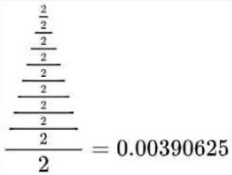


Question		Answers	Notes	Total
1	a	$\frac{4}{7}$ OE	Only accept $\frac{4}{7}$ OE as the final answer.	1
	b	.1 multiply correct probabilities for first selected numbers without replacement .2 multiply correct probabilities for second selected numbers without replacement .3 correctly add their multiplied probabilities	.1 $\frac{4}{10} \times \frac{6}{9}$ OE ACCEPT 0,266(66...) or 0,267 .2 $\frac{6}{10} \times \frac{4}{9}$ OE ACCEPT 0,266(66...) or 0,267 .3 their $\frac{8}{15}$ OE , ACCEPT their 0.533(33...)	3

Question		Answers	Notes	Total
2	a	.1 Correctly write a in a simplified exact form .2 Correctly write b in a simplified exact form .3 Correctly write c in a simplified exact form	.1 $\log\left(\frac{1}{2}\right)$ or $\log(1/2)$ or $\log(0.5)$ or $-\log 2$ seen .2 $\log 12$ seen DO NOT ACCEPT $\log(6 \times 2)$ as their answer .3 $\log 32$ or $5 \log 2$ seen ACCEPT $\log 2^5$ DO NOT ACCEPT $\log(16 \times 2)$ as their answer	3
	b	.1 Correctly write a in a simplified index form .2 Correctly write b in a simplified index form .3 Correctly write c in a simplified index form	.1 $2x^{-\frac{1}{2}}y^2$ or $\frac{2y^2}{x^{\frac{1}{2}}}$ or $2x^{-1/2}y^2$ seen DO NOT ACCEPT y^2 written as y^2 and DO NOT ACCEPT $x^{\frac{1}{2}}$ written as \sqrt{x} or $\text{sqrt}(x)$ or $x^{-1/2}$.2 $2xy$ seen .3 $\frac{1}{2}$ or $1/2$ or 0.5 or 2^{-1} seen	3

Question		Answers	Notes	Total
3	a	.1 Equate $f(x)$ and 2 .2 Correct value of a	.1 $4^x = 2$ or $4^a = 2$ ACCEPT $x = \log_4 2$ or $x \log 4 = \log 2$.2 ($a =$) 0.5 OE DO NOT ACCEPT 0.5 written in log form as final answer ACCEPT as coordinates (0.5, 2) or (0.5,0)	2
	b	AM1 .1 Equate $g(x)$ and 2 .2 Correctly apply log rule .3 Correctly rearrange for their x or their $-x$.4 The correct value of x AM2 .1 Equate $g(x)$ and 2 .2 Correctly apply laws of exponents .3 Correctly rearrange for their x .4 The correct value of x	AM1 .1 $3^{5-x} = 2$ or $\log 3^{5-x} = \log 2$ ACCEPT not seeing this step .2 $\log_3 2 = 5 - x$ or $(5 - x) \log 3 = \log 2$ OE ACCEPT $5 - x = 0.63(09\dots)$.3 $(x =) 5 - \frac{\log 2}{\log 3}$ or $\frac{5 \log 3 - \log 2}{\log 3}$ or $5 - \log_3 2$ or $-x = \frac{\log 2}{\log 3} - 5$ or $-x = \frac{\log(\frac{2}{243})}{\log 3}$ The correct .3 implies .2 and .1 .4 ($x =$) 4.369(070....) ACCEPT 4.37 or 4.4 or as coordinates (4.37,2) or (4.37,0) with or without brackets AM2 .1 $3^{5-x} = 2$ ACCEPT not seeing this step .2 $\frac{3^5}{3^x} = 2$.3 $3^x = \frac{3^5}{2}$ or $(x =) \log_3(\frac{3^5}{2})$ The correct .3 implies .2 and .1 .4 ($x =$) 4.369(070....) ACCEPT 4.37 or 4.4 or as coordinates (4.37,2) or (4.37,0) with or without brackets In all .1, .2, .3, .4 ACCEPT using any symbol x or b ,..etc	4
	c	Correctly subtract their a from their b	($x =$) their 3.869(070....) ACCEPT 3.869 or 3.87 or 3.9 DO NOT ACCEPT their 3.869(070....) written in log form	1

Question	Answers	Notes	Total
4	a Correctly write the value of r.	$\frac{1}{\sqrt{2}}$ OE DO NOT ACCEPT in words ACCEPT 0.707(10.6...) or 0.71 or 0.7 DO NOT ACCEPT $\pm\sqrt{2}$	1
	b .1 correctly write at least two more terms .2 correct value of n	.1 $(4, 2\sqrt{2}, 2, \sqrt{2}, 1, (\frac{\sqrt{2}}{2}) \text{OE})$ Equation with their $\frac{1}{\sqrt{2}}$ doesn't get .1 .2 $(n=)6$ ACCEPT U_6	2
	c .1 correctly substitute 4 and 21 and their r into the nth term of G.S formula .2 at least one correct intermediate step for their k using any method .3 the correct value of k from their .1	.1 $(U_{21} =)4 \times \text{their}(\frac{1}{\sqrt{2}})^{21-1}$ OE ACCEPT their 0.0039(...) .1 DO NOT ACCEPT if their $r \geq 1$.2 Examples of correct intermediate steps : Using powers of 2 : $\frac{2^2}{\text{their}2^{10}}$ or $\frac{2^2}{\text{their}2^{(\frac{1}{2})^{20}}}$ or $2^2 \times \text{their}2^{-10}$ Using logs : $\log_2(4 \times \text{their}(\frac{1}{\sqrt{2}})^{21-1}) = k$ OE ACCEPT not seeing k Listing powers of 2 : see image  .3 $(k =) \text{their}-8$ ACCEPT $2^{\text{their}-8}$ ACCEPT only if their $-8 \in \mathbb{Z}$	3

4	d	<p>.1 substitute 4 and their r into the sum to infinity formula</p> <p>.2 correctly write their answer as one radical fraction</p> <p>.3 correctly rationalize their denominator</p> <p>.4 correct simplified sum to infinity</p>	<p>.1 $\frac{4}{1 - \text{their } \frac{1}{\sqrt{2}}}$ OE</p> <p>.2 their $\frac{4\sqrt{2}}{\sqrt{2}-1}$ OE, DO NOT AWARD if their r is $\sqrt{2}$</p> <p>.3 their $\frac{4\sqrt{2}(\sqrt{2}+1)}{1}$</p> <p>.4 $8 + 4\sqrt{2}$ ACCEPT only if their 8 and their 4 $\in \mathbb{N}$</p>	4
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Question	Answers	Notes	Total
5	<p>a</p> <p>AM1 (using sin or cos ratios) .1 correctly divide by two the 150 AND 5.4</p> <p>.2 correctly substitute into trig ratio</p> <p>.3 correct value of r before rounding AG 2.80</p> <p>AM2 (using sine rule) .1 correctly substitute into sine rule</p> <p>.2 correctly rearrange for r on one side</p> <p>.3 correct value of r before rounding AG 2.80</p> <p>AM3 (using cos rule) .1 correctly substitute into cosine rule</p> <p>.2 correctly rearrange for r^2 on one side</p> <p>.3 correct value of r before rounding AG 2.80</p> <p>AM4 (using tan ratio) .1 correctly calculate the angle and correctly divide 5.4 by two</p> <p>.2 correctly substitute tan15 or tan75 ratio into Pythagoras</p> <p>.3 correct value of r before rounding AG 2.80 Award any VALID method using same marking principles</p>	<p>AM1 (using sin or cos ratios) .1 75 AND 2.7 seen. ACCEPT 15 AND 2.7 seen</p> <p>.2 $\sin 75 = \frac{2.7}{r}$ OR $\cos 15 = \frac{2.7}{r}$ OE ACCEPT $\frac{2.7}{\sin 75}$ OR $\frac{2.7}{\cos 15}$ seen</p> <p>.3 (r =)2.79(52....) .3 ACCEPT their correct r due to earlier rounding provided it rounds to 2.8</p> <p>AM2 (using sine rule) .1 $\frac{5.4}{\sin 150} = \frac{r}{\sin 15}$ OE ACCEPT not seeing this step</p> <p>.2 (r =) $\frac{5.4 \times \sin 15}{\sin 150}$ OE</p> <p>.3 (r =)2.79(52....) .3 ACCEPT their correct r due to earlier rounding provided it rounds to 2.8</p> <p>AM3 (using cos rule) .1 $5.4^2 = 2r^2 - 2r^2 \cos 150$ OE ACCEPT not seeing this step</p> <p>.2 $(r^2 =) \frac{5.4^2}{2 - 2 \cos 150}$ OE , or 7.81(33..) seen or $2r^2 = 15.62(68...)$</p> <p>.3 (r =)2.79(52....) .3 ACCEPT their correct r due to earlier rounding provided it rounds to 2.8</p> <p>AM4 (using tan ratio) .1 15 and 2.7 or 15 and 2.7 seen</p> <p>.2 $r^2 = 2.7^2 + 2.7^2 \tan^2 15$ or $(r^2 =) 2.7^2 + \frac{2.7^2}{\tan^2 75}$ OE or 7.81(33..) seen</p> <p>.3 (r =)2.79(52....) .3 ACCEPT their correct r due to earlier rounding provided it rounds to 2.8</p>	3

5	b	<p>.1 correct trig ratio using R and h</p> <p>.2 correctly write R in terms of h OR correctly write h in terms of R</p> <p>.3 substitute 2.8 into volume of sphere formula OR substitute .2 into volume of cone formula</p> <p>.4 evidence of equating their two volumes</p> <p>.5 correctly rearrange their equated volumes to have h or h³ on one side OR to have R³ of R on one side</p> <p>.6 correctly calculate their h after their rearrangement of their equated volumes</p>	<p>.1 $\tan 15 = \frac{R}{h}$ or $\tan 75 = \frac{h}{R}$ or $\frac{R}{\sin 15} = \frac{h}{\sin 75}$</p> <p>.2 $R = h \tan 15$ or $R = \frac{h}{\tan 75}$ or $h = \frac{R}{\tan 15}$ or $h = R \tan 75$ or $R = \frac{h \sin 15}{\sin 75}$ or $h = \frac{R \sin 75}{\sin 15}$ ACCEPT $h=3.73R$ or $R=0.27h$.2 implies .1</p> <p>.3 $(V =) \frac{4\pi 2.8^3}{3}$ OR $\frac{\pi \text{their}(h \tan 15)^2 h}{3}$ or $\frac{\pi R^2 \text{their} R}{3 \tan 15}$ or any from their .2 OE ACCEPT if $r=2.795$ for the sphere ACCEPT 91.95(23...)</p> <p>.4 $\frac{4\pi 2.8^3}{3} = \frac{\pi \text{their}(h \tan 15)^2 h}{3}$ OE or $\frac{4\pi 2.8^3}{3} = \frac{\pi \text{their} R^3}{3 \tan 15}$ or any from their .3 OE</p> <p>.5 $(h^3 =) \frac{4\pi 2.8^3}{\pi (\tan 15)^2}$ OE OR $(R^3 =) 4(2.8)^3 (\tan 15)$ OE .5 implies .4</p> <p>.6 $(h =) 10.69(407...)$ DO NOT AWARD the last mark if their $R=2.8$ or their $R=2.7$</p>
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Question		Answers	Notes	Total
6	a	8 to 10 hours within the interval 6 pm to 6 am	Ex: 8pm to 5am ACCEPT correct 24-hour format ignoring am/pm	1
	b	AM1 (using the 12-hour clock) .1 Maximum at 12:00 pm .2 Minimum at 12:00 am AM2 (using the 24-hour clock) .1 Maximum at 12:00 (am/pm) .2 Minimum at 24:00 (am/pm)	AM1 (using the 12-hour clock) .2 ACCEPT 0:00 am AM2 (using the 24-hour clock) .2 ACCEPT 0:00	2
	c	.1 Amplitude 0.5 OE .2 Period 24	.1 ACCEPT .5 DO NOT ACCEPT -0.5	2
	d	.1 Maximum 37 .2 Minimum 36		2

6	e	<p>.1 evidence of substituting 7.25 into the formula</p> <p>.2 the correct value of B</p> <p>.3 correctly round their value of B in .2 to 1 dp</p>	<p>.1 $(B =) -0.5\cos\left(\frac{\pi}{12} \times 7.25\right) + 36.5$ ACCEPT $(B =) -0.5\cos(15 \times 7.25) + 36.5$</p> <p>.2 36.66(071973....) DO NOT ACCEPT the using degrees answer (36.00027433)</p> <p>.3 their 36.7</p>	3
	f	<p>.1 correctly write the equation modelling Ray's temperature</p>	<p>.1 $R = -0.5\cos\frac{\pi}{12}t + 36.75$ using R or any other letter</p> <p>ACCEPT $B = -0.5\cos\frac{\pi}{12}t + 36.75$</p> <p>ACCEPT $-0.5\cos\frac{\pi}{12}t + 36.75$</p>	
6	g	<p>.1 evidence of correctly equating their expression in terms of t with 36.5</p> <p>.2 correctly rearrange for their $\cos\frac{\pi}{12}t$ on one side</p> <p>.3 correctly inverse their cosine in radians</p> <p>.4 correct value of <u>their first</u> t after correctly inverse their cosine</p>	<p>.1 $36.5 = \text{their } -0.5\cos\frac{\pi}{12}t + 36.75$ or $36.5 = -0.5\cos\frac{\pi}{12}t + \text{their } 36.75$ ACCEPT using x instead of t</p> <p>.2 $\cos\frac{\pi}{12}t = \frac{\text{their}(-0.25)}{-0.5}$ OE</p> <p>.2 ACCEPT correctly rearrange linear equation for t but DO NOT AWARD .3 and .4</p> <p>e.g $(t =) \text{their } \frac{36.5 - 36.75}{-0.5\cos\left(\frac{\pi}{12}\right)}$.but do not award .3 and .4</p> <p>.3 their $\frac{\pi}{12}t = 1.047(197551\dots)$ OE or $\frac{\pi}{12}t = \frac{\pi}{3}$ ACCEPT not seeing this step</p> <p>.4 $(t =) \text{their } 4$ (am) or 04:00 OE ignore incorrect time of day after seeing their 4</p>	4

7

c

.1 any two from

- i. line within the zone
- ii. fairly passing through points Ex: at least two points above and two points below the line
- iii. line domain at least [5.5.10.5]

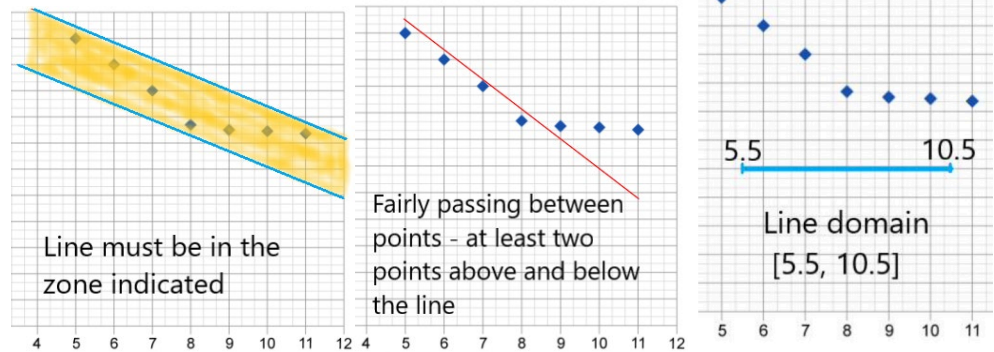
.2 the third from

- i. line within the zone
- ii. fairly passing through points. Ex: at least two points above and two points below the line
- iii. line domain at least [5.5.10.5]

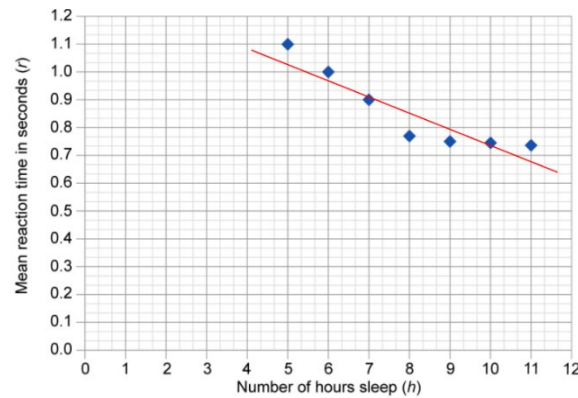
DO NOT award any marks for horizontal line

DO NOT award any marks if they have more than one line drawn

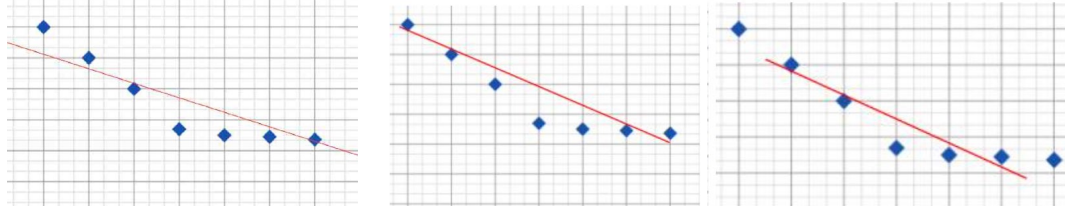
DO NOT award any marks if their line has positive gradient



Ex:



Examples acceptable for (2 marks)

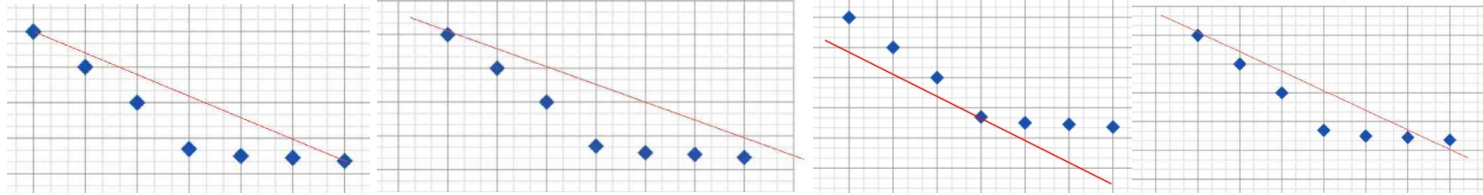


Further examples of different scenarios on the next page

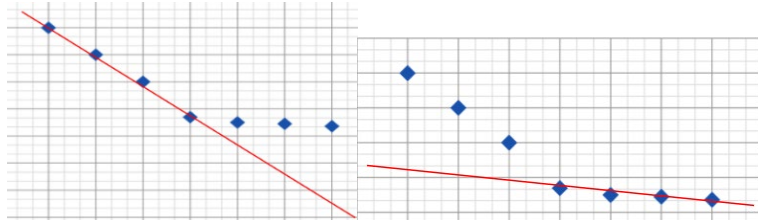
7

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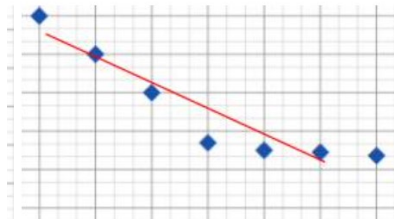
Examples acceptable for (1 mark)



line within the zone **and** line domain at least [5.5,10.5], **but** the line is not fairly passing through points. Award 1 mark

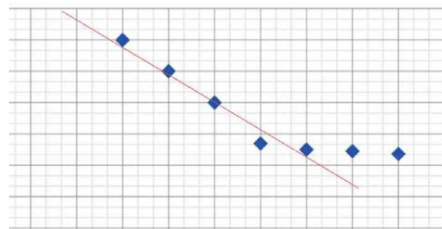


fairly passing through points **and** domain at least [5.5.10.5], **but** the line is not within the zone. Award 1 mark

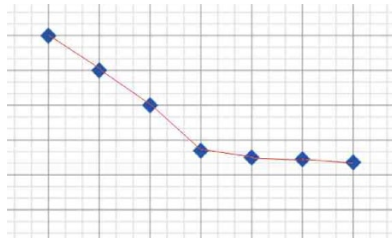


line is within the zone **and** fairly passing through points **but** domain not at least [5.5.10.5] Award 1 mark

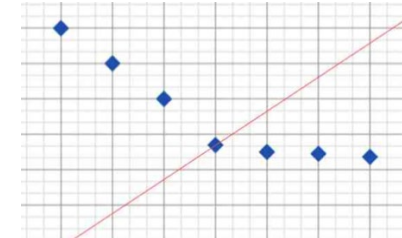
Examples not acceptable (0 marks)



Line is not within the zone and domain is not [5.5.10.5] Award 0 marks



more than one line drawn. Award 0 marks



their line has positive gradient. Award 0 marks

7	d	.1 correct value of their r for $h = 4$.2 correct value of their r for $h = 7.5$.1 ACCEPT error ± 0.02 DO NOT ACCEPT if $h=4$ is not on their line .2 ACCEPT error ± 0.02 DO NOT ACCEPT if $h=7.5$ is not on their line	2
	e	.1 correctly substitute 0.77 into the formula .2 correct value of w .3 correctly round their w to 2 sf	.1 ($w =$) $24(100)^{-0.77}$.2 0.692(1675608...) ACCEPT not seeing this step .3 their 0.69 OE	3

Question 7f 8 marks			
Mark	1	2	3
Factors (F)	The Two factors below identified explicitly Reaction time AND Sleeping time WTTE DO NOT ACCEPT factors embedded in working		
Calculate (C)	one correct w value from their r without working OR At least two incorrect w values from their r with working seen ACCEPT $w > 1$ ACCEPT w and its corresponding r value seen in the table or in the response box ACCEPT their rounding of w provided it correctly rounds to 1 d.p Ex: $w=0.6867$ and they write 0.68 DO NOT ACCEPT w for $r=0.77$	Two correct w values from their r without working ACCEPT $w > 1$ ACCEPT w and its corresponding r value seen in the table or in the response box ACCEPT their rounding of w provided it correctly rounds to 1 d.p Ex: $w=0.6867$ and they write 0.68 DO NOT ACCEPT w for $r=0.77$	Three correct w values from their r without working ACCEPT $w > 1$ ACCEPT w and its corresponding r value seen in the table or in the response box ACCEPT their rounding of w provided it correctly rounds to 1 d.p Ex: $w=0.6867$ and they write 0.68 DO NOT ACCEPT w for $r=0.77$
Comment (J)	Correct comment on the positive relationship between probability of winning and sleeping. Ex: WTTE When sleeping duration increases the probability of winning increases ACCEPT: -Good sleep increases probability of winning -Bad sleep decreases probability of winning -reaction time is better when sleeping well so probability of winning increases -sleeping 10h has probability 0.8, sleeping 4h has probability 0.2 and 0.8 is more than 0.2 -sleeping 10h has $w=0.8$ while sleeping 4h has $w=0.1$ only DO NOT ACCEPT : -comment involving only reaction time and sleeping. -sleeping 10h has probability 0.8 compared to sleeping 4h has probability 0.1	Additional correct comment realizing that probability of winning depends on more than sleeping. Ex: WTTE -Chance of winning will not just keep increasing when the number of hours of sleep increases. -Sleeping h hours does not automatically mean that the sprinter will win or will not win -Winning also depends on other factors ACCEPT Wining also depends on any of: talent or endurance or fitness or training or experience OE DO NOT ACCEPT J2 if J1 not awarded	

Mark	1	2	3
Justify degree of Accuracy (A)	<p>Weak justification</p> <p>inaccurate with weak justification</p> <p>Ex:</p> <ul style="list-style-type: none"> -inaccurate since I used line of best fit that has approximations -inaccurate as values given are not exact -inaccurate as sample size small or only 20 -accurate, however I used rounding -accurate to a certain extent, as data given was not exact -using rounding decreased the accuracy <p>OR</p> <p>Accurate with acceptable justification</p> <p>Ex:</p> <ul style="list-style-type: none"> -accurate since numbers I used in my calculations are rounded 2 s.f. -the accuracy of my findings comes from rounding I used which is 2 s.f. <p>ACCEPT accurate due to rounding only if they mention the degree of accuracy of their rounding</p> <p>DO NOT ACCEPT</p> <ul style="list-style-type: none"> -accurate because I used my line of best fit or data given or graph OE -accurate because I used exact values or because I didn't round my results OE <p>DO NOT ACCEPT just seeing their values rounded correctly</p>	<p>Inaccurate with good justification</p> <p>inaccurate AND state that the relation between reaction time and sleeping cannot be linear WTTE</p> <p>OR</p> <p>inaccurate AND state that the line equation may not be valid beyond the data given WTTE</p>	

Question		Answers	Notes	Total
8	a	correctly place 100 and 144		1
	b	.1 correctly describe one pattern for V in words with correct terminology .2 correctly describe a second pattern for V in words with correct terminology	ACCEPT complete terminology only, for example (below are different descriptions): DO NOT ACCEPT two from the same description <ul style="list-style-type: none"> - The increase is increasing by a constant, the number you add increases constantly, the increase goes up by a constant, second difference is constant, the difference is in pattern 12, 20, 28..., V goes up by 12, 20, 28... - Quadratic - Square numbers, square of even numbers - Multiples of 4, divisible by 4 DO NOT ACCEPT, for example: Arithmetic, increasing, increasing by a constant Even numbers, the square numbers, the multiples of 4 DO NOT ACCEPT The rule in words, for example: 2 times n squared, n multiplied by 2 squared, double of n squared, twice stage number squared, the square of n times 2 and product of n with 2 Note: More than two different patterns, all correct award (2 marks) Ex: multiples of 4, square numbers and it is 2 times n squared More than two different patterns, with any incorrect award (1 mark) Ex: multiples of 4, second difference is constant and it is 3 times n	2
	c	.1 the correct general rule .2 the correct simplified general rule with correct notation for V in terms of n	.1 $(V =) 4n^2$ or $(V =) 4n^2$ or $(V =) 4*n*n$ or $(V =)(2 \times n)^2$ or $V = 4 \times n^2$ ACCEPT $V=4x^2$.2 $V = 4n^2$ or $V=(2n)^2$ ACCEPT $V_n =4n^2$ or $V(n)=4n^2$ or use v for V DO NOT ACCEPT description in words SC for 1 mark if NR in 8c and correct general rule seen in 8b condone incorrect notation award 1 mark	2

8	d	<p>.1 correctly substitute $n \geq 5$ into their general rule (from 8c or 8b)</p> <p>.2 correctly calculate their value of V after substituting $n \geq 5$</p> <p>.3 recognise that their correctly calculated value of V is the same as their predicted value</p>	<p>.1 Ex: 4×5^2</p> <p>.2 Ex: 100 (for $n = 5$)</p> <p>.3 same as when candidate explains how the pattern continues Ex: how 100 is obtained by adding 36 to 64 .3 ACCEPT seeing the value in the table in 8a and seeing their matching calculated V using $n \geq 5$ Ex: we find the candidate has 100 in the table for $n = 5$</p>	3
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Question 8e 22 marks

Mark	1	2	3	4
<p>Predictions (P)</p>	<p>Correctly predict two terms for <i>H</i> or <i>A</i> ACCEPT whether in the table or in the response box.</p>	<p>Correctly predict at least two terms in <i>H</i> and one term in <i>A</i> ACCEPT whether in the table or in the response box.</p>	<p>Correctly predict at least two terms in <i>H</i> and two terms in <i>A</i> ACCEPT whether in the table or in the response box.</p>	
<p>Description (D)</p>	<p>Correctly describe a pattern in words for <i>A</i> Ex for patterns: Multiples of 4 / Divisible by 4 It's a cubic sequence The first difference is quadratic The difference of the difference increases The second difference is linear (increasing by 24) The second difference is in arithmetic sequence The third difference is constant (24)</p> <p>DO NOT ACCEPT The multiples of 4, exponential sequence, the increase increases more, even numbers, <i>V</i> is square of <i>H</i></p> <p>OR Attempt to describe a general rule for <i>A</i> in terms of <i>n</i> Ex: Rule in words Four times the cube of <i>n</i> Four <i>n</i> cubed Incorrect rule $A = 8n^3$, $A = (4n)^3$</p> <p>OR Correctly describe a general rule for <i>A</i> in terms of <i>V</i> or <i>H</i> Ex $A = V \times n$ or $A = V \times \frac{h}{2}$ or $A = 2H \times n^2$ ACCEPT non-simplified and ignore incorrect notation</p>	<p>Correctly describe a pattern in words for <i>A</i></p> <p>AND</p> <p>Attempt to describe a general rule for <i>A</i> in terms of <i>n</i> or correctly describe a general rule for <i>A</i> in terms of <i>V</i> or <i>H</i></p> <p>ACCEPT non-simplified and ignore incorrect notation</p>	<p>Correctly describe a general rule for <i>A</i> in terms of <i>n</i></p> <p>Rule: $A = 4n^3$</p> <p>ACCEPT the rule is $4n^3$</p> <p>ACCEPT non-simplified and ignore incorrect notation Ex $\frac{1}{2} \times 4n^2 \times 2n$</p>	<p>Correctly describe a pattern in words for <i>A</i></p> <p>AND</p> <p>Correctly describe a general rule for <i>A</i> in terms of <i>n</i></p> <p>Rule: $A = 4n^3$</p> <p>ACCEPT the rule is $4n^3$</p> <p>ACCEPT non-simplified and ignore incorrect notation Ex $\frac{1}{2} \times 4n^2 \times 2n$</p>

Mark	1	2	3	4
<p>Testing (T)</p>	<p>Attempt to test their general rule for A using $n \leq 4$ Ex: Correctly substitute in their general rule value of $n \leq 4$</p> <p>OR</p> <p>Correctly test their described pattern or their rule (e.g. recursive rule)</p> <p>OR</p> <p>Correctly test their general rule for A in terms of V or H (that may include n)</p>	<p>Correctly test their general rule for A only in terms of n using $n \leq 4$ Ex: Correctly calculate their value for A in their general rule using $n \leq 4$</p> <p>AND</p> <p>Recognise that their correctly calculated value for A is the same as the given value.</p> <p>ACCEPT seeing their correctly calculated value for A and the given value in the table being equal</p>		
<p>Verifying (V)</p>	<p>Attempt to verify their general rule for A using $n \geq 5$ Ex: Correctly substitute in their general rule value of $n \geq 5$</p> <p>OR</p> <p>Correctly verify their described pattern or their rule (e.g. recursive rule)</p> <p>OR</p> <p>Correctly verify their general rule for A in terms of V or H (that may include n)</p>	<p>Correctly calculate their value for A in their general rule only in terms of n using $n \geq 5$</p>	<p>Correctly calculate their value for A in their general rule only in terms of n using $n \geq 5$</p> <p>AND</p> <p>Recognise that their correctly calculated value for A is the same as their predicted value obtained by continuing the pattern</p> <p>ACCEPT seeing their correctly calculated value for A and their predicted value in the table being equal</p>	

Mark	1	2	3	4
Justify (J)	<p>Attempt to justify their described pattern or their general rule Ex: Substitute at least two other values of n in A and say they are the same or the rule works</p> <p>OR Cubic model and valid attempt to find coefficients using any method</p> <p>OR Substitute at least two other values of V and H into area of rhombus formula and say they are the same or the rule works</p> <p>OR Substitute into area of rhombus formula at least one from $V=4n^2$ and $H=2n$ and simplify correctly Ex: $A = \frac{4n^2 \times H}{2} = 2n^2H$</p> <p>OR Spotting the general rule from the table seeing $A = (4n^2)n = 4n^3$</p> <p>DO NOT ACCEPT only saying $(A=) Vn$ or $(A=) \frac{V \times H}{2}$</p>	<p>Justify their general rule arithmetically</p> <p>Cubic model and get correct values of coefficients using any method</p> <p>OR Compare values they obtain using the general rule with values they obtain using the area of rhombus or triangles formula</p> <p>OR Weak attempt to justify the general rule for A geometrically by using correct general rules for V and H in terms of n seeing $\frac{4n^2 \times 2n}{2}$</p>	<p>Attempt to justify the general rule for A geometrically by using correct general rules for V and H in terms of n seeing $\frac{V \times H}{2} = \frac{4n^2 \times 2n}{2}$</p> <p>OR seeing $\frac{4n^2 \times 2n}{2} = 4n^3$</p> <p>ACCEPT all of the above in a correct description in words.</p> <p>ACCEPT the $4n^3$ as $n(4n^2)$ or $(2n)^2$</p>	<p>Correctly justify the general rule for A geometrically by using correct general rules for V and H in terms of n <u>and related to the Area of a rhombus</u></p> <p>seeing all of:</p> <ul style="list-style-type: none"> • <u>“area of rhombus”</u> WTTE • $\frac{V \times H}{2} = \frac{4n^2 \times 2n}{2} = 4n^3$ <p>ACCEPT all of the above in a correct description in words.</p> <p>ACCEPT the $4n^3$ as $n(4n^2)$ or $n(2n)^2$</p>

Communication criteria

Mark	1	2	3
<p>Notation and terminology (N)</p>	<p>Correct notation of <u>their</u> general rule Ex: $A = Vn$, $A = \frac{VH}{2}$, $A = 8n^3$</p> <p>OR The notation of <u>the general</u> rule includes errors, ex: $A = 4n^3$, $A = 4 * n^3$, $A = 4 \times n^3$ The rule for A is $4n^3$ or non-simplified general rule $A = \frac{1}{2} \times 4n^2 \times 2n$</p> <p>OR Correctly describe at least one pattern in words for A</p> <p>DO NOT ACCEPT if they don't have any rules and they don't describe any patterns</p>	<p>Correct notation of <u>the general</u> rule for A $A = 4n^3$ ACCEPT $A_n = 4n^3$ or $A(n) = 4n^3$</p> <p>OR The notation of <u>the general</u> rule includes errors (see examples in N1) AND Correctly describe at least one pattern in words for A</p> <p>DO NOT ACCEPT if they don't have a general rule</p>	<p>Correct notation of <u>the general</u> rule for A</p> <p>AND Correctly describe at least one pattern in words for A</p>

Continued on next page

Mark	1	2	3
<p>Communication (L)</p> <p>Organisation and coherence</p> <p>Can be awarded even there are errors in their descriptions and working.</p>	<p>At least three from the following are seen:</p> <ul style="list-style-type: none"> • describe a pattern or rule in words • write a general rule • test their general rule or pattern • verify their general rule or pattern • justify their general rule or pattern 	<p>At least four of the following are seen:</p> <ul style="list-style-type: none"> • describe a pattern or rule in words • write a general rule • test their general rule or pattern • verify their general rule or pattern • justify their general rule or pattern <p>AND</p> <p>For coherence, they identify the processes correctly. At least one from the following:</p> <ul style="list-style-type: none"> • test • verify • justify <p>Ex:</p> <ul style="list-style-type: none"> • For test: they say “test” and they test using value(s) of $n \leq 4$ only • For verify: they say “verify” and they verify using value(s) of $n \geq 5$ only • For test and for verify: they say ‘test and verify’ and they test using value(s) of $n \leq 4$ and then verify using value(s) of $n \geq 5$ • For justify: they say “justify” or “my rule works because” WTTE and their justification is seen • For justify: they substitute at least two values of n and say “the rule justified” or “it works” WTTE • For justify: They justify <u>the general rule</u> for A geometrically 	<p>DO NOT ACCEPT if D3 and J2 not awarded</p> <p>At least four of the following are seen:</p> <ul style="list-style-type: none"> • describe a pattern or rule in words • write <u>the general rule</u> • test <u>the general rule</u> • verify <u>the general rule</u> • justify <u>the general rule</u> <p>AND</p> <p>For coherence, they identify the processes correctly. At least two from the following:</p> <ul style="list-style-type: none"> • test • verify • justify <p>Ex:</p> <ul style="list-style-type: none"> • For test: they say “test” and they test using value(s) of $n \leq 4$ only • For verify: they say “verify” and they verify using value(s) of $n \geq 5$ only • For test and for verify: they say ‘test and verify’ and they test using value(s) of $n \leq 4$ and then verify using value(s) of $n \geq 5$ • For justify: they say “justify” or “my rule works because” WTTE and their justification is seen • For justify: they substitute at least two values of n and say “the rule justified” or “it works” WTTE • For justify: They justify <u>the general rule</u> for A geometrically

n	Vertical length (V)	Horizontal length (H)	Area of rhombus (A)
1	4	2	4
2	16	4	32
3	36	6	108
4	64	8	256
5	100	10	500
6	144	12	864
7	196	14	1372
n	$4n^2$	$2n$	$4n^3$