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EDEXCEL GCSE (9-1) MATHS: QUESTIONS BY TOPIC

Angles, Polygons & Bearings (G1)

GCSE (9-1) Mathematics (1MA1) · Higher tier

21 questions · 83 marks · Mark schemes included

Past papers June 2017 - June 2025 · 3 sub-topics

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 Piccadilly Business Centre, Unit C, Aldow Enterprise Park
Blackett Street, Manchester, M12 6AE

HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.

Click any row below to jump straight to that sub-topic or question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.

A gold bar in the left margin marks exactly where the question sits on the original page.

Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.

Each question is filed under its main topic; longer questions may also test skills from other topics.

QUESTION	SOURCE	MARKS	PAGE
G1a ANGLE FACTS & PARALLEL LINES		8 Qs · 33 marks	2
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3. Q3	GCSE Paper 2H November 2018	4	5
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G1b POLYGONS & PROPERTIES OF SHAPES		10 Qs · 38 marks	11
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G1c BEARINGS		3 Qs · 12 marks	22
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QUESTIONS

21 questions · 83 marks · 3 sub-topics

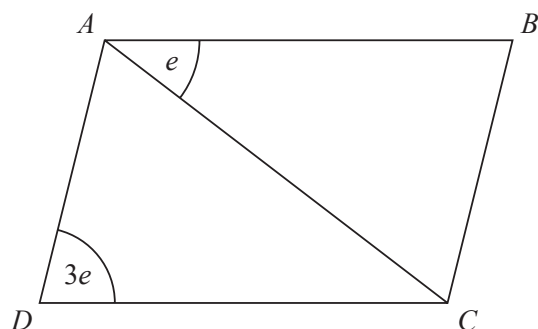
SUB-TOPIC G1a

ANGLE FACTS & PARALLEL LINES

Sub-topic G1a · 8 questions · 33 marks · lowest tariff first



- 4 $ABCD$ is a parallelogram.



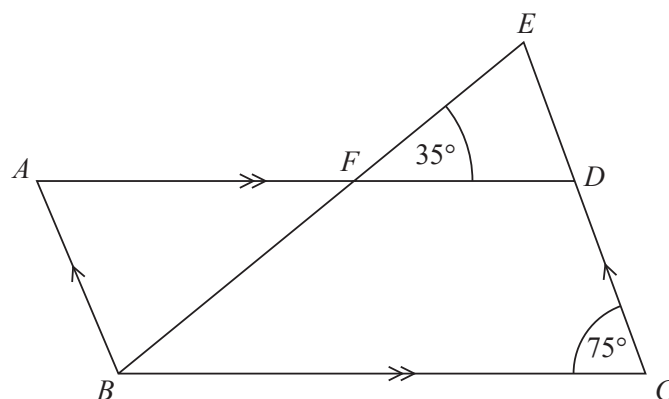
All angles are measured in degrees.

Find an expression, in terms of e , for the size of angle CAD .
Give a reason for each stage of your working.

(Total for Question 4 is 3 marks)



3



$ABCD$ is a parallelogram.

EDC is a straight line.

F is the point on AD so that BFE is a straight line.

Angle $EFD = 35^\circ$

Angle $DCB = 75^\circ$

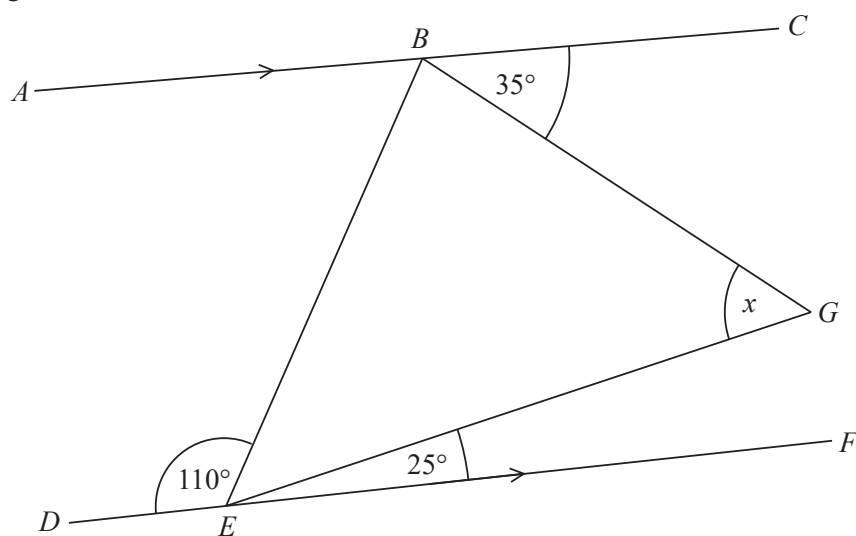
Show that angle $ABF = 70^\circ$

Give a reason for each stage of your working.

(Total for Question 3 is 4 marks)



3 BEG is a triangle.



ABC and DEF are parallel lines.

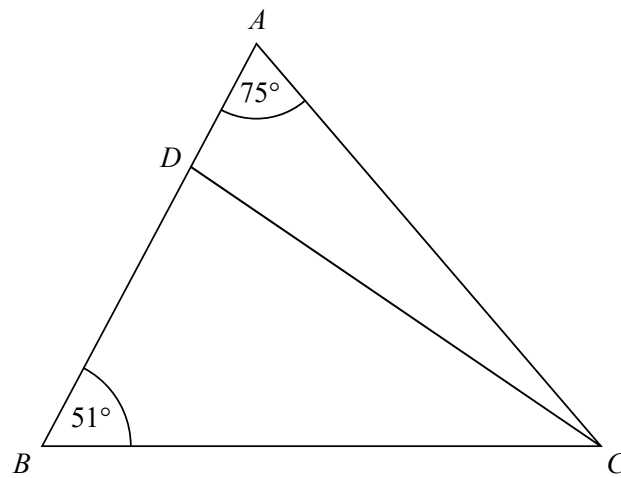
Work out the size of angle x .

Give a reason for each stage of your working.

(Total for Question 3 is 4 marks)



- 5 The diagram shows triangle ABC .



ADB is a straight line.

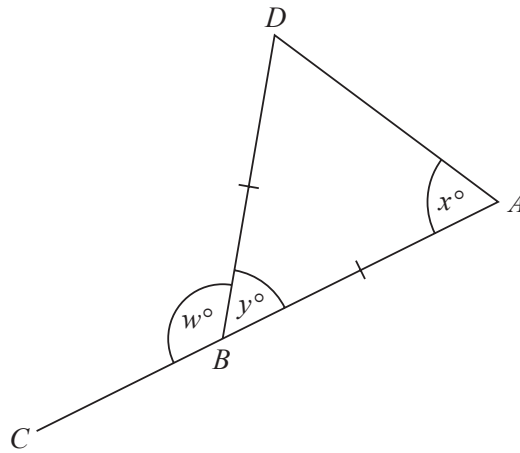
the size of angle DCB : the size of angle $ACD = 2 : 1$

Work out the size of angle BDC .

(Total for Question 5 is 4 marks)



- 6 The diagram shows an isosceles triangle ABD and the straight line ABC .



$$BA = BD$$

$$x : y = 2 : 1$$

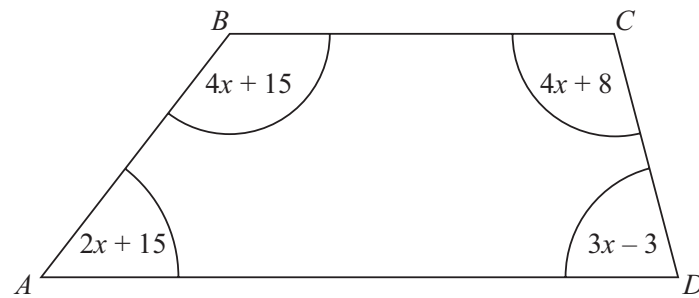
Work out the value of w .

$$w = \dots\dots\dots$$

(Total for Question 6 is 4 marks)



7 $ABCD$ is a quadrilateral.



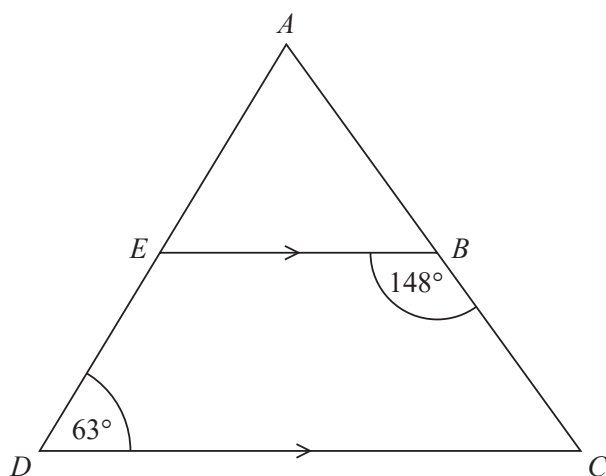
All angles are measured in degrees.

Show that $ABCD$ is a trapezium.

(Total for Question 7 is 4 marks)



6 ADC is a triangle.



AED and ABC are straight lines.

EB is parallel to DC .

Angle $EBC = 148^\circ$

Angle $ADC = 63^\circ$

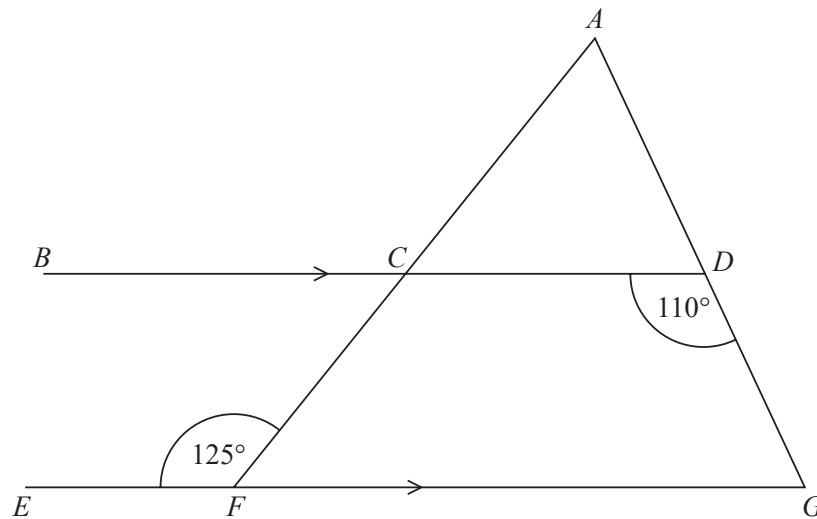
Work out the size of angle EAB .

You must give a reason for each stage of your working.

(Total for Question 6 is 5 marks)



- 3 ACF and ADG are straight lines.
 BCD and EFG are parallel lines.



Show that triangle ACD is isosceles.
Give a reason for each stage of your working.

(Total for Question 3 is 5 marks)



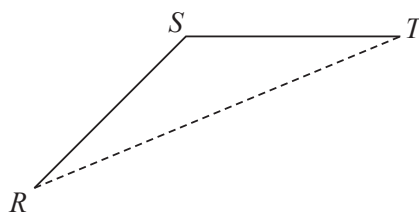
SUB-TOPIC G1b

POLYGONS & PROPERTIES OF SHAPES

Sub-topic G1b · 10 questions · 38 marks · lowest tariff first



12



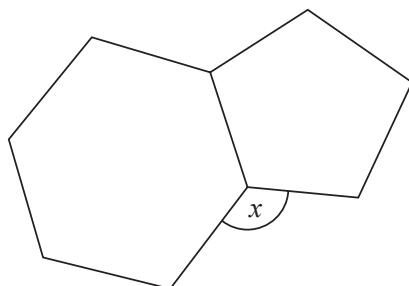
RS and ST are 2 sides of a regular 12-sided polygon.
 RT is a diagonal of the polygon.

Work out the size of angle STR .
You must show your working.

(Total for Question 12 is 3 marks)



- 5 Here is a regular hexagon and a regular pentagon.



Work out the size of the angle marked x .
You must show all your working.

(Total for Question 5 is 3 marks)

8 $1.25 \times 10^{-12} = k \times (4 \times 10^{-20})$

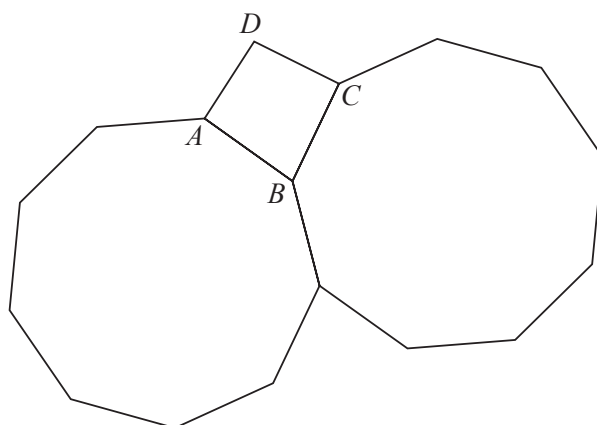
Work out the value of k .

Give your answer in standard form.

$k = \dots\dots\dots$

(Total for Question 8 is 2 marks)

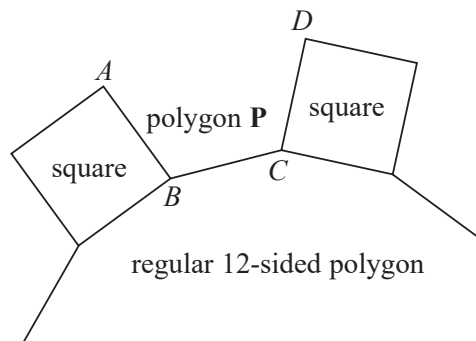
- 9 The diagram shows two congruent regular 9-sided polygons.
 $ABCD$ is a quadrilateral.



Show that $ABCD$ is **not** a square.

(Total for Question 9 is 3 marks)

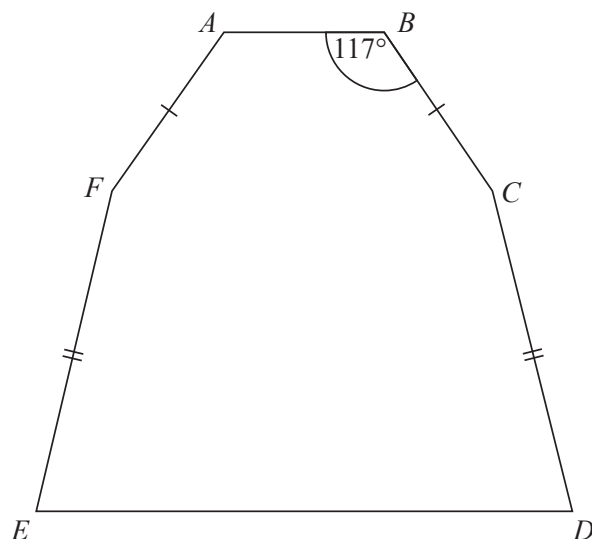
- 5 In the diagram, AB , BC and CD are three sides of a regular polygon **P**.



Show that polygon **P** is a hexagon.
You must show your working.

(Total for Question 5 is 4 marks)

- 5 The diagram shows a hexagon.
The hexagon has one line of symmetry.



$$FA = BC$$

$$EF = CD$$

$$\text{Angle } ABC = 117^\circ$$

$$\text{Angle } BCD = 2 \times \text{angle } CDE$$

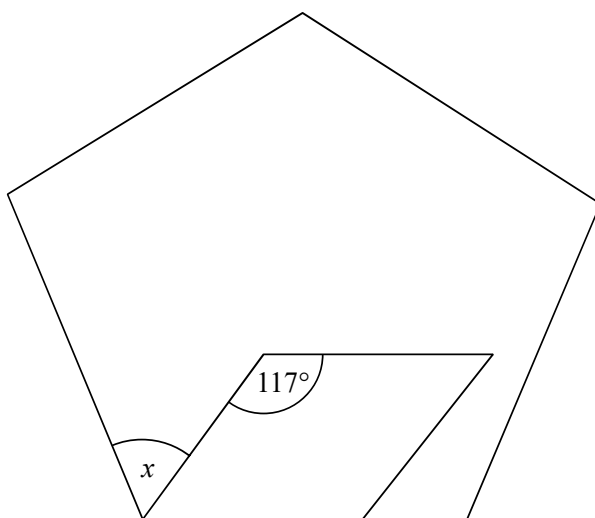
Work out the size of angle AFE .

You must show all your working.

(Total for Question 5 is 4 marks)



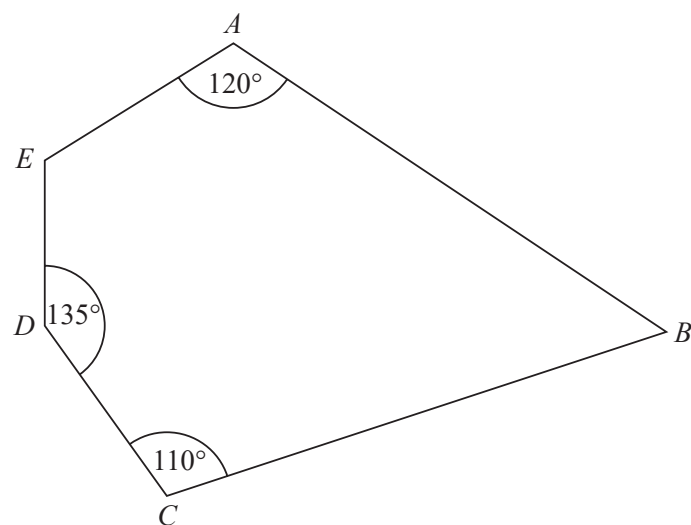
- 8 The diagram shows a regular pentagon and a parallelogram.



Work out the size of the angle marked x .
You must show all your working.

(Total for Question 8 is 4 marks)

10 Here is a pentagon.



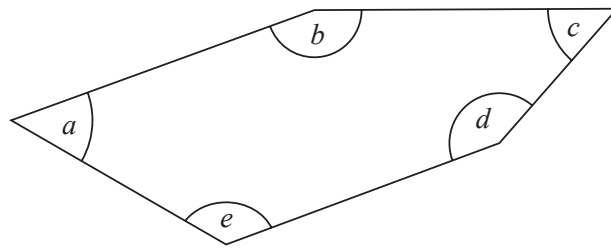
$$\text{Angle } AED = 4 \times \text{angle } ABC$$

Work out the size of angle AED .
You must show all your working.

(Total for Question 10 is 4 marks)



6 Here is a pentagon.



Angle a = angle c

Angle b = 155°

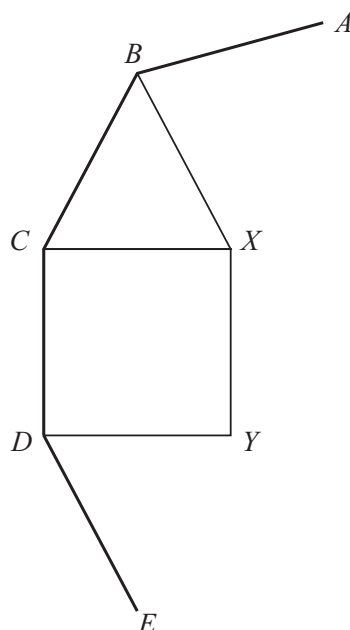
Angle d is three times the size of angle c

Angle e is two times the size of angle c

Work out the size of angle a

(Total for Question 6 is 4 marks)

- 6 AB , BC , CD and DE are four sides of a regular polygon with n sides.



BCX is an equilateral triangle.

$CDYX$ is a square.

Work out the value of n .

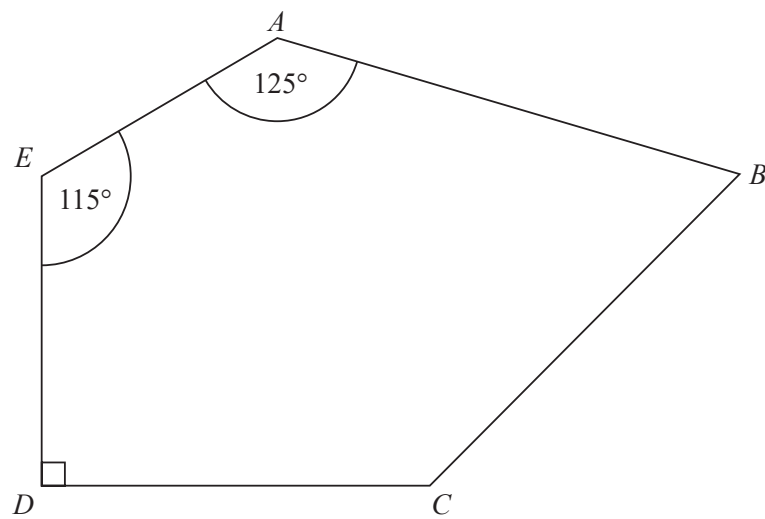
You must show all your working.

$n = \dots\dots\dots$

(Total for Question 6 is 4 marks)



8 $ABCDE$ is a pentagon.



Angle $BCD = 2 \times \text{angle } ABC$

Work out the size of angle BCD .
You must show all your working.

(Total for Question 8 is 5 marks)



SUB-TOPIC G1c

BEARINGS

Sub-topic G1c · 3 questions · 12 marks · lowest tariff first



- 5 Chris, Debbie and Errol share some money in the ratio 3:4:2
Debbie gets £120

Chris then gives some of his share to Debbie and some of his share to Errol.
The money that Chris, Debbie and Errol each have is now in the ratio 2:5:3

How much money did Chris give to Errol?

£.....

(Total for Question 5 is 4 marks)

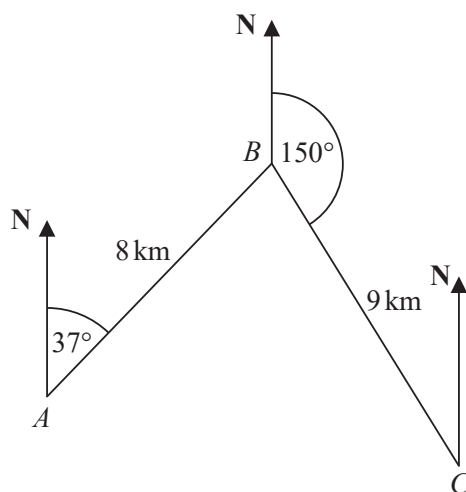
- 6 The bearing of port B from port A is 147°
Work out the bearing of port A from port B .

o

(Total for Question 6 is 2 marks)



23 The diagram shows the positions of three towns, Acton (A), Barston (B) and Chorlton (C).



Barston is 8 km from Acton on a bearing of 037°
Chorlton is 9 km from Barston on a bearing of 150°

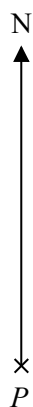
Find the bearing of Chorlton from Acton.
Give your answer correct to 1 decimal place.
You must show all your working.

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



- 8 The accurate scale drawing shows the positions of port P and a lighthouse L .



Scale: 1 cm represents 4 km.

Aleena sails her boat from port P on a bearing of 070°

She sails for $1\frac{1}{2}$ hours at an average speed of 12 km/h to a port Q .

Find

- the distance, in km, of port Q from lighthouse L ,
- the bearing of port Q from lighthouse L .

distance QL = ... km

bearing of Q from L = ...^o

(Total for Question 8 is 5 marks)



MARK SCHEMES

official mark schemes, in the same order as the questions



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	180 – 4e and reason	M1 A1 C1	for angle $ACD = e$ or for angle $ADC + \text{angle } BAD = 180$ or for angle $BAX = 3e$ (where X lies on DA extended) for 180 – 4e oe (dep M1) for an appropriate reason relating to parallel lines from eg <u>alternate</u> angles are equal or <u>allied</u> angles / <u>co-interior</u> angles add up to 180 or for <u>corresponding</u> angles are equal	Angles must be clearly labelled on the diagram or otherwise identified May be unsimplified Underlined words need to be shown Reason needs to be linked to their method, which can be implied from correctly identified angles (stated or written on the diagram)
5 (a)	Estimated time	P1 P1 A1	for rounding of distance = 5 (miles) or speed = 30 (mph) (dep) for using time = distance/speed eg $5 \div 30$ or for a complete process, eg $30 \div 60 (= 0.5)$ and $5 \div "0.5"$ or $30 \div 5 (= 6)$ and $60 \div "6"$ or $4.96 \times \frac{60}{30}$	
(b)	Overestimate with reason	C1	ft from (a) for decision with correct reasoning, eg overestimate as dividing a larger number by a smaller number or overestimate as miles rounded up and speed rounded down	Ft the rounding and process from (a) Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

Paper: 1MA1/1H				
Question	Working	Answer	Mark	Notes
1		$2 \times 2 \times 3 \times 3$	M1 A1	for complete method to find prime factors; could be shown on a complete factor tree with no more than 1 arithmetic error or 2,2,3,3,(1) $2 \times 2 \times 3 \times 3$ oe
2		14:21:42	P1 P1 P1 A1	for 2 out of 3 expressions in one letter eg from x , $x+7$ $2x+14$ or see a set of numbers to show interpretation of the relationships, eg 10, 17, 34 (dep) for sum of their 3 expressions = 77 eg $x + x + 7 + 2x + 14 = 77$ oe or 2 systematic correct trials including addition for a correct process to isolate their term in x or $x=14$ for ratio 14:21:42 oe
3	CB extended to form CG	Reasoning	B1 M1 C2 (C1)	for 35 or 75 or 145 or 105 or $DEF = 70$, marked on the diagram or 3 letter description for $180-70-35$ or $180-75-35$ or a correct pair of angles that would lead to 75 or 70, eg $AFB = 35$ and $FAB = 75$ or $AFB = 35$ and $ABG = 75$ or $FBC = 35$ and $ABG = 75$ or $EDF = 75$ and $DEF = 70$ or $FDC = 105$ and $FBC = 35$ or $ABC = 105$ and $FBC = 35$ (dep on B1M1) All figures correct with all appropriate reasons stated. Angles must be clearly labelled or on the diagram. Full solution must be seen (dep on B1 or M1) for one reason clearly used and stated.) <u>Corresponding angles</u> are equal, <u>alternate angles</u> are equal, <u>opposite angles</u> in a <u>parallelogram</u> are equal, <u>angles in a triangle</u> sum to 180, <u>angles</u> on a straight <u>line</u> sum to 180, vertically <u>opposite angles</u> are equal, <u>vertically opposite angles</u> are equal, <u>angles in a quadrilateral</u> sum to 360, <u>co-interior angles</u> sum to 180, <u>allied angles</u> sum to 180, <u>angles</u> around a <u>point</u> sum to 360

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	60	M1	use of parallel lines to find an angle eg $ABE=70$ or $EBG=75$ or $EBC = 110$ or shows parts of x as 35 or 25	Parts of x should be identified on the diagram by the insertion of a dividing line through angle x (need not be identified or drawn parallel).
		M1	for a complete method to find angle x ; could be in working or on the diagram	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for $x = 60$	
		C1	(dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: <u>alternate</u> angles are equal, <u>allied</u> angles / <u>co-interior</u> angles add up to 180, <u>angles</u> on a straight <u>line</u> add up to 180, <u>angles</u> in a <u>triangle</u> add up to 180°	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.
4 (a)	Ben (supported)	P1	shows how to work interest out for one year eg $2000 \times 0.025 (= 50)$ or $1600 \times 0.035 (= 56)$ or 150 or 168 or $2000 \times 1.025 (= 2050)$ or $1600 \times 1.035 (= 1656)$	Throughout accept figures ± 1 pence which do not need to be presented in money notation (to 2dp) or with monetary symbols.
		P1	shows compound interest calculation for one account eg $2050 \rightarrow 51.25$ or $2101.25 \rightarrow 52.53$ or $1656 \rightarrow 57.96$ or $1713.96 \rightarrow 59.99$ eg $2000 \times 1.025^3 (= 2153.78)$ or $1600 \times 1.035^3 (= 1773.95)$	Award mark for a correct process shown, for which these figures can be taken as implying the process.
		P1	shows complete compound interest calculation for both accounts eg $2000 \times 1.025^3 (= 2153.78)$ and $1600 \times 1.035^3 (= 1773.95)$ OR one interest stated correctly eg 153.78 or 173.95	As above, award mark for both correct processes shown for both accounts, which these figures can be taken as implying the process.
		C1	Ben (shares) supported by 153.78 and 173.95	Accept an answer of "shares".

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	93	M1	for method to find angle ACB , eg. $180 - 75 - 51 (= 54)$	Angles may be shown on diagram but must not be ambiguous eg. M0 for angle of 54° shown in the wrong place
		M1	(dep M1) for method to use the ratio, eg. $"54" \div (2 + 1) (= 18)$	
		M1	for complete method, eg. $180 - 51 - "18" \times 2$ or $75 + "18"$ oe	
		A1	cao	
6	No (supported)	P1	for process to find total weight of the 4 red bricks, eg. $5 \times 4 (= 20)$ or for process to find total weight of the 5 blue bricks eg. $9 \times 5 (= 45)$	May be seen next to statements 20 must be clearly referenced to the red bricks. $5 + 9 + 6 = 20$ gets no marks Candidates working in grams will need to give 7100 and 7000 for example as comparable figures
		P1	for process to find total weight of all 10 bricks, eg. $"20" + "45" + 6 (= 71)$	
		C1	No with correct supporting evidence Acceptable examples No, it is 7.1 She is wrong, it is 0.1 more No, (the total weight is) 71 not 70 Not acceptable examples Yes No, it is 71	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	144	P1 P1 P1 A1	for using the ratio, eg $x = 2y$ or $2y + 2y + y = 180$ or $2 + 2 + 1 = 5$ (parts)) for using angle facts to give an equation, eg $x + x + y = 180$ or $2y + 2y + y = 180$ or $y + w = 180$ or $5x \div 2 = 180$ oe or $w = 2x$ or for $180 \div 5 (= 36)$ for a complete process, eg $180 - (180 \div 5)$ cao	The first two marks may be awarded in either order Award P2 for $x = 72$ or $y = 36$
7	2400	P1 P1 P1 P1 A1	for setting up an equation in x , eg $x + (3x + 1) + (2x - 5) = 44$ or $6x - 4 = 44$ or $x = 48 \div 6 (= 8)$ for substituting “8” into either $(3x + 1)$ or $(2x - 5)$ eg $3 \times “8” + 1 (= 25)$ or $2 \times “8” - 5 (= 11)$ for finding the mass of one book, eg $7500 \div “25” (= 300)$ for finding the mass of the books on shelf A, eg $“300” \times “8”$ cao	
8	1100	M1 A1	for a complete method to find the original cost, eg $660 \div (100 - 40) \times 100$ or $660 \div 0.6$ oe cao	



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
7	Shown	M1	for deriving a suitable equation, eg $4x + 15 + 2x + 15 + 4x + 8 + 3x - 3 = 360$ ($13x + 35 = 360$) or $4x + 15 + 2x + 15 = 180$ ($6x + 30 = 180$) or $4x + 8 + 3x - 3 = 180$ ($7x + 5 = 180$)	If starting with an equation = 180 need to substitute into the opposite pair.
		M1	(dep) for a method to isolate terms in x , eg $4x + 2x + 4x + 3x = 360 - 15 - 15 - 8 + 3$ or $4x + 2x = 180 - 15 - 15$ or $4x + 3x = 180 - 8 + 3$	
		A1	for solving equation to $x = 25$	
		C1	for substituting $x = 25$ into $A + B$ or $C + D$ and showing = 180, and gives a suitable statement, eg co-interior/allied angles (sum to 180), or since $A + B = 180$ the lines are parallel	
			Alternative solution assuming it is a trapezium	
7	Shown	M1	for deriving a suitable equation, eg $4x + 15 + 2x + 15 = 4x + 8 + 3x - 3$ ($6x + 30 = 7x + 5$)	
		M1	(dep) for a method to isolate terms in x , eg $15 + 15 - 8 + 3 = 4x + 3x - 4x - 2x$	
		A1	for solving equation to $x = 25$	
		C1	for a fully correct statement, eg since $A + B = 180$ the lines are parallel	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	20	P1	for process to find SP of 24 chocolate bars, eg. $0.50 \times 24 (= 12)$ oe or for process to find the overall profit eg $(24 \times 0.5) - 10 (= 2)$ or for process to find CP of one chocolate bar, eg. $1000 \div 24 (= 41.66\dots)$ oe	Working can be carried out in either pounds or pence.
		P1	(dep) for start to a process to find percentage profit, eg. using $\frac{"12"-10}{10}$ or $\frac{"12"}{10}$ or $\frac{50 - "41.66\dots"}{"41.66\dots"}$ oe with consistent units	
		A1	cao	
6	85 with working and reasons	M1	for correct use of corresponding angles eg $AEB = 63$ or co-interior angles eg $BCD = 180 - 148 (= 32)$ or $DEB = 180 - 63 (= 117)$	Angles must be clearly labelled on the diagram or otherwise identified. Full solution must be seen.
		M1	(dep) for a complete method to find angle EAB eg. $180 - "63" - (180 - 148)$ or $148 - "63"$ or $"117" - (180 - 148)$	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for $EAB = 85$ (identified)	
		C2	(dep on M2) all working correct with all appropriate reasons stated. <u>Corresponding</u> angles are equal <u>Allied angles</u> / <u>Co-interior</u> angles add up to 180 <u>Angles</u> on a straight line add up to 180 <u>Angles</u> in a triangle add up to 180 The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u> .	When reasons are given the key words underlined must be present. Reasons need to be linked to their method; any reasons not linked, do not credit. There should be no incorrect reasons given.
		(C1	for one reason relating to parallel lines clearly used and stated or for any two reasons clearly stated for their fully correct method)	

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	Shown with reasons	M1	for method to find ACD using parallel lines eg $BCA = 125$ and $ACD = 180 - 125 (= 55)$ or $BCF = 180 - 125 (= 55) = ACD$ or $FCD = 125$ and $ACD = 180 - 125 (= 55)$ or $CFG = 180 - 125 (= 55) = ACD$	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		M1	for method to find ADC eg $180 - 110 (= 70)$ or for method to find CAD eg $180 - ("70" + "55") (= 55)$ or $110 - "55" (= 55)$	
		A1	for $ACD = 55$ and $CAD = 55$	
		C1	for one correct parallel lines reason linked to their method eg <u>Corresponding</u> angles are equal <u>Allied</u> angles / <u>Co-interior</u> angles add up to 180 <u>Alternate</u> angles are equal	
		C1	for one other reason stated linked to their method eg <u>Angles</u> on a straight <u>line</u> add up to 180 <u>Angles</u> in a <u>triangle</u> add up to 180 Vertically <u>opposite angles</u> are equal OR <u>Vertically opposite</u> angles are equal The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u> . <u>Angles</u> in a <u>quadrilateral</u> add up to 360. Accept "4-sided shape"	
4	17.5	P1	for a first step, eg $5 \times 14 (= 70)$ or $14 \div 4 (= 3.5)$ or $5 \div 4 (= 1.25)$ or $4 \div 5 (= 0.8)$	Could be done algebraically. 11.2 as answer scores no marks.
		A1	oe	



Paper: 1MA1/2H				
Question	Working	Answer	Mark	Notes
12		15	P1 P1 A1	for a process to find the interior or exterior angle of a regular 12 sided polygon e.g. $\frac{10 \times 180}{12}$ (= 150) or $\frac{360}{12}$ (= 30), must be no contradictions for process to find angle <i>STR</i> , eg $\frac{180 - "150"}{2}$ or $\frac{"30"}{2}$ cao
13 (a)		58600	M1 A1	for a complete method, eg 50000×1.02^8 (= 58582(.969...)) or for finding the increase in value of the company after 8 years, eg 8582(.969...) or 8600 cao
(b)		4.5	P1 P1 A1	for a process to find multiplier for 6 year period, eg $325 \div 250$ oe (= 1.3) or 130(%) or for $250000 \times y^6 = 325000$ for a process to find multiplier for one year, eg $("1.3")^{\frac{1}{6}}$ or 1.044... or 1.045 4.4 – 4.5



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	132	M1 M1 A1	for finding an exterior angle eg $360 \div 6 (= 60)$ or $360 \div 5 (= 72)$ or an interior angle eg $180 \times 4 \div 6 (= 120)$ or $180 \times 3 \div 5 (= 108)$ for a complete method eg $360 - "120" - "108"$ or $"60" + "72"$ cao	Angles may be shown on the diagram. Only award this mark for an angle that is not contradicted Answer only award no marks
6	(a) 5,(1),(-1),-1,1,5 (b) Graph drawn (c) 0.3 to 0.5 and 2.5 to 2.7	B2 (B1) B2 (B1) M1 A1	for all 4 values correct (B1 for 2 or 3 correct values) for a fully correct graph (B1 fit (dep on B1 in (a)) for plotting at least 5 of the points from their table correctly) for a correct method, eg marking intercepts with x -axis or one correct solution or both solutions given as a coordinates, eg (0.4, 2.6) or (0.4, 0) and (2.6, 0) for answers in the range 0.3 to 0.5 and 2.5 to 2.7 or fit their graph with at least 2 solutions	 Accept a freehand curve drawn that is not made of line segments Ignore anything drawn outside the required range fit their graph for this mark Accept these coordinates reversed
7	3 : 2	P1 P1 A1	for a process to find either volume eg $3^3 (= 27)$ or $4^3 (= 64)$ for showing density A = $81 \div "27" (= 3)$ or density B = $128 \div "64" (= 2)$ for 3 : 2 oe	 Ignore units quoted



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	3.125×10^7	M1 A1	for $(k =) (1.25 \times 10^{-12}) \div (4 \times 10^{-20})$ or for the digits 3125 cao	Can condone missing brackets on division 3.1×10^7 or 3.12×10^7 or 3.13×10^7 will score M1A0
9	shown	M1 M1 A1	for method to find the interior angle eg $(9 - 2) \times 180 \div 9 (= 140)$ or exterior angle eg $360 \div 9 (= 40)$ of a regular nonagon for a complete method to find the interior angle ABC , eg $360 - "140" - "140" (= 80)$ or $"40" \times 2 (= 80)$ or finds the angle sum assuming a square, eg $90 + "140" + "140" (= 370)$ for complete solution with correct conclusion, eg interior angle of a square is 90, not 80 or angles around a point sum to 360 not 370	Angles may be shown on the diagram Any angle labelled correctly as 140 or 40 and not contradicted scores this mark
10	$x = -2.5, y = -6$	M1 A1 M1 A1	for a correct method to eliminate one variable (condone one arithmetic error) for either $x = -2.5$ or $y = -6$ oe (dep M1) for substituting found value into one of the equations or correct method after starting again (condone one arithmetic error) for either $x = -2.5$ and $y = -6$ oe SCB2 for both correct answers if no more than 1 mark awarded SCB1 for one correct answer if no marks awarded	Fractions do not need to be in simplest form Fractions do not need to be in simplest form



Paper 1MA1: 3H				
Question	Working	Answer	Mark	Notes
4		68	P1 P1 P1 P1 A1 OR P1 P1 P1 P1 A1	for a process to find the number of vanilla cakes, eg $420 \times 2 \div 7$ oe (= 120) for a process to find the number of banana cakes, eg 420×0.35 oe (= 147) (dep P1) for a full process to find the number of lemon/chocolate cakes eg $420 - (\text{vanilla cakes}) - (\text{banana cakes})$ (= 153) (dep on previous P1) for a process to find the number of lemon cakes eg " $153 \div 9 \times 4$ oe (= 68) OR for writing two proportions in the same format for combining the proportions of vanilla and banana cakes eg $2/7 + 7/20$ (= 89/140) (dep P1) for a full process to find the proportion or number of lemon/chocolate cakes eg $1 - "89/140"$ (= 51/140) (dep on previous P1) for a process to find the number of lemon cakes eg " $51/140 \times 420 \div 9 \times 4$ (= 68) OR for a complete method to find the interior or exterior angle of the dodecagon eg $180 - \frac{360}{12}, \frac{180}{12} (12 - 2)$ oe (= 150), $360 \div 12$ (=30) for a complete method to find the interior angle of polygon P eg at <i>B</i> or <i>C</i> : $360 - "150" - 90$ (= 120) or " $30" + 90$ (= 120) or for a complete method to find the interior or exterior angle of the hexagon eg $180 - \frac{360}{6}, \frac{180}{6} (6 - 2)$ oe (= 120), $360 \div 6$ (= 60) for 30 and 120 or 30 and 60 or 120 and 150 or 60 and 150 complete solution, fully supported by accurate figures
5		Shows polygon is a hexagon	M1 M1 A1 C1	for a complete method to find the interior or exterior angle of the dodecagon eg $180 - \frac{360}{12}, \frac{180}{12} (12 - 2)$ oe (= 150), $360 \div 12$ (=30) for a complete method to find the interior angle of polygon P eg at <i>B</i> or <i>C</i> : $360 - "150" - 90$ (= 120) or " $30" + 90$ (= 120) or for a complete method to find the interior or exterior angle of the hexagon eg $180 - \frac{360}{6}, \frac{180}{6} (6 - 2)$ oe (= 120), $360 \div 6$ (= 60) for 30 and 120 or 30 and 60 or 120 and 150 or 60 and 150 complete solution, fully supported by accurate figures



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	162 supported	M1	for method to find sum of the interior angles of a hexagon eg $(6 - 2) \times 180 (= 720)$ oe OR for method to find sum of the interior angles of a pentagon, eg $(5 - 2) \times 180 (= 540)$ OR for method to find angle AFC or BCF , eg $(360 - 2 \times 117) \div 2 (= 63)$ OR for dropping a perpendicular from A or B to ED with 90° marked on ED and 27° at the top	Must be a complete process that would lead to a figure of 720 if evaluated correctly. For a pentagon there must be an indication that they have divided the hexagon into two halves. 63 may be shown on the diagram for angle AFC or angle BCF
		M1	for method to use ratio 2 : 1 eg marks as $2x$ and x or as x and $\frac{1}{2}x$ on diagram OR for $([\text{angle sum of hexagon}] - 2 \times 117) \div 6 (= 81)$ oe or $([\text{angle sum of hexagon}] \div 2 - 117) \div 3 (= 81)$ oe or $117 + 117 + 2x + 2x + x + x = [\text{angle sum of hexagon}]$ oe OR eg $([\text{angle sum of pentagon}] - 117 - 180) \div 3 (= 81)$ oe or $117 + 180 + 2x + x = [\text{angle sum of pentagon}]$ oe	Ratio must be used correctly if awarded for diagram Award provided $[\text{angle sum of hexagon}]$ is greater than 700 or $[\text{angle sum of pentagon}]$ is greater than 500 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified.
		M1	for finding angle $FED = 81$ or for finding angle $CDE = 81$ OR for complete process to find angle AFE eg $([\text{angle sum of hexagon}] - 2 \times 117) \div 6 \times 2$ oe OR $([\text{angle sum of pentagon}] - 117 - 180) \div 3 \times 2$ oe	This may be shown by solving a correct equation to find the value of x .
		C1	for accurate working leading to angle $AFE = 162$	Award marks for 162 on the diagram with working and not contradicted by the answer line. Award 0 marks for 162 without working.

Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	45	P1	for $180 - 117 (=63)$ or states, or uses, exterior angle $+ x = 117$	Angles may be shown on the diagram.
		P1	for process to find the exterior or the interior angle of the pentagon, eg $360 \div 5 (=72)$ or $180 - (360 \div 5) (=108)$ or $((5-2) \times 180) \div 5$ $(=108)$	Any angle labelled correctly as 63 and not contradicted scores this mark
		P1	for a complete process to find x , eg $180 - "72" - "63"$ or $"108" - "63"$ or $117 - "72"$	Exterior = 108 or interior = 72 does not score the mark
		A1	cao	An answer of 45 with no supporting working scores 0
9	Enlargement	B2	vertices at (2.5, 1) (2.5, 6) (5, 6)	
		(B1	for triangle of the correct size and orientation in the wrong position or a correct enlargement of a different scale factor centre (0, 1) or correct orientation with 2 of 3 vertices correct)	
10	(a)	M1	for multiplying both sides by 7 as a first step eg $9 + x = 7(11 - x)$ or dividing each term on the left hand side by 7 eg $\frac{9}{7} + \frac{x}{7} = 11 - x$	$\times 7$ written near the equation is not enough for this mark
		M1	(dep M1) for method to isolate the x terms on one side	
		A1	oe	
	(b)	B1	$4(y + 3)$ or $4y + 12$	



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	$x = 6$ $y = -2$	B1	cao	
10	140	P1 P1 P1 A1	for process to find sum of the interior angles of a pentagon eg $180 \times (5 - 2) (= 540)$ oe (dep P1) for process to use ratio 4 : 1, eg labels as $4x$ and x or as x and $\frac{1}{4}x$ or $110 + 135 + 120 + 4x + x = "540"$ or for $"540" - 110 - 135 - 120 (= 175)$ for process to find angle ABC or angle AED eg $"175" \div (4 + 1) (= 35)$ or $"175" \div (4 + 1) \times 4$ cao	Angles must be clearly labelled on the diagram or otherwise identified. Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Ratio must be used correctly if awarded for diagram A correct answer with no supportive working gets 0 marks



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	55	P1	for process to find the sum of the interior angles of a pentagon, eg $180 \times (5 - 2) (= 540)$ oe	Can be implied by the shape correctly divided into triangle and quadrilateral or three triangles with correct angle sums marked
		P1	for the start to a process of giving each angle in a common form, eg $d = 3c$ or $e = 2c$ or $x, 3x, 2x$	Can be implied by division by 7 or 1, 1, 3, 2 given in a ratio eg 1 : 2 : 1 : 3
		P1	for process to find the value of c , eg $([540] - 155) \div 7$ oe or for a correct equation in one variable, eg $c + 155 + c + 3c + 2c = [540]$ oe	Where [540] is what they believe to be the angle sum of the pentagon
		A1	cao	
7	Rate of change of volume	C1	for a correct explanation Acceptable examples The rate of water poured Speed of pouring water out from the tank How fast the water is being used (in the tank over time) Amount of water decreasing in the tank each second Not acceptable examples Negative correlation / negative gradient Amount of water decreasing in the tank in seconds As time increases the volume of water in the tank decreases It is negative, the volume of litres is going down It represents the deceleration or changing speed	Allow amount of water increasing in the tank each second

Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	1.037×10^4	M1 A1 A1	for 570 or 9800 or 0.57×10^3 or 98×10^2 for 10370 oe eg 10.37×10^3 or 103.7×10^2 for 1.037×10^4	
6	12	P1 P1 or P1 or A1	for (interior angle $\Rightarrow$) $(180 \div 3) + (360 \div 4)$ ($= 150$) for (exterior angle $\Rightarrow$) $180 - "150"$ ($= 30$) or for " 150 " $= \frac{(n-2) \times 180}{n}$ oe for $360 \div "30"$ or for a correct process to solve the equation as far as " 30 " $n = 360$ cao	150 may be seen on diagram. May be seen on diagram Exterior angle of 30 implies P1P1 A correct answer with no supportive working gets 0 marks Minimum supportive working is P1P1 or Trials of interior angle sum Finding $1800 \div 150 = 12$ oe with 12 as answer scores P1P1P1A1



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
8	140	P1	for complete process to find sum of the interior angles of a pentagon eg $(5 - 2) \times 180$ or exterior $360 \div 5 = 72$, interior $180 - 72 = 108$, 108×5 OR for complete process to find sum of the exterior angles of the pentagon eg $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90)$	Must be a complete process that could lead to a figure of 540 if that process is evaluated incorrectly
		A1	for sum of interior angles is 540 OR for sum of exterior angles is 360	360 must be identified as the sum of the exterior angles
		P1	for start to process to find angle <i>ABC</i> eg [angles in a pentagon] – $115 - 125 - 90 (= 210)$ or $115 + 125 + 90 + x + 2x =$ [angles in a pentagon] OR $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90) = 360$	Award provided [angles in a pentagon] is greater than 400 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified
		P1	for process to find angle <i>ABC</i> eg “210” $\div 3 (= 70)$, “210” divided in the ratio 2 : 1 or for process to find angle <i>BCD</i> eg $\frac{2}{3} \times “210”$ or for $3x = “210”$ or $-3x = -“210”$	Award if 70 is given for either <i>ABC</i> or <i>BCD</i> on the diagram
		A1	cao	Award marks for 140 on the diagram with working and not contradicted by the answer line. Award 0 marks for 140 without working.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	4811.20	M1	for a full method for one year, eg 4500×1.034 (= 4653) oe OR for a full method for 2 years, eg 4500×1.034^2 oe	Can be implied by 4806 or 9306
		A1	for 4811.2(0)	Accept 4811.202 and 4811.21
4	11	M1	for one correct step to isolate x term or constant term on one side, eg adds x to both sides to get $5x - 14 + x = 52 - x + x$ or adds 14 to both sides to get $5x - 14 + 14 = 52 - x + 14$ oe	May be seen in different equivalent forms but must be carried out, not just intention seen. Can be implied by eg $4x = 66$ or $6x = 38$
		M1	for both correct steps to isolate terms in x on one side and constant term on one side, eg " $6x$ " - $14 + 14 = 52 + 14$, or $5x + x = "66" + x - x$	
		A1	cao	
5	21	P1	for process to work correctly with initial ratio, eg $120 \div 4 \times 9$ (= 270) or $90 + 120 + 60$ (= 270)	Can be implied by $90 : 120 : 60$ or by a second ratio that totals 270
		P1	for process to find the value of 1 part in the new ratio, eg " 270 " $\div (2 + 5 + 3)$ (= 27)	
		P1	for complete process to find both values for Errol, eg " 27 " $\times 3$ (= 81) and $120 \div 4 \times 2$ (= 60)	
		A1	cao	
6	327	M1	for $147 + 180$ or for $360 - (180 - 147)$, or for drawing a suitable diagram with 147 in the correct position and with the bearing of A from B indicated	Diagram can be a sketch
		A1	cao	



Paper: 1MA1/3H				
Question	Answer	Mark	Mark scheme	Additional guidance
23	098.6	P1	for using bearings to determine ABC as 67°	Accept 67 written on the diagram.
		P1	for using the cosine rule to find AC eg $(AC^2 =) 9^2 + 8^2 - 2 \times 9 \times 8 \times \cos[67]$ oe or $AC = 9.4199\dots$	Accept correct substitution into RHS of equation Accept AC in the range 9.41 to 9.42
		P1	(dep P1) for using the sine rule to find angle BAC eg $\frac{9}{\sin BAC} = \frac{8}{\sin[67]}$ oe	
			OR for using the cosine rule to find angle BAC eg $9^2 = "9.42^2" + 8^2 - 2 \times "9.42" \times 8 \times \cos BAC$ oe	
		P1	for rearranging eg $\sin BAC = 9 \times \frac{\sin[67]}{"9.42"}$ oe	Accept any equivalent form with values substituted
			OR eg $\cos BAC = ("9.42^2" + 8^2 - 9^2) \div (2 \times "9.42" \times 8)$ oe	
			OR for angle $BAC = 61.57\dots$	
		A1	for angle in the range 98.5 to 98.6	If the correct answer is given without supportive evidence award 0 marks. Condone missing "0" at the front. If an answer within the range is seen in working and rounded incorrectly award full marks.



Paper: 1MA1/1H				
Question	Answer	Mark	Mark scheme	Additional guidance
7 (a)	p^{10}	B1	cao	
		M1	for any two of $12 \div 6 (= 2)$, $x^7 \div 3 (= x^4)$, $y^3 \div 1 (= y^2)$ in a single product or written as a fraction with complete and correct cancelling of at least two terms	
		A1	cao	
8 (i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070° , eg. a line drawn 70° from the North line at P	Accept a line of any length as long as the intention is clear.
		P1	for a process to work out the distance PQ , eg. $12 \times 1.5 (= 18)$	
		P1	(dep previous P1) for the process to use the given scale, eg. " $18'' \div 4 (= 4.5 \text{ cm})$ "	
		A1	(dep P3) for distance in the range 20 to 23	
		A1	(dep P3) for bearing in the range 317 to 330	
8 (ii)	Bearing in the range 317 to 330			Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to $12 \times 1.5 (= 18)$
				Award no marks if no supportive processes Award no marks if no supportive processes Award A0A0 if Q is not in the correct place