

Edexcel IAL D1 Decision Mathematics 1 Practice Exam: Mark Scheme

Pearson Edexcel International A Level Mathematics · 14 questions · 59 marks

- M marks are for a correct method; A marks for an accurate answer that follows a correct method; B marks are independent of method.
- Accept any correct method that reaches a correct answer, unless the question says which method to use.
- Practise these topics online with instant feedback: alevelmathrevision.com/alevel-frontend/alevel-unit.html?course=ial&unit=9

Question 1

2 marks

Sum of degrees = $14 = 2 \times$ number of edges **M1**

7 edges **A1**

Final answer: 7

Question 2

2 marks

A cycle visiting every vertex exactly once, e.g. $A - B - E - F - C - D - A$ **M1 A1**

Final answer: e.g. A-B-E-F-C-D-A

Question 3

3 marks

1. B and D : the only vertices of odd degree **B1**

2. No arc needs to be repeated **M1**

49 **A1**

Final answer: a) B and D ; b) 49

Question 4

4 marks

Quotients 22, 11, 5, 2, 1, 0 **M1 A1**

Remainders 1, 0, 1, 1, 0, 1 **A1**

Output 101101 **A1**

Final answer: 101101

Question 5

4 marks

1. $7 + 6 + 5 + 4 + 3 + 2 + 1$ **M1**

28 **A1**

2. Every comparison finds a pair in the wrong order **M1**

28 swaps **A1**

Final answer: a) 28; b) 28



Question 6

4 marks

Full bins: $9 + 6$, $8 + 7$, $5 + 10$, $4 + 11$ **M1 A1 A1**

Total $60 = 4 \times 15$, so 4 bins is the lower bound: optimal **B1**

Final answer: $9+6$, $8+7$, $5+10$, $4+11$ (4 bins, optimal)

Question 7

4 marks

A, then C (AC 5), D (CD 6) **M1 A1**

E (DE 3), B (DB 4) **A1**

Weight 18 **A1**

Final answer: A, C, D, E, B; weight 18

Question 8

4 marks

Final values S 0, A 5, B 8, D 12, C 13, T 19 **M1 A1 A1**

Route $S - A - B - D - C - T$, length 19 **A1**

Final answer: S–A–B–D–C–T, 19

Question 9

4 marks

$x + y \geq 30$ **B1**

$y \leq 50$ **B1**

$x \geq 0.2(x + y)$ **M1**

$4x \geq y$ **A1**

Final answer: $x + y \geq 30$, $y \leq 50$, $4x \geq y$

Question 10

5 marks

1. A 2, C 7, D 4, F 7, H 1 **M1 A1 A1**

2. D has float $4 \geq 3$: no effect **B1**

H has float 1: the project is delayed by 2 hours, to 20 hours **B1**

Final answer: a) A2, C7, D4, F7, H1; b) D: none; H: +2 hours

Question 11

5 marks

$B = 11$ odd: $C = 13$; $A = 26$, $B = 5$ **M1 A1**

$B = 5$ odd: $C = 39$; $A = 52$, $B = 2$; $B = 2$ even; $A = 104$, $B = 1$ **A1**

$B = 1$ odd: $C = 143$; $B = 0$: output 143 **A1**

It multiplies A by B **B1**

Final answer: 143; it multiplies A by B

Question 12

5 marks

1. Final values S 0, B 4, A 5, C 7, D 12, E 12, T 18 **M1 A1 A1**

2. $S - B - C - E - T$, 18 **A1**

3. Trace back from T : an arc XY is on the route if (final value of Y) – (final value of X) = weight of XY **B1**

Final answer: a) S 0, B 4, A 5, C 7, D 12, E 12, T 18; b) S–B–C–E–T, 18



Question 13

6 marks

1. $7 + 3, 8 + 2, 5 + 5, 6 + 4, 9 + 1$ **M1 A1**

Total 50, so at least 5 bins: optimal **A1**

2. bin 1: 9, 1; bin 2: 8, 2; bin 3: 7, 3; bin 4: 6, 4; bin 5: 5, 5 **M1 A1 A1**

Final answer: a) 5 full bins; b) bin 1: 9, 1; bin 2: 8, 2; bin 3: 7, 3; bin 4: 6, 4; bin 5: 5, 5

Question 14

7 marks

1. Earliest starts: A 0, B 0, C 6, D 6, E 4, F 9, G 11, H 13 **M1 A1**

$13 + 5 = 18$ days **A1**

2. Latest finishes: A 6, B 4, C 9, D 9, E 11, F 13, G 13, H 18 **M1 A1**

Every activity has float $LF - ES - \text{duration} = 0$ **A1**

3. The paths $A - D - F - H$ and $B - E - G - H$ still take 18 days **B1**

Final answer: a) 18 days; b) all floats 0

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