

IGCSE Maths 4MA1 Statistics, Vectors, Proof and Calculus Practice Exam: Mark Scheme

Pearson Edexcel International GCSE Mathematics A (4MA1), Higher tier · 17 questions · 49 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: [igcsemathrevision.com/igcse-unit.html?course=igcse&unit=6](https://www.igcsemathrevision.com/igcse-unit.html?course=igcse&unit=6)

Question 1

1 mark

B1 33

Final answer: 33

Question 2

2 marks

M1 uses $2k$ for the even number and $2n + 1$ for the odd number and multiplies: $2k(2n + 1)$

A1 $2k(2n + 1) = 2(2kn + k)$, which is $2 \times$ an integer, so even

Final answer: $2k(2n + 1) = 2(2kn + k)$, $2 \times$ an integer, so even (proved)

Question 3

2 marks

M1 median is about the 60th value ($120 \div 2$)

A1 $160 < h \leq 165$

Final answer: $160 < h \leq 165$

Question 4

2 marks

M1 $5n + 15 - 3n - 15$

A1 $2n$, a multiple of 2, so even

Final answer: $2n$, so even (shown)

Question 5

2 marks

M1 $v = 12t^2 - 2$

A1 46 m/s

Final answer: 46 m/s

Question 6

3 marks

M1 $n(A \cup B) = 90 - 22 = 68$

M1 $48 + 35 - 68$

A1 15

Final answer: 15



Question 7**3 marks**

M1 $AB = b - a$

M1 $OP = a + \frac{1}{4}(b - a)$

A1 $\frac{3}{4}a + \frac{1}{4}b$ oe

Final answer: $\frac{3}{4}a + \frac{1}{4}b$

Question 8**3 marks**

M1 $25n^2 + 10n + 1 - (n^2 + 10n + 25)$

A1 $24n^2 - 24$

A1 $24(n^2 - 1)$, a multiple of 24

Final answer: $24n^2 - 24 = 24(n^2 - 1)$ (proved)

Question 9**2 marks**

M1 $n(A \cup B) \leq 40$, so $n(A \cap B) \geq 25 + 22 - 40$

A1 7

Final answer: 7

Question 10**3 marks**

M1 cumulative frequency at 22 hours: $118 + (2/5) \times 55 = 140$

M1 $200 - \text{their } 140$

A1 60 (accept 57 to 63 from a graph)

Final answer: 60

Question 11**3 marks**

M1 $(2n + 1)^2 + 7 = 4n^2 + 4n + 8$

M1 $4n(n + 1) + 8$

A1 $n(n + 1)$ is a product of consecutive integers, so even; so $4n(n + 1)$ is a multiple of 8, and adding 8 gives a multiple of 8

Final answer: $(2n + 1)^2 + 7 = 4n(n + 1) + 8$, with $n(n + 1)$ even, so a multiple of 8 (proved)

Question 12**3 marks**

M1 $(n + 3)^3 = n^3 + 9n^2 + 27n + 27$ or $(n + 1)^3 = n^3 + 3n^2 + 3n + 1$

M1 $6n^2 + 24n + 24$

A1 $6(n^2 + 4n + 4) = 6(n + 2)^2$, and $n + 2$ is an integer

Final answer: $6n^2 + 24n + 24 = 6(n + 2)^2$, 6 times the square of the integer $n + 2$ (proved)



Question 13**3 marks**

M1 $v = 6t^2 - 30t + 36$

M1 $a = 12t - 30$

A1 -18 m/s^2

Final answer: -18 m/s^2

Question 14**4 marks**

M1 $OQ = 4a + \frac{3}{4}(4b - 4a) = a + 3b$

A1 $PQ = -a + 3b$

M1 $PR = -2a + 6b$

A1 $PR = 2PQ$, so PQ and PR are parallel and share the point P: P, Q, R are collinear

Final answer: (a) $-a + 3b$ (b) $\overrightarrow{PR} = -2a + 6b = 2\overrightarrow{PQ}$, parallel with the common point P, so collinear (proved)

Question 15**4 marks**

B1 angle QPS + angle PSR = 180° (co-interior angles between parallel lines)

M1 angle TPS + angle TSP = $\frac{1}{2} \times 180^\circ = 90^\circ$ (T lies on both bisectors)

A1 angle PTS = $180^\circ - 90^\circ = 90^\circ$

B1 reasons given: co-interior angles add up to 180° ; angles in a triangle add up to 180°

Final answer: angle TPS + angle TSP = 90° , so angle PTS = 90° (proved)

Question 16**5 marks**

B1 $AB = AC$ (given), angle BAD = angle CAD (AD bisects angle BAC), AD common

B1 congruent (SAS)

M1 angle ADB = angle ADC (corresponding angles of congruent triangles) and they add up to 180° (angles on a straight line)

A1 each is 90° , so AD is perpendicular to BC

B1 $BD = 5$ ($BD = DC$ from the congruence), $AD = \sqrt{13^2 - 5^2} = 12 \text{ cm}$

Final answer: (a) congruent by SAS (proved) (b) angle ADB = angle ADC = 90° (proved) (c) 12 cm

Question 17**4 marks**

M1 $v = 3t^2 - 18t + 24$

M1 $3(t - 2)(t - 4) = 0$

A1 $t = 2$ and $t = 4$

A1 22 m and 18 m

Final answer: 22 m ($t = 2$) and 18 m ($t = 4$)

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