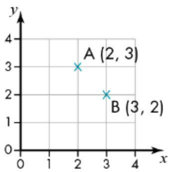
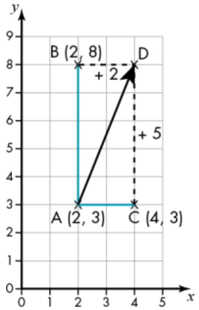
Guidance on the use of codes for this mark scheme	
M	Method mark
A	Accuracy mark
B	Mark awarded independent of method
oe	Or equivalent
ft	Follow through
cao	Correct answer only

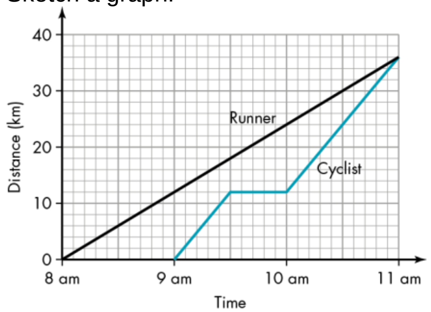
Question	Working	Answer	Mark	AO	Notes	Grade
1 **a** **b** **c** **d** **e** **f**		$D = 7w$ $C = pn$ $Y = \frac{m}{12}$ $P = 100D$ $A = lw$ $P = nl$	B1 B1 B1 B1 B1 B1 **6**	3	B1 oe B1 oe B1 oe B1 oe B1 oe B1 oe	B
2 **a** **b**		$C = 80h$ $C = 80h + 50$	B1 B1 **2**	3	B1 cao B1 cao	B
3 **a** **b**		No To be able to work out what the number thought of, you need to know the answer. Yes Because I can write an equation from the information and solve it. $x + 15 = 26$ so $x = 11$	B1 B1 B1 **3**	2	B1 for No and a reason B1 for Yes and a reason B1 for showing the equation and the solution	B
4		For example, in the rule pay =15 × hours. As hours varies, so will the calculation to calculate pay. Yes, there will be others, there will be hundreds of different possible calculations.	B1 B1 B1 **3**	2	B1 for an explanation of why it is possible for more than one calculation to match with the same rule B1 for using an example to go alongside the explanation B1 for stating Yes there will be more, and qualifying this	B
5		We use (x, y) to describe the position, where the first part, x, is along the x-axis. Then the second part, y, is along the y-axis. Example, e.g. The convention for point A is (2, 3). If we didn't have the convention then we could use (3, 2) but that could be confused now with point B.	B1 B1 **2**	2	B1 for clear explanation B1 for a clear example illustrated with a sketch graph	B
6 **a** **b**		Yes For example we could write as $2x = y - 6$ Rearranging an equation. Yes The first equation has been divided by 2 throughout.	B1 B1 B1 **3**	2	B1 for Yes with an example to illustrate B1 for correct language B1 for yes and a reason	B

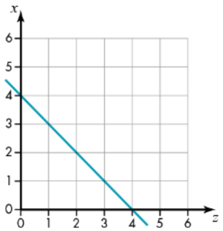
7		Substitute $x = 3$ in the equation to give $y = 3 + 2 = 5$ so when $x = 3$, $y = 5$, hence (2, 6) is not on the line **or** The constant term is 2 so the line crosses the y-axis at the point (0, 2). Then for every point across it goes up 1 (gradient is 1) so by the time $x = 3$, y will = 5.	B1	2	B1 for a clear example	B
			1			
8 a		Is the sum of the cost of the CDs plus the coffee and the taxi less than £70?	B1	3	B1 for good question	B
b	Money spent = 2 × £14.99 + 2 × £2.50 + (12 × £0.80 + £2.50) = £29.98 + £5 + (£9.60 + £2.50) = £34.98 + £12.10 = £47.08 Money left = £70 – £47.08 = £22.92	Money left = £70 – money spent This is less than £70 so she can afford the taxi.	B1 M1 A1 B1		B1 for a correct formula that could be used M1 for the process of calculating how much has been spent A1 cao B1 for clear, complete solution with correct answer	
			5			
9		Look for the words that will represent variables and if possible, use appropriate letters to represent those variables. e.g. Area = height multiplied by breadth Formula could be $A = hb$	B1 B1	2	B1 for an explanation of how to link a formula expressed in words to a formula expressed algebraically B1 if a suitable example has been included	B
			2			
10 a		$2n$ means 2 times n while $n + 2$ means add 2 to n.	B1	2	B1 for clear explanation	B
b		$3(c + 5)$ means add 5 to c and then multiply the answer by 3, $3c + 5$ means multiply c by 3 and then add 5 to the answer.	B1		B1 for clear explanation	
c		n^2 means multiply n by itself, $2n$ means multiply n by 2.	B1		B1 for clear explanation	
			3			
11	Perimeter = $2 \times l + 2 \times 3l$ $= 2l + 6l = 8l$ So $8l = 48$ $l = 6$ cm Area = length × width $= l \times 3l$ = 6 + 3 × 6 = 6 + 18 = 24 cm^2	24 cm^2	M1 A1 M1 A1	3	M1 for using perimeter formula A1 cao M1 for area formula A1 ft	B
			4			

12	$\frac{(32-24)}{4} = 8 \div 4 = 2$ $24 - 2 \times 4 = 24 - 8$ $= 16$	$C = 16$	M1 A1 **2**	3	M1 for the correct process of working out C A1 cao	B
13		Plot the three points and draw the two sides. You can then complete the missing sides of the rectangle to complete the shape as shown in the diagram. Hence find the fourth vertex as in the diagram as (4, 8).	B1 B1 B1 **3**	2 3	B1 for clear explanation B1 for including a sketch alongside the explanation B1 for correctly indicating (4, 8)	B
14	Let the smaller number be n, then the next even number will be $(n + 2)$. $n + (n + 2) = 50$ $2n + 2 = 50$ $2n = 48$ $n = 24$ The lower number will be 24 so the larger number will be 26.	26	B1 M1 A1 A1 **4**	2 3	B1 for stating starting points M1 for method of setting up the equation A1 for solving for the first number A1 cao	B
15		Example 1 As $24 = 6 \times 4$ $= 6 \times 2^2$ $t = ba^2$ Will give 24 when $b = 6$ and $a = 2$ Example 2 As $24 = 3 \times 8$ $= 3 \times (2 + 6)$ $t = 3(a + b)$ Will give 24 when $a = 2$ and $b = 6$	B1 B1 B1 B1 **4**	2	B1 for first formula that works B1 for clear explanation of how it was found B1 for second formula that works B1 for clear explanation of how it was found	M

16 **a**		$5(c + 4) = 5c + 20$ Feedback 'Don't forget to multiply out both terms in the brackets.'	M1 A1	2	M1 for correctly expanding the brackets A1 for suitable feedback	M
b		$6(t – 2) = 6t – 12$ Feedback 'Don't forget 6(…..) means multiply both terms by 6.'	M1 A1		M1 for correctly expanding the brackets A1 for suitable feedback	
c		$–3(4 – s) = –12 + 3s$ Feedback 'Don't forget -3(……) means multiply both terms by 6 and a minus × minus = …	M1 A1		M1 for correctly expanding the brackets A1 for suitable feedback	
d		$15 – (n – 4) = 15– n + 4 = 15 + 4 – n$ $= 19 – n$ Feedback 'Don't forget - $(n – 4)$ means multiply each term in the bracket by – 1 and that the – in the bracket belongs to the 4 to make it – 4.'	M1 A1 **8**		M1 for correctly expanding the brackets A1 for suitable feedback	
17		Any equation in the form $y = mx + 1$ will pass through (0, 1) So $y = 2x + 1$ $y = 3x + 1$ will both pass through (0, 1)	B1 B1 B1 **3**	2	B1 for clear explanation B1 for first correct equation B1 for second correct equation	M
18 **a**		A correct example e.g. $2(z – 3) + 5q$	B1	2	B1 for an expression that is equivalent to $4z + 5q – 6$	M
b		A correct example e.g. $\frac{(10x-4y)}{2}$	B1 **2**		B1 for an expression that simplifies to $5x – 2y$	
19 **a**		$\begin{array}{\|c\|c\|c\|}\hline x & 12x & 2x \\ \hline 7x & & 5x \\ \hline 8x & 10x & -2x \\ \hline\end{array}$	B4	3	B1 for each correct entry in the table	M
b		Own example that works.	B1 5		B1 for their own correct example that works	

20	$Z = 3A$ $Z = A + 18$ So $3A = A + 18$ $2A = 18$ $A = 9$ Substitute $A = 9$ into $Z = A + 18$ to give $Z = 27$ Check $3 \times 9 = 27$ which is correct.	Zoe has 27 and Alyssa has 9.	B1 B1 M1 A1 M1 A1 6	3	B1 for setting up first equation B1 for setting up second equation M1 for method of combining equations to eliminate one variable A1 for first correct answer found M1 for substituting first answer A1 for correct second answer	M
21	$n + n + 20 = 2n + 20$ $2n + 20 = 90$ $2n = 70$ $n = 35$ So 35 on first shelf and 35 + 20 = 55 on second. Need 90 ÷3 = 30 on each shelf.	So need to move 5 from first shelf onto third shelf and 25 from second to third shelf.	B1 M1 A1 A1 B1 5	2 3	B1 for setting the initial expression M1 for setting this up to equal 90 A1 for first shelf as 35 A1 for second shelf as 55 B1 for correct process of sorting the books out to 30 on each shelf	M
22		Select x values less than 0 and substitute into the equation.	B1 **1**	2	B1 for clear explanation	M
23 a		$y = 3$	B1	2	B1 cao	M
b	Using $y = mx + c$ and $m = \frac{\text{change in } y}{\text{change in } x}$ $m = \frac{6-(-4)}{3-(-2)} = \frac{6+4}{3+2}$ $= \frac{10}{5} = 2$ Giving $y = 2x + c$ You know the point (1, 2) is on the line, so substitute into $y = 2x + c$. $2 = 2 \times 1 + c$ so $c = 0$. So the equation of the line is $y = 2x$.	$y = 2x$	M1 M1 A1		M1 for correct process of finding gradient in using $y = mx + c$ M1 for correct process to find c A1 for $y = 2x$	
c		Use this to find three more points in the third quadrant, e.g. (–1, –2), (–3, –6), (–4, –8)	M1 A1 **6**		M1 for correctly only using negative values of x A1 for three correct coordinates	

24		Since $y = 2x + 2$ $y = 2(x + 1)$ Hence for any integer value of x, y will be an even number.	B1 **1**	2	B1 for clear explanation	M
25	nth term of first sequence is $6n - 1$ nth term of second sequence is $3n - 2$ So for a common term: $6n - 1 = 3n - 2$ $3n = -1$ So n is not a whole number. And hence there is no term in both sequences.	No	B1 B1 M1 B1 A1 **5**	2 3	B1 for nth term of first sequence B1 for nth term of second sequence M1 for method of putting both nth terms equal to each other B1 correctly finding n to be non-integer A1 for No alongside clear solution	M
26 a **b**	D (5, 1) Area of trapezium $= \frac{1}{2} \times (4 + 10) \times 5$ $= \frac{1}{2} \times 14 \times 5$ 35 cm^2	(5, 1) 35 cm^2	B1 M1 A1 **3**	3	B1 cao M1 for correct method in finding area of trapezium A1 cao	M
27	Sketch a graph:  	11 am	B1 B1 B1 B1 **4**	3	B1 for showing runner on graph or explaining B1 for showing cyclist on graph or explaining B1 for showing where the two lines meet on graph or explaining B1 cao	M
28	100, 96, 92, 88, 84, 80, 76, 72, 68, 64, 60, 56, 52, 48, 44, 40, 36, 32, 28, 24, 20, 16, 12, 8, 4 2, 8, 14, 20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98 Those in common 8, 20, 32, 44, 56, 68, 80, 92	8, 20, 32, 44, 56, 68, 80, 92	M1 M1 A1 **3**	3	M1 for process of accounting for first sequence M1 for process of accounting for second sequence A1 for all 8 correct terms	M

29	Left hand graph is $x + y = 5$ Right hand graph is $y = z + 1$ Substitute y into first equation $x + z + 1 = 5$ $x + z = 4$		B1 B1 M1 A1 B2 **6**	3	B1 first graph equation B1 second graph equation M1 substituting to eliminate y A1 cao B1 for graph drawn with x on vertical axis. Allow x on horizontal axis B1 for $x + z = 4$ drawn correctly	M
30 a **b** **c**	Distance = 2 × 25 km = 50 km 50 km ÷ 8 hours= 6.25 km per hour. e.g. What is Philip's highest speed? At what times did Philip have a rest? A two part question, getting more difficult. And a mark scheme.	 6.25 km/h	M1 A1 B1 B2 **5**	2 3	M1 for division of total distance by time A1 cao B1 for an example of a questions that could be asked about this situation B1 for a two part question using the graph with increase in difficulty B1 for suitable mark scheme	M
31		Own story Sketch graph Question for the graph	B1 B1 B1 **3**	2	B1 for suitable story B1 for matching sketch graph B1 for suitable question	M
32 a i **ii** **b** **c**	35 × 8 + 10 35 × 14 $35n + 10 = 220$ $35n = 210$ $n = \frac{210}{35} = 6$ (7 × 35) + 20 = £265 (7 × 35) = 10 = £255	£290 £490 6 sessions £10 more	M1 A1 M1 A1 M1 A1 M1 A1 **8**	3	M1 for the correct method A1 cao M1 for correct method A1 cao M1 for process of sorting which rule to use A1 cao M1 for finding suitable calculations to find the difference A1 cao	M
33		$10 + 15 = 25 = 5^2$ $15 + 21 = 36 = 6^2$	B4 **4**		B1 for each correct part of the number pattern provided correct signs and symbols are present	M

34 a **b** **c** **d / e**		Triangle drawn 36 cm 48 cm 63 139 143 806 710 cm	B1 B1 B1 B1 **4**	3	B1 for diagram drawn for all shapes B1 cao B1 cao B1 cao	M
35 a **b**		Same difference of 2.4 but starting value is different. What are the differences What is the starting value.	B1 B1 B1 B1 **4**	2	B1 cao B1 cao B1 cao B1 cao	M
36 a **b**		Multiple of 4 No because we need to know the starting value as well.	B1 B1 B1 **3**	2	B1 cao B1 for no B1 for reason alongside no	M
37		Boys Get a red egg each from each of 4 girls: 4 red One green egg each other: 2 green Girls Get a blue egg from each of the 2 boys: 2 blue One yellow egg from each other will be 3 yellow eggs each: 12 yellow	B1 B1 B1 B1 B1 **5**	3	B1 for explanation of 4 red B1 for explanation of 2 green B1 for explanation of 2 blue B1 for explanation of 12 yellow B1 for complete clear solution	M
38	Example $2n^2 = 2 \times (3^2) = 2 \times 9 = 18$ $(2 \times 3)^2 = 6 \times 6 = 36$	Using BIDMAS for $2n^2$ tells you to calculate the power first. BIDMAS for $(2n)^2$ tells you that you do the calculation inside the bracket first.	A1 **1**	2	A1 for an explanation. An example could be given to support the argument	M

39		A letter, say f, stands for an unknown if it is in an equation such as $3f + 2 = 14$. Then $f = 4$ is the only number that satisfies this equation. A letter stands for an variable if it is part of an equation that has more than two letters. E.g. $A = \pi r^2$, where both A and r are variables that will be different for different values of A or r.	B1 B1 B1 B1 **4**	2	B1 for clear explanation B1 for an example alongside the explanation B1 for a clear explanation B1 for an example alongside the explanation	M
40 a		**ii**, **v** and **vi** might be difficult as they all involve squaring a term. The classic error made in **ii** will be to calculate half of at and then to square that. The same error can be found in **vi** where $2\pi r$ can be calculated first and then squared.	B2	2	B1 for identifying some examples with a valid reason B1 for clear identification and explanation of classic errors	M
b		**ii** and **vi** are also difficult to rearrange as they involve a quadratic element and it's not easy to make each variable the subject of the formula. Classic errors in rearranging $s = ut + \frac{1}{2}at^2$ to make *a* the subject include: Incorrect sign when changing sides, e.g. $s + ut = \frac{1}{2}at^2$ Incorrect removal of fraction e.g. $\frac{1}{2}(s + t) = at^2$	B2 **4**		B1 for identifying some examples with a valid reason B1 for clear identification and explanation of classic errors	

41		Start with numbers that work $\frac{(6-1)}{2} = 2.5$ So $z = \frac{(s-1)}{t}$ will satisfy the conditions. Start with a formula say $z = \frac{(3s-4t+x)}{2}$ Substitute $z = 2.5$, $s = 6$, $t = 2$ to find x. $5 = 18 - 8 + x$. $x = -5$ $z = \frac{(3s-4t-5)}{2}$ satisfies the conditions.	M1 A1 M1 A1 B1 **5**	2 3	M1 for first method, e.g. starting with numbers A1 for an example that works M1 for second method, e.g. starting with a formula A1 for an example that works B1 for clear complete solution showing two different methods and two examples	M
42		$\frac{(2n+6)}{2}$ $= \frac{2(n+3)}{2} = n + 3$	M1 A1 **2**	2	M1 for factorising A1 for any correct expression	M
43		Let base length be b, then height will be $3b$ Area of triangle = $\frac{1}{2}$ × base × height $= \frac{1}{2} \times b \times 3b$ $= \frac{3}{2}b^2$ Where $A = 6$ $\frac{1}{2}b^2 = 6$ $b^2 = 2 \times \frac{6}{3} = 4$ $b = 2$ so height is 3 × 2 which is 6 cm.	B1 B1 B1 M1 A1 A1 **6**	3	B1 for stating variables B1 for stating triangle formula B1 for correct expression M1 for equating 6 with found expression A1 for $b = 2$ A1 for 6 cm	M

<table>
<tr><td>44 a</td><td></td><td>You could use trial and improvement or a graph to help you decide where to start.</td><td>B1</td><td>2</td><td>B1 for explanation of suitable methods, could also be graphs</td><td>H</td></tr>
<tr><td>b</td><td>
<table>
<tr><td>x</td><td>x^3</td><td>$x + x^3$</td><td>Too...</td></tr>
<tr><td>1</td><td>1</td><td>2</td><td>small</td></tr>
<tr><td>2</td><td>8</td><td>10</td><td>small</td></tr>
<tr><td>3</td><td>27</td><td>30</td><td>big</td></tr>
<tr><td>2.5</td><td>15.63</td><td>18.13</td><td>small</td></tr>
<tr><td>2.6</td><td>17.58</td><td>20.18</td><td>big</td></tr>
<tr><td>2.55</td><td>16.58</td><td>19.13</td><td>small</td></tr>
</table>
<table>
<tr><td>x</td><td>$x + 2$</td><td>$x(x + 2)$</td><td>Too...</td></tr>
<tr><td>7</td><td>9</td><td>63</td><td>small</td></tr>
<tr><td>8</td><td>10</td><td>80</td><td>big</td></tr>
<tr><td>7.5</td><td>9.5</td><td>71.25</td><td>big</td></tr>
<tr><td>7.3</td><td>9.3</td><td>67.89</td><td>exact</td></tr>
</table>
</td><td>Use trial and improvement to solve both problems.

Number is 2.6

Width is 7.3 cm</td><td>M1
M2

A1
M2

A1
8</td><td></td><td>M1 for using their suggested method(s)
M1 for finding the range including the solution
M1 for process of finding which of the 1 dp trials is closest

A1 for 2.6 or more accurate

M1 for finding the range including the solution
M1 for process of finding which of the 1 dp trials is closest

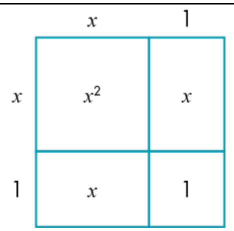
A1 cao</td><td></td></tr>
<tr><td>45 a</td><td></td><td>‘I think of a number and double it’ just has an expression of $2x$ where x is the number I thought of – still unknown at the moment.
‘I think of a number and double it – the answer is 12’ has a solution that I know is 6.</td><td>B1</td><td>2</td><td>B1 for clear explanation of the difference</td><td>H</td></tr>
<tr><td>b i</td><td></td><td>One</td><td>B1</td><td></td><td>B1 cao</td><td></td></tr>
<tr><td>ii</td><td></td><td>e.g. $10 = p + 3$</td><td>B1</td><td></td><td>B1 for a correct example</td><td></td></tr>
<tr><td>iii</td><td></td><td>Because each solution is $p = 7$</td><td>B1
4</td><td></td><td>B1 for a clear explanation</td><td></td></tr>
</table>

<table>
<tr><td>46</td><td>Looking at total counters needed for each step, he uses:
Step 1: 6 counters
Step 2: 12 counters
Step 3: 18 counters
Step 4: 24 counters
Step n: $6n$ counters

Adding how many counters he needs in total:
Step 1: 6 counters
Step 2: 18 counters
Step 3: 36 counters
Step 4: 60 counters

Looking at the pattern suggests products being involved, I see that this pattern can be written as
Step 1: 3 × 1 × 2 = 6
Step 2: 3 × 2 × 3 = 18
Step 3: 3 × 3 × 4 = 36
Step 4: 3 × 4 × 5 = 60
Step n: $3n(n + 1)$

I need to find a value for n where this total is first over 1000
Use trial and improvement
<table>
<tr><td>n</td><td>$n + 1$</td><td>$3n(n + 1)$</td><td>Too…</td></tr>
<tr><td>10</td><td>11</td><td>330</td><td>small</td></tr>
<tr><td>20</td><td>21</td><td>1260</td><td>big</td></tr>
<tr><td>15</td><td>16</td><td>720</td><td>small</td></tr>
<tr><td>17</td><td>18</td><td>918</td><td>small</td></tr>
<tr><td>18</td><td>19</td><td>1026</td><td>big</td></tr>
</table></td><td>Harry will run out of counters while trying to complete step 18.</td><td>M1
A1
M1
M1
B1
B1
M1
A1
8</td><td>3</td><td>M1 for the process of finding how many counters needed for each step
A1 for $6n$
M1 for the process of finding the total number of counters used by each step
M1 for the process of looking to generalise this pattern
B1 for the generalisation
B1 for the explanation of what he needed to do.
M1 for a suitable process of finding which step he would get to
A1 cao</td><td>H</td></tr>
<tr><td>47</td><td></td><td>No. All the terms will be even.</td><td>B1
B1
2</td><td>2</td><td>B1 for no
B1 for clear explanation</td><td>H</td></tr>
</table>

48	$H = 1.10E$ $E = C - 50$ $D = \frac{2}{3}E$ $C = 500$ Charles is in the next round Substitute $C = 500$ into each equation: $E = C - 50$ $E = 450$ Eliza is in the next round $D = \frac{2}{3} \times 450 = 300$ Denise will not be in the next round $H = 450 \times 1.10$ $= 495$ Hussein will be in the next round.	There will be 3 candidates in the next round.	B1 M1 A1 M1 A1 M1 A1 B1 **8**	3	B1 for setting up all the equations from the given data M1 for substituting $C = 500$ A1 for $E = 450$ and staying in next round M1 for calculating D A1 for $D = 300$ and not being in the next round M1 for calculating H A1 for 495 and being in next round B1 for stating 3 candidates in next round	H
49	 $(x + 1)^2 = x^2 + x + x + 1$	$(x + 1)^2 = x^2 + 2x + 1$ As required.	B2 B1 **3**	2	B1 for showing the x^2 in the correct place B1 for correctly showing x, x and 1 B1 for clearly showing the required result from the diagram	H

<table>
<tr>
<td>50 a

b

c

d

e</td>
<td>1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1

Looking at the diagonal rows:
The first diagonal row contains only 1s.
The second diagonal consists of all counting numbers: 1, 2, 3, 4, 5, etc.
The third row consists of the triangle numbers: 1, 3, 6, 10, 15, etc.

Triangle numbers

1, 2, 4, 8, 16, 32 ….

Multiplying by 2 each time, the nth term will be 2^{n-1}</td>
<td></td>
<td>B1

B3

B1

B1

B1
7</td>
<td>2
3</td>
<td>B1 for correct next three rows

B1 for first pattern
B1 for second pattern
B1 for third pattern

B1 for triangle numbers

B1 for correct sequence

B1 for clear explanation</td>
<td>H</td>
</tr>
<tr>
<td>51</td>
<td>$6(x - c) = 5x - 4$
$6x - 6c = 5x - 4$
$x = 6c - 4$
$6c$ is always even as even × odd/even = even
4 is even
So x must be even as even – even = even</td>
<td></td>
<td>M1

A1
B1

3</td>
<td>2</td>
<td>M1 for expanding the bracket

A1 for x as subject
B1 for clear explanation</td>
<td>H</td>
</tr>
<tr>
<td>52</td>
<td colspan="2">
<table>
<tr><td>n</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>$\frac{n+1}{2n+1}$</td><td>$\frac{2}{3}$</td><td>$\frac{3}{5}$</td><td>$\frac{4}{7}$</td><td>$\frac{5}{9}$</td><td>$\frac{6}{11}$</td><td>$\frac{7}{13}$</td><td>$\frac{8}{15}$</td><td>$\frac{9}{17}$</td></tr>
<tr><td></td><td>$0.6\dot{6}$</td><td>0.6</td><td>$0.\dot{5}7142\dot{8}$</td><td>$0.5\dot{5}$</td><td>$0.\dot{5}\dot{4}$</td><td>$0.\dot{5}3846\dot{1}$</td><td>$0.53\dot{3}$</td><td>$0.\dot{5}294117\dot{6}$</td></tr>
</table>
Only $\frac{3}{5}$ is a terminating decimal.</td>
<td>B1

B1

B1
3</td>
<td>2</td>
<td>B1 for showing the pattern of fractions

B1 for showing all the decimals

B1 for clear explanation</td>
<td>H</td>
</tr>
<tr>
<td>53 a
b
c
d
e
f
g
h</td>
<td></td>
<td>even
odd
even
even
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even
odd
even</td>
<td>B1
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8</td>
<td>2</td>
<td>B1 cao
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B1 cao
B1 cao
B1 cao</td>
<td>H</td>
</tr>
</table>

54 a		$t = \frac{6}{n}$: Graph B One person will take a long time, many people will take a short time.	B2 B1	2 3	B1 for correct equation B1 for correct graph B1 for good reason for choice	H
b		$s = -4.9t^2 + 40t + 80$: Graph D This is a quadratic graph and it shows the value 80 when t is 0, the height of the cliff.	B2 B1		B1 for correct equation B1 for correct graph B1 for good reason for choice	
c		$y = 3x + 320$: Graph A This will be a linear graph and this graph also crosses the vertical axis at (320, 0) showing his starting pay before selling any items.	B2 B1		B1 for correct equation B1 for correct graph B1 for good reason for choice	
d		$x^2 + 72x - 225 = 0$: Graph C The area from the dimensions will create a quadratic graph which moves further and further into the first quadrant.	B2 B1		B1 for correct equation B1 for correct graph B1 for good reason for choice	
			12			
55		**c** and **d** can be difficult because they contain minus signs and this is a point where errors are made, combining minus signs. In substituting $x = -3$ into $t = -2(3 - x)$, a classic error is to assume 3 – –3 is 0. In substituting $x = -3$ into $z = \frac{-2(x+2)}{x}$, a classic error is to give a negative divided by a negative a negative answer. A suggestion to avoid these errors is to remember that when multiplying or dividing with positive and negative numbers, same signs means positive, different signs means negative.	B1 B2 B1	2	B1 for identifying some examples with a valid reason B1 for clear identification of one classic error with one equation B1 for another classic error B1 for a satisfactory suggestion	H
			4			

56		The similarities are that both have an equals sign and both require the manipulation of terms. The difference is that in solving an equation you end up with a numerical answer, but in rearranging you still have a formula.	B1 B1 **2**	2	B1 for clear explanation of similarities B1 for clear explanation of differences	H
57 a		The two straight-line graphs will be parallel, with the same gradient of 2. $y = 2x$ crosses the y-axis at the origin and $y = 2x + 6$ crosses the y-axis at $y = 6$	B2	2	B1 for explanation of parallel B1 for explanation containing points of intersection of axes	H
b		The two straight-line graphs will be parallel, with the same gradient of 1. $y = x + 5$ crosses the y-axis at $y = 5$, and $y = x - 6$ crosses the y-axis at $y = -6$	B2		B1 for explanation of parallel B1 for explanation containing points of intersection of axes	
c		The two straight-line graphs will cross each other at $(\frac{11}{8}, \frac{1}{2})$ and each one is a reflection of the other in a vertical mirror line.	B2		B1 for explanation containing point of intersection B1 for explanation of symmetry	
d		The two straight-line graphs will both cross the y-axis at the origin, one with gradient 2, another with a gradient of $\frac{1}{2}$.	B2 **8**		B1 for explanation of passing through origin B1 for explanation about gradient	