

4(a)(i)	Using Figure 1.1: calculate the total float for activity C Total float is the maximum time an activity can be delayed without delaying the whole project time or LFT – duration – EST OR LST – EST (1 mark) Total float = 80 – 40 – 30. (2 marks) = 10 weeks (3 marks) No need for weeks																												
4(a)(ii)	Identify the minimum project duration. Sum durations of critical path: 40 + 60 + 10 + 5 = 115 weeks (1 mark) No need for weeks																												
4(b)	Evaluate the importance of Critical Path Analysis (CPA) to the success of the hard rock mine. <table border="1"> <thead> <tr> <th>Level</th><th>AO1 Knowledge and understanding 2 marks</th><th>AO2 Application 2 marks</th><th>AO3 Analysis 2 marks</th><th>AO4 Evaluation 6 marks</th></tr> </thead> <tbody> <tr> <td>3</td><td></td><td></td><td></td><td> 5–6 marks Developed evaluation in context - A developed judgement/conclusion is made in the business context. - Developed evaluative comments which balance some key arguments in the business context. </td></tr> <tr> <td>2</td><td> 2 marks Developed knowledge of relevant key term(s) and/or factor(s) is used to answer the question. </td><td> 2 marks Developed application of relevant point(s) to the business context. </td><td> 2 marks Developed analysis that identifies connections between causes, impacts and/or consequences. </td><td> 3–4 marks Developed evaluation - A developed judgement/conclusion is made. - Developed evaluative comments which balance some key arguments. </td></tr> <tr> <td>1</td><td> 1 mark Limited knowledge of relevant key term(s) and/or factor(s) is used to answer the question. </td><td> 1 mark Limited application of relevant point(s) to the business context. </td><td> 1 mark Limited analysis that identifies connections between causes, impacts and/or consequences. </td><td> 1–2 marks Limited evaluation - A judgement/conclusion is made with limited supporting comment/evidence. - An attempt is made to balance the arguments. </td></tr> <tr> <td>0</td><td> 0 marks No creditable response. </td><td> 0 marks No creditable response. </td><td> 0 marks No creditable response. </td><td> 0 marks No creditable response. </td></tr> </tbody> </table>				Level	AO1 Knowledge and understanding 2 marks	AO2 Application 2 marks	AO3 Analysis 2 marks	AO4 Evaluation 6 marks	3				5–6 marks Developed evaluation in context - A developed judgement/conclusion is made in the business context. - Developed evaluative comments which balance some key arguments in the business context.	2	2 marks Developed knowledge of relevant key term(s) and/or factor(s) is used to answer the question.	2 marks Developed application of relevant point(s) to the business context.	2 marks Developed analysis that identifies connections between causes, impacts and/or consequences.	3–4 marks Developed evaluation - A developed judgement/conclusion is made. - Developed evaluative comments which balance some key arguments.	1	1 mark Limited knowledge of relevant key term(s) and/or factor(s) is used to answer the question.	1 mark Limited application of relevant point(s) to the business context.	1 mark Limited analysis that identifies connections between causes, impacts and/or consequences.	1–2 marks Limited evaluation - A judgement/conclusion is made with limited supporting comment/evidence. - An attempt is made to balance the arguments.	0	0 marks No creditable response.	0 marks No creditable response.	0 marks No creditable response.	0 marks No creditable response.
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4(b)	Responses may include: AO1 Knowledge and understanding <i>Limited knowledge</i> K will be demonstrated through knowledge of CPA. <i>Developed knowledge</i> K + K will be demonstrated through knowledge of CPA and its usefulness. - Knowledge of CPA: network, EST, LFT, floats, nodes, minimum duration, critical path. - Benefits of CPA: calculation of project duration - knowing when activities should start - knowing latest finish times - knowing critical path - knowing floats. - Limitations of CPA: - analysis only as good as the data. - new projects may not have past experience as a guide - planning costs. - does not ensure effective management. - Knowledge of other factors: availability of finance, materials and equipment. - Investment appraisal methods also needed to assess financial criteria for success. - Business objectives matching project aims. AO2 Application <i>Limited application</i> APPI applies knowledge to LBM once. <i>Developed application</i> APPI APPI applies knowledge to LBM twice. Application is making use of relevant case information not just repeating it. - Hard rock mine follows the hot water mine, which will be nearing completion of building and about to start production. - need to buy equipment for drilling and factory. - data for CPA from partners, suppliers and R and D. - Minimum project duration is just over two years. - CPA relates to the complex sequence of activities (A to H) involved in establishing the hard rock mine. - The planned start of the mine is in two years' time (104 weeks), but the calculated duration is 115 weeks. - CPA uses data obtained from mining industry sources and the LBM Research and Development (R&D) team. - Lithium is found 500 metres underground. - Activity C (Obtain drilling machinery) has 15 weeks of float.
4(b)	AO3 Analysis <i>Limited analysis</i> AN – candidate shows one link in the chain of analysis. <i>Developed analysis</i> L2AN – candidate shows two or more links in the chain of analysis. - CPA identifies the critical activities (A-H route through nodes 1–2–4–5–7–8, for example) which, if delayed, will delay the whole project duration. This allows LBM, a new mining operator, to focus its limited resources and management supervision on these tasks AN, thereby preventing cost overrun L2AN. - CPA reveals that the current duration (115 weeks) already exceeds the planned start time (2 years/104 weeks). This forces LBM to find ways to shorten the duration to meet the original target AN, maximising early revenue generation L2AN. - The calculation of float (e.g., 15 weeks for activity C) enables Astor to reallocate resources away from non-critical tasks to critical ones AN, helping to reduce the overall project duration and improving efficiency L2AN. - As this is the first mining activity for LBM there is no past experience to rely on therefore the data may be inaccurate AN. AO4 Evaluation <i>Limited evaluation</i> EVALL – limited supported judgement and/or a weak attempt at evaluative comment. <i>Developed evaluation</i> L2EVALL – supported judgement and/or reasonable evaluative comment. <i>Developed evaluation in context</i> L3EVALL – supported judgement in context and/or reasonable evaluative comment in context. - Supported judgement as to the importance of CPA. - CPA is highly important for the success of the hard rock mine because the project is complex and already forecasted to be delayed (115 weeks vs 104 weeks goal). CPA provides the necessary planning and monitoring framework to potentially shorten this delay and secure timely revenue. - Factors that the impact might depend on: - CPA relies entirely on the accuracy of time estimates provided by the R&D team and suppliers. If these estimates are inaccurate (e.g., optimistic), the critical path may be wrong, leading LBM to misallocate resources and still fail to achieve the minimum duration. - CPA must be continuously monitored and updated as the project progresses to account for unexpected operational difficulties (e.g., drilling 500m underground). - Project success also depends on availability of finance, equipment and appropriate employees. Without them the project is less or not likely to succeed.

4(b)	Accept all valid responses Exemplar L3 Evaluation The benefit of CPA is limited by its reliance on assumptions. CPA's success depends entirely on the accuracy of the time estimates for activities like D (Install drilling machinery) and E (Test drill exercise), which were obtained from mining industry sources and the LBM Research and Development (R&D) team. Since LBM is a new operator in Country G, and the scale of this project (drilling 500 m) is complex, these estimates may be overly optimistic or inaccurate. If the critical path calculation is flawed, LBM might misallocate resources, potentially causing unnecessary delays in the 115-week plan or wasting scarce finance.
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3(a)	Using the data in Table 1.1, calculate the average monthly labour productivity for January to May 2025. Average monthly labour productivity = Total output / Number of employees OR 90 000 / 480 (1) 187.5 (2) OR 188 (2)			
3(b)	Using the data in Table 1.1, calculate the percentage of output that failed to meet quality standards for January to May 2025. Percentage failing to meet quality standards / output × 100 OR 15 000 / 90 000 × 100 (1) 16.67% OR 16.7% OR 17% (2) Accept 16.66% and 16.6% (2)			
3(c)	Evaluate the best approach for WS to improve the performance of its production employees.			
	Level	AO1 Knowledge and understanding 2 marks	AO2 Application 2 marks	AO3 Analysis 2 marks
	3			5–6 marks Developed evaluation in context - A developed judgement/conclusion is made in the business context. - Developed evaluative comments which balance some key arguments in the business context.
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3(c)	Indicative content AO1 Knowledge and understanding <i>Limited knowledge [K] will be demonstrated through knowledge of measures of performance.</i> <i>Developed knowledge [K] + [K] will be demonstrated through knowledge of measures of performance <u>and</u> knowledge of how to improve performance of production employees.</i> - Employee performance measured by productivity, absenteeism, labour turnover, accident rates, wastage/product rejection rates. - HRM components: motivation, management styles. - Reference to theories on motivation including: Taylor, Mayo, Herzberg and Maslow - Possible techniques to improve performance include: - Providing better equipment and training. - Appropriate motivation techniques for employees. - Realistic informed target setting. - Bonus payments for production/waste targets. - Facilitating employee participation in decision making and/or working arrangements. AO2 Application <i>Limited application, [APP] applies knowledge to WS once.</i> <i>Developed application, [APP] + [APP] applies knowledge to WS twice.</i> - Batch production on assembly lines. - Information from Table 1.1 showing employee performance measures. - Increase in number of units failing to meet quality standards. - Increase in labour turnover. - Increase in number of accidents. - Use of bullet points on employee performance. - Wages 10% more than industry average. - Complaints about production targets. - On-the-job training. - Limited opportunities for career progression. - Strict management style.
3(c)	AO3 Analysis <i>Limited analysis [AN] – candidate shows one link in the chain of analysis.</i> <i>Developed analysis [L2/AN] – candidate shows two or more links in the chain of analysis</i> Chains of reasoning developing how techniques will impact performance: - Bonuses for achievement of production targets will provide a financial incentive for production employees encouraging them to be more focused on increasing output and therefore increasing productivity. - Off the job training could make employees feel more valued and increase skills therefore improving motivation and quality of work which will reduce the number of defects and lead to higher output. - Empowering workers to make more decisions about their working day will reduce the conflict caused by the current strict management style and have a positive impact on motivation therefore resulting in a reduction in labour turnover. - Possible reasons for decreased performance include: - Little training 'expected to learn on job', non-participation in decision making 'follow instructions', complaints about targets. - Limited opportunities for progression. - All measures in Table 1.1 show decreasing performance. - Pay does not seem to be a factor 'paid 10% more than industry average'. AO4 Evaluation <i>Limited evaluation [EVAL] – limited supported judgement and/or a weak attempt at evaluative comment.</i> <i>Developed evaluation [L2/EVAL] – supported judgement and/or reasonable evaluative comment.</i> <i>Developed evaluation in context [L3/EVAL] – supported judgement in context and/or reasonable evaluative comment in context.</i> Justified recommendations based on analysis include: - More and better training for employees and supervisors. - More participation in decision making. - More freedom to carry out tasks as employees decide. - More motivation techniques to be applied e.g. regular appraisals, non-financial motivators. - Clear realistic targets set, possibly with bonuses for meeting them. - Regular meetings with employees and/or their representatives. - Balanced argument on the advantages and disadvantages of a given approach. - Weighting of advantages and disadvantages of a given approach. Accept all valid responses