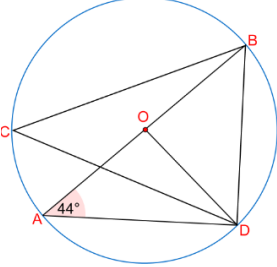
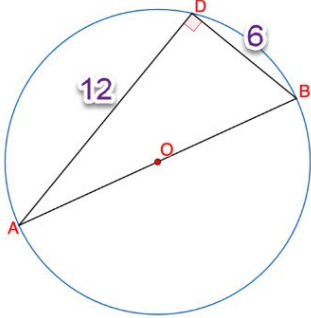
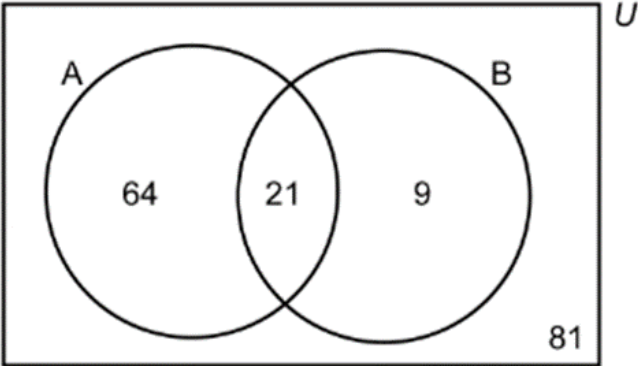
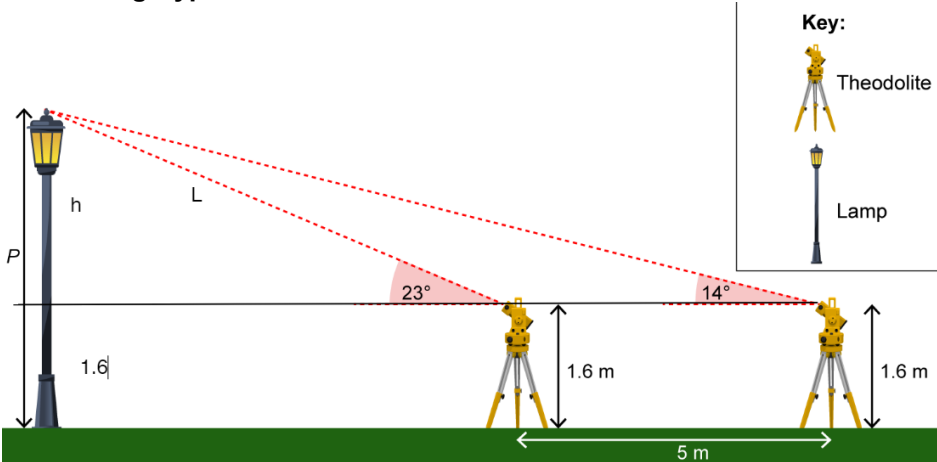


Q1	Answers	Notes	Total
a	Angle AOD 92 Angle DOB 88 Angle DCB 44	<p>Angle AOD <input type="text" value="92"/> °</p> <p>Angle DOB <input type="text" value="88"/> °</p> <p>Angle DCB <input type="text" value="44"/> °</p> 	3
b	The correct reason	<p>ACCEPT (AB) diameter, passes by the centre, $AB=2r$ A, O, and B are on the same line semi-circle, half circle, cuts the middle of the circle (angle) ADB is half (angle) AOB WTTE</p> <p>DO NOT ACCEPT seeing only 90 is half 180 AB passes by the origin O is midpoint , OA and OB are radius AB doesn't move regardless how we move D Triangle inside a circle A and B positioned at both ends</p>	1

c	<p>.1 correctly substitute into Pythagoras theorem or cosine rule</p> <p>.2 correctly write the result in simplest surd form</p> <p>For reference:</p> 	<p>.1 $(AB^2=)12^2 + 6^2$ or 180 or $\sqrt{180}$ OE or $(AB^2 =)12^2 + 6^2 - 2(12)(6) \cos 90^\circ$ OE .1 ACCEPT 13(.4164...)</p> <p>.2 $6\sqrt{5}$.2 ACCEPT $6\sqrt{3}$ only if their bp1 is $12^2 - 6^2$ or 108 or $\sqrt{108}$.2 DO NOT ACCEPT $6\sqrt{3}$ coming from 1: 2: $\sqrt{3}$.2 DO NOT ACCEPT $13\sqrt{1}$</p>	2
d	<p>.1 Correctly substitute their radius as half their diameter from c) into area of circle formula</p> <p>.2 Correct value of their area in terms of π after squaring their radius seen in bp1.</p>	<p>.1 $\pi \left(\frac{\text{their } 6\sqrt{5}}{2}\right)^2$ or $\pi \times (\text{their } 3\sqrt{5})^2$ or $\pi \times \left(\frac{\text{their } 13(.416\dots)}{2}\right)^2$ or $\pi \times (\text{their } 6.5)^2$ OE .1 ACCEPT using 3.14 or $\frac{22}{7}$ instead of π</p> <p>.2 their 45π .2 ACCEPT their 45 rounded as decimals to at least 1 dp (Ex. 42.3π)</p>	2

Q2 using	Answers	Notes	Total
a	.1 The correct probability	<p>.1 $\frac{21}{30}$ OE</p>  <p>The diagram shows a rectangle labeled 'U' representing the universal set. Inside, two overlapping circles are labeled 'A' and 'B'. Circle A contains the number 64, circle B contains the number 9, and the overlapping region between them contains the number 21. The number 81 is written in the bottom right corner of the rectangle 'U'.</p>	1
b	<p>.1 Correctly write their two probabilities without replacement based on their probability in part a) OR correctly multiply their two probabilities with replacement based on their probability in part a).</p> <p>.2 Correct probability after multiplying their two probabilities without replacement from bp1.</p>	<p>.1 Seeing their $\frac{21}{30}$ and their $\frac{20}{29}$ OR their $\frac{21}{30} \times \frac{21}{30}$ or $\left(\text{their } \frac{21}{30}\right)^2$ or their $\frac{49}{100}$ or their 0.49</p> <p>.2 $\left(\text{their } \frac{21}{30} \times \frac{20}{29} =\right)$ their $\frac{14}{29}$ OE or their 0.48(2758621)</p> <p>.2 DO NOT ACCEPT the multiplication of any two probabilities</p>	2

c	Using $P(A \cap B) = P(A) \times P(B)$ or $P(A B) = P(A)$ or $P(B A) = P(B)$		2
	<p>.1 Correctly calculate one from</p> <p>$P(A) \times P(B)$ OR</p> <p>$P(A B)$ OR</p> <p>$P(B A)$</p>	<p>.1</p> <p>$\left(\frac{30}{175} \times \frac{85}{175} =\right) \frac{2550}{30625}$ or 0.08(3...) OE</p> <p>$\frac{21}{30}$ OE or 0.7</p> <p>$\frac{21}{85}$ OE or 0.247(0588..) or 0.25</p>	
	<p>.2 Correct explicit argument from</p> <p>$P(A \cap B)$ is not equal to their $P(A) \times P(B)$ OR</p> <p>Their $P(A B)$ is not equal to $P(A)$ OR</p> <p>Their $P(B A)$ is not equal to $P(B)$</p>	<p>.2</p> <p>0.12 \neq their 0.08(3...) or $\frac{3675}{30625} \neq$ their $\frac{2550}{30625}$ (from $\frac{21}{175} \neq \frac{2550}{30625}$)</p> <p>their 0.7 \neq 0.49 or their $\frac{735}{1050} \neq \frac{510}{1050}$ (from $\frac{21}{30} \neq \frac{85}{175}$)</p> <p>their 0.25 \neq 0.17 or their $\frac{735}{2975} \neq \frac{510}{2975}$ (from $\frac{21}{85} \neq \frac{30}{175}$)</p> <p>.2 DO NOT ACCEPT $P(A) \times P(B)$ without seeing the calculated product</p> <p>.2 DO NOT ACCEPT an argument of comparison without a similar base of comparison (same denominator or decimals)</p> <p>.2 DO NOT ACCEPT any explanation around the independency.</p> <p>.1 AND .2 DO NOT ACCEPT probabilities more than 1.</p>	
	<p>AG They are not independent</p>	<p>SC for 1 mark when correctly discounting the students outside A and B</p> <p>$P(A \cap B) = P(A) \times P(B)$</p> <p>$\frac{21}{94} = \frac{85}{94} \times \frac{30}{94}$</p> <p>$\frac{21}{94} = \frac{2550}{8836}$</p> <p>0.22(34 ...) = 0.29 Not equal, hence not independent.</p>	

Q3	Answers	Notes	Total
<p>EXT</p>	<p>AM1 Using Hypotenuse (Here we're using L and h, but candidates may use different variables)</p> <p>.1 Correctly calculate top angle</p> <p>.2 Correctly substitute their angle into sine rule</p> <p>.3 Their correct value for L OR hypotenuse</p> <p>.4 Correctly substitute their L or their hypotenuse into correct trig ratio or sine rule to find h.</p> <p>.5 Correct value for their P after adding 1.6 to their h.</p> <p>AM2 on next page</p>	<p>AM1 Using Hypotenuse</p>  <p>.1 $(180-14-157=) 9$ (degrees) seen either calculated or seen in working.</p> <p>.2 $\frac{L}{\sin 14} = \frac{5}{\sin 9}$ OR $\frac{hyp}{\sin 157} = \frac{5}{\sin 9}$ OE</p> <p>.3 ($L=$) their 7.7(323...) OR ($hyp=$) their 12.48865(231...) or 12.5</p> <p>.4 $\sin 23 = \frac{h}{7.7(323...)}$ or $\cos 67 = \frac{h}{7.7(323...)}$ OE OR $\sin 14 = \frac{h}{12.5}$ or $\cos 76 = \frac{h}{12.5}$ OE</p> <p>.5 (their 3(.0086...)+ 1.6) = their 4.6(086...) or (their 3(.02402...)+1.6) = 4.6(240...)</p> <p>.5 DO NOT ACCEPT adding 1.6 to their bp3.</p> <p>AM2 on next page</p>	<p>5</p>

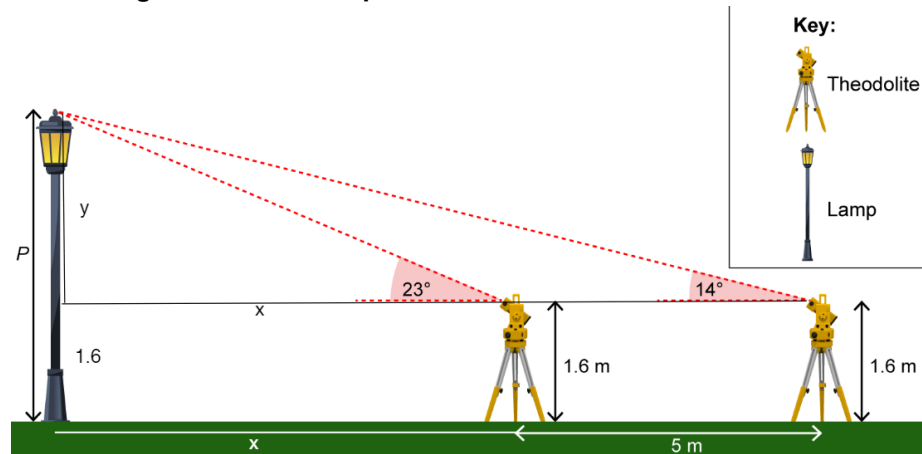
AM2 Using simultaneous equations

(here we're using x and y, but candidate may use different variables)

.1 Correctly substitute 14 AND 23 into *tan* ratio or *sine* rule

.2 Correctly rearrange to solve simultaneous equations (either one equation equal to the other OR one equation substituted into the other)

AM2 Using simultaneous equations with x



.1 Examples of correct substitutions

<i>Tan</i> ratio	$\tan 14 = \frac{P-1.6}{5+x}$ OE AND $\tan 23 = \frac{P-1.6}{x}$ OE
<i>Sine</i> rule	$\frac{P-1.6}{\sin 14} = \frac{x+5}{\sin 76}$ OE AND $\frac{P-1.6}{\sin 23} = \frac{x}{\sin 67}$

.2 Examples of rearrangements. ACCEPT decimals with correct roundings.

<i>Tan</i> ratio	$\frac{\tan 14}{\tan 23} = \frac{x}{5+x}$ or $(5+x) \tan 14 = x \tan 23$ ACCEPT $0.25(x+5) = 0.42x$ OE
<i>Sine</i> rule	$\frac{x \sin 23}{\sin 67} = \frac{(x+5) \sin 14}{\sin 76}$ or $\frac{x}{x+5} = \frac{\sin 14 \sin 67}{\sin 23 \sin 76}$ OE

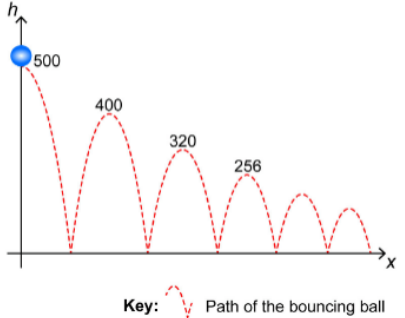
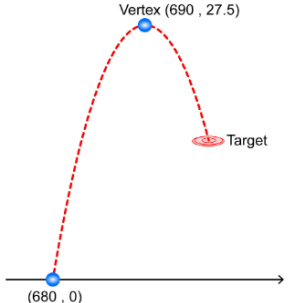
The correct bp2 implies bp1

bp3 and bp4 continued on the next page

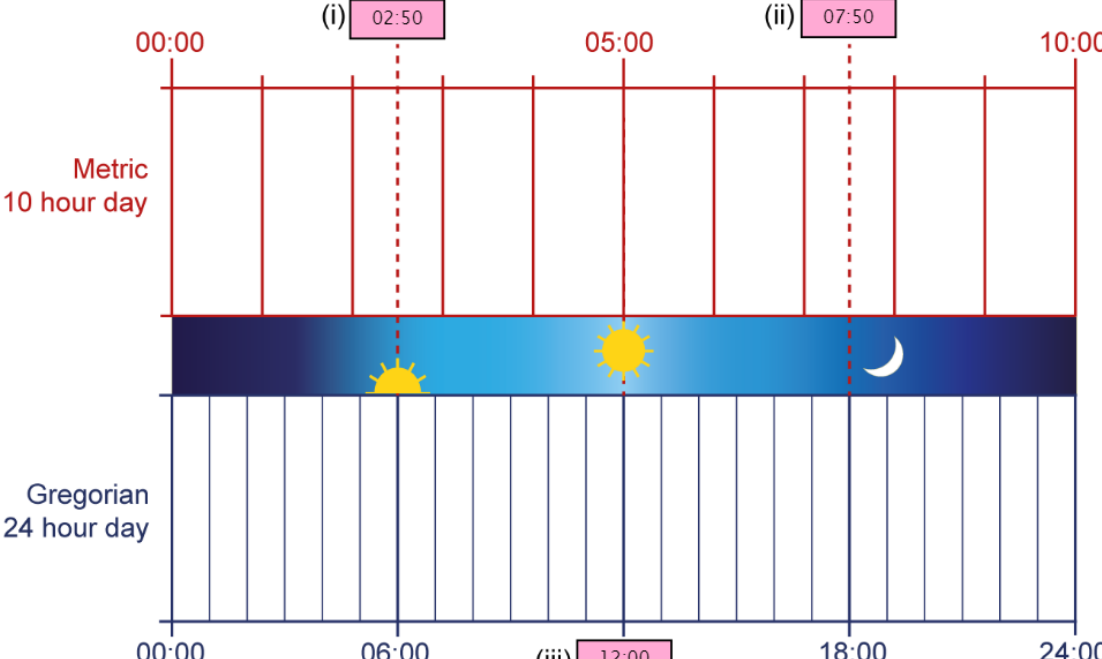
		<p>.3 Correctly solve for their x</p> <p>.4 Correctly substitute their x from bp3 into correct trig ratio or correct sine rule to find vertical length (y or $P-1.6$) OR correctly substitute into an equation from the start to find vertical length (y or $P-1.6$).</p> <p>.5 Correct value for their P after taking into account 1.6</p>	<p>.3 their7.1(1768...) ACCEPT 7.35(2941..) or 7.17(0731...) or 7.2 .3 ACCEPT their 12.1(153...) coming from x being the total and $(x-5)$ the other horizontal length. .3 The correct bp3 implies bp2 and bp1</p> <p>.4 $\tan 23 = \frac{P-1.6}{\text{their7.1}}$ or $\tan 67 = \frac{\text{their7.1}}{P-1.6}$ or $\frac{\text{their7.1}}{\sin 67} = \frac{P-1.6}{\sin 23}$ OR</p> <p>$\tan 14 = \frac{P-1.6}{5+\text{their7.1}}$ OE or $\tan 23 = \frac{P-1.6}{\text{their7.1}}$ OE or</p> <p>$\frac{P-1.6}{\sin 14} = \frac{\text{their7.1}+5}{\sin 76}$ OE or $\frac{P-1.6}{\sin 23} = \frac{\text{their7.1}}{\sin 67}$</p> <p>.4 ACCEPT incorrect use of P (they use P rather than $P-1.6$). Ex. $\tan 23 = \frac{P}{\text{their7.1}}$</p> <p>.5 (their3.02...+1.6) = their4.6(21...) ACCEPT 4.7(2...) DO NOT ACCEPT adding 1.6 to their x from bp3.</p> <p>ACCEPT correct rounding in any step DO NOT ACCEPT rounding errors</p>	
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Q4	Answers	Notes	Total
a	$\frac{1 - 3x}{x - 2} = 4x + 1$ <p>.1 Correctly multiply $(4x+1)$ and $(x-2)$</p> <p>.2 Correctly rearrange and simplify their quadratic to have all variables on one side after equating to $(1-3x)$</p> <p>.3 Correctly factorize their rearranged quadratic after bp2</p> <p>OR</p> <p>Correctly substitute their coefficients of their quadratic after bp2 into quadratic formula</p> <p>.4 The correct two values for x.</p>	<p>.1 $(1 - 3x =) 4x^2 + x - 8x - 2$ or $(1 - 3x =) 4x^2 - 7x - 2$.1 DO NOT ACCEPT seeing only $(4x + 1)(x - 2) = 1 - 3x$</p> <p>.2 their $4x^2 - 4x - 3$ or their $4x^2 - 4x = 3$.2 the correct .2 implies .1 .2 DO NOT ACCEPT other quadratic without seeing .1</p> <p>.3 their $(2x + 1)(2x - 3)$ or $(x - \frac{3}{2})(x + \frac{1}{2})$ or $(4x - 6)(x + \frac{1}{2})$ OE</p> <p>OR</p> <p>their $\frac{4 \pm \sqrt{(-4)^2 - 4(4)(-3)}}{2(4)}$</p> <p>.3 ACCEPT one notation mistake in substitution into quad formula Ex : $\frac{4 \pm \sqrt{-4^2 - 4(4)(-3)}}{2(4)}$ or $\frac{4 + \sqrt{(-4)^2 - 4(4)(-3)}}{2(4)}$</p> <p>.3 DO NOT ACCEPT their $(2x+1)(2x-3)$ without seeing their quadratic</p> <p>.4 $(x =) \frac{-1}{2}$ and $(x =) \frac{3}{2}$ OE</p>	4

	b	<p>For reference $f(x) = 4x + 1$ and $g(x) = \frac{1-3x}{x-2}$</p> <p>.1 Correctly substitute their -0.5 or their 1.5 into $f(x)$ or $g(x)$</p> <p>.2 Correct value of their y-coordinate for A after substituting into $f(x)$ or $g(x)$</p> <p>.3 Correct value of their y-coordinate for B after substituting into $f(x)$ or $g(x)$</p>	<p>.1 $4(\text{their} - 0.5) + 1$ or $4(\text{their}1.5) + 1$ or $\frac{1-3(\text{their}-0.5)}{\text{their}-0.5-2}$ or $\frac{1-3(\text{their}1.5)}{\text{their}1.5-2}$</p> <p>.2 their -1 .2 ACCEPT only if negative. DO NOT ACCEPT 0. .2 DO NOT ACCEPT their-1 without working</p> <p>.3 their 7 .3 ACCEPT only if positive. DO NOT ACCEPT 0. .3 DO NOT ACCEPT their 7 without working</p> <p>ACCEPT -1 and 7 not labeled as A or B.</p>	<p>3</p>
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Q5	Answers	Notes	Total
a	<p>At least two ratios showed equals OR at least two ratios equals to 0.8 showed</p>  <p>Key: Path of the bouncing ball</p>	<p>Two from:</p> $\frac{256}{320} = \frac{320}{400} = \frac{400}{500}$ <p>OR two from:</p> $\frac{256}{320} = 0.8, \quad \frac{320}{400} = 0.8, \quad \frac{400}{500} = 0.8$ <p>ACCEPT at least two from $500 \times 0.8 = 400$, $400 \times 0.8 = 320$, $320 \times 0.8 = 256$</p> <p>DO NOT ACCEPT using the geometric sequence formula. EX. $500 \times 0.8^2 = 320$.</p>	1
b	<p>.1 Correctly substitute 10 into correct geometric sequence formula</p> <p>.2 Correctly calculate their U_{10} after substituting 10 into their geometric sequence formula</p>	<p>.1 ($U_{10} =$) $500 \times 0.8^{(10-1)}$ OE ACCEPT $n = 10$ AND $500 \times 0.8^{(n-1)}$</p> <p>.2 (U_{10}) = <i>their</i> $67(.108864)(cm)$</p> <p>.2 DO NOT ACCEPT 67.12</p> <p>.2 ACCEPT 65 (coming from $0.8^9 = 0.13$)</p>	2
c	<p>.1 Correctly substitute (690, 27.5) into correct formula</p> <p>.2 Correctly substitute (680,0) into their formula from bp1</p> <p>.3 Correct value of their a after their bp2.</p>	<p>.1 ($h(x) =$) $a(L - 690)^2 + 27.5$</p> <p>.1 ACCEPT a quadratic equation in the form $a(x-b)^2+c$ with incorrect "a", but (690,27.5) correctly substituted. Ex: $h(x) = -1(x-690)^2 + 27.5$</p> <p>.2 their ($0 = a(680 - 690)^2 + 27.5$)</p> <p>.3 ($a =$) their -0.275</p> <p>.3 ACCEPT only if their "a" is negative</p> <p>Accept the use of x instead of L</p>	 <p>3</p>

d	<p>AM1 When they don't expand (L-690)²</p> <p>.1 Equate their equation to 17.6</p> <p>.2 Correctly rearrange the quadratic for $(L - 690)^2$</p> <p>.3 Correctly square root both sides from their bp2.</p> <p>.4 Correctly identify the value for L as 696</p> <p>AM2 When they expand (L-690)²</p> <p>.1 Equate their equation to 17.6</p> <p>.2 Correctly expand $(L-690)^2$ AND rearrange the quadratic = 0</p> <p>.3 Correctly substitute their coefficients of their quadratic from bp2 into quadratic formula</p> <p>.4 Correctly identify the value for L as 696</p>	<p>AM1 When they don't expand (L-690)²</p> <p>.1 $17.6 = \text{their } (-0.275(L-690)^2+27.5)$ or $\text{their } -9.9 = \text{their } (-0.275(L-690)^2)$</p> <p>.2 $(L - 690)^2 = 36$ OE</p> <p>.3 $L-690 = \text{their } +/-6$ ACCEPT $L-690 = \text{their } 6$ ACCEPT not seeing their negative root. .3 DO NOT ACCEPT negative under the root or as the answer</p> <p>.4 $(L =) 696$</p> <p>AM2 When they expand (L-690)²</p> <p>.1 $17.6 = \text{their } (-0.275(L-690)^2+27.5)$ or $\text{their } -9.9 = \text{their } (-0.275(L-690)^2)$</p> <p>.2 $0 = -0.275L^2 + 379.5L - 130917.6$ or $0 = 0.275L^2 - 379.5L + 130917.6$ OE</p> <p>.3 <i>their</i> $\frac{379.5 \pm \sqrt{(-379.5)^2 - 4(0.275)(130917.6)}}{2(0.275)}$</p> <p>.3 ACCEPT $(-b)^2$ written as b^2 under the square root .3 ACCEPT their simpler quadratic $ax^2 + c = 0$ or $ax^2 + bx = 0$, only if they solve it correctly at least for the positive value. Ex: if their bp2 is $-9.9 = 0.275L^2 - 130900$ and $L = 689.9$</p> <p>.4 $(L =) 696$</p> <p>For any AM, bp2 implies bp1 DO NOT ACCEPT if candidate found both values (684 and 696) and didn't identify 696 as the one.</p> <p>Accept the use of x instead of L</p>	4
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Q6	Answers	Notes	Total
6a	<p>.1 Correctly write one time</p> <p>.2 Correctly write another two times</p>	<p>ACCEPT 2:50 or 2h50 or 250 or 2.50 or 2.5 2.5:00 OE DO NOT ACCEPT 2:5 or 25 or 2:30 OE</p> <p>ACCEPT 7:50 or 7h50 or 750 or 7.50 or 7.5 7.5:00 OE DO NOT ACCEPT 7:5 or 75 or 7:30 OE</p> <p>ACCEPT 12:00 or 12h00 or 1200 or 12.00 or 12 or 12pm OE</p> 	2
6b	<p>.1 Correct number of hours in the hours box</p> <p>.2 Correct number of minutes in the minutes box</p>	<p>.1 2 in the hours box</p> <p>.1 ACCEPT $\frac{24}{10}$ or 2.4 OE in the hours box</p> <p>.1 ACCEPT 2 or 2.4 hours in the response box <u>only if the hours box is empty</u></p> <p>.2 24 OE in the minutes box</p> <p>.2 ACCEPT 24 minutes in the response box <u>only if the minutes box is empty</u></p>	2

6c	School event	Metric time	Metric seconds in standard form	Examples of correct values with incorrect form
	Examination	90 minutes	9×10^3	90×10^2 0.9×10^4
	School day	2 hours and 40 minutes	2.4×10^4	0.24×10^5 24×10^3 240×10^2
	Time to run 10 kilometres	53 minutes	5.3×10^3	
	Climbing mount Kilimanjaro	4 days, 2 hours and 5 minutes	4.205×10^5	0.4205×10^6 42.05×10^4 420.5×10^3 4205×10^2

.1 Correctly write first row	.1 9×10^3 ACCEPT 9.0×10^3
.2 Correctly write second row	.2 2.4×10^4 ACCEPT 2.40×10^4
.3 Correctly write third row	.3 53 min .3 ACCEPT 53.00 mins or half hour and 3 mins or 50 minutes and 300 sec OE .3 DO NOT ACCEPT without units Ex: 53
.4 Correctly write fourth row	.4 4.205×10^5

For bp1, bp2, and bp4
ACCEPT if the value in seconds is correct but written in incorrect standard form, and **deduct only one mark from the total**
Do not deduct if the value incorrectly written in standard form is already 0 marks (incorrect value of seconds)

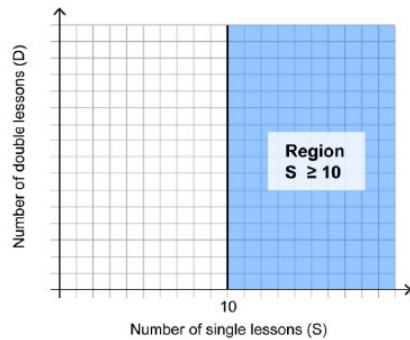
Examples:
 90×10^2 , 24×10^3 , 53 minutes, 4205×10^2 → Award (1 + 1 + 1 + 1) – 1 = 3 marks
 90×10^3 , 2.4×10^4 , 5 hours and 3 minutes, 4205×10^2 → Award (0 + 1 + 0 + 1) – 1 = 1 mark
 9×10^3 , 24×10^4 , 53 mins, 4.2×10^5 → Award (1 + 0 + 1 + 0) – 0 = 2 marks

4

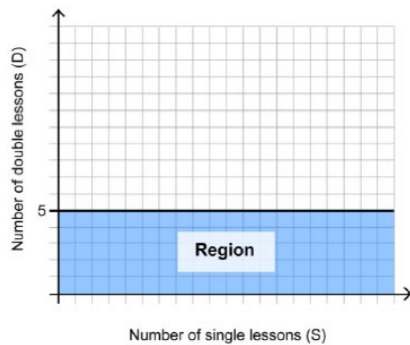
- 6 d
- .1 Two correct
 - .2 Another two correct
 - .3 Another two correct

0 – 1 correct	0 marks
2 – 3 correct	1 mark
4 – 5 correct	2 marks
6 correct	3 marks

For reference
Line1

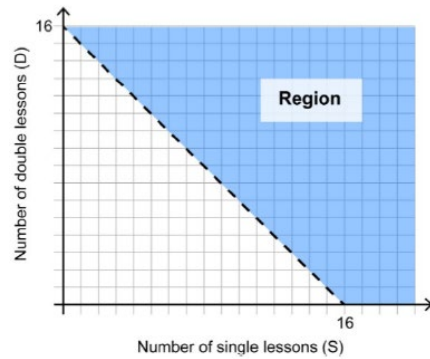


Line2

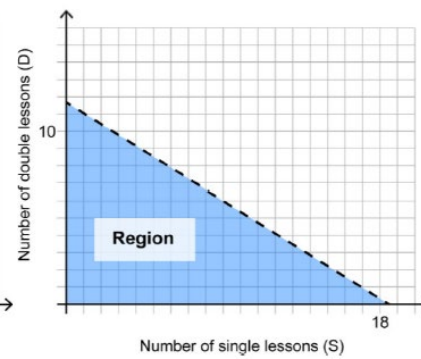


Inequalities	Description of region in words
$S \geq 10$	The number of single lessons is at least 10 WTTE
$D \leq 5$	The number of double lessons is at most 5 WTTE
$S + D > 16$	The total number of single and double lessons is more than 16 WTTE
$5S + 8D < 92$	

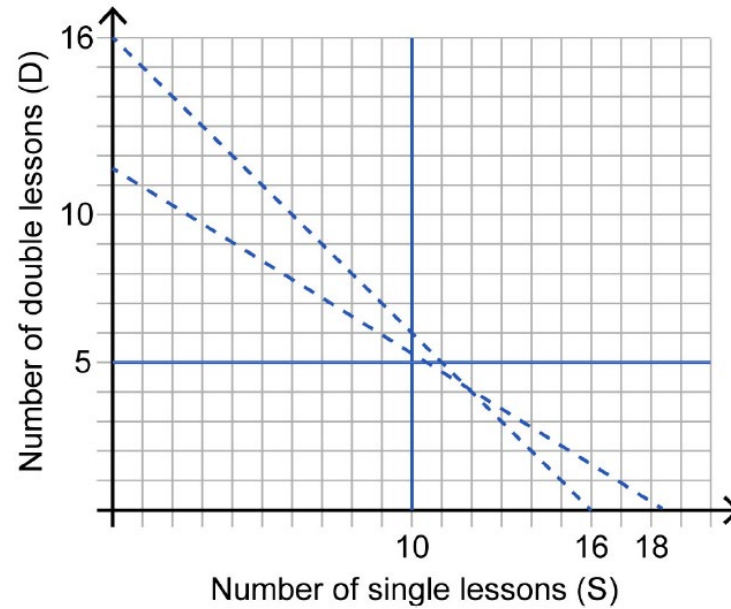
For reference:
Line3



Line4



e



.1 One correct pair of integer values of S and D.

.2 Correctly calculate number of minutes using one of their (S,D)

.3 Explicitly identify 15 and 2 OR 15 and 2 seen as the only final answer.

.1 (16,1) or (S=)16 and (D=)1 OR (15,2) or (S=)15 and (D=)2

.2 (20xtheir16 + 40xtheir1=) their360 or (their15x20 + 40xtheir2=) their380
Examples of minutes

(12,4)	(13,3)	(14,2)	(15,1)	(15,2)	(16,0)	(16,1)	(18,0)
400	380	360	340	380	320	360	360

.3 (S=15) and (D=2)

The MYP 5 chemistry class is creating copper sulphate crystals from a solution.

It takes **one** metric day for the solution to form 2.987 grams of copper sulphate crystal.

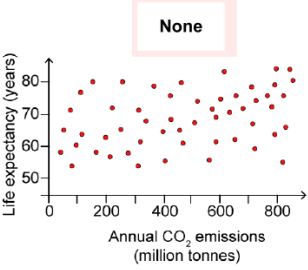
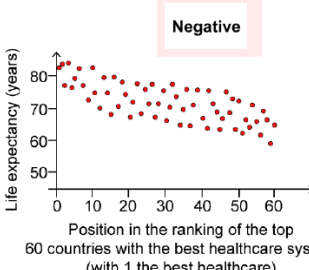
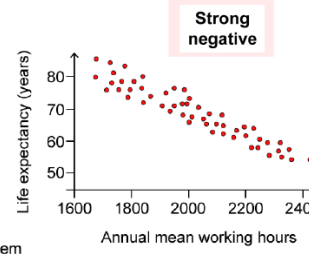
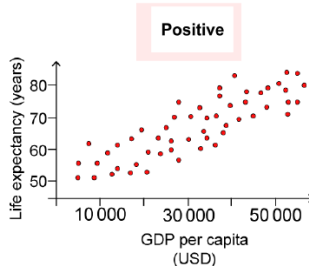

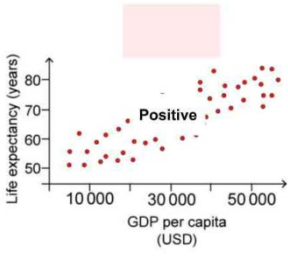
Show that the rate of production is 2.987

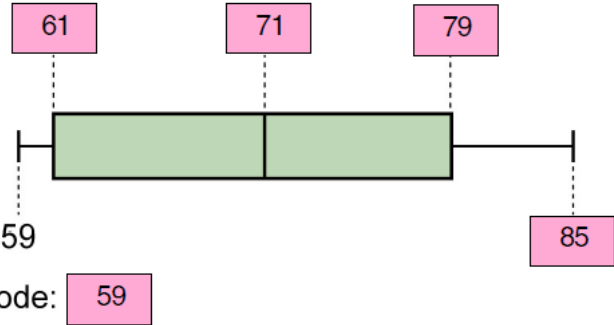
f) milligrams per minute.

6f	Correctly apply on 2.987 g per day both conversions: from g to mg and from day to minutes AG 2.987 (mg/min)	Conversions with correct mass units mentioned and divide by 1000. Example: 2.987 mg (per day) and 2987/1000 OR Conversions with correct time units mentioned and multiply by 1000. Example: 0.002987 (grams) per min and 0.002987x1000 ACCEPT Multiply 2.987 by 1000 and divide by 1000. Ex: $2.987 \times \frac{1000}{1000}$ DO NOT ACCEPT any of the following to replace any part from the accepted above 2.987 mg per minute (it is the required AG) 2.987 g per day 1 day=10 hours or 1000 mins 1g=1000mg DO NOT ACCEPT (in any order): $\frac{2.987}{1000} = 0.002987$ g/min and 0.002987g/min=2.987mg/min (because the second part is 2.987 mg per minute AG)	1
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Calculate the maximum number of grams that can be produced from 04:00 on Day 1 to 04:00 on Day 2. Give your answer to the nearest gram.

<p>g) 6g</p>	<p>AM1</p> <p>.1 Correct total duration in days OR in hours OR in minutes</p> <p>.2 Correct ratio seen in any notation or applied on their time</p> <p>.3 Correct result of 3 after the correct calculation</p> <p>AM2</p> <p>.1 Correct additional duration in days OR in hours OR in minutes</p> <p>.2 Correct ratio seen in any notation or applied on their time</p> <p>.3 Correct result of 3 after the correct calculation</p>	<p>AM1</p> <p>.1 $\frac{10.9}{10}$ or 1.09 (days) OR 10.9 (hours) OR 1090 (mins)</p> <p>.2 “if in 1 day 2.987 gm then in their1.09 days it is or ” $\frac{1}{\text{their}1.09} = \frac{2.987}{x}$ OE OR “if in 10 hours 2.987 gm then in 10.9 it is “ or $\frac{10}{\text{their}10.9} = \frac{2.987}{x}$ OE OR “if in 1000 min 2.987 gm then in their1090 it is” or $\frac{1000}{\text{their}1090} = \frac{2.987}{x}$ OE</p> <p>.2 ACCEPT $2.987 \times \text{their}1090$.2 DO NOT ACCEPT their time being 10 or 100 or 1000</p> <p>.3 2.987×1.09 or $\frac{2.987 \times 10.9}{10}$ or $\frac{2.987 \times 1090}{1000}$ OE or $3.25583 \approx 3$ (gm)</p> <p>.3 ACCEPT only if the calculation is correct</p> <p>AM2</p> <p>.1 0.09 (days) OR 0.9 (hours) OR 90 (mins)</p> <p>.2 “if in 1 day 2.987 gm then in their0.09 days it is or ” $\frac{1}{\text{their}0.09} = \frac{2.987}{x}$ OE OR “if in 10 hours 2.987 gm then in their0.9 it is” or $\frac{10}{\text{their}0.9} = \frac{2.987}{x}$ OE OR “if in 1000 min 2.987 gm then in their90 it is” or $\frac{1000}{\text{their}90} = \frac{2.987}{x}$ OE</p> <p>.2 ACCEPT $2.987 \times \text{their}90$.2 DO NOT ACCEPT their time being 10 or 100 or 1000</p> <p>.3 2.987×0.09 or $\frac{2.987 \times 0.9}{10}$ or $\frac{2.987 \times 90}{1000}$ or $0.26883 + 2.987$ or $3.25583 \approx 3$ (gm)</p> <p>.3 ACCEPT only if the calculation is correct</p>	<p>3</p>
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Q7	Answers	Notes	Total
a	<p>.1 Correctly identify 3 scatter plots</p> <p>.2 Correctly identify another 2 scatter plots</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>None</p>  </div> <div style="text-align: center;"> <p>Negative</p>  </div> <div style="text-align: center;"> <p>Strong negative</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>Positive</p>  </div> <div style="text-align: center;"> <p>Strong positive</p>  </div> </div> <p>ACCEPT identifying on the graph instead of the box above it. Ex:</p> <div style="text-align: center; margin-top: 20px;">  </div>	<p>2</p>

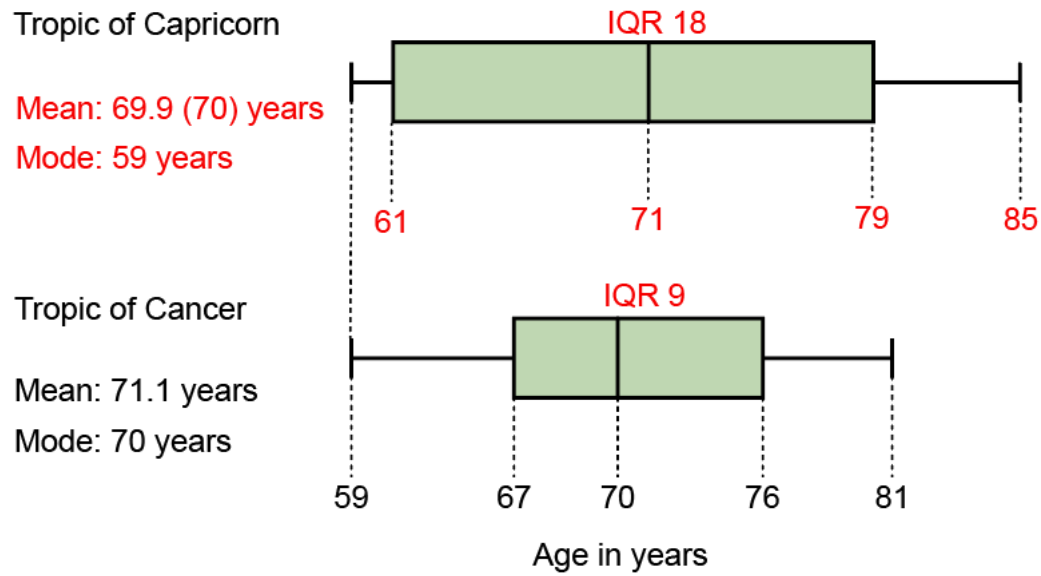
b	<p>.1 Two correct</p> <p>.2 Third correct</p> <p>.3 fourth and fifth correct</p>	<p>Mode 59 LQ 61 Median 71 UQ 79 Max 85 Tropic of Capricorn</p>  <p>Mode: 59</p>	3
c	<p>Range:</p> <p>.1 Correctly subtract 59 from 85</p> <p>Interquartile range (IQR):</p> <p>.2 Correctly subtract 61 from 79</p>	<p>Range:</p> <p>.1 26 .1 ACCEPT correctly subtracting 59 from their max in their box plot in part b) i.e (their85–59=) their26</p> <p>Interquartile range (IQR):</p> <p>.2 18 .2 ACCEPT correctly subtracting their LQ from their UQ on their box plot in part b) i.e (their79–their61=) their18</p>	2

7	d		10
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Mark	1	2
Identify factors (F)	<p>Note: Award F1 automatically if C3 is achieved</p> <p>OR</p> <p>Identify two from the elements below <u>in the elements box</u> (ACCEPT WTTE):</p> <ol style="list-style-type: none"> 1) Mean or Mode or Median 2) Range or IQR 3) Trend over the years or line of best fit or any description for the graph 4) Max or Min or UQ or LQ or quartiles 5) Health care or mean working hours or GDP or life satisfaction or the correlation <p>DO NOT ACCEPT General terms like: Measures of central tendency or measures of dispersion or statistics or Box and whisker or the graph for life expectancy or the scatter graph Number of countries in each tropic (11 countries on Capricorn and 17 on Cancer) Location of countries Annual CO₂ emissions Just values for the elements</p>	<p>Identify three from the elements below <u>in the elements box</u> (ACCEPT WTTE):</p> <ol style="list-style-type: none"> 1) Mean or Mode or Median 2) Range or IQR 3) Trend over the years or line of best fit or any description for the graph <p>DO NOT ACCEPT Any element from 4) or 5) (mentioned for F1)</p>

In 2021	Mean	Mode	IQR	Range	Min	LQ	Median	UQ	Max
Capricorn	69.9.. (or 70)	59	18	26	59	61	71	79	85
Cancer	71	70	9	22	59	67	70	76	81

Image 2



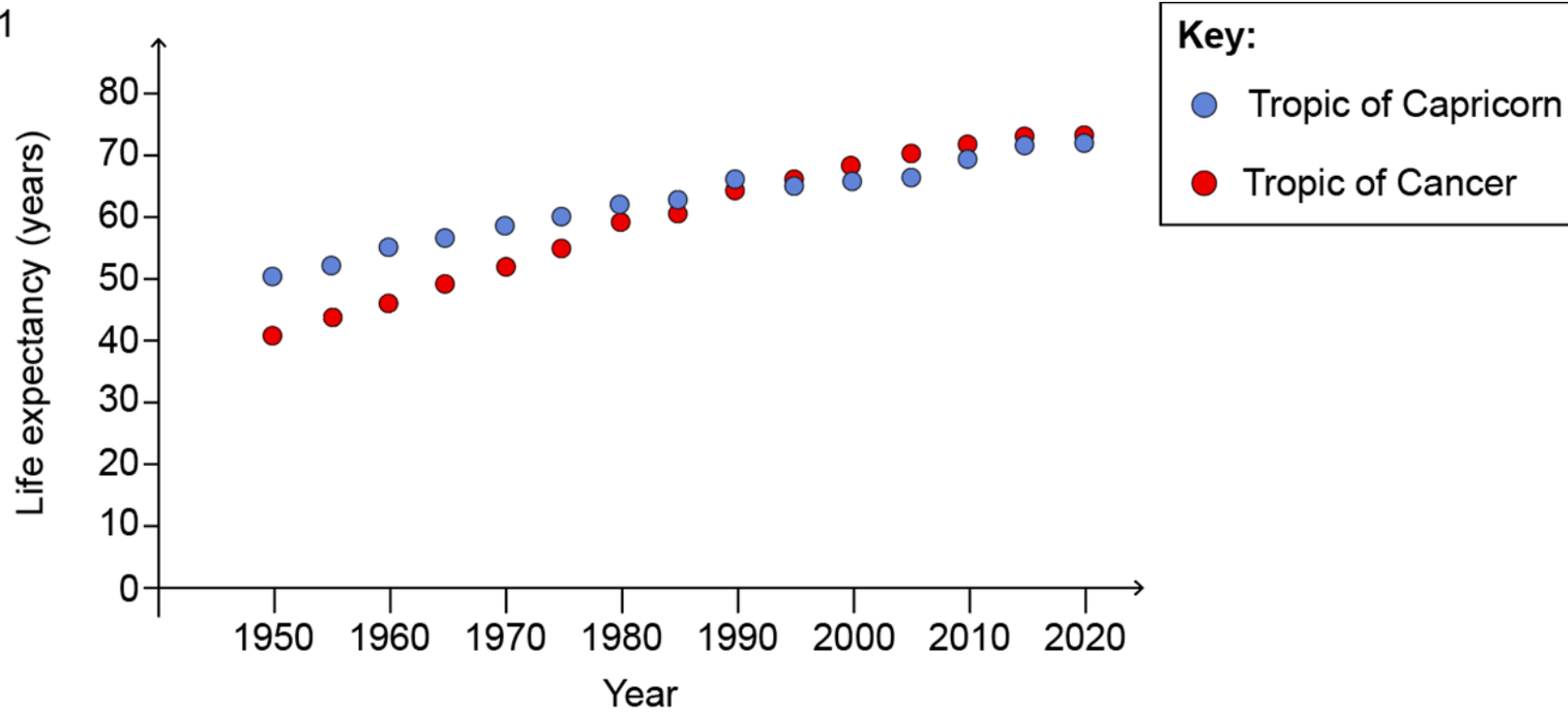
In 2021

Capricorn has bigger/larger: Median, IQR and Range

Cancer has bigger/larger: Mean and Mode

Mark	1	2	3	4
Comparative calculations (C) ACCEPT seeing in the elements response box or under any title in their response box	Correctly compare any two from their statistics: Their Mean Their Mode Their Median Their Range Their IQR Their Max or Min or LQ or UQ Example: They have similar mean and median Highest value in Capricorn is 85 while Cancer 81 Cancer mode is 70 and compared to Capricorn 59 Capricorn less Q1 but higher median	Correctly compare any three from their statistics: Their Mean Their Mode Their Median Their Range Their IQR Their Max or Min or LQ or UQ Example: Capricorn higher median and IQR but same min	Values must be seen Correctly compare: The Mean: 69.9 or 70 AND One from Their Range or Their IQR Note: When comparing their range or their IQR ACCEPT seeing only their values for cancer (their22 or their9)	Values must be seen Correctly compare: The Mean: 69.9 or 70 AND One from The Range or The IQR AND One from The Mode or The Median Note: When comparing the range or the IQR ACCEPT seeing only the values for cancer (22 or 9) Note: If they compare by writing directly the difference then it has to be correct (4 for range or 9 for IQR)
	OR Attempt to calculate the mean for the tropic of Capricorn Ex: adding the values incorrectly and divide by 11 their769/11	OR Correctly calculate The mean for the tropic of Capricorn (769/11=)69.9 or 70	OR Correctly compare: The Mean AND The Mode and The Median ACCEPT only one with their value but not both	
	ACCEPT			
	Spelling mistakes Ex: "medium" instead of "median" "similar" WTTE when comparing Mean or Median Q1 instead of LQ, Q3 instead of UQ, "Middle" age or "Q2" instead of "median" "most common" instead of "mode" "lowest" or "smallest" OE instead of "minimum, "highest" or "largest" OE instead of "Maximum" IQR "more concentrated" instead of smaller			
DO NOT ACCEPT				
Cancer is higher WTTE when comparing their median, their IQR, or their range Using "central tendency" or "average" instead of "mean or mode or median" Using "measures of dispersion" or "spread" instead of "range or IQR"				

Image 1



Mark	1	2
<p>Comment on the Headline (H)</p> <p>ACCEPT seeing in the elements response box or under any title in their response box</p>	<p>Correct comment on the headline referring to the trend over the years with <u>specific years</u> (based on the graph in image 1)</p> <p>Ex: WTTE Correct up to [1980 , 2000] Incorrect after [1980 , 2000] After 1950 Capricorn higher for [30,50] years In the last [20,40] years cancer increased further There was a gap but it narrowed in [1980 , 2000] There was a gap for [30,50] years after 1950 then it narrowed The headline was written in the [1980 , 2000] It was true up to [1980 , 2000] but after that the opposite Capricorn had higher life expectancy until [1980 , 2000]</p> <p style="text-align: center;">OR</p> <p>C1 is achieved AND Correct comment on the headline referring to <u>general</u> trend over the years (based on the graph in image 1)</p> <p>Ex: WTTE Correct in the past Incorrect recently Somehow correct but they are becoming closer Over the years the gap has narrowed The Headline is outdated Cancer has higher slope (or steeper) Capricorn has lower slope Cancer was lower but increased more Recently Capricorn became closer to Cancer and expected to increase</p>	<p>C3 is achieved AND Correct comment on the headline referring to trend over the years with <u>specific years</u> (based on the graph in image 1)</p>

Mark	1	2
	ACCEPT only if C1 is achieved	ACCEPT only if C3 is achieved
Justify (J) ACCEPT seeing in the elements response box or under any title in their response box	One reason Implying accurate or Inaccurate related to the data given WTTE 1) Inaccurate as Capricorn only 11 countries or (tropics) don't have same number of countries or (tropics) don't have same number of people or we don't know the number of people 2) Accurate as the data given in the graph "starts from 1950" or "is until 2020" or "until 2021" OR as they are based on [70,73] years of data 3) Accurate as I compared <u>both</u> measures of central tendency and measures of dispersion OR mean (or median or mode) and range (or IQR) 4) Inaccurate as life expectancies were rounded OR accurate/inaccurate as some (accept all) data is given to nearest 1 decimal place 5) Inaccurate as image 1 (or the graph) does not indicate which average is graphed. e.g. image 1 does not show mean or median for life expectancy DO NOT ACCEPT other reasoning Ex: Inaccurate because diseases (or pandemic or storm or, wars...etc) Accurate/Inaccurate as data is from a (given) graph Inaccurate because image 2 is only about one year (2021) Inaccurate as we don't know the source of data Inaccurate as I am not sure of my calculations Accurate as I am sure of what I calculated or I used the right formula Inaccurate as I had to guess values Accurate as the data is provided	Two reasons from the list (1 to 5) in J1
		<p style="text-align: center;">OR</p> Implying inaccurate with the reason related to population of each country WTTE Ex: Inaccurate as we do not know the number of people <u>in each country</u> Inaccurate as the population of <u>each country</u> is different Inaccurate as <u>countries</u> don't have same number of people

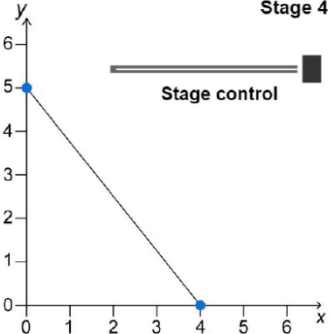
Task 3

Glossary for task 3

Term used	Clarification
General rule	Rule in terms of only n (if they use x , it is still general rule but penalise in notation)
The general rule	The correct general rule in terms of only n (if they use x , it is still the general rule but penalise in notation)
Their general rule	valid attempt for the general rule but in terms of only n (if they use x , it is still their general rule but penalise in notation)
Their rule	Correct rule not in terms of only n
Recursive rule	$U_n = \frac{(U_{n-1}-1)}{n}$ or $U_{n+1} = \frac{(U_n-1)}{n+1}$ or $U_n = \sqrt{(U_{n-1} + 4n)}$ or $U_{n+1} = \sqrt{(U_n + 4n + 4)}$

We accept subsequent use of their general rule provided it is of similar complexity. In general, the complexity of the rule depends on its form. The table below shows examples.

The general rule accepted simplified forms	ACCEPT for their general rule	DO NOT ACCEPT for their general rule
$G = \frac{-(n+1)}{n}$ or $G = \frac{-n-1}{n}$ or $G = \frac{(-n-1)}{n}$	Quadratic or exponential or rational	Linear
$L = \sqrt{2n^2 + 2n + 1}$ or $L = \sqrt{n^2 + (n + 1)^2}$	Quadratic or exponential or $\sqrt{\text{quadratic}}$	Linear or $\sqrt{\text{linear}}$

Question 8 EXT	Answers	Notes	Total
a	<p>Correctly substitute (4,0) and (0,5) into gradient formula</p> $\frac{5 - 0}{0 - 4}$ $= \frac{-5}{4} \text{AG}$ <p>For reference</p> 	$\frac{5-0}{0-4} \text{ OR } \frac{0-5}{4-0}$ <p>ACCEPT With or without brackets. ACCEPT Substituting (4,0) into line equation $y=ax+b$ where b is 5 AND correctly calculate "a".</p> <p>Ex: $0=a(4)+5$ and $-5 = 4a$ or $a = \frac{0-5}{4}$</p> <p>ACCEPT inappropriate notation Ex: $5-0/0-4$ or $0-5/4-0$ $5-0$ over $0-4$ Numerator $5-0$ and denominator $0-4$</p> <p>DO NOT ACCEPT $x=4$ and $y=-5$ (4,0) and (0,5) with formula $\frac{y_2-y_1}{x_2-x_1}$ Only seeing $5-0$ and $0-4$ Rise -5 over run 4 Using the formula from part d)</p>	1

b

.1 Correctly write at least one value for G

.2 Correctly write all six values of $b, h,$ and G for $n=5$ and 6.

Stage (n)	Base (b)	Height (h)	Gradient (G)
1	1	2	-2/1
2	2	3	-3/2
3	3	4	-4/3
4	4	5	-5/4
5	5	6	-6/5
6	6	7	-7/6

5	5	6	$-\frac{6}{5}$ or -6/5
6	6	7	$-\frac{7}{6}$ or -7/6

ACCEPT

5	6	$-\frac{6}{5}$
6	7	$-\frac{7}{6}$

ACCEPT equivalent values for all

2

c	<p>.1 correctly describe one pattern for G in words</p> <p>.2 correctly describe a second pattern for G in words</p> <p>For reference</p> <table border="1"> <tr><td>G</td></tr> <tr><td>$\frac{-2}{1}$</td></tr> <tr><td>$\frac{-3}{2}$</td></tr> <tr><td>$\frac{-4}{3}$</td></tr> <tr><td>$\frac{-5}{4}$</td></tr> <tr><td>$\frac{-6}{5}$</td></tr> <tr><td>$\frac{-7}{6}$</td></tr> </table>	G	$\frac{-2}{1}$	$\frac{-3}{2}$	$\frac{-4}{3}$	$\frac{-5}{4}$	$\frac{-6}{5}$	$\frac{-7}{6}$	<p>ACCEPT complete terminology only, for example (below are seven different descriptions)</p> <p>Numerator decreases by one or goes down by one or subtract 1 or absolute value increases by one WTTE Denominator increases by 1 or adds 1 or goes up by 1 WTTE Numerator difference -1, common difference -1, linear with difference -1, arithmetic with difference -1 Denominator difference 1, common difference 1, linear with difference 1, arithmetic with difference 1 Numerator or denominator second difference zero Absolute value of numerator is always 1 more than absolute value of denominator Rational</p> <p>ACCEPT small spelling errors. Examples: Using “Numoroter” or “Nomurator” instead of “Numerator”</p> <p>DO NOT ACCEPT Using “nominator” instead of “numerator” Using “rise” instead of numerator or using “run” instead of “denominator” General description, for example: (Num. or Denom.) Integers, negative, arithmetic, decreasing, composed of only fractions The rule in words or description related to n for example: negative n minus one over n, denominator is always n, n goes up by 1 General rules in terms of n, example: $G = -(n+1)/n$ Description in terms of h and b, example: gradient is always $-h/b$</p> <p>Note, in the case when they have more than two different patterns: If two are accepted and the rest are all correct: award 2 marks Ex: Denominator integers and adds 1 and Second difference is zero Ex: Denominator linear and increases by 1 and has difference of 1</p> <p>If two are accepted and any of the rest is incorrect: award 1 mark Ex: Denominator increases by 1 and Second difference is zero and G decreases by one.</p> <p>If only one is accepted, ignore the rest and award 1 mark</p> <p>SC for 1 mark Two different <u>correct</u> descriptions using incorrect terminology. Examples The top decreases by 1 and bottom increases by 1 The rise has difference -1 and the run increases by 1</p>	2
G										
$\frac{-2}{1}$										
$\frac{-3}{2}$										
$\frac{-4}{3}$										
$\frac{-5}{4}$										
$\frac{-6}{5}$										
$\frac{-7}{6}$										

e	<p>.1 correctly substitute $n \geq 5$ into their general rule (from 8c or 8d)</p> <p>.2 correctly calculate their value of G after their bp1</p> <p>.3 recognise that their correctly calculated value of G is the same as their predicted value</p>	<p>.1 Ex: $\frac{-(5+1)}{5}$</p> <p>ACCEPT seeing their equation AND their chosen n. Ex: $n = 5$ AND $(G=) - \frac{(n+1)}{n}$</p> <p>.1 DO NOT ACCEPT if their G is linear.</p> <p>.2 Ex: $\frac{-6}{5}$ (for $n=5$) bp1 must be awarded</p> <p>.2 DO NOT ACCEPT if their G is linear.</p> <p>.2 DO NOT ACCEPT brackets error. Ex: their $-6-1 / 6$ is not $-7/6$, it gives $-37/6$</p> <p>.3 If they use $n=5$ or $n=6$ ACCEPT only if they say "as seen in the table" WTTE or "correct"</p> <p>.3 If they use $n \geq 6$ ACCEPT only if they say "the same as when we continue the pattern" WTTE and state how. Examples: for $\frac{-8}{7}$; "it is obtained by subtracting 1 to -7 and adding 1 to 6" OR they show the further predictions including $\frac{-8}{7}$ here in part e)</p> <p>SC for 1 mark Correctly test their general rule by applying the steps of verification mentioned in the left column, including bp3, with a value of $n \leq 4$</p> <p>SC for 1 mark Correctly verify, with a value ≥ 5, including bp3, the correctly described pattern or recursive rule or rule from part c) or d). Ex.: If they have two rules, one for numerator and one for denominator Numerator : $U_n = -2+(n-1)x-1$ $U_6 = -2+(6-1)x-1 = -7$ and they say it's the same as the table WTTE AND Denominator $U_n = 1+(n-1)x1$ $U_6 = 1+(6-1)x1 = 6$ and they say it's the same as the table WTTE</p>	3
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Question 8f (20 marks)

Mark	1		
Predictions (P)	<p>Correctly predict two terms for L ACCEPT whether in the table or in the response box.</p> <table border="1"><tbody><tr><td>$\sqrt{61}$</td></tr><tr><td>$\sqrt{85}$</td></tr></tbody></table> <p>ACCEPT square root of 61 or square root of 85</p> <p>DO NOT ACCEPT decimals</p>	$\sqrt{61}$	$\sqrt{85}$
$\sqrt{61}$			
$\sqrt{85}$			

Mark	1	2	3	4
<p>Description (D)</p> <p>ACCEPT incorrect terminologies, notation errors, non-simplified rule, or rule in words but penalize in notation (N)</p> <p>Ignore additional incorrect patterns</p>	<p>Attempt to describe a pattern in words or recursive rule for L</p> <p>Examples for $(2n^2 + 2n + 1)$: Difference (or the increase) increases by 4 WTTE It increases by multiples of 4 WTTE Second difference 4 Quadratic (Recursive rule) $U_n=U_{n-1}+4n-4$ or $U_{n+1}=U_n+4n+4$</p> <p>DO NOT ACCEPT incorrect or too general patterns Ex: second difference is $\sqrt{4}$ Ex: L is a surd Ex: Under the square root are odd numbers</p>	<p>Attempt to describe a pattern in words or recursive rule for L</p> <p>AND</p> <p>Their general rule for L a <u>quadratic</u> satisfying at least one value for n in their $(2n^2+2n+1)$</p>	<p>Attempt to describe a pattern in words or recursive rule for L</p> <p>AND</p> <p>Attempt the general rule for L</p> <p>DO NOT ACCEPT in words</p>	<p>Attempt to describe a pattern in words or recursive rule for L</p> <p>AND</p> <p>The general rule for L</p>
	<p>OR</p> <p>Their general rule for L a <u>quadratic</u> satisfying at least one value for n in their $(2n^2+2n+1)$</p>	<p>OR</p> <p>Attempt the general rule for L $(L =) n(n + 1) \times 2 + 1$ or $(L =) n^2 + (n + 1)^2$ or $(L =) 2n^2+2n+1$ OE or A <u>quadratic</u> satisfying at least two values for n in their $(2n^2+2n+1)$</p>	<p>OR</p> <p>The general rule for L $(L =)\sqrt{2n^2 + 2n + 1}$ or $(L =)\sqrt{n^2 + (n + 1)^2}$ or $(L =)\sqrt{n(n + 1) \times 2 + 1}$ OE</p>	
	<p>OR</p> <p>The rule for L in terms of b and h. $(L =)\sqrt{b^2 + h^2}$</p> <p>ACCEPT $L^2=b^2+h^2$</p>	<p>OR</p> <p>The general rule for L in words or partially in words</p>		

Mark	1	2
Testing (T)	<p>Attempt to test their general rule for L or their $(2n^2 + 2n + 1)$ using $n \leq 4$</p> <p>Ex: Correctly substitute in their general rule for L or their $(2n^2 + 2n + 1)$ value of $n \leq 4$</p>	<p>Correctly test their general rule for L or their $(2n^2 + 2n + 1)$ using $n \leq 4$ Ex: Correctly calculate their value for L or their $(2n^2 + 2n + 1)$ in their general rule for L or their $(2n^2 + 2n + 1)$ using $n \leq 4$</p> <p>AND</p> <p>Recognise that <u>their</u> correctly calculated value for L or their $(2n^2 + 2n + 1)$ is the same as <u>the</u> given value.</p> <p>ACCEPT Seeing their correctly calculated value for L or their $(2n^2 + 2n + 1)$ and the given value in the table being equal</p>
	<p style="text-align: center;">OR</p> <p>Correctly test their described pattern or their rule (e.g. recursive rule, or rule in terms of b and h)</p> <p>Ex: Testing $L = 4n + 1$, when $n=1$, $L = 4(1) + 1 = 5$</p> <p>Ex: Testing $L = \sqrt{b^2 + h^2}$ when $n=2$, $b=2$, $h=3$, $L = \sqrt{2^2 + 3^2} = \sqrt{13}$,</p>	

Mark	1	2	3
Verifying (V)	<p>Attempt to verify their general rule for L or their $(2n^2 + 2n + 1)$ using $n \geq 5$</p> <p>Ex: Correctly substitute in their general rule for L or their $(2n^2 + 2n + 1)$ value of $n \geq 5$</p>	<p>Correctly calculate their value for L or their $(2n^2 + 2n + 1)$ in their general rule or their $(2n^2 + 2n + 1)$ using $n \geq 5$</p>	<p>ACCEPT only if they have <u>the</u> general rule for L</p> <p>Correctly calculate their value for L in the general rule using $n \geq 5$</p> <p>AND</p> <p>Recognise that <u>their</u> correctly calculated value for L is the same as <u>the</u> correctly predicted value obtained by continuing the pattern</p> <p>ACCEPT Seeing their correctly calculated value for L and the correctly predicted value in the table being equal</p>
	<p style="text-align: center;">OR</p> <p>Correctly verify their described pattern or their rule (e.g. recursive rule or rule in terms of b and h)</p> <p>Ex: Verifying $L = 5n + 26$ $L = 5(5) + 26 = 61$</p> <p>Ex.: Verifying $L = \sqrt{b^2 + h^2}$ when $n=5$, $b=5$, $h=6$ $L = \sqrt{5^2 + 6^2} = \sqrt{61}$</p>		

Mark	1	2	3	4
	ACCEPT only if D1 is achieved	ACCEPT only if D2 is achieved	ACCEPT only if they have the general rule for L	ACCEPT only if they have the general rule for L
Justify (J) ACCEPT seeing anywhere in the response	Attempt to justify their general rule for L ACCEPT justification for their $(2n^2 + 2n + 1)$ provided it's quadratic Ex: Quadratic model and valid attempt to find coefficient using any method	Attempt to justify $(2n^2 + 2n + 1)$ algebraically. Ex: Quadratic model and find the correct values of coefficients using any method	Good attempt to justify the general rule for L geometrically using the rules for b and h into Pythagoras Showing the rules for b and h that could be substituted into Pythagoras Ex: Seeing $(L =) \sqrt{b^2 + h^2}$	Correctly justify the general rule for L geometrically using the rules for b and h into Pythagoras : Substituting the rules for b and h into Pythagoras with <u>correct simplification</u> leading to one of the two forms When their form of the general rule is $(L =) \sqrt{n^2 + (n + 1)^2}$
	OR	OR	AND	AND
	Weak attempt to justify their general rule for L Writing down Pythagoras theorem in terms of b and h . $(L =) \sqrt{b^2 + h^2}$ ACCEPT only if it is not their rule for L . ACCEPT writing down Pythagoras using values for a specific n provided the value is the same than the table. $\sqrt{25} = \sqrt{3^2 + 4^2}$	Attempt to justify their general rule for L geometrically with incorrect L or incorrect rules for b and h . Ex1: Seeing $(L =) b^2 + h^2$ AND Rules $b = n$ and $h = n + 1$ Ex2: Seeing $(L =) \sqrt{b^2 + h^2}$	Rules $b = n$ and $h = n + 1$ AND $(L =) \sqrt{n^2 + (n + 1)^2}$	When their form of the general rule is $(L =) \sqrt{2n^2 + 2n + 1}$
OR	AND			
Substitute at least two other values of n in their general rule for L or their $(2n^2 + 2n + 1)$ and say they are the same or hence the rule works WTTE	Rules $b = n$ and $h = n - 1$		Seeing $(L =) \sqrt{b^2 + h^2}$ AND Rules $b = n$ and $h = n + 1$ AND $(L =) \sqrt{n^2 + n^2 + 2n + 1}$	

NOTE	The following are considered errors in notation		
	1	2	3
	ACCEPT only if D1 achieved	ACCEPT only if they have the <u>general rule for L</u>	ACCEPT only if they have the <u>general rule for L</u>
Notation and terminology (N) Ignore additional incorrect patterns	Correctly describe a pattern for <u>L</u> in words <u>using correct terminology</u> Ex: The terms under the root form a quadratic The root of a quadratic What's under the root has a second difference of 4 The second difference between values squared is 4 ACCEPT radical or surd WTTE DO NOT ACCEPT a quadratic then "add" root DO NOT ACCEPT if the pattern is not accepted in D1	Correctly describe a pattern for <u>L</u> in words <u>using correct terminology</u> (see examples in N1) AND The notation of the general rule includes errors or not simplified or in words (see examples in N1)	Correctly describe a pattern for <u>L</u> in words <u>using correct terminology</u> (see examples in N1) AND Correct notation of the <u>general rule</u> for L in simplest form (see N2)
	<p style="text-align: center;">OR</p> The notation of the <u>general rule</u> includes errors or not simplified or in words. Ex: $y = \sqrt{2n^2 + 2n + 1}$ The rule for L is $\sqrt{2n^2 + 2n + 1}$ $L = \sqrt{n(n + 1) \times 2 + 1}$ $L = \sqrt{(2n^2 + 2n + 1)}$, $L = \sqrt{2n^2 + 2n + 1}$ L is the square root of $2n^2 + 2n + 1$ Under the root, it is the square of n plus the square of n + 1 ACCEPT () ^{1/2} instead of $\sqrt{\quad}$	<p style="text-align: center;">OR</p> Correct notation of the <u>general rule</u> for L in simplest form $L = \sqrt{n^2 + (n + 1)^2}$ OR $L = \sqrt{2n^2 + 2n + 1}$ ACCEPT $L = \sqrt{(2n^2 + 2n + 1)}$	
	<p style="text-align: center;">OR</p> Correct notation or <u>their</u> general rule for L. ACCEPT if not simplified DO NOT ACCEPT rules for L ² . DO NOT ACCEPT without the root $\sqrt{\quad}$ Ex : $L = \sqrt{2n^2 + 1}$, $L = \sqrt{n^2 + n^2 + n + 1}$, $L = \sqrt{b^2 + h^2}$	ACCEPT () ^{1/2} instead of $\sqrt{\quad}$ ACCEPT L _n or Ln or L(n)	

Mark	1	2	3
		ACCEPT only if they have a general rule for L or for their $(2n^2 + 2n + 1)$	ACCEPT only if they have <u>the</u> general rule for L
<p>Communication (L)</p> <p>Organisation and coherence</p> <p>Can be awarded even if there are errors</p> <p>For items: Describing pattern and writing rule can be considered an item even if D0 and N0 awarded</p>	<p>At least three from the following items are seen:</p> <ul style="list-style-type: none"> describe a pattern in words write a rule test their general rule or rule or recursive rule or pattern (at least T1) verify their general rule or rule or recursive rule or pattern (at least V1) justify their general rule or rule or recursive rule or pattern (at least J1) 	<p>At least four of the following items are seen:</p> <ul style="list-style-type: none"> describe a pattern in words write a general rule test their general rule (at least T1) verify their general rule (at least V1) justify their general rule (at least J1) <p>AND</p> <p>For coherence, they identify the processes correctly.</p> <p>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 substitute in their general rule value(s) of $n \leq 4$ only For verify: they say “verify” and they substitute in their general rule value(s) of $n \geq 5$ only For justify: They say “justify” and they write a justification <p>Note for coherence: If they say “test and verify” and they substitute in their general rule value(s) of $n \leq 4$ <u>followed by</u> value(s) of $n \geq 5$, consider it as only one identified process</p>	<p>The following two items must be seen :</p> <ul style="list-style-type: none"> write <u>the general rule for L</u> justify <u>the general rule</u> (at least J2) <p>AND</p> <p>At least two of the following items are seen:</p> <ul style="list-style-type: none"> describe a pattern or rule in words test <u>the general rule</u> (at least T1) verify <u>the general rule</u> (at least V1) <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 substitute in the general rule for A value(s) of $n \leq 4$ only For verify: they say “verify” and they substitute in the general rule for A value(s) of $n \geq 5$ only For justify: They say “justify” and they write a justification <p>Note for coherence: If they say “test and verify” and they substitute in the general rule value(s) of $n \leq 4$ <u>followed by</u> value(s) of $n \geq 5$, consider it as only one identified process</p>