CALC C · MARK SCHEME

# GCSE Mathematics · Higher Tier

40 marks · 45 minutes · Calculator

**M** method **A** accuracy (depends on M) **B** independent **P** process **C** communication

oe or equivalent cao correct answer only ft follow through Accept any correct, fully justified method.

## Question 1

Reverse percentages · R9 · Ratio & proportion · AO1 · 2 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 1 | **£570** | **M1** | For $484.50 \div 0.85$, or $484.50 \div 85 \times 100$ |
| | | **A1** | cao |

## Question 2

Rearranging formulae · A5 · Algebra · AO1 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 2(a) | $a = \frac{2(s-ut)}{t^2}$ | **M1** | For a correct first step, e.g. $s - ut = \frac{1}{2}at^2$ or $2s = 2ut + at^2$ |
| | | **A1** | oe, e.g. $a = \frac{2s-2ut}{t^2}$ |
| 2(b) | **3.08** | **B1** | Accept 3.08 to 3.082 (from $62.4 \div 20.25 = 3.0814\ldots$) |

## Question 3

Scatter graphs · S6 · Statistics · AO1 · AO2 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 3(a) | **£11 000** | **M1** | For a line of best fit drawn, or a reading at 5 years shown |
| | | **A1** | Accept £10 000 to £12 000 |
| 3(b) | **Explanation** | **C1** | For explaining that 15 years is outside the range of the data, so the trend may not continue (extrapolation) |

## Question 4

Forming equations · A21 · A17 · Algebra · AO3 · 4 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 4 | **27.25 cm$^2$** | **P1** | For a correct expression for either perimeter, e.g. $2(2x + 3.5 + x - 1.2) = 6x + 4.6$ or $5x + 8.3$ |
| | | **P1** | For forming the equation $6x + 4.6 = 5x + 8.3$ |
| | | **A1** | For $x = 3.7$ |
| | | **A1** | For $10.9 \times 2.5 = 27.25$, accept 27.2 or 27.3 |

## Question 5

Pressure · R11 · Ratio & proportion · AO3 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 5 | **1600 N/m$^2$** | **P1** | For finding the area of the largest face ($0.6 \times 0.35 = 0.21$) or the smallest face ($0.35 \times 0.2 = 0.07$) |
| | | **P1** | For $168 \div 0.07$ $(= 2400)$ and $168 \div 0.21$ $(= 800)$ |
| | | **A1** | cao |

## Question 6

Angle of elevation · G20 · Geometry & measures · AO3 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 6 | **28.9 m** | **P1** | For $\tan 33° = \frac{h}{42}$ oe |
| | | **P1** | For $42 \times \tan 33°$ $(= 27.27\ldots)$ and adding 1.6 |
| | | **A1** | Accept 28.8 to 28.9 |

## Question 7

Product rule for counting · N5 · Number · AO2 · 2 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 7 | **486 720** | **M1** | For $26 \times 26 \times 10 \times 9 \times 8$ |
| | | **C1** | For 486 720 and a statement that this is more than 450 000 |

## Question 8

Cumulative frequency · S3 · Statistics · AO1 · AO2 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 8(a) | **Correct graph** | **B1** | For at least 5 points plotted correctly at the upper class bounds: $(5, 4)$, $(10, 13)$, $(15, 28)$, $(20, 46)$, $(25, 56)$, $(30, 60)$ |
| | | **B1** | For a correct curve or line segments through all the points (and through $(0, 0)$) |
| 8(b) | **No, with reason** | **C1** | For stating Jess is not correct, e.g. the median is about 15.5 kg (accept 15 to 16), which is less than 17.5 kg; or about 23 parcels (accept 20 to 26) have a mass greater than 17.5 kg, which is less than 30 |

## Question 9

Area of a triangle · G23 · Geometry & measures · AO1 · 2 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 9 | **35.9 cm$^2$** | **M1** | For $\frac{1}{2} \times 8.4 \times 11.7 \times \sin 47°$ |
| | | **A1** | Accept 35.9 to 36.0 |

## Question 10

3D Pythagoras · G20 · Geometry & measures · AO2 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 10 | No, 57.7 cm | M1 | For $\sqrt{45^2 + 30^2}$ $(= 54.08\ldots)$ or $45^2 + 30^2$ $(= 2925)$ |
| | | M1 | For $\sqrt{45^2 + 30^2 + 20^2} = \sqrt{3325}$ |
| | | C1 | For 57.6 to 57.7 and stating the rod will not fit, as $57.7 < 58$ |

## Question 11

Upper and lower bounds · N16 · Number · AO1 · AO2 · 4 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 11(a) | 5.54 cm | M1 | For $53.5 \div 9.65$ |
| | | A1 | Accept 5.54 to 5.545 |
| 11(b) | 6 cm | M1 | For the upper bound $54.5 \div 9.55 = 5.70\ldots$ (accept 5.7 to 5.71) |
| | | C1 | For 6 with a reason, e.g. both bounds round to 6 to 1 significant figure (but not to the same value to 2 significant figures) |

## Question 12

Inverse proportion · R10 · Ratio & proportion · AO3 · 3 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| 12 | 11 | P1 | For $14 \times 6.5 = 91$ (machine-hours), or $T = \frac{91}{n}$ |
| | | P1 | For $91 \div 3.75 = 24.2\ldots$, so 25 machines |
| | | A1 | cao. 10 scores P1 P1 A0 |

## Question 13

Algebraic fractions · A18 · Algebra · AO1 · AO2 · 5 marks

| QN | ANSWER | MARK | GUIDANCE |
|---|---|---|---|
| **13(a)** | **Shown** | **M1** | For $3(x-1)+2(x+2)=4(x+2)(x-1)$ |
| | | **C1** | For $5x+1=4x^2+4x-8$ leading to $4x^2-x-9=0$ |
| **13(b)** | $1.63, -1.38$ | **M1** | For $\frac{1\pm\sqrt{(-1)^2-4\times4\times(-9)}}{2\times4}$ |
| | | **M1** | For $\frac{1\pm\sqrt{145}}{8}$ |
| | | **A1** | For both $1.63$ and $-1.38$ |

# Paper overview

| Q | TOPIC | SPEC REF | STRAND | AO | MARKS |
|---|---|---|---|---|---|
| 1 | Reverse percentages | R9 | Ratio & proportion | AO1 | 2 |
| 2 | Rearranging formulae | A5 | Algebra | AO1 | 3 |
| 3 | Scatter graphs | S6 | Statistics | AO1 · AO2 | 3 |
| 4 | Forming equations | A21 · A17 | Algebra | AO3 | 4 |
| 5 | Pressure | R11 | Ratio & proportion | AO3 | 3 |
| 6 | Angle of elevation | G20 | Geometry & measures | AO3 | 3 |
| 7 | Product rule for counting | N5 | Number | AO2 | 2 |
| 8 | Cumulative frequency | S3 | Statistics | AO1 · AO2 | 3 |
| 9 | Area of a triangle | G23 | Geometry & measures | AO1 | 2 |
| 10 | 3D Pythagoras | G20 | Geometry & measures | AO2 | 3 |
| 11 | Upper and lower bounds | N16 | Number | AO1 · AO2 | 4 |
| 12 | Inverse proportion | R10 | Ratio & proportion | AO3 | 3 |
| 13 | Algebraic fractions | A18 | Algebra | AO1 · AO2 | 5 |
| **Total** | | | | | **40** |

## Marks by strand

| | |
|---|---|
| Number | **6 marks (15%)** |
| Algebra | **12 marks (30%)** |
| Ratio & proportion | **8 marks (20%)** |
| Geometry & measures | **8 marks (20%)** |
| Probability | **0 marks (0%)** |
| Statistics | **6 marks (15%)** |

## Marks by assessment objective

| | |
|---|---|
| AO1 Standard techniques | **16 marks (40%)** |
| AO2 Reasoning | **11 marks (28%)** |
| AO3 Problem solving | **13 marks (32%)** |