



Unit 2 Revision Sheet B Algebra Simultaneous Equations Inequalities Sequences Foundation & Higher

Questions

Q1.

Simon has x sweets.

Yuen has 2 more sweets than Simon.

Giulia has 3 times as many sweets as Yuen.

Simon, Yuen and Giulia have a total of T sweets.

- (a) Write down a formula for T in terms of x .

Give your formula in its simplest form.

(3)

- (b) Make g the subject of the formula $r = 4g + 7$

(2)

- (c) Solve $6y - 3 = 2y + 8$

Show clear algebraic working.

(3)

(Total for question = 8 marks)

Q2.

- (a) Expand $x(5 - x)$

(1)

- (b) Factorise $3y - 21$

(1)

- (c) Make p the subject of the formula $f = 3p - d$

(2)

Sergio buys m boxes of seeds and n packets of seeds.

Each box contains 10 seeds.

Each packet contains 6 seeds.

The total number of seeds that Sergio buys is T .

- (d) Write down a formula for T in terms of m and n .

(3)

(Total for question = 7 marks)



Q3.

(a) Factorise $25f - 10$

(1)

(b) Make y the subject of the formula $c = 5y - h$

(2)

(c) Solve the inequality $4x + 7 > 2$

(2)

(Total for question = 5 marks)

Q4.

(a) Expand and simplify $3x(2x + 3) - x(3x + 5)$

(2)

(b) Make t the subject of the formula $p = at - d$

(2)

Given that $\frac{w^5 \times w^n}{w^3} = w^{10}$

(c) work out the value of n .

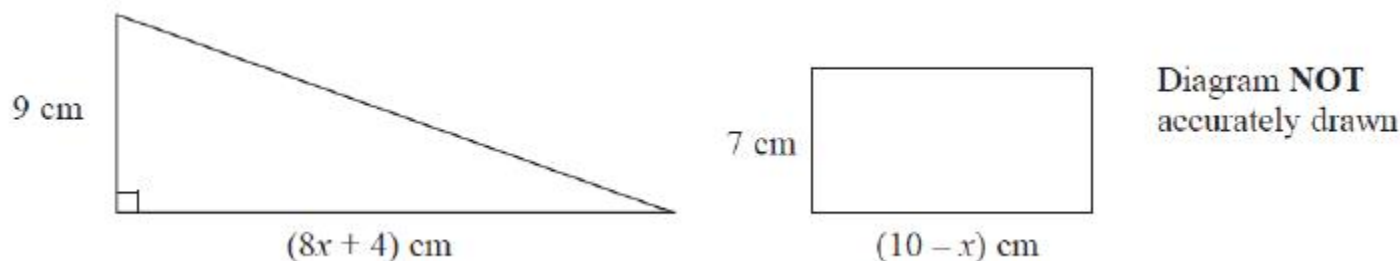
(2)

(Total for question = 6 marks)



Q5.

The diagram shows a right-angled triangle and a rectangle.



The area of the triangle is twice the area of the rectangle.

- (i) Write down an equation for x .
- (ii) Find the area of the rectangle.
Show clear algebraic working.

(Total for question = 7 marks)

Q6.

This formula can be used to work out the cost, in Riyals, of hiring a car in Qatar for a number of days.

$$\text{Cost} = 85 \times \text{number of days}$$

- (a) Daisha hired a car for 12 days.
Work out the cost.

(1)

- (b) Yusuf hired a car.
The cost was 765 Riyals.
Work out the number of days for which Yusuf hired the car.

- (c) C Riyals is the cost of hiring a car for n days.
Write down a formula for C in terms of n .

(2)

- (d) As a special offer, the cost of hiring a car for a month is 1800 Riyals.
Awad wants to hire a car for a number of days.
He works out that 1800 Riyals is less than the cost of hiring the car at 85 Riyals for each day.
Work out the smallest number of days for which Awad wants to hire a car.

(2)

(Total for question = 7 marks)



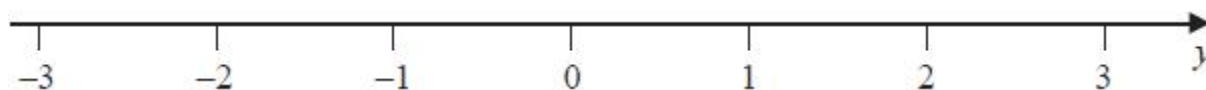
Q7.

n is an integer.

(a) Write down all the values of n such that $-2 \leq n < 3$

(2)

(b) On the number line, represent the inequality $y \leq 1$



(1)

(Total for question = 3 marks)

Q8.

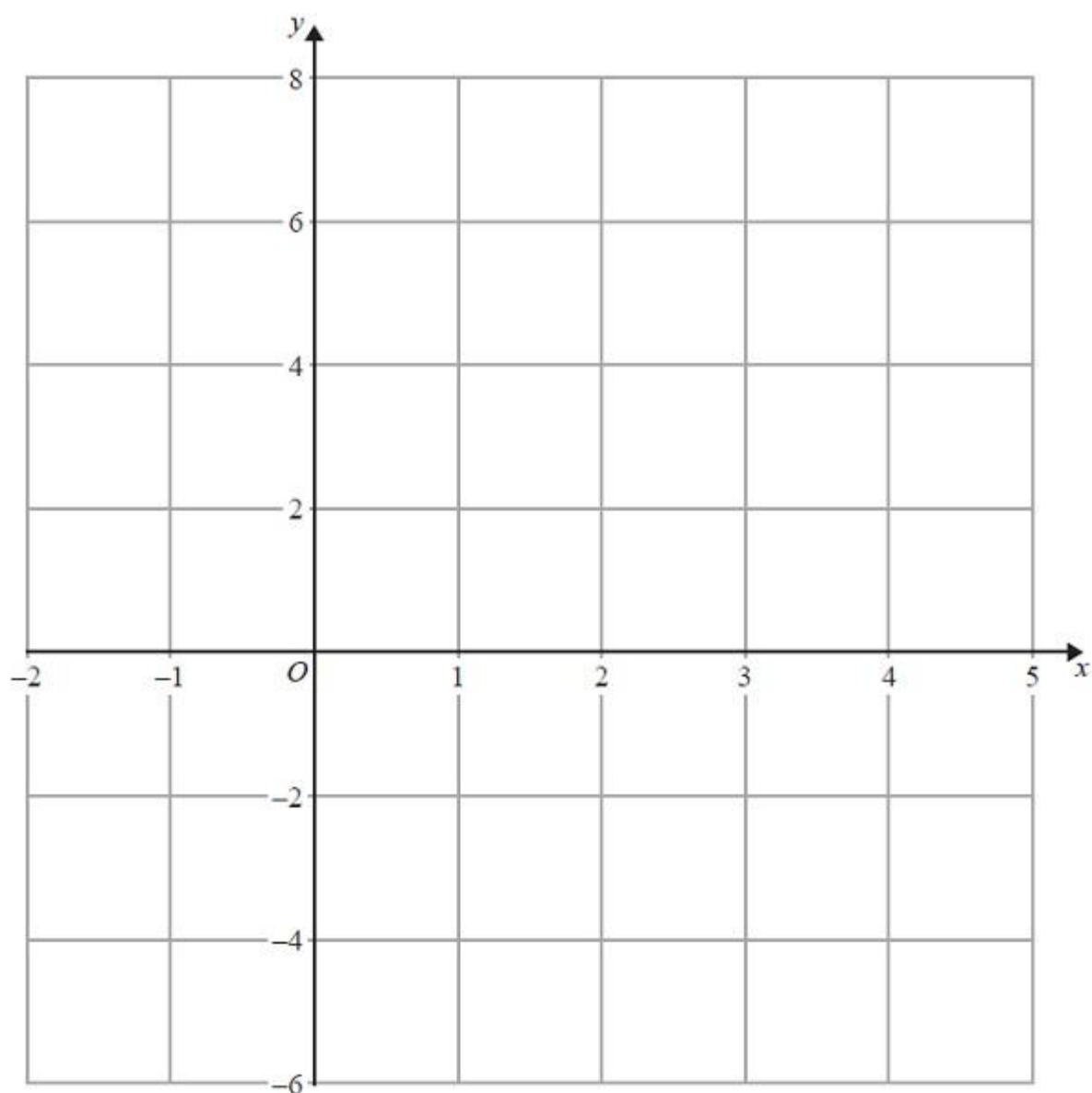
(a) Complete the table of values for $2x + y = 4$

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

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

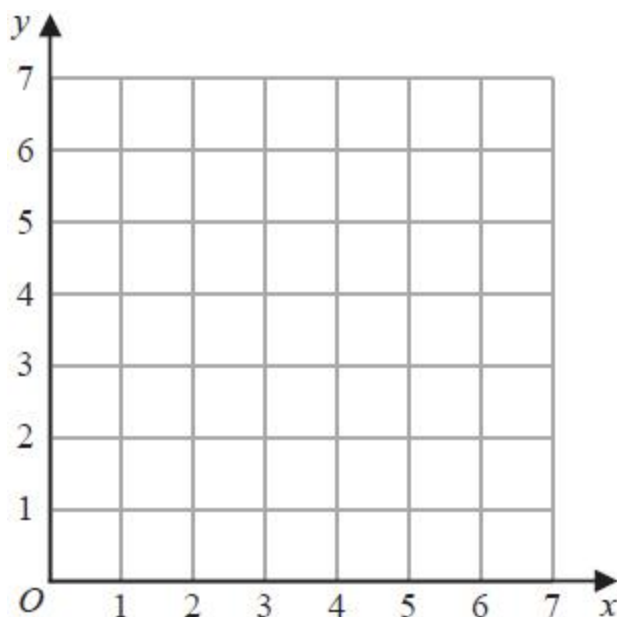
Label the region **R**.

(2)

(Total for question = 6 marks)



Q9.



(a) On the grid, draw and **label** the straight line with equation

(i) $x = 1.5$

(ii) $y = x$

(iii) $x + y = 6$

(3)

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

$$x \geq 1.5 \quad y \geq x \quad x + y \leq 6$$

Label the region **R**.

(1)

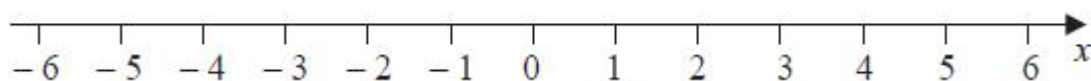
(Total for question = 4 marks)

Q10.

(i) Solve the inequalities $-7 \leq 2x - 3 < 5$

(3)

(ii) On the number line, represent the solution set to part (i)



(2)

(Total for question = 5 marks)



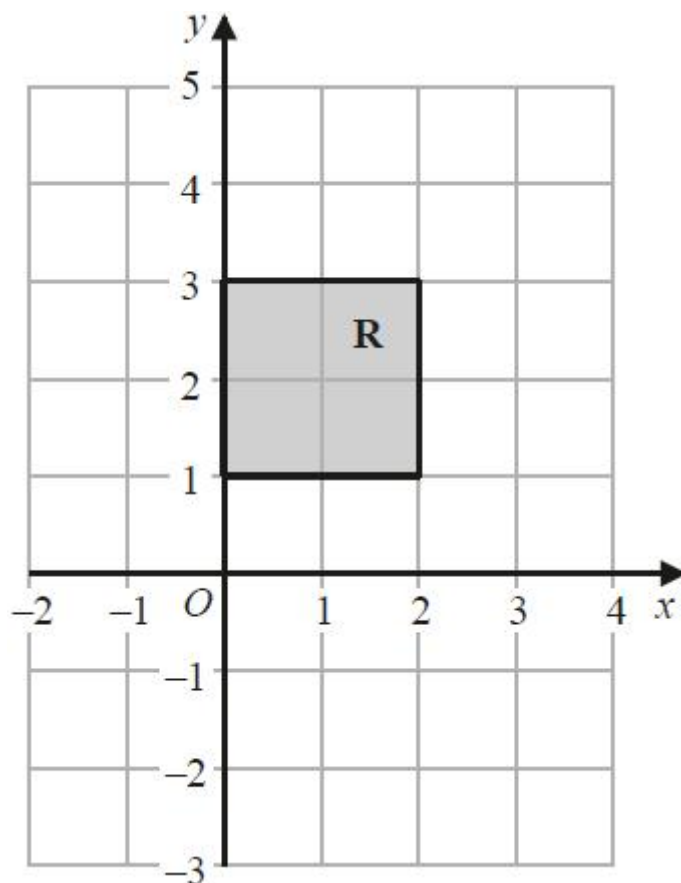
Q11.

The straight line **L** has gradient 5 and passes through the point with coordinates $(0, -3)$

(a) Write down an equation for **L**.

(2)

(b)



The region **R**, shown shaded in the diagram, is bounded by four straight lines.

Write down the inequalities that define **R**.

(2)

(Total for question = 4 marks)



Q12.

Solve the simultaneous equations

$$\begin{aligned}4x + 5y &= 4 \\ 2x - y &= 9\end{aligned}$$

Show clear algebraic working.

(Total for question = 3 marks)

Q13.

Solve the simultaneous equations

$$\begin{aligned}x + 2y &= -0.5 \\ 3x - y &= 16\end{aligned}$$

Show clear algebraic working.

(Total for question = 3 marks)

Q14.

Solve the simultaneous equations

$$\begin{aligned}6x + 4y &= 19 \\ 5x + y &= 3\end{aligned}$$

Show clear algebraic working.

(Total for question = 3 marks)



Q15.

Calvin has 8 identical rectangular tiles and 4 identical square tiles.
He arranges the tiles to fit exactly round the edge of a rectangle, as shown in the diagram below.

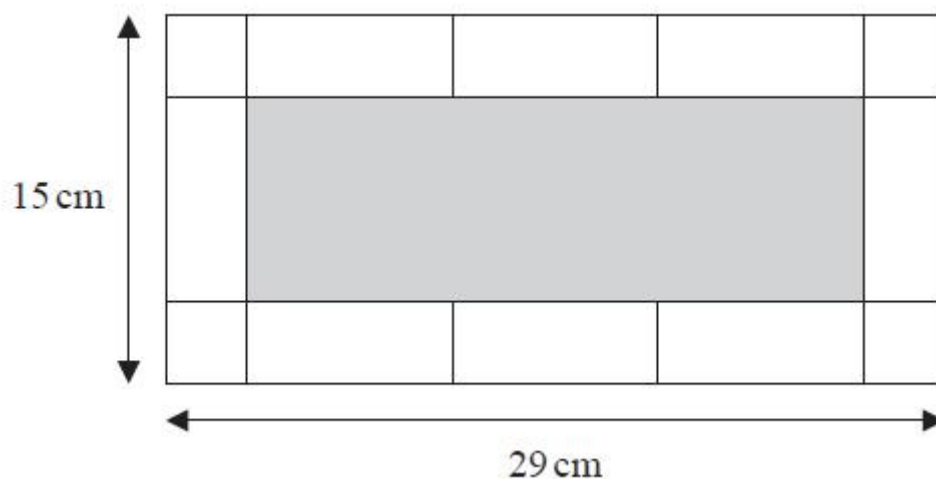


Diagram **NOT**
accurately drawn

Work out the area of one of Calvin's rectangular tiles.

(Total for question = 5 marks)

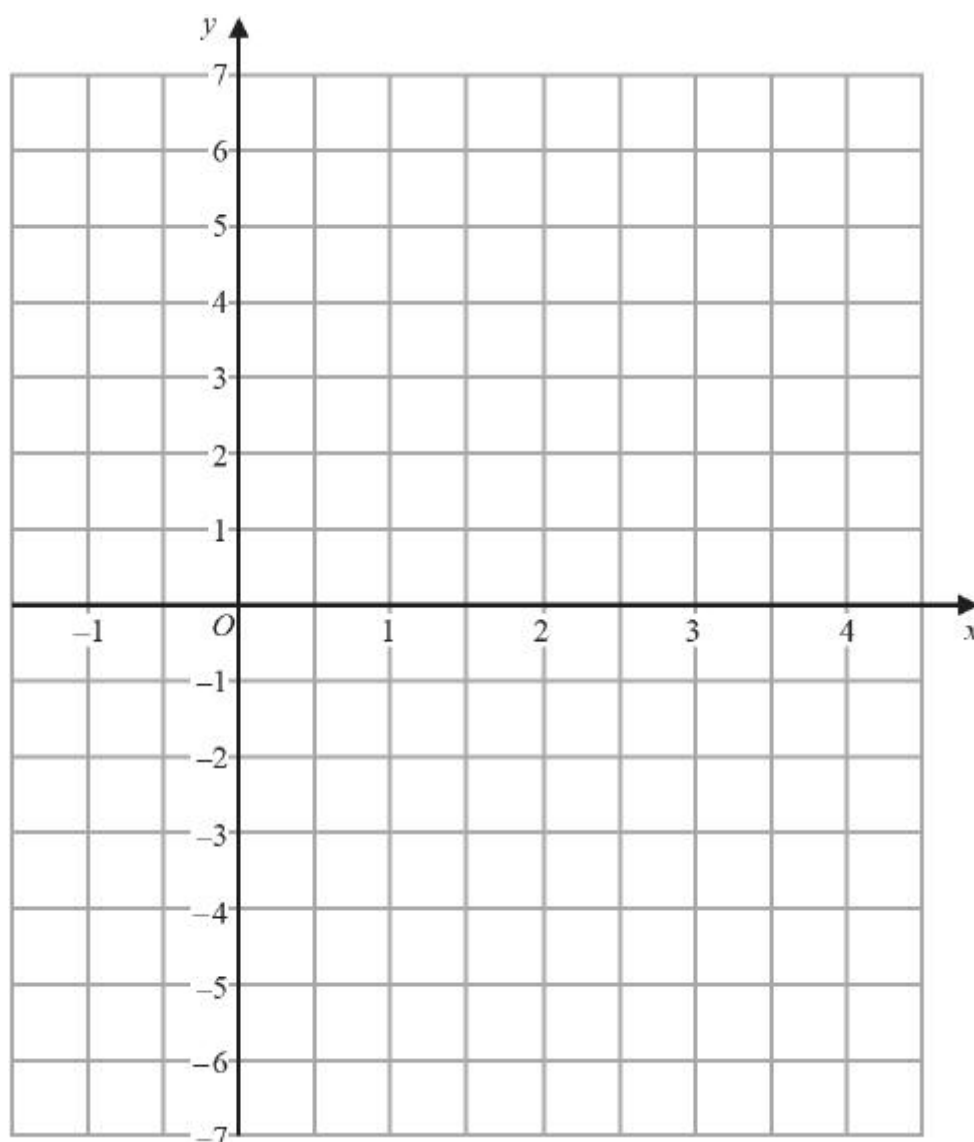


Q16.

Write your answers in the spaces provided.

You must write down all the stages in your working.

On the grid, draw the graph of $y = 2x - 3$ for values of x from -1 to 4



(Total for question = 3 marks)

**Q17.**

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)

Q18.

Here are the first 4 terms of an arithmetic sequence.

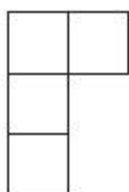
85 79 73 67

Find an expression, in terms of n , for the n th term of the sequence.

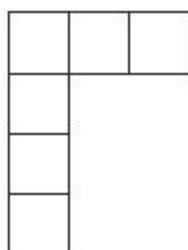
(Total for question = 2 marks)

Q19.

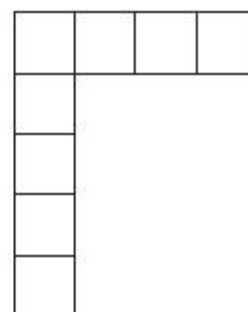
Here is a sequence of patterns made from square tiles.



Pattern number 1



Pattern number 2



Pattern number 3

(a) In the space below, draw Pattern number 4

(1)



(b) Complete the table.

Pattern number	1	2	3	4	5
Number of tiles	4	6	8		

(1)

(c) Work out the number of tiles in Pattern number 30

(2)

Liz says that in Pattern number n , the number of tiles is $2n$.

(d) Is Liz correct?

You must give a reason for your answer.

(1)

(Total for question = 5 marks)

Q20.

Write your answers in the spaces provided.

You must write down all the stages in your working.

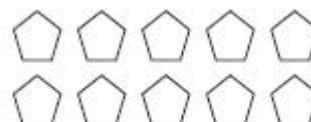
Here is a sequence of patterns made from identical pentagons.



Pattern
number 1



Pattern
number 2



Pattern
number 3

(a) (i) Work out the number of pentagons in Pattern number 4

(ii) Explain how you worked out your answer.

(2)

A different sequence of patterns is made from identical hexagons. The rule below can be used to find the number of hexagons in each pattern of this sequence.

Multiply the Pattern number by 5 and subtract 1

(b) Work out the number of hexagons in Pattern number 7

(1)



A pattern in this sequence has exactly 59 hexagons.

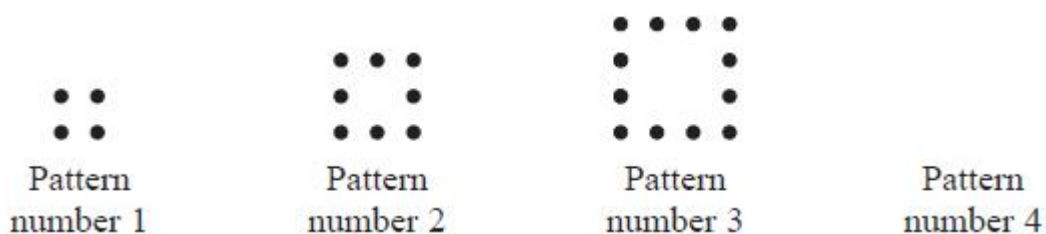
(c) Work out its Pattern number.

(2)

(Total for question = 5 marks)

Q21.

Here is a sequence of patterns made from dots.



(a) Draw Pattern number 4 in the space above.

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	4	8	12		

(1)

(c) Work out the number of dots in Pattern number 13

(2)

(d) Find an expression, in terms of n , for the number of dots in Pattern number n .

(1)

There are fewer than 90 dots in Pattern number k .

(e) What is the largest possible value of k ?

(2)

(Total for question = 7 marks)



Mark Scheme

Q1.

Question	Working	Answer	Mark	Notes
(a)	e.g. $x + 2$ or $3x + 6$ or $3(x + 2)$			M1
	e.g. $x + x + 2 + 3x + 6$ or $5x + 8$ or $x + x + 2 + 3(x + 2)$			M1 dep
		$T = 5x + 8$	3	A1 accept $T = 8 + 5x$ (SC B2 $T = 5x + a$ where $a \neq 0$ or $T = bx + 8$ where $b \neq 0$)
(b)	e.g. $r - 7 = 4g$ or $\frac{r}{4} = g + \frac{7}{4}$ or $-4g = 7 - r$ or $-g = \frac{7-r}{4}$ or $-g = \frac{r-7}{4}$ oe or $\frac{r-7}{4}$ oe			M1 for a first step of subtracting 7 or dividing by 4 in a correct equation
		$g = \frac{r-7}{4}$	2	A1 oe
(c)	e.g. $6y - 2y = 8 + 3$ or $2y - 6y = -3 - 8$ oe e.g. $4y - 3 = 8$ or $6y = 2y + 11$ or $-3 = -4y + 8$ or $6y - 11 = 2y$			M1 for correct rearrangement with y terms on one side and numbers on the other side e.g. $6y - 2y = 8 + 3$ or for the correct simplification of either y terms or numbers on one side in a correct equation e.g. $4y - 3 = 8$ or $6y = 2y + 11$
	e.g. $4y = 11$ or $-4y = -11$ or			M1 for correct rearrangement with y terms on one side and numbers on the other and correct simplification of terms on both sides or for $4y - 11 = 0$ or for $11 - 4y = 0$
		$\frac{11}{4}$	3	A1 dep on M1 accept 2.75 or $2\frac{3}{4}$ oe Award full marks for a correct answer if at least 1 method mark awarded If no correct algebraic working then award no marks
				Total 8 marks



Q2.

Question	Working	Answer	Mark	Notes
(a)		$5x - x^2$	1	B1
(b)		$3(y - 7)$	1	B1
(c)	$f + d = 3p$ or $\frac{f}{3} = p - \frac{d}{3}$		2	M1 A correct first stage in a correct formula
		$p = \frac{f + d}{3}$		A1 for $p = \frac{f + d}{3}$ (must see p = ... at some stage) (SCB1 for $p = \frac{f - d}{3}$)
(d)		$T = 10m + 6n$	3	B3 for $T = 10m + 6n$ oe
				(B2 for $10m + 6n$ or $T = 10m + an$ or $T = bm + 6n$ or $T = 6m + 10n$)
				(B1 for $10m + an$ or $bm + 6n$ or $6m + 10n$) or for $T =$ an incorrect expression in m and n
				Total 7 marks



Q3.

Q	Working	Answer	Mark	Notes
a		$5(5f-2)$	1	B1
b	$c+h=5y$ or $\frac{c}{5}=y-\frac{h}{5}$ or $\frac{c+h}{5}$		2	M1
		$y=\frac{c+h}{5}$		A1 oe if the student puts $\frac{c+h}{5}$ on the answer line then if we have previously see $y=\frac{c+h}{5}$ we can award full marks
c	$4x>2-7$ oe or $x+\frac{7}{4}>\frac{2}{4}$ oe		2	M1 accept as an equation or with wrong inequality sign.
		$x>-1.25$		A1 oe allow $(-1.25, (+)\infty)$ Note: award M1A0 for an answer of -1.25 with no sign or the incorrect sign eg $x=-1.25, x<-1.25$
				Total 5 marks



Q4.

Q	Working	Answer	Mark	Notes
(a)	$6x^2 + 9x - 3x^2 - 5x$		2	M1 expansion with at least 3 correct terms (must see for example, $6x^2$ and not just $3x \times 2x$)(can assume that no sign in front of a number is a + if terms written in a list or table)
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	$3x^2 + 4x$		A1 or $4x + 3x^2$ or $x(3x + 4)$ or $x(4 + 3x)$
(b)	$p + d = at$ or $-at = -d - p$ or $\frac{p}{a} = \frac{at}{a} - \frac{d}{a}$ oe		2	M1 Correct first stage in rearrangement
	<i>Working not required, so correct answer scores full marks</i>	$t = \frac{p+d}{a}$		A1 oe eg $t = \frac{p}{a} + \frac{d}{a}$ or $t = \frac{-p-d}{-a}$ Must have “t=” either in working or on answer line
(c)	$w^2 \times w^n = w^{10}$ or $w^5 \times w^n = w^{13}$ or $w^5 \times w^{n-3} = w^{10}$ or $\frac{w^{5+n}}{w^3} = w^{10}$ oe or $5 + n - 3 = 10$ or $2 + n = 10$ or $5 + n = 13$		2	M1 A correct first stage simplifying at least one index in a correct equation or a correct equation using indices only
	<i>Working not required, so correct answer scores full marks (unless from obvious incorrect working)</i>	8		A1 accept w^8 (trial and error gains full marks if correct and no marks if incorrect unless a rule of indices is clearly shown)
				Total 6 marks



Q5.


Question	Working	Answer	Mark	Notes
(i)			2	M1 for $0.5 \times 9 \times (8x + 4)$ oe or $7 \times (10 - x)$ oe (may be seen as part of an equation)
		eg. $9(8x + 4) = 28(10 - x)$		A1 for any correct equation
(ii)	$36x + 18 = 140 - 14x$		5	M1 Correct removal of either bracket in an equation (ft providing equation is of form $a(x + b) = c(x + d)$) NB: This mark can be implied
	$50x = 122$			M1 dep ft for getting to $mx = k$ oe
	$x = 2.44$ or $\frac{61}{25}$ oe			A1 ft (at least 3 sig figs or a fraction)
	$7 \times (10 - "2.44")$			M1 ft their value substituted (must be positive)
		52.92		A1 cao NB: Working for part (ii) may be seen in part (i)
				Total 7 marks



Q6.

Question number	Working	Answer	Mark	Notes
(a)		1020	1	B1 cao
(b)	$85n = 765$ oe or $765 \div 85$		2	M1
		9		A1 cao
(c)		$C = 85n$	2	B2 B1 for $C = \text{linear expression}$ B1 for $85n$ oe SC B1 for $n = \frac{C}{85}$ oe
(d)	$1800 \div 85$ or $21.176\ldots$ or 21		2	M1
		22		A1 cao
Total 7 marks				

Q7.

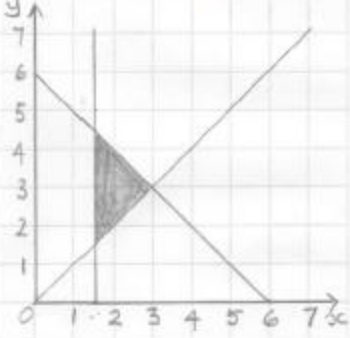
Q	Working	Answer	Mark	Notes
(a)		-2, -1, 0, 1, 2	2	B2 for -2, -1, 0, 1, 2 with no additions or repeats (B1 for 4 of -2, -1, 0, 1, 2 with no additions or repeats or for 6 values with no more than one incorrect value e.g. all of -2, -1, 0, 1, 2, 3 or for 5 values with one error)
(b)		Closed circle at $x = 1$ and a line with an arrow to the left	1	B1 for a closed circle at $x = 1$ and a line with an arrow of any length to the left Allow] for a closed circle Allow a line without an arrow if it reaches to at least -3
Total 3 marks				



Q8.

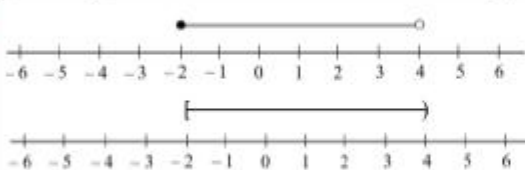
Question	Working	Answer	Mark	Notes
(a)		6, 0, -4	2	B2 Award B1 for any one correct.
(b)	$(-1, 6), (2, 0), (4, -4)$	correct line	2	M1ft Plot any two points, from table with no ft errors, (dependent on at least B1 above). A1 Straight line joining $(-1, 6)$ to $(4, -4)$
(c)			2	M1 Draw lines $x = -1$ and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

Q9.

Q	Working	Answer	Mark	Notes
(a)(i)		Correct line	1	B1 For $x = 1.5$ drawn
(ii)		Correct line	1	B1 For $y = x$ drawn
(iii)		Correct line	1	B1 For $x + y = 6$ drawn
(b)		Correct region	1	B1 dep on B3 for correctly shading the region R accept unlabelled or unshaded if clear. Shading can be 'in' or 'out'.
Total 4 marks				



Q10.

Q	Working	Answer	Mark	Notes
(i)	$-7+3 \leq 2x < 5+3$ oe or $\frac{-7}{2} \leq x - \frac{3}{2} < \frac{5}{2}$ oe or $-7+3 \leq 2x$ oe and $2x < 5+3$ oe or $(x =) -2$ or $(x =) 4$		3	M1 or one side of the inequality correct, i.e.. $x \geq -2$ oe or $x < 4$ Condone = rather than \leq or $<$ or any other sign for the M marks.
	$\frac{-7+3}{2} \leq x < \frac{5+3}{2}$ or $\frac{-7}{2} + \frac{3}{2} \leq x < \frac{5}{2} + \frac{3}{2}$ or $\frac{-7+3}{2} \leq x$ oe and $x < \frac{5+3}{2}$ or $(x =) -2$ and $(x =) 4$			M1
	Correct answer scores full marks (unless from obvious incorrect working)	$-2 \leq x < 4$		A1 allow $x \geq -2$ and $x < 4$ Allow $[-2, 4)$
(ii)			2	M1 ft for drawing a line from -2 to 4 or (indep) for a closed circle or [at -2 or (indep) for an open circle or) or [at 4 Only allow a follow through for a double ended inequality
		Correct diagram		A1 ft for correct diagram Only allow a follow through for a double ended inequality
				Total 4 marks



Q11.

Question	Working	Answer	Mark	Notes
(a)		$y = 5x - 3$ oe	2	B2 fully correct equation eg $y = 5x + -3$ or $y - -3 = 5(x - 0)$ If not B2 then B1 for $y = 5x$ or $y = 5x + a$ or $y = bx - 3$ ($b \neq 0$) or ($=$) $5x - 3$
(b)	$x \geq 0, x \leq 2, y \geq 1, y \leq 3$ or	$0 \leq x \leq 2$ $1 \leq y \leq 3$	2	B2 fully correct oe (B1 for 2 or 3 out of 4 inequalities correct) (Treat double-ended inequalities as two separate inequalities) (SC B2 $y > 3, y < 1, x < 0, x > 2$) Accept $<, \leq, >$ and \geq throughout
				Total 4 marks

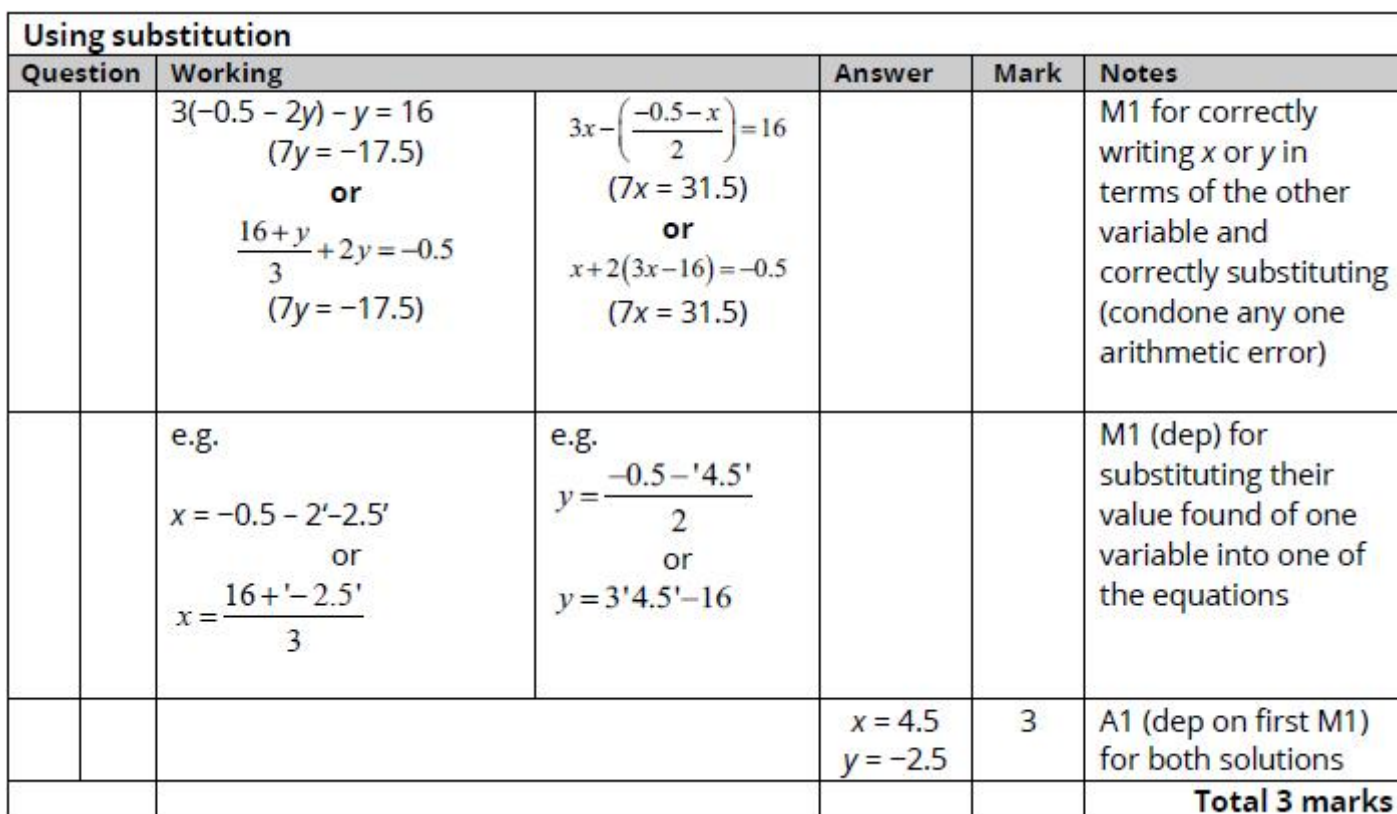
Q12.

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



Q13.

Using elimination then substitution					
Question	Working		Answer	Mark	Notes
	e.g. $x + 2y = -0.5$ $+ 6x - 2y = 32$ $(7x = 31.5)$	e.g. $3x + 6y = -1.5$ $- 3x - y = 16$ $(7y = -17.5)$			M1 for a correct method to eliminate x or y: coefficients of x or y the same and correct operation to eliminate selected variable
	e.g. $'4.5' + 2y = -0.5$ or $3 \times '4.5' - y = 16$	e.g. $x + 2 \times '-2.5' = -0.5$ or $3x - '-2.5' = 16$			M1 (dep) for substituting their value found of one variable into one of the equations or for repeating above method to find second variable
			$x = 4.5$ $y = -2.5$	3	A1 (dep on first M1) for both solutions
					Total 3 marks

[illegible]



Q15.

Q	Working	Answer	Mark	Notes	
	$29 - 15 (= 14)$			M1	
	$"14" \div 2 (=7)$			M1	method to find length or width of rectangle
	$(15 - 7) \div 2 (= 4)$			M1	
	$"7" \times "4"$			M1	
		28	5	A1	
					Total 5 marks
	Alternative				
	$3x + 2y = 29$ or $x + 2y = 15$			M1	
	$(29 - 15) \div 2 (=7)$			M1	method to find length or width of rectangle
	$(15 - 7) \div 2 (= 4)$			M1	
	$"7" \times "4"$			M1	
		28	5	A1	
					Total 5 marks



Q16.

Question	Working	Answer	Mark	Notes
	$(-1, -5), (0, -3), (1, -1), (2, 1), (3, 3), (4, 5)$ $(-1, -5), (0, -3), (1, -1), (2, 1), (3, 3), (4, 5)$	Correct line	3	<p>B3 for a correct line between $x = -1$ and $x = 4$</p> <p>If not B3 then B2 for a line segment through at least 3 of $(-1, -5), (0, -3), (1, -1), (2, 1), (3, 3), (4, 5)$</p> <p>or</p> <p>all points correctly plotted</p> <p>or</p> <p>a line drawn through $(0, -3)$ and with clear intention to use gradient of 2</p> <p>E.g. a line through $(0, -3), (0.5, -1)$</p> <p>If not B2 then B1 for at least 2 correct points stated or plotted (ignore incorrect points)</p> <p>or</p> <p>a line drawn with a positive gradient through $(0, -3)$ but not a line through $(0, -3)$ and $(2, 0)$</p> <p>or</p> <p>a line with gradient 2</p>

Q17.

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
				Total 5 marks



Q18.

Q	Working	Answer	Mark	Notes
		$91 - 6n$	2	B2 for a correct answer in any form eg $91 - 6 \times n$ or $-6n + 91$ or $85 + (n - 1)(-6)$ oe (B1 for $-6n + k$ oe (k may be zero or absent)) NB: award full marks for eg $x = 91 - 6n$ or n th term = $91 - 6n$ but only B1 for $n = 91 - 6n$
				Total 2 marks

Q19.

Question	Working	Answer	Mark	Notes
(a)		pattern 4 drawn	1	B1
(b)		10, 12	1	B1
(c)	14, 16, 18, 20, 22, 24, 26, 28, 30, 32 or $2 \times 30 + 2$ or $12 + (25 \times 2)$ or $4 + (29 \times 2)$ or 31×2 or uses or states $2n + 2$		2	M1 for adding 2 and continuing to at least pattern 15 (allow one error) or for a correct diagram or any correct method which would lead to 62
		62		A1
(d)	E.g. n th term is $2n + 2$ oe or gives a counter example e.g. when $n = 1$, $2n$ gives 2 (not 4)	No with reason	1	B1 oe
				Total 5 marks



Q20.

Question	Working	Answer	Mark	Notes
(a)(i)		14	1	B1
(a)(ii)		Added 4	1	B1 Accept +4, 4 more, jumped forward by 4, difference = 4 or sight of $4n - 2$
(b)		34	1	B1
(c)	$(59 + 1) \div 5$ or $59 = 5n - 1$ or 4, 9, 14, 19,, 54, 59 (may start at 34 or 39)			M1 or for $12 \times 5 - 1$
		12	2	A1

Q21.

Question	Working	Answer	Mark	Notes
(a)		correct pattern	1	B1 5 dots \times 5 dots open square
(b)		16, 20	1	B1
(c)	eg 4×13 or $14 + 14 + 12 + 12$ or $12 \times 4 + 4$ or 24, 28, 32, 36, 40, 44, 48, 52 or a fully correct diagram		2	M1 allow 1 arithmetical error in continuing the sequence to 13 terms
		52		A1
(d)		$4n$	1	B1 oe eg $n + n + n + n$ or $4 + (n - 1)4$
(e)	$90 \div 4 (= 22.5)$ or 88		2	M1 or continuing the sequence to 88 or 92 with just one error
		22		A1
				Total 7 marks