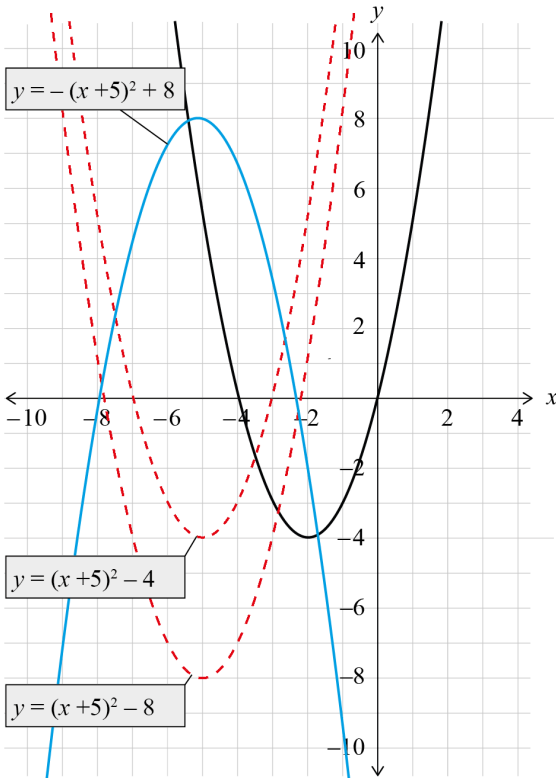**Assessment Schedule – 2019**

Mathematics and Statistics: Investigate relationships between tables, equations and graphs (91028)
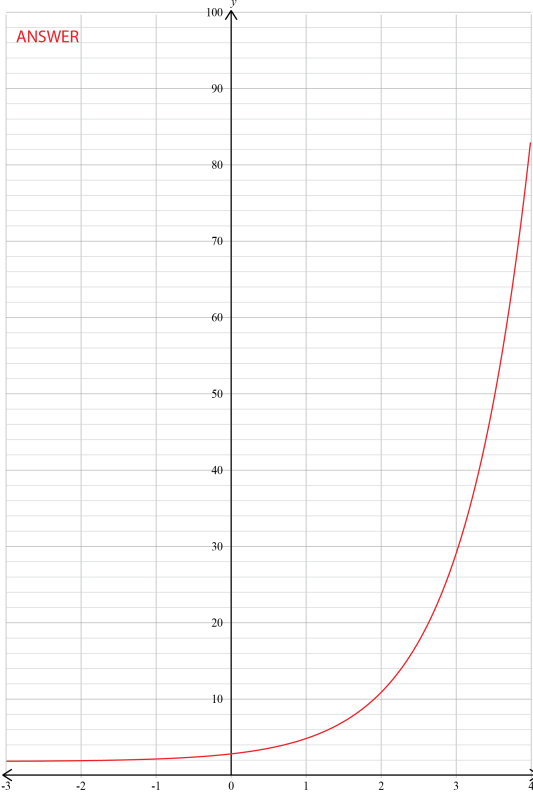
Evidence

Question ONE	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)(i)	$y = -3x - 5$ or equivalent.	Correct equation.		
(ii)	$y = (x + 2)^2 - 4$ OR $y = x(x + 4)$ OR $y = x^2 + 4x$	Correct equation.		
(iii)	$y = -(x + 5)^2 + 8$ OR $y = -(x + 3)(x + 7) + 4$ OR $y = -x^2 - 10x - 17$	ONE part of the transformation correct OR correctly drawn fully transformed graph.	TWO parts of the transformations correct.	Correct equation, including all THREE transformations or C.A.O.

(b)(i)	$x = 0$ so $h = 2$ metres. (Units not required.)	Correct answer.		
(ii)	$x = 8$ $h = 2$ into $h = -\dfrac{x}{2}(x-r)+2$ $2 = -\dfrac{8}{2}(8-r)+2$ $0 = 8 - r$ $r = 8$ Accept alternative non-algebraic justification.	Substitutes (8,2) into equation OR C.A.O.	Calculates r, with justification.	
(iii)	$x = 4$ into $h = -\dfrac{x}{2}(x-8)+2$ $h = -\dfrac{4}{2}(4-8)+2$ $h = 10$ metres. Or consistent with (ii). (Units not required.)	C.A.O.	Calculates height, with justification.	
(c)	• To make the roller coaster steeper, the enlargement factor would need to be increased from the current ½ . • To make it higher, you would add on a number higher than the current value of 2. • If we make r bigger, then this would make the graph / roller coaster higher and steeper. • Making the graph steeper will also make the graph taller / will alter the y-value of the maximum.	ONE valid statement.	ONE valid statement clearly connecting the equation to the steepness or height of the roller coaster.	TWO valid and consistent statements clearly outlining how the equation could represent a higher and / or steeper roller coaster.

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	ONE question attempted towards solution.	TWO questions attempted towards solution.	1u	2u	1r	2r	1t	2t

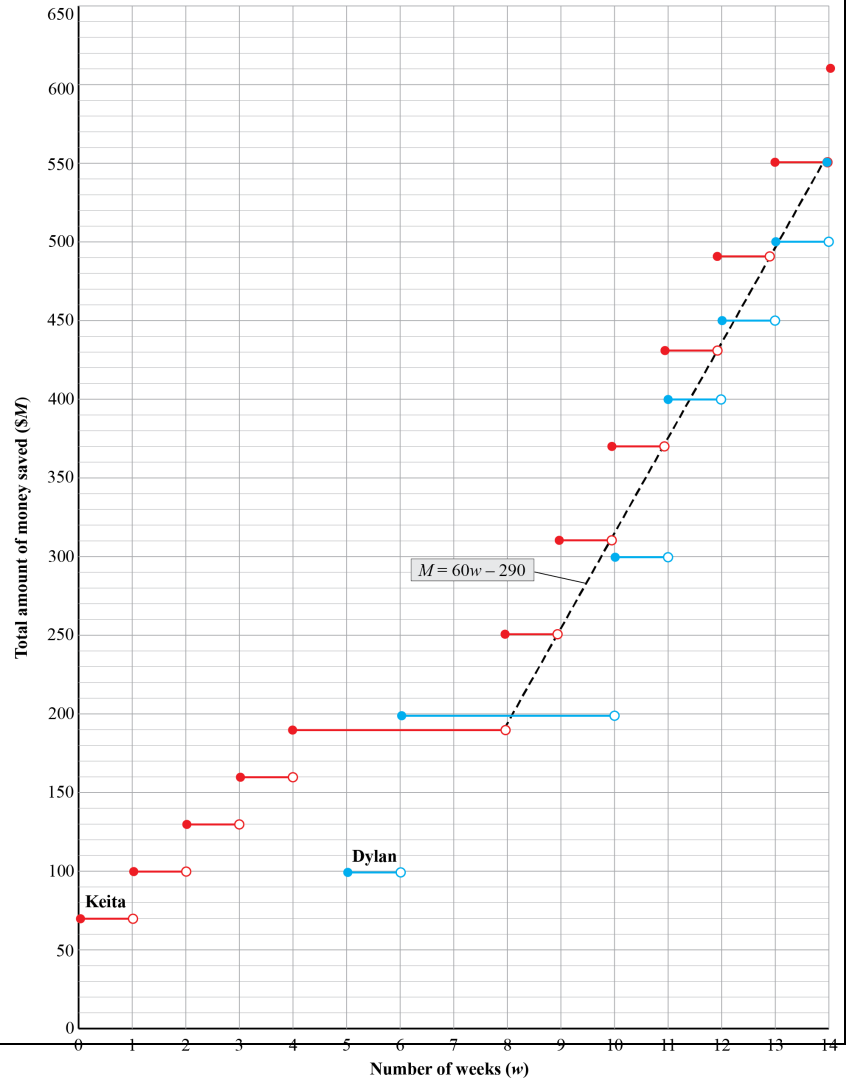| Question TWO	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	Correct graph. _(table of values)_ 	x	Y
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−3	2.037
−2	2.111
−1	2.333
0	3
1	5
2	11
3	29
4	83 | 	Correct shape and at least TWO points correct OR table of values constructed with at least THREE correct values.	Correct graph appropriate to the graph paper provided.	
(b)(i)	$A = 4 \times 2^d$ OR $A = 2^{d+2}$	Equation recognised as an exponential and involving base value of 2.	Correct equation.	
(ii)	• The y-intercept would stay at 4 (Also accept different y-intercepts (0,12) for the different type of bacteria). • The curve would become steeper. • The horizontal asymptote would stay the same (or equivalent wording). • Listing of table values for comparison. • Provides equation of new different bacteria $A = 3 \times 2^{d+2}$.	ONE valid non-trivial statement.	TWO valid non-trivial statements	TWO valid non-trivial statements AND equation of model of new bacteria OR THREE valid statements.

(iii)	Valid investigation, including prediction of area over time. As the number of days increases, the area decreases until there is hardly any area of bacteria remaining after about 35 days. $A = 512 \times 0.8^{d-7}$	ONE of: • table of values constructed with at least THREE correct values • graph attempted • valid comment regarding area of bacteria over time.	TWO of: • table of values constructed with at least THREE correct values • exponential graph attempted • valid comment regarding area of bacteria over time.	Correct and clear representation of the situation, supported with table and graph and equation AND valid comment regarding area of bacteria over time.

Days	Area
7	512
8	409.6
9	327.68
10	262.14
11	209.72
12	167.77

$A = 4 \times 2^d$

$A = 512 \times 0.8^{(d-7)}$

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	ONE question attempted towards solution.	TWO questions attempted towards solution.	1u	2u	1r	2r	1t	2t

Question THREE	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
(a)	Graph drawn.	First five points graphed correctly (can be a line, discrete points, or a step graph).		
(b)	From week 4 sections graphed correctly. Allow consistency from part (a)	One part graphed correctly.	Both parts graphed correctly.	Step graph with correct end point indicators.
(ii)	Either $M = 60w - 290$ (using the ○ dots) or $M = 60w - 230$ (using the ● dots) or $M = 60(w-7) + 190$ Accept either $y = 60x - 290$ or $y = 60x - 230$.	Gradient correct OR y-intercept correct.	Correct equation.	
(c)	Valid saving plan, using both a table and a graph. (Various solutions possible.)	ONE of: • correct table of values starting from week 4 or 5 • graph is correct • consistent graph from incorrect table.	Both table and graph correct.	Both table and graph are correct AND correct and clear valid representation and communication of the plan.

Possible table solution for Dylan:

w	Money earned	Money saved in bank
5	100	100
6	100	200
7	0 Family Visit	200
8	0 Family Visit	200
9	0 Family Visit	200
10	100	300
11	100	400
12	50	450
13	50	500
14	50	550

$M = 60w - 290$

Dylan

Keita

Total amount of money saved (M)

Number of weeks (w)

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	ONE question attempted towards solution.	TWO questions attempted towards solution.	1u	2u	1r	2r	1t	2t

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 14	15 – 18	19 – 24