

**Higher GCSE Mathematics Revision Pack****ALGEBRA – CALC**

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**Q11.** Solve the simultaneous equations

$$3x + 4y = 7$$

$$5x - 2y = 16.$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total 3 marks)**

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**Q12.** Solve  $x^2 - 4x - 45 = 0$ .

$$\dots\dots\dots$$

**(3)**

(b) Solve  $3x^2 + 7x - 13 = 0$

Give your solutions correct to 2 decimal places.

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots$$

**(3)**

**(Total 6 marks)**

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**Q8.** Solve the simultaneous equations

$$3x + 2y = 11$$

$$2x - 5y = 20$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

**(Total 4 marks)**

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- Q2.** A bag contains only red counters, blue counters, green counters and yellow counters.  
Rachel is going to take at random a counter from the bag.

The table shows each of the probabilities that Rachel will take a red counter or a blue counter or a green counter or a yellow counter.

Colour	Red	Blue	Green	Yellow
Probability	0.15	$2x$	$x$	0.1

- (a) Work out the probability that Rachel will take a green counter.

.....

(2)

Rachel says that there are exactly 9 blue counters in the bag.  
Rachel is wrong.

- (b) Explain why there cannot be exactly 9 blue counters in the bag.

.....

.....

(1)

(Total 3 marks)

- Q3.** Mary plays a game of throwing a ball at a target.

The table shows information about the probability of each possible score.

Score	0	1	2	3	4	5
Probability	0.09	$x$	$3x$	0.16	0.21	0.30

Mary is 3 times as likely to score 2 points than to score 1 point.

- (a) Work out the value of  $x$ .

.....

(3)

Mary plays the game twice.

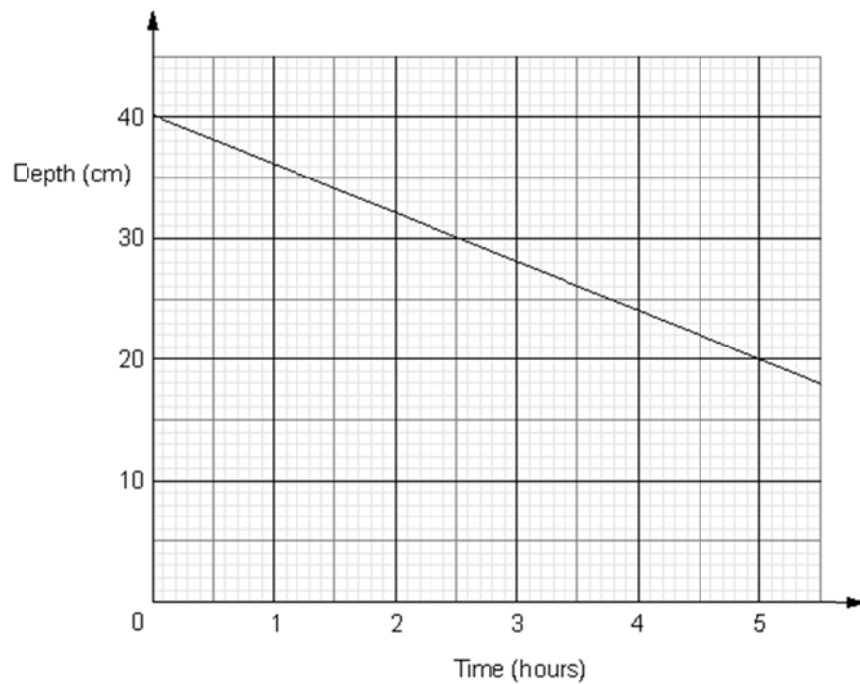
- (b) Work out the probability of Mary scoring a total of 8.

.....

(3)

(Total 6 marks)

- Q4.** Water flows out of a cylindrical tank at a constant rate.  
The graph shows how the depth of water in the tank varies with time.



- (a) Work out the gradient of the straight line.

.....

(2)

- (b) Write down a practical interpretation of the value you worked out in part (a).

.....

.....

(1)

(Total 3 marks)

**Q14.** (a) Solve  $x^2 - 2x - 1 = 0$ .

Give your solutions correct to 2 decimal places.

.....

(3)

(b) Write down the solutions, correct to 2 decimal places, of  $3x^2 - 6x - 3 = 0$ .

.....

(1)

(Total 4 marks)

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**Q6.**

The time it takes for the pendulum of a clock to swing from one end of its arc to the other and back again is given by the formula

$$T = 2\pi \sqrt{\frac{l}{g}}$$



(a) Find the value of  $l$ , when

$$T = 2, \pi = 3.14 \text{ and } g = 9.81$$

.....

(2)

(b) Make  $l$  the subject of the formula.

.....

(3)

(Total 5 marks)

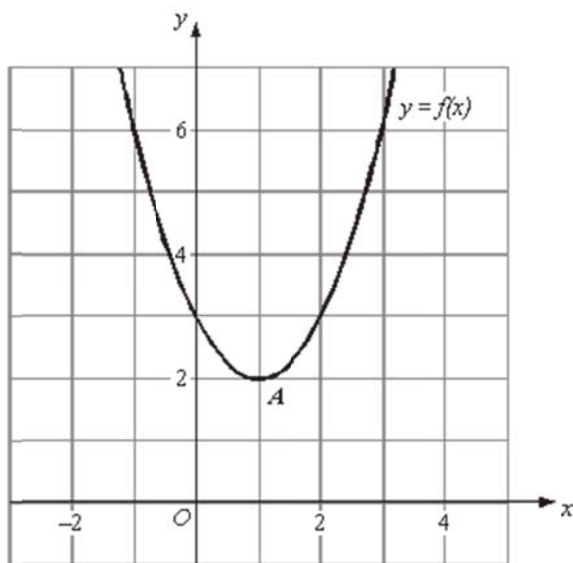
**Q9.** Solve  $3x^2 + 2x - 4 = 0$

Give your answer correct to three significant figures.

.....

**(Total 3 marks)**

**Q10.**



The diagram shows the graph of  $y = f(x)$ .

The only vertex of the graph is  $A$  at  $(1, 2)$ .

Write down the coordinates of the vertex of the curve with equation.

(a) (i)  $y = f(x) + 3$

....., .....

**(1)**

(ii)  $y = f(x - 2)$

....., .....

**(1)**

The curve with equation  $y = f(x)$  is transformed to give the curve with equation

$y = -f(x)$

(b) Describe the transformation.

.....

**(1)**

**(Total 3 marks)**

**Q13.** Rearrange  $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

to make  $u$  the subject of the formula.

Give your answer in its simplest form.

.....

**(Total 2 marks)**

**Q5.** (a) Show that the equation

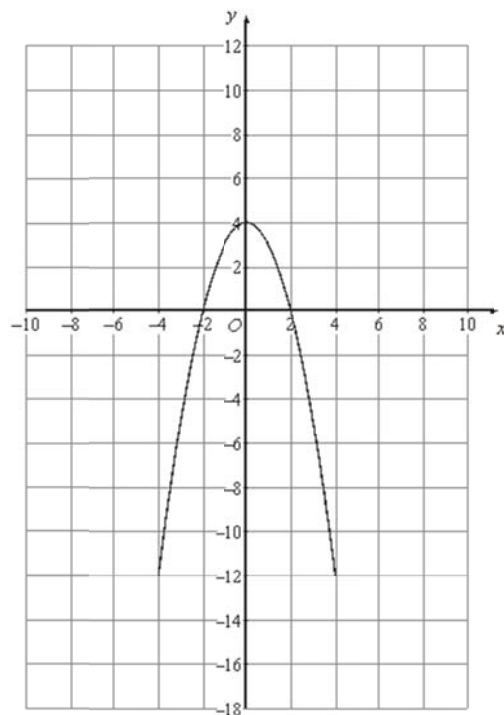
$$\frac{5}{x+2} = \frac{4-3x}{x-1}$$

can be rearranged to give  $3x^2 + 7x - 13 = 0$

**(3)**

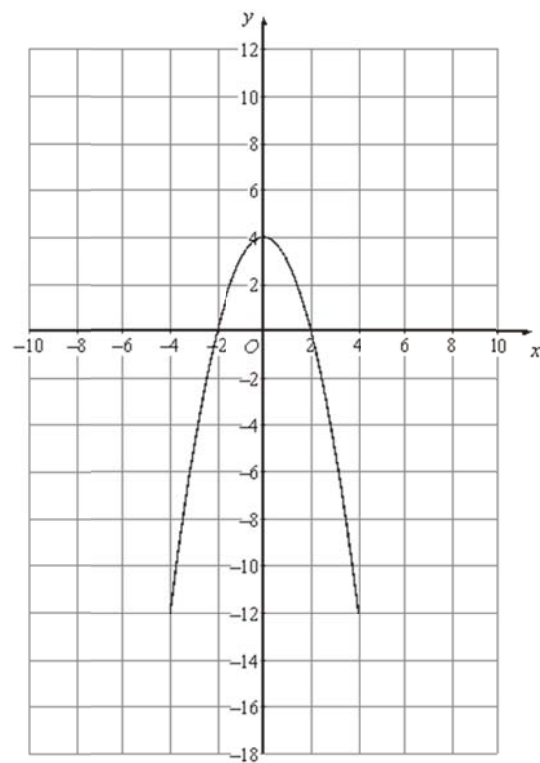
**Q15.** The graph of  $y = f(x)$  is shown on the grids.

(a) On this grid, sketch the graph of  $y = f(x) - 4$ .



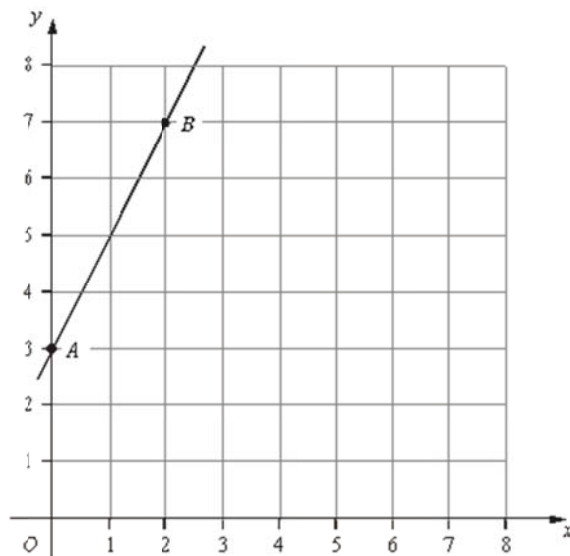
**(2)**

- (b) On this grid, sketch the graph of  $y = f\left(\frac{1}{2}x\right)$ .



(2)  
(Total 4 marks)

**Q16.**



$A$  has coordinates  $(0, 3)$ .

$B$  has coordinates  $(2, 7)$ .

Work out the gradient of the line that passes through  $A$  and  $B$ .

.....

**(Total 2 marks)**

**Q17.** Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$

**(Total 3 marks)**

**Q18.**  $q$  is inversely proportional to the square of  $t$ .

When  $t = 4$ ,  $q = 8.5$

(a) Find a formula for  $q$  in terms of  $t$ .

$q = \dots\dots\dots$

**(3)**

(b) Calculate the value of  $q$  when  $t = 5$

.....

**(1)**

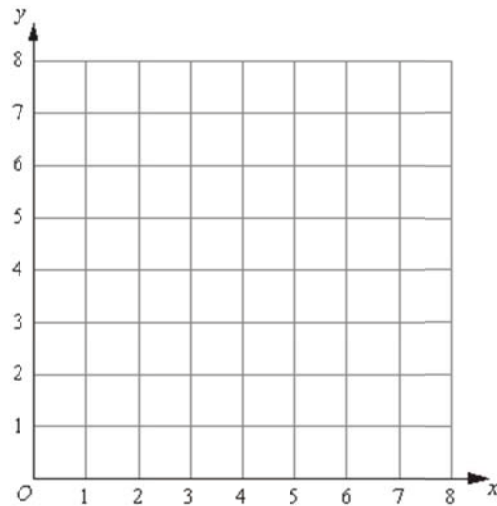
**(Total 4 marks)**



**Q19.** The region **R** satisfies the inequalities

$$x \geq 2, y \geq 1, x + y \leq 6$$

On the grid below, draw straight lines and use shading to show the region **R**.



(Total 3 marks)

**Q20.** The diagram below shows a 6-sided shape.  
All the corners are right angles.  
All the measurements are given in centimetres.

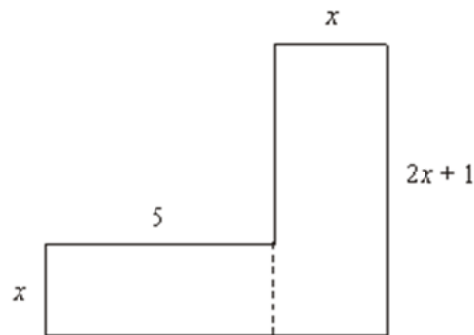


Diagram **NOT** accurately drawn

The area of the shape is  $95 \text{ cm}^2$ .

(a) Show that  $2x^2 + 6x - 95 = 0$

(3)

(b) Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$

(3)

(Total 6 marks)

**Q7.** Solve

$$\frac{x}{x+4} = \frac{x+7}{x+3}$$

$x = \dots\dots\dots$

**(Total 4 marks)**

**Q21.** Simplify fully

$$\frac{x^2 - 8x + 15}{2x^2 - 7x - 15}$$

$\dots\dots\dots$

**(Total 3 marks)**

**Q22.** Prove that  $(3n + 1)^2 - (3n - 1)^2$  is a multiple of 4, for all positive integer values of  $n$ .

**(Total 3 marks)**

**Q23.** Tarish says,

‘The sum of two prime numbers is always an even number’. He is **wrong**.  
Explain why.

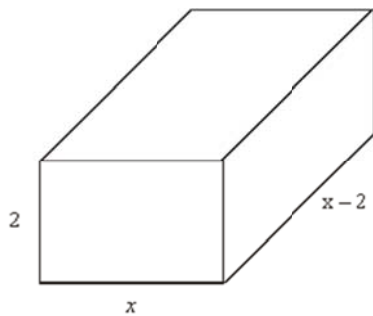
$\dots\dots\dots$

$\dots\dots\dots$

**(Total 2 marks)**

Q24.

Diagram **NOT**  
accurately drawn



The diagram shows a cuboid.  
All the measurements are in cm.

The volume of the cuboid is  $51 \text{ cm}^3$ .

- (a) Show that  $2x^2 - 4x - 51 = 0$  for  $x > 2$

(4)

- (b) Solve the quadratic equation

$$2x^2 - 4x - 51 = 0$$

Give your solutions correct to 3 significant figures.  
You must show your working.

.....

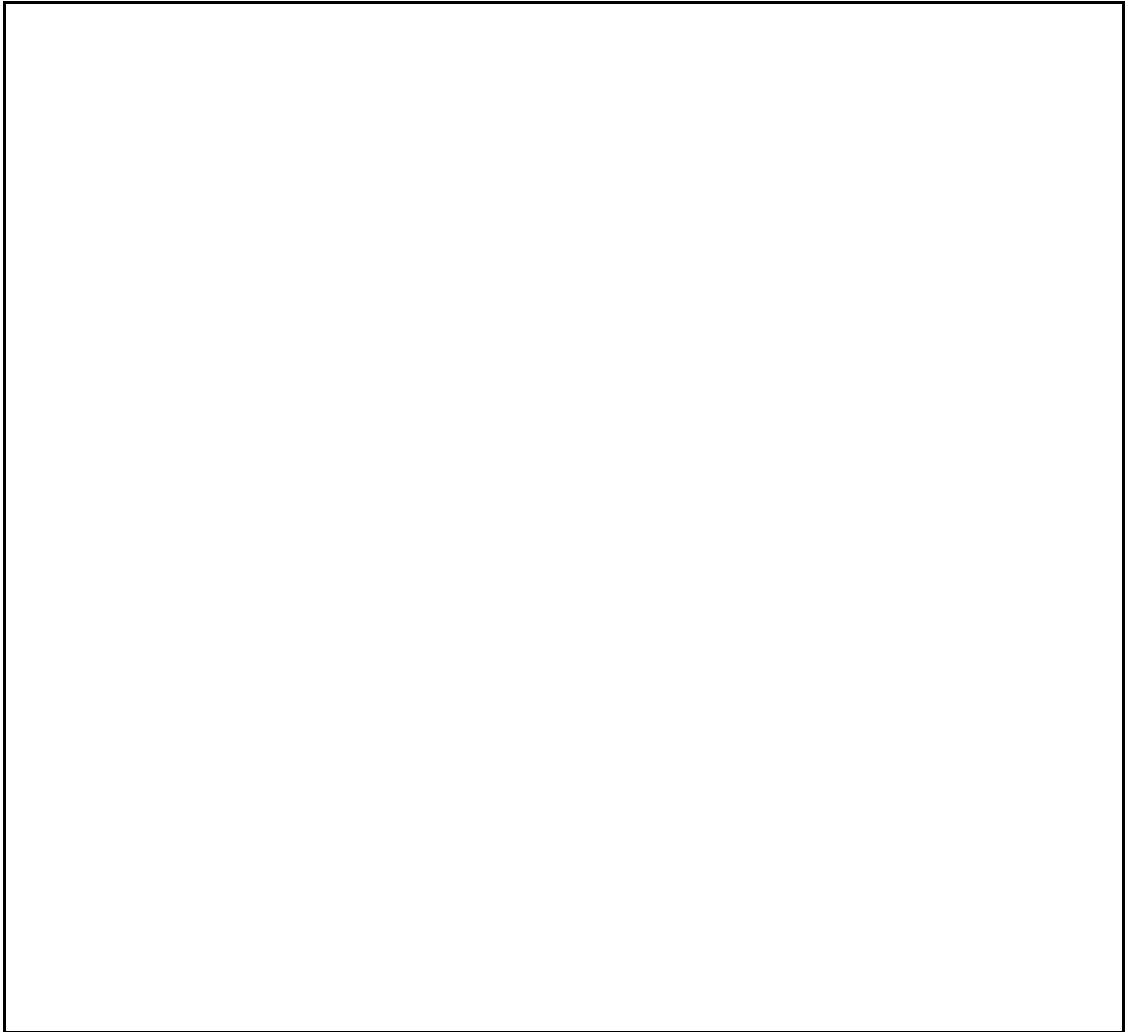
(3)

(Total 7 marks)

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**Q25.** The line  $y = 2x + 3$  meets the line  $y = 4x + 2$  at the point  $P$ .

Find an equation of the line which is perpendicular to the line  $y = 2x + 3$  and which passes through the point  $P$ .



.....

(5)

**(Total 5 marks)**

**Q26.** (a) Simplify fully  $(x^3)^{\frac{1}{2}} \times (x^2)^{\frac{1}{4}}$

.....

(3)

(b) Solve  $(x - 1)(x + 2) = 18$

.....

(4)

(c) Solve the simultaneous equations

$$y = x^2 - 1$$

$$y = 5 - x$$

.....

.....

(5)

(Total 12 marks)

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**Q27.** Fred and Jim pay Malcolm to do some gardening.

Fred has £ $x$ .

Jim has ten pounds less than Fred.

Fred pays one third of his money to Malcolm.

Jim pays half of his money to Malcolm.

(a) Show that the amount that Malcolm is paid is  $\frac{x}{3} + \frac{x-10}{2}$ .

(1)

Malcolm is paid a total of £170.

(b) Use algebra to show how much money Fred has left.

.....

(4)

(Total 5 marks)

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Q28.

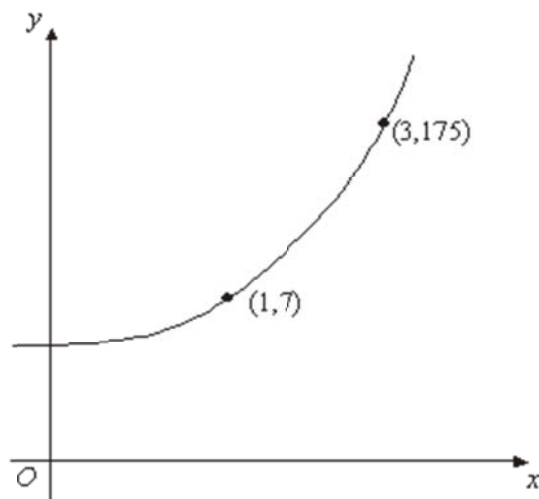


Diagram **NOT** accurately drawn

The sketch shows a curve with equation

$$y = ka^x$$

where  $k$  and  $a$  are constants, and  $a > 0$

The curve passes through the points  $(1, 7)$  and  $(3, 175)$ .

Calculate the value of  $k$  and the value of  $a$ .

$k =$  .....

$a =$  .....

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(Total 3 marks)

# Higher Algebra Calculator Revision - MARK SCHEME

M11.

Working	Answer	Mark	Additional Guidance
$3x + 4y = 7$ $10x - 4y = 32$ $13x = 39$ $x = 3$ $3 \times 3 + 4y = 7$ $4y = -2$ $y = -\frac{1}{2}$ $x = \frac{7-4y}{3}$ $10\left(\frac{7-4y}{3}\right) - 4y = 32$	$x = 3,$ $y = -\frac{1}{2}$	3	<b>M1</b> for coefficients of $x$ or $y$ the same followed by correct operation, condone one arithmetical error <b>M1</b> (dep) for substituting found value in one equation <b>A1</b> cao SC: <b>B1</b> for one correct answer only if Ms not awarded  <b>Alternative method</b> <b>M1</b> for rearranging one equation and substituting in other to eliminate one variable (condone one arithmetical error) <b>M1</b> (dep) for substituting found value in one equation <b>A1</b> cao
Total for Question: 3 marks			

M12.

Working	Answer	Mark	Additional Guidance
$(x + 5)(x - 9)$	9, -5	3	<b>M2</b> for $(x - 9)(x + 5)$ <b>(M1</b> for $(x \pm 9)(x \pm 5)$ <b>A1</b> cao 9 and -5  <b>OR</b> <b>M1</b> for substitution into formula (condone incorrect signs) $\frac{4 \pm \sqrt{196}}{2}$ <b>M1</b> for <b>A1</b> cao  <b>OR</b> <b>M1</b> for $(x - 2)^2 - 2^2 - 45 (= 0)$ <b>M1</b> for $x = 2 \pm \sqrt{4 + 45}$ <b>A1</b> cao  <b>OR T&amp;I</b> <b>B3</b> Both solutions correct <b>(B1</b> One solution correct)

M8.

Working	Answer	Mark	Additional Guidance
$15x + 10y = 55$ $4x - 10y = 40$ $19x = 95$ $x = 5$ $15 + 2y = 11$ $2y = -4$ $y = -2$	$x = 5$ $y = -2$	4	<p><b>M1</b> for correct multiplication and use of correct operation to eliminate either x or y, condone one arithmetical error</p> <p><b>A1</b> for either <math>x = 5</math> or <math>y = -2</math></p> <p><b>M1</b> (dep) for substitution of found variable into either equation</p> <p><b>A1</b> for correct value of 2<sup>nd</sup> variable</p> <p><b>OR</b></p> <p><b>M1</b> for correct rearrangement of 1 equation and substitution into 2<sup>nd</sup></p> <p><b>A1</b> for either <math>x = 5</math> or <math>y = -2</math></p> <p><b>M1</b> (dep) for substitution of found variable into either equation</p> <p><b>A1</b> for correct value of 2<sup>nd</sup> variable</p> <p><b>OR</b></p> <p><b>M1</b> for one line drawn</p> <p><b>M1</b> for second line drawn</p> <p><b>A1</b> for <math>x = 5</math></p> <p><b>A1</b> for <math>y = -2</math></p> <p>(SC : If no method marks awarded, score B1 for one value correct)</p>
Total for Question: 4 marks			

M2.

	Working	Answer	Mark	Additional Guidance
(a)	$1 - (0.15 + 0.1) = 0.75$	0.25	2	<p><b>M1</b> for <math>1 - (0.15 + 0.1)</math> or 0.75 seen</p> <p><b>A1</b> cao</p>
(b)		appropriate correct	1	<b>C1</b> for an appropriate correct explanation, e.g. you can't have 4.5



		explanation		green counters or $9 \div 5$ is not a whole number, or that would mean there are 1.8 yellow counters
Total for Question: 3 marks				

**M3.**

	Working	Answer	Mark	Additional Guidance
(a)	$1 - (0.3 + 0.21 + 0.16 + 0.09)$ $0.24 \div 4$	0.06	3	<b>M1</b> for $1 - (0.3 + 0.21 + 0.16 + 0.09)$ or $1 - 0.76$ or 0.24 <b>M1</b> dep for "0.24" $\div 4$ <b>A1</b> cao
(b)	$0.3 \times 0.16 + 0.16 \times 0.3 + 0.21 \times 0.21$	0.1401	3	<b>M1</b> for one correct product or 3 correct pairs identified by scores or probabilities. Ignore 4 + 4 repeated with no other errors. <b>M1</b> for all correct products with intention to add <b>A1</b> for 0.1401
Total for Question: 6 marks				

**M4.**

	Answer	Mark	Additional Guidance
(a)	- 4	2	<b>M1</b> for 'difference in y' / 'difference in x' or 4 seen <b>A1</b> for - 4 SC If no marks scored allow B1 for $y = 40 - 4x$ , $y = - 4x$ , $40 - 4x$ or $- 4x$
(b)	Practical interpretation	1	<b>B1</b> ft for depth decreases by "4" cm each hour oe or enables you to work out that the tank will be empty in 10 hours
Total for Question: 3 marks			

M14.

	Working	Answer	Mark	Additional Guidance
(a)	$x = \frac{- -2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2}$ $= \frac{2 \pm \sqrt{8}}{2}$ $= \frac{2 \pm 2.82843}{2}$ $x = -0.4142 \text{ or } x = 2.4142$	-0.41, 2.41	3	<p><b>M1</b> for substitution into formula (condone incorrect signs)</p> $\frac{2 \pm \sqrt{8}}{2}$ <p><b>M1</b> for</p> <p><b>A1</b> for -0.41 to -0.415 and 2.41 to 2.415</p> <p><b>OR</b></p> <p><b>M1</b> for <math>(x - 1)^2 - 1^2 - 1</math> seen</p> <p><b>M1</b> for <math>(x - 1) = \pm \sqrt{2}</math></p> <p><b>A1</b> for -0.41 to -0.415 and 2.41 to 2.415</p> <p>T&amp;I <b>B3</b> both solutions, <b>B1</b> 1 solution</p>
(b)		-0.41, 2.41	1	<b>B1</b> ft from (a)
Total for Question: 4 marks				

M6.

	Working	Answer	Mark	Additional Guidance
(a)	$2 = 2 \times 3.14 \times \sqrt{\frac{l}{9.81}}$ $\sqrt{\frac{l}{9.81}} = \frac{2}{2 \times 3.14}$ $\frac{l}{9.81} = \left( \frac{2}{2 \times 3.14} \right)^2$ $l = 9.81 \times \left( \frac{2}{2 \times 3.14} \right)^2$	0.995	2	<p><b>M1</b> for dividing 2 by <math>2 \times 3.14</math> and squaring</p> <p><b>A1</b> for 0.994(96937) cao</p>

(b)	$T^2 = 4\pi^2 \frac{l}{g}$ $\frac{T^2}{4\pi^2} = \frac{l}{g}$	$l = \frac{T^2 g}{4\pi^2}$	3	<b>M1</b> for squaring both sides <b>M1</b> for dividing by $4\pi^2$ or multiplying by $g$ <b>A1</b> for $l = \frac{T^2 g}{4\pi^2}$ oe
Total for Question: 5 marks				

M9.

Working	Answer	Mark	Additional Guidance
$\frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -4}}{2 \times 3}$ $= \frac{-2 \pm \sqrt{52}}{6}$ <b>OR</b> $3(x + \frac{1}{3})^2 - \frac{13}{3} = 0$ $(x + \frac{1}{3})^2 = \frac{13}{9}$	0.869 -1.54	3	$\frac{-2 \pm \sqrt{2^2 - 4 \times 3 \times -4}}{2 \times 3}$ <b>M1</b> for allow substitution of $c = \pm 4$ $= \frac{-2 \pm \sqrt{52}}{6}$ <b>M1</b> for <b>A1</b> for 0.869 and -1.54 <b>OR</b> $3(x + \frac{1}{3})^2 - \frac{13}{3} = 0$ <b>M1</b> for $(x + \frac{1}{3})^2 = \frac{13}{9}$ <b>M1</b> for <b>A1</b> for 0.869 and -1.54 <b>Trial and improvement:</b> M1 correct set of trials A1 for 0.869 and -1.54
Total for Question: 3 marks			

M10.

	Working	Answer	Mark	Additional Guidance
(a)(i)		(1, 5)	2	<b>B1</b> cao
(ii)		(3, 2)		<b>B1</b> cao
(b)		Reflection in x axis	1	<b>B1</b> cao

M13.

Working	Answer	Mark	Additional Guidance
$\frac{1}{u} = \frac{1}{f} - \frac{1}{v}$ $\frac{1}{u} = \frac{v-f}{fv}$	$u = \frac{fv}{v-f}$	2	<p><b>M1</b> <math>\frac{1}{u} = \frac{v-f}{fv}</math> oe or <math>vf + uf = uv</math> oe or <math>\frac{1}{u} = \frac{f-v}{fv}</math> or</p> <p><math>u = \frac{1}{\frac{v-f}{fv}}</math> or <math>u = \frac{1}{\frac{1}{f} - \frac{1}{v}}</math></p> <p><b>A1</b> <math>u = \frac{fv}{v-f}</math> or <math>u = \frac{-fv}{f-v}</math></p>
Total for Question: 2 marks			

M5.

	Working	Answer	Mark	Additional Guidance
(a)	$5(x-1) = (4-3x)(x+2)$ $5x-5 = 4x+8-3x^2-6x$ $(= 8-2x-3x^2)$ $(3x^2+6x+5x-4x-5-8=0)$ $3x^2+7x-13=0$	Proof	3	<p><b>M1</b> multiply through by <math>(x-1)(x+2)</math> and cancel correctly M1 expand <math>5(x-1)</math> and <math>(4-3x)(x+2)</math> correctly, need not be simplified</p> <p><b>A1</b> rearrange to give required equation (dep on both Ms and fully correct algebra)</p>
(b)	$a=3, b=7, c=-13$ $x = \frac{-7 \pm \sqrt{7^2 + 4 \times 3 \times 13}}{6}$ $= \frac{-7 \pm \sqrt{49 + 156}}{6}$ $= \frac{-7 \pm \sqrt{205}}{6}$	1.22 -3.55	3	<p><b>M1</b> correct substitution in formula of <math>a=3, b=7</math> and <math>c=\pm 13</math></p> <p><b>M1</b> reduction to <math>\frac{-7 \pm \sqrt{205}}{6}</math></p> <p><b>A1</b> 1.215 to 1.22 and -3.55 to -3.555</p>

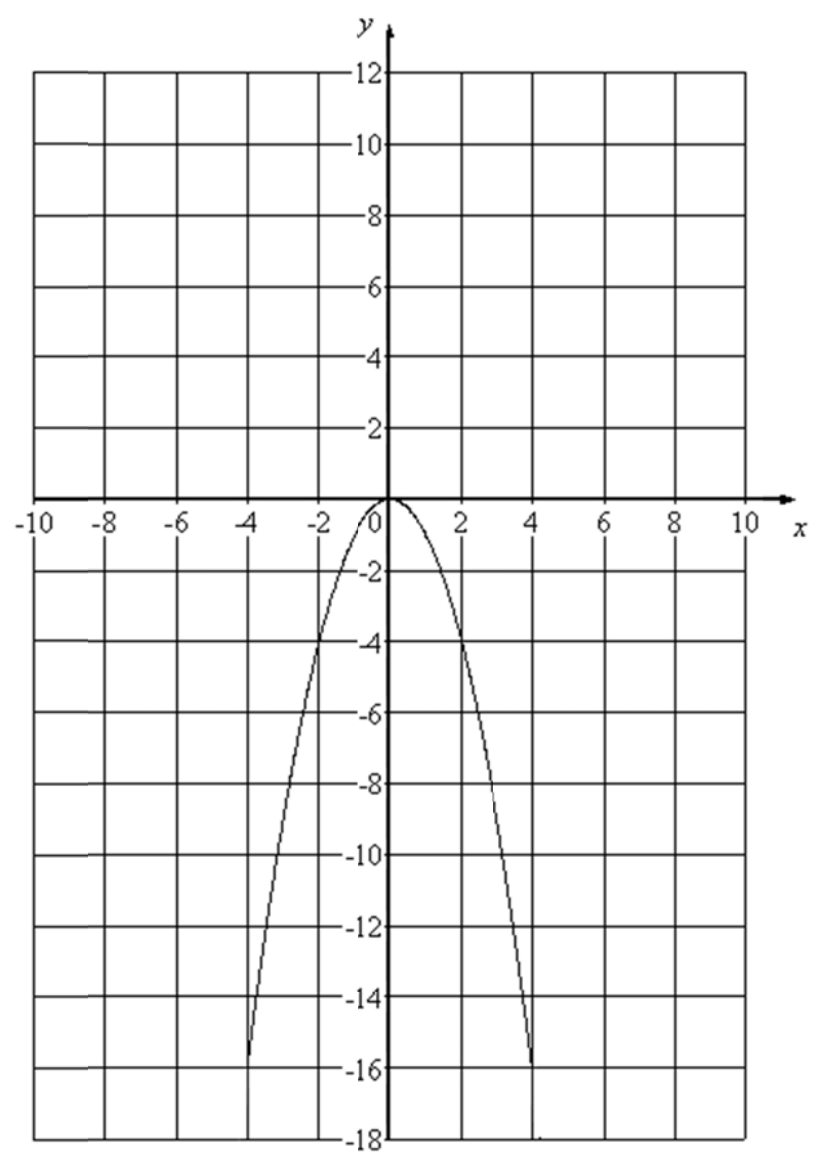
$x = 1.2196... \text{ or } -3.55297....$ Or $\left(x + \frac{7}{6}\right)^2 - \left(\frac{7}{6}\right)^2 - \frac{13}{3} = 0$ $\left(x + \frac{7}{6}\right) = \pm \sqrt{\left(\frac{7}{6}\right)^2 + \frac{13}{3}}$ $x = 1.2196... \text{ or } -3.55297....$		Or <b>M1</b> $\left(x + \frac{7}{6}\right)^2$ <b>M1</b> $-\frac{7}{6} \pm \sqrt{\frac{205}{36}}$ <b>A1</b> 1.215 to 1.22 and $-3.55$ to $-3.555$ SC T&I 1 mark for 1 correct root, 3 marks for both correct roots
<b>Total for Question: 6 marks</b>		

**M15.**

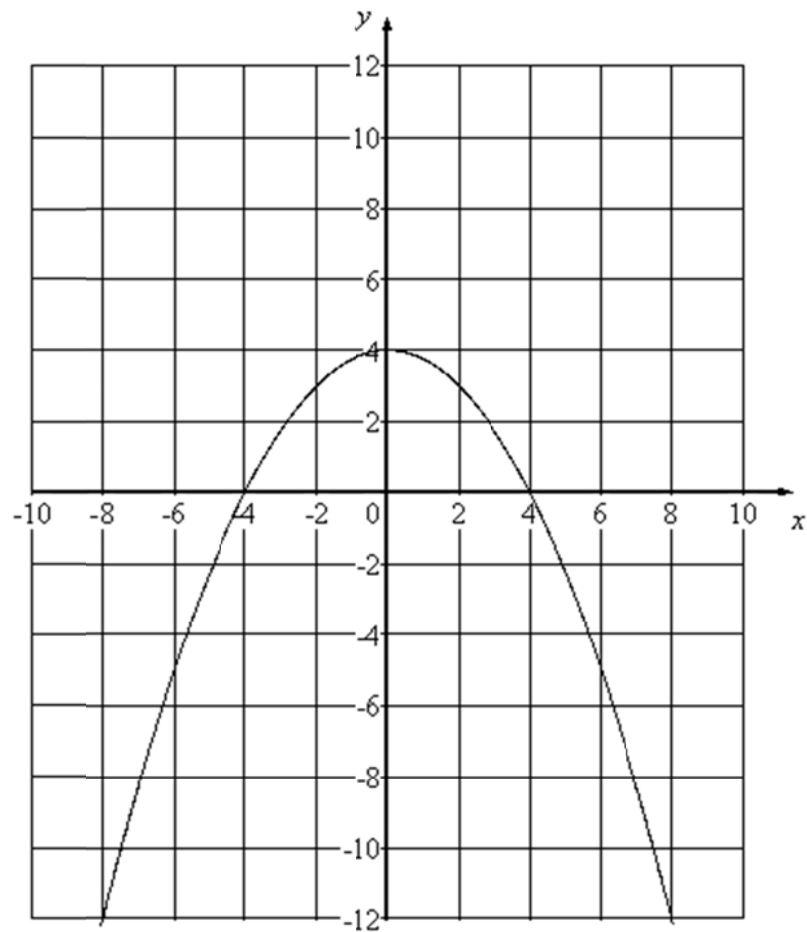
	Answer	Mark	Additional Guidance
(a)	Curve	2	<b>B2</b> parabola max (0, 0), through (−2, −4) and (2, −4) Tol ½sq <b>(B1</b> parabola with single maximum point (0, 0) or through (−2, −4) and (2, −4), but not both or the given parabola translated along the y-axis by any other value than −4 - the translation must be such that the points (0, 4), (−2, 0), (2, 0) are translated by the same amount. Tol ½sq)
(b)	Curve	2	<b>B2</b> parabola max (0, 4), through (−4, 0) and (4, 0) Tol ½sq <b>(B1</b> parabola with single maximum point (0, 4)) Tol ½sq
<b>Total for Question: 4 marks</b>			

PTO for graphs

(a)



(b)



M16.

Working	Answer	Mark	Additional Guidance
$\frac{7-3}{2-0} (= 2)$	2	2	<p><b>M1</b> for a correct method to work out change in <math>y</math> and change in <math>x</math>, e.g. <math>7 - 3 (= 4)</math> and <math>2 - 0 (= 2)</math>, values may be marked on diagram</p> <p><b>A1</b> for 2, accept <math>\frac{2}{1}</math>, <math>\frac{4}{2}</math> oe</p> <p>SC: <b>B1</b> for <math>y = 2x + 3</math> with gradient not identified</p>
Total for Question: 2 marks			

M17.

Working	Answer	Mark	Additional Guidance
$x = \frac{-6 \pm \sqrt{6^2 - 4 \times 2 \times (-95)}}{4}$ $x = \frac{-6 \pm \sqrt{796}}{4}$ <p>OR</p> $x^2 + 3x - 47.5 = 0$ $(x + 1.5)^2 - 1.5^2 - 47.5 = 0$ $x = -1.5 \pm \sqrt{49.75}$	5.55, -8.55	3	<p><b>M1</b> for correct substitution in formula of 2, 6 and <math>\pm 95</math></p> $\frac{-6 \pm \sqrt{796}}{4}$ <p><b>M1</b> for reduction to</p> <p><b>A1</b> 5.55 to 5.555 <b>and</b> -8.55 to -8.555</p> <p>OR</p> <p><b>M1</b> <math>(x + 1.5)^2 - 1.5^2 - 47.5 = 0</math></p> <p><b>M1</b> <math>x = -1.5 \pm \sqrt{49.75}</math></p> <p><b>A1</b> 5.55 to 5.555 and -8.55 to -8.555</p> <p>SC: <b>B1</b> for one answer correct with or without working</p>
Total for Question: 3 marks			

M18.

	Working	Answer	Mark	Additional Guidance
(a)	$q = \frac{k}{t^2}; 8.5 = \frac{k}{4^2}$ $k = 8.5 \times 4^2;$ $k = 136$	$q = \frac{136}{t^2}$	3	<p><b>M1</b> <math>q = \frac{k}{t^2}, (k \neq 1)</math></p> <p><b>M1</b> <math>8.5 = \frac{k}{4^2}</math></p> <p><b>A1</b> cao</p> <p>NB <math>q = \frac{k}{t^2}</math> in the answer line followed by</p>



				$k$ being found correctly anywhere in (a) or (b) earns all 3 marks
(b)	$q = "136" \div 5^2$ $= "136" \div 25$	5.44	1	$\frac{'136'}{25}$ oe <b>B1</b> ft for
Total for Question: 4 marks				

**M19.**

Answer	Mark	Additional Guidance
Region indicated	3	<b>M1</b> Both $x = 2$ drawn from at least (2, 1) to (2, 4) and $y = 1$ drawn from at least (2, 1) to (5, 1) <b>M1</b> for $x + y = 6$ drawn from at least (2, 4) to (5, 1) <b>A1</b> Correct region indicated by shading or clearly labelled. Boundaries of the region may be solid or dashed.
Total for Question: 3 marks		

**M20.**

	Working	Answer	Mark	Additional Guidance
(a)	$x(2x + 1) + x \times 5$ $2x^2 + 6x$	As given	3	<b>M1</b> $x(2x + 1)$ and $x \times 5$ <b>OR</b> $x(x + 5)$ and $x(x + 1)$ condone missing brackets. <b>M1</b> $2x^2 + x + 5x$ <b>OR</b> $x^2 + 5x + x^2 + x$ (can imply first <b>M1</b> ) <b>A1</b> $2x^2 + 6x = 95$ AG
(b)	$x = \frac{-6 \pm \sqrt{6^2 - 4 \times 2 \times (-95)}}{4}$ $x = \frac{-6 \pm \sqrt{796}}{4}$  <b>or</b> $x^2 + 3x - 47.5 = 0$	5.55, -8.55	3	<b>M1</b> for correct substitution in formula of 2, 6 and $\pm 95$ <b>M1</b> for reduction to $\frac{-6 \pm \sqrt{796}}{4}$ <b>A1</b> 5.55 to 5.555 inclusive and -8.55 to -8.555 inclusive <b>OR</b>

$(x + 1.5)^2 - 1.5^2 - 47.5 = 0$ $x = -1.5 \pm \sqrt{49.75}$			<b>M1</b> $(x + 1.5)^2 - 1.5^2 - 47.5 = 0$ <b>M1</b> $x = -1.5 \pm \sqrt{49.75}$ <b>A1</b> 5.55 to 5.555 and -8.55 to -8.555 [SC: <b>B1</b> for one answer correct with or without working]
Total for Question: 6 marks			

**M7.**

Working	Answer	Mark	Additional Guidance
$x(x + 3) = (x + 7)(x + 4)$	-3.5	4	<b>M1</b> for multiplying through by LCD = $(x + 4)(x + 3)$ <b>A1</b> for $x^2 + 3x = x^2 + 11x + 28$ <b>B1</b> for $-28 = 8$ <b>A1</b> cao
Total for Question: 4 marks			

**M21.**

Working	Answer	Mark	Additional Guidance
$\frac{(x-3)\cancel{(x+5)}}{(2x+3)\cancel{(x+5)}}$	$\frac{(x-3)}{(2x+3)}$	3	<b>B1</b> for $(x - 3)(x - 5)$ or $x(x - 5) - 3(x - 5)$ <b>M1</b> for $(2x \pm 3)(x \pm 5)$ or $2x(x + 5) \pm 3(x + 5)$ or $2x(x - 5) \pm 3(x - 5)$ $\frac{(x-3)}{(2x+3)}$ <b>A1</b> for $\frac{(x-3)}{(2x+3)}$ cao as final answer
Total for Question: 3 marks			

**M22.**

Working	Answer	Mark	Additional Guidance
$(9n^2 + 6n + 1) - (9n^2 - 6n + 1)$ $= 12n$	$12n$ correct comment	3	<p><b>M1</b> for <math>(3n)^2 + 3n + 3n + 1</math> or <math>(3n)^2 - 3n - 3n + 1</math> or <math>((3n + 1) - (3n - 1))((3n + 1) + (3n - 1))</math></p> <p><b>A1</b> for <math>12n</math> from correct expansion of both brackets</p> <p><b>A1</b> for <math>12n</math> is a multiple of 4 or <math>12n = 3 \times 4n</math> or</p> $12n = 4 \times 3n \text{ or } \frac{12n}{4} = 3n \text{ or } \frac{12n}{3} = 4n$ <p>NB: Trials using different values for <math>n</math> score no marks.</p>
Total for Question: 3 marks			

**M23.**

Answer	Mark	Additional Guidance
2 + 'prime number' is odd	2	<p><b>M1</b> for a counter example showing intent to add 2 and another prime number; ignore incorrect examples</p> <p><b>A1</b> for a correctly evaluated counter example with no examples given that involve either non-primes or incorrect evaluation</p> <p><b>Alternative method</b></p> <p><b>B2</b> for fully correct explanation '2 is a prime number, odd + even (or 2) = odd' oe with no accompanying incorrect statements or examples</p> <p>(<b>B1</b> for '2 is a prime number' or recognition that not all prime numbers are odd or odd + even (or 2) = odd; ignore incorrect examples or statements)</p>
Total for Question: 2 marks		

**M24.**

	Working	Answer	Mark	Additional Guidance
(a)	$\text{Vol} = x \times (x - 2) \times 2 = 51$	Derives given	4	<b>M1</b> $\text{Vol} = x \times (x - 2) \times 2$

	$\text{Vol} = 2x^2 - 4x - 51 = 0$	answer and condition		<b>M1</b> expands bracket correctly <b>A1</b> (E1) sets equal to 51 <b>B1</b> $2 > x$ as the lengths of the cuboid have to be positive.
(b)	$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 2 \times (-51)}}{2 \times 2}$ $x = \frac{4 \pm \sqrt{424}}{4}$	6.15, -4.15 both to 3sf	3	<b>M1</b> correct substitution (allow sign errors in $a$ , $b$ and $c$ ) into quadratic formula $x = \frac{4 \pm \sqrt{424}}{4}$ <b>M1</b> <b>A1</b> 6.14(7..., - 4.14(7...)
Total for Question: 7 marks				

M25.

Working	Answer	Mark	Additional Guidance
Eliminate $y$ to get $2x + 3 = 4x + 2$ , $x = 0.5$ $y = 4$  <b>OR</b> $y = 2x + 3$ and $y = 4x + 2$ drawn correctly on graph paper Perpendicular drawn correctly through (0.5, 4) Intercept found Gradient found	$y = -0.5x + 4.25$	5	<b>M1</b> eliminate $y$ <b>M1</b> substitute the found value of $x$ in the equation <b>A1</b> both answers <b>M1</b> an equation of the form $y = mx + c$ with either $c$ correct or $m$ correct or the correct gradient stated <b>A1</b> cao <b>OR</b> <b>B1</b> $y = 2x + 3$ drawn <b>B1</b> $y = 4x + 2$ drawn <b>M1</b> draws perpendicular through point of intersection <b>M1</b> an equation of the form $y = mx + c$ with either $c$ correct or $m$ correct or the correct gradient stated <b>A1</b> cao
Total for Question: 5 marks			

M26.

	Working	Answer	Mark	Additional Guidance
(a)	$x^{3/2} \times x^{1/2}$	$x^2$	3	<b>B1</b> $x^{3/2}$ seen <b>B1</b> $x^{1/2}$ oe seen <b>A1</b> cao
(b)	$x^2 - 1x + 2x - 2 = 18$ $x^2 + x - 20 = 0$ $(x + 5)(x - 4)$	4, -5	4	<b>M1</b> Correct expansion <b>B1</b> $x^2 + x - 20 = 0$ <b>B1</b> $(x + 5)(x - 4)$ <b>A1</b> cao
(c)	$x^2 + x - 6 = 0$ $(x + 3)(x - 2)$ $x = -3, x = 2$	$x = -3, y = 8$ $x = 2, y = 3$	5	<b>M1</b> Sets equations equal and rearranges <b>B1</b> $x^2 + x - 6 = 0$ <b>B1</b> $(x - 3)(x + 2)$ <b>A2</b> Two correct pair of sollutions <b>A1</b> correct set of x values
Total for Question: 12 marks				

M27.

	Working	Answer	Mark	Additional Guidance
(a)	Fred pays $\frac{x}{3}$ and Jim pays $\frac{x-10}{2}$  Malcolm gets £170 for Fred and Jim, so Malcolm gets $\frac{x}{3} + \frac{x-10}{2} = 170$	Clear and coherent explanation	1	<b>C1</b> a clear and coherent explanation
(b)	Fred has $\frac{2x}{3}$ left, so solving for x using	£140	4	<b>M1</b> multiply through by 6 and cancels fractions <b>M1</b> (dep)expand $3(x - 10)$ <b>M1</b> (dep)collect terms on each

$\frac{x}{3} + \frac{x-10}{2} = 170$ $2x + 3(x-10) = 170 \times 6$ $5x = 1050$ $x = 210$ <p><b>OR</b></p> $\frac{x}{3} + \frac{x-10}{2} = \frac{2x+3(x-10)}{6}$ $\frac{5x-30}{6} = 170$ $5x = 1050$ $x = 210$		side correctly <b>A1</b> cao  <b>OR</b> <b>M1</b> collects terms over 6 <b>M1</b> (dep) expand $3(x-10)$ <b>M1</b> (dep) multiply through by 6 and collect terms <b>A1</b> cao
<b>Total for Question: 5 marks</b>		

**M28.**

Working	Answer	Mark	Additional Guidance
$7 = ka^3$ ; $175 = ka^3$ $k = \frac{7}{a^3}$ , $175 = \frac{7a^3}{a^3}$ , $175 = 7a^2$ $a^2 = 25$ , so $a = 5$ , $k = 1.4$ Or $7^3 = k^3a^3$ , $175 = ka^3$ $k^3 = \frac{7}{175}$ , $k = 1.4$ , $a = 5$	$k = 1.4$ $a = 5$	3	<b>M1</b> either $a^2 = 25$ or $7 = ka$ (or $7 = ka^1$ ) and $175 = ka^3$ <b>A1</b> $k = 1.4$ oe <b>A1</b> $a = 5$ SC Either $a = 5$ or $k = 1.4$ oe gets <b>B2</b>
<b>Total for Question: 3 marks</b>			