



Pearson
Edexcel

Mark Scheme (Results)

Summer 2025

Pearson Edexcel International GCSE
In Mathematics A (4WMA1) Paper 1HR

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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* (i)		142.75	1	B1
(ii)		142.85	1	B1 accept 142.8499... or 142.849
			Total 2 marks	

2*	eg $\frac{9}{4}$ and $\frac{12}{7}$		3	M1 for $2\frac{1}{4}$ and $1\frac{5}{7}$ expressed as improper fractions
	eg $\frac{9}{4^1} \times \frac{12^3}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28}$ or $\frac{63}{28} \times \frac{48}{28} = \frac{3024}{784}$			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	eg $\frac{9}{4^1} \times \frac{12^3}{7} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{108}{28} = 3\frac{24}{28} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{63}{28} \times \frac{48}{28} = \frac{3024}{784} = \frac{27}{7} = 3\frac{6}{7}$ or $\frac{9}{4} \times \frac{12}{7} = \frac{63}{28} \times \frac{48}{28} = \frac{3024}{784} = 3\frac{672}{784} = 3\frac{6}{7}$ or correct working to $\frac{27}{7}$ and writing $3\frac{6}{7} = \frac{27}{7}$ <i>Working required</i>	shown		A1 dep on M2, for conclusion to $3\frac{6}{7}$ from correct working – either sight of the result of the multiplication e.g. $\frac{108}{28}$ oe must be seen or correct cancelling prior to the multiplication to $\frac{27}{7}$ NB: use of decimals scores no marks unless as a check
			Total 3 marks	

3* (a)		0.7	1	<p>B1 oe eg $\frac{7}{10}$ oe or 70% or $\frac{0.7}{1}$</p> <p>If probabilities are given as percentages then % sign must be seen</p>
(b)	<p>eg $1 - (0.12 + 0.2 + 0.38) (= 0.3)$ oe or $1 - "0.7" (= 0.3)$ oe or $0.12 + 0.20 + 0.38 + 4x + x = 1$ oe or $"0.7" \times 350 (= 245)$ oe or $0.12 \times 350 (= 42)$ or $0.38 \times 350 (= 133)$</p>		4	<p>M1 ft their "0.7"</p> <p>If probabilities are given as percentages then % sign must be seen</p>
	<p>eg $"0.3" \div 5 (= 0.06)$ or $"0.3" \div 5 \times 4 (= 0.24)$ or 0.24 or $(x =) 0.06$ or $(4x =) 0.24$ or $"0.3" \times 350 (= 105)$ oe or $350 - "245" (= 105)$ oe or $350 - "42" - 0.20 \times 350 - "133" (= 105)$ oe</p>			<p>M1</p>
	<p>eg $"0.06" \times 350 (= 21)$ oe or $"105" \div 5 (= 21)$ oe or $"0.06" \times 4 \times 350$ oe or $"0.24" \times 350$</p>			<p>M1 or for $\frac{21}{350}$ or $\frac{84}{350}$</p>
	<p><i>Correct answer scores full marks (unless from obvious incorrect working)</i></p>	84		<p>A1 cao</p>
				Total 5 marks

4*	(a)(i)	2, 3, 4, 6, 8, 9, 10, 12	1	B1
	(ii)	1, 2, 4, 5, 7, 8, 10, 11	1	B1
	(b)(i)	\emptyset	1	B1
	(ii)	\notin	1	B1
				Total 4 marks

5	(a)	12	1	B1 Allow 3^{12}
	(b)	5	1	B1 Allow 4^5
	(c)	20	1	B1 Allow 6^{20}
	(d)	0	1	B1 Allow 5^0
				Total 4 marks

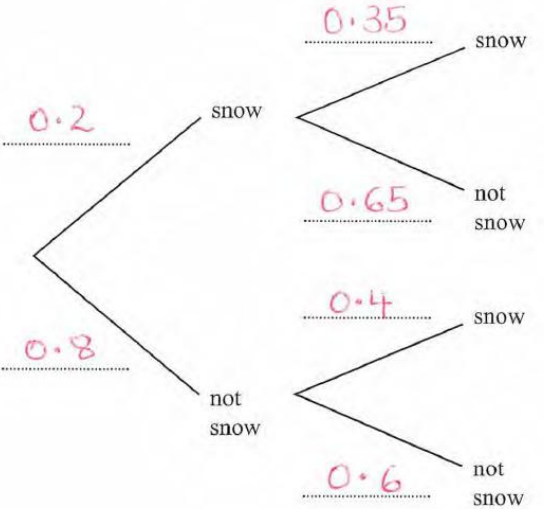
6	$4x + 6 = 30 - x$ oe		3	M1 for equating the 2 expressions
	$4x + x = 30 - 6$ or $5x = 24$ or $6 - 30 = -x - 4x$ or $-24 = -5x$			M1 for collecting x terms on one side and the number terms on the other side
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	4.8		A1 oe eg $\frac{24}{5}$
				Total 3 marks

7	$40 \div 1000 (= 0.04)$ oe or $40 \times 60 \times 60 (= 144\ 000)$ oe or $40 \div \frac{1}{3600} (= 144\ 000)$ oe or $40 \div 1000 \times 60 (= \frac{12}{5} = 2.4)$ or $\frac{3600}{1000}$ or $\frac{18}{5}$ or 3.6 oe or $\frac{1000}{3600}$ or $\frac{5}{18}$ or 0.277(7...) oe		3	M1
	$\frac{40 \times 60 \times 60}{1000}$ oe or 40×3.6 oe or $40 \div \frac{1000}{3600}$ oe or $\frac{0.04}{2.77(777...)} \times 10^{-4}$ oe			M1 for a complete method
	<i>Working required</i>	144		A1 dep on M2
				Total 3 marks

8	$\tan 32 = \frac{17}{(BD)}$ or $\tan 58 = \frac{(BD)}{17}$ or $\frac{(BD)}{\sin 58} = \frac{17}{\sin 32}$ oe	M2 for $(CD =) \frac{17}{\sin 32} (32.0(803\dots))$ or $(CD =) \frac{17}{\cos 58} (32.0(803\dots))$ and		4	M1 Allow trig values to 2 dp truncated or rounded
	$(BD =) \frac{17}{\tan 32} (= 27.2(05\dots))$ or $(BD =) 17 \times \tan 58 (= 27.2(05\dots))$ or $(BD =) \frac{17}{\sin 32} \times \sin 58$ oe $(= 27.2(05\dots))$	$(BD =) \sqrt{32.0^2 - 17^2}$ $(= 27.2(05\dots))$			M1
	$\sin 65 = \frac{(AD)}{27.2}$ or $(AD =) 27.2 \times \sin 65$ or $\cos 25 = \frac{(AD)}{27.2}$ or $(AD =) 27.2 \times \cos 25$ or $\frac{(AD)}{\sin 65} = \frac{27.2}{\sin 90}$ oe or $(AD =) \frac{27.2}{\sin 90} \times \sin 65$ or $(AB =) 27.2 \times \cos 65 (= 11.4(976\dots))$ and $(AD =) \sqrt{27.2^2 - 11.4^2}$ or $(AB =) 27.2 \times \sin 25 (= 11.4(976\dots))$ and $(AD =) \sqrt{27.2^2 - 11.4^2}$				M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>		24.7		A1 Allow 24.6 – 24.7
	Total 4 marks				

9	(a)		$25k^6n^8$	2	B2 for $25k^6n^8$ B1 for a product in the form ak^pn^q where 2 from a, p or q are correct eg $5k^6n^8$ (Allow $25k^6$ or $25n^8$ or $2k^6n^8$ so as long as not added to any other terms)
	(b)		$6m^2y(2y^3 + 3m)$	2	B2 for $6m^2y(2y^3 + 3m)$ B1 for any correct partial factorisation with at least 2 factors outside the bracket eg $3m^2y(4y^3 + 6m)$ or $2m^2y(6y^3 + 9m)$ or $m^2y(12y^3 + 18m)$ or $6m^2(2y^4 + 3my)$ or $6y(2m^2y^3 + 3m^3)$ $6my(2my^3 + 3m^2)$ or $3my(4my^3 + 6m^2)$ or $2my(6my^3 + 9m^2)$ etc or for a correct factor with one error inside the bracket eg. $6m^2y(a + 3m)$ or $6m^2y(2y^3 + b)$
	(c) (i)	$(x \pm 6)(x \pm 7)$ or $(6 \pm x)(7 \pm x)$ or $x(x - 6) - 7(x - 6)$ or $x(x - 7) - 6(x - 7)$		2	M1 or for for $(x + a)(x + b)$ where $ab = 42$ or $a + b = -13$
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$(x - 6)(x - 7)$		A1 A1 oe Allow any letter for x
	(ii)		6, 7	1	B1 B1 must fit from their answer to (b)(i) fit from their incorrect factors in the form $(x + a)(x + b)$
					Total 7 marks

10	$DC^2 + 8^2 = 17^2$ or $DC^2 + 64 = 289$ or $DC^2 = 17^2 - 8^2$ or $DC^2 = 289 - 64$	M2 for $(BDC =) \sin^{-1}\left(\frac{8}{17}\right) = 28.0(724\dots)$ and $(DC =) 17 \times \cos"28.0" (=15)$ or $(DC =) \frac{8}{\tan"28.0"} (=15)$		5	M1 for finding the length of DC^2
	$DC = \sqrt{17^2 - 8^2}$ $(= \sqrt{289 - 64} = \sqrt{225} = 15)$	OR $(DBC =) \cos^{-1}\left(\frac{8}{17}\right) = 61.9(275\dots)$ and $(DC =) 17 \times \sin"61.9" (=15)$ or $(DC =) 8 \times \tan"61.9" (=15)$			M1 for finding the length of DC
	"15" \times 8 (= 120)				M1 ft for finding the area of the rectangle (use of their value for DC) NB Do not award for $17 \times 8 (\div 2)$ or $136 (\div 2)$ or 68
	$\frac{150}{"120"}$ oe				M1 dep on previous M1 ft for using the formula correctly (use of their value for DC)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>		1.25		A1 oe eg. $\frac{5}{4}$ If no M marks awarded then award SCB1 for $\frac{150}{17 \times 8} \left(= \frac{150}{136} = 1.1(029\dots) \right)$
Total 5 marks					

11 (a)	<p style="text-align: center;">Saturday Sunday</p> 	0.2 and 0.8 0.35 and 0.65 0.4 and 0.6	2	B2 for all 3 correct pairs of probabilities on the correct branches (B1 for 1 correct pair of probabilities on a correct branch) Allow equivalent fractions or percentages
(b)	“0.2” × “0.35” oe		2	M1 ft (Both probabilities must be less than 1)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	0.07		A1 ft oe eg $\frac{7}{100}$ or 7%
Total 4 marks				

12* (a)	eg $12 \times \frac{5a+8}{3} - 12 \times \frac{2a+5}{4} = 12 \times 23$ or eg $4(5a+8) - 3(2a+5) = 12 \times 23 (= 276)$ or eg $\frac{4(5a+8)}{12} - \frac{3(2a+5)}{12} (= 23)$ or eg $\frac{4(5a+8) - 3(2a+5)}{12} (= 23)$	4	M1 for a clear intention to multiply all terms by 12 or a multiple of 12 or to express LHS as two fractions over 12 or a multiple of 12 or as a single fraction with a denominator of 12 (If expanded numerator, allow one sign error or one numerical error but not both) Accept $\frac{20a+32}{12} - \frac{6a+15}{12} (= 23)$ or $\frac{20a+32-6a+15}{12} (= 23)$ or $\frac{20a+32-6a+15}{12} (= 23)$
	eg $20a + 32 - 6a - 15 = 12 \times 23 (= 276)$ oe or $14a + 17 = 276$		M1 ft for expanding brackets and multiplying both sides by denominator with no more than one error in total leading to a linear equation Accept a linear equation leading to $14a - 17 = 276$ oe or $14a + 47 = 276$ oe or $26a + 17 = 276$ This mark implies the previous M mark if not already awarded
	eg $20a - 6a = 276 - 32 + 15$ oe or $14a = 259$		M1 ft dep on previous M1 for correctly rearranging terms in a on one side and number terms on the other side
	<i>Working required</i>	18.5	A1 oe eg $\frac{37}{2}$ or $\frac{259}{14}$ dep on M2

(b)	eg $\frac{3}{\sqrt{y}} \left(= \frac{3\sqrt{y}}{y} \right) \text{ or } \frac{3}{y^{0.5}} \text{ or } \frac{3}{y^{\frac{1}{2}}}$ $\text{or } \left(\frac{y^{0.5}}{3} \right)^{-1} \text{ or } \left(\frac{y^{\frac{1}{2}}}{3} \right)^{-1} \text{ oe}$		2	M1 for a correct first step by applying one of the following index rules $\sqrt{x} = x^{\frac{1}{2}} = x^{0.5} \text{ or } \left(\frac{a}{b} \right)^{-1} = \left(\frac{b}{a} \right)$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$3y^{-0.5}$		A1 oe eg $3y^{-\frac{1}{2}}$, accept $c = 3$ and $n = -0.5$ oe
				Total 6 marks

13 (a)	$\tan 30 = \frac{(AX)}{25} \text{ or } (AX =) 25 \tan 30 (= \frac{25\sqrt{3}}{3} = 14.4(337\dots)) \text{ or}$ $\tan 60 = \frac{25}{(AX)} \text{ or } (AX =) \frac{25}{\tan 60} (= \frac{25\sqrt{3}}{3} = 14.4(337\dots)) \text{ or}$ $\frac{(AX)}{\sin 30} = \frac{25}{\sin 60} \text{ or } (AX =) \frac{25}{\sin 60} \times \sin 30 (= \frac{25\sqrt{3}}{3} = 14.4(337\dots)) \text{ or}$ $(AB^2 =) ("28.8")^2 + ("33.6")^2 - (2 \times "28.8" \times "33.6" \times \cos 72) \text{ or}$ $\frac{(AB)}{\sin 72} = \frac{"33.6"}{\sin 60} \text{ or } \frac{(AB)}{\sin 72} = \frac{"28.8"}{\sin 48}$		3	M1 indpt (X is a point on AB where BX = CD) NB The lengths of AC and BC are $AC = \frac{25}{\cos 30} = \frac{25}{\sin 60} = \frac{50\sqrt{3}}{3} = 28.8(675\dots)$ $BC = \frac{25}{\cos 42} = \frac{25}{\sin 48} = 33.6(408\dots)$ Allow trig values to 2 dp truncated or rounded
	$\tan 42 = \frac{(BX)}{25} \text{ or } (BX =) 25 \tan 42 (= 22.5(101\dots)) \text{ or}$ $\tan 48 = \frac{25}{(BX)} \text{ or } (BX =) \frac{25}{\tan 48} (= 22.5(101\dots)) \text{ or}$ $\frac{(BX)}{\sin 42} = \frac{25}{\sin 48} \text{ or } (BX =) \frac{25}{\sin 48} \times \sin 42 (= 22.5(101\dots)) \text{ or}$ $(AB =) \sqrt{("28.8")^2 + ("33.6")^2 - (2 \times "28.8" \times "33.6" \times \cos 72)} \text{ or}$ $(AB =) = \frac{"33.6"}{\sin 60} \times \sin 72 \text{ or } (AB =) = \frac{"28.8"}{\sin 48} \times \sin 72$			M1 indpt
	Correct answer scores full marks (unless from obvious incorrect working)	36.9		A1 awrt 36.9
(b)	$\tan \alpha = \frac{"36.9"}{25} \text{ or } (\alpha =) \tan^{-1} \left(\frac{"36.9"}{25} \right)$		2	M1 ft their answer from part (a)
	Correct answer scores full marks (unless from obvious incorrect working)	55.9		A1 Allow 55.8 – 55.95
Total 5 marks				

<p>14*</p>	<p>(10000x =) 6121.21..._</p> <p>eg <u>(100x =) 61.21...</u></p> <p>(1000x =) 612.12..._</p> <p>or <u>(10x =) 6.12...</u></p> <p>(100x =) 61.212..._</p> <p>or <u>(x =) 0.612...</u></p>		2	<p>M1 for 2 recurring decimals that when subtracted give a whole number or terminating decimal with <u>intention to subtract</u>. (ie give 60.6 or 606 or 60600 etc)</p> <p>eg (1000x =) 612.12... and (10x =) 6.12....</p> <p>or (100 000x) = 61 212.12.... and (1000x) = 612....</p> <p>or (100x =) 61.212.... and (x =) 0.612....</p> <p>with intention to subtract x is not required to award this mark (if recurring dots not shown in both numbers then showing at least one of the numbers to at least 5sf)</p> <p>or $\frac{6}{10} + 1000x(12.12) - 10x(0.12)$</p>
	<p>eg $10000x - 100x = 6121.21... - 61.21... = 6160$ (9900x = 6160)</p> <p>and $\frac{6160}{9900} = \frac{101}{165}$ or</p> <p>$1000x - 10x = 612.12... - 6.12... = 606$ (990x = 606)</p> <p>and $\frac{606}{990} = \frac{101}{165}$ or</p> <p>$100x - x = 61.212... - 0.612... = 60.6$ (99x = 60.6)</p> <p>and $\frac{60.6}{99} = \frac{101}{165}$ oe</p> <p>OR</p> <p>0.6 + ... and (1000x - 100x = 990x = 12)</p> <p>and $0.6 + \frac{12}{990} = \frac{0.6 \times 990 + 12}{990} = \frac{101}{165}$ oe</p>	shown		<p>A1 for completion to $\frac{101}{165}$ dep on M1 and must use algebra for this final mark to be awarded</p> <p>[allow for instance $99x = 60.6$ and then $\frac{606}{990} = \frac{101}{165}$]</p> <p>No algebra used gets a maximum of 1 mark</p>
	Working required			Total 2 marks

15 (a)	$\frac{-4 \pm \sqrt{4^2 - (4 \times 3 \times -18)}}{2 \times 3}$ <p>or</p> $3 \left[\left(x + \frac{4}{6} \right)^2 - \left(\frac{4}{6} \right)^2 \right] - 18$ <p>or</p> $3 \left[\left(x + \frac{4}{6} \right)^2 - \left(\frac{4}{6} \right)^2 - \frac{18}{3} \right]$ <p>or</p> $3 \left[\left(x + \frac{4}{6} \right)^2 - \left(\frac{4}{6} \right)^2 - 6 \right]$ <p>or</p> $3 \left(x + \frac{4}{2 \times 3} \right)^2 - \frac{4^2}{4 \times 3} - 18$	M2 for allowing one sign error and some simplification – allow as far as $\frac{-4 \pm \sqrt{16 + 216}}{6}$ <p>or</p> $\frac{-4 \pm \sqrt{16 - -216}}{6}$	3	M1 for correctly substituting into the quadratic formula (don't need a bracket around $4ac$) or completing the square (condone one sign error) allow partial correct evaluation
	$\frac{-4 \pm \sqrt{232}}{6}$ oe <p>or</p> $\left(x + \frac{4}{6} \right)^2 = \frac{232}{36}$ <p>or</p> $\frac{-4 \pm \sqrt{16 + 216}}{6}$ <p>or</p> $-\frac{4}{6} \pm \frac{\sqrt{58}}{3}$ oe			M1 dep on M1 If the first M1 is awarded and an answer of 1.87.... and –3.20... seen award this M mark
	<i>Working required</i>		1.87 and –3.21	A1 awrt 1.87 and –3.21 dep on M2

15 (b)	$(2x-3)(x+4) = 2x^2 + 8x - 3x - 12 (= 2x^2 + 5x - 12)$ or $(2x-3)(x-1) = 2x^2 - 2x - 3x + 3 (= 2x^2 - 5x + 3)$ or $(x+4)(x-1) = x^2 - x + 4x - 4 (= x^2 + 3x - 4)$		3	M1 for an expansion with one error for 3 terms correct out of 4 terms or for 2 terms correct out of 3 terms
	$(2x^2 + 5x - 12)(x - 1)$ $= 2x^3 + 5x^2 - 12x - 2x^2 - 5x + 12$ or $(2x^2 - 5x + 3)(x + 4)$ $= 2x^3 - 5x^2 + 3x + 8x^2 - 20x + 12$ or $(x^2 + 3x - 4)(2x - 3)$ $= 2x^3 + 6x^2 - 8x - 3x^2 - 9x + 12$			M1 ft dep on M1 allow one further error
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$2x^3 + 3x^2 - 17x + 12$		A1 cao (terms may be in any order but must be simplified) dep on M1 Do not ISW incorrect simplification
	Alternative			
	$2x^3 + 8x^2 - 3x^2 - 12x - 2x^2 - 8x + 3x + 12$		3	M2 for a complete expansion with 8 terms present of which 4 are correct (M1 for 4 correct terms from any number of terms)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	$2x^3 + 3x^2 - 17x + 12$		A1
				Total 6 marks

16	(a)		24	1	B1 Allow $2\sqrt{24}$
	(b)	$\frac{8}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}}$ or $\frac{8}{3-\sqrt{5}} \times \frac{-3-\sqrt{5}}{-3-\sqrt{5}}$		3	M1 for explicitly multiplying the numerator and the denominator by $3+\sqrt{5}$ or $-3-\sqrt{5}$
		eg $\frac{8(3+\sqrt{5})}{9+3\sqrt{5}-3\sqrt{5}-5}$ or $\frac{8(3+\sqrt{5})}{3^2-5}$ or $\frac{8(3+\sqrt{5})}{9-5}$ or $\frac{8(3+\sqrt{5})}{4}$ or $\frac{24+8\sqrt{5}}{9-5}$ or $\frac{24+\sqrt{320}}{9-5}$			M1 dep on M1 (denominator may be 4 terms which need to be all correct) NB $\frac{8}{3-\sqrt{5}} \times \frac{3+\sqrt{5}}{3+\sqrt{5}} = 6+2\sqrt{5}$ scores M1M0
		<i>Working required</i>	$6+\sqrt{20}$		A1 dep on M2 SCB1 for $6+\sqrt{20}$ gained with no method marks awarded SCB2 for $6+\sqrt{20}$ gained if you would award 1 st M1 but not 2 nd M1 (total 2 marks)
					Total 4 marks

<p>17*</p>	$\frac{2}{9} \times \frac{1}{8} \left(= \frac{2}{72} \right) \text{ oe or } \frac{1}{9} \times \frac{2}{8} \left(= \frac{2}{72} \right) \text{ oe or } \frac{2}{9} \times \frac{3}{8} \left(= \frac{6}{72} \right) \text{ oe or } \frac{3}{9} \times \frac{2}{8} \left(= \frac{6}{72} \right) \text{ oe or}$ $\frac{2}{9} \times \frac{5}{8} \left(= \frac{10}{72} \right) \text{ oe or } \frac{5}{9} \times \frac{2}{8} \left(= \frac{10}{72} \right) \text{ oe}$ <p>or</p> ${}^9C_2 \text{ or } \frac{9!}{2!7!} \text{ or } \frac{9 \times 8}{2} \text{ or } 36 \text{ or } 1 + 2 + 6 (= 9)$		3	<p>M1 for finding one correct product</p> <p>or</p> <p>for the correct number of total outcomes or for the correct number of outcomes when the sum < 5</p> <p>NB If using decimals allow 2 decimal places truncated or rounded</p>
	$3 \times \frac{2}{72} + 2 \times \frac{6}{72} \text{ oe or}$ $\frac{2}{72} + \frac{6}{72} + \frac{10}{72} \text{ oe}$ <p>or</p> ${}^9C_2 \text{ or } \frac{9!}{2!7!} \text{ or } \frac{9 \times 8}{2} \text{ or } 36 \text{ and } 1 + 2 + 6 (= 9)$			<p>M1 for a complete correct method</p> <p>or</p> <p>for the correct number of total outcomes and for the correct number of outcomes when the sum < 5</p>
	<p><i>Correct answer scores full marks (unless from obvious incorrect working)</i></p>	$\frac{18}{72}$		<p>A1 oe eg $\frac{9}{36}$ or 0.25 or 25%</p> <p>SCB1 for $\frac{21}{81}$ oe eg $\frac{7}{27}$ or 0.259(25...) or 25.9(25...) % truncated or rounded</p>
<p>SEE NEXT PAGE FOR ALT METHOD</p>				<p>Total 3 marks</p>

17* ALT	$\frac{2}{9} \times \frac{1}{8} \left(= \frac{2}{72} \right) \text{ oe or } \frac{1}{9} \times \frac{2}{8} \left(= \frac{2}{72} \right) \text{ or } \frac{1}{9} \times \frac{1}{8} \left(= \frac{1}{72} \right) \text{ oe or } \frac{2}{9} \times \frac{2}{8} \left(= \frac{4}{72} \right) \text{ or}$ $\frac{3}{9} \times \frac{1}{8} \left(= \frac{3}{72} \right) \text{ oe or } \frac{1}{9} \times \frac{3}{8} \left(= \frac{3}{72} \right) \text{ oe or } \frac{2}{9} \times \frac{3}{8} \left(= \frac{6}{72} \right) \text{ oe or } \frac{3}{9} \times \frac{2}{8} \left(= \frac{6}{72} \right) \text{ oe or}$ $\frac{1}{9} \times \frac{6}{8} \left(= \frac{6}{72} \right) \text{ oe or } \frac{6}{9} \times \frac{1}{8} \left(= \frac{6}{72} \right) \text{ oe or } \frac{3}{9} \times \frac{6}{8} \left(= \frac{18}{72} \right) \text{ oe or } \frac{6}{9} \times \frac{3}{8} \left(= \frac{18}{72} \right) \text{ oe or}$ $\frac{1}{9} \times \frac{8}{8} \left(= \frac{8}{72} \right) \text{ oe or } \frac{8}{9} \times \frac{1}{8} \left(= \frac{8}{72} \right) \text{ or } \frac{2}{9} \times \frac{8}{8} \left(= \frac{16}{72} \right) \text{ oe or } \frac{8}{9} \times \frac{2}{8} \left(= \frac{16}{72} \right) \text{ oe}$		3 M1 for finding one correct product NB If using decimals allow 2 decimal places truncated or rounded
	$1 - \left(2 \times \frac{1}{72} + 7 \times \frac{2}{72} + 4 \times \frac{3}{72} + 2 \times \frac{4}{72} + 3 \times \frac{6}{72} \right) \text{ or}$ $1 - \left(\frac{6}{72} + \frac{6}{72} + \frac{18}{72} + \frac{8}{72} + \frac{16}{72} \right) \text{ or } 1 - \frac{54}{72} \text{ oe}$		M1 for a complete correct method
	<p><i>Correct answer scores full marks (unless from obvious incorrect working)</i></p> <p>Do not allow $\frac{6}{9} \times \frac{3}{8} = \frac{18}{72}$ or $\frac{3}{9} \times \frac{6}{8} = \frac{18}{72}$ as this an incorrect method (M1M0A0)</p>	$\frac{18}{72}$	A1 oe eg $\frac{9}{36}$ or 0.25 or 25% SCB1 for $\frac{21}{81}$ oe eg $\frac{7}{27}$ or 0.259(25...) or 25.9(25...) % truncated or rounded
			Total 3 marks

18 (a)	$2(x-3)^2 \dots\dots$ or $2[(x-3)^2 \dots\dots]$ or $2\left(x + \frac{-12}{2 \times 2}\right)^2 + \dots\dots$ or $a = 2$		3	M1 for a start to completing the square or correct substitution into $a\left(x + \frac{b}{2a}\right) + \dots\dots$ from the formula $a\left(x + \frac{b}{2a}\right)^2 - \frac{(b)^2}{4a} + c$ or stating the correct value of a or $a = 2$ embedded in an incorrect final answer in the form $2(x - b)^2 + c$ (must be these signs)
	$2[(x-3)^2 - 3^2] \dots\dots$ or or $2[(x-3)^2 - 3^2 \dots\dots]$ or $2[(x-3)^2 - 9 \dots\dots]$ or $2(x-3)^2 - 18 \dots\dots$			M1 for correctly completing the square but terms do not need to be simplified and 23 may or may not be present or correct simplification of the first two parts of $a\left(x + \frac{b}{2a}\right)^2 - \frac{(b)^2}{4a} (+c)$ NB: Please refer to ALT mark scheme after (b) for comparison of coefficients method
	<i>Working required</i>	$2(x-3)^2 + 5$		A1 oe eg $5 + 2(x-3)^2$
(b)		5	1	B1 must fit dep on M1 in part (a)
				Total 4 marks

18 ALT	(a) $ax^2 - 2abx + ab^2 + c$ or $a = 2$		3	M1 for multiplying out $a(x-b)^2 + c$ or stating the correct value of a or $a = 2$ embedded in an incorrect final answer in the form $2(x-b)^2 + c$ (must be these signs)
	$-2ab = -12$ or $2ab = 12$ or $ab^2 + c = 23$			M1 for equating coefficients
	<i>Working required</i>	$2(x-3)^2 + 5$		A1 oe eg $5 + 2(x-3)^2$

19	$(2x+3)^2$ or $(2x+3)(2x+3)$ or $4x^2 + 12x + 9$ oe	$\frac{1}{2} \times 2x \times (2x+3)$ or $\frac{4x^2 + 6x}{2}$ oe or $2x^2 + 3x$ oe or $2x(2x+3) - \frac{1}{2} \times 2x \times (2x+3)$ oe	5	M1 for setting up an algebraic expression for the area of square or triangle
	$(2x+3)^2 + \frac{1}{2} \times 2x \times (2x+3) = 84$ or $(2x+3)(2x+3) + \frac{1}{2} \times 2x \times (2x+3) = 84$ or " $4x^2 + 12x + 9$ " + " $2x^2 + 3x$ " = 84 or $(2x+3)^2 + 2x(2x+3) - \frac{1}{2} \times 2x \times (2x+3) = 84$ or $(2x+3)(2x+3) + 2x(2x+3) - \frac{1}{2} \times 2x \times (2x+3) = 84$			M1 for setting up an equation for the area of pentagon (area of pentagon = area of square + area of triangle) Allow an incorrect expansion of $(2x+3)^2$ or $\frac{1}{2} \times 2x \times (2x+3)$ if correct expression is clearly shown as in the first M1
	eg $6x^2 + 15x - 75 (= 0)$ oe or $6x^2 + 15x = 75$ oe $2x^2 + 5x - 25 (= 0)$ oe or $2x^2 = -5x + 25$ oe $12x^2 + 30x - 150 (= 0)$ oe or $12x^2 + 30x = 150$ oe			M1 dep on previous M1 for multiplying out and collecting terms, forming a three term quadratic in any form of $ax^2 + bx + c (= 0)$ where at least 2 coefficients (a or b or c) are correct
	eg $(2x-5)(x+5) (= 0)$ or $x = \frac{-5 \pm \sqrt{5^2 - 4 \times 2 \times -25}}{2 \times 2}$ or $\left(x + \frac{5}{4}\right)^2 - \left(\frac{5}{4}\right)^2 = \frac{25}{2}$ or $(x = 2.5 \text{ and/or } x = -5)$			M1 ft dep on previous M1 method to solve their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as eg $\frac{-5 \pm \sqrt{25 + 200}}{4}$ or if factorising allow brackets which expanded give 2 out of 3 terms correct) or correct values for x or $x = 2.5$ and/or $x = -5$
	<i>Working required</i>	64	A1 dep on M2	
				Total 5 marks

20*	eg $(AC^2 \Rightarrow) 18^2 - 7^2 (= 275)$ or $(AC \Rightarrow) \sqrt{18^2 - 7^2} (= \sqrt{275} \text{ or } 5\sqrt{11} \text{ or } 16.5(831\dots))$ or $(FB^2 \Rightarrow) 9^2 + 7^2 (= 130)$ or $(FB \Rightarrow) \sqrt{9^2 + 7^2} (= \sqrt{130} \text{ or } 11.4(017\dots))$ or $(GC^2 \Rightarrow) 18^2 - 9^2 (= 243)$ or $(GC \Rightarrow) \sqrt{18^2 - 9^2} (= \sqrt{243} \text{ or } 9\sqrt{3} \text{ or } 15.5(884\dots))$ or $18^2 = (BC)^2 + 7^2 + 9^2$ oe		3	M1 for method to find AC^2 or AC or FB^2 or FB or GC^2 or GC or for a correct equation using BC^2 and 18 and 7 and 9 Other longer ways to find AC , FB , GC may be used but must be a complete method eg $\angle FCA = \sin^{-1}\left(\frac{7}{18}\right) (= 22.8(8\dots))$ and $AC = \frac{7}{\tan "22.8(8\dots)"}$
	eg $"275" - 9^2 (= 194)$ or $"16.5\dots" - 9^2 (= 194)$ or $18^2 - "130" (= 194)$ or $18^2 - "11.4\dots" (= 194)$ $"243" - 7^2 (= 194)$ or $"15.5\dots" - 7^2 (= 194)$ or $18^2 - 7^2 - 9^2 (= 194)$ or $(\angle FCB \Rightarrow) \sin^{-1}\left(\frac{"11.4"}{18}\right) (= 39.3(036\dots))$ and $\cos "39.3" = \frac{(BC)}{18}$ oe or $\tan "39.3" = \frac{"11.4"}{(BC)}$ oe			M1 for complete method to find BC^2 Other longer ways to find BC may be used but must be a complete method, leading to a trig equation in BC
	Correct answer scores full marks (unless from obvious incorrect working)	13.9		A1 accept 13.8 to 14
				Total 3 marks

21	$60 \div 15 (= 4)$ or a correct value on the FD scale and no errors or 25 small squares = 2.5 or 5 small squares = 0.5 oe or 1 small square = 0.1 oe or 150 or 100 or 210 or 50		3	M1 for finding the frequency density or for finding the number of members for squares or use of counting squares or blocks
	$(0.5 \times 10) + (30 \times 0.7)$ oe or $(5 \times 1) + (30 \times 0.7)$ or 5 + 21 or $[(0.5 \times 100) + 210] \times 0.1$ oe or $(50 + 210) \times 0.1$ oe			M1 for a complete correct method
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	26		A1
				Total 3 marks

22*	eg $\frac{40}{360} \pi r^2 - \frac{1}{2} r^2 \sin 40 (= 28)$ oe or $\frac{40}{360} \pi r^2 = 28 + \frac{1}{2} r^2 \sin 40$ oe		6	M1 for a correct expression for the area of the shaded region Allow 3.14... or $\frac{22}{7}$ for π $\sin 40 = 0.64...$
	(radius ² =) 992 – 1024 (radius =) 31.5 – 32.0			A1 for r and r^2
	eg $(BC^2 =) 2 \times "31.8" - 2 \times "31.8" \cos 40 (= 473.4...)$ or $\frac{0.5BC}{"31.8"} = \sin 20$ or $\frac{BC}{\sin 40} = \frac{"31.8"}{\sin 70}$			M1 for a correct first step to find BC using their clearly identified radius eg $r = \dots$ or seen on diagram NB $\frac{180 - 40}{2} = 70$ $\sin 20 = 0.34...$ $\sin 70 = 0.93... \text{ or } 0.94$
	eg $(BC =) \sqrt{2 \times "31.8" - 2 \times "31.8" \cos 40} (= 21.7...)$ or $(BC =) 2 \times "31.8" \sin 20 (= 21.7...)$ or $BC = \frac{"31.8" \sin 40}{\sin 70} (= 21.7...)$			M1 dep on previous M1 for a complete method to find BC $\cos 40 = 0.76... \text{ or } 0.77$
	eg $\frac{130}{360} \times 2 \times \pi \times "21.7"$			M1 dep on previous M1 for a complete method to find the length of arc BD
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	49.4		A1 accept 48.9 – 49.7
				Total 6 marks

23	$p+3 = -\frac{5}{4}p + \frac{21}{4}$ oe or $p = 1$ or $-\frac{5}{4} \times m = -1$ oe or $(m =) \frac{4}{5}$ or 0.8		5	M1 for a correct method to find the value of p or for a correct method to find the perpendicular gradient
	(1, 4)			A1 for (1, 4)
	$\frac{4q - ("1" + 3)}{3q - "1"} = \frac{4}{5}$ oe or $"1" + 3 = \frac{4}{5}("1") + c$ or $c = \frac{16}{5}$ and $4q = \frac{4}{5}(3q) + \frac{16}{5}$ or $q = 2$			M1 dep on M1 for a correct method to find the value of q (equation must be in one variable)
	$((3 \times "2") - "1")^2 + ((4 \times "2") - ("1" + 3))^2$ oe or $\sqrt{((3 \times "2") - "1")^2 + ((4 \times "2") - ("1" + 3))^2}$ oe or $(6-1)^2 + (8-4)^2$ or $\sqrt{(6-1)^2 + (8-4)^2}$			M1 Correct method to find the radius or the square of the radius
	<i>Working required</i>	$\sqrt{41}$		A1 dep on M3
				Total 5 marks

24	$\frac{(2x+3)(x-4)}{(x+4)(x-4)} \times \frac{x(x+4)}{(2x+3)(3x+1)}$ <p>eg $\frac{1}{(x+4)} \times \frac{x(x+4)}{(3x+1)}$ or</p> <p>or 2 from $(2x+3)(x-4)$ or $(x+4)(x-4)$ or $x(x+4)$ or $(2x+3)(3x+1)$</p>		4	<p>M1 for factorising 2 or 3 of the quadratics correctly – could be implied by 2 factors cancelled correctly</p> <p>NB factors must be in the form $(ax + b)$</p>
	$\frac{(2x+3)(x-4)}{(x+4)(x-4)} \times \frac{x(x+4)}{(2x+3)(3x+1)}$ <p>eg $\frac{x}{3x+1}$ or</p> <p>or $(2x+3)(x-4)$ and $(x+4)(x-4)$ and $x(x+4)$ and $(2x+3)(3x+1)$</p>			<p>M1 for factorising all of the quadratics correctly – could be implied by 2 factors cancelled correctly</p> <p>NB factors must be in the form $(ax + b)$</p>
	$\frac{(2x-1)(3x+1)+x}{3x+1}$ or $\frac{6x^2+2x-3x-1+x}{3x+1}$			<p>M1 for a correct denominator and numerator as a single fraction</p>
	<i>Working required</i>	$\frac{6x^2-1}{3x+1}$		<p>A1 oe dep on M2 Do not ISW incorrect simplification</p>
				Total 4 marks

