



IB Demystified

Mathematics: Applications and Interpretation HL

Paper 1 | Mock Examination

Mock Exam 1

Calculator: A graphic display calculator (GDC) is required

Time allowed: 2 hours

Maximum mark: 110 marks

Candidate name:

Session number:

Date:

Information for Candidates

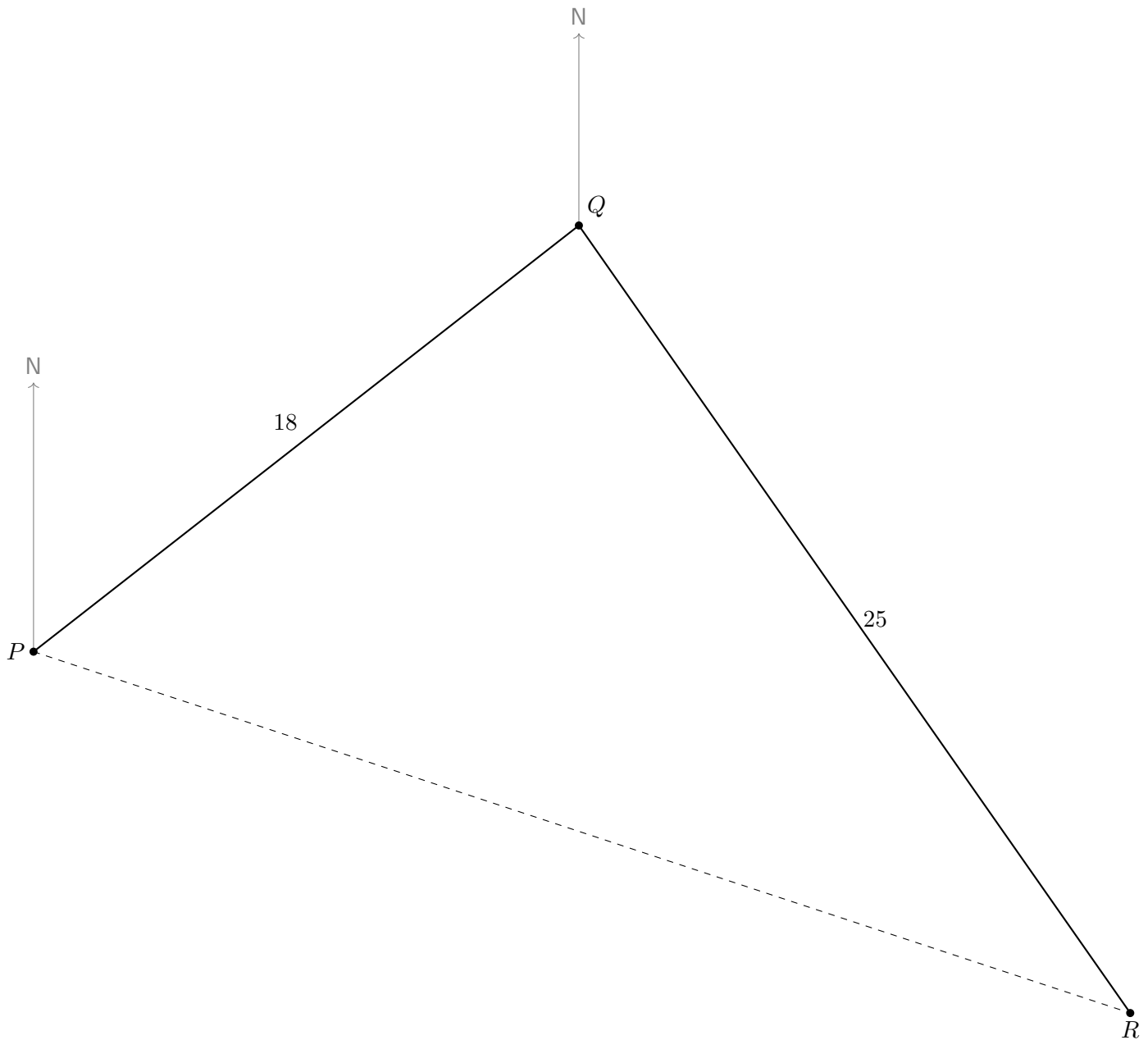
- A graphic display calculator is required throughout this paper.
- You may use one clean copy of the *Mathematics: Applications and Interpretation HL* formula booklet.
- Attempt every question. Write each response in the working space provided for that question.
- Unless a question states otherwise, give numerical answers either exactly or rounded to three significant figures.
- Where a question concerns an amount of money, give your answer to two decimal places unless told otherwise.
- Any answer obtained from a calculator must be accompanied by appropriate supporting working.
- If you use a graph to reach an answer, include a sketch or a clear description of the graphing method you used.
- Answers stated without supporting working may not receive full marks.
- The maximum mark for this paper is **110 marks**. The time allowed is **2 hours**.

Full marks are not necessarily awarded for a correct answer with no working. Where an answer is incorrect, some marks may be awarded for a correct method, provided this is shown by written working. You are therefore advised to show all working.

■ Question 4

[Maximum mark: 7]

coastguard vessel leaves port P and sails on a bearing of 052° for 18 km to reach a buoy Q . It then changes course and sails on a bearing of 145° for 25 km to reach a marker R .



- (a) Find the distance PR . [3]
- (b) Find the bearing of R from P . [2]
- (c) The vessel then sails directly from R back to P . Find the bearing on which it must sail. [2]

Question 5

[Maximum mark: 8]

The mass, in grams, of apples produced by an orchard is modelled by a normal distribution with mean 165 g and standard deviation 22 g.

- (a) An apple is classified as *premium* if its mass exceeds 180 g. Find the probability that a randomly chosen apple is premium. [2]
- (b) Apples with a mass below 140 g are rejected. Find the probability that a randomly chosen apple is rejected. [2]
- (c) Find the mass m such that 90% of all apples have a mass greater than m . [2]
- (d) A box contains 12 apples, chosen at random. Find the probability that exactly 4 of them are premium. [2]

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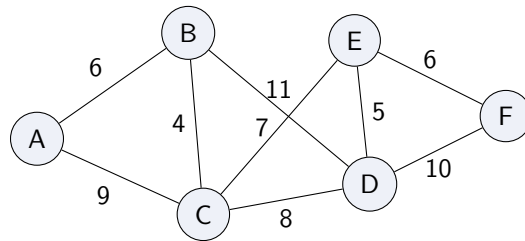
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Question 10

[Maximum mark: 9]

delivery company connects six depots, A, B, C, D, E, F , by direct roads. The graph below shows the roads and their lengths in kilometres.



- (a) Using a suitable algorithm, find a minimum spanning tree for this network and state its total length. [3]
- (b) Find the length of the shortest route from depot A to depot F , and state the route. [3]
- (c) Determine whether it is possible for a driver to travel along every road exactly once. Justify your answer, and if it is possible, state where such a route must start and finish. [3]

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Question 12

[Maximum mark: 9]

concert sells three types of ticket: *standard* (x tickets), *premium* (y tickets) and *VIP* (z tickets). The organisers record the following.

- A total of 420 tickets are sold.
- Standard tickets cost \$40, premium tickets \$75 and VIP tickets \$150, for a total revenue of \$36 300.
- The number of premium tickets sold is 60 more than the number of standard tickets sold.

- (a) Write this information as a system of three linear equations in x , y and z . [2]
- (b) Write the system in the form $M\mathbf{v} = \mathbf{b}$, where M is a 3×3 matrix. [2]
- (c) Use your calculator to find the number of each type of ticket sold. [3]
- (d) Find $\det(M)$ and explain what its value tells you about the solution to the system. [2]

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Question 13

[Maximum mark: 7]

quality engineer tests a random sample of 10 batteries of a certain type. For this sample, the mean lifetime is 41.2 hours and the standard deviation of the sample, s_n , is 3.6 hours.

- (a) Find an unbiased estimate of the variance of the lifetimes of all batteries of this type. [2]
- (b) Assuming the lifetimes are normally distributed, find a 95% confidence interval for the mean lifetime of all batteries of this type. [3]
- (c) The manufacturer claims that the mean lifetime is 45 hours. Using your interval from part (b), comment on whether this claim is plausible. [2]

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