the prioritisation of projects.
- The characteristics of portfolio management.
- Risk versus return in relation to why projects are prioritised.
- Recognise that the capacity of an organisation to undertake projects is linked to its available resources and how it forms part of portfolio management.
- Situations where the use of portfolio management is appropriate

**Learning Outcomes**
- Distinguish between portfolio management and project management.
- Explain situations where portfolio management would be appropriate.

**Section 1.3 Q1**

Explain **four** aspects of portfolio management.
Project Context - BoK Topic 1.4

What the syllabus says

**Topic Coverage**
- The need to understand a project’s context.
- The need to consider the internal and external context (environment) of a project.
- The use of tools such as PESTLE and SWOT.

**Learning Outcomes**
- Describe what is meant by a project’s context.
- Explain a tool for ascertaining a project’s context.

**Section 1.4 Q1**
Consider a project to build a nuclear power plant in England in an area with high unemployment, but a large population.

Undertake a preliminary assessment of the project’s context.

**Section 1.4 Q2**
Explain five benefits undertaking an analysis of a project’s context.
Project Sponsorship - BoK Topic 1.5

What the syllabus says

**Topic Coverage**
- The role and responsibilities of the project sponsor (executive) and how it changes through the project life cycle.
- Why effective project sponsorship is important to project management.
- The relationship between the project sponsor and the project manager.

**Learning Outcomes**
- Describe the role and typical responsibilities of the project sponsor (executive) across a project life cycle.
- Explain the importance of project sponsorship in project management.

**Section 1.5 Q1**
State ten typical responsibilities of the project sponsor during the project life-cycle.
Project Office - BoK Topic 1.6

What the syllabus says

**Topic Coverage**

- The role of the project office.
- Different types and functions of project office, some acronyms include Project Support Office (PSO), Project and Programme Support Office (PPSO), Programme Management Office (PMO), Enterprise Programme Management Office (EPMO).
- The benefits of using a project office linked to its type and function such as PSO, PPSO, PMO, EPMO.
- The role of project support in project management.

**Learning Outcomes**

- Describe functions that project offices often perform.
- Explain benefits of a project office.

**Section 1.6 Q1**

*List and describe five responsibilities of a project office.*
Project Success & Benefits Management - BoK Topic 2.1

What the syllabus says

**Topic Coverage**
- Success criteria and key performance indicators (KPIs) and their uses in defining and measuring project success.
- The importance of success factors to project management.
- Benefits management and how benefits should be realised.

**Learning Outcomes**
- Distinguish between success criteria and success factors.
- Explain the relationship between success criteria and KPIs.
- Describe benefits management.

**Section 2.1 Q1**
Explain five elements of benefits management and realisation.

**Section 2.1 Q2**
Explain the differences between success criteria, success factors and key performance indicators and give two examples of each.
Stakeholder Management - BoK Topic 2.2

What the syllabus says

**Topic Coverage**
- A stakeholder management process (such as identification, analysis, communications planning, ongoing management).
- Tools that can be used in stakeholder analysis such as suitably labelled axes on a 2x2 or 4x2 grid.
- Why stakeholder management should be undertaken.

**Learning Outcomes**
- Describe a stakeholder management process.
- Explain the importance of stakeholder management.

**Section 2.2 Q1**

Explain a process that can be used to analyse stakeholder needs and expectations and the benefits of such a process. Make four relevant points and include a diagram that fully illustrates the use of the process.

**Section 2.2 Q2**

Explain four benefits of stakeholder management and give an example in each case.
Project Management Plan - BoK Topic 2.4

What the syllabus says

Topic Coverage

- The typical contents of the Project Management Plan (PMP).
- The PMP as the why, what, how, how much, who, when and where for a project.
- Authorship, approval and audience for the PMP.
  - Who should develop the PMP.
  - Who should own and update the PMP.
  - Who needs to read and understand the PMP.
- The PMP as a baseline document.
- The use of the PMP throughout the project life cycle.

Learning Outcomes

- Explain the purpose of a Project Management Plan (PMP).
- Describe typical contents of a PMP.
- Describe the authorship, ownership and audience of a PMP.

Section 2.4 Q1

List the content of the “what”, “why”, “when”, “how”, “where”, “who” and “financial” parts of the PMP.

Section 2.4 Q2

State ten fundamental parts of the project management plan.
Project Risk Management - BoK Topic 2.5

What the syllabus says

**Topic Coverage**

- A risk management process such as that described in the APM’s PRAM Guide 2nd edition excluding quantitative analysis i.e. initiate, identify, assess, plan responses, implement responses and the overarching manage process.

- Risk as threat and opportunity.

- Techniques for risk identification such as brainstorming, SWOT analysis, assumptions analysis, constraints analysis, prompt lists, check lists, interviews.

- The use of a probability and impact grid (matrix) to assess risks.

- How should risk ownership be determined and managed.

- Basic responses to threats i.e. avoid, reduce, transfer and accept.

- Basic responses to opportunities i.e. exploit, enhance, share and accept.

- The use of a risk log (register).

- Benefits and costs of risk management.

**Learning Outcomes**

- Describe a project risk management process.

- Explain each stage of a project risk management process.

- Explain benefits of project risk management.

**Section 2.5 Q1**

Explain five elements of a risk management process.

**Section 2.5 Q2**

Explain four ways in which a Probability/Impact grid can be used to assess the importance of a risk to a project. Include a diagram that fully illustrates the use of the technique.

**Section 2.5 Q3**

List and describe five responses that can be applied to threats.

**Section 2.5 Q4**

List and describe five responses that can be applied to opportunities.
Project Quality Management - BoK Topic 2.6

What the syllabus says

Topic Coverage

- Quality planning, quality assurance and quality control and continuous improvement.
- The need to manage the quality of the deliverables (products) or service that a project delivers.
- The need to manage the quality of the project management process.
- Techniques used in quality planning and assurance such as quality plans, audit, procedures/checklists
- Techniques used in quality control and improvement such as inspection, Ishikawa diagrams, Pareto analysis, control charts.
- The importance of acceptance criteria for each work package.
- Benefits and costs of project quality management.

Learning Outcomes

- Describe project quality management.
- Explain differences between quality planning, quality assurance, quality control and continuous improvement.
- Explain benefits of project quality management.

Section 2.6 Q1

Explain the purpose of five quality management tools and give examples of when each could be used.

Section 2.6 Q2

Explain five occasions when quality will be particularly relevant within a project life cycle.
Health, Safety and Environmental Management - BoK Topic 2.7

What the syllabus says

**Topic Coverage**
- Purpose of health, safety and environmental (HSE) regulations.
- Examples of generally applicable health and safety regulation/guidance such as COSHH, Management standards for tackling stress at work, preventing slips and trips at work.
- Duty of care for a project manager and team member in health and safety.
- Responsibilities of a project manager regarding health and safety.
- Health and safety risk assessment as applicable to project management.
- Environmental legislation as applicable to project management such as noise and statutory nuisance and waste including pollution.

**Learning Outcomes**
- Explain the importance of project health and safety management.
- Explain the importance of project environmental management.

**Section 2.7 Q1**
This question has two parts. Answer both parts.
(a) Explain the overall aim of the Health and Safety at Work, Etc, Act (HSWA) 1974
(b) Explain **four** specific duties of employers or employees regarding (HSWA).

**Section 2.7 Q2**
List and describe **five** steps of a Health and Safety Risk Assessment.
Scope management - BoK Topic 3.1

What the syllabus says

Topic Coverage

- The need for effective scope definition and management.
- An example of:
  - Product Breakdown Structure (PBS).
  - Work Breakdown Structure (WBS).
  - Cost Breakdown Structure (CBS).
  - Organisational Breakdown Structure (OBS).
- Responsibility Assignment Matrix (RAM) and how it is constructed.
- Features of a work package.
- The scope baseline.
- The link between the WBS and project scheduling.

Learning Outcomes

- Explain scope management.
- Describe Product Breakdown Structure (PBS).
- Describe Work Breakdown Structure (WBS).
- Describe Cost Breakdown Structure (CBS).
- Describe Organisational Breakdown Structure (OBS).
- Explain the reasons for using a Responsibility Assignment Matrix (RAM).

Section 3.1 Q1

Explain the relationship between the main breakdown structures.

Section 3.1 Q2

a) Explain how a Work Breakdown Structure (WBS) will be constructed and its purpose in a project. Include a diagram in your answer.

b) List six benefits of using a WBS.
Scheduling - BoK Topic 3.2

What the syllabus says

**Topic Coverage**

- The scheduling process and the use of project schedules.
- The precedence (activity-on-node) diagramming technique including different types of logical dependencies (links) such as finish to start, start to start and finish to finish.
- Basic critical path analysis (only using finish to start dependencies).
- The use of total and free float in scheduling.
- The use of Gantt (bar) charts.
- Durations estimating (overview).
- Updating project schedules.
- Program Evaluation and Review Technique (PERT) as a method for estimating activity durations. The PERT formula should be understood but there is no need to calculate values.
- Milestones and milestone progress charts.
- Software tools used to create and manage schedules. No particular software tools need to be known.

**Learning Outcomes**

- Explain how a project schedule is created and maintained.
- Demonstrate the use of different techniques for scheduling projects.
- Explain advantages and disadvantages of using software tools for scheduling.

Questions 1 – 4 below combine aspects of topics 3.2 (scheduling) and 3.3 (resourcing). The questions are intended to let you practise the techniques and if you can do these then you can do any in the exam. Each part question reflects a question that could be asked in an examination (although it should be noted that you are very unlikely to be asked to draw a network). Likely exam scenarios are to be given a network and asked to find the critical path; to be given an analysed network and be asked to create a bar chart; to be given a bar chart and a list of resources and be asked to create a resource histogram and “s” curve. It is expected that each part of the question will take about 15 minutes to complete.
Section 3.2 Q1

Using the information given in table 1:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the critical path, total float and free float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve (“S” curve). Note – the resources given are the number of resources used per task per week.

Table 1

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Section 3.2 Q2

Using the information given in table 2:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the free and total float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve (“S” curve). Note – the resources given are the number of resources used per task per week.

d) What could be done to reduce the peak resource demand on week 9?

Table 2

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</table>
Section 3.2 Q3

Using the information given in table 3:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the free and total float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve (“S” curve).

Note – the resources given are the number of resources used per task per week.

Table 3

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</tbody>
</table>
Section 3.2 Q4

Using the information given in table 4:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the free and total float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve (“S” curve). Note – the resources given are the number of resources used per task per week.

Table 4

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</tbody>
</table>
Section 3.2 Q5

Explain how a milestone chart is constructed and used. Include an appropriately labelled diagram.
Resource Management - BoK Topic 3.3

What the syllabus says

**Topic Coverage**
- Types of resources such as replenishable and re-usable.
- Resource estimating (overview).
- Resource allocation.
- Resource smoothing (time-limited scheduling) and resource levelling (resource-limited scheduling).
- The concept of splitting activities to assist in resource smoothing and levelling.
- Resource histograms and cumulative S curves.
- Software tools used to manage resources. No particular software tools need to be known.

**Learning Outcomes**
- Describe resource management.
- Distinguish between resource smoothing (time-limited scheduling) and resource levelling (resource-limited scheduling).
- Demonstrate use of different resource management techniques.

**Section 3.3 Q5**

Explain the difference between resource smoothing and resource levelling and give an example of when each might be used.
Budgeting and Cost Management - BoK Topic 3.4

What the syllabus says

**Topic Coverage**
- The link between cost estimating and budgeting and cost management (overview).
- Planned expenditure.
- Commitments and accruals.
- Actual expenditure.
- Cash flow forecasts.
- Forecast out-turn cost.
- Cost monitoring and control and cost reporting.

**Learning Outcomes**
- Explain budgeting and cost management.
- Explain benefits of budgeting and cost management.

**Section 3.4 Q1**

a) Explain how an advance payment can be used to assist project cashflow.

b) State **three** benefits to the supplier/contractor of having an advance payment.

c) State **one** benefit the customer can expect if an advance payment is agreed.

**Section 3.4 Q2**

a) Explain the difference between commitment and accrual.

b) State **four** benefits of cost management.
Change Control - BoK Topic 3.5

What the syllabus says

**Topic Coverage**

- A change control process.
- Change requests and change request forms.
- The use of a change log (register).
- The importance of change control in preventing scope creep or requirements creep.
- Why does change occur and what are the different types of change.
- The increasing cost of making changes through the project life cycle.
- The concept of a change freeze.
- Responsibilities in change control such as project sponsor, project manager, change control board.
- Links between change control and configuration management.

**Learning Outcomes**

- Describe a change control process.
- Explain each stage of a change control process.
- Explain reasons for requiring change control on a project.

**Section 3.5 Q1**

Explain five features of an effective change control process.

**Section 3.5 Q2**

List five roles that are fundamentally involved in change control and describe the contribution of each role.
Earned Value Management - BoK Topic 3.6

What the syllabus says

Topic Coverage

- The principles of Earned Value Management (EVM).
- Planned Costs (Budgeted Cost of Work Scheduled - BCWS)
- Actual Costs (Actual Cost of Work Performed - ACWP)
- Earned Value (Budgeted Cost of Work Performed - BCWP)
- Cost Variances (CV) and Schedule Variance (cost) (SV). As defined in BS6079-1: 2002
- Trends and Indices; Cost Performance Index (CPI) and Schedule Performance Index (cost) (SPI). As defined in BS6079-1: 2002
- CPI as a measure of efficiency.
- Derive earned value curves from basic data.
- Using earned value analysis to forecast out-turn costs and durations.
- Why use EVM and what are its advantages and disadvantages.
- The link between cumulative resource S curves and planned costs.

Note: examination candidates will not be required to provide definitions of earned value terms. Only the wording Planned Costs, Actual Costs and Earned Value will be used in examinations.

Learning Outcomes

- Describe Earned Value Management (EVM).
- Explain advantages and disadvantages of EVM.
- Perform earned value calculations and interpret earned value data.
**Section 3.6 Q1**

Complete the table below calculating the Earned Value (EV), the Efficiency and the % Complete for weeks 4, 8, 12, 16 and 20. What can you conclude from the results?

NB This will take more than 15 minutes – the question to provide practice of the calculations and interpretation of results.

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</tbody>
</table>

All figures for Budget and Actual costs in Man/Hours
**Section 3.6 Q2**

Consider a project with a budget of £1m (BAC). It has a planned duration of 18 months. After 10 months the reported figures are:

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Planned Costs</td>
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</tr>
<tr>
<td>Actual Costs</td>
<td>£500k</td>
</tr>
<tr>
<td>Earned Value</td>
<td>£460k</td>
</tr>
</tbody>
</table>

Calculate CPI, CV, SPI, SV, Final Cost, Final Planned Duration and % Complete. Comment on the figures you have calculated.

**Section 3.6 Q3**

Consider a project with a budget of £1.6m (BAC). It has a planned duration of 24 months. After 10 months the reported figures are:

<table>
<thead>
<tr>
<th>Cost Type</th>
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<tbody>
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<tr>
<td>Actual Costs</td>
<td>£800k</td>
</tr>
<tr>
<td>Earned Value</td>
<td>£850k</td>
</tr>
</tbody>
</table>

Calculate CPI, CV, SPI, SV, Final Cost, Final Planned Duration and % Complete. Comment on the figures you have calculated.

**Section 3.6 Q4**

Explain five benefits of using Earned Value Management.

**Section 3.6 Q5**

*Using the data below:*

  a) Calculate EV for months 1 - 5, draw the graph showing Budget Curve and PC for months 1 to 10 and AC and EV for months 1 to 5.

  b) Calculate the Final Cost and Final Duration for this project based on the figures at Month 5.

<table>
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<th>3</th>
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<td>25</td>
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</tbody>
</table>
Information Management and Reporting - BoK Topic 3.7

What the syllabus says

Topic Coverage

- An information management system (such as collection, storage, dissemination, archiving and appropriate destruction of information).
- Project reporting and reporting requirements.
- A typical project reporting cycle including the gathering of data and dissemination of reports.
- The principles of reporting by exception.

Learning Outcomes

- Explain information management.
- Explain project reporting.

Section 3.7 Q1

a) State six types of information that a task owner will report on throughout the project

b) Explain two ways in which the project manager will use the information stated above.

Section 3.7 Q2

List and describe five reasons for archiving project documentation.
Issue Management - BoK Topic 3.8

What the syllabus says

**Topic Coverage**

- An issue management process (such as identification, escalation, monitoring/reporting, resolution).
- The use of an issue log (register).
- The importance of issue management.

**Learning Outcomes**

- Describe issue management.
- Explain the importance of issue management.

**Section 3.8 Q1**

a) State a definition of an issue.
b) Explain four steps of an issue management.
Requirements Management - BoK Topic 4.1

What the syllabus says

**Topic Coverage**
- A requirements management process (such as capture, analysis & prioritisation, testing).
- Factors used to structure requirements.
- The importance of requirements management and link to scope management and project quality management.

**Learning Outcomes**
- Describe requirements management.
- Explain the importance of requirements management.

**Section 4.1 Q1**

a) **State three elements of a requirements management process.**

b) **State why requirements management is important.**

c) **Explain how requirements management is applied across the project life cycle.**
Estimating - BoK Topic 4.3

What the syllabus says

**Topic Coverage**
- Estimating through the project life cycle.
- The changing accuracy of estimates through the project life cycle and the concept of the estimating funnel.
- Estimating methods such as bottom up, comparative, parametric.
- Estimating durations, resources and costs.
- Importance and practical difficulties of estimating.
- Three-point estimating and its links to PERT (see scheduling).

**Learning Outcomes**
- Describe practical problems of estimating across the project life cycle.
- Explain bottom-up estimating.
- Explain comparative estimating.
- Explain parametric estimating.
- Explain three-point estimating.

**Section 4.3 Q1**

Explain bottom-up estimating. Include a diagram to illustrate your answer.
Configuration Management - BoK Topic 4.7

What the syllabus says

**Topic Coverage**
- A configuration management process (such as planning, identification, control, status accounting, audit, close-out)
- The principle of a configuration item.
- Similarities between configuration management and version control.
- Links to change control.

**Learning Outcomes**
- Describe a configuration management process.
- Explain reasons for requiring configuration management on a project.

**Section 4.7 Q1**
Explain five elements of a configuration management process.

**Section 4.7Q2**
Describe five elements of the link between change control and configuration management.
Business Case - BoK Topic 5.1

What the syllabus says

**Topic Coverage**
- The purpose of the business case.
- The typical contents of the business case.
- The business case as the ‘why’ for the project.
- Authorship and ownership of the business case.
- Importance and use of a business case during the project life cycle.
- The use of investment appraisal techniques such as payback (using non-discounted figures), Internal Rate of Return (IRR), Net Present Value (NPV). Excluding the need to explain formulae or to calculate values.

**Learning Outcomes**
- Explain the purpose of a business case.
- Describe typical contents of a business case.
- Describe the authorship and ownership of a business case.
- Explain the use of payback, Net Present Value (NPV) and Internal Rate of Return (IRR) as investment appraisal techniques.

**Section 5.1 Q1**
State **ten** items that will typically be included within the contents of a business case.

**Section 5.1 Q2**
Explain the use of Payback, Net Present Value (NPV) and Internal Rate of Return (IRR) as investment appraisal techniques.
Procurement - BoK Topic 5.4

What the syllabus says

**Topic Coverage**
- Procurement in project management.
- The purpose and content of a procurement strategy.
- Processes for supplier selection.
- Different methods of supplier reimbursement, such as firm fixed price contract, contract target cost, contract target price, cost plus fixed fee contract, cost reimbursement type contract, cost plus incentive fee contract.
- Types of contractual relationship such as partnering, alliancing and turnkey contract.

**Learning Outcomes**
- Describe procurement.
- Explain typical contents of a procurement strategy.
- Explain a supplier selection process.
- Distinguish between different methods for supplier reimbursement.
- Distinguish between different contractual relationships.

**Section Q1**
State eight steps that may form part of a simple procurement process.

**Section Q2**
Explain five payment options and for each option give an example of where it may be used.
Project Life Cycles - BoK Topic 6.1

What the syllabus says

**Topic Coverage**
- The project life cycle.
- Project phases such as concept, definition, implementation, handover and close-out.
- The relationship between phases and stages.
- Why split projects into phases e.g. end of phase reviews, go/no go decisions, high level planning.
- The extended life cycle.

**Learning Outcomes**
- Describe a project life cycle.
- Explain why projects are split into life cycle phases.
- Explain differences between a project life cycle and extended life cycle.

**Section 6.1 Q1**
Explain five benefits of splitting a project into phases.

**Section 6.1 Q2**
- a) List and describe *four* phases of the project life cycle.
- b) State *two* benefits of splitting a project into phases.
Handover and Closeout - BoK Topic 6.5

What the syllabus says

**Topic Coverage**
- Typical activities involved in handover and closeout such as preparation, testing and acceptance of deliverables
- Handover to the client, customer, operations, business user.
- Formally closing the project.
- The importance of handover.
- The importance of closeout.

**Learning Outcomes**
- Describe activities involved in handover and closeout.
- Explain the importance of project handover.
- Explain the importance of project closeout.

**Section 6.5 Q1**
Explain five elements of a project handover process.

**Section 6.5 Q2**
Explain five benefits of formally closing a project.
Project Reviews - BoK Topic 6.6

What the syllabus says

**Topic Coverage**
- Different types of reviews including project evaluation reviews, gate reviews, audits, post-project reviews, benefits realisation reviews.
- Importance of project reviews.
- The need to learn lessons throughout the project.
- Benefits of performing reviews.

**Learning Outcomes**
- Describe project evaluation reviews.
- Describe gate reviews.
- Describe audits.
- Describe post-project reviews.
- Describe benefit realisation reviews.
- Explain benefits of project reviews.

**Section 6.6 Q1**

Explain five types of project reviews.
Organisation - BoK Topic 6.7

What the syllabus says

**Topic Coverage**
- Different types of organisation structure (functional, matrix, project).
- The advantages and disadvantages of different types of organisational structure.
- The types of projects suited to each type of organisation.
- Links between organisation structure, the Organisational Breakdown Structure (OBS) and the Responsibility Assignment Matrix (RAM).

**Learning Outcomes**
- Distinguish between functional, matrix and project organisation structures.
- Explain advantages and disadvantages of a functional organisation structures.
- Explain advantages and disadvantages of a matrix organisation structures.
- Explain advantages and disadvantages of a project organisation structures.

**Section 6.7 Q1**
Explain five strengths or weaknesses of managing a project in a matrix type of organisational structure.

**Section 6.7 Q2**
Explain five strengths or weaknesses of managing a project in a functional type of organisational structure.

**Section 6.7 Q3**
Explain five strengths or weaknesses of managing a project in a project type of organisational structure.
Organisational Roles - BoK Topic 6.8

What the syllabus says

**Topic Coverage**
- Roles and responsibilities of the project manager, project sponsor (executive), users, project team members and the project steering group (project board).
- The relationship between the different roles.

**Learning Outcomes**
- Explain the role and typical responsibilities of the project manager.
- Explain differences between the role and typical responsibilities of the project manager and the project sponsor (executive).
- Describe the role of users.
- Describe the role of project team members.
- Describe the role of the project steering group (project board).

**Section 6.8 Q1**

Explain the main responsibilities of five key project management team roles
Methods and Procedures - BoK Topic 6.9

What the syllabus says

Topic Coverage
- Methods and procedures as a means to maintain consistency of project management practice within an organisation.
- Development and maintenance of methods and procedures.
- Typical contents of a structured method.
- The advantages of using a structured method.
- Publicly available methods including PRINCE2.
- Links to governance of project management.

Learning Outcomes
- Describe typical contents of a structured method.
- Explain advantages of adopting a structured method.

Section 6.9 Q1
Explain five topics that could be documented within a project management method.

Section 6.9 Q2
Explain five topics that could be documented within a project management method.
Governance of a Project - BoK Topic 6.10

What the syllabus says

Topic Coverage

- Use Directing Change, a Guide to Governance of Project Management as a guide to why governance of project management is important and what principles should be used.
- The principles of the governance of project management.

Learning Outcomes

- Explain governance of project management.
- Describe the principles of governance of project management.

Section 6.10 Q1

(a) State six principles of the governance of project management that would help avoid common causes of project failure.

(b) For each of two distinct principles stated in part (a), explain the possible effects of NOT practising them.
Communication - BoK Topic 7.1

What the syllabus says

**Topic Coverage**
- The contents of a communication plan.
- The importance of effective communication.
- Methods and media that can be used for communication within a project.
- The need for two-way communication.
- Barriers to communication.
- Links between the communication plan and information management and reporting.

**Learning Outcomes**
- Describe typical contents of a project communication plan.
- Explain the importance of effective communication in project management.
- Explain typical barriers to communication and how they may be overcome.

**Section 7.1 Q1**
State ten factors that a project manager should consider to ensure that project communication is effective.

**Section 7.1 Q2**
Describe six items that will typically be included in a project communication plan.
Teamwork - BoK Topic 7.2

What the syllabus says

**Topic Coverage**
- Differentiate between groups and teams.
- The concept of teamwork.
- Team development models such as Tuckman or Katzenbach and Smith.
- Features of a high performing team.
- Social roles in teams such as Belbin or Parker.

**Learning Outcomes**
- Describe a team development model.
- Explain the importance of team development.
- Describe a social roles model.

**Section 7.2 Q1**
- a) List **nine** roles described by Belbin.
- b) For each role listed state two strengths and one tolerable weakness.

**Section 7.2 Q2**
- Explain **five** stages of team development using a recognised model.
Leadership - BoK Topic 7.3

What the syllabus says

Topic Coverage

- Impact of leadership on team performance.
- Leadership qualities of a project manager.
- Motivational theories such as Maslow or Hertzberg.
- A situational leadership model such as Hersey and Blanchard.

Learning Outcomes

- Describe typical leadership qualities.
- Explain principles and importance of motivation.
- Describe a situational leadership model.

Section 7.3 Q1

Explain the difference between motivators and hygiene factors.

Section 7.3 Q2

Explain a situational leadership model and show how it may be applied as a team develops. Include a diagram in your answer.
Conflict Management - BoK Topic 7.4

What the syllabus says

Topic Coverage
- Sources of conflict in the project life cycle
- Conflict resolution models such as Thomas Kilmann or Russo and Eckler.

Learning Outcomes
- Describe sources of conflict in the project life cycle.
- Explain a conflict resolution model.

Section 7.4 Q1
Explain five different approaches that could be used in a conflict situation and give an example of when each approach would be relevant.

Section 7.4 Q2
Explain five impacts of avoiding conflict and not resolving it and include a relevant example.
Negotiation - BoK Topic 7.5

What the syllabus says

Topic Coverage
- The process and stages of negotiation such as preparation, face-to-face meeting, follow-up.
- The importance of preparing for a negotiation.
- When will a project manager need to negotiate, including negotiations with suppliers or contractors, users, resource providers, team members and the project sponsor.

Learning Outcomes
- Describe a negotiation process.
- Explain each stage of a negotiation process.

Section 7.5 Q1

Explain four stages that an effective negotiation should progress through.
Section 4 Sample Answers

Project Management - BoK Topic 1.1

Section 1.1 Q1

*Explain five differences between Projects and Business as Usual.*

A project introduces change into an organisation whilst the Business as Usual (BAU) manages the process. When a project delivers (or hands over) its final product, be that a new building, IT system, organisational process the business will change dramatically – a step change in the way that things are done. On the other hand BAU optimises the way things are done – the process – and any changes are introduced relatively slowly.

Projects deliver products into the business as described above, after which the project is usually disbanded. The BAU on the other hand uses the products of the project to realise the benefits. It is unusual for projects to deliver any benefits into the organisation during their implementation (unless there is some form of phased roll-out). The task of benefits realisation belongs to the BAU and it is fundamental to the success of the project that this task is given priority and that benefits are realised.

Project managers manage time whereas BAU managers optimise time. In a project the project manager has to deliver the products within an appropriate timescale and will take action to make sure the products are delivered on time – this may result in other elements of the project such as cost suffering. The BAU manager must optimise the timescale within which his/her repetitive tasks are undertaken to drive out efficiencies within the business.

Projects are inherently risky and project managers need to be risk aware and manage the risk, reducing it to an acceptable level. No risk means “no or little change” and on occasion the project manager will take risks to get things done on time and on cost. The BAU manager on the other hand generally looks to reduce risk to its lowest practical level and is often risk averse, and limits change by concentrating on standard production techniques.

BAU often uses a process of continual improvement to increase the quality of the service or the product in question. The project manager is responsible for producing products that conform to a specified standard and whilst s/he will look to improve the quality of the process, it is the quality of the output that is the prime concern. The project manager should prevent the team from continually trying to improve the product if the customer has not specified this, whilst the BAU manager will see continual improvement as part of his/her daily routine.
Section 1.1 Q2

a) State the objectives of the four project management processes.
b) For each phase of the project life cycle explain how the project management processes are used.

a) The four processes are:

- Starting or initiation process – this establishes the outline definition (what) and reasons (why) for the phase, including the basic team design and the approach to be adopted in the phase (how).

- Defining and planning process – builds on the definition, establishes the scope, and produces the project management plan for approval – essentially adding the “who, where and when”.

- Monitoring and control process – sending and receiving information (monitoring) and taking action/making decisions (control).

- Learning and closing process – covers handover to the customer and operational environment, reviewing the way the project was managed and establishing any lessons for future projects (what went well, what went badly, what you would do differently).

b) For smaller projects the four processes are aligned to the four phases as follows:

Starting and Initiation – the Concept Phase
Defining and Planning – the Definition Phase
Monitoring and Controlling – the Implementation Phase
Learning and Closing – the Handover and Closeout Phase.

However, for all but the smaller projects (say in excess of 6 months duration), all the processes are applicable to each phase as follows:

Concept: during concept it is likely that a feasibility study will be required. Starting and initiating will establish the team and the reason for the phase (i.e. to establish options, make a recommendation and produce a business case for the project). Defining and planning will plan the study and the production of the business case. Monitoring and controlling will ensure the work is completed on time and budget to the required standard. Finally learning and closing will hand the completed study and Business Case to the project sponsor for action.

Definition: during this phase the starting and initiation process is not as prominent. It will be used to determine that the appropriate resources are available and ensure that the resources are available to prepare the PMP. It should be clear why the PMP is required and the purpose it will serve. Definition and planning is the main process here as this is the key activity in this phase – to define and plan the project. However, the actual activities associated with preparing the PMP will require planning; once planned they must be implemented and monitored and controlled. Finally the PMP will be completed and passed to the sponsor for approval.

Implementation: during this phase the plan is implemented and so the major process in use will be monitoring and controlling. However, it will be worth checking that the purpose of the phase is clear, that the plans for managing the phase are clear. Learning and closing has less impact in this phase,
unless the phase is split into sub-phases, in which case the outputs of the phases need to be accepted and lessons learned for future phases.

Handover and Closeout: during this phase the learning and closing process will be used most. However, it is again important to check that the objectives of the phase are clear, the plans for managing the phase are understood and the activities undertaken during the phase will be monitored and controlled.
Explain five typical responsibilities of the Programme Manager throughout the programme life cycle.

Planning. The programme manager is responsible for planning the programme. This will start at the beginning of the programme by identifying a list of contributing projects and then having the project managers produce a plan and schedule for their work. The programme manager takes the outputs from the projects and, in conjunction with the project managers, identifies the relationships between the project and their interdependencies. This will result in a programme plan that can be put into action.

Monitoring and controlling the plan. The programme manager is responsible for ensuring that the projects produce their outputs on time, on cost to the appropriate standard. The programme manager will authorise the projects to proceed after each stage of work and will accept the completed products. Any problems must be addressed and appropriate action taken. The programme manager must manage the inter-dependencies between the projects. This may include starting new projects, stopping projects and accelerating projects.

Managing communications. The programme manager must make sure that communications to the programme stakeholders is completed in a timely manner and that all information required is collated and issued. This not only includes external stakeholders but those within the programme team and the projects themselves. The communications will most likely be distilled from the information being reported from the projects so it is important that the programme manager specifies his/her requirement for information at the start of each project (and each project phase).

Managing risks and issues. Risks at project level may well have knock on effects at programme level because they cause problems for other projects. As such it is important that the programme manager ensures that the project manager refers upwards all risks within the project that might affect the programme. This enables the programme manager to assess these project risks along with any specifically programme related risks identified in the normal manner. The risk management process in terms of assessment and action is largely the same at both levels, although the impacts may be greater at programme level.

Benefits management. A key responsibility of the programme manager is to ensure that benefits are realised as a result of the outputs from the projects being implemented within the business. At the end of each phase of the programme the manager must make sure that the outputs are accepted by the business and a formal benefits realisation plan is in place. The programme manager must make sure that the benefits realisation plan is developed before the outputs are delivered.
Section 1.2 Q2

Explain five challenges that an organisation will face when using programme management.

Risk management. Programmes are risky by nature and the organisation needs a process to manage risk at all levels throughout the organisation. The programme will probably be based on a need to undergo a strategic change within the organisation and this will result in a number of strategic risks being identified. These risks will cascade down into the programme and the projects as the causes of the risks are challenged. For example, a delay in delivering a programme benefit could have serious consequences for the organisation. The reason for the delay needs to be understood and it is likely that the root cause and therefore the area that requires mitigation is actually within the project, e.g. a problem with a supplier. The organisation must be able to see and manage this cascade. There must also be a process in place to escalate risks from the project to the programme to the strategic level. The whole process must be linked with the management of organisational risk within the organisation.

Resource allocation. Different programmes need different teams and within any organisation there will be finite resources and this will be especially true in specialist areas such as IT. The organisation requires a process by which it can forecast the demand for resources at project, programme and operational level over the period of the programme. At the strategic level this must in essence cover a timeframe of at least 12 – 24 months, 9 – 18 months at programme level and 0 – 9 months at project level. The resource requirements must be rolled forward on a regular basis, perhaps quarterly. There needs to be a process that will cater for exceptional demand and a clear route for escalation and decision making, with individuals clearly made responsible for these activities and decisions.

Decision making and empowerment. Decisions must be made at all levels within the programme and its strategic setting. Programme managers, sponsors and steering groups must be given the authority to make decisions within the programme. These decisions will cover the commitment of people, materials and money. Without this level of empowerment delays will occur as decisions are sought and extra work will be created for managers within the programme who need to provide the supporting information. This will inevitably lead to delays, increased costs, and ultimately programme failure.

Change management. Too many programmes – too much change. This is perhaps one of the most serious challenges facing any organisation that has a series of programmes underway. This is especially the case when the changes are of a strategic nature and involve changes to way everybody in the business behaves and undertakes their daily tasks. People are generally resistant to change and fearful of it. This means that the organisation must consider how the transition is managed from old to new such that the majority of the workforce is wholeheartedly behind the change initiatives. Organisations need to be aware of the effect of too many changes and may have to revise the portfolio if the best possible outcomes are to be achieved.

Skill Sets. If an organisation is about to introduce programme management then it is unlikely that the personnel involved will have the necessary skills to establish and manage a programme, or indeed the projects within it. Therefore, considerable investment will be required in training the staff to be programme managers, not only in cost, but also in time terms. This time delay is likely to be more important as senior managers will want the
programme to make progress, but will have to wait while the staff are trained and experience is gained, before the people involved are fully effective.
Portfolio Management – BoK Topic 1.3

Section 1.3 Q1

*Explain four aspects of portfolio management.*

At its simplest form one organisation would have a single portfolio containing one or more programmes that supported the strategic vision and intent of the company. Each programme is then broken down into its constituent projects all of which will be undertaken in addition to the normal operations of the organisation. Management of the relationships between the programmes, projects and Business as Usual (BAU), is normally the responsibility of a senior management team within the organisation concerned.

Key tasks for this team will be to monitor the resource requirements across the 3 strands, to ensure that the programmes continue to support the global strategy and vision, and to ensure that benefits are realised. In particular the portfolio management team will be concerned with the interdependencies between programmes and projects in terms of scarce resources, balance within the portfolio of risks and returns, timing of the outputs and managing capacity bottlenecks where more than one project requires the same resource(s) at the same time.

It is probable in many large organisations that whilst there might be an overarching strategy each function may have its own portfolio. For example the Sales and Marketing Department may have a number of programmes running which support their strategic sales vision, each spawning a number of projects whilst they continue to manage the BAU.

At the same time the Operations Department may have a similar portfolio to manage. This portfolio may be centred on the business cycle (such as the company’s financial year). The challenges for the operational manager are to implement a number of projects within his/her budget constraints for people and money. Typically, this will involve trade-offs between the day-to-day BAU activities and delivering the projects and prioritising those projects that must be undertaken. At the operational level the manager will also have the added challenge of implementing new initiatives from other strategies.
Project Context - BoK Topic 1.4
Section 1.4 Q1

Consider a project to build a nuclear power plant in England in an area with high unemployment, but a large population.

Undertake a preliminary assessment of the project’s context.

Political
Is there government commitment to nuclear energy; if yes, then project in sound footing, if unclear then risk increased.

How does the local authority view the project – favourable then good news, against then more risk, and much more work to do on “hearts and minds”.

What sort of stakeholders will need to be considered in this area? Will they be positive or negative?

Economic
An area that has high unemployment may consider the relevance of grants, European funding, central government funding.

Likely to boost local jobs and economy so should engender positive views of local community.

Social
There is likely to be a mixed response. Some people will see the investment providing jobs and boosting local economy whereas some may not want the threat of nuclear power in their area (closely linked to environmental considerations).

With the current security threat levels there are bound to be concerns in this area. The project must consider the security implications, make the appropriate plans, and commit sufficient resource.

Technical
This will use new technology but there is expertise available. The project will need to ensure proper representation from international suppliers who have the latest experience in this area. The fact that the technology is new and is likely to change before the station is built indicates that the project budget must include for these possible changes and contain sufficient contingency to cater for unexpected problems.

Legal
There are likely to be legal challenges to the construction from a range of sources. It will be important to ensure that all areas are investigated and the appropriate legal team established to deal with challenges that are likely to be based on environmental concerns and local issues. Consider any relevance of European legislation affecting nuclear installations.

Environmental
This is an area where there is likely to be the most concerns and where the majority of the opposition will come from. There are likely to be protests for anti-nuclear groups, environmental campaigners and so forth. The project will need to carefully research this aspect and ensure that appropriate security measures are put in place for people working on the project both in the planning and delivery phases.
Section 1.4 Q2

*Explain five benefits undertaking an analysis of a project’s context.*

When the project’s context is established the type of project will be known. This is achieved by analysing what you know about your project.

<table>
<thead>
<tr>
<th>Project Type</th>
<th>“WHAT” known</th>
<th>“HOW” known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint by numbers</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Going on a Quest</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Making a Movie</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Walking in the Fog</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

1. Each type of project will need a different approach. For example, paint by number is straightforward using a standard delivery life-cycle; a quest would mean a feasibility study(ies) is required; a movie would require investigation of ways in which to exploit expertise whilst walking in the fog needs small interim stages to establish the basis for the project itself. This information will help to set the stakeholder expectations in terms of what can be achieved and by when.

2. Undertaking a PESTLE analysis will help to identify the risks facing the project and the main areas of risk. This will help the project sponsor and project manager best decide who is best placed to own and tackle the risks. It will also indicate how much of the risk should be escalated to the programme or strategic level.

3. Similarly, a PESTLE analysis or a What/How analysis (shown above) will indicate the issues that the project must deal with. This is particularly relevant to the fog, movie, and quest projects that need to be transformed into paint by number before progress on actual delivery can be made.

4. The results of a PESTLE and What/How analysis may well identify the options that could be used to satisfy the reasons for the project. These options can be used as a basis for the business case. Careful considerations of these options will ensure that the business case is robust and valid before major commitment is made to the project in terms of both time and money.

5. A PESTLE analysis will help to identify key stakeholders in the project in each of the areas. This information can be further refined through a stakeholder analysis to identify how the project will communicate and work with these stakeholders. Once identified stakeholders may be able to contribute to further analysis of the project’s context.

Failure to consider any of the above factors will significantly increase the chance of project failure, poor public perception and de-motivated teams.

Other items that could be discussed could include identification of constraints, dependencies, assumptions and issues.
Project Sponsorship - BoK Topic 1.5
Section 1.5 Q1

State ten typical responsibilities of the project sponsor during the project lifecycle.

NB a total of 13 statements have been made here – any ten could be used.

Concept phase:

1. During concept the project sponsor (PS) should establish, with the project manager (PM), the context of the project. This will include consideration of the political, economic, social, technical, legal and environmental aspects of the project.

2. Help the PM to design the team, which the PS should confirm and make sure that adequate resources are made available.

3. During concept the business case for the project must be prepared and this will require the PS to state the benefits and contribute to its production.

4. Upon completion the PS will sign off the business case and make application to the corporate body for agreement to proceed into the Definition phase. The PS owns the business case and is accountable for delivering the benefits to the organisation.

Definition phase:

5. During definition the project management plan (PMP) will be produced and this will incorporate fundamental decisions on risk, plans, budgets and stakeholder management. The PS will make these decisions and provide guidance throughout. It is very important that the PS is involved and 100% committed to the project and this will be demonstrated by his/her involvement during definition.

6. At the end of definition the PS will make application to the corporate body for the funding to cover the project and sign off the PMP.

Implementation phase:

7. During implementation the PS will receive the regular progress reports, resolve issues, chair steering group meetings, and provide advice, guidance and support to the PM throughout.

8. If the project is staged the PS will be required to authorise the PM to proceed with the work in the next stage of the implementation phase, normally at a Gate Review.

9. Another important facet of the PS involvement in implementation will be making decisions about change requests received and analysed by the PM.

10. The PS must make sure that arrangements are made to realise the benefits, and that the benefits are benchmarked during the implementation stage.

Handover and closeout phase:

11. In this final phase of the project the PS must accept the project’s deliverables after checking and being confident that they have met their acceptance criteria.
12 The PS must ensure that s/he understands the amount of outstanding work and the arrangements that have been made to have it completed.

13 During this phase the PS must complete the arrangements for benefits realisation with the business areas concerned.

14 The PS must take part in the post project review and sign off the final project reports.
Section 1.6 Q1

List and describe five responsibilities of a project office.

Administration

Preparation of plans

Receive reports and update schedules

Facilitate workshops

Centre of excellence for project management tools

**Administration:** The amount will vary from maybe 2 or 3 days a week to a full time role on large projects. It will involve assisting the PM with administration, completion of minutes of meetings, filing, making travel arrangements. They will often maintain the risk, issue and change logs or registers. In a small project this is often a part time function and can be difficult to justify in terms of headcount and the resources available. For this reason many organisations have established a formal Project Support Office (PSO) function.

**Preparation of plans:** Often a project office will contain staff with planning skills where they are required to take the output of a planning workshop and turn that into a Product (or Work) Breakdown Structure, prepare the Network, add the estimates and prepare the schedule, highlighting resource requirements and the critical path. This will involve using planning tools such as MSProject or Artemis.

**Receive reports and update the schedule:** Again using tools such as MSProject or Artemis the project office will receive reports from the teams on progress and update the schedule accordingly. They will advise the project manager of any problems that will require his/her intervention. Depending on the size of the project they may also be using data from accounting systems such as SAP and providing Earned Value data.

**Facilitate workshops:** Many project use workshops for topics such as planning, risk and problem solving. A successful workshop requires a facilitator and a note taker, both functions that can be undertaken by project office. The facilitator will run the workshop and the note taker record the findings. Using project office means that the project manager can take part as a member rather than being in control and perhaps being seen as trying to sway the findings of the workshop.

**Centre of excellence for project management tools:** Most projects use complex tools such as MSProject, Artemis, SAP and various risk management tools. Project office staff can be trained in these specifically to a high level meaning that the project manager can concentrate on interpreting the results of these activities and taking appropriate action. The expertise gained in project office saves the Project manager becoming an expert in everything.
Project Success & Benefits Management - BoK Topic 2.1

Section 2.1 Q1

*Explain five elements of benefits management and realisation.*

Benefits are tangible or intangible effects of the project that justify the time, money and resources that are spent on delivering a project. If there are no benefits then, ideally, there should be no project. If the benefits disappear, for whatever reason then the project should be stopped. The benefits should be monitored and maintained throughout the life-cycle of the project and efforts made to realise them once the project products have been delivered. However, in many projects, this is overlooked and the projects continue when no benefits can be identified.

Benefits should be identified by the project sponsor in concept and used as a basis for the business case. Throughout the definition and implementation stages the benefits should be further refined and if possible expanded to re-enforce the business case as the project progresses.

In implementation the benefits should be benchmarked so that there is a reference point that can be used as a comparison during the realisation of the benefits. After closure the project sponsor should ensure that the operation business environment takes on the benefits realisation plan and does all in its power to ensure the benefits are realised.

Benefits should be measurable. They can be categorised as tangible and intangible. Hopefully, the main justification for the project will be made on tangible benefits that can be directly related to a financial measure. For example staff reductions, reduction in revenue spending on consumables and so forth. Intangible benefits are more difficult to measure but should be included so that the whole benefits picture can be understood. They may well indicate areas where cultural change may be required within the organisation. This could represent considerable challenges to realise these benefits.

Each benefit identified must be carefully and precisely stated and it is useful to test the benefits against the “DOAM” criteria:

- **DESCRIPTION**
  - What precisely is this benefit?

- **OBSERVATION**
  - What differences should be noticeable between pre- and post-project?

- **ATTRIBUTION**
  - Where will this benefit arise?

- **MEASUREMENT**
  - How will the achievement of the benefit be measured?
Section 2.1 Q2

*Explain the differences between success criteria, success factors and key performance indicators and give two examples of each.*

Success criteria are those things, which if met, will indicate that the project has been successful. Specifically these revolve around time, cost, quality/performance and the customer’s requirements. Of these the last is particularly important. Budgets and timescales are often set in advance, and the customer’s requirements and associated acceptance criteria can be difficult to pin down.

What makes the product/deliverable acceptable to the customer? Indeed sometimes the question, “who is the customer?” needs to be answered.

Examples would include:

The project completes within 4 weeks of its target date.

The project completes within 10% of the agreed budget.

Success factors are those things that contribute to the achievement of the success criteria. Research has indicated that there are five key factors that can be established against which success can be measured:

- **Project Objectives**  
  - must be clearly identified within the project plans and *kept to* throughout the work

- **Project Personnel**  
  - the project manager and the project team must be competent

- **Support from Above**  
  - the project must be supported by top management

- **Resources**  
  - time, money, material and people must be sufficient to do the job

- **Communication and Control**  
  - communications channels up, down and across the project are established with clear mechanisms for feedback on reports, deliverables and quality. Control must be in place and used such as milestones, plans, approvals, reviews etc. Contractors must be responsive to their clients.

The APM defines Key Performance Indicators as “measurable indicators that will be used to report progress that is chosen to reflect the success criteria of the project”.

The Key Performance Indicators must be carefully chosen to be suitable measures of the project’s success, and they must be clear and unambiguous to all stakeholders.

Examples could include: Earned Value Analysis to monitor out-turn costs and durations; quality checking results showing that the products are meeting their quality criteria and therefore the end result will be what is required by the customer.
Stakeholder Management - BoK Topic 2.2

Section 2.2 Q1

Explain a process that can be used to analyse stakeholder needs and expectations and the benefits of such a process. Make four relevant points and include a diagram that fully illustrates the use of the process.

Key stakeholders should be identified early within the project life cycle, mapped and analysed.

This will involve a number of steps:

1. Identify the stakeholders, perhaps through a workshop or other brainstorming activity.

2. For each stakeholder identified establish his or her main interest in the project – e.g. time, cost, scope, benefit or quality. Not only will this help to identify how stakeholders are likely to react in the future but will show what the stakeholders see as the main driver of the project. For example if the analysis shows a majority of ticks against quality and none against cost it would show that the main driver is quality and cost is not a key issue.

3. For each stakeholder identified establish his or her own power and interest rating on a scale of low, medium and high. It should also be established whether s/he has a positive or negative attitude towards the project.

4. The results of the power/interest analysis can be plotted on a grid – as shown below. The grid shows whether the stakeholder should be a Partner, just kept informed and so forth.

The information relating to main interest area that was gathered earlier can now be used as a basis of the communications plan, as it will show the type of information each stakeholder (group) requires. The analysis could also be used to identify the role the stakeholder should take, if any, on the project team. It is important to consider the stakeholder’s positive or negative attitude towards the project when formulating the plan.

Stakeholder Grid

![Stakeholder Grid Diagram](image-url)
**Alternative view of a Stakeholder Grid**

<table>
<thead>
<tr>
<th>Power</th>
<th>Against Project</th>
<th>For Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stakeholders with high power who are “for” the project can be used to influence those who are “against” the project. Also those who are “against” must be carefully managed to either change their perspective, or minimise the adverse effect they can have.
Section 2.2 Q2

*Explain four benefits of stakeholder management and give an example in each case.*

Risk Management. Once stakeholders are identified and analysed it will help with the management of risks within the project including their identification and assessment. For example, if there are a significant number of negative stakeholders, or a key stakeholder is found to be negative then the risk in the project will be high. Once this is established it can be mitigated and reduced. Similarly, if the right stakeholders are brought onto the team then they will help with risk identification and the risk within the project can be more accurately assessed.

Communications planning. Not everybody needs to know everything, but everybody needs to know something. The results of the analysis will define these key requirements. This is especially true if the key interests of the stakeholders have been gathered in terms of time, cost, quality, scope and benefits. Not only can the appropriate level of information be ascertained but also where the information will come from and how it will be transmitted. Examples could be email, monthly traffic light reports (showing red, amber, green status), intranet communications, internet communications. This information will be key, especially if team members are working remotely and have limited access to electronic media and broadband connections.

Team formation. Knowing which stakeholders are partners, consultative, need to be involved/engaged or kept informed, will help to define whether or not they need a place on the team. The diagram below indicates the relationships of these groupings. Certainly those seen as partners will play a key role as suppliers and members of the steering group depending on their interests and level of seniority. Those in the involve/engage area may need to be encouraged to be partners. Similarly, if there are many stakeholder groups that need to be consulted this may mean that the team needs to be built to complete these activities.

**Stakeholder Grid**

![Stakeholder Grid Diagram]
Management actions. Once identified it is possible to apply a further analysis to the stakeholder to develop a strategy for dealing with the stakeholders concerned. Basically for each stakeholder, or group, the following information should be defined:

- Their goal
- Past reactions
- What to expect
- Positive/negative impact
- Possible reactions to the project.

This information is used to develop a number of strategies to deal with the reactions of the stakeholder.
Project Management Plan - BoK Topic 2.4

Section 2.4 Q1

List the content of the “what”, “why”, “when”, “how”, “where”, “who” and “financial” parts of the PMP.

- **What:** the detail of the project scope derived from the Product/Work Breakdown Structures, the Success Criteria and KPIs described in the Business Case and the Acceptance Criteria noted in the Quality Plan and Requirements Specification.

- **Why:** The justification for the project described in the Business Case – i.e. the benefits, be they tangible or intangible that outweigh the costs, time and risks involved.

- **When:** The Project Schedule (Gantt Chart) and Network showing all the tasks, when they occur, the resources required and the dependencies between them. It will also show key Project Milestones.

- **How:** This section of the PMP will contain all the strategies for the project including – Health and Safety Plan, Quality Plan, Configuration and Change Management Procedures, Stakeholder Management Strategy, Risk Management Strategy, Benefits Management Strategy, Monitoring and Control strategy (Milestone Charts, Earned Value Management, Escalation processes)

- **Where:** Location of the teams

- **Who:** The Project Organisation Structure and Job Descriptions.

- **Financial:** Project Budget, Cashflow, Accounting Methods
Section 2.4 Q2

*State ten fundamental parts of the project management plan.*

WBS – the work breakdown structure will show the tasks that must be completed in the project in order for the products to be built. It will help all concerned to see the amount of work required and define the scope of the project.

Monitoring and control methods – this section will define the reporting structure for the project (monitoring) and the way in which decisions will be made (control); it will also include an exception process for escalating issues and define the way the project will be phased (or staged) to give senior management control over the progress of the project.

Risk management strategy – this will define the project’s approach to risk, the processes to be used to identify, analysis and select mitigating actions including the timing of the analysis, and the way in which mitigating actions should be managed.

Stakeholder management strategy – used to define the process for identification and analysis of stakeholders and resultant management.

Procurement strategy – will define the organisation’s approach to procurement in the project – e.g. is it formal or informal.

Health and Safety plan – used to document the results of the H&S risk analysis that has been undertaken and the resultant actions.

Change control procedure – fundamental part of project control and will document how change is to be managed, the person(s) responsible for accepting changes, or otherwise and the limits of their authority.

Configuration management plan – will define the way in which the products of the project will be controlled, baselined, issued for change and released to the customer. It will include the method of identification to be used and note the name of the responsible person or group.

Project schedule – this defines the high level view of the project in terms of key milestones and major deliverables. It may be in the form of a high level Gantt chart.

Project Budget – this will reflect the estimated time and cost associated with the project’s WBS and schedule.
Project Risk Management - BoK Topic 2.5

Section 2.5 Q1

Explain five elements of a risk management process.

Risk management process

This process is taken from the PRAM Guide. The processes are:

Initiate: During this process the project will be clearly defined so that its objectives, scope and strategy are understood. The Risk management process needs definition including establishing the values that are assigned to probability and impact, the amount of risk that project is prepared to accept before mitigation (sometimes known as risk tolerance or appetite), the roles and responsibilities relating to risk (identification, ownership decision making for example). The risk log should be opened and any interfaces to the programme (for example) put in place. This information is recorded in the risk management plan, which is part of the project management plan.

Identify: The project team will identify risks. This could achieved using brainstorming, assumptions analysis, check lists, prompt lists, SWOT analysis, lessons learned, constraints analysis or interviews. Once identified the risks will be entered into the risk log.

Assess: The probability and impact of the risks will be assessed; using the criteria defined during initiation the importance of the risk is determined and the results noted on a probability-impact table.

Plan responses: The appropriate response to the risk (threat or opportunity) is planned and agreed by the sponsor/steering group. This can fall into these categories: avoid, transfer, reduce, accept, fallback (plan B) for threats or for opportunities – exploit, enhance or plan an option. An owner for the risk must be assigned.

Implement responses: This final step involves the implementation of the planned response, adding tasks and resources into the plan to make sure the
mitigation happen. The risk must now be monitored to make sure it is having the desired effect.

The final process “manage processes” ensures that the five processes described above are having the desired effect and if necessary corrective action can be taken.
Section 2.5 Q2

Explain four ways in which a Probability/Impact grid can be used to assess the importance of a risk to a project. Include a diagram that fully illustrates the use of the technique.

1. A PI grid such as that shown above has a number of uses. However, before it can be used it must be quantified. The scales of “Very Low” to “Very High” must be established as per the example below.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Probability</th>
<th>Timescale (months)</th>
<th>Cost (% Increase)</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLO</td>
<td>&lt; 10%</td>
<td>&lt; 1</td>
<td>&lt; 5%</td>
<td>Failure to meet a minor criterion</td>
</tr>
<tr>
<td>LO</td>
<td>10 - 30%</td>
<td>1 - 2</td>
<td>5 - 10%</td>
<td>Failure to meet more than one minor criterion</td>
</tr>
<tr>
<td>MED</td>
<td>30 - 50%</td>
<td>3 - 4</td>
<td>10 - 15%</td>
<td>Shortfall in meeting acceptance criteria</td>
</tr>
<tr>
<td>HI</td>
<td>50 - 70%</td>
<td>5 - 6</td>
<td>15 - 30%</td>
<td>Significant shortfall in meeting acceptance criteria</td>
</tr>
<tr>
<td>VHI</td>
<td>&gt; 70%</td>
<td>&gt; 6</td>
<td>&gt; 30%</td>
<td>Failure to meet acceptance criteria</td>
</tr>
</tbody>
</table>

2. The placing of the lines that denote red, amber and green risks must be done for each project. A red risk is one that must be mitigated and its probability, impact or both reduced (for threats) so that the assessment goes into the amber or green area.

An amber risk is one that need not necessarily be mitigated but must reviewed regularly in case its probability or impact increases, in which case it must be mitigated.

Risks falling into the green area can be accepted and monitored in case their probability or impact changes.
It is possible that placing the lines may be different for time, cost and quality. If this were the case then it may be preferable to have three PI grids, one for each impact type. An example of this would be the Olympic Stadium where it is likely that tolerance of risks adversely affecting time must be mitigated giving a large area of the grid in the “red” area whereas cost may not be a major driver and the red risk area could be smaller.

Whether one or three grids are used the process is the same. The risk is assessed using the scales, for example a risk could have a high probability, with a low time impact, a high cost impact and a very high quality impact – the latter two assessments would take the risk into the “red risk” area. At this point the risk can be mitigated.

3 The grid can also be used as a reporting tool; all the risks can be plotted on the grid and the overall level of risk to the project reviewed. Clearly if there were many red risks it may indicate that the project should not be undertaken.

4 Values can also be allocated to the Probability and Impact scales, the fields cross-multiplied to give a “score”. Typically, values for probability would be 0.1, 0.3, 0.5, 0.7, and 0.9; for impact values may be 0.05, 0.1, 0.2, 0.4 and 0.8. The probability and impact scores are multiplied together. The larger the number, the higher priority the risk. This scale weights the result towards impact. The scores of all the risks can be added together to give a total risk score for the project.
Section 2.5 Q3

List and describe five responses that can be applied to threats.

Five possible responses are:

1. Prevent (also known as Avoid or Terminate)
2. Reduce (also known as Treat)
3. Transfer (also known as Share)
4. Contingency (also known as Fallback, Plan B and sometimes Treat)
5. Accept (also known as Absorb or Tolerate)

Preventing a risk from happening in the first place relies on “doing something differently” thus avoiding the situation that leads to a risk occurring in the first place. For example if the risk were related to using a particular type of technology then using a different solution would prevent that risk. As with all risk mitigations there may well be risks associated with the new situation (known as secondary risks). Implementing preventative measures can often be expensive and may have a detrimental impact on the project’s objectives (because we have changed the solution perhaps) and may not be acceptable to the stakeholders.

Reducing a risk’s probability or impact is often used more than prevention and in some cases whether an action is preventative or reductive may only be a philosophical debate. In this case some action is taken to reduce either the probability or the impact of a risk to an acceptable level. For example if there is a danger of a storage area on site being flooded (probability very high because it is on the banks of the river) then moving the storage facility to higher ground (say 1m higher) would reduce the probability of the facility being flooded to low because the river rarely reaches that level.

Transfer is common practice in many contractual situations. If the customer is concerned about late delivery because of some factor that is directly under the control of the contractor the risk is likely to be transferred to the contractor to manage. In this case it is important to note that the probability and impact of the risk occurring have not changed merely because the risk has been transferred. The supplier (in this instance) will have to demonstrate the measures that will be taken to reduce its probability and/or impact. Transferring a risk usually increases the contract price. Another form of transfer is to take out insurance. The insurance company now carries the risk but again the probability and impact have not been affected. One could argue that probability is reduced if the risk is transferred to a supplier as it is less likely to happen and the impact is reduced if the risk is transferred via insurance as some form of compensation would be payable.

Contingency/Fallback is a plan that comes into force if the risk occurs. An example of this might be a business continuity plan put in place in the event of some sort of disaster occurring. If it is decided that contingency is the best action then the plan must be developed, tested and the trigger for the plan agreed by all concerned. For example, if there is a risk that the migration to a new IT system may fail over the weekend then there may be a plan in place...
that states “If the system is not working at 3 p.m. on Sunday then the old system must be reinstated and this is how that is done”.

Acceptance is used when the assessment of the risk falls below the tolerance line for the project. In this case the risk must be regularly monitored to ensure that if the probability and impact change then appropriate action can be taken.

Most risk actions cost money as they involve taking actions not already planned. The cost of these actions must be balanced against the cost of the risk occurring and the monies/time saved by the proposed action(s). It is common for risks to have a number of mitigating actions, e.g. there may be a plan to reduce the probability but a contingency/fallback plan may also be established as well.
Section 2.5 Q4

List and describe five responses that can be applied to opportunities.

Five possible responses are:

1. Exploit
2. Enhance probability or impact
3. Plan an option
4. Reject
5. Share contractually

1. Exploiting an opportunity involves changing the plan such that the opportunity will be realised. This will change the project scope in some manner such that beneficial outcomes are achieved for the stakeholders. If the contractor can find an opportunity to reduce the time and cost of a project without affecting the quality then this opportunity would be exploited. This may result in the benefits being shared with the customer (but that would depend on the type of contract in place).

2. Enhancing probability or impact requires some form of active response. For example, a strategic response would be to take the opportunity to design in-house rather than sub-contract the works. Tactical responses may involve improved resource allocation to potentially reduce costs and improve efficiencies.

3. Plan an option relates to developing plans that would be implemented if a project were to develop in a particular manner. For example, there may be an opportunity to increase the quality or scope of a project if the earlier works are completed faster than anticipated. This would require the “new plan” to be developed in readiness for the anticipated situation.

4. Rejection is the rejection of an opportunity perhaps because the benefits are small compared to the effort required.

5. Share contractually may be used when the contract permits. If an opportunity to save money/time is identified then the benefits may be shared within the contract. This provides an incentive to the contractor to reduce cost and time without affecting quality; the result being a share in the savings. A Target Cost/Incentive Fee type of contract would consider this approach.
**Project Quality Management - BoK Topic 2.6**

**Section 2.6 Q1**

*Explain the purpose of five quality management tools and give examples of when each could be used.*

**Audits:** a review of the project, its management, standards and procedures. An internal body, such as project support office, or an external auditor, can undertake the audit depending on the situation. The aim of the audit is to assist the team to undertake the project in a controlled manner that will aid the project to deliver “right first time”. The auditor will prepare a report documenting the results of the audit and if non-conformances are noted will normally give a date by which they should be rectified. This will often include a date for a re-assessment.

This would normally be used as part of the regular project review cycle – perhaps at the end of a stage or phase.

**Ishakawa Diagrams (Cause and Effect Analysis):** These are also known as fishbone diagrams where there is an effect, and a range of possible causes “sorted” into categories with factors on each “bone” emanating from the central backbone. Variants include Influence Diagrams and Mind Maps. In a quality situation the quality problem would be the “head” and factors that contribute to the problem would be categorised and added to the “bones”.

Once this has been completed a further analysis will be required to see which “bone” or group of “bones” would have the most effect if fixed. This could be achieved using a Pareto analysis.

This tool could be used when quality problems are being experienced – perhaps a series of complaints about installation problems are being received from customers and it is necessary to get to the root cause.

**Pareto Analysis:** Vilfredo Pareto was an Italian economist who, in 1906, observed that twenty percent of the Italian population owned eighty percent of the country’s total wealth. Ever since then, Pareto’s observation has been used in a variety of ways, and is often referred to as the 80-20 Rule, the “Vital Few and Trivial Many Rule.” or simply Pareto's Principle.

It is of particular use when we have a number of causes and we need to establish where to put out efforts to solve the majority of the problems quickly and efficiently. It is used in conjunction with fishbone diagrams.

Thus it is possible to identify those problems (the 20%) that if fixed will have the most effect (the 80%).

An example would be having established the causes of the complaints we can quickly see which problem to fix will have the most effect. From experience I did this and found that the majority of complaints were caused by “keep me informed” once we adopted a process that kept the customer informed of changes to the installation plan the complaints dropped dramatically by 90% almost overnight. The remaining problems required “one off solutions”.

**Sampling:** This is a quality control technique and is used to check that products meet the quality criteria specified. For example, in a manufacturing environment the products will be checked every 100 runs.

**100% testing:** This quality control technique does exactly what it says – everything is tested. For example an installation of telephone sockets in a large building may mean that 10,000 outlets are installed. The client may
want all to be tested. However, as this number includes a number of spares and allows for growth it may be that sampling may be a more cost effective and adequate approach.
Section 2.6 Q2

Explain five occasions when quality will be particularly relevant within a project life cycle.

Beginning:

1. At the start of the project it is necessary to establish the acceptance criteria for the project. In other words a list of measurable criteria that determine what will make the project's final product acceptable to the customer. These criteria must be measurable and examples could include: delivery date, development cost, elements of functionality, running costs, reliability, mean time to repair, mean time between failures. The project sponsor must agree the criteria.

2. Based on these criteria a quality plan for the project should be prepared and included within the project management plan. This document will state the acceptance criteria, quality responsibilities and describe the processes to be used for testing the product. For example, if it were an IT system this would include, module testing, integration testing, system testing, user testing and operational testing. It could also include reference to standards to be used.

Middle:

3. Once the project has been given the go-ahead the products must be described, either as a product description, or as the output of a task or activity and described in a statement of work. The description of the product will include a list of quality criteria that are pertinent to the product. This will ensure that the product is produced “right first time” because the producer will know exactly what is required.

4. As the project progresses the quality tests and checks (quality control) will be planned into the schedules to reflect the process described in the project quality plan. These checks will test the products against the product’s quality criteria which if achieved will ensure that the project’s acceptance criteria are met. It is important at these points to record the results and watch for trends – particularly of poor performance.

End:

5. At the end of the project it is likely that there will be a final inspection or test that will demonstrate the quality of the final product. Based on this the product will be had over to the customer and accepted. The customer will assess the product against the initial acceptance criteria and if found to be acceptable will sign for and take responsibility for the projects products.
Health, Safety and Environmental Management - BoK Topic 2.7

Section 2.7 Q1

This question has two parts. Answer both parts.

(a) Explain the overall aim of the Health and Safety at Work, Etc, Act (HSWA) 1974.

The Health and Safety at Work etc Act 1974 sets out the responsibilities of employers and employees with regard to safety in the workplace. It provides the legal umbrella for the various safety regulations that have been developed for specific industries and activities. The HSWA sets out in broad terms the duties of those persons with responsibilities for health, safety and welfare within the workplace.

The Act is also an "enabling Act" allowing Regulations on specific subjects to be made under the HSWA. These Regulations, and their accompanying Approved Codes of Practice and Guidance, add detail to the legislation that is set out in broad statements in the HSWA.

(b) Explain four specific duties of employers or employees regarding (HSWA).

Duties of employers: (given in full but not required by the question – 2 explained)

a. Provide and maintain a safe workplace, plant and equipment.

   It is important that the employer makes sure that the workplace is safe and that any plant and equipment in use is suitably maintained in accordance with the manufacturer’s recommendations. This ensures that any risks associated with the work are reduced to a reasonable level – i.e. ALARP – as low as reasonably practicable.

b. Provide safe systems of work.

c. Provide the information, instruction, training and supervision necessary so that employees endanger neither themselves nor their colleagues.

   The employer must make sure that all staff are given the appropriate training and so forth when they are recruited and when there are changes to working practices. This will make sure that all understand the procedures and assuming the employee plays their part will ensure that the work proceeds in a safe manner.

d. Provide and maintain a safe and healthy environment.

e. Provide suitable facilities and arrangements for the welfare of employees.

Duties of employees: (given in full but not required by the question – 2 explained)

a. To take reasonable care while at work for his or her own health and safety and for that of persons who may be affected by his or her acts or omissions at work.

   The employee must make sure that s/he understands the hazards in the...
workplace, attends safety briefings, does not take risks with procedures or equipment and act in a responsible manner to ensure the work is undertaken in a safe manner. Where the employee sees something that affects the safety of the operation s/he should bring this to the attention of the employer. The employee should also be aware of others in the workplace and their safety.

b. To co-operate with the employer on safety matters.

Attending safety briefings, notifying the employer of safety issues and behaving responsibly ensures that the risks in the workplace are reduced to the lowest practical level.

c. Not to misuse or damage safety equipment provided by the employer.
Section 2.7 Q2

List and describe five steps of a Health and Safety Risk Assessment.

The five steps are:

1. Identify the Hazards
2. Decide who might be harmed and how
3. Assess the risk and decide on precautions
4. Record your findings and implement them
5. Review your assessment and update if necessary

**Identify the Hazards:** This can be done in many ways – brainstorming, inspections, review previous projects/similar situations. A hazard is something which is capable of causing harm, for example a trailing cable across a floor presents a trip hazard, a pair of steps presents a “fall from height” hazard. You should also ask your employees and you can consult the HSE website. Your accident records will also provide a useful source of information.

**Decide who might be harmed and how:** List the type or group of people that might be harmed and in what way. For example, people using steps may overbalance and fall causing injuries that could range from slight to fatal. It is important to be realistic in these assessments and not to over complicate, or over emphasise the risks involved.

**Assess the risk and decide on precautions:** basically, the first option is “can I get rid of the risk altogether”. If you can, then do so, but apply common sense. For example, there is no need to stop providing tea and coffee because it is hot and might get spilled. A better solution would be to provide lids for cups if the coffee/tea is to be carried to another part of the office from the machine. If you can’t eliminate risk (or it is not sensible to do so) then consider the following (if possible in this order):

   a. Try a less risky option such as using a water based paint instead of solvent based.

   b. Prevent access to the hazard, by guarding for example

   c. Organise work to reduce access and provide suitable work instructions

   d. Provide suitable personal protective equipment (PPE)

   e. Provide welfare and first aid facilities

**Record your findings and implement them:** record your findings in a suitable register as follows:

<table>
<thead>
<tr>
<th>What are the hazards?</th>
<th>Who might be harmed and how?</th>
<th>What are you already doing?</th>
<th>What further action is necessary?</th>
<th>Action by whom?</th>
<th>Actions by when?</th>
<th>Done</th>
</tr>
</thead>
</table>

Then make sure you take the action!
Review your assessment and update if necessary: Make sure you keep your assessment up to date by reviewing at an appropriate frequency, probably annually, or when working practices change.
Scope management - BoK Topic 3.1

Section 3.1 Q1

Explain the relationship between the main breakdown structures.

Relationships between Breakdown Structures

Breakdown structures are related to each other. It can be argued that to produce a PBS or WBS will first need some form of team to be developed – therefore some form of OBS is required to get the planning process started.

The next step is to produce a PBS and this in itself may well identify products that require specialise expertise incorporating into the team – hence the OBS will be updated.

Once the PBS is completed a WBS will be produced to identify the tasks required to build the products. Again the OBS may well be enhanced as the full skills requirement of the project is identified. As the WBS is produced the CBS can be started and then finalised when the RAM is produced and the staff types and charges known.

The refined OBS and the WBS are related to produce a RAM, which then enables a full CBS to be produced.
Section 3.1 Q2

c) Explain how a Work Breakdown Structure (WBS) will be constructed and its purpose in a project. Include a diagram in your answer.

d) List six benefits of using a WBS.

Answer part a)

A WBS is a hierarchical breakdown of the activities that are required to produce the products described in the product breakdown structure.

It is not strictly necessary to have a PBS available before the WBS is constructed but it will help. If this is the case then each product will have a breakdown of activities beneath it. This is shown in the example below. To produce the site description five tasks are required as shown

Example of a Work Breakdown Structure

Whilst the top level remains as a product the subsidiary level contains activities.

Each element of the WBS is numbered and this numbering will remain constant throughout the project.

Once a WBS has been completed it will become necessary to assign the work to the teams or personnel responsible for undertaking the work. This results in a responsibility assignment matrix that is produced by cross referencing the work and organisation breakdown structures.

Answer part b)

Key benefits of the WBS are:

1. Helps to define the scope of the project
2. Forces the team to think through the production process
3. Forms the basis for precedence networks and estimating
4. Defines the work content
5. Assists in the preparation of SOW (statement of work)
6. Forms the basis of Earned Value calculations by defining the base data for effort, materials and other resources.
Scheduling - BoK Topic 3.2

Questions 1 – 4 below are slightly longer than any you could expect to get in an exam. It is also likely that the question could be combined with resourcing (see section 3.15). The questions are intended to let you practice the techniques and if you can do these then you can do any in the exam. It is expected that they will take you between 20 and 30 minutes to complete.
Section 3.2 Q1

Using the information given in table 1:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the critical path, total float and free float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve ("S" curve). Note – the resources given are the number of resources used per task per week.

Table 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Predecessor</th>
<th>Duration (wks)</th>
<th>Resources</th>
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Answer Part a) Analysed Network

Critical Path = A - E & H - K - L - M

G & J have Free Float = 3 weeks

KEY

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Arrow indicates critical path
Answer Part b) Gant Chart

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**KEY**
- **Total Float**
- **Total and Free Float**
- **Critical Path Tasks**
- **Non Critical Path Tasks**
Answer Part c) Gantt Chart with resources

| Wk | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A  | 2  | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| B  |    |    | 1  | 1  | 1  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| C  |    |    |    |    |    | 3  | 3  | 3  | 3  | 3  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D  |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 2  | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| E  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
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| G  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  | 3  | 3  |
| H  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 3  | 3  | 3  | 3  | 3  | 3  |
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**Men/week**

0 2 2 4 4 4 4 4 4 4 4 4 4 4 4 2 2 2 3 3 3 3 3 3 3 3 3 4 4 6 3 3 3

**Cumulative Man Weeks**

0 2 4 8 12 16 20 24 29 33 37 41 43 45 47 50 53 56 59 62 65 69 73 79 82 85 88 89 90
Answer Part c) Resource Histogram

![Resource Histogram](image)
Answer Part c) “S” Curve

Cumulative "S" Curve

Cumulative Man Weeks

Week Number
Section 3.2 Q2 Using the information given in table 2:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the critical path, total float and free float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve ("S" curve). Note – the resources given are the number of resources used per task per week.

d) What could be done to reduce the peak resource demand on week 9?

Table 2

<table>
<thead>
<tr>
<th>Activity</th>
<th>Predecessor</th>
<th>Duration (wks)</th>
<th>Resources</th>
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Answer Part a) Analysed Network

Critical Path = B - E - F - J - L - M

Free Floats: G 3 weeks, H 5 weeks, K 2 weeks

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ES Earliest Start Time
EF Earliest Finish Time
FF Free Float (2 units)
LS Latest Start Time
LF Latest Finish Time
D Duration
TF Total Float

Arrow indicates critical path
Answer Part b) Gant Chart

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**KEY**

- **Total Float**
- **Total and Free Float**
- **Critical Path Tasks**
- **Non Critical Path Tasks**
Answer Part c) Gantt Chart with resources

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**Men/week**

- 0 5 5 5 6 5 5 4 4 8 5 2 2 2 2 2 5 5 5 1 1 3 3 3

**Cumulative Man Weeks**

- 0 5 10 15 21 26 31 35 39 47 52 54 56 58 60 65 70 75 80 81 82 85 88 91

**KEY**

- Total Float
- Total/Free Float
Answer Part c) Resource Histogram

![Resource Histogram](image)

Week Number

Man Weeks

Men/week
Answer Part c) “S” Curve

Answer Part d)
By delaying the start of Task G by 1 week the resource demand for week 9 will reduce from 8 to 5; the resources required on week 11 will increase from 2 to 5. This will use 1 week of free float of task G (and its total float will also decrease by 1 week).
Section 3.2 Q3
Using the information given in table 3:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the critical path, total float and free float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve ("S" curve). Note – the resources given are the number of resources used per task per week.

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Answer Part a) Analysed Network

Critical Path = A - B - C - E - F - J - L - M

Free Floats: H 2 weeks, K 4 weeks

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Arrow indicates critical path
Answer Part b) Gant Chart

| Wk | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| B  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| C  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| D  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| E  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| F  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| G  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| H  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | F | F |   |   |   |
| J  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | F | F |
| K  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   | F | F | F |
| L  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| M  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

**KEY**
- Total Float
- Total and Free Float
- Critical Path Tasks
- Non Critical Path Tasks
Answer Part c) Gantt Chart with resources

| Wk | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A  | 2 | 2 | 2 | 2 |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| B  |   | 4 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| C  |   |   | 1 | 1 | 1 | 1 |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| D  |   |   |   | 6 | 6 | 6 |   |   |   |   | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  |
| E  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| F  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  |
| G  | 4 | 4 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| H  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  |    |    |    |    |
| J  |   | 2 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| K  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 2  | 2  | 2  | 2  | 2  |
| L  | 5 | 5 |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| M  |   | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

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Key:
- **-** Total Float
- **-** Total/Free Float

**Men/week**
- 0 2 2 2 2 2 2 4 7 7 7 5 5 5 5 8 8 8 8 8 8 8 8 8 8 6 6 1 1 1 2 5 5 5 2 2 2

**Cumulative Man Weeks**
- 0 2 4 6 8 12 19 26 33 38 43 51 59 67 75 83 91 97 100 101 102 104 109 114 116 118 120
Answer Part c) Resource Histogram

Resource Histogram

Week Number

Man Weeks

Man/week

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

0 1 2 3 4 5 6 7 8 9

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

Week Number

Man Weeks

Man/week
Answer Part c) “S” Curve

Cumulative "S" Curve

Week Number
Cumulative Man Weeks
Section 3.2 Q4

Using the information given in table 4:

a) Draw a network of the activities given in the table; identify the critical path, the total and free floats.

b) Use the network constructed in part (a) above to draw a bar (Gantt) chart. Indicate the critical path, total float and free float on the chart.

c) Using the Gantt chart drawn in (b) and the resources shown in the table draw a resource histogram and cumulative resource curve ("S" curve). Note – the resources given are the number of resources used per task per week.

Table 4

<table>
<thead>
<tr>
<th>Activity</th>
<th>Predecessor</th>
<th>Duration (wks)</th>
<th>Resources</th>
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<td>L</td>
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<td>4</td>
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<td>M</td>
<td>J &amp; L</td>
<td>5</td>
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</table>
Answer Part a) Analysed Network

Critical Path = A - C - F - G - K - L - M

Free Floats: J 10 weeks

KEY

<table>
<thead>
<tr>
<th>ID</th>
<th>ES</th>
<th>EF</th>
<th>LS</th>
<th>TF</th>
<th>LF</th>
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</table>

ES = Earliest Start Time
EF = Earliest Finish Time
LS = Latest Start Time
LF = Latest Finish Time
D = Duration
TF = Total Float

Arrow indicates critical path
Answer Part b) Gant Chart
Answer Part c) Gantt Chart with resources

**Diagram Description:**
- **Activity Labels:** A, B, C, D, E, F, G, H, J, K, L, M
- **Men/week:**  Number of men per week for each activity.
- **Cumulative Man Weeks:** Total man weeks required for each activity.
- **Total Float:** Period during which the activity can be delayed without affecting the project completion date.
- **Total/Free Float:** Period during which the activity can be delayed without affecting the project completion date or any successors.

**Diagram Notes:**
- **Activities A, B, C, D, E, F, G, H, J, K, L, M** are represented with bars indicating their duration and dependencies.
- **Men/week** values show the number of men required per week, with horizontal lines indicating the number of weeks.
- **Cumulative Man Weeks** show the cumulative man weeks required for each activity up to the end of the project.

**Key:***
- **Black Bar:** Total Float
- **Yellow Bar:** Total/Free Float

**Time Period:**
- **Wk 0 to 30:** Each week is represented with a number, from 0 to 30.

**Activities Details:**
- **A:** 2 men per week for 4 weeks.
- **B:** 1 man per week for 1 week.
- **C:** 1 man per week for 5 weeks.
- **D:** 4 men per week for 4 weeks.
- **E:** 3 men per week for 3 weeks.
- **F:** 4 men per week for 4 weeks.
- **G:** 4 men per week for 5 weeks.
- **H:** 4 men per week for 4 weeks.
- **J:** 3 men per week for 3 weeks.
- **K:** 4 men per week for 4 weeks.
- **L:** 2 men per week for 2 weeks.
- **M:** 1 man per week for 1 week.
Answer Part c) Resource Histogram

![Resource Histogram](image-url)
Answer Part c) “S” Curve
Section 3.2 Q5

*Explain how a milestone chart is constructed and used. Include an appropriately labelled diagram.*

*NB although this answer covers many pages in an exam situation small sketches of the diagrams shown would be acceptable.*

**Example milestone chart**

A milestone chart is formed by plotting “plan time” across the top of the chart and “real time” down the side shown as monitoring periods. In the example above the monitoring periods occur every 4 weeks. By plotting the monitoring period against plan time the completion line is created. This represents time in the project. The milestones are scheduled at the top of the chart and each monitoring period the date for the milestone is plotted. The points in the future are shown with a different symbol. The resulting charts are extremely useful for senior management as they provide, at a glance, a view of how well the project is progressing.

The charts have four basic shapes as shown and discusses below.
Milestone Chart Interpretation 1

In this project something clearly happened between monitoring periods 3 and 4 to cause a 6-week delay in the project – perhaps a change was authorised? In any event the situation came under control again and no further slippage occurred.
Milestone Chart Interpretation 2

This chart has been prepared at monitoring period 5 (note the different shapes of the forecast dates). The chart shows significant slippage on the middle two milestones and yet the end date remains unchanged. As all milestones ultimately link to the final milestone this should be challenged as it would seem unlikely that any project could contain that amount of delay and yet still complete on time.
Milestone Chart Interpretation 3

This is a classic case of “just too late”. The milestone has been forecasted as “on time” until just before it completes when it slips a month. This is often due to poor reporting from the teams where the team has reported “what the PM wants to hear” rather than the actual state of progress. Action should be taken to encourage the teams to report accurately and honestly throughout the project.
Milestone Chart Interpretation 4

This project is out of control!
Resource Management - BoK Topic 3.3

Section 3.3 Q5

Explain the difference between smoothing and levelling and give an example of when each might be used.

NB the diagrams contained within this explanation are more complex than those that you would have time to complete in an exam situation. They do however illustrate the technique. In the examination simple sketches would be more appropriate.

Resource smoothing is used when the time is critical and the end date should not be missed. In this instance the available float is used to move tasks within their float to obtain the smoothest histogram. The down side of this is that as the float is used so the risk of not completing the project is increased. However, assuming the resources have the capability for the work concerned, the time taken for team communication is reduced within a smaller team resulting in lower costs.

The diagrams below indicate this technique.

Resource Smoothing – before

![Resource Smoothing - Before Diagram]

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Activity A
Activity B
Activity C
Activity D
Activity E
Activity F
Activity G
Activity H

Total Resource/Day 1 1 2 2 2 2 3 3 2 2 1 1 1 1 1 1 1 1 1
Resource 3
Resource 2 G G G G G G G G H H F F
Resource 1 A A B B B B B C C C C C C D D E E E E

Resource Smoothing – after

![Resource Smoothing - After Diagram]

Day 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Activity A
Activity B
Activity C
Activity D
Activity E
Activity F
Activity G
Activity H

Total Resource/Day 1 1 2 2 2 2 2 2 2 2 1 1 1 1 1 1 1 1 1
Resource 3
Resource 2 G G G G G G G G H H F F
Resource 1 A A B B B B B C C C C C C D D E E E E
Resource Levelling

If, however, the project is resource limited then there may be insufficient resources available to complete the work as initially planned. In this case resource levelling techniques must be used. Again this does assume that resources have the capability to undertake all the works. The tasks are moved to reduce the resources required, but this often results in the end date moving out in time.

The diagrams below indicate this technique.

**Resource Levelling – before**

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| Activity A |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity B |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity C |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity D |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity E |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity F |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity G |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Activity H |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Total Resource/Day | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Resource 3 |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |
| Resource 2 | G | G | G | G | G | G | G | G | G | H | H | F | F | F | F | F | F | F |
| Resource 1 | A | A | B | B | B | B | C | C | C | C | C | C | C | C | C | D | D | E | E |

**Resource Levelling – after**

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Budgeting and Cost Management - BoK Topic 3.4

Section 3.4 Q1

d) Explain how an advance payment can be used to assist project cashflow.
e) State three benefits to the supplier/contractor of having an advance payment.
f) State one benefit the customer can expect if an advance payment is agreed.

Answer Part a)

No advance payment example
In the example above the solid line represents the cumulative cashflow (cost profile) over the project. The dotted line represents the payments that have been made (income). Where the solid line is above the dotted line this indicates that the project is in deficit and money must be borrowed to fund the project. This is often the case for suppliers in a project and in this situation they may have difficulty funding the project and go into liquidation due to cashflow problems.

Advance payment example

In the example above (advance payment example) and advance is made and the regular payments made into the project. In this instance the income is always above the cost profile and therefore no borrowing is required.
Answer part b)
This is especially good for suppliers as they will be cash positive throughout,
Their payment risks are virtually nil and they may be able to invest the spare funds thereby raising extra investment income.
Contractors may be able to negotiate good terms with their suppliers as they are in a position to negotiate favourable payments terms.
Answer part c)
If this method was used it would be reasonable to expect the supplier to reduce their price as they are not carrying any payment risks, are cash positive and not likely to have cashflow problems during the project.
**Section 3.4 Q2**

a) Explain the difference between commitment and accrual.

b) State four benefits of cost management.

**Answer part a)**

In a cash accounting environment entries are made into the accounts when funds are paid or received for the goods/services in question. This gives a simple picture if the state of the project’s finances but does not indicate any commitment or accrual that are relevant.

In an accrual based environment the entries are made into the project’s accounts when the goods or service is received. This means that the liability to pay for the goods/services has already been made and the accounts will reflect the state of the projects finances assuming all has been paid. This helps the project manager to accurately forecast cashflow for the project.

In a commitment based environment the entries are based on when the contract is let or the order made. In other words the funds for that set of goods or services are effectively withdrawn from the project’s accounts and put in reserve so that the commitment can be honoured at a future date. This means that the cashflow must be carefully managed as the funds in the accounts may not actually be available for use in between the commitment and the actual date the payment is made.

**Answer part b)**

Benefits of cost management include the ability to:

1. Accurately forecast cashflow, so that borrowing requirements are known, understood and controlled.

2. Ensure payment milestones are placed in a manner that supports the schedule of work reducing negative balances to a minimum.

3. Maximise the opportunities to receive advance payments that can be used to finance future work, reducing the borrowing requirement and maximising profits.

4. Reduce risks associated with payments and costs, thereby affording the opportunity to reduce the contingency allowances within the project budget.
Change Control - BoK Topic 3.5

Section 3.5 Q1

**Explain five features of an effective change control process.**

a) Change form. An effective process must have a means of entry and some form of change request form achieves this. Depending on the industry this may be called a variation order, request for architect’s instruction or request for engineering instruction. The form will contain information such as: “Date; author; description of request; priority; impact of the change; date required by”.

b) Change log. The change request is logged within the change log and this provides a full audit trail for the project of all the changes. It will include information such as: “Change number; description of the change; author of request; date received; date evaluated; date decision made; decision; implementation date; status”.

This enables any person to evaluate the status of changes within the project.

c) Evaluation and prioritisation. Each change request needs to be evaluated and assigned a priority such as 1 – a must, 2 – important, 3 nice-to-have/cosmetic or 4 – no change required. The following question could be asked about the change itself:

* Is it possible?
* Is it customer requested, or self inflicted?
* If not customer requested, is it really necessary?
* What is the cost?
* Who will pay?
* How will progress be affected?
* What are the risks?
* What is the effect on the Business Case?
* How will safety, reliability and performance be affected?
* Will it affect work completed?
* What documentation needs to change?
* Should (and can) the change wait until after the current project ends?

d) Decision-making. There should be a defined person or group authorised to agree to implement changes. This could include a formal change control board, the sponsor, the project manager and the team managers. Authority is often delegated at various levels, for example, the PM may be able to accept changes not exceeding 5% of the project budget, no single change to exceed £5,000 or causing more than 3 days delay. A similar formula would be defined for the different levels within the project organisation.

e) Change budget. If change control is to work efficiently then there must be some form of change budget available. Otherwise each and every change will result in a request to the funding body for additional funds to cover the changes. Including provisional and prime cost sums in the contract would be one type of change budget or a percentage of the total cost set aside for change, e.g. 15%.
Section 3.5 Q2

List five roles that are fundamentally involved in change control and describe the contribution of each role.

Five roles are:

- Project Manager
- Project Sponsor
- Steering Group
- Users
- Supplier

Project Manager. The PM will be responsible for ensuring that the change requests are logged and that the change log is kept updated throughout the project. (Often this will be delegated to project support office.) Once the change request is received the PM will have to analyse the change, asking a range of questions to establish what is actually required, how much it will cost, the effect of the change on the schedule and budget, the benefits and risks associated with the change. Once this analysis is complete the PM will pass the change onto the body authorised to agree the change, or otherwise.

Sponsor. The sponsor will be the focal point for decision making on change issues. S/he will sign off the change control process and will often take the role of authorising body. In any event the sponsor will chair the steering group. The sponsor will discuss the change with the user and decide whether the change can be justified. It is likely that the sponsor will control the change budget.

Steering group. Often the steering group will act as a change control board. This forum has the authority to accept or reject changes (or put the on the pending pile). Chaired by the sponsor, the board will examine the PM's analysis of the situation and make decisions about the change.

User. The user community will often be the prime source of change requests. They will be required to justify the change and provide the benefits information so that the PM can evaluate the cost benefit balance when s/he has obtained the costs for the change.

Supplier. The supplier can raise change requests although these are likely to be “internal” and raised to correct problems during the “build” process and therefore not chargeable to the customer. The supplier will also examine customer change requests and provide the time and cost information required by the PM as part of his/her analysis. Income from change requests can form a key part of the supplier’s profit and care must be taken to ensure that the costs obtained are fully justified. This risk could be limited by asking the supplier to include a schedule of rates within their bid.
Earned Value Management - BoK Topic 3.6
Section 3.6 Q1

Complete the table below calculating the Earned Value (EV), the Efficiency and the % Complete for weeks 4, 8, 12, 16 and 20. What can you conclude from the results?

NB This will take more than 15 minutes – the question to provide practice of the calculations and interpretation of results.

Solution:

| Activity | Budget | % Complete | Actual Costs | EV | Efficiency | % Complete | Actual Costs | EV | Efficiency | % Complete | Actual Costs | EV | Efficiency | % Complete | Actual Costs | EV | Efficiency | % Complete | Actual Costs | EV | Efficiency | % Complete | Actual Costs | EV | Efficiency |
|----------|--------|------------|--------------|----|------------|------------|--------------|----|------------|------------|--------------|----|------------|------------|--------------|----|------------|------------|--------------|----|------------|------------|--------------|----|------------|------------|--------------|
| A        | 300    | 20         | 60           | 60 | 92.3%      | 50         | 130          | 125.0%       | 50 | 130        | 125.0%     | 50 | 130        | 125.0%     | 50 | 130        | 125.0%     | 50 | 130        | 125.0%     | 50 | 130        | 125.0%     |
| B        | 400    | 15         | 70           | 60 | 85.7%      | 40         | 180          | 83.3%         | 40 | 180        | 83.3%      | 40 | 180        | 83.3%      | 40 | 180        | 83.3%      | 40 | 180        | 83.3%      | 40 | 180        | 83.3%      |
| C        | 500    | 10         | 90           | 50 | 55.6%      | 50         | 250          | 95.2%         | 50 | 250        | 95.2%      | 50 | 250        | 95.2%      | 50 | 250        | 95.2%      | 50 | 250        | 95.2%      | 50 | 250        | 95.2%      |
| D        | 200    | 5          | 12           | 10 | 83.3%      | 10         | 20           | 87.0%         | 10 | 20         | 87.0%      | 10 | 20         | 87.0%      | 10 | 20         | 87.0%      | 10 | 20         | 87.0%      | 10 | 20         | 87.0%      |
| E        | 350    | 10         | 20           | 15 | 87.0%      | 15         | 38           | 83.3%         | 15 | 38         | 83.3%      | 15 | 38         | 83.3%      | 15 | 38         | 83.3%      | 15 | 38         | 83.3%      | 15 | 38         | 83.3%      |
| F        | 240    | 0          | 0            | 0  | 0          | 0          | 0            | 0            | 0  | 0          | 0          | 0  | 0          | 0          | 0  | 0          | 0          | 0  | 0          | 0          | 0  | 0          | 0          |
| TOTALS   | 1990   | 9%         | 237          | 180 | 75.9%      | 17%        | 462          | 73.5%         | 17 | 462        | 73.5%      | 17 | 462        | 73.5%      | 17 | 462        | 73.5%      | 17 | 462        | 73.5%      | 17 | 462        | 73.5%      |
| BAC      | 1990   |            | 237          | 180 | 75.9%      |            | 17%          |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |            |
In all control mechanisms the important factor is to look for trends, and when using Earned Value data such as this it is the trend that is important.

If one assumes that the optimum performance is 100% +/- 20% then the following is clear from the data:

- Task A has gone very well with a month on month increase in performance. It would be worth investigating the cause of the increased efficiency as perhaps it could be applied elsewhere in the project.
- Task B has completed within the parameters set.
- Task C has problems – the staff on the task have consistently underperformed and a trend such as this should be ringing alarm bells. In the first instance the project manager should have got to grips with the situation at week 4 and certainly by week 8. There must be a reason – perhaps there are unapproved changes taking place, perhaps there is a claim to be made for delays elsewhere. In any event action is required now.
- Task D is performing satisfactorily.
- Task E is performing satisfactorily.
- Task F is performing within limits, but at the lower end. Some investigation could be undertaken to look at improving the efficiency.
Section 3.6 Q2

Consider a project with a budget of £1m (BAC). It has a planned duration of 18 months. After 10 months the reported figures are:

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Costs</td>
<td>£600k</td>
</tr>
<tr>
<td>Actual Costs</td>
<td>£500k</td>
</tr>
<tr>
<td>Earned Value</td>
<td>£460k</td>
</tr>
</tbody>
</table>

Calculate CPI, CV, SPI, SV, Final Coat, Final Planned Duration and % Complete. Comment on the figures you have calculated.

Formulae

\[
\begin{align*}
\text{CPI} & = \frac{EV}{AC} \\
\text{SPI} & = \frac{EV}{PC} \\
\text{CV} & = EV - AC \\
\text{SV} & = EV - PC \\
\text{Final Cost} & = \frac{BAC}{CPI} \\
\text{Final Planned Duration} & = \text{Planned Duration} / \text{SPI} \\
\% \text{ complete} & = \left( \frac{EV}{BAC} \right) \times 100
\end{align*}
\]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>0.92</td>
</tr>
<tr>
<td>SPI</td>
<td>0.77</td>
</tr>
<tr>
<td>CV</td>
<td>-40</td>
</tr>
<tr>
<td>SV</td>
<td>-140</td>
</tr>
<tr>
<td>Final Cost</td>
<td>£1,087k</td>
</tr>
<tr>
<td>Final Planned Duration</td>
<td>23 months</td>
</tr>
<tr>
<td>% complete</td>
<td>46%</td>
</tr>
</tbody>
</table>

A CPI value less than 1, or a negative CV indicates that the project will be over budget. This is supported by the Final Cost calculation indicating a budget overrun of just under 9%.
A SPI value less than 1, or a negative SV, indicates that the project will be late. This is supported by the Final Planned Duration figure of 23 months.

The project is less than half finished (%complete = 46%) and is going to be late by 5 months in a 18 month project.

This is perhaps more worrying than the cost overrun as this is less than a potentially acceptable 10% overall.

I would investigate the reasons for the delay and see if it can be corrected.
Section 3.6 Q3

Consider a project with a budget of £1.6m (BAC). It has a planned duration of 24 months. After 10 months the reported figures are:

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned Costs</td>
<td>£700k</td>
</tr>
<tr>
<td>Actual Costs</td>
<td>£800k</td>
</tr>
<tr>
<td>Earned Value</td>
<td>£850k</td>
</tr>
</tbody>
</table>

Calculate CPI, CV, SPI, SV, Final Coat, Final Planned Duration and % Complete. Comment on the figures you have calculated.

**Formulae**

- CPI = EV/AC
- SPI = EV/PC
- CV = EV – AC
- SV = EV – PC
- Final Cost = BAC/CPI
- Final Planned Duration = Planned Duration/SPI
- % complete = (EV/BAC) * 100

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>1.06</td>
</tr>
<tr>
<td>SPI</td>
<td>1.21</td>
</tr>
<tr>
<td>CV</td>
<td>50</td>
</tr>
<tr>
<td>SV</td>
<td>150</td>
</tr>
<tr>
<td>Final Cost</td>
<td>£1,506k</td>
</tr>
<tr>
<td>Final Planned Duration</td>
<td>20 months</td>
</tr>
<tr>
<td>% complete</td>
<td>53%</td>
</tr>
</tbody>
</table>

A CPI value greater than 1, or a positive CV indicates that the project will be under budget. The Final Cost calculation indicating a budget underspends of about 10% supports this.

A SPI value greater than 1, or a positive SV indicates that the project will be completed ahead of schedule. This is supported by the Final Planned Duration figure of 20 months.
The project is more than half finished (%complete = 53%) and is going to be early by 4 months in a 24 month project.

I would investigate the cause for the excellent performance and ensure that it was maintained. Perhaps there may be a cause for a celebration?
Section 3.6 Q4

*Explain five benefits of using Earned Value Management.*

Five benefits are:

1. Helps to see how well we are doing
2. Helps to see how well we could do by changing the plan
3. Identified areas of under/over achievement
4. Provides a basis for standard curves to provide targets for future projects
5. Can be used as a basis for staged payments

**Helps to see how well we are doing**

By comparing EV (%complete x budget) with the Actual Cost (AC) and the Planned Costs (PC) we can derive the Cost Performance Index (which is a measure of efficiency) and the Schedule Performance Index. (CPI=EV/AC, SPI=EV/PC) If the indices are less than one this indicates that we will be over budget/late, over 1 then we will be under budget/early. The Final Project Costs can be estimated by Budget/CPI and the Final Duration by Planned Duration/SPI. This enables the project manager to take corrective action at an early stage to bring the project back on track. For example if late and under budget, money could be spent to accelerate the works. If late and over budget, perhaps the scope could be reduced? These figures are included in performance reports to the Sponsor and Steering Group.

**Helps to see how well we could do by changing the plan**

Cost Variance and Schedule variance can also be calculated (CV=EV-AC, SV=EV-PC) and these can be used as KPIs and trends recorded and acted upon. Negative figures indicate a trend towards over budget and late whilst positive values indicate a trend towards under budget and early. By setting parameters above and below zero “Green”, “Amber” and “Red” bands can be identified. Whist the variance is within green no action is required, amber indicates questions to be asked and red requires immediate action.

When calculating final costs and duration the assumption is made that current trends will continue. However, EVM can be used to work out what needs to change in order to improve matters. This may involve re-estimating future work, or changing the order or dependencies. “What if” analysis can be undertaken to assist with these projections.

**Identifies areas of under/over achievement**

Typically EV will be calculated for each task within the plan, or subset thereof. CPI and efficiency is calculated and then compared against 100%. For example if three tasks were being undertaken (A,B,C) and the efficiency was 80%, 90% and 65% respectively, the Project Manager make take the view that anything between 80 and 120% was acceptable. Thus no action is required for tasks A and B. However, task C seems to have a serious problems and an investigation will be required. Perhaps additional work has been incorporated into the plan, and a change request should be issued. Perhaps another supplier has caused a delay and therefore a claim can be raised. Alternatively, there may have been problems and now these are resolved the task can be re-estimated to give a more realistic view of out turn costs and durations.
Provides a basis for standard curves to provide targets for future projects

If a process is undertaken regularly then empirical data can be gathered from the work to produce a standard plan curve. For example, a company making helicopters will be able, after the staff have become familiar with the process, to define the activity required for each stage of the build such as basic airframe, building the fuselage, adding undercarriage, engines rotors etc. These standard curves can then be supplied to other manufacturers, or other plants within the company as targets for them to achieve. As an example Boeing supplied standard curves for the Apache build to Westland Helicopters. This saved extensive effort by Westland in defining the build plan and resource requirements. If also provides targets for staff achievements which can be incorporated into performance bonuses.

Can be used as a basis for staged payments

A common method of payment is to pay via achievement of milestones. This does tempt some companies to “chase the milestone” to the detriment of the other activities not associated with the milestone. As an alternative payment can be made via earned value, in other words payment is made for useful work done. Current recommendations advocate payment no more than 80% of contract value in this manner, with the remainder being made via standard milestone payment scheme.

This method is widely used in the US defence industry and is being introduced in the UK (2008/09).
Section 3.6 Q5

Using the data below:

a) Calculate EV for months 1 - 5, draw the graph showing Budget Curve and PC for months 1 to 10 and AC and EV for months 1 to 5.

b) Calculate the Final Cost and Final Duration for this project based on the figures at Month 5.

<table>
<thead>
<tr>
<th>Month</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>0</td>
<td>5</td>
<td>15</td>
<td>30</td>
<td>50</td>
<td>80</td>
<td>120</td>
<td>140</td>
<td>155</td>
<td>165</td>
<td>170</td>
</tr>
<tr>
<td>AC</td>
<td>0</td>
<td>6</td>
<td>20</td>
<td>35</td>
<td>55</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%C</td>
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<td>2</td>
<td>7</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td></td>
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<table>
<thead>
<tr>
<th>Month</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>PC</td>
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<td>120</td>
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<td>165</td>
<td>170</td>
</tr>
<tr>
<td>AC</td>
<td>0</td>
<td>6</td>
<td>20</td>
<td>35</td>
<td>55</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>3.4</td>
<td>11.9</td>
<td>25.5</td>
<td>42.5</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Budget</td>
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<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
<td>170</td>
</tr>
<tr>
<td>%C</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

At Month 5 CPI = EV/AC = 68/95 = 0.72
At Month 5 SPI = EV/PC = 68/80 = 0.85

Final Cost = Budget/CPI = 170/0.72 = 236
Final Duration = Duration/SPI = 10/0.85 = 11.8
Information Management and Reporting - BoK Topic 3.7

Section 3.7 Q1

a) State six types of information that a task owner will report on throughout the project

b) Explain two ways in which the project manager will use the information stated above.

a)

1. Performance status - the task owner should report the actual or forecast date of achievement for the deliverables.
2. Schedule status - the task owner may be required to report the estimated time of completion for each task.
3. Cost Status - the task owner should report the actual expenditure and the committed expenditure to date for each task.
4. Status of quality progress - the task owner should report any changes that might affect the form or function of the task deliverables.
5. Risk exposure system - the task owner should report any changes in the status of any identified threats to the achievement of tasks, together with any new threats or opportunities.
6. Exception thresholds and variance reporting - defined triggers will require the task owner to report variations to forecast time and cost at completion and suggest recovery actions.

b) Use 1: The information will be reviewed and the schedule updated. The variances to the schedule for time and cost will be noted and if necessary corrective action will be taken to bring the tasks back onto the appropriate time and cost schedule.

The information could trigger an issue that will require escalating to the sponsor and/or steering group.

It could also be used a basis for performance reviews with the teams concerned, particularly with a view to continued improvement, for example, when reviewing the quality statistics.

Information from teams could also be used to support valuations of work performed and related payments. This may be linked to an earned value management system.

b) Use 2: The project manager will use the information as a basis for reporting to the sponsor and steering group and other stakeholders as indicated by the communications plan. S/he will consolidate the information received from the task owners into a consolidated report. Information from the task owners and teams is received frequently, often weekly, whilst the consolidated report is required at a longer frequency, often monthly.
Section 3.7 Q2

List and describe five reasons for archiving project documentation.

1. Provides a repository for historic records
2. Enables future audits of a project’s performance
3. Helps to estimate future projects
4. Stores lessons from the project that can be applied to other projects
5. Provides a mechanism for sharing data to others.

1. Archiving project documentation is vital as it provides a repository for historic records. This may be important for legal reasons including perhaps the provisions of the Data Protection Act. These records can be used to provide data for a number of company initiatives such as marketing and promotional literature where project information can be used to positive effect.

2. The records provide an audit trail of the project and will facilitate a future audit of the project’s performance. It is often required that these records are kept for 7 – 10 years for this purpose. Whilst necessary in all cases it is particularly important when projects have not gone as well as expected and a major review is required. An example would be the enquiry into the Scottish Parliament Project.

3. Project records will (should) record original and final estimates for each of the tasks. This provides vital information for an organisation and enables it to improve its forecasting and estimating capability. This should help companies to refine their estimates such that future works can be more accurately forecast, particularly at the initial tender stages.

4. The records will record that which went well, that which went badly and that which would be differently in future. Often noted in a lessons learned report this information is important for both project managers and the organisation if his/her/its ability to implement projects is to improve. This information should be made available for all parties to review and share throughout the organisation.

5. As the information is to be shared with many people every effort should be made to capture experience in a form that they can use. Often this is achieved through the use of a company intranet and in some cases it is open to a wider audience through the Internet. Information is only of use if it can be accessed; therefore it needs to be stored in a usable format.
Issue Management - BoK Topic 3.8

Section 3.8 Q1

a) State a definition of an issue.

b) Explain four steps of an issue management.

Answer:

a) Definition: An Issue is something that threatens the project objectives and cannot be resolved by the project manager. An example could be a risk that has happened and the result requires senior management intervention.

b) Step 1. There must be a log within which the project manager can record all project issues that are raised. (It is also possible that there may be a corresponding issue form). The log would contain information such as:

- Issue number
- Author
- Date raised
- Description
- Analysis
- Date escalated
- Action taken
- Status
- Owner
- Date cleared

Once the issue has been logged and given a number the author should be advised and given the number so that s/he can enquire about the progress of the issue.

Step 2. Analysis, the issue must be reviewed to establish the cause and exact details of the problem, its effect on the time, cost, quality, scope, risks and benefit objectives. This information can be used to establish the best possible course of action so that a recommendation can be made to the sponsor/steering group. An owner of the issue should also be established. This would be the person who is responsible for its resolution.

Step 3. Escalate the issue to the sponsor and steering group for action. This senior management body is then responsible for agreeing, or otherwise, the project manager’s recommendation and ensuring that the owner is aware of the situation and has agreed to take action to resolve the issue. The project manager is informed of the decision and the issue log updated.

Step 4. Once escalated the project manager should monitor all issues to ensure that the agreed actions are happening and having the desired effect. Information on the issue status should be included within the reports given to both senior management and the team. In the event of an issue not being resolved further escalation to the sponsor will be required. If issues continue to be raised and older ones are left unresolved then the project is out of control.
Requirements Management - BoK Topic 4.1
Section 4.1 Q1

a) State **three elements of a requirements management process.**

b) State why requirements management is important.

c) Explain how requirements management is applied across the project life cycle.

**Answer**

a)  
1. Capture, where they are discovered, structured and documented along with any relevant acceptance criteria.
2. Analysis, where they are assessed and prioritised in accordance with the needs of the business and the project’s priorities.
3. Testing, where the views of different stakeholders need to be considered and the requirements tested against them to ensure that they are comprehensive and accurate and if met will satisfy the diverse stakeholder groupings.

b) Requirements are the basis for the project – they describe what the customer wants and are used as a platform for the solution and the way in which that solution is provided. If requirements are not adequately determined and maintained then there will be an excessive amount of changes necessary and this will inevitably lead to cost and time overruns.

c) Initially, the user requirements will be generated during the concept phase by discussing the project with the sponsor and the users in particular. This will comprise a high level view of the stakeholders wants and will not necessarily describe what is actually needed. They will form the basis of the business case. The requirements should be documented and structured such that the value, priority, timescales and process are clear for each requirement.

Value represents the amount of benefit that will accrue from the requirement and could be used to assess its priority – how important is this requirement compared to the others.

The timescale associated with the requirement should reflect the timescales of the business, i.e. when must this requirement be satisfied if the business is to meet its strategic aims and finally the process describes the means by which the requirements will be satisfied - i.e. the solution or project approach.

As the project moves into the definition stage and more is known about the solution the requirements will be revisited and refined to ensure that they are realistic and that they will be adequately satisfied by the solution. The statement of requirements will be baselined and placed under configuration management so that any future changes can be adequately analysed prior to inclusion in the project.

During implementation the solution will be tested as each part of the solution is created. The requirements will form a basis for these quality checks and the results recorded in some form of quality log. It is usual to get the users involved in these tests as this generates commitment to the products and
provides an early opportunity for any misunderstanding about the requirements to be resolved.

Finally in the Handover phase the users will take part in Acceptance Testing. This is where the final product of the project is tested to see that it meet the acceptance criteria. The acceptance criteria are based on the requirements. During operations the solution will be seen to satisfy the requirements.
Estimating - BoK Topic 4.3

Section 4.3 Q1

Explain bottom-up estimating. Include a diagram to illustrate your answer.

Example 1 – Bottom-up estimating

In the example above the site description is completed when the tasks below it are completed. The cost of the description is a summation of the costs of all the subsidiary tasks and amounts to £1,950. However, summation of the time required can give a false answer, as the individual tasks do not necessarily run sequentially. Indeed, in this example it is likely that tasks A1.4 and A1.5 will happen concurrently and the other will be sequential. This the time required is actually 6.5 days, not the 9.5 originally calculated.

Example 2 – Bottom-up estimating

In this example the wheel assembly has work associated with it in its own right and this cost must also be added into the summation of the costs of the subsidiary tasks. The timings associated with this breakdown must also be carefully considered if erroneous estimates are to be avoided.

Summary

It is important to recognise what the figures at the lowest level comprise. Do they include, for example, any allowance for inaccuracy; is there an allowance been made for risk and so on? This information must also be considered if an accurate estimate is to be achieved.

Remember costs include a number of elements such as manpower and materials, sub contract, plant etc and these costs must be clearly shown.
Finally, consider the interface between the lower level and the upper level – is there an activity “hidden” here, such as some form of assembly? If so consider adding the tasks or make sure that its associated costs are carried upwards in the breakdown.
Configuration Management - BoK Topic 4.7

Section 4.7 Q1

*Explain five elements of a configuration management process.*

There are basically five stages involved in any configuration management process:

1. **Planning:** Firstly, it is necessary to decide how the end product is going to be released and how updates to the individual components will be managed. Different levels of management will be required at different levels of the supply chain. For example, the manufacturers of a radio may maintain records of the components parts – aerial, case, speaker, electronics board, component board. This represents the level at which the components are procured. The supplier of the electronics board will maintain a record of the individual components, and the supplier of the components will maintain a record of their individual parts. This can be summarised as the lowest level at which an individual component can be installed, replaced or modified.

2. **Identification:** Once the level of management has been achieved it is necessary to identify and specify all components of the final product. This means that an identification scheme is required. Typically this will involve project name, product type, product title and version number. For example, in the radio product the loudspeaker may be identified as radio\audio\loudspeaker\v2.6.7.

3. **Control:** Once identified the components are brought under change control and may not be amended unless the appropriate change control process has been followed. The configuration librarian (who looks after the system) will make sure that configuration items are baselined, copies issued for change and the new version baselined at the new level. Subsequently the new versions are released and the old version recalled.

4. **Status Accounting:** The configuration librarian will be able to supply and account of the status of each item. This will include information relating to the version of the product, has it been completed, is it baselined, has it been issued for a change etc. This will enable a current and historical record to be provided for each item.

5. **Verification:** Finally the librarian will undertake reviews and audits to ensure that there is conformity between the project’s products and the authorised state of configuration items as registered in the configuration management records.
Section 4.7 Q2

Describe five elements of the link between change control and configuration management.

1. Once the individual components of the project have been identified they are brought under control. This means that nothing moves and nothing changes unless it passes through the change control process and the associated link to change control.

2. The configuration librarian will often be responsible for maintaining the change log, and if not must maintain a close relationship with the group that do.

3. When products are produced they are baselined and if they need to be amended then a change request must be raised. Once the request has been through the change process and been agreed the configuration librarian will take a copy of the product (NB the master is never changed) and give it a new version number, ideally indicating that this is draft product that is being worked upon. Typically this is undertaken by adding a lower case letter after the version number, e.g. v1.6a.

4. This product is issued to the appropriate team for updates and when the product is completed and signed off it will be returned to the configuration librarian. The librarian baselines the product, taking away the lower case letter, and archives the old baseline. Copies of the new product are released and old version recalled and destroyed.

5. If multiple changes to a product are required then they should be sent as a group of changes with the product to one person to undertake so that one change does not undo another. Finally the system should maintain a link between the product and the change request that caused the change to the product.
State **ten** items that will typically be included within the contents of a business case.

*(Note – more than the required ten have been shown for example purposes)*

1. **Background and reasons** that describe the business setting of the project and the reasons describe the problem that is to be solved, or the opportunity that is to be grasped. The reasons are distinct from the benefits, which describe the improvement that will be gained when the project is complete.

2. **Goals and objectives** that state the key objectives in terms of time, cost and quality for the project and the ultimate goal that will be achieved when the project is complete.

3. **Options.** This section states the solutions that have been considered, the selected option, and the reasons for its adoption.

4. **Key deliverables.** The main products of the project are described here.

5. **Scope.** This describes the main work areas of the project and the outputs of the project that will form the key deliverables.

6. **Exclusions** – that will state what is **not** being done. Most important as otherwise the readership tends to assume these things are included.

7. **Benefits and outline realisation plan.** This is a key section of the business case as it is the benefits that justify the expenditure in terms of time and cost that is proposed. The benefits should be tangible, financially biased, and they must outweigh the costs and risks if the business case is to be viable.

8. **Stakeholder analysis.** This will provide a view of the backers and their role in the project. It will also identify any negative stakeholders and their likely reactions to the project.

9. **Organisation structure.** Based on the stakeholder analysis this will indicate who is taking the key roles in the project, particularly the sponsor, steering group and project manager.

10. **Assumptions** that state what has been assumed about the project during the preparation of the business case and will needs to be tested.

11. **Risks** – a list of the major threats and opportunities raised during the preparation of the business case.

12. **Issues** – a list of any issues that require resolution.

13. **Dependencies** – a list of anything upon which the business case is dependent.

14. **Constraints** – those things that the project must work within, such as time, cost, safety, technology, legal etc.

15. **Investment appraisal.** This states the financial aspects of the business case. This could include discounted cash flow, net present value, internal rate of return and return on investment figures.

16. **Evaluation.** This final section provides a summary of the business case and evaluates the investment appraisal.
Section 5.1 Q2

*Explain the use of Payback, Net Present Value (NPV) and Internal Rate of Return (IRR) as investment appraisal techniques.*

Payback states when the original investment will be recouped. It does not take into the account the cost of money or future cashflows. It is a useful first step when assessing the viability of a project. It tends to be used in projects that have a short life cycle such as fashion or seasonal products. It may also ignore the costs of borrowing. An example would be setting up a shop selling Christmas goods in September. The initial investment must be paid back well before Christmas if profits are to be made thereafter and the project is to be successful.

Net Present Value (NPV) is based on a Discount Cash Flow (DCF). This technique allows cashflows to be considered in today’s terms. The sum of a DCF is known as the NPV. Basically, having established the cashflow for the project a Discount Factor is applied to it which effectively converts the figure into today’s monetary value assuming a given interest rate. As an approximate example if the interest rate was 5% (this would be the Discount Rate that would be used to calculate the Discount Factor) and next year’s cashflow was £105 this would equate to £100 in today’s money. This allows different cashflows to be compared on a “like for like” basis. The one with the highest NPV would be the better option.

Internal Rate of Return is defined as the Discount Rate when the NPV is zero. This requires a project to have both income and cost. It is calculated by applying different discount rates until the NPV equals zero. This is easily done by taking a low rate of say 2% calculating the NPV and plotting this on a graph. The NPV is calculated with a high rate of say 30% and NPV plotted. The two figures are joined and where it crosses the axis is the IRR (see the diagram below). Basically, if IRR is greater than the market rates the project will make a profit, if IRR is less than the market rate the project will make a loss. Most companies set a value of IRR around say 14%, which is much higher than the market rate, and expect the IRR of the project to be greater than this figure.

**IRR Graph.** The IRR in this example is approximately 10%
Procurement - BoK Topic 5.4
Section 5.4 Q1

State *eight* steps that may form part of a simple procurement process.

The basic steps involved in a simple procurement process are given below. I have used a new hotel kitchen to explain the process.

1. Establish the user's need. In the first step the users (the chefs) would be consulted and a list of requirements developed. These requirements may be in the form of a “wish list” at this stage and it may not be possible to achieve them all. This expectation should be clearly set at this stage.

2. Survey the market place. Taking the list to market will enable me to answer questions such as how much the kitchen is likely to cost; is it possible to get this type of technology; how long will it take to be delivered; are there any constraints; what are the likely maintenance costs.

3. Specify a realistic requirement. Having got some preliminary information I can now engage the chefs in the debate and a realistic set of requirements can be generated taking into account the information discovered in step 2.

4. Seek tenders for supply. The information agreed in step 3 is converted into a specification that is issued with an invitation to tender (ITT) or request for proposal (RFP) to a number of suppliers. It is likely that these suppliers have been pre-qualified by this stage. I will also have prepared a list of assessment criteria for the tenders, including weighting of requirements, cost, support terms etc.

5. Assess tenders and choose supplier. When the tenders are received they will be assessed against the assessment criteria. It is likely that a shortlist will be established and interviews undertaken to clarify points of detail. Following this the supplier will be appointed.

6. Accept the goods into service (commissioning). The supplier will build the kitchen, commission the systems and handover the completed kitchen to the customer – the chefs. After a final inspection the kitchen will be accepted into service and the final invoices paid.

7. Support the equipment during use (Storage; Maintenance; Repair; Training; etc.) This part of the process covers the ongoing maintenance and support of the kitchen. This may include regular servicing of appliances, repair activities and upgrades during its useful life.

8. Decommission and dispose of redundant equipment. In this final stage the kitchen will be come to end of its useful life and will be replaced.
Section 5.4 Q2

*Explain five payment options and for each option give an example of where it may be used.*

**Fixed Price.** This is also known as lump sum. It means that the customer has agreed to pay the contractor a fixed price for the work. The monies will be paid on completion of the work or a stage of it. Variations to the contract may be made through the agreed change or variation process. A fixed price contract may include a variable element to allow for part of the work that may vary due to things such as taxes, inflation, raw material prices and so forth. If these elements are not included it is known as a firm price – and no variable elements are built in. Firm price contracts can still be amended via the agreed variation or change process.

Fixed price is often used when the scope of works can be clearly defined and the risks are limited e.g. house building.

**Unit Rate Based.** Payments are made based on pieces or units of work done. This may be a number of power sockets installed, drawings completed, lengths of pipework etc. It allows greater flexibility than fixed price and is often used when the exact quantities of work is unknown. It allows for a detailed comparison of bids and provides a basis for pricing variations. However, preparing the schedule of rates compiling the list of items required under the contract takes time and the customer incurs this cost before the bid is issued.

Unit Rate Based contracts could be used when considering a major data cabling installation in a new building where the customer has yet to decide their exact requirements.

**Activity schedules/milestones/planned payments.** In this form of payment structure the payments are broken down against a series of activities that must be completed for the payment to be made, often related to key milestones in the project. It provides the client with a view of the likely cashflow across the project and allows comparison of cashflows at the bid stage. The supplier has an incentive to meet the schedule and achieve the milestones. A disadvantage is that the contractor often “chases the milestone” which can be detrimental to the overall programme.

This type of payment method is often used on major build projects such as aircraft or helicopter projects.

**Target cost.** In this form of payment the customer and contractor agree a target cost for the project. This gives an incentive to the contractor to perform well as any savings on the target cost are usually shared between the customer and the contractor. These arrangements also apply to overruns with the customer paying a proportion of the cost overrun.

It does require clear agreements to be made about what is and isn’t included and consideration should be given to variations to contract.

This form of payment could be used on a large contract such as a road scheme and would be used to give the contractor an incentive to finish ahead of schedule.
Cost-reimbursement. In this form of contract the supplier is paid for work done and materials consumed plus an element of profit. The customer has great flexibility to vary the work required but bears greater risk for cost escalation. Suppliers can bid for this work stating their rates.

It is useful for emergency work or small contracts where the total liability is limited.
Project Life Cycles - BoK Topic 6.1

Section 6.1 Q1

*Explain five benefits of splitting a project into phases.*

Five benefits are:

- **Facilitates rolling wave planning.** Splitting the project will assist with the overall planning of the project. It is very difficult to accurately plan timescales in excess of say, 3 – 6 months. By splitting the project into smaller chunks the entire project can be planned at high level and the detail required for the day-to-day management can be planned in detail for 3 – 6 months. This gives greater control over the monitoring and control of the project.

- **Helps with risk management.** The risks inherent in any project can be managed better if the project is split into phases. For example a high risk project would have more phases; at the end of each a decision is made on whether to continue or not. More frequent decision points allow for gathering information on risks and making sure they are under control before authorising spend on the next phase. This limits the exposure of the project to risk.

- **Helps to plan payment structure.** Phases enable the payment profile to be managed as it becomes easier to set the appropriate milestones or decision points related to payments. This is associated with the point made above about planning. Smaller stages planned in greater detail make it easier to plan payments and ensure they are geared to actual progress and delivery of key milestones.

- **Helps with resource management.** Stages or phases assist the PM to predict the resource requirements, improving utilisation of resource and its availability. If the plan is made on a rolling basis of say 100 days the plan can be rolled forward every few weeks and the on going need for resources predicted. This will enable costs to be kept to a minimum.

- **Provides go/no go decision points.** A final and most important benefit of splitting a project into phases or stages is that it allows assessment of each stage to take place, before any further work takes place. The business case, risks and overall progress of the project can be assessed by the sponsor and steering group before funds and resources are committed to the next stage or phase. Again this helps to reduce the risk of spending money on a project that has ceased to have any benefits.
Section 6.1 Q2

a) List and describe four phases of the project life cycle.

b) State two benefits of splitting a project into phases.

NB this answer describes the APM BoK project life-cycle – it is acceptable for you to describe the life-cycle used by your organisation. I recommend that you start your answer with a statement such as “I work for ….. and our life cycle covers these phases.” Then go on to describe the purpose of each phase and its typical outputs.

a) Four phases of the project life cycle in the APM BoK are:

- Concept
- Definition
- Implementation
- Handover and Closeout

Concept is the first phase of the project life-cycle and it is here that the need, problem or opportunity is confirmed and investigated. The feasibility of the project is assessed and if found to be acceptable the project proceeds into Definition. The main output of the concept phase is the Business Case. The business case will continue to be developed during definition.

Definition is the second phase of the project life cycle. During this phase the preferred solution is further evaluated and optimised. Often an iterative process, definition can affect requirements and the project’s scope, time, cost and quality objectives. As part of this phase the project management plan (PMP) is produced and the resources required during the implementation phase will be identified.

Implementation is the third phase of the project life cycle, during which the project management plan (PMP) is executed, monitored and controlled. In this phase the design is finalised and used to build the deliverables. This phase may be split into smaller technical phases such as specification, design, build etc. During implementation the project manager will allocate work to the teams, monitor progress and take controlling action where required. Change control will be vital during this phase.

Handover and closeout is the fourth and final phase in the project life cycle. During this phase final project deliverables are handed over to the sponsor and users. Closeout is the process of finalising all project matters, carrying out final project reviews, archiving project information and redeploying the project team.

Once the project is completed the project manager must make sure all project personnel are deployed in an appropriate manner; the project's accounts need to be finalised; contracts and purchase orders are finalised; a post project review is completed and all records are archived for audit purposes in the future. It may also be appropriate to complete performance appraisals of the project personnel.

b) Phases facilitate rolling wave planning. The entire project is planned at high level and the next stage is planned in detail. The peak of planning detail “rolls” forward as the project progresses.
Phases make it easier to identify and manage risk; the phases are short and the work well defined so it is much easier to identify the risk and implement appropriate mitigating actions.

Other statements that could be made here include:

Go/no go decision points
Estimating
Early phase success reinforce stakeholder commitment
Funding in chunks
Lessons learned applied to future phases.
Handover and Closeout - BoK Topic 6.5

Section 6.5 Q1

Explain five elements of a project handover process.

Handover process

Inform stakeholders of stage entry

Brief project team

Finalise release preparations

Prepare for project closure

Release decision

Release

Complete project work scope

Handover & close project

PROJECT CLOSED

Post Project Review

END

Step 1. As the end of the project approaches the project manager (PM) will inform the stakeholders that the handover/closure is about to take place. This will ensure that all involved parties are prepared. This will include a briefing for the project team to ensure that all tasks required during the final stage have been planned, risks identified and mitigated, and any problems identified and solved.

Step 2. The project will complete the work ready for the release of the final product. This will involve final testing/inspection, completion of handover documentation, as fitted documentation, records etc. The PM will also prepare for closing the project – archiving files, preparing the necessary documentation.

Step 3. The decision to release the products of the project is made and the products released to the customer and the operational environments. The customer and operational representatives will complete a final acceptance test, which may result in some form of “snagging” list that the project team will complete.

Step 4. Final handover and acceptance will happen after the snagging is completed and the project is formally closed. Contracts will be finalised, staff returned to their operational areas and cost centres closed. All relevant documentation will be archived and a post project review will be completed to evaluate how well the project was managed.

Step 5. Post project there must be a benefits review to establish whether the project did realise any benefits. Arrangements for the review must be made before the project is completed so that there is a focus for benefits within the operational environment.
Section 6.5 Q2

Explain five benefits of formally closing a project.

Clear handover. Formal closure will ensure that the products of the project are formally handed to the customer and that the customer accepts the outputs. Similarly, the products must be handed to, and accepted by, the operational and maintenance area that will look after the products in service. This avoids the tendency to drift into operational life with no clear demarcation between the project and the business. Handover at this point may be qualified in that there may be some remedial work to complete.

Provides an opportunity to take stock of achievement. It is important that then members of the have some time to take stock of what has, and has not, been achieved. This forms part of the post project review and it is important to cover the operational aspects of the project in terms of the way it was managed and also to collect and distribute the lessons learned focusing on what went well, what went badly and what would be done differently. It is important that this information is not lost.

Prevents loss of focus. Often one of the main difficulties at the end of a project is that both the client and the contractor/supplier “lose” interest. This is due to a variety of emotional responses. Often supplier staff are becoming concerned over their future – what happens when the project finishes, what shall I do? On the client side, the focus has been lost and they are working towards the next initiative, before the current one is completed. By maintaining a focus on the end of the project, the need for a formal handover ensures that the PM motivates all concerned to make that extra effort and make sure all is completed and managed appropriately.

Financial control. At the end of a project there will be a number of financial aspects to be completed. These include payment of final contractor invoices, payment of expenses, finalising the project’s accounts and closing the cost centres down. The latter is most important and the PM must make sure that all claims are received before the cost centre is closed – if not then getting the funds can be difficult. It is also important to make sure that project staff do not continue to book time and expense to the project when it has been completed. This can occur if the project is not formally closed.

Focus for benefits realisation. Finally a formal closure ensures that there is commitment from the business to the benefits realisation process. Benefits realisation is often difficult to achieve, as many people seem to “find something better to do”. Formal closure should include a process to ensure that a realisation plan is in pace, signed off by the sponsor and that such a plan has the commitment of the business. This could include including these objectives in personal development plans, performance or bonus related criteria.
Project Reviews - BoK Topic 6.6

Section 6.6 Q1

Explain five types of project reviews.

Project Evaluation Review

These reviews are additional to the normal monitoring and control points within a project. They are often undertaken by some form of assurance function and their purpose is to discover whether, or not, the project is being managed correctly. They should be included in the project schedule by the project manager and they will use the project management plan as their base document.

Gate Reviews

Typically undertaken at the end of a phase a gate review is a point where the senior management in an organisation assure themselves that the project is worthwhile. It will concentrate on the viability of the project based on the work to date, the outcome of the project evaluation reviews and any other relevant organisational standards.

Audits

Normally undertaken by an independent body, internal or external to the organisation an audit is similar to a project evaluation review. Its objective is to provide (senior) management with assurance that the project is being managed correctly. Audits can be undertaken by a project support office should one exist.

Post Project Reviews

These are an operation review of how well the project was managed. It should be concluded prior to formal closure of the project. It can be considered as the final project evaluation review, except that it has an historical perspective.

It should focus on how the project performed in terms of cost, schedule adherence and delivery of specification. Its report should be widely distributed; recipients may include:

Project Sponsor
Project Manager
Project Team
Key Stakeholders.

The essential outcome is to make lessons learnt available to all.

Benefits Review

Between three to six months after the project has been closed a formal review should be undertaken to determine whether the project has met its stated objectives or is on course to meet them. It is important that the review is considered from the differing viewpoints of the various stakeholders involved.

The benefits review will probably be initiated by the project sponsor and should result in action plans for improvement where necessary and help in the achievement of the benefits if they have not been realised already.
Organisation - BoK Topic 6.7

Section 6.7 Q1

*Explain five strengths or weaknesses of managing a project in a matrix type of organisational structure.*

1. Many organisations use this form of organisational structure to manage their projects as business as usual and project work can coexist and be undertaken by the same workforce. Projects can draw on the entire resources of the parent organisation. Resources can be ‘shared’ by a number of projects. In theory, a matrix organisation attempts to support effective project management by formalising the informal links between projects and the parent organisation’s specialist functions. This facilitates communication at the operational level.

2. As all projects within the organisation are managed using the matrix there is a common understanding of the need to share staff between the project and the business. Personnel within the business (or function) are able to enhance their technical expertise whilst getting experience of working on a range of projects. This provides greater variance in job role, gives individuals a wider career path and is often seen as motivational.

3. As each project has different objectives and technical needs the organisation can be tailored to meet the needs of the project, whilst maintaining a single point of responsibility for the project, facilitating a rapid response to client needs. However, this can lead to difficulties as the individual team members may have divided loyalties between the function and the project.

4. Dual reporting an also be a problem especially in weak matrices. Members of the team have to report to the project manager on project matters and often have to report the same thing to their functional manager. This, of course, increases the individual’s workload and can be de-motivational.

5. Sharing resources can lead to conflict between the function that needs to resources to undertaken business and usual and the project that needs the resources at specific times in order to meet time constraints. Additionally, projects may also compete for the same resource and functional departments may be reluctant to surrender their best personnel to projects.
Section 6.7 Q2

*Explain five strengths or weaknesses of managing a project in a functional type of organisational structure.*

1. Functional organisations is the traditional form of organisation in many large organisations and public sector bodies, although there is a tendency now for these companies to be move to a matrix style. It provides a hierarchical form of management where the functional managers may have project and line management responsibilities. This enables, theoretically, a high level of staff flexibility to be achieved. However this is often limited by the bureaucratic nature of many such organisations.

2. With staff permanently based within the functional department, it is often easier to provide personnel with greater access to training, career progression thereby improving the technical expertise within the function. This provides a well established ‘within profession’ career path.

3. There are several disadvantages of functional organisations. Within a functional department the “customer” is less likely to be the primary focus of attention. The day-to-day operations of the function often take priority over the function and the focus of the project can be lost. The client may fall between departments and each function can claim that they are not responsible for the aspect of the project that the customer is enquiring about.

4. Responsibilities may be difficult to define when projects are undertaken across departments. Departmental priorities may conflict with project priorities and consequently there is significant scope for co-ordination failures.

5. Finally, communication within the project is often difficult due to lack of a single point of contact, no defined communication routes between functions and the development of “invisible” barriers between functions and between the individuals concerned.
Section 6.7 Q3

*Explain five strengths or weaknesses of managing a project in a project type of organisational structure.*

1. A project organisation has a number of teams, the members of each team are dedicated to a particular project. Where this type of organisation is used the team will move onto the next project when the current one is finished, rather than back to the functional areas as might be the case with a strong matrix. In this organisational structure the project managers normally agree targets and refine individual responsibilities with the co-operation of their team. They also have overall project and line management responsibilities for their project(s) with each team having a distinct project identity.

2. This type of structure has many advantages, for example team members report directly to their project manager, and there is no dual reporting as is the case with matrix organisations. This saves time for the individual and enables a better rapport to be built with the project manager and allows for a stronger team identity and ensuing team motivation. The whole team is customer focused and aware of their responsibilities and their individual contribution to the successful outcome of the project.

3. This leads to teams being self-directed and as they mature they are usually highly motivated and very task orientated. Responses to customer requests and enquiries can be made quickly and efficiently because communication channels and processes are well established and less bureaucratic in nature. Information can be shared easily between team members.

4. On the down side the insularity of project organisations can lead to duplication of effort when many projects are running concurrently and there may be a propensity to ‘stockpile’ equipment and specialist staff. There may also be a tendency to become remote from the overall business activities of the company within which the project is happening.

5. On an individual basis staff within project organisations do not have the same opportunities as their colleagues in the matrix (and function) to develop new skills and develop their career they are often “pigeon-holed” as specialists. This can also lead to problems the project ends, as continuity of employment cannot be guaranteed in this type of organisation. It can also be difficult to integrate temporary staff assigned to the project for a short period.
Organisational Roles - BoK Topic 6.8
Section 6.8 Q1

Explain the main responsibilities of five key project management team roles.

Project Sponsor. The sponsor owns the project’s business case and is the primary risk taker. Representing the business the sponsor is primarily concerned with value for money. Throughout the project the sponsor is the key decision maker and will hold the budget for the project. The sponsor will chair the steering group. Ultimate accountability for the success or failure of the project will lie with the sponsor. Other responsibilities include:

- Decisions on change matters
- Issue resolution
- Ensure agreed risk management activities are implemented.

Steering Group. This group is made up of key stakeholders and chaired by the project sponsor. Its role is to provide guidance on all aspects of the project particularly with regard to strategic direction, risk management decisions and issue management.

Project Manager. The PM is responsible for the day-to-day management of the project on behalf of the sponsor and the steering group. The PM will ensure that:

- The project management plan is produced.
- The project schedule is accurate and reflects accurate and realistic estimates.
- The statements of work are written and issued.
- The work is monitored and controlled in an appropriate manner.
- Management reports are issued in a timely manner and accurately reflect the situation.

Project Support Office. The project office or PSO will provide administrative support to the PM throughout the project. This will include preparing minutes of meetings, logging issues and risks, receiving progress reports from the teams and updating the schedule accordingly, bringing matters of concern to the attention of the PM. The project office or PSO will often be subject matter experts on matters such as risk and planning software.

Team Manager. The team managers will run the teams of people who are undertaking the work itself. Their responsibilities include scheduling the teams’ work, making sure the work is to the required standard, motivating the teams, liaising with the PM, receiving work instructions (statements of work), managing team level risks, reporting progress to the PM and taking corrective action at team level if required.
Methods and Procedures - BoK Topic 6.9

Section 6.9 Q1

Explain five topics that could be documented within a project management method.

Five topics that should be documented are:

1. Procedures for key aspects of project management
2. Processes to explain how the procedures are used.
3. Definition of key roles and responsibilities
4. Documentation templates
5. Specific techniques

Procedures for key aspects of project management

The procedures should cover key elements of a project such as

- organisational structure
- business case management
- risk management
- quality management
- change and configuration management
- planning
- monitoring and control

Each procedure should explain how the topic is applied within the organisation and any variations that should be considered for different size of projects or its interface with the organisation's programmes.

Processes to explain how the procedures are used

Processes should be written to explain how the project is approached in each phase from Concept through to Handover and closeout (and possibly include topics such as benefits realisation in the operational phase. Typically this will explain how the business case is developed and used across the life-cycle. Other topics covered could include the process for reviews and audits. Decision making and planning processes could also be documented.

Definition of key roles and responsibilities

This part of the method should include a definition of the key project management roles used such as the Project Sponsor, Project Manager, Steering Group, project Support arrangements and Specialist workstream leaders or Team managers.

Each role definition should be supported with a list of key responsibilities for each role. This will ensure everyone involved in the project know where they fit, what is expected of them and should help to prevent misunderstandings.
Documentation Templates
Every project will produce documentation such as a Project Management Plan containing all the various strategies for risk, quality, communications, work breakdown structures, cashflow forecasts etc. Other items such as the Business case will be required and there will always be a requirements for progress reports between the various team levels.

Each one of these key documents should be explained and document templates made available to provide a consistency of approach across all projects in the portfolio. It may also be useful to explain how these documents could be tailored to suit, for example, small projects that do not require the formality that may be applied to larger, or higher risk projects.

Specific techniques
A section detailing specific techniques that can be applied and used will be very useful to all team members. It will enable all team members to ensure that their knowledge levels are appropriate for the project concerned and seek further training and guidance if required. This could cover such items as:

- Stakeholder analysis
- Earned value management
- Motivation
- Leadership
- Team building
Section 6.9 Q2

*Explain five advantages or disadvantages of using a structured method.*

**Advantages.**

1. A structured method brings rigour and discipline to the management of projects within an organisation and provides a common language for project management terms. If the method is adopted across the organisation then all members of the organisation will understand the responsibilities associated with their role in the project.

2. The method will establish common documentation formats and all parties will know where to find the relevant information, e.g. some organisations have a Project Definition Document that clearly describes the project and its objectives and includes many elements normally included within the project management plan.

**Disadvantages.**

3. In some organisations the method can be implemented with too much rigour and instead of being a means to an end the method becomes a means in itself. This is particularly apparent on smaller projects where the need for rigour and discipline is much less when compared to a larger project but the same methods and processes are applied which makes the project process heavy.

4. Staff are not adequately trained in the method and its use. For a method to be effective requires all staff to understand how it must be applied. This is often not the case, particularly at senior management level. This can lead to people being unsure of their responsibilities, confusion arises and failure ensues.

5. Training in the method does not necessarily mean that people understand the techniques of project management such as scheduling, resourcing, risk management for example. As these basic points are missed projects continue to fail, the method is blamed and ceases to be used.
Governance of a Project - BoK Topic 6.10

Section 6.10 Q1

(a) State six principles of the governance of project management that would help avoid common causes of project failure.

NB all eleven principles have been stated for completeness – the question only asked for six and this requirement should be observed in the examination.

There are eleven principles of governance that are applicable to projects:

- The board has overall responsibility for governance of project management.
- The roles, responsibilities and performance criteria for the governance of project management are clearly defined.
- Disciplined governance arrangements, supported by appropriate methods and controls, are applied throughout the project life cycle.
- A coherent and supportive relationship is demonstrated between the overall business strategy and the project portfolio.
- All projects have an approved plan containing authorisation points at which the business case is reviewed and approved. Decisions made at authorisation points are recorded and communicated.
- Members of delegated authorisation bodies have sufficient representation, competence, authority and resources to enable them to make appropriate decisions.
- The project business case is supported by relevant and realistic information that provides a reliable basis for making authorisation decisions.
- The board or its delegated agents decide when independent scrutiny of projects and project management systems is required, and implement such scrutiny accordingly.
- There are clearly defined criteria for reporting project status and for the escalation of risks and issues to the levels required by the organisation.
- The organisation fosters a culture of improvement and of frank internal disclosure of project information.
- Project stakeholders are engaged at a level that is commensurate with their importance to the organisation and in a manner that fosters trust.

(b) For each of two distinct principles stated in part (a), explain the possible effects of NOT practising them.

Principle: The project business case is supported by relevant and realistic information that provides a reliable basis for making authorisation decisions.

The business case is the driver of a project as it provides the business justification for the project and states why the forecast time and effort is worth the expenditure. It must contain tangible business benefits that can be accurately measured and realised post project. If this is not done then the money spent on the project will be wasted as the reason and benefits for the project are lost in the “folklore” of the organisation.

The business case is also used to continually align the project with the business and provides a focus for the ongoing justification of the project and
will be used at key decision points to decide whether the project should continue. If this is not done the project becomes a “mastermind” project – “I’ve started so I’ll finish!” Again the effort and costs are wasted.

Principle: There are clearly defined criteria for reporting project status and for the escalation of risks and issues to the levels required by the organisation.

For any project to succeed it is essential that the risks faced by the project are identified, analysed and appropriate actions taken to mitigate the threats or maximize the opportunities. This often requires escalation to the sponsor and/or steering group. If the escalation process is not defined these decisions will not be made, opportunities will be missed and risks will occur increasing the project costs and timescales and ultimately lead to project failure.

Similarly, issues require immediate action. If they are not resolved they will become “showstoppers” and the project will fail. Clear lines of escalation are required and all parties need to be clear about, and accept, their responsibilities.

Finally, if clear reporting lines are not in place senior project staff, the sponsor and steering group will not have the right level of information to make decisions and this leads to extensive delays.
Communication - BoK Topic 7.1

Section 7.1 Q1

State ten factors that a project manager should consider to ensure that project communication is effective.

1. Clearly define the requirements of all stakeholders to make sure that all stakeholders are known, their position understood, and their needs noted in the communications plan.

2. Agree the communications plan with the stakeholders to ensure that the needs have been correctly understood and recorded – in other words get the foundations right before you start.

3. Build a feedback loop into the communications process so that communications can be evaluated to see that they are meeting the need.

4. Appropriateness of the information; for example is it too much or too little. If too much it will not be read - too little and it will be ignored.

5. Method of communications – electronic/hard copy/internet/intranet for example. Don’t send large multi-megabyte files – don’t assume everybody has broadband. It is very easy to fill an inbox and again this will devalue the communication.

6. Make sure the style is appropriate for the audience. A freeform chatty style may not be appropriate for senior management. Similarly, formal communications may not be appropriate for the team members. Don’t assume “one size fits all”.

7. Language. This is most important if dealing with teams from different countries and cultures. Ensure that the language is correct and does not cause offence. Don’t use local colloquialisms as these may not be understood, or may be mis-understood.

8. Regulatory requirements. In some projects formal representation to government bodies may be required, for example the local planning authority and in these cases a specified form of words or presentations may be needed. In one example in Scotland I had to fold the plans. The authority would not accept plans that were rolled in a tube and would send the application back and that would have delayed the application and the project.

9. Configuration management. If more than one version of a document is required then some form of version control is required and a formal process for issuing the updated versions and disposing and archiving of old version.

10. Jargon and acronyms. Beware of using technical jargon and acronyms in communications. Many people do not know what they mean but are afraid to ask. If jargon and acronyms must be used make sure they are defined.
Section 7.1 Q2

Describe six items that will typically be included in a project communication plan.

Within any project it is imperative that the communication needs of the stakeholders is clearly stated. The form for this statement is the communications plan, which will form part of the PMP and will be prepared following the stakeholder analysis.

Its content will vary from project to project and organisation to organisation but typically will include the following:

1. Stakeholder list including name, title, postal address, email and telephone number. This will ensure that all stakeholders are known and can be contacted. This is vital information for all members of the team.

2. Stakeholder involvement. This information will explain how the stakeholder is involved and may contain information about how the stakeholder should be contacted, e.g. only approach the sponsor after you have spoken to the project manager.

3. Reports/information required. Contains details of the information each stakeholder requires; it would inform the reader if a person needed a copy of a report for example.

4. Report/information provider. Tells the reader who is responsible for providing the information and the time and frequency at which the information is required.

5. Format of the communication. Will include how the information is gathered and distributed, e.g. email, formal reports, informal reports, oral, written and so forth.

6. Frequency of the communication. Explains how often the information is distributed, e.g. weekly, monthly, ad hoc.

It is important that the internal stakeholders (i.e. the project team) are included within this document.
Teamwork - BoK Topic 7.2
Section 7.2 Q1

c) List nine roles described by Belbin.
d) For each role listed state two strengths and one tolerable weakness.

Note: the following explanatory text is not required by the question. It is included to aid with revision.

In the 1970’s Meredith Belbin used business games to develop a way of describing the team roles assumed by individuals working together in a team environment. As a result of his work he identified nine distinct team roles. These are summarised below. He concluded that successful teams required a balanced mix of roles, not necessarily one of each type. There is no ‘best’ team role; everyone is different. However, it is claimed that everyone has a ‘preferred’ team role and a ‘secondary’ team role that they assume when working with someone with a greater preference, and a role (or roles) they should try to avoid. Each role has strengths and “tolerable” weaknesses.

Belbin’s Team Roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Strengths</th>
<th>Tolerable weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant</td>
<td>Creative, imaginative, unorthodox. Solves difficult problems.</td>
<td>Can be a weak communicator.</td>
</tr>
<tr>
<td>Resource Investigator</td>
<td>Extrovert, enthusiastic, communicative. Explores opportunities and develops contacts.</td>
<td>Tend to lose interest and enthusiasm.</td>
</tr>
<tr>
<td>Co-ordinator</td>
<td>Mature, confident, a good chairperson. Clarifies goals, promotes decision-making and delegates well.</td>
<td>Not necessarily the cleverest members of a team.</td>
</tr>
<tr>
<td>Shaper</td>
<td>Challenging, dynamic and thrives on pressure. Has the drive and courage to overcome obstacles.</td>
<td>Can be aggressive and impatient.</td>
</tr>
<tr>
<td>Monitor Evaluator</td>
<td>Sober, strategic and discerning. Sees all the options. Judges accurately.</td>
<td>Can be over serious or too critical.</td>
</tr>
<tr>
<td>Team Worker</td>
<td>Co-operative, mild, perceptive and diplomatic. Listens, builds, averts friction and ‘calms the waters’.</td>
<td>They may be indecisive in crunch situations.</td>
</tr>
<tr>
<td>Implementer</td>
<td>Disciplined, reliable, conservative and efficient. Turns ideas into practical actions.</td>
<td>May be resistant to new ideas until convinced of their merits.</td>
</tr>
<tr>
<td>Completer</td>
<td>Painstaking, conscientious, anxious. Searches out errors and omissions. Delivers on time.</td>
<td>May refuse to admit when “good enough” is “enough”</td>
</tr>
<tr>
<td>Specialist</td>
<td>Single-minded, self starting and dedicated. Provides knowledge and skills in rare supply.</td>
<td>Maintain focus on their area of specialism.</td>
</tr>
</tbody>
</table>
Section 7.2 Q2

Explain five stages of team development using a recognised model.

Effective team working develops over time. During that period a lot of learning and development takes place and the team collectively goes through a number of developmental phases, classically referred to as Forming, Storming, Norming and Performing. Latterly, for completeness within a project management environment, an Adjourning stage has been included.

Stage 1: Forming

This initial stage establishes the foundations upon which the team is ‘constructed’ or developed. Typically, team members are unsure of both their individual objectives and the overall team objectives. They therefore look to each other and the leader for direction and guidance.

Stage 2: Storming

During this stage team members begin to understand the task, and may perhaps realise that it is more difficult than they imagined. They are likely to be uncertain about their own individual objectives and become defensive. If not well managed, competition between team members may give rise to conflict.

Stage 3: Norming

During this third stage, team members begin to identify with the team and reconcile their differences. They begin to realise that if the team succeeds they all succeed and if the team fails they all fail. As a result, competitive relationships become more co-operative and team members begin to learn from each other.

Stage 4: Performing

At this stage, team members have reconciled most of their differences and communicate openly within the team. They should now be committed to one another and their objective. As a result, a lot of work gets done, quickly and efficiently (i.e. the sum is now greater than the parts).

Stage 5: Adjourning/Mourning

This stage is about learning from experience. Both the organisation and individuals have a lot to gain from this stage. For example, maintenance of the corporate knowledge base, updating CVs and Continuous Professional Development (CPD).
Leadership - BoK Topic 7.3

Section 7.3 Q1

*Explain the difference between motivators and hygiene factors.*

Maslow expressed this concept in terms of a hierarchy of needs. He identified five levels as shown below.

**Maslow’s Hierarchy of Needs**

```
Maslow's Hierarchy of Needs

Self - actualisation
Achievement, Leadership
Companionship, Belonging
Safety, Protection, Savings
Sleep, Food, Shelter
```

This can be adapted for a project situation to give a hierarchy such as that portrayed below:

**Project Hierarchy of needs.**

```
Project Hierarchy of needs

Success
Recognition of effort
Team building
Processes, procedures, safety instructions
Site facilities, welfare, offices infrastructure
```

The first three levels of Maslow’s hierarchy are concerned with ‘Extrinsic Factors’. That is, the working environment, not with the content of the work. Herzberg called these ‘hygiene factors’ and they have the following attributes:

- They are not a potent source of satisfaction
- Their absence is the cause of dissatisfaction
- Their impact on attitudes is relatively short-lived
• They are ‘inflationary’.

This is why the ‘carrot and stick’ approach doesn’t work for very long.

Factors predominantly associated with satisfying ‘higher order needs’ tend to be ‘Intrinsic Factors’, that is, those concerned with the content of the work. They have the effect of motivating higher performance.

Herzberg called these ‘motivators’ and they have the following attributes:

• Their absence is less likely to cause complaint or dissatisfaction
• Their absence causes a lack of satisfaction which leads to apathy and lack of interest and initiative
• Their presence is likely to be highly motivational.

Herzberg suggests the need for a two-pronged approach that removes factors that distract from performance such as discriminatory promotion policies, unfair salary systems, poor working conditions, and poor management.

Then seek out ways that enable employees to get more recognition, challenge, self-fulfilment and satisfaction from their work.
Section 7.3 Q2

*Explain a situational leadership model and show how it may be applied as a team develops. Include a diagram in your answer.*

**Situational Leadership styles and the Tuckman model**

![Diagram showing situational leadership styles and the Tuckman model]

In the diagram above M1 – M4 relate to the maturity of the team member with respect to the task.

At M1 the team member may lack the expertise to undertake the work or may not have done that type of work before. At this time s/he will require detailed information and about what to do and will require regular checks. This needs a “telling” style of leadership (S1). This is often the case for team members when the team has just formed – the Tuckman level “forming”.

As the team members become more familiar with the tasks involved and become more confident they move to M2 and the leader must change their style to concentrate less on the task requirements and more on the relationship with the individuals and the team – style S2 “Selling”. This is often the position as the team is storming, finding its feet and the best fit for the team members. Work is getting done but there may be some conflict but to get the team to the norming stage the leader must concentrate on the people rather than the task – the Tuckman level “storming”.

As the team members find their positions within the team, increase in confidence and their abilities to do the task, they move to M3 and the leadership style moves to S3 “participating” where the leader and the team members share decision-making and members can contribute towards the team’s success. This will be the case in the norming stage of team development in the Tuckman model.

Finally, as the team starts to perform and enters the performing stage the leader can adopt a delegating style of leadership (S4) as the members have reached the M4 level of maturity and are capable of “running their own show”. The team become self-directed and has reached the performing stage of the Tuckman model.

If the team changes then the leadership style may also have to change to reflect the change in status of the team. Individuals may also move up and down the M1 – M4 spectrum if new tasks are introduced where staff have little or no experience and again the leadership style must change to accommodate this.
Conflict Management - BoK Topic 7.4

Section 7.4 Q1

Explain five different approaches that could be used in a conflict situation and give an example of when each approach would be relevant.

NB. The answer given below is longer than you could expect to complete within 15 minutes but it does give some extra detail that will aid your revision.

The grid above details 5 methods of dealing with conflict. It comes from the work undertaken by Kenneth Thomas (1975).

Conflict Handling Modes – Competing

An individual pursues his own concerns at the other person's expense.

This is a power-oriented mode in which an individual uses whatever power seems appropriate to win his or her own position. Examples include ability to argue, economic sanctions and their rank or position. Competing might mean "standing up for your rights" or defending a position that you believe is correct. Alternatively, it may be simply about trying to win.

This mode would be most suitable when the team is going through high levels of conflict, for example in the "forming" and particularly "storming" phase. In order to get the work done decisions must be made and the team leader may use this style to get things moving and then move into other areas to help the team get to the "norming" stage.

Conflict Handling Modes – Collaborating

This mode is also known as Problem Solving.

Collaborating involves an attempt to work with the other person to find some solution that fully satisfies the concerns of both individuals. It means digging into an issue to identify the underlying concerns of the two people (or groups) involved in order to find an alternative that meets both sets of concerns. Collaborating between two persons might take the form of exploring a disagreement to learn from each other’s insights, concluding to resolve some condition which would otherwise have them competing for resources, or confronting and trying to find a creative solution to an interpersonal problem.

This mode is most appropriate when problems occur – perhaps it is not possible to complete the work in the way planned and different solutions are required. An example would be when a project issue is raised.

Conflict Handling Modes - Compromising

The objective is to find some expedient, mutually acceptable solution that partially satisfies both parties.
Compromising falls on a middle ground between competing and accommodating. It gives up more than competing but less than accommodating. Likewise, it addresses an issue more directly than avoiding, but doesn't explore it in as much depth as collaborating. Compromising might mean splitting the differences, exchanging concessions, or seeking a quick middle ground position.

This would be most useful when neither party feels strongly about a problem and both would move in some way to get the work completed, for example if overtime were required it might mean payment and time off in lieu.

**Conflict Handling Modes – Avoiding**

The individual does not immediately pursue his or her own concerns or those of the other person. The individual concerned does not address the conflict.

Avoiding might take the form of diplomatically sidestepping an issue, postponing an issue, or simply withdrawing from a threatening situation.

This is likely to occur during the storming stage when it may be necessary for both parties to avoid the conflict, make progress with the project, and then move to a collaborative approach when they are surer of their ground and position in the team.

**Conflict Handling Modes – Accommodating**

When accommodating an individual neglects his or her own concerns in order to satisfy the concerns of the other person; there is an element of self-sacrifice in this mode. Accommodating might take the form of selfless generosity or charity, obeying another person's order when one would prefer not to, or yielding to another's point of view.

For example, one party may feel that the team leader is taking a course of action that is inappropriate but in the interests of longer term relationships it would not be appropriate to stand one's ground. This could easily occur in the storming stage of team building when the leader is “competing”.

**Specific Example:**

If a customer complained about some aspect of the project, it may be initially best to adopt the accommodating approach with the customer, use competing with the team to rectify the situation and then use collaboration to ensure the problem did not occur again.

Compromise with the customer may be necessary if some form of recompense was required.

It would not be appropriate to use “avoiding” in this situation, as the situation must be resolved.
Section 7.4 Q2

Explain five impacts of avoiding conflict and not resolving it and include a relevant example.

If conflict is avoided then it can lead to:

1. An escalation of the conflict situation between the parties concerned. As the conflict escalates it will become progressively more difficult to deal with and may result drastic action being taken. For example if there was some dissatisfaction amongst the labour force and this was not resolved it could escalate into strike action.

2. Team formation going backwards. If conflict within a team is avoided then the team will move back through the model to the storming stage. This will lead to inefficiencies, poor team motivation and increased stress to all concerned, which could have the potential for sickness absences and increased costs and delays.

3. Increased costs. Avoidance of conflict may mean that the project is being undertaken in an inefficient manner because the team leader or project manager is not prepared to tackle the situation. This will ultimately lead to failure and poor team motivation compounding the situation further.

4. Loss of respect. By not tackling a problem or conflict situation the project manager or team leader is likely to lose the respect of his/her team. This will make it difficult to compete the project in a satisfactory manner and could lead to further conflict throughout the project life-cycle.

5. Removal from the team. Avoidance of conflict often leads to its escalation and it becomes more difficult to resolve. The final option may well be to remove the persons concerned from the project team entirely. This affects the individuals concerned and the rest of team who, in many cases, have "taken sides". This is going to make resolution and further team building as the personnel are replaced that much more difficult.
Negotiation - BoK Topic 7.5

Section 7.5 Q1

Explain four stages that an effective negotiation should progress through.

A structured process gives the negotiator a framework and some checks on progress.

**Preparation.** During the preparation stage it is important for the negotiators to understand the issue/problem, study relevant material, learn about opponents’ objectives (if possible) and this should avoid surprises, anticipate opponents’ strategies, define their own objectives and priorities, define their own negotiating strategy and allocate roles and responsibilities. This will include deciding which member of the team will lead the negotiation, the member who is to take notes and the member who will observe. The team should establish what they are prepared to trade and establish their “bottom line”. As well as deciding upon their “bottom line” the team should also anticipate the other party’s “bottom line” and areas of potential trade.

**Discuss.** Trade information and check any assumptions you have made about the other party. At this point you may have to change your expectations in light of some information gained from the other party. You should also be looking for signals from the other party as to interest points and areas they will not discuss. Time spent at this step will assist the process later. This will involve the note taker in keeping notes of the discussions made, any phrases that may indicate that the other party is prepared to trade (e.g. “normally”, “mostly we..”, there may be possibilities”). The observer should be concentrating on the responses of the other party to the statements made during the discussion. It is often useful after this step to take a short break so that the information gathered by the negotiator, observer and note taker can be analysed and the negotiation strategy improved.

**Propose and bargain.** The opening bids. These should be made in the expectation of a counter bid. If they get rejected then you have missed something in the discuss step, go back. If a counter bid is made then you move into bargaining to get closer to a deal. Opening and later bids should always be made in format of “If you ….. then we….” followed by counter-proposals, adjusting till you come to an acceptable agreement. During this stage it is again useful to break off to analyse the information gained by the team. This also stops hasty decisions being made and can lead to a better deal for all concerned.

**Closing.** It is important to confirm the agreement and record the results of the negotiation. This should be a written record that all parties can sign and leave the negotiating table with an accurate and complete record of the agreement achieved. This is most important, as you want to avoid any comeback or misunderstandings later. When the agreement is written up both parties should be prepared to scrutinise it carefully and make sure that the common agreement reached orally has been transcribed accurately into the written form. This may require some minor adjustments until the final document is agreed.