



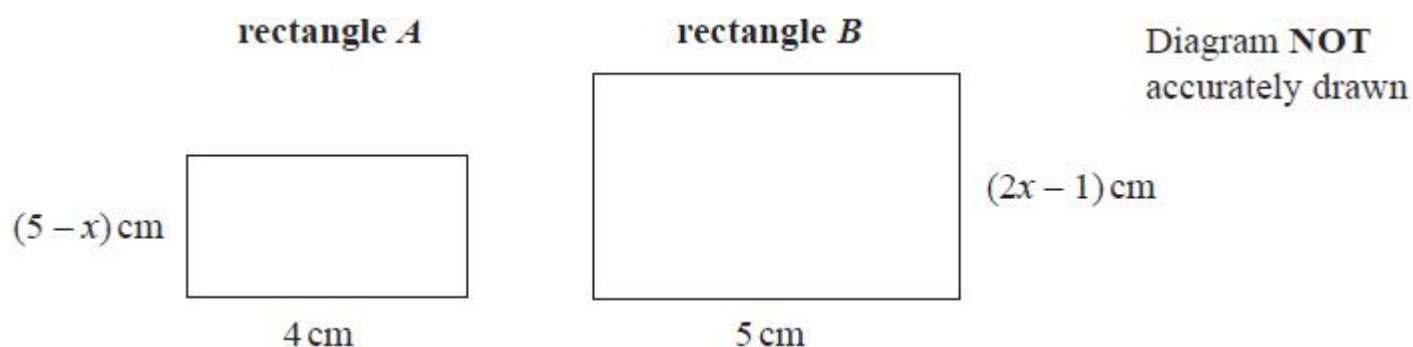
## Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Proof Algebraic Proportion Sequences Higher

**Note:** Higher tier students must also revise using the foundation tier revision worksheets as this content can also be assessed on higher tier papers.

### Questions

**Q1.**

Here are two rectangles, rectangle *A* and rectangle *B*.



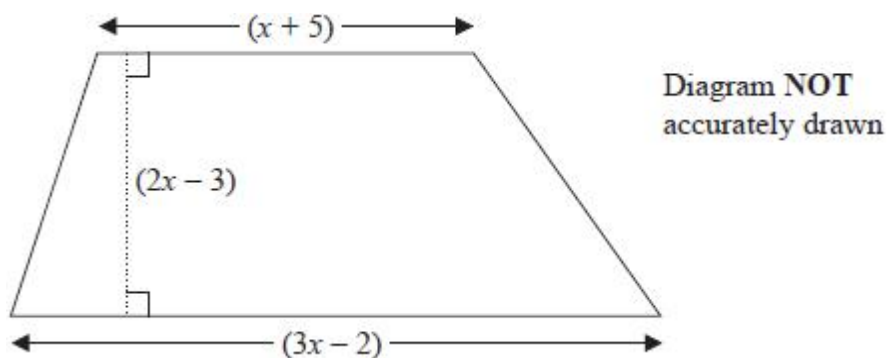
The area of rectangle *B* is twice the area of rectangle *A*.

Work out the value of  $x$ .  
Show your working clearly.

(Total for question = 4 marks)

**Q2.**

The diagram shows a trapezium.



All measurements shown on the diagram are in centimetres.

The area of the trapezium is  $133 \text{ cm}^2$

(a) Show that  $8x^2 - 6x - 275 = 0$   
(3)



(b) Find the value of  $x$ .

Show your working clearly.

(3)

(Total for question = 6 marks)

**Q3.**

Make  $r$  the subject of the formula  $A = 4\pi r^2$  where  $r$  is positive.

(Total for question = 2 marks)

**Q4.**

Make  $t$  the subject of  $5(t - g) = 2t + 7$

(Total for question = 3 marks)

**Q5.**

Make  $x$  the subject of the formula  $y = \frac{ax + b}{cx + d}$

(Total for question = 4 marks)

**Q6.**

$$y = \sqrt{\frac{3x - 2}{x + 1}}$$

Make  $x$  the subject of the formula

(Total for question = 4 marks)

**Q7.**

Given that  $y$  is positive, make  $y$  the subject of  $y = \sqrt{ay^2 + n}$

Show clear algebraic working.

(Total for question = 5 marks)



**Q8.**

Make  $r$  the subject of the formula  $A = 4r^2 - \pi r^2$  where  $r$  is positive.

**(Total for question = 3 marks)**

**Q9.**

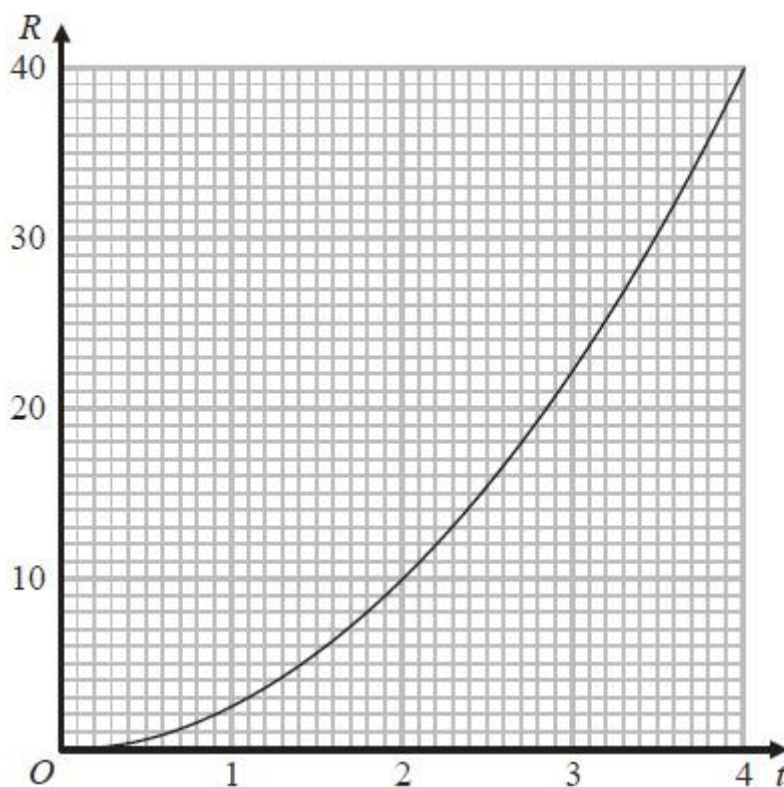
Prove that the difference between two consecutive square numbers is always an odd number.  
Show clear algebraic working.

**(Total for question = 3 marks)**

**Q10.**

$R$  is proportional to  $t^2$

The graph shows the relationship between  $R$  and  $t$  for  $0 \leq t \leq 4$



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

(3)



Given also that  $R = \frac{8}{5x}$

(b) show that  $t$  is inversely proportional to  $\sqrt{x}$  for  $t > 0$

(2)

**(Total for question = 5 marks)**

**Q11.**

Prove algebraically that the difference between the squares of any two consecutive odd numbers is always a multiple of 8

**(Total for question = 4 marks)**

**Q12.**

$T$  is directly proportional to  $\sqrt{x}$   
 $T = 400$  when  $x = 625$

(a) Find a formula for  $T$  in terms of  $x$ .

(3)

(b) Calculate the value of  $T$  when  $x = 56.25$

(1)

**(Total for question = 4 marks)**

**Q13.**

When a photograph is taken, the exposure time,  $t$ , is directly proportional to the square of the size,  $f$ , of the opening in the camera lens.  
 $t = 0.02$  when  $f = 8$

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

(3)

(b) Calculate the value of  $f$  when  $t = 0.0098$

(2)

**(Total for question = 5 marks)**

**Q14.**

$P$  is inversely proportional to the square of  $q$ .  
When  $q = 2$ ,  $P = 12.8$

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

(3)

(b) Find the value of  $P$  when  $q = 8$

(1)

**(Total for question = 4 marks)**

**Q15.**

$A$ ,  $r$  and  $T$  are three variables.

$A$  is proportional to  $T^2$

$A$  is also proportional to  $r^3$

$T = 47$  when  $r = 0.25$

Find  $r$  when  $T = 365$

Give your answer correct to 3 significant figures.

**(Total for question = 4 marks)**

**Q16.**

Solve the simultaneous equations

$$y - 2x = 6$$

$$y + 2x = 0$$

Show clear algebraic working.

**(Total for question = 3 marks)**

**Q17.**

Solve the simultaneous equations

$$4x + 5y = 4$$

$$2x - y = 9$$

Show clear algebraic working.

**(Total for question = 3 marks)**



**Q18.**

Solve the simultaneous equations

$$\begin{aligned}7x - 2y &= 34 \\ 3x + 5y &= -3\end{aligned}$$

Show clear algebraic working.

**(Total for question = 4 marks)**

**Q19.**

Solve the simultaneous equations

$$\begin{aligned}3xy - y^2 &= 8 \\ x - 2y &= 1\end{aligned}$$

Show clear algebraic working.

**(Total for question = 5 marks)**

**Q20.**

The line with equation  $y = x + 2$  intersects the curve with equation  $x^2 + y^2 - 2y = 24$  at the points  $A$  and  $B$ .

Find the coordinates of  $A$  and  $B$ .  
Show clear algebraic working.

**(Total for question = 5 marks)**

**Q21.**

(a) Find the gradient of the line with equation  $3x + 4y = 10$

**(3)**

(b) Find the coordinates of the point of intersection of the line with equation  $3x + 4y = 10$  and the line with equation  $5x - 6y = 23$   
Show your working clearly.

**(5)**

**(Total for question = 8 marks)**



**Q22.**

Alison buys 5 apples and 3 pears for a total cost of \$1.96

Greg buys 3 apples and 2 pears for a total cost of \$1.22

Michael buys 10 apples and 10 pears.

Work out how much Michael pays for his 10 apples and 10 pears.

Show your working clearly.

**(Total for question = 5 marks)**

**Q23.**

Solve the simultaneous equations

$$x^2 - 9y - x = 2y^2 - 12$$

$$x + 2y - 1 = 0$$

Show clear algebraic working.

**(Total for question = 5 marks)**

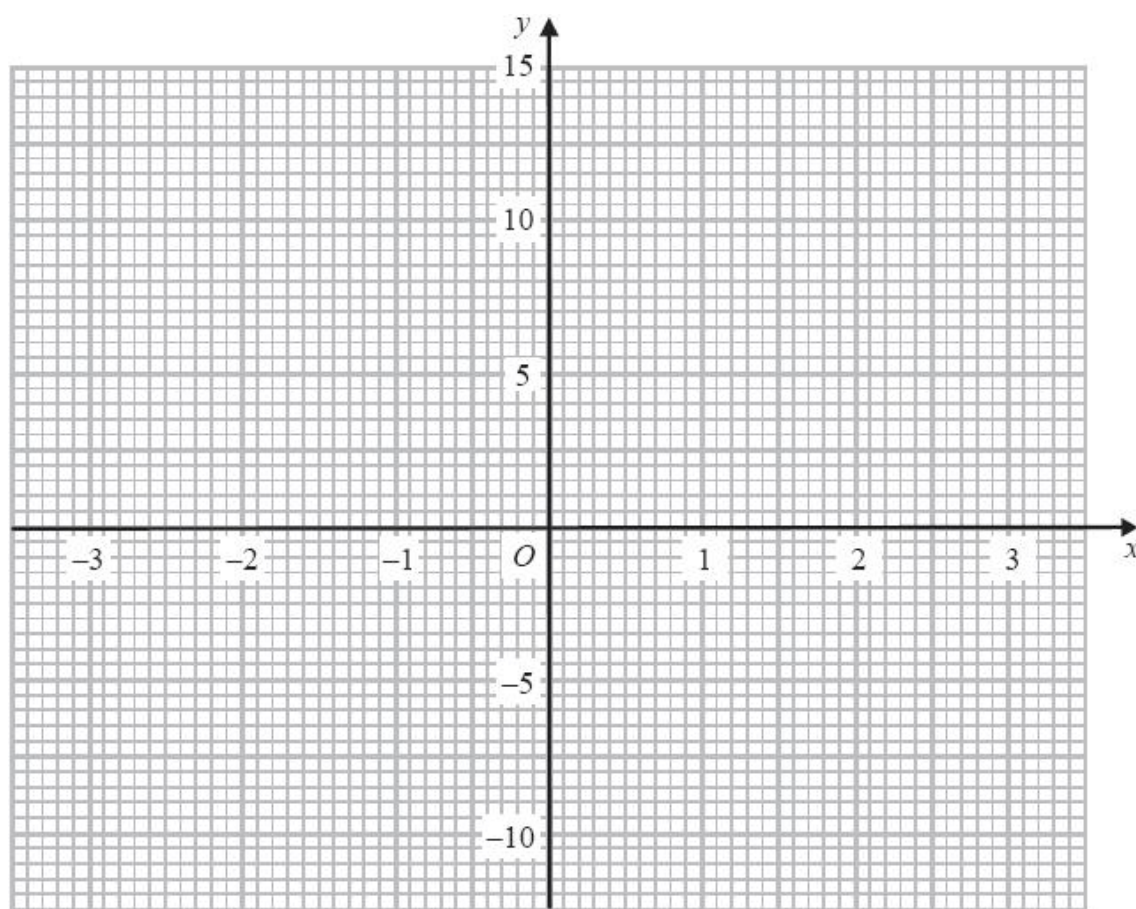
**Q24.**

(a) Complete the table of values for  $y = x^3 - 5x + 2$

$x$	-3	-2	-1	0	1	2	3
$y$		4			-2		14

(2)

(b) On the grid, draw the graph of  $y = x^3 - 5x + 2$  for  $-3 \leq x \leq 3$



(2)

The equation  $x^3 - 6x + m = 0$ , where  $m$  is an integer, has one negative solution and two positive solutions.

(c) Given that  $x = 1$  is one of the positive solutions, show that  $m = 5$

(1)

(d) By drawing a suitable straight line on the grid, find an estimate for the negative solution of  $x^3 - 6x + 5 = 0$ . Give your estimate to 1 decimal place.

(2)

(Total for question = 7 marks)





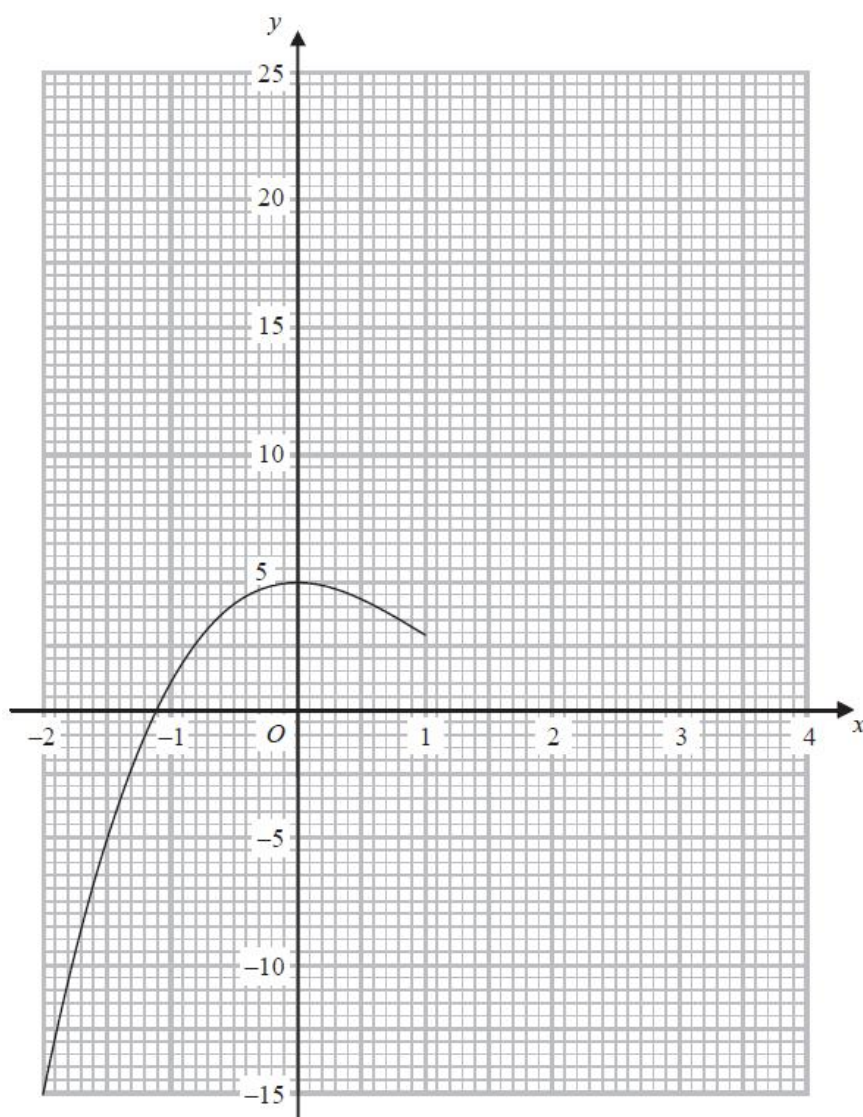
**Q25.**

(a) Complete the table of values for  $y = x^3 - 3x^2 + 5$

$x$	-2	-1	0	1	2	3	4
$y$	-15	1	5	3			

(1)

(b) On the grid, complete the graph of  $y = x^3 - 3x^2 + 5$  for  $-2 \leq x \leq 4$



(1)

(c) Use the graph to find an estimate for the solution of the equation  $x^3 - 3x^2 + 5 = 0$

(1)

(d) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation

$$x^3 - 3x^2 + 2x + 4 = 0$$

(3)

(Total for question = 6 marks)



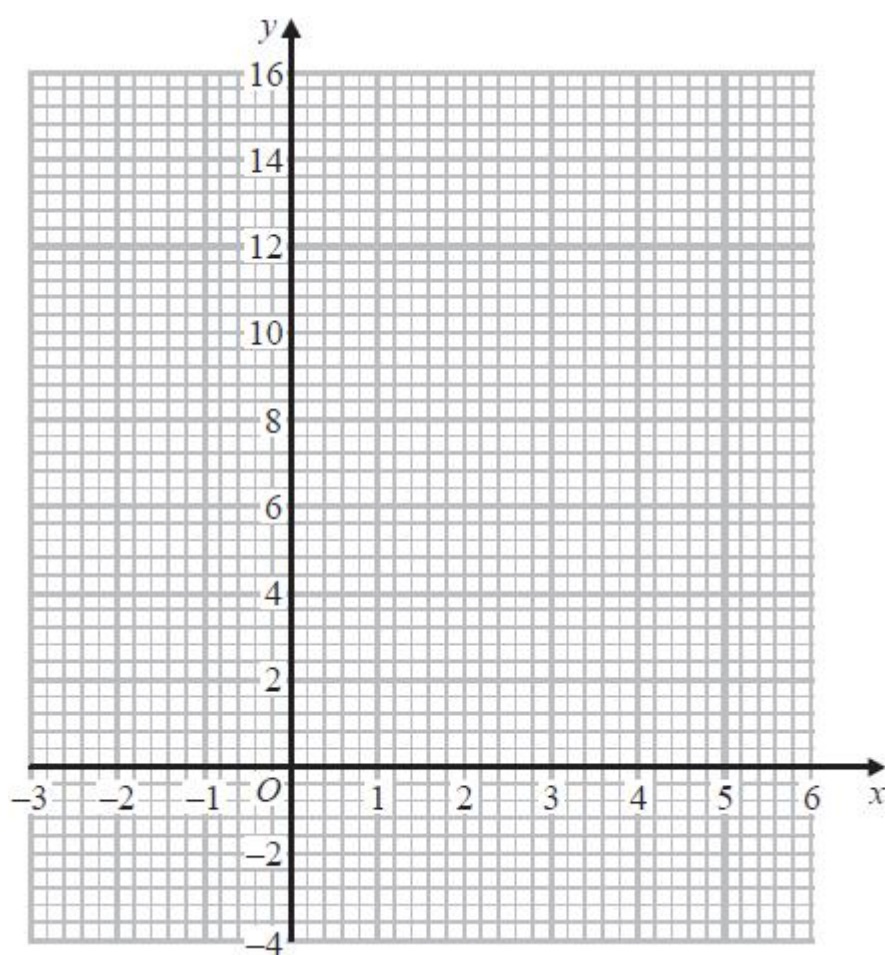
**Q26.**

(a) Complete the table of values for  $y = x^2 - 4x + 2$

$x$	-2	-1	0	1	2	3	4	5
$y$	14		2			-1	2	

(2)

(b) On the grid, draw the graph of  $y = x^2 - 4x + 2$  for values of  $x$  from -2 to 5



(2)

The point  $P(k, 4)$  where  $k > 0$  lies on the graph of  $y = x^2 - 4x + 2$

(c) Use your graph to find an estimate for the value of  $k$ .

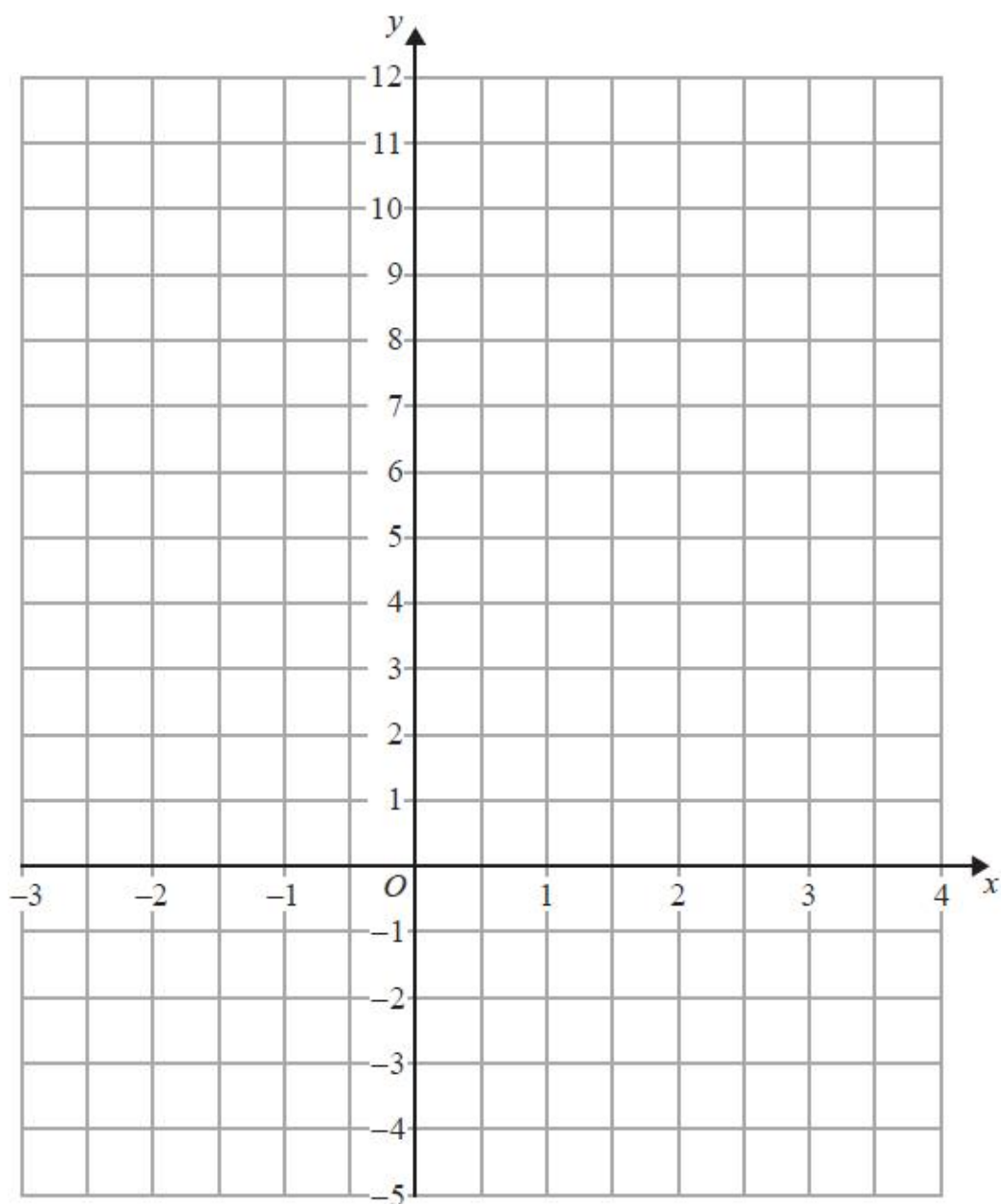
(1)

**(Total for question = 5 marks)**



**Q27.**

(a) On the grid, draw the graph of  $y = 3x + 2$  for values of  $x$  from  $-2$  to  $3$



(3)

(b) Mark with a cross (x) a point on the grid that satisfies both the inequalities

$$x > 2 \text{ and } y > 3x + 2$$

Label this point  $P$ .

(2)

**(Total for question = 5 marks)**



Q28.

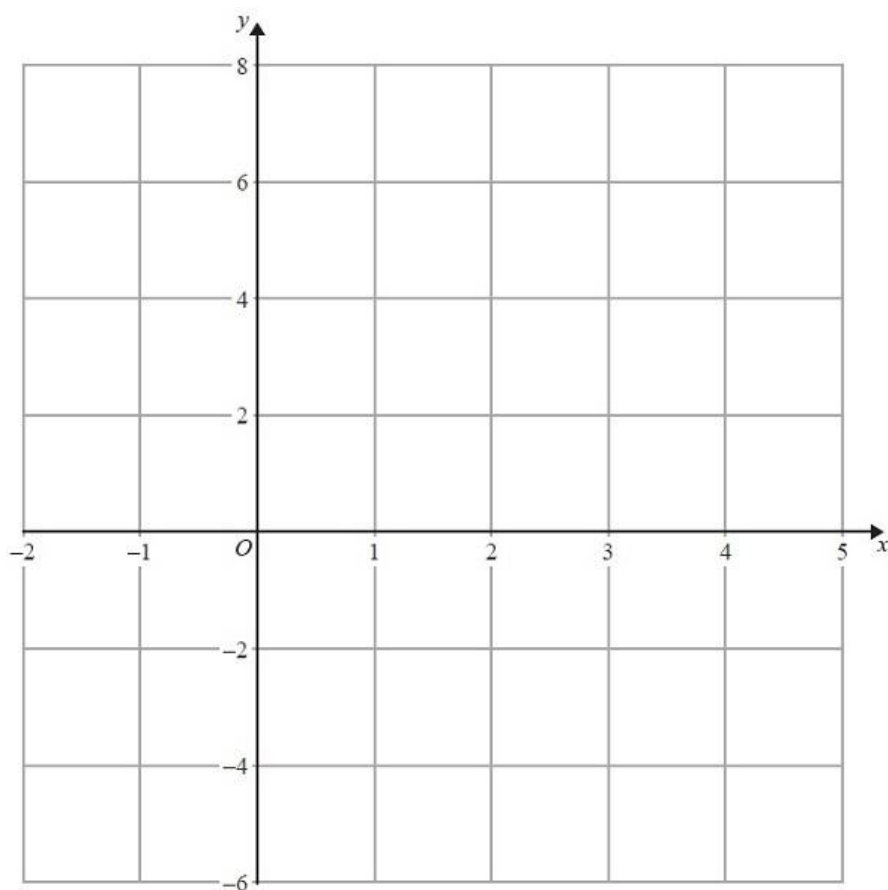
(a) Complete the table of values for  $2x + y = 4$

$x$	-1	2	4
$y$			

(2)

(b) On the grid, draw the graph of  $2x + y = 4$  for values of  $x$  from -1 to 4

(2)



(c) Show, by shading on the grid, the region which satisfies **all three** of the inequalities

$$x \geq -1, y \geq 2 \text{ and } 2x + y \leq 4$$

Label the region **R**.

(2)

(Total for question = 6 marks)



**Q29.**

$$-4 \leq 2y < 6$$

$y$  is an integer.

(a) Write down all the possible values of  $y$ .

(2)

(b) Solve the inequality  $7t - 3 \leq 2t + 31$

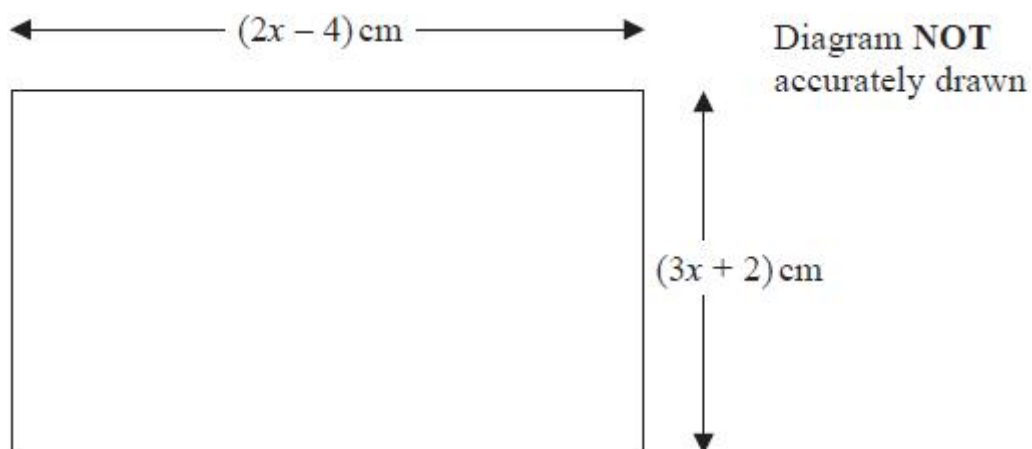
Show your working clearly.

(2)

**(Total for question = 4 marks)**

**Q30.**

The diagram shows a rectangle.



The area of the rectangle is  $A \text{ cm}^2$

Given that  $A < 3x + 27$

find the range of possible values for  $x$ .

**(Total for question = 5 marks)**

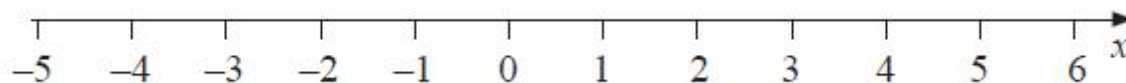
**Q31.**

(a) Solve  $x^2 + 2x > 6x + 5$

(3)



(b) Represent your solution set to part (a) on the number line below.



(1)

(Total for question = 4 marks)

**Q32.**

Here are the first five terms of an arithmetic sequence.

8      15      22      29      36

Work out the sum of all the terms from the 50th term to the 100th term inclusive.

(Total for question = 4 marks)

**Q33.**

The sum of the first 48 terms of an arithmetic series is 4 times the sum of the first 36 terms of the same series.

Find the sum of the first 30 terms of this series.

(Total for question = 5 marks)

**Q34.**

Here are the first five terms of a number sequence.

7      11      15      19      23

(a) Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.

(2)

The  $n$ th term of a different number sequence is given by  $80 - 2n$

(b) Write down the first 3 terms of this sequence.

(2)

Yuen says there are no numbers that are in both of the sequences.  
Yuen is correct.

(c) Explain why.

(1)

(Total for question = 5 marks)



**Q35.**

The 3rd term of an arithmetic series,  $A$ , is 19  
The sum of the first 10 terms of  $A$  is 290

Find the 10th term of  $A$ .

**(Total for question = 5 marks)**

**Q36.**

Here are the first five terms of an arithmetic sequence.

7    10    13    16    19

Find the sum of the first 100 terms of this sequence.

**(Total for question = 2 marks)**

**Q37.**

$(2x + 23)$ ,  $(8x + 2)$  and  $(20x - 52)$  are three consecutive terms of an arithmetic sequence.

Prove that the common difference of the sequence is 12

**(Total for question = 4 marks)**



## Mark Scheme

Q1.

Q	Working	Answer	Mark	Notes
	$4 \times (5 - x)$ or $5 \times (2x - 1)$ or $20 - 4x$ or $10x - 5$ oe		4	M1 for setting up a correct algebraic expression for area $A$ or area $B$ (could be seen as part of an equation) (condone lack of brackets for multiplying if meaning is clear for this mark only)
	<div>                     one from:  <math>4(5 - x) = 20 - 4x</math>                      or  <math>2 \times 4(5 - x) = 40 - 8x</math>                      or  <math>0.5 \times 4(5 - x) = 10 - 2x</math>                      oe                 </div> <div>                     and one from:  <math>5(2x - 1) = 10x - 5</math>                      or  <math>2 \times 5(2x - 1) = 20x - 10</math>                      or  <math>0.5 \times 5(2x - 1) = 5x - 2.5</math>                      oe                 </div>			M1 for expanding 2 sets of brackets correctly (one for each shape) [allow $\times 2$ or $\div 2$ for the wrong shape for this mark] Need not be in an equation at this stage.
	eg $10x + 8x = 40 + 5$ or $-5 - 40 = -10x - 8x$ or $18x = 45$ or $-45 = -18x$ or $4x + 5x = 20 + 2.5$ oe			M1 for a <u>correct</u> equation with terms in $x$ on one side and number terms the other side
	<i>Working required</i>	2.5		A1 oe dep on M1
				<b>Total 4 marks</b>





Q2.

Question	Working	Answer	Mark	Notes
(a)	e.g. $\frac{1}{2} \times (x+5+3x-2) \times (2x-3)$ or $0.5(4x+3)(2x-3)$ oe  eg. $\frac{1}{2} \times (8x^2 - 12x + 6x - 9) = 133$ or $8x^2 - 12x + 6x - 9 = 266$	shown	3	M1 correct algebraic expression for area  M1 for correct equation with brackets expanded  A1 for completion to given equation dep on M2
(b)	$\frac{- -6 \pm \sqrt{36 - -8800}}{2 \times 8} \text{ or } \frac{6 \pm \sqrt{36 + 8800}}{16} \text{ or } \frac{6 \pm \sqrt{8836}}{16}$ or $(4x - 25)(2x + 11) (=0)$	6.25 oe	3	M2 If not M2 then award M1 for $\frac{- -6 \pm \sqrt{(-6)^2 - 4 \times 8 \times -275}}{2 \times 8}$ Condone one sign error in substitution; allow evaluation of individual terms e.g. 36 in place of $(-6)^2$ [allow $-6^2$ or $6^2$ in place of $(-6)^2$ , throughout allow + rather than $\pm$ ] or $(4x \pm 25)(2x \pm 11) (=0)$  (if student gains M1 and shows both answers the 2 <sup>nd</sup> M1 can be awarded)  ft from an incorrect 3 term quadratic equation  A1 dep on M1 and 6.25 oe alone given as final answer



**Q3.**

The correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
	$\frac{A}{4\pi} = r^2$		2	M1
		$\sqrt{\frac{A}{4\pi}}$		A1 accept equivalents eg. $\frac{\sqrt{A\pi}}{2\pi}$ , $\frac{1}{2}\sqrt{\frac{A}{\pi}}$
				<b>Total 2 marks</b>

**Q4.**

Question	Working	Answer	Mark	Notes
	$5t - 5g = 2t + 7$			M1 for expanding bracket within the equation or division of all terms by 5
	$5t - 2t = 7 + 5g$			M1 (ft a 4 term equation) to isolate terms in $t$
		$t = \frac{5g + 7}{3}$	3	A1 oe
				<b>Total 3 marks</b>

**Q5.**

Ques	Working	Answer	Mark		Notes
	$cxy + dy = ax + b$			M1	both terms in original denominator multiplied by $y$
	e.g. $cxy - ax = b - dy$ or $dy - b = ax - cxy$			M1	for isolating terms in $x$ and non $x$ terms correctly ft from $cxy + d = ax + b$ or $cx + dy = ax + b$
	$x(cy - a) = b - dy$			M1	for taking out a factor of $x$ correctly provided there are two terms in $x$
		$x = \frac{b - dy}{cy - a}$	4	A1	for $x = \frac{b - dy}{cy - a}$ oe e.g. $x = \frac{dy - b}{a - cy}$
					<b>Total 4 marks</b>



Q6.

Question	Working	Answer	Mark	Notes
	$y^2 = \frac{3x-2}{x+1}$			M1 squaring both sides to get a correct equation
	$xy^2 + y^2 = 3x - 2$ oe			M1 for multiplying by the denominator <b>and</b> expanding the bracket
	$y^2 + 2 = x(3 - y^2)$ oe			M1 for isolating terms in x <b>and</b> factorising the correct expression of the equation
		$x = \frac{2+y^2}{3-y^2}$	4	A1 accept $x = \frac{-2-y^2}{y^2-3}$ oe
				<b>Total 4 marks</b>

Q7.

Question	Working	Answer	Mark	Notes
	$y^2 = ay^2 + n$		5	M1
	$y^2 - ay^2 = n$ or $1 = a + \frac{n}{y^2}$ or $1 - a = \frac{n}{y^2}$			M1 isolate terms in $y^2$ or divide through by $y^2$
	$y^2(1 - a) = n$			M1 take out $y^2$ as a common factor
	$y^2 = \frac{n}{1 - a}$			M1 $y^2$ as subject
		$\sqrt{\frac{n}{1-a}}$		A1 accept $\sqrt{\frac{-n}{a-1}}$
				<b>Total 5 marks</b>



**Q8.**

Question	Working	Answer	Mark	Notes
	$A = (4 - \pi)r^2$ or $\frac{A}{r^2} = 4 - \pi$		3	M1
	$r^2 = \frac{A}{4 - \pi}$			M1 for isolating $r^2$
		$\sqrt{\frac{A}{4 - \pi}}$		A1 Also accept $\pm \sqrt{\frac{A}{4 - \pi}}$
				<b>Total 3 marks</b>

**Q9.**

Question	Working	Answer	Mark	Notes
	e.g. $n^2 - (n - 1)^2$ or $(n + 1)^2 - n^2$		3	M1 for setting up a correct algebraic expression (any letter can be used)
	e.g. $n^2 - n^2 + 2n - 1$ or $n^2 + 2n + 1 - n^2$			M1 Correct expansion of brackets and correct signs or a correct result
		e.g. $2n - 1$ is always odd		A1 dep on M2 for eg $2n - 1$ or $2n + 1$ or $-(2n + 1)$ oe <b>and</b> a suitable conclusion  SCB1 for eg $(2n)^2 - (2n - 1)^2$ or $(2n + 1)^2 - (2n)^2$ oe
				<b>Total 3 marks</b>



Q10.

Question	Working	Answer	Mark	Notes
(a)	$R = kt^2$ oe		3	M1 Equation consistent with $R \propto t^2$
	eg $10 = k \times 2^2$ or $40 = k \times 4^2$ or $k = 2\frac{1}{2}$			M1 Substitute values at any point on the graph or find the value of $k$ . (Implies first M1.) Allow readings from graph for $t \pm 0.1$ and $R \pm 1$
		$R = \frac{5}{2}t^2$		A1 Award for $R = kt^2$ if the value of $k$ is shown clearly in (a) or (b).
(b)	$\frac{8}{5x} = \frac{5}{2}t^2$		2	M1 ft dep on answer of the form $R = kt^2$
		$t = \frac{0.8}{\sqrt{x}}$		A1 ft dep on answer of the form $R = kt^2$ Simplification of constant is not required. eg accept $t = \sqrt{\frac{16}{25}} \times \frac{1}{\sqrt{x}}$ [allow other clear arguments that clearly shows $t$ is inversely proportional to $\sqrt{x}$ ]
				<b>Total 5 marks</b>





Q11.

Q	Working	Answer	Mark	Notes	
	eg. $2n + 1, 2n + 3$			M1	for algebraic representation of two consecutive odd numbers
	$(2n + 3)^2 - (2n + 1)^2 =$ $(4n^2 + 6n + 6n + 9) - (4n^2 + 2n + 2n + 1)$			M1	for correct expansion of at least one bracket
	$8n + 8$			M1	for simplified answer, may be factorised
		proof	4	A1	for completion of proof
					<b>Total 4 marks</b>

Q12.

Question	Working	Answer	Mark	Notes	
(a)	$T = k\sqrt{x}$		3	M1	or for $T = \sqrt{mx}$ $k$ may be numeric (but not 1)
	$400 = k\sqrt{625}$ or $k = 16$ or $400 = \sqrt{m625}$ or $m = 256$			M1	implies the first M1
		$T$ $= 16\sqrt{x}$		A1	accept $T = \sqrt{256x}$ Award 3 marks if $T = k\sqrt{x}$ but $k$ is evaluated correctly in part (a) or (b). SC: B2 for correct formula for $x$ in terms of $T$
(b)		120	1	B1	fit for a correct answer from a substitution into an equation (or expression) in the form $(T =) k\sqrt{x}$ except for $k = 1$
					<b>Total 4 marks</b>



Q13.

Q	Working	Answer	Mark	Notes
(a)	$t = kf^2$		3	M1 for $t = kf^2$ but not for $t = f^2$ Also award for correct equation in $t, f^2$ and a constant or for $t = \text{some numerical value} \times f^2$
	$0.02 = k \times 8^2$ or $k = \frac{1}{3200}$ or $k = 0.0003125$ or $3.125 \times 10^{-4}$			M1 for $0.02 = k \times 8^2$ or for correct substitution into an equation which scores the first method mark (may be implied by correct evaluation of the constant)
		$t =$ $0.0003125f^2$ or $t =$ $= \frac{1}{3200}f^2$		A1 Award 3 marks if answer is $t = kf^2$ but $k$ is evaluated in part (b)
(b)	$f^2 = \frac{0.0098}{0.0003125}$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$		2	M1 for substitution and rearrangement into form $f^2 = \frac{0.0098}{k}$ with their value of $k$ except for $k = 1$ or $f^2 = \frac{0.0098}{0.02} \times 8^2$
		5.6 oe		A1
				<b>Total 5 marks</b>



Q14.

Question	Working	Answer	Mark	Notes
(a)	$P = \frac{k}{q^2}$	$p = \frac{51.2}{q^2}$	3	M1 Allow $Pq^2 = k$ or $q^2 = \frac{k}{p}$  Do not allow $P = \frac{1}{q^2}$
	$12.8 = \frac{k}{2^2}$ oe or $k = 12.8 \times 2^2$ or $k = 51.2$			M1 For correct substitution in a correct equation. Implies first M1 Award M2 if $k = 51.2$ stated unambiguously
				A1 Award 3 marks if answer is $P = \frac{k}{q^2}$ but $k$ is evaluated in (a) or (b) SCB2 for $Pq^2 = 51.2$ or $q^2 = \frac{51.2}{p}$
(b)	$\frac{51.2}{8^2}$	0.8	1	B1ft ft equation in the form $P = \frac{k}{q^2}$ oe
				<b>Total 4 marks</b>





**Q15.**

The correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
	$A = KT^2$ and $A = kr^3$ or $T^2 = \frac{k}{K}r^3$ or $T^2 = pr^3$ $r^3 = \frac{K}{k}T^2$ or $r^3 = qT^2$		4	M1 condone the same constant used in both equations  <b>NB: Values may be substituted in place of the variables</b>
	$47^2 = \frac{k}{K}0.25^3$ or $47^2 = m0.25^3$ or $\frac{47^2}{0.25^3} (= 141376)$ or $\frac{0.25^3}{47^2} (= \frac{1}{141376} = 7.07(3\dots) \times 10^{-6})$			M1  <b>NB: 2209 may be seen in place of <math>47^2</math></b>  $\frac{1}{64}$ or 0.015625 may be seen in place of $0.25^3$
	$(r^3 =) \frac{0.25^3}{47^2} \times 365^2$ or $365^2 \div 141376$ or $365^2 \times 7.07(3\dots) \times 10^{-6}$ or 0.942...			M1
		0.980		A1 awrt 0.980 accept 0.98
				<b>Total 4 marks</b>



Q16.

Q	Working	Answer	Mark	Notes
	$2y = 6$ or $4x = -6$	$x = -1.5y = 3$	3	M1 Adding or subtracting correctly or correct substitution leading to one correct equation and one unknown. A1 A1 dep on M1 awarded otherwise M0A0
				<b>Total 3 marks</b>

Q17.

Question	Working	Answer	Mark	Notes
	e.g. $4x + 5y = 4$ $4x - 2y = 18$ with the operation of subtraction  $4x + 5y = 4$ $10x - 5y = 45$ With the operation of adding  $y = 2x - 9$ and $4x + 5(2x - 9) = 4$	$x = 3.5$ oe, $y = -2$	3	M1 for correct method to eliminate one variable – multiplying one or both equations so the coefficient of $x$ or $y$ is the same in both with the intention to add or subtract to eliminate one variable (condone one arithmetic error) or isolating $x$ or $y$ in one equation and substituting into the other equation  M1 (dep) for substitution of found variable into one equation or correct method to eliminate second variable  A1 Dep on M1



Q18.

Q	Working	Answer	Mark	Notes
	<b>Elimination</b> E.g. $21x - 6y = 102$ $21x + 35y = -21$ $(-41y = 123)$ or $35x - 10y = 170$ $6x + 10y = -6$ $(41x = 164)$	<b>Substitution</b> E.g. $3\left(\frac{34+2y}{7}\right) + 5y = -3$ or $3x + 5\left(\frac{7x-34}{2}\right) = -3$ or $7\left(\frac{-3-5y}{3}\right) - 2y = 34$ or $7x - 2\left(\frac{-3-3x}{5}\right) = 34$	4	M1 for a correct method to eliminate $x$ or $y$ : coefficients of $x$ or $y$ the same <b>and</b> correct operation to eliminate selected variable (condone 1 arithmetical error)  or  for correctly writing $x$ or $y$ in terms of the other variable and correctly substituting
				A1 dep on M1 for $x = 4$ or $y = -3$
	E.g. $7x - 2 \times -3 = 34$			M1 dep on M1 for substitution of found variable  or  repeating the steps in first M1 for the second variable
		$x = 4$ $y = -3$		A1 cao A correct answer without working scores no marks
				<b>Total 4 marks</b>



Q19.

Q	Working	Answer	Mark	Notes
	$3y(2y+1) - y^2 = 8$ or $x = \frac{8+y^2}{3y} \rightarrow \frac{8+y^2}{3y} - 2y = 1$ or $-3xy - y^2 = 8$ $3xy - 3y \times 2y = 3y \times 1$ oe	$3x\left(\frac{x-1}{2}\right) - \left(\frac{x-1}{2}\right)^2 = 8$ oe		M1 correct first step eg substitution by eg $x = 1 + 2y$ or $y = \frac{x-1}{2}$ to get an equation in a single variable or writing 2 <sup>nd</sup> equation with $x$ the subject and substituting into 1 <sup>st</sup> or multiplying 2 <sup>nd</sup> equation by $3y$ and subtracting from 1 <sup>st</sup> oe
	eg $5y^2 + 3y - 8 (= 0)$	eg $5x^2 - 4x - 33 (= 0)$		A1 for a correct simplified quadratic
	$(5y+8)(y-1) (= 0)$ or $\frac{-3 \pm \sqrt{3^2 - 4 \times 5 \times (-8)}}{2 \times 5}$	$(5x+11)(x-3) (= 0)$ or $\frac{4 \pm \sqrt{(-4)^2 - 4 \times 5 \times (-33)}}{2 \times 5}$		M1ft dep on M1 for solving their 3 term quadratic equation using any correct method (allow one sign error and some simplification – allow as far as $\frac{-3 \pm \sqrt{9+160}}{10}$ ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct)
	$y = -\frac{8}{5}$ and $y = 1$ (both)	$x = -\frac{11}{5}$ and $x = 3$ (both)	5	A1 dep on first M1
		$x = -\frac{11}{5}, y = -\frac{8}{5}$ $x = 3, y = 1$		A1 oe dep on first M1 Must be paired correctly
				<b>Total 5 marks</b>





Q20.

Question	Working	Answer	Mark	Notes
	$x^2 + (x+2)^2 - 2(x+2) = 24$		5	M1 for substituting linear equation into the quadratic equation
	$2x^2 + 2x - 24 (=0)$ or $x^2 + x - 12 (=0)$ or $2x^2 + 2x = 24$ or $x^2 + x = 12$			A1 for a correct equation in the form $ax^2 + bx + c = 0$ or $ax^2 + bx = -c$
	$(x+4)(x-3) (=0)$ or $x = \frac{-1 \pm \sqrt{1^2 - (4 \times 1 \times -12)}}{2 \times 1}$ or $\left(x - \frac{1}{2}\right)^2 - \left(\frac{1}{2}\right)^2 - 12 = 0$			M1ft dep on M1 for solving their quadratic equation using any correct method (allow one sign error and some simplification – allow as far as $\frac{-1 \pm \sqrt{1+48}}{2}$ ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct)
	$x = -4$ and $x = 3$			A1 for both $x$ values dep on M1
	$(-4, -2)$ and $(3, 5)$	$(-4, -2)$ and $(3, 5)$		A1 for both solutions dep on M1

Question	Working	Answer	Mark	Notes
<b>Alternative mark scheme</b>				
	$(y-2)^2 + y^2 - 2y = 24$		5	M1 for substituting linear equation into the quadratic equation
	$2y^2 - 6y - 20 (=0)$ or $y^2 - 3y - 10 (=0)$ $2y^2 - 6y = 20$ or $y^2 - 3y = 10$			A1 for a correct equation in the form $ay^2 + by + c = 0$ or $ay^2 + by = -c$
	$(y-5)(y+2) = 0$ or $y = \frac{- -3 \pm \sqrt{(-3)^2 - (4 \times 1 \times -10)}}{2 \times 1}$ or $\left(y - \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 - 10 = 0$			M1ft dep on M1 for solving their quadratic equation using any correct method (allow one sign error and some simplification – allow as far as $\frac{3 \pm \sqrt{9+40}}{2}$ ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct
	$y = 5$ and $y = -2$			A1 for both $y$ values dep on M1
	$(-4, -2)$ and $(3, 5)$	$(-4, -2)$ and $(3, 5)$		A1 for both solutions dep on M1
				<b>Total 5 marks</b>



Q21.

Question	Working	Answer	Mark	Notes
(a)	$4y = 10 - 3x$ or $4y = 3x - 10$		3	M1 May be implied by second M1 or by $y = -\frac{3}{4}x + c$ even if value of $c$ is incorrect or find coordinates of 2 points the line eg (0, 25), $x = 2$ , $y = 1$ , table, diagram.
	$y = \frac{5}{2} - \frac{3}{4}x$ oe or $y = \frac{10}{4} - \frac{3}{4}x$ oe or $y = \frac{10-3x}{4}$ oe			M1 or for clear attempt to evaluate $\frac{\text{vert diff}}{\text{horiz diff}}$ for their pts
		$-\frac{3}{4}$		A1 Award 3 marks for correct answer if either first M1 scored or no working shown.  SC If M0, award B1 for $-\frac{3}{4}x$
(b)	$9x + 12y = 30$  $10x - 12y = 46$	$15x + 20y = 50$  $15x - 18y = 69$	5	M1 for coefficients of $x$ or $y$ the same or for correct rearrangement of one equation followed by substitution in the other  eg $5x - 6\left(\frac{10-3x}{4}\right) = 23$
	$x = 4$	$y = -\frac{1}{2}$		A1 cao dep on M1
				M1 (dep on 1st M1) for substituting for other variable
		$x = 4, y = -\frac{1}{2}$		A1 Award 4 marks for correct values if at least first M1 scored
		$(4, -\frac{1}{2})$		B1 Award 5 marks for correct answer if at least first M1 scored ft from their values of $x$ and $y$
				Total 8 marks



Q22.

Q	Working		Answer	Mark	Notes
	<b>Elimination</b>				
	$5a + 3p = 1.96$ and $3a + 2p = 1.22$ oe or $5a + 3p = 196$ and $3a + 2p = 122$ oe		M2 for an arithmetical method (must see the calculation to find 0.22 or 0.26 or 0.74 and 0.48 oe)	5	M1 for setting up both equations oe Allow the use of apples and pears oe throughout, e.g. 5 apples + 3 pears = 1.96 and 3 apples + 2 pears = 1.22
	E.g. $15a + 9p = 5.88$ $15a + 10p = 6.10$ Subtracting $(-p = -0.22)$	E.g. $10a + 6p = 3.92$ $9a + 6p = 3.66$ Subtracting $(a = 0.26)$	E.g. $6.1(0) - 5.88 (= 0.22)$ oe or $3.92 - 3.66 (= 0.26)$ oe or $1.96 - 1.22 (= 0.74)$ oe and $1.22 - "0.74" (= 0.48)$		M1 for a correct method to eliminate $a$ or $p$ : coefficients of $a$ or $p$ the same and correct operation to eliminate selected variable (condone any one arithmetic error) or to find the cost of 1 apple and 1 pear
	E.g. $5a + 3p = 1.96$ and $6a + 4p = 2.44$ oe Subtracting				
	E.g. $5a + 3("0.22") = 1.96$ or $3a + 2("0.22") = 1.22$	E.g. $5("0.26") + 3p = 196$ or $3("0.26") + 2p = 1.22$	E.g. $3 \times 0.22 (= 0.66)$ $1.96 - "0.66" (= 1.3(0))$ $"1.3(0)" \div 5 (= 0.26)$ or $5 \times 0.26 (= 1.3(0))$ $1.96 - "1.3(0)" (= 0.66)$ $"0.66" \div 3 (= 0.22)$ or Apple and pear is 0.48 oe		M1 (dep on M2) for substituting their value found (must be $> 0$ ) of one variable into one of the equations or for repeating above method to find second variable or for third working column allow $k(a + p) = k(0.48)$ or for a complete arithmetical method to find the other value
	E.g. $a + p = 0.48$ oe				
	$10 \times "0.26" + 10 \times "0.22"$ or $(a + p) 0.48 \times 10$ oe or $k(a + p) = k(0.48) \times \frac{10}{k}$				M1 (dep on M3) can be implied by $10(a + p)$ provided $a$ and $p$ must be $> 0$
	<i>Working required</i>		4.8(0)	A1 dep M2	
					<b>Total 5 marks</b>





Substitution			
$5a + 3p = 1.96$ and $3a + 2p = 1.22$ oe <b>or</b> $5a + 3p = 196$ and $3a + 2p = 122$ oe		5	M1 for setting up both equations oe Allow the use of apples and pears oe throughout, e.g. 5 apples + 3 pears = 1.96 and 3 apples + 2 pears = 1.22
E.g. $3\left(\frac{1.96 - 3p}{5}\right) + 2p = 1.22$ or $5\left(\frac{1.22 - 2p}{3}\right) + 3p = 1.96$ or $3a + 2\left(\frac{1.96 - 5a}{3}\right) = 1.22$ or $5a + 3\left(\frac{1.22 - 3a}{2}\right) = 1.96$ or $p = 0.22$ or $a = 0.26$			M1 for correctly writing $a$ or $p$ in terms of the other variable <b>and</b> correctly substituting (condone any one arithmetic error)
E.g. $(a =) \frac{1.96 - 3(0.22)}{5}$ or $(a =) \frac{1.22 - 2(0.22)}{3}$ or $(p =) \frac{1.96 - 5(0.26)}{3}$ or $(p =) \frac{1.22 - 3(0.26)}{2}$			M1 (dep on M2) for substituting their value found (must be $> 0$ ) of one variable into one of the equations or  for repeating above method to find second variable
$10 \times "0.26" + 10 \times "0.22"$			M1 (dep on M3) can be implied by $10(a + p)$ provided $a$ and $p$ must be $> 0$
<i>Working required</i>	4.8(0)		A1 dep M2
			<b>Total 5 marks</b>





Q23.

Q	Working	Answer	Mark	Notes
	$(1-2y)^2 - 9y - (1-2y) = 2y^2 - 12$ $x^2 - 9\left(\frac{1-x}{2}\right) - x = 2\left(\frac{1-x}{2}\right)^2 - 12$		5	M1 substitution of linear equation into quadratic
	e.g. $2y^2 - 11y + 12 (= 0)$ oe allow $2y^2 - 11y = -12$ oe e.g. $x^2 + 9x + 14 (= 0)$ oe allow $x^2 + 9x = -14$ oe			A1 (dep on M1) writing the correct quadratic expression in the form $ax^2 + bx + c (= 0)$ allow $ax^2 + bx = c$
	e.g. $(2y-3)(y-4)(=0)$ $(y =) \frac{11 \pm \sqrt{(-11)^2 - 4 \times 2 \times 12}}{2 \times 2}$ e.g. $2\left[\left(y - \frac{11}{4}\right)^2 - \left(\frac{11}{4}\right)^2\right] = -12$ oe	e.g. $(x+7)(x+2)(=0)$ $(x =) \frac{-9 \pm \sqrt{9^2 - 4 \times 1 \times 14}}{2}$ e.g. $\left(x + \frac{9}{2}\right)^2 - \left(\frac{9}{2}\right)^2 = -14$		M1 (dep on M1) for a complete method to solve their 3-term quadratic equation (allow one sign error and some simplification – allow as far as $\frac{11 \pm \sqrt{121 - 72}}{4}$ or $\frac{-9 \pm \sqrt{81 - 56}}{2}$ )
	$y = \frac{3}{2}$ oe and $y = 4$	$x = -7$ and $x = -2$		A1 (dep on M1) both x-values or both y-values
		$x = -2,$ $y = \frac{3}{2}$ oe and $x = -7,$ $y = 4$		A1 (dep on first M1) must be paired correctly
				<b>Total 5 marks</b>



**Q24.**

Question	Working	Answer	Mark	Notes
(a)		-10, (4), 6, 2, (-2), 0, (14)	2	B2 Award B1 for any 2 correct.
(b)	$(-3, -10), (-2, 4), (-1, 6), (0, 2), (1, -2), (2, 0), ((3, 14),$	Correct curve	2	B2 For the correct smooth curve.  B1 for at least 5 points plotted correctly; ft from table for plotting only provided at least B1 scored in (a).
(c)	$1^3 - 6 \times 1 + m = 0$ or $1 - 6 + m = 0$	5	1	B1
(d)				M1 $y = x - 3$ drawn
		-2.7 to -2.9	2	A1 ft from graph (dep on M1)
				<b>Total 7 marks</b>

**Q25.**

Apart from d, where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
(a)		1, 5, 21	1	B1
(b)		correct curve	1	B1 Correct curve through (1,3), (2, 1), (3, 5), and (4, 21).
(c)		-1.1	1	B1 Accept $-1.15 \leq x \leq -1.05$
(d)	$y = 1 - 2x$ drawn			M2 Line must be long enough to cross curve and verify accuracy. M1 for $x^3 - 3x^2 + 5 = -2x + 1$ or $y = -2x + 1$ oe
		-0.8	3	A1 dep on M2 Accept $-0.9 \leq x \leq -0.7$
				<b>Total 6 marks</b>



Q26.

Ques		Working	Answer	Mark	Notes	
	a		7, -1, -2, 7	2	B2 B1	all correct for 2 or 3 correct
	b		Correct curve	2	M1 A1	for plotting at least 6 points correctly from their table (dep on B1 earned in (a)) fully correct curve
	c		4.4 – 4.5	1	B1	fit any parabola with 2 intersections with $y = 4$ , 1 value for $x$ only. Condone eg (4.4, 4)
					<b>Total 5 marks</b>	



**Q27.**

The correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
(a)	$(-2, -4), (-1, -1), (0, 2), (1, 5), (2, 8), (3, 11)$	correct line drawn from between $x = -2$ and $x = 3$	3	<p>B3 For a correct line between <math>x = -2</math> and <math>x = 3</math>.</p> <p>B2 If not B3, then B2 for:</p> <ul style="list-style-type: none"> <li>at least 2 correct points plotted or</li> <li>for a line passing through at least 2 correct points or</li> <li>for a line drawn with positive gradient through <math>(0, 2)</math> and clear intention to use a gradient of 3 (eg. a line through <math>(0, 2)</math> and <math>(0.5, 5)</math>)</li> </ul> <p>B1 If not B2 then B1 for:</p> <ul style="list-style-type: none"> <li>at least 2 correct points stated (may be in a table) or</li> <li>for a line drawn with a positive gradient through # <math>(0, 2)</math> or</li> <li>for a line with gradient 3.</li> </ul>
(b)		correct point	2	<p>M1 fit for a point marked above their <math>y = 3x + 2</math> if at least B1 scored in (a) or for a point to the right of <math>x = 2</math></p> <p>A1 Point marked above <math>y = 3x + 2</math> and to the right of <math>x = 2</math> (not on lines). Label <math>P</math> may be omitted if unambiguous. SCB1 for the correct region identified by either shading in or shading out.</p>
				<b>Total 5 marks</b>



Q28.

Question	Working	Answer	Mark	Notes
(a)		6, 0, -4	2	B2 Award B1 for any one correct.
(b)	(-1, 6), (2, 0), (4, -4)	correct line	2	M1ft Plot any two points, from table with no ft errors, (dependent on B1). A1 Straight line joining (-1, 6) to (4, -4) or better.
(c)			2	M1 Draw lines $x = -1$ and $y = 2$ A1 Correct region identified (R need not be labelled). Accept shaded or unshaded.
Total 6 marks				

Q29.

Q	Working	Answer	Mark	Notes
(a)		-2, -1, 0, 1, 2	2	B2 (B1 for 4 correct values and no incorrect values (eg -1, 0, 1, 2) or for 6 values with no more than one incorrect value (eg -2, -1, 0, 1, 2, 3))
(b)	$7t - 2t \leq 31 + 3$ or $5t \leq 34$ or $-3 - 31 \leq 2t - 7t$ or $-34 \leq -5t$ oe		2	M1 $t$ terms on one side and numbers on the other. Condone = rather than $\leq$ or any other sign for this mark.
	Working required	$t \leq 6.8$		A1 oe (dep on M1) eg $t \leq \frac{34}{5}$ or $t \leq 6\frac{4}{5}$ or $6.8 \geq t$  Must have correct sign on answer line (sight of correct answer in working space and just 6.8 oe on answer line gains M1 only)
Total 4 marks				

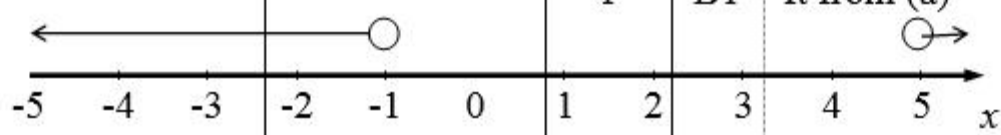




Q30.

Q	Working	Answer	Mark	Notes
	$(3x + 2)(2x - 4) < 3x + 27$ oe eg $6x^2 - 8x - 8 < 3x + 27$			M1 condone incorrect symbol
	eg $6x^2 - 11x - 35 < 0$			M1 expanding and rearranging to get a correct 3 term quadratic, condone incorrect symbol
	$(2x - 7)(3x + 5) (= 0)$ or $\frac{11 \pm \sqrt{(-11)^2 - 4 \times 6 \times (-35)}}{2 \times 6}$			M1 first step to find the critical values dep on M1 for solving their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as the equivalent of $\frac{11 \pm \sqrt{121 + 840}}{12}$ ) or if factorising, allow brackets which expanded give 2 out of 3 terms correct)
	$-\frac{5}{3}, \frac{7}{2}$			A1 oe the positive critical value only or both critical values (if both they must be correct)
		$2 < x < \frac{7}{2}$	5	A1 accept $2 \leq x < \frac{7}{2}$ may be seen as two separate inequalities $x > 2$ ( $x \leq 2$ ) and $x < \frac{7}{2}$
				Total 5 marks

Q31.

Q	Working	Answer	Mark	Notes
a	$x^2 + 2x - 6x - 5 > 0$ or $x^2 - 4x - 5 > 0$			M1
	$(x - 5)(x + 1)$			M1
		$x < -1, x > 5$	3	A1
b			1	B1 ft from (a)
				Total 4 marks



Q32.

Q	Working	Answer	Mark	Notes
	$a = 8 \quad d = 7$		4	M1 can be implied
	$(S_{100}) = \frac{100}{2}(2 \times 8 + (100 - 1) \times 7) (= 35\,450) \text{ or}$ $(S_{49}) = \frac{49}{2}(2 \times 8 + (49 - 1) \times 7) (= 8624) \text{ or}$ $(S_{50}) = \frac{50}{2}(2 \times 8 + (50 - 1) \times 7) (= 8975)$			M1
	$'35450' - '8624' \text{ or}$ $'35450' - '8975' + (8 + (50 - 1) \times 7)$			M1
		26 826		A1
				<b>Total 4 marks</b>
	<b>Alternative scheme</b>			
	$(u_n) = 7n + 1$ $(u_{50}) = 7 \times 50 + 1 (= 351) \text{ or}$ $(u_{100}) = 7 \times 100 + 1 (= 701)$	$a = 8 \text{ and } d = 7$ $(u_{50}) = 8 + (50 - 1) \times 7$ $(= 351)$	4	M1 can be implied
				M1
	$\frac{51}{2}('351' + '701')$	$\frac{51}{2}(2 \times 351 + (51 - 1) \times 7)$		M1
		26 826		A1
				<b>Total 4 marks</b>



Q33.

Question	Working	Answer	Mark	Notes
	$\frac{48}{2}(2a+(48-1)d)$ or $\frac{36}{2}(2a+(36-1)d)$ oe		5	M1 For a correct expression for the first 48 terms or the first 36 terms
	$\frac{48}{2}(2a+(48-1)d)=4\times\frac{36}{2}(2a+(36-1)d)$ oe			M1 For a correct equation.
	$96a + 1392d = 0$ oe eg $4a + 58d = 0$ , $2a + 29d = 0$ or $a = -14.5d$ etc			M1
	$\frac{30}{2}(2a+(30-1)d)$			M1 Indep Allow substitution of any 'found' values of $a$ and $d$
		0		A1
				<b>Total 5 marks</b>

Q34.

Q	Working	Answer	Mark	Notes
(a)		$4n + 3$	2	B2 B1 for $4n + x$ where $x$ is any integer
(b)		78, 76, 74	2	B2 B1 for one correct term
(c)		Correct reason	1	B1 The first sequence is only odd numbers and the second is only even numbers
				<b>Total 5 marks</b>





Q35.

Q	Working	Answer	Mark	Notes	
	$a + 2d = 19$		5	M1	A formula for term 3
	$\frac{10}{2}(2a + 9d) = 290$ oe			M1	A formula for the sum of the first 10 terms
	Eg $10a + 45d = 290$ $10a + 20d = 190$ Or $5(2(19 - 2d) + 9d) = 290$ , $a = 11$ , $d = 4$			M1	A correct method to find $a$ or $d$
	10 <sup>th</sup> term = $11 + 9 \times 4$ or $290 - 4.5(2 \times 11 + 8 \times 4)$	47		M1 A1	A correct method to find the 10 <sup>th</sup> term.
					<b>Total 5 marks</b>

Q36.

Question	Working	Answer	Mark	Notes	
	$a = 7$ and $d = 3$ $\frac{100}{2}(2 \times 7 + (100 - 1) \times 3)$ or 100th term is $7 + (100 - 1) \times 3 (= 304)$ <b>and</b> $100 \times (7 + "304") \div 2$ or  $100^{\text{th}}$ term is $3 \times 100 + 4 (= 304)$ <b>and</b> $100 \times (7 + "304") \div 2$		2	M1	for a method to find the sum - brackets $(100 - 1)$ must be used correctly
		15 550		A1	
					<b>Total 2 marks</b>



Q37.

Question	Working	Answer	Mark	Notes
	<b>Mark scheme 1</b>			
	$(8x + 2) - (2x + 23) (= 6x - 21)$ or $(2x + 23) - (8x + 2) (= -6x + 21)$ or $(20x - 52) - (8x + 2) (= 12x - 54)$ or $(8x + 2) - (20x - 52) (= -12x + 54)$  $(8x + 2) - (2x + 23) = (20x - 52) - (8x + 2)$ oe or $(2x + 23) - (8x + 2) = (8x + 2) - (20x - 52)$ oe  $x = 5.5$  Eg $2 \times 5.5 + 23 (=34)$ and $8 \times 5.5 + 2 (=46)$ <b>OR</b> $8 \times 5.5 + 2 (=46)$ and $20 \times 5.5 - 52 (=58)$			M1 for a correct expression for the common difference in terms of $x$ brackets must be present or removed correctly  M1 for a correct equation  A1  A1 for 12 from correct working
		shown	4	



Question	Working	Answer	Mark	Notes
	<p><b>Alternative method – starts by assuming <math>d = 12</math></b>  <b>E.g.</b>  <math>(2x + 23) + 12 = (8x + 2)</math> <b>or</b>  <math>(8x + 2) + 12 = (20x - 52)</math> <b>or</b>  <math>(2x + 23) - 12 = (8x + 2)</math> <b>or</b>  <math>(8x + 2) - 12 = (20x - 52)</math>  <b>or</b>  <math>(2x + 23) + (8x + 2) + (20x - 52) =</math>  <math>\frac{3}{2}(2(2x + 23) + 2 \times 12)</math></p> <p><math>x = 5.5</math>  <b>or</b> <math>x = 1.5</math> from <math>(2x + 23) - 12 = (8x + 2)</math>  <b>or</b> <math>x = 3.5</math> from <math>(8x + 2) - 12 = (20x - 52)</math>  <math>2 \times 5.5 + 23 (=34)</math> <b>and</b>  <math>8 \times 5.5 + 2 (=46)</math>  <b>and</b> <math>20 \times 5.5 - 52 (=58)</math></p> <p><b>OR</b>  <math>2x + 23 + 12 = (8x + 2)</math> <b>and</b>  <math>(8x + 2) + 12 = (20x - 52)</math>  <b>and gets <math>x = 5.5</math> both times</b></p>	shown	4	<p><b>M2</b> for a correct equation  If not M2 then award  <b>M1</b> for a correct  expression for the  common difference in  terms of <math>x</math> brackets  must be present or  removed correctly  e.g  <math>(8x + 2) - (2x + 23) (=</math>  <math>6x - 21)</math> <b>or</b>  <math>(20x - 52) - (8x + 2) (=</math>  <math>12x - 54)</math></p> <p><b>A1</b></p> <p><b>A1</b> for explicitly showing  <b>both</b> common  differences are 12</p> <p><b>OR</b>  solves both  <math>(2x + 23) + 12 = (8x +</math>  <math>2)</math>  <b>and</b>  <math>(8x + 2) + 12 = (20x -</math>  <math>52)</math>  <b>and gets <math>x = 5.5</math> both</b>  <b>times</b></p>