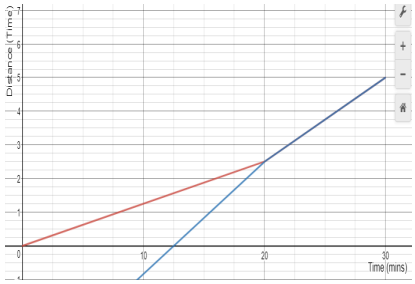
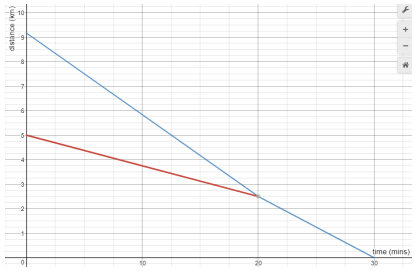
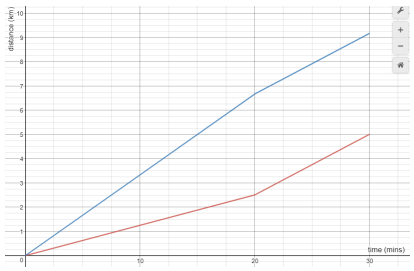
Assessment Schedule – 2018

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

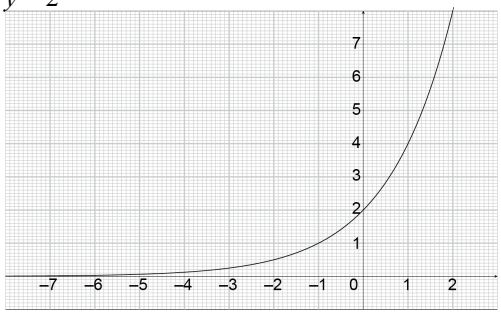
Evidence Statement

Q	Expected coverage	Achievement	Merit	Excellence
ONE (a)	$y = -0.75x + 6$	Correct equation.		
(b)(i)	James's average speed is $\frac{5}{40}$ $= 0.125$ km / min or 7.5 km / hr or 2.08 m / s	Correct calculation to find a speed. (Ignore units.)		

(ii)	 OR  OR  Their speed changes to 0.25 km / min. James's gradient prior to meeting at 20 mins was $\frac{5}{40}$ km / min. Emma's speed prior to meeting at 20 mins was $\frac{1}{3}$ km / min Accept negative variations.	James journey correct from home to the meeting point represented with time on the *x*-axis. OR Correct speed after meeting stated. OR A meeting point (20,2.5) shown on graph.	All of James's journey represented on a graph correctly. OR All THREE speeds correctly calculated and stated.	Both James's and Emma's journeys represented on the graph correctly.

(iii)	James: $y = –0.125x + 5$ Emma: $y = -\frac{1}{3}x + 9$ After they meet: $y = –0.125x + 7.55$ OR First 20 mins: James: $y = 0.125x$ Emma: $y = \frac{1}{3}x - 4\frac{1}{6}$ After they meet: $y = 0.25x - 2.5$ OR Emma: Before they meet: $y = \frac{1}{3}x$ Emma: After they meet: $y = \frac{1}{4}x + \frac{5}{3}$ Accept other correct variations	ONE equation stated correctly or consistently.	TWO equations stated correctly. OR TWO or THREE equations stated consistently.	ALL equations stated correctly.
(iv)	• James and Emma travel at 15 km / hr once they meet. • Emma is travelling at 20 km / hr before she meets James. • Emma and James meet 2.5 km from school 20 mins after they leave home. • Emma lives $9\frac{1}{6}$ km from school.	ONE valid statement made.	TWO valid statements made.	THREE valid statements made.

N1: One question attempted towards solution **N2: Two questions attempted towards solution**	**A3: 1u** **A4: 2u**	**M5: 1r** **M6: 2r**	**E7: 1t** **E8: 2t**

Q	Expected coverage	Achievement	Merit	Excellence
TWO (a)(i)	$y = 2^{(x+1)}$  	THREE points plotted on graph. OR THREE points correctly found in a table.	Correct graph.	
(ii)	$y = 2^{(x-2)} + 4$	−2 correct. OR +4 correct.	Correct equation.	
(b)(i)	Number of students by the 3rd day is 11. Number of students by the 4th day is 19. Number of additional students whose names were recorded on the 4th day is 8.	Number of additional students whose names were recorded on the 4th day found is 8. Also accept 4		
(ii)	Table formed and equation found x | Differences 2 | 2 3 | 4 4 | 8 5 | 16 n | $2^{(n-1)}$ On the nth day the number of students whose names were recorded is given by $y = 2^n + 3$ The day before the number of students recorded is $y = 2^{(n-1)} + 3$ Number of students recorded on any day is given by $m = (2^n + 3) - (2^{(n-1)} + 3)$ $= 2^n - 2^{n-1}$ $= 2^{(n-1)}(2 - 1)$ $= 2^{(n-1)}$	TWO other differences found in a graph or table. OR Expression given in terms of n for two consecutive days.	Expression given by subtracting $n-1$ term from nth term.	Correct equation found from table or graph. OR Correct equation found from table or graph.

<table>
<tr>
<td>(iii)</td>
<td>The maximum of the total number of students recorded because of the stomach bug will occur when $y = 2^n + 3 = 67$.
From the table or graph this occurs when $n = 6$.
Using the model for the decreasing number of students:
<table>
<tr><th>Days since number begins to decrease</th><th>No of students</th></tr>
<tr><td>1</td><td>25</td></tr>
<tr><td>2</td><td>24</td></tr>
<tr><td>3</td><td>21</td></tr>
<tr><td>4</td><td>16</td></tr>
<tr><td>5</td><td>9</td></tr>
<tr><td>6</td><td>0</td></tr>
</table>
6 days before the decrease.
Plus 6 days after the decrease.
Total of 12 days.</td>
<td>Identifies 67 recorded on the 6th day.
(Accept CAO of 6.)
OR
Begins a table or graph of after the numbers start to decrease (three points found or plotted).
OR
Identifying the additional number of days.
(Accept CAO of 6.)</td>
<td>Has a table or graph from $x = 1$ to $x = 6$ to find additional day of 6
OR
Solving the equation $-(x - 5)(x + 3) + 9 = 0$ to find additional day of 6.
OR
CAO of 12.</td>
<td>Correctly identifying the number of days the students go to the school nurse with the stomach bug with evidence of method involving equation or graphs or a table.</td>
</tr>
</table>

N1: One question attempted towards solution **N2: Two questions attempted towards solution**	**A3: 1u** **A4: 2u**	**M5: 1r** **M6: 2r**	**E7: 1t** **E8: 2t**

<table>
<tr><th>Q</th><th>Expected coverage</th><th>Achievement</th><th>Merit</th><th>Excellence</th></tr>
<tr><td>THREE
(a)</td><td>$y = (x – 5)(x + 1)$
$y = (x – 2)^2 – 9$
$y = x^2 – 4x – 5$</td><td>Correct equation.</td><td></td><td></td></tr>
<tr><td>(b)(i)</td><td>Table of values correct
<table><tr><th>Diam</th><th>Radius</th><th>Area</th></tr><tr><td>2</td><td>1</td><td>3</td></tr><tr><td>4</td><td>2</td><td>12</td></tr><tr><td>6</td><td>3</td><td>27</td></tr><tr><td>8</td><td>4</td><td>48</td></tr></table></td><td rowspan="2">Calculates TWO valid areas correctly.

OR

Identifies ONE feature of the graph.
OR
Calculated with diameter rather than radius.
For either table or graph.</td><td rowspan="2">Correct table or graph from x = 1 to $x = 4$.

OR

Identifies
TWO features of the graph
OR
TWO of the evidence statements for achievement.</td><td rowspan="2">Correct table or graph from $x = 1$ to $x = 4$.
Clearly indicates on graph or table or in discussion that radius must be between 1 and 4.

AND
Identifies TWO features of the graph.</td></tr>
<tr><td>(ii)</td><td>Graph correct consistent with table of values.
Graph of a parabola $y = 3x^2$
From its minimum value at (1,3) through to its maximum value of (4,48).
As the radius increases so does the area.</td></tr>
<tr><td>(iii)</td><td><table><tr><th>Radius</th><th>Red Area</th><th>Blue Area</th><th>sum</th></tr><tr><td>1</td><td>3</td><td>48</td><td>51</td></tr><tr><td>2</td><td>12</td><td>27</td><td>39</td></tr><tr><td>3</td><td>27</td><td>12</td><td>39</td></tr><tr><td>4</td><td>48</td><td>3</td><td>51</td></tr></table>OR
Graph correct consistent with table of values.</td><td>Calculates one area sum correctly.</td><td>Correct table, graph or equation from $x = 1$ to $x = 4$.</td><td>Gives the equation of the total area = $3(2r^2 – 10r + 25)$.
$A = 6r^2 – 30r + 75$
$= 6(r – 2.5)^2 + 37.5$
where r is the radius of the red circle.</td></tr>
<tr><td>(iv)</td><td>If the sum of the radii is n, and r is the radius of one circle
Area = $3(r^2 + (n – r)^2)$
$= 3(r^2 + n^2 – 2nr + r^2)$
$= 3(2r^2 – 2nr + n^2)$
Accept Area = $3r^2 + 3(n – r)^2$
$A = 6r^2 – 6nr + 3n^2$</td><td>Relationships stated for the area of ONE circle in terms of n and r.</td><td>Relationships stated for the area of BOTH circles in terms of n and r.</td><td>Generalised formula.</td></tr>
</table>

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Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 13	14 – 18	19 – 24