

Q	Answer	Mark	Comments
19(a)	6 seconds	B1	

Q	Answer	Mark	Comments
19(b)	Correct tangent drawn at 6 seconds	B1	
	Correct gradient for their tangent	B1ft	ft their tangent, which must be an increasing straight line
	m/s	B1	oe eg metres per second or mps
	Additional Guidance		
	If no tangent is drawn the maximum mark possible is B0B0B1		
	Allow the units to be given in working lines if no units on the answer line		

Q	Answer	Mark	Comments
20	$x^2 - 9x + 3x - 27$ or $x^2 - 6x - 27$	M1	oe implied by eg $\frac{1}{2}x^2 - \frac{9}{2}x + \frac{3}{2}x - \frac{27}{2}$ may be seen in a grid
	their $(x^2 - 9x + 3x - 27) = 12 - 2x^2$	M1dep	oe equation with brackets expanded eg their $\left(\frac{1}{2}x^2 - \frac{9}{2}x + \frac{3}{2}x - \frac{27}{2}\right) = 6 - x^2$
	$3x^2 - 6x - 39 (= 0)$ or $3x^2 - 6x = 39$	M1dep	oe $ax^2 + bx + c (= 0)$ or $px^2 + qx = r$ eg $x^2 - 2x - 13 (= 0)$ or $\frac{3}{2}x^2 - 3x - \frac{39}{2} (= 0)$ implied by eg $\frac{2 \pm \sqrt{56}}{2}$
	$d = k \quad e = 14k^2 \quad f = k$ where k is a non-zero constant	A1	eg $d = 1 \quad e = 14 \quad f = 1$ or $d = 2 \quad e = 56 \quad f = 2$ or $d = 6 \quad e = 504 \quad f = 6$
	Additional Guidance		
	Take the values on the answer lines as the final answer eg $\frac{2 \pm \sqrt{56}}{2}$ in working with $d = 2 \quad e = \sqrt{56} \quad f = 2$ on answer lines		M3A0
	$1 \pm \sqrt{14}$ in working with $d = 1 \quad e = 14 \quad f = (\text{blank})$		M3A0
	For terms seen in a grid accept eg $3x$ for $+3x$		
	For up to M2 accept algebraic fractions but do not allow 3rd M1 unless recovered eg $\frac{x^2 - 9x + 3x - 27}{x + 3} = \frac{12 - 2x^2}{x + 3}$		M1M1

Q	Answer	Mark	Comments
5(a)	$C(0, 6)$	B1	if answer space is blank, accept (0, 6) written at C on the diagram
	$D(3, 0)$	B1	if answer space is blank, accept (3, 0) written at D on the diagram
	Additional Guidance		
	For each part mark the answer space unless blank		
	Allow x and y written above the coordinates but do not allow eg $(0x, 6y)$		

Q	Answer	Mark	Comments
5(b)	5	B1	
	3	B1	
	Additional Guidance		
	Mark the answer lines only		
	Do not allow eg $(0, 5)$		

Question	Answer	Mark	Comments
18(a)	Alternative method 1 large rectangle – 4 squares		
	$x(x + 5)$	M1	
	$x^2 + 5x - 400 = 1000$ or $x^2 + 5x - 400 - 1000 = 0$ or $x^2 + 5x = 1000 + 400$ with M1 seen	M1dep	400 may be seen as 4×10^2 or 4×100 oe equation with brackets expanded and 400 and 1000 seen
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Alternative method 2 three vertical rectangles		
	$(x + 5)(x - 20)$ or $(2 \times)10(x - 15)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 20x + 5x - 100 + 20x - 300 = 1000$ or $x^2 - 15x - 100 + 20x - 300 = 1000$ with M1 seen	M1dep	oe equation with brackets expanded and 100 and 300 and 1000 seen allow 150 seen twice for 300
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0

Mark scheme and Additional Guidance continue on the next page

Question	Answer	Mark	Comments
18(a)	Alternative method 3 three horizontal rectangles		
	$x(x - 15)$ or $(2 \times)10(x - 20)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 15x + 20x - 400 = 1000$ with M1 seen	M1dep	oe equation with brackets expanded and 400 and 1000 seen allow 200 seen twice for 400
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Alternative method 4 central rectangle + four outer rectangles		
	$(x - 15)(x - 20)$ or $(2 \times)10(x - 15)$ or $(2 \times)10(x - 20)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 20x - 15x + 300 + 20x - 300 + 20x - 400 = 1000$ or $x^2 - 35x + 300 + 20x - 300 + 20x$	M1dep	oe equation with brackets expanded and 300 seen twice and 400 and 1000 seen allow 150 seen twice for one of the 300s allow 200 seen twice for 400

cont	$-400 = 1000$ with M1 seen		
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Additional Guidance		
	If 1st M1 seen award M1 even if expression is not subsequently used		
	For M1 allow multiplication signs eg $x \times (x + 5)$		M1
	$x(x + 5) = x^2 + 5x$ $1000 + 400 = 1400$		M1
	$x^2 + 5x = 1400$ (previous line shows 1000 and 400) $x^2 + 5x - 1400 = 0$		M1 A1
	$x(x + 5) = x^2 + 5x$ $x^2 + 5x = 1400$ (equation does not have 1000 and 400) $x^2 + 5x - 1400 = 0$		M1 M0 A0
	Only equation seen is $x^2 + 5x - 1400 = 0$ the maximum mark is M1		

Question	Answer	Mark	Comments
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18(b)	No and valid reason	B1	eg No and x cannot be negative (in this context)
	Additional Guidance		
	If neither box is ticked condone if No is clearly stated in working lines		
	Yes or both boxes ticked		B0
	Allow 'it' to represent x		
	No and x is (only) 35		B1
	No and it cannot be -40		B1
	No and the width would be negative		B1
	No and the width should be positive		B1
	No she put -40		B1
	No and you can't have two answers		B0
	No and the answers are too big		B0
	No and it should be 40 (and -35)		B0

15	$w = \sqrt[3]{y^2}$	B1	
	Additional Guidance		

Question	Answer	Mark	Comments
15(a)	Identifies error in working	B1	eg $2y^2$ should be $4y^2$ 2 should be 4 2 should be squared Should have worked out $(2y)^2$ but has only worked out y^2
	Additional Guidance		
	Answer may be seen next to Sami's method below the diagram		
	Adding brackets around $2y$ to Sami's working in line 2 (working lines may be blank)		B1
	Showing the error being corrected eg1 $(2y)^2 = 100$ and $2y = 10$ eg2 $4y^2 = 36 + 64$		B1 B1
	She hasn't squared the bracket		B1
	Has only squared y		B1
	The brackets have been left out		B1
	$(2y)^2$ is not equal to $2y^2$		B1
	Should have square rooted 100 before dividing by 2 because the $2y$ should not have been taken out of the bracket		B1
	Should have square rooted 100 before dividing by 2 (could be referring to working from line 3 to line 4)		B0
	Line 2 is wrong (has not identified which part of line 2 is wrong)		B0
	Answer should be $y = 5$ (has not shown what the error is)		B0
	Ignore non-contradictory work if correct response seen		
15(b)	No and valid reason	B1	eg No and the hypotenuse is 10 No and $2y$ is 10 No and if you double y it is more than 8
	Additional Guidance		
	Valid reason must be for Mel's argument		
	Neither box ticked with valid reason can score B1 if decision in words eg $2y$ is 10 so Mel is wrong		B1
	No and she didn't double it to 10		B1
	No and she didn't double y		B0
	No and she has to double 5 which makes it 10		B1
	No and she has to double 5		B0
	No and the hypotenuse is $2y$ so that's more than 8		B1
	No and the hypotenuse is $2y$		B0
	No and the hypotenuse is the longest side		B0

	No and y is 5	B0
	No and if you double y it is more than 6 and 8	B1
	No and if you double y it is more than 6	B0
	Yes and valid reason	B0

11	9.56 × 3 ¹⁰ 9563 9.56 × 10 ³ or 564 508 (.44) 9563 9560 with no incorrect evaluations seen	B2	B1 9.563 × 10 ³ or 9560 or 564 508 (.44) or 5.6(450844) × 10 ⁵ SC1 9.56 × 10 ³ 9563 9.56 × 3 ¹⁰ with no incorrect evaluations seen
	Additional Guidance		
	Allow numbers to be written in original or converted form or as a mixture for B2 or SC1		
	Incorrect evaluation seen scores a maximum of B1		

Q	Answer	Mark	Comment
24	$247 - 170$ or 77	M1	oe may be on diagram
	$23 \times 1\frac{1}{2}$ or 34.5	M1	oe eg $23 + 11.5$ or $23 \times 90 \div 60$ or 23×1.5 may be on diagram
	$(\text{their } 34.5)^2 + 60^2 - 2 \times \text{their } 34.5 \times 60 \times \cos(\text{their } 77)$ or $[3858, 3859]$	M1dep	oe dep on at least one M scored
	$\sqrt{\text{their } [3858, 3859]}$ or $62.1(\dots)$	M1dep	oe eg $\sqrt{34.5^2 + 60^2 - 2 \times 34.5 \times 60 \times \cos 77}$ dep on 3rd M1
	No and $62.1(\dots)$	A1	oe eg 62.1 and the ship is further away accept No and 62 with M4 scored
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	2nd M1 Do not accept 23×1.30 unless recovered		

Q	Answer	Mark	Comments
12	Alternative method 1		
	$6x + x + 5x + 6x + x + 6x + x$ or $26x$ or $6 + 1 + 5 + 6 + 1 + 6 + 1$ or 26	M1	oe eg $7x + 6x - x + 6x + x + 6x + x$ $26x$ or 26 is implied by 3.8 oe if addition not seen
	their $26x = 98.8$ or $98.8 \div \text{their } 26$ or 3.8 or $\frac{19}{5}$	M1	oe equation must have terms collected if 1st M1 not awarded their $26x$ must be $24x$ or $25x$ or $27x$ if 1st M1 not awarded their 26 must be 24 or 25 or 27
	their 3.8×14	M1dep	dep on 2nd M1 oe eg $45.6 + 7.6$
	53.2	A1ft	oe ft their 3.8 if M0M2 awarded

Mark scheme and Additional Guidance continue on the next page

12 cont	Alternative method 2		
	$6x + x + 6x$ or $13x$ or $6 + 1 + 6$ or 13	M1	oe eg $6x + x + 5x + x$ $13x$ or 13 is implied by 3.8 oe if addition not seen
	their $13x = 98.8 \div 2$ or $49.4 \div \text{their } 13$ or 3.8 or $\frac{19}{5}$	M1	oe equation must have terms collected if 1st M1 not awarded their $13x$ must be $12x$ if 1st M1 not awarded their 13 must be 12
	their 3.8×14	M1dep	dep on 2nd M1 oe eg $49.4 + 3.8$
	53.2	A1ft	oe ft their 3.8 if M0M2 awarded
	Additional Guidance		
	Up to M3 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Follow through must be to at least 1 dp and their 26 or their 13 must be seen For information: $24 \rightarrow 57.6\dots$ $25 \rightarrow 55.3\dots$ $27 \rightarrow 51.2\dots$ $12 \rightarrow 57.6\dots$		M0M1M1A1ft
	Both 2nd and 3rd method marks may be implied by their answer. If not using 24, 25, 26, 27, 12 or 13 you must have seen the first M1.		

$27x = 98.8$ (1st M0, no addition seen, but $27x$ allowed) $\frac{98.8}{27} \times 14$, answer 51.2	M0M1 M1A1ft
$7x + 5x + 6x + x + 6x + x = 20x$ (correct terms added with incorrect total) $98.8 \div 20 = 4.94$ 69.16 (multiplication by 14 implied)	M1 M1 M1A0
$98.8 \div 20 = 4.94$ (1st M0, no addition seen, and 20 not allowed) 4.94×14 , answer 69.16	M0M0 M0A0
$6x + x + 5x + 6x + x + 6x + x = 26x^7$	M1M0M0A0

Q	Answer	Mark	Comments
8(a)	11 5 4	B2	any order
	or		B1 answer of three positive numbers in any order with sum 20
	10 7 3		eg 17 2 1
	or		or $9\frac{1}{2}$ $8\frac{1}{2}$ 2
	10 6 4		or 10 5 5
	or		or $6\frac{2}{3}$ $6\frac{2}{3}$ $6\frac{2}{3}$
	9 8 3		or
	or		correct equation in w, x and y
	9 7 4		eg $4w + 4x + 4y = 80$ or $w + x + y = 20$
	or		
8 7 5			
Additional Guidance			
Ignore attempts to work out the volume or surface area eg 10 5 5 volume calculated as 500			B1
Negative numbers and/or zero used			B0
$wxy > 200$ or $wxy = 200$			B0
Allow $6.\dot{6}$ for $6\frac{2}{3}$			

Q	Answer	Mark	Comments
8(b)	$54a^2$	B1	

Q	Answer	Mark	Comments
5	At least two of $2^3, 3^2, 7$ selected eg $2^3 \times 3^2 \times 7$ or $2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 7$ or $2^2 + 3^2 + 7$ or $2^3 \times 3^2$ or $2^3 + 7$ or $3^2 \cdot 7$	M1	allow 2^3 to be $2 \times 2 \times 2$ or 8 allow 3^2 to be 3×3 or 9 allow 7 to be 7^1 selection is implied by inclusion in intersection of overlapping circles M0 inclusion of 5 in selection
	504	A1	
	Additional Guidance		
	$8 \times 9 \times 7$		M1
	8, 9, 49		M1
	$4 + 9 + 7$		M1
	Intersecting circles with eg only 9 and 7 in the intersection		M1
	Allow inclusion of 1 for up to M1 eg $1 \times 2^3 \times 3^2 \times 7$		M1
	$2^3 \times 3^2 \times 5 \times 7$		M0
	Answer 504		M1A1
	M1 seen with answer the LCM		M1A0

Q	Answer	Mark	Comments
22	Alternative method 1		
	All three of 1, 8 and 1, 2, 4, 8 and 1, 3, 5, 7, 9 or all three of 2, 4 and 5	B2	B1 any two correct do not allow 2, 4 or 5 from an incorrect list of numbers
	their $2 \times$ their $4 \times$ their 5 or 40	M1	working out the number of possible codes ft their non-zero number of options for each digit implied by $\frac{1}{\text{their } 2} \times \frac{1}{\text{their } 4} \times \frac{1}{\text{their } 5}$
	$\frac{1}{40}$	A1ft	oe fraction, decimal or percentage ft their non-zero number of options for each digit
	Alternative method 2		
	All three of $\frac{1}{2}$ and $\frac{1}{4}$ and $\frac{1}{5}$	B2	B1 any two correct oe fractions, decimals or percentages do not allow $\frac{1}{2}$, $\frac{1}{4}$ or $\frac{1}{5}$ from an incorrect list of numbers
	their $\frac{1}{2} \times$ their $\frac{1}{4} \times$ their $\frac{1}{5}$	M1	oe fractions, decimals or percentages allow their $\frac{1}{2}$ to be 1 their $\frac{1}{4}$ must be < 1 their $\frac{1}{5}$ must be < 1
	$\frac{1}{40}$	A1ft	oe fraction, decimal or percentage ft their probabilities

Additional Guidance is on the next page

22 cont	Additional Guidance	
	If 0 is taken to be a cube number, $\frac{1}{3} \times \frac{1}{4} \times \frac{1}{5} = \frac{1}{60}$	B1M1A1ft
	If they only have one cube number, $1 \times \frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$	B1M1A1ft
	8, 9 and 1, 2, 4, 8 and 1, 3, 5, 7, 9 $\frac{1}{2} \times \frac{1}{4} \times \frac{1}{5} = \frac{1}{40}$	B1 M1A1ft
	Ignore conversion attempt after correct answer seen	
	Allow 1^3 , 2^3 for 1, 8	

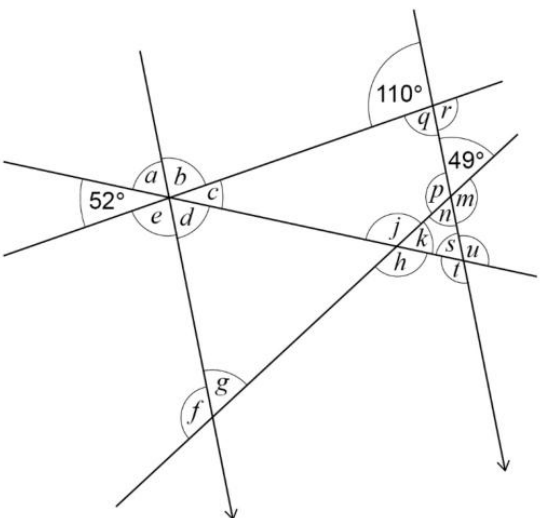
Q	Answer	Mark	Comments
13	$80 \times x$ or $80x$ or $x \times 80$ or $x80$ or $x \div 60$ or $\frac{x}{60}$ or $\frac{1}{60}x$ or $x\frac{1}{60}$ or $80 \div 60$ or $\frac{80}{60}$	M1	teabags per hour boxes per minute
	$\frac{80x}{60} \left(= \frac{4x}{3} \right)$ or $80 \div 60 \times x \left(= \frac{4x}{3} \right)$	A1	oe showing 80 and 60 and x eg $\frac{80 \times x}{60} \left(= \frac{4x}{3} \right)$ or $x\frac{80}{60} \left(= \frac{4x}{3} \right)$ or $\frac{80}{60} \times x \left(= \frac{4x}{3} \right)$ or $80x \div 60 \left(= \frac{4x}{3} \right)$
	Additional Guidance		
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	Do not allow M1 if only seen embedded in an incorrect expression or calculation eg $80x \times 4 = 320x$		M0
	$60 \times \frac{4x}{3} = 80x$ (M1 allowed as $80x$ is not embedded in an incorrect expression or calculation, A0 because using the given answer)		M1A0
	Condone $x = 80 \div 60$		M1A0
	$\frac{80x}{60} \left(= \frac{4x}{3} \right)$		M1A1
	$\frac{80}{60} = \frac{4}{3}$ and $\frac{4}{3} \times x \left(= \frac{4x}{3} \right)$ $\frac{80}{60} = \frac{4}{3}$ and $\frac{4x}{3}$		M1A1
			M1A0
	No equivalents allowed for M1		
	Ignore units		
	Condone 1.33(...) for $\frac{4}{3}$		
	Ignore non-contradictory working after M1A1 seen		

Q	Answer	Mark	Comments
14(a)	4200×1.12^{20}	M1	oe allow $4200 \times [9.64, 9.65]$
	40 514(...) or 40 515 or 40 500 or 40 510 or 40 489 or 40 509 or 40 548	A1	
	Additional Guidance		
	Year on year calculations Consistently rounding down to nearest integer leads to 40 489 Consistently rounding to nearest integer leads to 40 509 Consistently rounding up to nearest integer leads to 40 548		

Q	Answer	Mark	Comments
14(b)	$4200 \times 1.13^{19} \times 0.92$ or [39 402, 39 403] or 39 400 or 39 372 or 39 407 or 39 435	M1	oe allow $4200 \times [10.19, 10.2] \times 0.92$
	No and [39 402, 39 403] or No and 39 400 or No and 39 372 or No and 39 407 or No and 39 435	A1	
	Additional Guidance		
	Year on year calculations Consistently rounding down to nearest integer leads to 39 372 Consistently rounding to nearest integer leads to 39 407 Consistently rounding up to nearest integer leads to 39 435		

Q	Answer	Mark	Comments
14(c)	0.4×700 or 280 or $(1 - 0.4) \times 900$ or 0.6×900 or 540 or 30×0.4 or 12 or $30 \times (1 - 0.4)$ or 30×0.6 or 18	M1	oe implied by 820
	$30 \times 0.4 \times 700$ or 8400 or $30 \times (1 - 0.4) \times 900$ or 16 200	M1dep	oe implied by 820×30
	24 600	A1	
	Additional Guidance		
	Up to M2 may be awarded for correct work, with no or incorrect answer,		

	even if this is seen amongst multiple attempts	
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Q	Answer	Mark	Comments
6	Using these letters for the unknown angles 		
	73	B3	B2 $180 - 110 + 52 - 49$ oe calculation or $h = 107$ or $j = 107$ or $k = 73$ or $g = 49$ and $d = 58$ or $g = 49$ and $e = 70$ or $f = 131$ and $d = 58$ B1 any angle correct (others may be incorrect)
	Additional Guidance		
	Angles will usually be seen on the diagram		
	Angles must be unambiguously linked to the correct position eg 131 seen in working but not on the diagram or in wrong position		B0
	$a = 58$ $b = 70$ $c = 52$ $d = 58$ $e = 70$ $f = 131$ $g = 49$ $h = 107$ $j = 107$ $k = 73$ $m = 131$ $n = 49$ $p = 131$ $q = 70$ $r = 110$ $s = 58$ $t = 122$ $u = 122$		

11	3.041...	M1	condone 3.042
	3.14 – 3.041... = 0.09... or 3.041... + 0.1 = 3.141... or 3.041... and 3.14 – 0.1 = 3.04	A1	oe condone 3.042 for 3.041...
	Additional Guidance		
	Must see calculation for the A mark		
	Do not allow use of a more precise value of π for the A mark		

Question	Answer	Mark	Comments
20	$0.25\pi^2(30 - 20)^2(30 + 20)$ or $0.25\pi^2 \times 10^2 \times 50$	M1	oe allow use of π as [3.14, 3.142]
	[12 320, 12 340.21]	A1	may be implied
	12 300 or 1.23×10^4 with no value outside [12 320, 12 340.21] seen	A1	
	Additional Guidance		
	$0.25\pi^2(30 - 20)^2(30 + 20)$ 12 300	M1 A1(implied)A1	
	12 300 with no incorrect working	M1A1A1	
	12 300.0 is not to 3 significant figures		
	M1 gained followed by answer 12 300.0	M1A0A0	
	Do not allow misreads eg $0.25\pi^2(30 + 20)^2(30 + 20)$	M0A0A0	
	Brackets expanded correctly and values substituted	M1	

8	Alternative method 1		
	22.5(0) and 4 or 27 and 8 or 31.5(0) and 12 or 36 and 16 or 40.5(0) and 20 or 45 and 24 or 30 : 16 or 45 : 24	M1	
	45 and 24 chosen	A1	eg 45 : 24 is the final ratio seen
	6	A1	

Mark scheme and additional guidance continues on the next page

Question	Answer	Mark	Comments
8 cont	Alternative method 2		
	18 + 4.5x and 4x seen or $\frac{18 + 4.5x}{15} = \frac{4x}{8}$	M1	any letter oe sets up correct equation
	8(18 + 4.5x) = 60x or 144 + 36x = 60x or 24x = 144	M1dep	eliminates denominators oe
	6	A1	
	Additional Guidance		
	Answer 6 that is not from incorrect method		M1A1A1
	45 and 24 followed by eg 49.5(0) and 28 (answer not 6)		M1A0A0
	Equivalent ratio to 15 : 8 that is not 30 : 16 or 45 : 24 eg 60 : 32 (answer not 6)		M0A0A0
	Final calculation $\frac{15}{8} \times 24 = 45$ (answer not 6)		M1A1A0

Question	Answer	Mark	Comments
15	Alternative method 1		
	1.015	M1	oe eg 101.5% or $1 + \frac{1.5}{100}$ Implied by 6090
	6000×1.015^n for any positive integer $n > 1$	M1dep	oe Implied by 6181.(...)
	11	A1	If showing trials for 10 and/or 11 years, must have $6000 \times 1.015^{10} = 6963.(...)$ and/or $6000 \times 1.015^{11} = 7067.(...) \text{ or } 7068$ If showing totals from year on year for 10 and/or 11 years, must have (Y10) [6963.21, 6963.30] and/or (Y11) [7067.65, 7067.75]
	Alternative method 2		
	1.015	M1	oe eg 101.5% or $1 + \frac{1.5}{100}$ Implied by 6090
	Evaluates 1.015^n for any positive integer $n > 1$ and $7000 \div 6000$ or 1.166... or 1.167 or 1.17	M1dep	
	11	A1	If showing trials for $n = 10$ and/or 11 must have $1.015^{10} = [1.160, 1.161]$ and/or $1.015^{11} = [1.177, 1.178]$

Additional Guidance is on the next page

15	Additional Guidance	
	Values for working year on year	
	Y1	$6000 \times 1.015 = 6090$
	Y2	$6090 \times 1.015 = 6181.35$
	Y3	$6181.35 \times 1.015 = [6274.07, 6274.08]$
	Y4	$[6274.07, 6274.08] \times 1.015 = [6368.18, 6368.20]$
	Y5	$[6368.18, 6368.20] \times 1.015 = [6463.70, 6463.73]$
	Y6	$[6463.70, 6463.73] \times 1.015 = [6560.65, 6560.69]$
	Y7	$[6560.65, 6560.69] \times 1.015 = [6659.05, 6659.11]$

Y8	$[6659.05, 6659.11] \times 1.015 = [6758.93, 6759.00]$	
Y9	$[6758.93, 6759.00] \times 1.015 = [6860.31, 6860.39]$	
Y10	$[6860.31, 6860.39] \times 1.015 = [6963.21, 6963.30]$	
Y11	$[6963.21, 6963.30] \times 1.015 = [7067.65, 7067.75]$	
Answer 11 with no working		M2A1
$1000 \div 90 = 11.1$ Answer 11		Zero

Question	Answer	Mark	Comments
10	3 6 9 ... or $23 + 12$ or $1.5n^2 \dots$	M1	
	35	A1	
	Additional Guidance		
	Answer line blank with 35 as next term in sequence		M1A1
	Answer line has attempt at term to term rule or n th term but 35 seen		M1A0
	35 seen on dotted line in sequence but a different answer given eg 50		M1A0

Question	Answer	Mark	Comments
7	Enlargement	B1	
	Scale factor ($\times$) $\frac{1}{3}$	B1	
	Centre (5, 1)	B1	
	Additional Guidance		
	Enlarge ($\times$) $\frac{1}{3}$ (5, 1)		B1B1B1
	Reduction or makes bigger or unenlargement or increase or negative enlargement		1st B0
	Any other transformation mentioned or implied such as reflection, rotation or translation loses the mark for enlargement eg enlarged and moved up 4 or enlarged and $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$		1st B0
	Do not accept $\div 3$ for scale factor		2nd B0
8	$[0, 5] \times 20 + [5, 10] \times 48$ $+ [10, 15] \times 30 + [15, 20] \times 22$ or 1170	M1	Must add 4 products
	their $1170 \div 120$	M1dep	
	9.75 or $\frac{39}{4}$ or $9\frac{3}{4}$	A1	
	Additional Guidance		
	$1170 \div 120$ or 9.75 with $5 < x \leq 10$ on answer line		M2A0
	Do not allow M1 for working in the table if a different method is used in working lines		

Q	Answer	Mark	Comments
20	Alternative method 1		
	5.88 ÷ 1.68 or 3.5 or 1.68 ÷ 5.88 or [0.285, 0.29] or 5.88 ÷ 5.60 or 1.05	M1	oe eg $\frac{7}{2}$ or $\frac{2}{7}$ or $\frac{21}{20}$ or $5.6 \times 1.05 = 5.88$
	5.6(0) ÷ (5.88 ÷ 1.68) or 5.6(0) × (1.68 ÷ 5.88) or 1.68 ÷ (5.88 ÷ 5.60) or 1.6	M1dep	oe eg 5.6(0) ÷ 3.5 or 5.6(0) × [0.285, 0.29] or 1.68 ÷ 1.05
	their 1.6 ÷ 1.68 or [0.952, 0.9524] or 1 – their 1.6 ÷ 1.68 or 1 – [0.952, 0.9524] or [0.0476, 0.048]	M1dep	oe eg $\frac{20}{21}$ or $1 - \frac{20}{21}$ or $\frac{1}{21}$ 5.6(0) ÷ 5.88 oe scores M3 1 – 5.6(0) ÷ 5.88 oe scores M3
	4.76	A1	
	Alternative method 2		
	5.88 ÷ 5.6(0) or 1.05	M1	oe eg $\frac{21}{20}$
	1 ÷ their 1.05	M1dep	oe eg $1 \div \frac{21}{20}$
	[0.952, 0.9524] or 1 – [0.952, 0.9524] or [0.0476, 0.048]	M1dep	oe eg $\frac{20}{21}$ or $1 - \frac{20}{21}$ or $\frac{1}{21}$ 5.6(0) ÷ 5.88 oe scores M3 1 – 5.6(0) ÷ 5.88 oe scores M3
	4.76	A1	

Additional Guidance is on the next page

Additional Guidance		
Up to M3 may be awarded for correct work with no, or incorrect answer, even if this is seen amongst multiple attempts		
$\frac{0.28}{5.60} = 0.05$ is M0 unless 1.05 subsequently used		
5.60 ÷ 1.68 with no further correct working		M0
Note that 1.6 seen may be from an incorrect method eg $1.68 \times 0.95 = 1.6$ does not score because 1.68×0.95 is an incorrect method and the actual value of 1.68×0.95 is 1.596		

20 cont	method and the actual value of 1.68×0.95 is 1.596	
	Any single calculation or set of calculations that lead to $\frac{20}{21}$ or $\frac{1}{21}$	M3
	Some common oes for $1 - 5.6(0) \div 5.88$ are $\frac{5.88 - 5.6(0)}{5.88}$ or $\frac{0.28}{5.88}$ and $\frac{1.68 - 1.6}{1.68}$ or $\frac{0.08}{1.68}$	M3
	3rd M1 oes include [0.952, 0.9524] $\times$ 100 or [95.2, 95.24]% 100% – [0.952, 0.9524] $\times$ 100 [0.0476, 0.048] $\times$ 100 or (4.76, 4.8)%	
	Values that score marks may be seen in ratios eg 5.88 : 1.68 (does not score at this stage) 3.50 : 1	M1
	Allow working in pence eg $588 \div 1.68$ or 350	M1
	Allow working in grams eg $5.88 \div 1680$ or 0.0035	M1

Q	Answer	Mark	Comment
3	15	B1	

Q	Answer	Mark	Comments
14(a)	Alternative method 1 Works out best estimate of the percentage of employees with hourly rate more than £17		
	$32 \div 2$ or 16	M1	oe implied by 41 or 82
	$(15 + 10 + \text{their } 16) \div 123$ or $41 \div 123$ or $\frac{1}{3}$ or 0.33(...) or $(66 + \text{their } 16) \div 123$ or $82 \div 123$ or $\frac{2}{3}$ or 0.66(...) or 0.67	M1dep	oe eg $(123 - 66 - \text{their } 16) \div 123$ or $13(.0...)(\%) + [12, 12.2](\%) + 8(.1...)(\%)$
	$33(.3...)(\%)$	A1	oe eg 0.33(3...) and 0.3 allow 33.2(%) from $13(\%) + 12.2(\%) + 8(\%)$ SC3 37 (or 36.9) and explains that a minimum of 12 of 32 people earn more than £17
	Alternative method 2 Compares best estimate of the number of employees with hourly rate more than £17 with 30% of number of employees		
	$32 \div 2$ or 16	M1	oe implied by 41 or 82
	0.3×123 or 36.9 or 0.7×123 or 86.1	M1	oe accept 36 or 37 for 36.9 accept 86 or 87 for 86.1
	41 and 36.9 or 82 and 86.1	A1	accept 36 or 37 for 36.9 accept 86 or 87 for 86.1 SC3 37 (or 36.9) and explains that a minimum of 12 of 32 people earn more than £17

Question 14(a) continues on the next page

	Alternative method 3 Shows that a value of x gives a percentage $> 30\%$		
	$(15 + 10 + x) \div 123$ where $12 \leq x \leq 32$	M2	oe eg $(25 + x) \div 123$ must see 15 and 10 or 25
	$(15 + 10 + x) \div 123$ where $12 \leq x \leq 32$ and evaluates $(15 + 10 + x) \div 123 \times 100$ correctly	A1	evaluations rounded or truncated to nearest integer or better SC3 37 (or 36.9) and explains that a minimum of 12 of 32 people earn more than £17
	Alternative method 4 Shows a number of employees that gives a percentage $> 30\%$		
	0.3×123 or 36.9	M1	oe

14(a) cont			accept 36 or 37 for 36.9
	15 + 10 + x or 25 + x where $12 \leq x \leq 32$	M1dep	must see 15 and 10 or 25
	36.9 and evaluates 15 + 10 + x correctly where $12 \leq x \leq 32$	A1	accept 36 or 37 for 36.9 SC3 37 (or 36.9) and explains that a minimum of 12 of 32 people earn more than £17
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	16 may be seen by the table		
	Alt 1 67% needs further explanation to score A1		
	Ignore irrelevant working in an otherwise fully correct response		
	For the SC3, minimum of 12 may be implied by an explanation that 10 + 15 + x is at least 37 or 25 + x is at least 37		
	Responses involving interpolation should be escalated		
Q	Answer	Mark	Comments
14(b)	Valid reason	B1	eg all employees in the second interval may earn less than £17
	Additional Guidance		
	Fewer than 12 employees could earn more than £17 per hour		B1
	Only 10 might get more than £17 in second class interval (10 could be replaced by any integer from 0 to 11 inclusive)		B1
	More than 12 in group 2 earn less than £17		B0
	Everyone in second group may earn 14 or 15 or 16		B1
	21 people may earn between £14 and £17 (21 could be replaced by any integer from 22 to 32 inclusive)		B1
	More people may earn between £14 and £17		B0
	People in the 14 to 20 group aren't evenly distributed		B0
	Not everyone in 14 – 20 earns more than £17		B0
	Not many in second group may get more than £17		B0
	Some of second group may get more than £17		B0
	14 to 20 includes people who get less than £17		B0
	2nd group includes some getting less than 17 and some getting more than 17		B0
	We don't know what each person earns		B1
	We don't know how many of 2nd group earn less than £17 per hour		B1
	Under £17 isn't in the data		B1
	Grouped data or it is only an estimate or using midpoints or data is wrong		B0

	Ignore irrelevant working but do not ignore incorrect working		
Q	Answer	Mark	Comments
14(c)	12×66 or 792 and 17×32 or 544 and 30×15 or 450 and 70×10 or 700	M1	oe implied by 2486 may be seen by the table allow one product or fx value to be incorrect
	(their 792 + their 544 + their 450 + their 700) $\div$ 123 or $2486 \div 123$	M1dep	oe eg $\frac{792 + 544 + 450 + 700}{66 + 32 + 15 + 10}$ condone bracket error if working seen eg $792 + 544 + 450 + 700 \div 123$
	20.2(1...)	A1	allow 20.20 if M2 seen and no errors
	Additional Guidance		
	Four values with three correct from 792, 544, 450, 700 can score up to M2 if they add and divide by 123		
	Correct products or values seen but a different method used eg $123 \div 4$		M0M0
	20.2(1...) in working with answer given as the interval $20 \leq p < 40$		M2A0
	Ignore any references to statement B eg £20.21 which makes B wrong		M2A1
	Condone $20.\dot{2}$, $20.\dot{2}1$ etc for $20.\dot{2}113\dot{8}$		
	Do not allow rounding of any of their 4 values in the second mark eg 792 544 450 700 $(800 + 544 + 450 + 700) \div 123$		M1 M0
Q	Answer	Mark	Comments
14(d)	Valid reason referring to the distribution	B1	eg 98 employees earned below £20
	Additional Guidance		
	Less than a half earned more than £20		B1
	Over a half earned between £10 and £14		B1
	Lots earned 10 to 14		B0
	Only 25 people were over £20		B1
	25 people were over £20		B0
	Not many earned more than the mean		B0
	Most earned less than £20		B1
	Some earned less than the mean, some earned more		B0
	Mean is not a real amount of money		B0
	Median is between £10 and £14		B1

14(u)	Median is better or mode is better	B0
	Modal class is $10 \leq p < 14$	B1
	The mode is between £10 and £14 (condone mode as modal class)	B1
	We don't know what each person earns	B0
	Grouped data or it is only an estimate or using midpoints or data is wrong	B0
	The range is large	B0
	The data has extreme values or outliers or anomalous values	B1
	The data is (positively) skewed	B1
	The distribution is not symmetrical	B1
	The distribution is not evenly spread	B1
	Not representative	B0
	Lots of low values or high values can make the mean inaccurate	B0
	Ignore irrelevant working but do not ignore incorrect working	