Pearson Edexcel

# Mark Scheme (Results)

## Summer 2025

Pearson Edexcel International GCSE
In Mathematics A Modular (4WM1H) Paper 01
Unit 1H 1 Higher Tier

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
  Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent

- awrt – answer which rounds to
- eeoo – each error or omission

- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.
- **With working**

  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review. If there is a choice of methods shown, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

  If there is no answer on the answer line then check the working for an obvious answer.
- **Ignoring subsequent work**

  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.
- **Parts of questions**

  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

| International GCSE Maths | | | | |
|---|---|---|---|---|
| **Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.** | | | | |
| **Q** | **Working** | **Answer** | **Mark** | **Notes** |
| **1** | $\frac{11}{3}(\times)\frac{18}{7}$ | | 3 | M1 for both fractions written as improper fractions |
| | $\frac{11}{3}\times\frac{18}{7}=\frac{198}{21}$ or $\frac{77}{21}\times\frac{54}{21}=\frac{4158}{441}$<br><br>$\frac{11}{\cancel{3}^{1}}\times\frac{\cancel{18}^{6}}{7}=\frac{66}{7}$ oe | | | M1 for multiplying the numerators and denominators<br>**or**<br>cancelling the fractions<br>and then multiplying numerators and denominators |
| | eg $\frac{11}{3}\times\frac{18}{7}=\frac{198}{21}=\frac{66}{7}=9\frac{3}{7}$ oe or<br>$\frac{11}{3}\times\frac{18}{7}=\frac{198}{21}=9\frac{9}{21}=9\frac{3}{7}$ oe<br>$\frac{11}{\cancel{3}^{1}}\times\frac{\cancel{18}^{6}}{7}=\frac{66}{7}=9\frac{3}{7}$ oe<br>*Working required* | Correct working leading to correct answer of<br>$9\frac{3}{7}$ | | A1 Completion to given simplest form. dep on M2<br><br>**All working must be shown clearly as requested in the question as this is a reasoning question testing working without the use of a calculator** |
| | | | | |
| | | | | **Total 3 marks** |

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| **2** (a) | | 17.75 | 1 | B1 | |
| (b) | | 147.5 | 1 | B1 | Allow $147.4\dot{9}$ for 147.5 |
| (c) | $\frac{5\times800}{0.4}$ | | 2 | M1 | for 2 of the numbers correctly rounded to one significant figure (numbers do not need to be in the correct sum if it is clear that they have been rounded correctly) |
| | *Working required* | 10 000 | | A1 | dep on all figures correctly rounded |
| | | | | | **Total 4 marks** |

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| **3** | 0.14 + 0.23 + 2$x$ + 0.18 + 7$x$ = 1 oe or 1 – 0.14 – 0.23 – 0.18 (=0.45) oe<br>or<br>0.14 × 500 (= 70) or<br>0.23 × 500 (= 115) or<br>0.18 × 500 (= 90) or<br>(0.14 + 0.23 + 0.18) × 500 (= 275) oe eg 0.55 × 500 (= 275)<br>or<br>$7x \times 500 (= 3500x)$ | | 4 | M1 | Correct use of probabilities total 1<br>or<br>correct calculation for an estimate for number of times the spinner will land on any colour<br>or<br>the algebraic expression for the expected number of blue outcomes |
| | "0.45" ÷ "9" (= 0.05) or $"0.45" \times \frac{7}{"9"} (= 0.35)$ " or $"0.45" \times \frac{2}{"9"} (= 0.1(0))$<br>or<br>500 – 70 – 115 – 90 (= 225) oe eg 500 – 275 (= 225)<br>or<br>"0.45" × 500 (= 225)<br>or eg<br>$"3500"x + "1000"x + "70" + "115" + "90" = 500$ oe | | | M1 | A completely correct method to find the value of $x$<br>Sight of 0.35 implies this method mark<br>or<br>a completely correct method to find the number of times the spinner will land on red or blue<br>or<br>for a correct algebraic equation for the expectancies |
| | eg $("0.05" \times 7) \times 500 (= 175)$ oe or $("0.05" \times 2) \times 500 (= 50)$ oe<br>eg $"0.35" \times 500$ or $"0.1" \times 500$<br>$\frac{"225"}{"9"} \times 7$ oe eg "25" × 7 or $\frac{"225"}{"9"} \times 2$ or "25" × 2<br>$\frac{"225"}{"4500"} \times "3500"$ oe or $\frac{"225"}{"4500"} \times "1000"$ oe | | | M1 | a correct method to find the estimate for 7$x$ or 2$x$<br>or an answer leading from 175 seen eg $\frac{175}{500}$ |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 175 | | A1 | |
| | | | | | **Total 4 marks** |

| | | | | | |
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| **4** | $\frac{15\times 20}{2}(=150)$ | | 3 | M1 | use of the correct figures for area of the triangle<br><br>The first two M1 marks can be awarded in either order |
| | $\frac{\pi\times 4^2}{2}(=8\pi=25.1...)$ | | | M1 | (indep)<br>for a correct method to find the area of the semicircle using correct figures<br>allow use of 3.14... or $\frac{22}{7}$ for π<br>The first two M1 marks can be awarded in either order |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 125 | | A1 | awrt 125 |
| | | | | | **Total 3 marks** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **5** | (a) | | 12 | 1 | B1 | accept $x^{12}$ |
| | (b) | | 5 | 1 | B1 | accept $y^5$ |
| | (c) | | $125a^{12}r^6$ | 2 | B2 | for $125a^{12}r^6$<br><br>(B1 for a product in the form $ka^pr^q$ where 2 from $k$, $p$ or $q$ are correct eg $5a^{12}r^6$<br>Allow $125a^{12}$ or $125r^6$ or $a^{12}r^6$ so as long as not added to any other terms) |
| | | | | | | **Total 4 marks** |

| | | | | | |
|---|---|---|---|---|---|
| **6** | $(x =)\ 65 = \frac{702}{6x}$ or $702 \div 65 (= 10.8)$ or $6x = 10.8$ | | 3 | M1 | For using the given formula correctly<br><br>$65 = \frac{702}{area}$ scores M0 unless recovered by writing down $702 \div 65$<br><br>NB: We will condone $x^2$ being used in these calculations for this M mark<br>eg $65 = \frac{702}{6x^2}$ |
| | $(x =) \frac{702}{6 \times 65}$ or $(x =) \frac{702}{390}$ or "10.8" $\div 6$ or | | | M1 | For a correct method to find $x$<br>(If a student goes straight to this stage they gain M2)<br><br>NB: We will **not** award for $x^2$ being used in these calculations or as<br>eg $x^2 = \frac{702}{6 \times 65}$ |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 1.8 | | A1 | oe $1\frac{4}{5}$ or $\frac{9}{5}$<br><br>do not ignore subsequent working<br>eg 1.8/2 = 0.9 on answer line |
| | | | | | **Total 3 marks** |

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| **7** (a) | $6x - 24 = 3 + 2x$ **or** $x - 4 = \frac{3}{6} + \frac{2}{6}x$ oe | | 3 | M1 | for correct removal of fraction and expansion of bracket in a correct equation<br>**or**<br>separating fraction (RHS) in an equation |
| | $6x - 2x = 3 + 24$ **or** $4x = 27$<br>**or** $-24 - 3 = 2x - 6x$ **or** $-27 = -4x$ oe<br>**or** $x - \frac{2}{6}x = \frac{3}{6} + 4$ oe<br>**or** $-4 - \frac{3}{6} = \frac{2}{6}x - x$ oe | | | M1ft | (dep on 4 terms) correctly rearranging their 4 term equation for terms in $x$ on one side of equation and number terms on the other |
| | *Working required* | $\frac{27}{4}$ | | A1 | oe eg 6.75 or $6\frac{3}{4}$, dep on M1 |
| (b)(i) | $(y \pm 6)(y \pm 5)$ **or** $(6 \pm y)(5 \pm y)$<br>**or** $y(y - 6) - 5(y - 6)$<br>**or** $y(y - 5) - 6(y - 5)$ | | 2 | M1 | for $(y \pm 6)(y \pm 5)$ **or** $(6 \pm y)(5 \pm y)$<br>**or** for $(y + a)(y + b)$ where $ab = 30$ or $a + b = -11$<br>**or**<br>$y(y + a) + b(y + a)$ or<br>$y(y + b) + a(y + b)$<br>where $ab = 30$ or $a + b = -11$ |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $(y - 6)(y - 5)$ | | A1 | oe, allow any letter for $y$ |
| (ii) | | $(y =) 6, (y =) 5$ | 1 | B1 | must ft from their answer in (b)(i) ft from their factors in the form $(y + a)(y + b)$ |
| | | | | | **Total 6 marks** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **8** | (a) | | 19, 23, 25, 29 | 2 | B2<br>(B1 | with no repeats<br>for the set<br>$A \cup B$ = 18, 20, 21, 22, 24, 26, 27, 28, 30<br>or for 3 correct values out of no more than 4 values<br>or the 4 values with one repeat<br>or 5 values with 4 correct) |
| | (b) | | Correct explanation with no incorrect statements | 1 | B1 | eg 30 is in the set $B \cap C$ or<br>30 is in both or<br>30 is in common or<br>Both $A$ and $B$ contain 30 |
| | (c) | | eg 18, 25, 26, 27, 29 | 2 | B2<br>(B1 | for 18, 26 with 3 odd values from the universal set<br>for a set of 5 values with one incorrect) |
| | | | | | | **Total 5 marks** |

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| **9** | (a) | | 0 | 1 | B1 | cao |
| | (b) | eg $\frac{8^7}{8^{12}}$ or $8^{-16} \times 8^{11}$ or $8^{-4} \times 8^{-1}$ etc or<br><br>$-4 + 11 - 12$ (=$n$) oe | | 2 | M1 | for use of one index rule<br>allow $8^{-4+11-12} = 8^n$ oe<br>follow through a correct index rule seen after an incorrect<br>eg $\frac{8^{-15}}{8^{12}}$ leading to $8^{-27}$<br>Index rules need to be written as powers of 8<br>**or** a correct expression for $n$<br>(could be in two parts<br>eg -4+11 = 7 (so) 7-12 (= $n$) ) |
| | | *Correct answer scores full marks (unless from obvious incorrect working)* | –5 | | A1 | allow $8^{-5}$ |
| | | | | | | **Total 3 marks** |

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| **10** | eg $12\sin 60\left(=6\sqrt{3}=10.3(9...)\right)$ **or** $\sqrt{12^2-"6"^2}\left(=6\sqrt{3}=10.3(9...)\right)$<br>**or** (Area *ADC* =) $\frac{1}{2}\times 12\times 47\times\sin 60 (=244.2...)$ | | 5 | M1 | for a method find the height of the trapezium<br>**or** the area of triangle *ADC*<br><br>The first two M1 marks can be awarded in either order |
| | eg $12\cos 60(=6)$ **or** $\sqrt{12^2-\left("6\sqrt{3}"\right)^2}(=6)$ **or** $\frac{"6\sqrt{3}"}{\tan 60}(=6)$ | | | M1 | (indep)<br>for a method find the base of the triangle, condone missing brackets around $"6\sqrt{3}"$<br><br>The first two M1 marks can be awarded in either order |
| | eg (*AB* =) 47 – "6" – "6" (= 35) | | | M1 | (dep on previous M1)<br>for method to find the length of *AB* |
| | eg (Trapezium =) $\frac{1}{2}\times(47+"35")\times"10.3(9...)"$<br>**or** (Rectangle + 2 × Triangle =) $"35"\times"10.3(9...)"+2\times\frac{1}{2}\times"6"\times"10.3(9...)"$<br>**or** (Rectangle + 2 × Triangle =) $"35"\times"10.3(9...)"+2\times\frac{1}{2}\times"6"\times 12\times\sin 60$<br>**or** (Triangle *ADC* + Triangle *ABC* =) $"244.2..."+\frac{1}{2}\times 12\times"35"\times\sin 120$<br>oe eg $(47-"6")\times"10.3(9...)"$ | | | M1 | for a complete method<br><br>There are other methods and marks should be awarded for a complete method that should give the correct area |
| | *Working required* | 426 | | A1 | (dep on M1) allow 420 – 427 from correct working |
| | | | | | **Total 5 marks** |

| | | | | | | | |
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| **11** (a) | $(5x)(5x + 4) = 25x^2 + 20x$<br><br>$(5x)(2x – 3) = 10x^2 – 15x$<br><br>$(5x + 4)(2x – 3) = 10x^2 – 15x + 8x – 12$<br>$(= 10x^2 – 7x – 12)$ | | 3 | M1 | An expansion with only one error.<br>Do not award this mark for $25x^2 + 20x + 10x^2 – 15x$<br>$(=35x^2 + 5x)$ | M2<br><br>(M1 | for 3 (out of a maximum of 4) of<br>$50x^3 –75x^2 +40x^2 – 60x$<br><br>for 2 correct out of a maximum of 4) |
| | $(25x^2 + 20x)(2x – 3) = 50x^3 –75x^2 +40x^2 – 60x$<br><br>$(10x^2 – 15x)(5x + 4) = 50x^3 –75x^2 +40x^2 – 60x$<br><br>$5x(10x^2 – 7x – 12) = 50x^3 –35x^2 – 60x$ | | | M1 | ft dep on M1<br>allow one further error | | |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $50x^3 –35x^2 – 60x$ | | A1 | cao (terms maybe in any order but must be simplified) dep on M1<br><br>ISW correct factorisation<br>$50x^3 –35x^2 – 60x$ must be seen previously to award 3 marks<br>eg<br>$5(10x^3 –7x^2 – 12x)$<br>$x(50x^2 –35x – 60)$<br>$5x(10x^2 –7x – 12)$<br><br>do not isw for incorrect simplification<br>eg<br>$50x^3 –35x^2 – 60x = 10x^3 –7x^2 – 12x$<br>gets M2A0 | | |

| | | | | | |
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| (b) | eg $\frac{45y}{20y}+\frac{4(y-7)}{20y}$ oe or $\frac{9(5y)}{20y}+\frac{4(y-7)}{20y}$ oe<br>or $\frac{9(5y)}{4(5y)}+\frac{4(y-7)}{4(5y)}$ oe or $\frac{45y}{20y}+\frac{4y-28}{20y}$ oe or<br>$\frac{9\times5y+4(y-7)}{20y}$ oe or $\frac{45y+4(y-7)}{20y}$ oe | | 3 | M1 | for two correct fractions with common denominator with the intention to add<br>**or**<br>a single correct fraction<br><br>brackets must be correctly placed unless recovered |
| | $\frac{45y}{20y}+\frac{4y-28}{20y}$ oe or $\frac{45y+4y-28}{20y}$ oe | | | M1 | for correct fraction(s) with bracket(s) expanded **and** dealing with the negative sign<br><br>or for the correct answer in unsimplified form<br>eg $\frac{98y-56}{40y}$ |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $\frac{49y-28}{20y}$ | | A1 | oe but must be simplified eg $\frac{-28+49y}{20y}$ or $\frac{7(7y-4)}{20y}$<br>do not ISW incorrect simplification<br><br>eg $\frac{49y-28}{20y}=\frac{21}{20}$ is M2A0 |
| | | | | | **Total 6 marks** |

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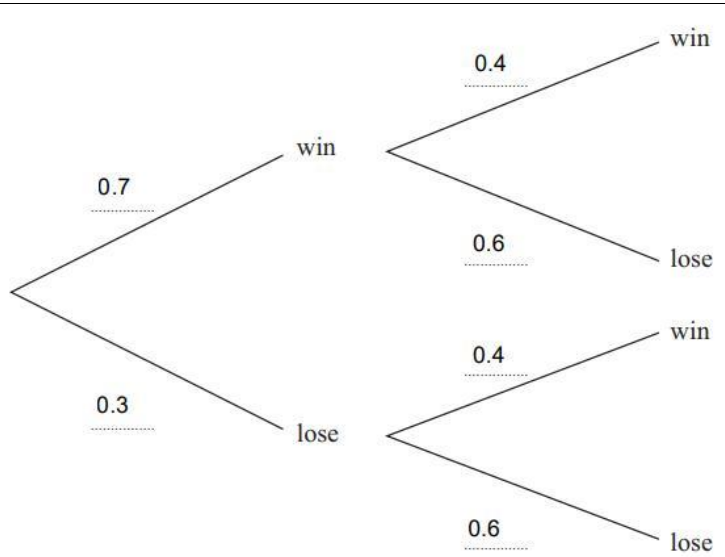
|---|---|---|---|---|---|
| **12** | (a) |  | Correct probabilities | 2 | B2 for all 3 correct pairs of probabilities on the correct branches<br><br>(B1 for 1 or 2 correct pairs of probabilities on the correct branches)<br>Allow equivalent fractions or percentages |
| | (b) | "0.3" × "0.6" | | 2 | M1ft (Both probabilities must be less than 1) |
| | | *Correct answer scores full marks (unless from obvious incorrect working)* | 0.18 | | A1ft oe eg $\frac{18}{100}$ or $\frac{9}{50}$ or $\frac{0.18}{1}$ or 18% |
| | | | | | **Total 3 marks** |

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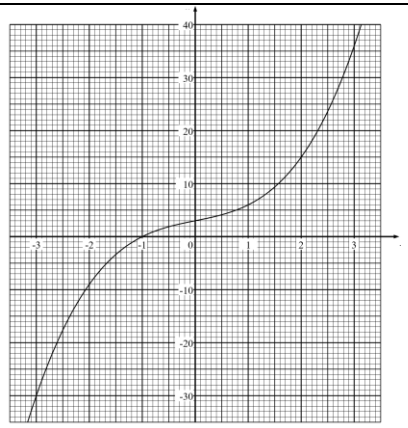
|---|---|---|---|---|---|
| **13** (a) | | −30, 15 | 1 | B1 | for −30 and 15 in the correct place, this may be awarded if plotted correctly on the graph |
| (b) | | | 2 | M1ft | for at least 6 points plotted correctly (within the circles on the overlay) ft their incorrect table |
| |  <br>*Correct answer scores full marks (unless from obvious incorrect working)* | Correct graph | | A1 | for correct curve between $x = -3$ and $x = 3$ (clear intention to go through all the points and which must be curved)<br><br>Ignore to the left of $x = -3$ and to the right of $x = 3$<br><br>**Note**: If a fully correct graph is shown, but an incomplete table is shown in (a), then award the mark for (a) |
| | | | | | **Total 3 marks** |

| | | | | | |
|---|---|---|---|---|---|
| **14** (a) | $\pi \times 12^2 \times \frac{40}{360}$ oe | | 2 | M1 | allow use of 3.14... or 22/7 for π<br><br>If $\pi \times 12^2 \times \frac{40}{360}$ is seen embedded within the working that leads to their final answer, award M1A0 |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 50.3 | | A1 | 50.2 – 50.3 |
| (b) | $\frac{1}{2} \times 7 \times 9 \times \sin 115$ | | 2 | M1 | |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 28.5 | | A1 | 28.5 – 28.6 |
| | | | | | **Total 4 marks** |

| | | | | | |
|---|---|---|---|---|---|
| **15** | $\frac{-9\pm\sqrt{9^2-4\times5\times-17}}{2\times5}$<br>or<br>$5\left[\left(x+\frac{9}{10}\right)^2-\frac{81}{100}\right]-17$<br>or<br>$5\left[\left(x+\frac{9}{10}\right)^2-\frac{81}{100}-\frac{17}{5}\right]$ | M2 for allowing one sign error and some simplification – allow as far as<br>$\frac{-9\pm\sqrt{81+340}}{10}$<br>or<br>$\frac{-9\pm\sqrt{9^2--340}}{10}$ | | 3 | M1 for correctly substituting into the quadratic formula or completing the square (condone **one** sign error) allow partial correct evaluation |
| | $\frac{-9\pm\sqrt{421}}{10}$<br>or<br>$\left(x+\frac{9}{10}\right)^2=\frac{421}{100}$ or better<br>or<br>$\frac{-9\pm\sqrt{81+340}}{10}$<br>or<br>$-\frac{9}{10}\pm\frac{\sqrt{421}}{10}$ oe | | | | M1 dep on M1<br>If the first M1 is awarded and an answer of 1.15.... and –2.95… seen award this M mark |
| | *Working required* | | 1.15 and –2.95 | | A1 awrt 1.15 and –2.95 dep on M2 |
| | | | | | **Total 3 marks** |

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| **16** | $\left(2^3\right)^{3y+4}$ or $2^{9y+12}$ AND $\left(2^2\right)^{3y}$ or $2^{6y}$ | | 3 | M1 writing values as powers of 2 |
| | eg $9y+12+6y=5y$ oe | | | M1 a correct equation<br>(If a student goes straight to this stage they gain M2) |
| | *Working required* | –1.2 | | A1 oe dep on M2 |
| | | | | **Total 3 marks** |

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|---|---|---|---|---|---|---|
| **17** | (a) | | 9 | 1 | B1 | allow $9\sqrt{3}$ |
| | (b) | $\frac{21}{3-\sqrt{2}}\times\frac{3+\sqrt{2}}{3+\sqrt{2}}$ **or** $\frac{21}{3-\sqrt{2}}\times\frac{-3-\sqrt{2}}{-3-\sqrt{2}}$ | | 3 | M1 | for explicitly multiplying the numerator and the denominator by $3+\sqrt{2}$ or $-3-\sqrt{2}$ |
| | | eg $\frac{21\left(3+\sqrt{2}\right)}{9-3\sqrt{2}+3\sqrt{2}-2}$ **or** $\frac{21\left(3+\sqrt{2}\right)}{3^2-2}$ **or** $\frac{21\left(3+\sqrt{2}\right)}{9-2}$ **or** $\frac{21\left(3+\sqrt{2}\right)}{7}$ **or** $\frac{63+21\sqrt{2}}{9-2}$ **or** $\frac{63+21\sqrt{2}}{7}$ | | | M1 | dep on M1 (denominator may be 4 terms which all need to be correct)<br><br>$\frac{21}{3-\sqrt{2}}\times\frac{3+\sqrt{2}}{3+\sqrt{2}}=9+3\sqrt{2}$ scores M1M0 |
| | | *Working required* | $9+\sqrt{18}$ | | A1 | dep on M2<br><br>SCB1 for $9+\sqrt{18}$ gained with no method marks awarded<br><br>SCB2 for $9+\sqrt{18}$ gained if you would award 1st M1 but not 2nd M1 (total 2 marks) |
| | | | | | | **Total 4 marks** |

| | | | | | |
|---|---|---|---|---|---|
| **18** | freq density × mins<br>10 × 2.5 (= 25)<br>5 × 4 (= 20)<br>15 × 3.6 (= 54)<br>20 × 0.5 (= 10)<br>10 × 1.7 (= 17)<br>10 × 0.5 (= 5) (area of 40 to 50 bar)<br><br>counting $cm^2$<br>2 × 5 (= 10)<br>1 × 8 (= 8)<br>3 × 7.2 (= 21.6)<br>4 × 1 (= 4)<br>2 × 3.4 (= 6.8)<br>2 × 1 (= 2) (area of 40 to 50 bar) | counting small squares<br>10 × 25 (= 250)<br>5 × 40 (= 200)<br>15 × 36 (= 540)<br>20 × 5 (= 100)<br>10 × 17 (= 170)<br>10 × 5 (= 50) (area of 40 to 50 bar) | | 3 | M1 for finding the area of at least 2 bars<br><br>either using freq density × mins<br><br>**or**<br><br>use of counting small squares or $cm^2$<br><br>Values may be seen on the diagram<br><br>22 or 220 or 8.8 implies M1 |
| | (10 × 2.5) + (5 × 4) + (15 × 3.6) + (20 × 0.5) + (10 × 1.7) (= 126)<br>**or**<br>"25" + "20" + "54" + "10" + "17" (= 126)<br>**or**<br>"250" + "200" + "540" + "100" + "170" (= 1260)<br>**or**<br>"10" + "8" + "21.6" + "4" + "6.8" (= 50.4) | | | | M1 for method to find total number of people (allow one error or omission)<br>**or**<br>total number of small squares/ $cm^2$ for method used (allow one error or omission) |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $\frac{11}{63}$ | | | A1 oe eg $\frac{22}{126}$ or $\frac{220}{1260}$ or 0.174(60…) or 0.175 or 17.4(60…)% or 17.5% or 22 out of 126<br>If $\frac{22}{126}$ is seen in the workings and 22 is on the answer line, award M2A0 |
| | | | | | **Total 3 marks** |

| | | | | | |
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| **19** | eg $\frac{3(x+y)(x-y)}{5x+5y} \div \frac{xy(y-x)}{10xy}$ or eg $\frac{(3x+3y)(x-y)}{5(x+y)} \div \frac{xy(y-x)}{10xy}$ or<br>eg $\frac{3x^2-3y^2}{5(x+y)} \div \frac{xy(y-x)}{10xy}$ or $\frac{(x+y)(3x-3y)}{5(x+y)} \div \frac{xy(y-x)}{10xy}$<br><br>or eg $\frac{3(x+y)(x-y)}{5x+5y} \div \frac{xy^2-x^2y}{10xy}$ or eg $\frac{3x^2-3y^2}{5(x+y)} \div \frac{xy^2-x^2y}{10xy}$<br>or eg $\frac{3x^2-3y^2}{5x+5y} \times \frac{10xy}{xy^2-x^2y}$<br><br>or $\frac{3(x+y)(x-y)}{5x+5y} \times \frac{10xy}{xy^2-x^2y}$<br><br>or $\frac{30x^3y-30y^3x}{5x^2y^2-5x^3y+5xy^3-5x^2y^2}\left(=\frac{30x^3y-30y^3x}{-5x^3y+5xy^3}\right)$ | | 3 | M1 | for fully factorising 2 of the 3 parts (need not be in a fraction, for this mark only)<br><br>or for fully factorising 1 part and at least one correct cancellation of a bracket or the *x* or *y* term<br><br>or for one correct cancellation of a bracket or the *x* or *y* term and inverting 2nd fraction<br><br>or fully factorising the quadratic and inverting 2nd fraction<br><br>or a fully correct expanded numerator and denominator after inverting 2nd fraction |
| | eg $\frac{3(x+y)(x-y)}{5(x+y)} \times \frac{10xy}{xy(y-x)}$<br><br>or eg $\frac{3x-3y}{5} \times \frac{10xy}{xy^2-x^1y}$ or $\frac{3(x-y)}{5} \times \frac{10xy}{xy^1-x^2y}$ or<br>$\frac{3(x-y)}{5} \times \frac{10xy}{xy(y-x)}$ or $\frac{6(x-y)}{y-x}$ oe<br><br>or eg $\frac{30xy(x^2-y^2)}{5xy(y^2-x^2)}$ or better eg $\frac{30xy(x^2-y^2)}{5xy(y-x)(x+y)}$ | | | M1 | M1 for fully factorising 3 out of 3 parts correctly and inverting 2nd fraction.<br>or a correct cancelled down expression $\frac{3x-3y}{5}$ oe **and** either one cancellation seen in the inverted second fraction, or the correct factorisation in inverted fraction.<br><br>or correct factorising giving two difference of two squares expressions inside the brackets in its simplest form |
| | *Working required* | –6 | | A1 | A1 dep on fully correct working shown |
| | | | | | **Total 3 marks** |

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| **20** | $\dfrac{7(\frac{3}{4n}+n)}{5-\frac{3}{4n}}$ oe eg $\dfrac{7\left(\frac{4n^2+3}{4n}\right)}{5-\frac{3}{4n}}$ or $\dfrac{7\left(\frac{3}{4n}\right)+7n}{5-\frac{3}{4n}}$ or $\dfrac{7(\frac{3}{4n}+n)}{\frac{20n-3}{4n}}$ | | 3 | M1 | for a correct expression in terms of $n$ only<br>Must have brackets unless recovered<br>eg $\dfrac{\frac{21}{4n}+7n}{5-\frac{3}{4n}}$ or $\dfrac{5.25n^{-1}+7n}{5-0.75n^{-1}}$ or<br>**or**<br>$20n-3$ on the denominator of their answer or their last attempt |
| | eg $\dfrac{7\times 4n\left(\frac{3}{4n}+n\right)}{5\times 4n-\frac{3}{4n}\times 4n}$ or $\dfrac{21+7n\times(4n)}{5\times(4n)-3}$ or $\dfrac{21+7n\times(4n)}{5\times(4n)-3}$ or $\dfrac{5.25+7n^2}{5n-0.75}$<br>**or** eg $\dfrac{\frac{21}{4n}+7n}{\frac{20n-3}{4n}}$ or $\dfrac{\frac{21+28n^2}{4n}}{\frac{20n-3}{4n}}$<br>leading to eg $\dfrac{21+28n^2}{4n}\div\dfrac{20n-3}{4n}$ or $\dfrac{21+28n^2}{4n}\times\dfrac{4n}{20n-3}$<br>**or** eg $\dfrac{21}{20n-3}+\dfrac{28n^2}{20n-3}$ or $\dfrac{84n+112n^3}{80n^2-12n}$ or $\dfrac{84+112n^2}{80n-12}$<br>**or** eg | | | M1 | for multiplying all terms by $4n$<br>leading to a correct expression for the numerator and denominator<br>**or** for correct simplification in numerator and denominator leading to improper fraction, leading to the correct multiplication/division method of two fractions.<br>**or** the correct answer in incorrect form<br>**or** for an answer that has $d = 3$ and two other correct terms and the last term should be an expression in $n$ only |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $\dfrac{21+28n^2}{20n-3}$ | | A1 | oe |
| | | | | | **Total 3 marks** |

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| **21** | $(BD^2 =)9.4^2 + 12.8^2 - 2\times 9.4\times 12.8\times \cos 72$ (= 177.8…)<br>**or** $(BD^2 =)88.36 + 163.84 - 2\times 9.4\times 12.8\times \cos 72$ (=177.8…) oe<br>**or** $(BD =)\sqrt{9.4^2 + 12.8^2 - 2\times 9.4\times 12.8\times \cos 72}$ | | 5 | M1 | for applying cosine rule |
| | | (*BD*=)13.3 | | A1 | allow 13.3 – 13.342 or $\sqrt{177.8...}$ or $\sqrt{178}$ |
| | eg $\frac{BC}{\sin 39} = \frac{"13.3..."}{\sin 54}$ **or** $\frac{\sin 39}{BC} = \frac{\sin 54}{"13.3..."}$ | | | M1ft | for applying the sine rule, allow use of their *BD* |
| | $(BC =)\frac{"13.3..."}{\sin 54}\times \sin 39$ | | | M1ft | for method to find *BC* using the sine rule<br>allow use of their *BD* |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | 10.4 | | A1 | allow 10.3 – 10.4 |
| | | | | | **Total 5 marks** |

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| **22** | eg (P(RRY) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\left(=\frac{504}{6840}=\frac{7}{95}\right)$ oe **or** (P(RRG) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{4}{18}\left(=\frac{288}{6840}=\frac{4}{95}\right)$ oe<br>**or** (P(RRR) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\left(=\frac{504}{6840}=\frac{7}{95}\right)$ oe **or** (P(RRR′) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{11}{18}\left(=\frac{792}{6840}=\frac{11}{95}\right)$ oe<br>**or** (P(YYR) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{9}{18}\left(=\frac{378}{6840}=\frac{21}{380}\right)$ oe **or** (P(YYG) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{4}{18}\left(=\frac{168}{6840}=\frac{7}{285}\right)$ oe<br>**or** (P(YYY) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{5}{18}\left(=\frac{210}{6840}=\frac{7}{228}\right)$ oe **or** (P(YYY′) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{13}{18}\left(=\frac{546}{6840}=\frac{91}{1140}\right)$ oe<br>**or** (P(GGR) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{9}{18}\left(=\frac{108}{6840}=\frac{3}{190}\right)$ oe **or** (P(GGY) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{7}{18}\left(=\frac{84}{6840}=\frac{7}{570}\right)$ oe<br>**or** (P(GGG) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{2}{18}\left(=\frac{24}{6840}=\frac{1}{285}\right)$ oe **or** (P(GGG′) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\left(=\frac{192}{6840}=\frac{8}{285}\right)$ oe<br>**or** (P(RGY) =) $\frac{9}{20}\times\frac{7}{19}\times\frac{4}{18}\left(=\frac{252}{6840}=\frac{7}{190}\right)$ oe | | 3 | M1 | for finding one correct product, does not need to be labelled<br>**or**<br>for an answer of $\frac{17}{76}$ oe eg 0.22(3…)<br>**or** 22(.3…)%<br>**or** $\frac{65}{76}$ oe eg 0.85(5…)<br>**or** 85(.5…)% |
| | (P(RRR′ or YYY′ or GGG′) =) $\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{11}{18}\right)+\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{13}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\right)$oe<br>**or** (P(RRY or RRG or YYR or YYG or GGR or GGY) =)<br>$\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\right)+\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{4}{18}\right)+\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{9}{18}\right)+$<br>$\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{4}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{9}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{7}{18}\right)$oe<br>**or** (1 – P(RRR or YYY or GGG or RGY) =)<br>$1-\left(\left(\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\right)+\left(\frac{7}{20}\times\frac{6}{19}\times\frac{5}{18}\right)+\left(\frac{4}{20}\times\frac{3}{19}\times\frac{2}{18}\right)+\left(6\times\frac{9}{20}\times\frac{7}{19}\times\frac{4}{18}\right)\right)$oe | | | M1 | for a complete calculation |
| | *Correct answer scores full marks (unless from obvious incorrect working)*<br>SCB1 for an answer of $\frac{669}{1000}$ oe eg 0.66(9) or 66(.9)% | $\frac{51}{76}$ | | A1 | oe eg 0.67(1…) or 67(.1…)% |
| | | | | | **Total 3 marks** |

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| **23** | $(PG =)\sqrt{(10-3)^2+12^2}\left(=\sqrt{193}=13.89...\right)$ | | 6 | M1 | a correct calculation for *PG* |
| | (height =) $\tan 24\times\sqrt{12^2+3^2}\left(=\sqrt{153}\tan 24=5.507...\right)$<br>(adjacent = ) $\sqrt{3^2+12^2}\left(=\sqrt{153}=12.36...\right)$ | | | M1 | indep of first M1 for a correct calculation for the adjacent or the height using the correct adjacent |
| | $\left(GA=\right)\sqrt{10^2+"\left(\sqrt{153}\tan 24\right)"^2}\,(=11.416...)$ | | | M1 | indep of first method mark but relies on a correct method to find height |
| | $\left(AP=\right)\sqrt{"153"+\left("\sqrt{153}\tan 24"\right)^2}\,(=13.53...)$<br>or<br>$\left(AP=\right)\dfrac{"\sqrt{153}"}{\cos 24}\,(=13.53...)$<br>or<br>$\left(AP=\right)\sqrt{12^2+3^2+"5.507..."^2}\,(=13.53...)$ | | | M1 | indep of 1st and previous method marks but replies on a correct method to find the relevant height or adjacent length |
| | $(\cos APG=)\dfrac{"13.89..."^2+"13.53..."^2-"11.41..."^2}{2\times"13.89..."\times"13.53..."}$ oe | | | M1 | all figures must be from correct working |
| | *Working required* | 49 | | A1 | awrt 49 dep on M4 |
| | | | | | **Total 6 marks** |

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| **24** | $\left(\frac{4+8}{2}, \frac{7-5}{2}\right)$ oe or (6, 1) | | 5 | M1 | for finding the midpoint of *PR* |
| | $\frac{7--5}{4-8}\left(=-\frac{12}{4}=-3\right)$ oe | | | M1 | for method to find the gradient of *PR* |
| | $"-3"\times m=-1$ oe or $(m=)\frac{-1}{"-3"}$ or $(m=)"\frac{1}{3}"$ | | | M1ft | for finding the gradient of *QS*, may be seen embedded in an equation, ft their gradient of *PR* |
| | $"1"="\frac{1}{3}"("6")+c$ oe or $c = -1$<br>**or** $y-"1"="\frac{1}{3}"(x-"6")$ **or** $y="\frac{1}{3}"x-1$ | | | M1ft | (dep on previous M1)<br>for finding the equation through *QS*, ft their gradient of *PR* and their midpoint of *PR*, do not allow (4, 7) or (8, –5) as midpoint *PR* |
| | *Correct answer scores full marks (unless from obvious incorrect working)* | $3y = x - 3$ | | A1 | oe eg $6y = 2x - 6$ or $3y - x + 3 = 0$ etc but must be integer coefficients<br>accept $a = 3$, $b = 1$, $c = -3$ |
| | | | | | **Total 5 marks** |

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| **25** (a) | $\pm 4\left[\left(x \pm \frac{3}{2}\right)^2 \ldots\right]$ or $\pm 4\left(x \pm \frac{3}{2}\right)^2 \ldots.$ | | 3 | M1 For a start to completing the square |
| | (8) $-4\left[\left(x+\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2\right]$ .....oe or<br>$-4\left[\left(x+\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 \ldots\ldots\right]$ oe | | | M1 for correctly completing the square but terms do not need to be simplified and 8 may or may not be present<br><br>**NB: Please refer to ALT mark scheme after (b) for comparison of coefficients method** |
| | *Working not required, so correct answer scores full marks (unless from obvious incorrect working)* | $17 - 4\left(x+\frac{3}{2}\right)^2$ | | A1 oe eg $-4\left(x+\frac{3}{2}\right)^2 + 17$ or $-4\left(\frac{3}{2}+x\right)^2 + 17$ |
| (b) | $\left(\frac{3}{2}+x\right)^2 = \frac{17}{4}$ or better | | 2 | M1ft for correct start to rearranging their completed square form from part (a).<br>Follow through their answer to part (a)<br><br>Students have been instructed to use their answer in (a) so the use of the quadratic formula will not be awarded here. |
| | *Working required* | $-\frac{3}{2} \pm \sqrt{\frac{17}{4}}$ | | A1ft for both solutions dep on M1<br>Must be in surd form.<br><br>Follow through their answer to part (a) provided it does not lead to the root of a negative.<br><br>Answers may be written in the form<br>$-\frac{3+\sqrt{17}}{2}$ and $-\frac{3-\sqrt{17}}{2}$ dep on M1 |
| | | | | **Total 5 marks** |

| | | | | |
|---|---|---|---|---|
| **25** (a)<br>**ALT** | $-bx^2 - 2bcx - bc^2 + a$ oe | | 3 | M1 for multiplying out $a - b(x+c)^2$<br>or<br>stating the correct value of $b$ or $b = 4$ embedded in an incorrect final answer in the form $a - 4(c + x)^2$ [signs as here] |
| | $2bc = 12$ or<br>$a - bc^2 = 8$ oe | | | M1 for equating coefficients |
| | *Working not required, so correct answer scores full marks (unless from obvious incorrect working)* | $17 - 4\left(\frac{3}{2} + x\right)^2$ | | A1 oe eg $-4\left(x + \frac{3}{2}\right)^2 + 17$ |

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