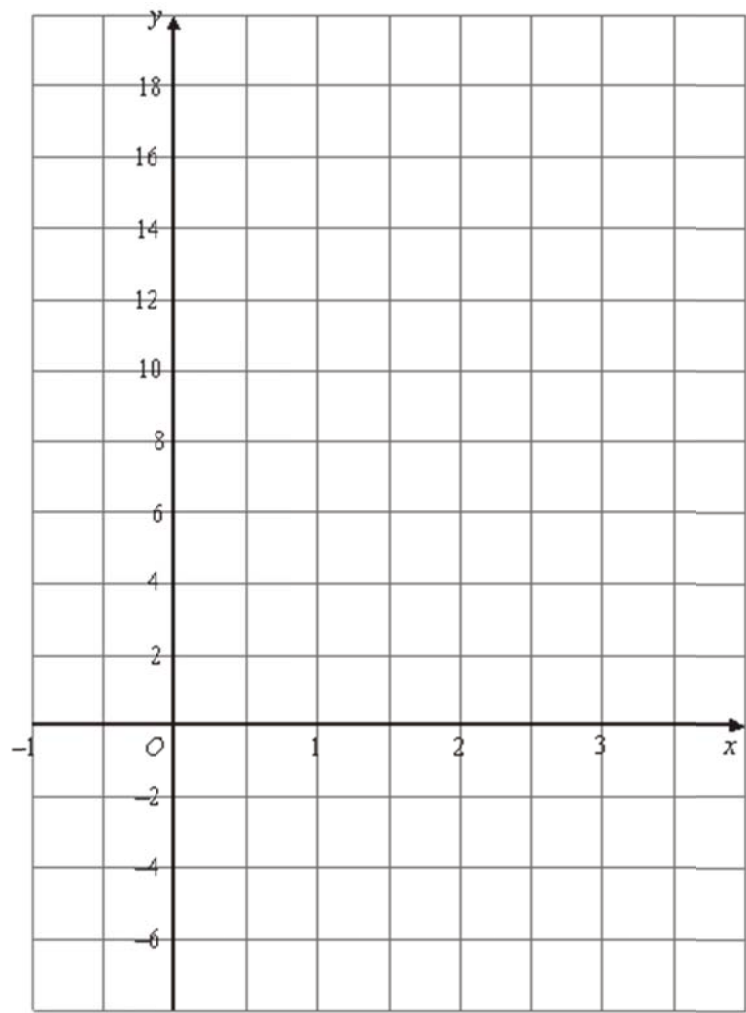


Higher GCSE Mathematics Revision Pack

ALGEBRA – NON-CALC

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Q1. (a) On the grid, draw the graph of  $y = 5x + 1$  from  $x = -1$  to  $x = 3$



(3)

(b) Which of the following is the equation of a line parallel to  $y = 5x + 1$ ?

- |             |              |              |                  |                        |
|-------------|--------------|--------------|------------------|------------------------|
| <b>A</b>    | <b>B</b>     | <b>C</b>     | <b>D</b>         | <b>E</b>               |
| $y = x + 1$ | $5y = x + 1$ | $y + 5x = 3$ | $y - 5x + 1 = 0$ | $y = -\frac{x}{5} + 1$ |

.....

(1)

(c) Find the equation of the line which is perpendicular to  $y = 5x + 1$  and passes through the point  $(0, 0)$ .

.....

(2)

(Total 6 marks)

---

**Q2.** (a) Simplify  $4b \times 2c$

.....  
(1)

(b) Expand  $3(2w - 5t)$

.....  
(2)

(c) Expand and simplify  $(x + 7)(x - 2)$

.....  
(2)

**(Total 5 marks)**

---

**Q3.** (a) Factorise fully  $20w^2y + 24wy^3$

.....  
(2)

(b) Factorise  $m^2 + 3m - 40$

.....  
(2)

**(Total 4 marks)**

---

**Q4.** (a) Expand and simplify  $2(x + 3) + 3(x + 6)$

.....  
(2)

(b) Factorise completely  $3y^2 - 12y$

.....  
(2)

(c) Factorise  $t^2 - 16$

.....  
(1)

**(Total 5 marks)**

---

**Q5.** (a) Simplify  $m^0$

.....  
(1)

(b) Simplify  $(2x^6y^{-1})^3$

.....  
(2)

**(Total 3 marks)**

---

**Q6.**  $AB$  is a line segment.

$A$  is the point  $(2, 5, 6)$ .

The midpoint of the line  $AB$  has coordinates  $(-1, -4, 2)$ .

Find the coordinates of point  $B$ .

( ..... , ..... , ..... )

(Total 2 marks)

**Q7.** (a) Expand  $3(x + 2)$

..... (2)

(b) Factorise completely  $12x^3y - 18xy^2$

..... (2)

(c) Expand and simplify  $(2x - 3)(x + 4)$

..... (2)

(d) Simplify  $5x^4y^3 \times 2x^3y^2$

..... (2)

(Total 8 marks)

**Q8.** (a) Write down the equation of a straight line that is parallel to  $y = 5x + 6$

..... (1)

(b) Find an equation of the line that is perpendicular to the line  $y = 5x + 6$  and passes through the point  $(-2, 5)$ .

..... (3)

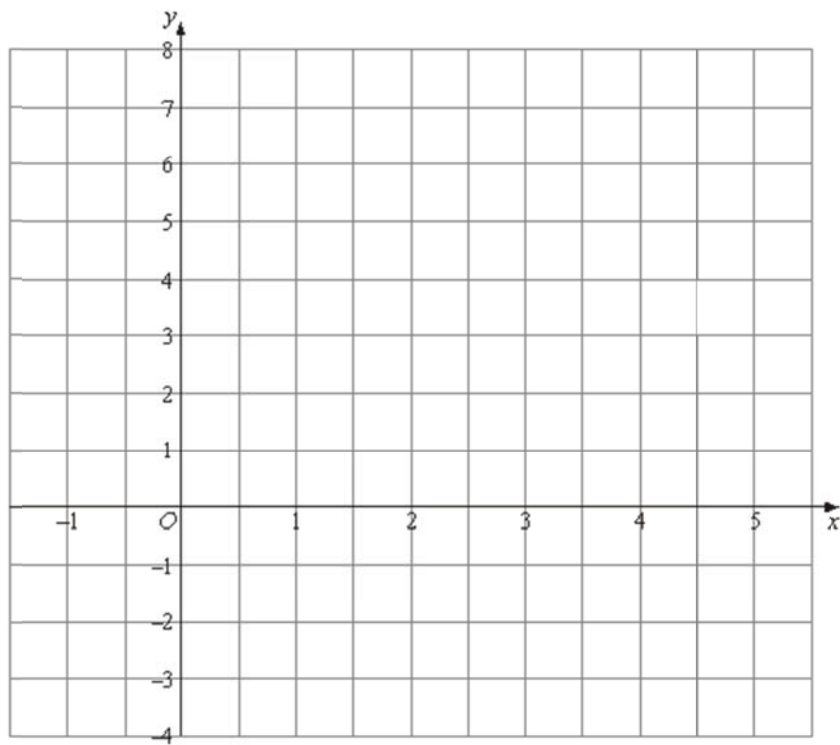
(Total 4 marks)

**Q9.** (a) Complete the table of values for  $y = x^2 - 4x + 2$

$x$	-1	0	1	2	3	4	5
$y$		2	-1		-1		7

(2)

(b) On the grid, draw the graph of  $y = x^2 - 4x + 2$



(2)  
(Total 4 marks)

**Q10.** (a) Solve the inequality

$$3t + 1 < t + 12$$

.....

(2)

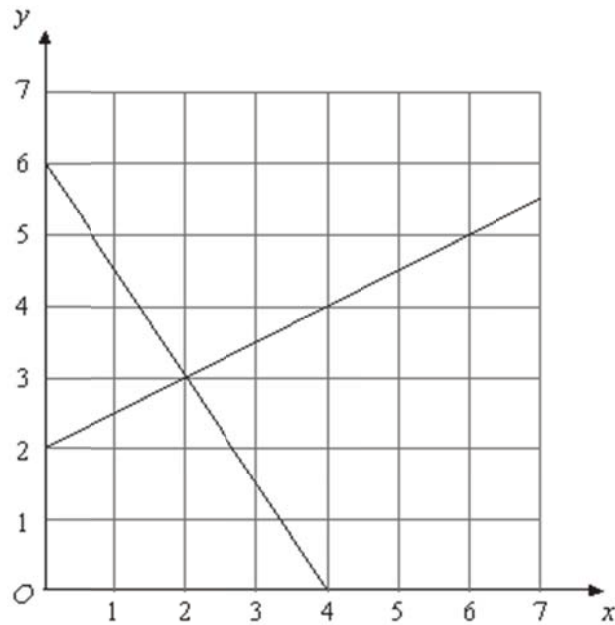
(b)  $t$  is a whole number.  
Write down the largest value of  $t$  that satisfies

$$3t + 1 < t + 12$$

.....

(1)  
(Total 3 marks)

**Q11.**



The diagram shows graphs of  $y = \frac{1}{2}x + 2$  and  $2y + 3x = 12$

(a) Use the diagram to solve the simultaneous equations

$$y = \frac{1}{2}x + 2$$

$$2y + 3x = 12$$

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

(1)

(b) Find an equation of the straight line which is parallel to the line  $y = \frac{1}{2}x + 2$  and passes through the point (0, 4).

.....

(2)

**(Total 3 marks)**

**Q12.** (a) Simplify

(i)  $a^5 \div a^3$

.....

(ii)  $2x^2 \times 3x^2y^2$

.....

(3)

(b) Expand and simplify  $(x + 3)(x + 7)$

.....

(2)

(c) Factorise fully  $3pq - 12p^2$

.....

(2)

(d) (i) Factorise  $3y^2 - 10y + 3$

.....

Hence, or otherwise

(ii) Factorise  $3(x + 2)^2 - 10(x + 2) + 3$

.....

(4)

(Total 11 marks)

---

**Q13.** (a) Factorise fully  $4x^2 - 6xy$

.....

(2)

(b) Factorise  $x^2 + 5x - 6$

.....

(2)

(Total 4 marks)

---

**Q14.** Solve the simultaneous equations.

$$2x + 3y = 0$$

$$x - 3y = 9$$

$x = \dots\dots\dots$ ,  $y = \dots\dots\dots$

(Total 3 marks)

---

**Q15.** Simplify fully  $\frac{x+3}{4} + \frac{x-5}{3}$

(Total 3 marks)

---

**Q16.**

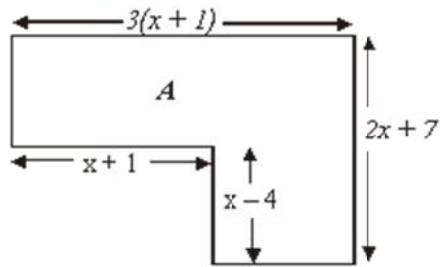
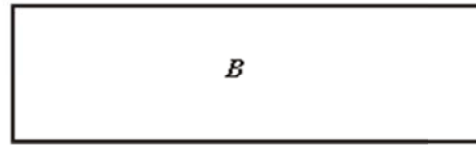


Diagram **NOT** accurately drawn



The diagram shows two shapes.  
In shape *A*, all of the angles are right angles.  
Shape *B* is a rectangle.  
All the measurements are in centimetres.

The area of shape *A* is equal to the area of shape *B*.

Find an expression, in terms of  $x$ , for the length and an expression, in terms of  $x$ , for the width of shape *B*.

.....

**(Total 6 marks)**

**Q17.** Simplify fully

$$\frac{x^2 - 2x - 15}{x^2 - 4x - 21}$$

.....

**(Total 3 marks)**

**Q18.** Simplify fully

$$\frac{x^2 + x - 6}{x^2 - 7x + 10}$$

.....

**(Total 3 marks)**

**Q19.** The diagram shows a pentagon.

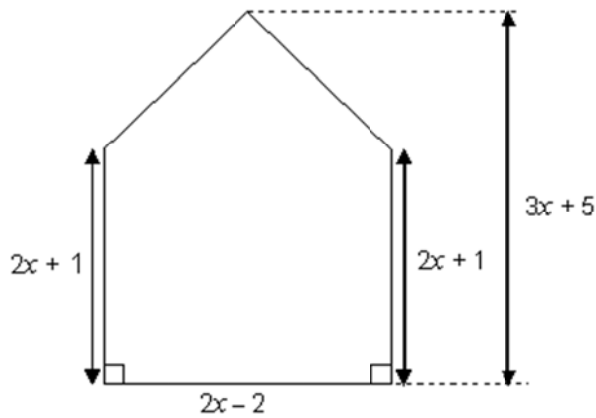


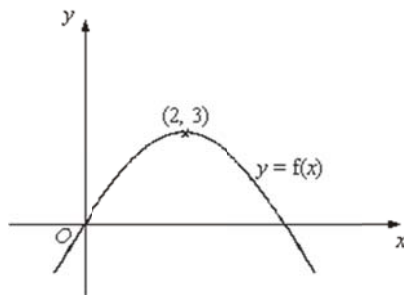
Diagram **NOT** accurately drawn

All measurements are in centimetres.

Show that the area of this pentagon can be written as  $5x^2 + x - 6$

**(Total 4 marks)**

**Q20.**



The diagram shows part of the curve with equation  $y = f(x)$ .  
The coordinates of the maximum point of this curve are  $(2, 3)$ .

Write down the coordinates of the maximum point of the curve with equation

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

(....., .....)

**(1)**

(b)  $y = 2f(x)$

(....., .....)

**(1)**

**(Total 2 marks)**



**Q21.** Write as a single fraction in its simplest form

$$\frac{2x}{x-1} - \frac{7x-3}{x^2-1}$$

.....

**(Total 4 marks)**

**Q22.** Simplify fully

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

.....

**(Total 3 marks)**

**Q23. (a)** Factorise  $x^2 - y^2$ .

.....

**(1)**

Hence, or otherwise,

**(b)** factorise  $(x + 1)^2 - (y + 1)^2$ .

.....

**(2)**

**(Total 3 marks)**

**Q24.** Simplify

$$\frac{x^2 + 2x + 1}{x^2 + 3x + 2}$$

.....

**(Total 3 marks)**

**Q25. (a)** Expand and simplify  $(y + 2)(y + 3)$

.....

**(2)**

**(b)** Simplify  $\frac{3(x-2)}{x^2 - 7x + 10}$

.....

**(2)**

**(Total 4 marks)**

**Q26.** Simplify fully  $\frac{x+3}{4} + \frac{x-5}{3}$

.....

**(Total 3 marks)**

**Q27.** Make  $b$  the subject of the formula  $a = \frac{2-7b}{b-5}$

.....

**(Total 4 marks)**

**Q28.** Solve the simultaneous equations

$$x^2 + y^2 = 5$$

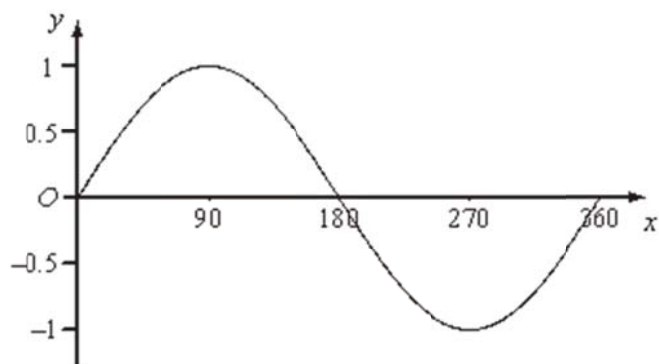
$$y = 3x + 1$$

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

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

**(Total 6 marks)**

**Q29.** The diagram shows a sketch of the curve  $y = \sin x^\circ$  for  $0 \leq x \leq 360$



The exact value of  $\sin 60^\circ = \frac{\sqrt{3}}{2}$

(a) Write down the exact value of

(i)  $\sin 120^\circ$ ,

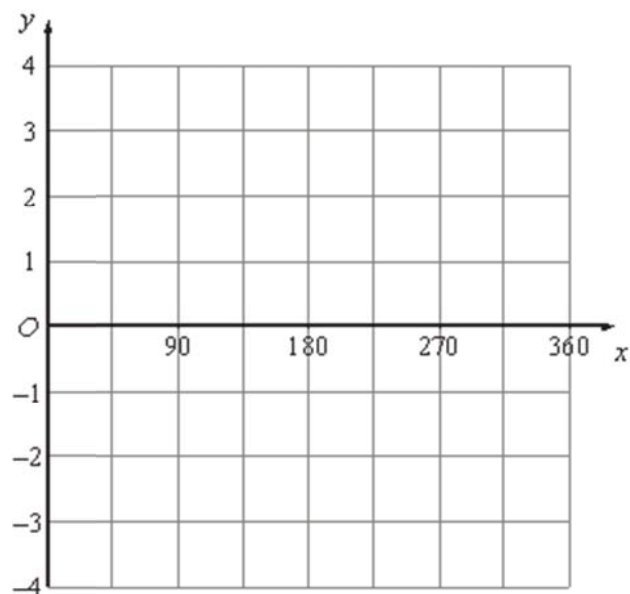
.....

(ii)  $\sin 240^\circ$ .

.....

(2)

(b) On the grid below, sketch the graph of  $y = 4 \sin 2x^\circ$  for  $0 \leq x \leq 360$



(2)  
(Total 4 marks)

**Q30.** (a) Factorise fully  $6x^2 + 9xy$

.....

(2)

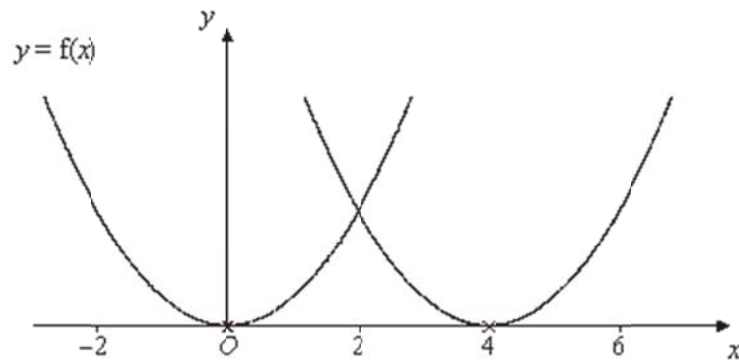
(b) Expand and simplify  $(2x + 5)(x - 2)$

.....

(2)

(Total 4 marks)

**Q31.**

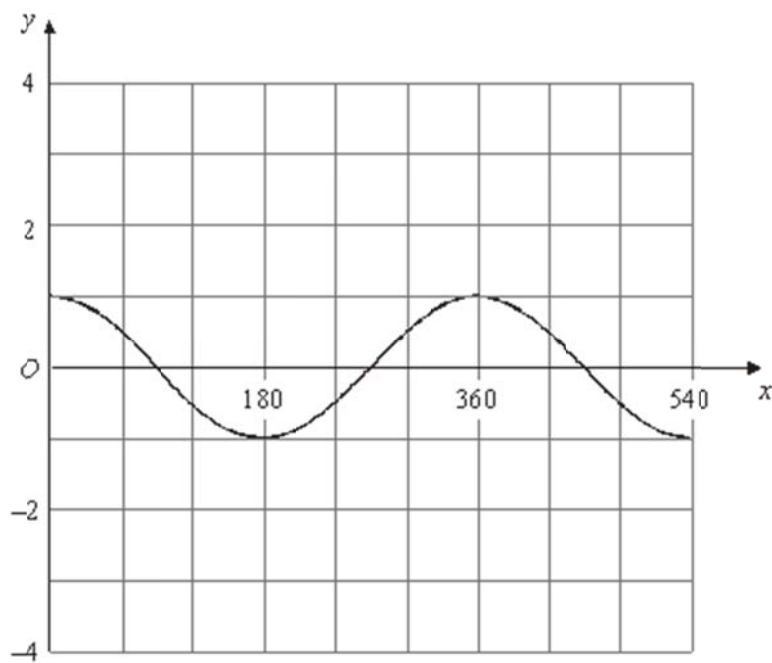


The curve with equation  $y = f(x)$  is translated so that the point at  $(0, 0)$  is mapped onto the point  $(4, 0)$ .

(a) Find an equation of the translated curve.

.....

(2)



The grid shows the graph of  $y = \cos x^\circ$  for values of  $x$  from 0 to 540.

- (b) On the grid, sketch the graph of  $y = 3 \cos (2x^\circ)$  for values of  $x$  from 0 to 540.

(2)

(Total 4 marks)

---

**Q32.**  $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$

$u = 2\frac{1}{2}, v = 3\frac{1}{3}$

- (a) Find the value of  $f$ .

.....

(3)

(b) 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.

.....

(2)

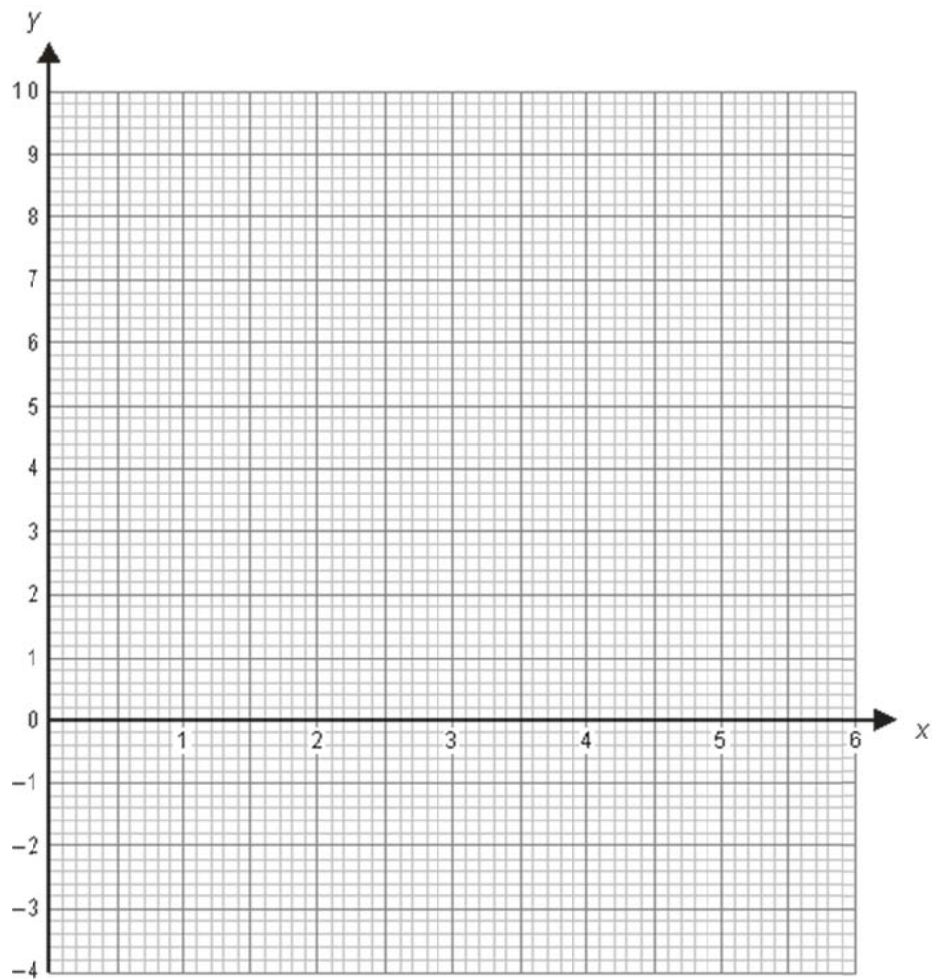
(Total 5 marks)

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- Q33.** Prove that the difference between the squares of consecutive odd numbers is a multiple of 8

(Total 6 marks)

- Q34.** (a) On the grid draw the graph of  $y = x(x - 3)$



(2)

- (b) Using your result for (a), or otherwise, solve the simultaneous equations

$$y = x(x - 3)$$

$$x^2 + y^2 = 9$$

(3)

(Total 5 marks)

- Q35.** Simplify  $\frac{3x^2 - 16x - 35}{9x^2 - 25}$

.....

(Total 3 marks)

M1.

	Working	Answer	Mark	Additional Guidance
(a)	Table of values $x = -1 \quad 0 \quad 1 \quad 2 \quad 3$ $y = -4 \quad 1 \quad 6 \quad 11 \quad 16$ <b>OR</b> Using $y = mx + c$ , gradient = 5, y- intercept = 1	Single line from $(-1, -4)$ to $(3, 16)$	3	<b>B3</b> for a correct single line from $(-1, -4)$ to $(3, 16)$ [B2 for at least 3 correct points plotted and joined with line segments <b>OR</b> 3 correct points plotted two of which must be the extremes with no joining <b>OR</b> a single line of gradient 5 passing through $(0, 1)$ ] B1 for 2 correctly plotted points <b>OR</b> a single line of gradient 5 <b>OR</b> a single line passing through $(0, 1)$
(b)		D	1	<b>B1</b> cao
(c)	Gradient = $-\frac{1}{5}$ , $c = 0$	$y = -\frac{1}{5}x$	2	$y = -\frac{1}{5}x + c$ <b>M1</b> for $y =$ <b>A1</b> cao
Total for Question: 6 marks				

M2.

	Working	Answer	Mark	Additional Guidance
(a)		$8bc$	1	<b>B1</b> cao
(b)		$6w - 15t$	2	<b>M1</b> for $3 \times 2w - 3 \times 5t$ or $6w$ or $-15t$ <b>A1</b> cao
(c)	$x^2 + -2x + 7x - 14$	$x^2 + 5x - 14$	2	<b>M1</b> for all 4 terms correct with or without signs <b>or</b> 3 out of no more than four terms correct

				with signs or $x(x - 2) + 7(x - 2)$ or $x(x + 7) - 2(x + 7)$ A1 cao
Total for Question: 5 marks				

M3.

	Answer	Mark	Additional Guidance
(a)	$4wy(5w + 6y^2)$	2	M1 for a correct factor taken outside the brackets Or $4wy$ (a 2 term expression in $w$ and $y$ , with just one error) A1 cao
(b)	$(m + 8)(m - 5)$	2	M1 for $(m \pm 8)(m \pm 5)$ A1 cao
Total for Question: 4 marks			

M4.

	Working	Answer	Mark	Additional Guidance
(a)	$2x + 6 + 3x + 18$	$5x + 24$	2	M1 for $2 \times x + 2 \times 3$ or for $3 \times x + 3 \times 6$ A1 for $5x + 24$ cao
(b)		$3y(y - 4)$	2	M1 for $3y(ay - b)$ or for $3(ay^2 - by)$ or for $y(3y - 12)$ A1 for $3y(y - 4)$ cao
(c)		$(t - 4)(t + 4)$	1	B1 for $(t - 4)(t + 4)$ oe
Total for Question: 5 marks				

M5.



	Answer	Mark	Additional Guidance
(a)	1	1	<b>B1</b> cao
(b)	$8x^{18}y^{-3}$	2	<b>M1</b> for $2^3x^{3 \times 6}y^{3 \times -1}$ or $8x^{18}y^k (k \neq 0)$ Or $8x^ky^{-3} (k \neq 0)$ or $kx^{18}y^{-3} (k \neq 0, k \neq 1)$ or $2x^6y^{-1} \times 2x^6y^{-1} \times 2x^6y^{-1}$ <b>A1</b> cao
Total for Question: 3 marks			

**M6.**

Working	Answer	Mark	Additional Guidance
$(2, 5, 6)$ to $(-1, -4, 2)$ is $(-3, -9, -4)$ $(-1 -3, -4 -9, 2 -4)$ $\frac{2+x}{2} = -1,$ $\frac{5+y}{2} = -4, \frac{6+z}{2} = 2$	$(-4, -13, -2)$	2	<b>M1</b> for a complete correct method for at least 1 coordinate (could be implied by 2 out of 3 coordinates correct) <b>A1</b> cao
Total for Question: 2 marks			

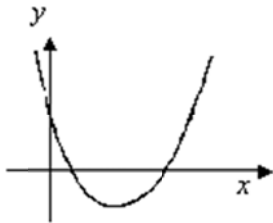
**M7.**

	Working	Answer	Mark	Additional Guidance
(a)		$3x + 6$	2	<b>M1</b> for attempted expansion of the bracket eg $3 \times x$ and $3 \times 2$ seen or $3x + k$ or $kx + 6$ <b>A1</b> for $3x + 6$
(b)		$6xy(2x^2 - 3y)$	2	<b>M1</b> or $6xy$ (two terms involving $x$ and/or $y$ ) or correct partial factorisation by taking out two from 6 (or 3 or 2) or $x$ or $y$ <b>A1</b> cao
(c)	$2x^2 + 8x - 3x - 12$	$2x^2 + 5x - 12$	2	<b>M1</b> for 3 out of 4 correct terms with correct signs, or all 4 terms ignoring signs <b>A1</b> cao
(d)		$10x^7y^5$	2	<b>B2</b> for $10x^7y^5$ ( <b>B1</b> for product of two of $5 \times 2$ oe, $x^{4+3}$ , $y^{3+2}$ ignore $\times$ signs)

M8.

	Working	Answer	Mark	Additional Guidance
(a)		$y = 5x + c$	1	<b>B1</b> for $y = 5x + c$ oe $c \neq 6$
(b)	$\text{gradient} = -\frac{1}{m} = -\frac{1}{5}$ $y = -\frac{1}{5}x + c \quad x = -2, y = 5$ $5 = \frac{2}{5} + c$ $c = 5 - \frac{2}{5} = 4\frac{3}{5}$ $y = -\frac{1}{5}x + 4\frac{3}{5}$	$y = -\frac{1}{5}x + 4\frac{3}{5}$	3	<p><b>M1</b> recognition that gradient <math>= -\frac{1}{m} = -\frac{1}{5}</math> oe</p> <p><b>M1</b> substitution of <math>x = -2, y = 5</math> in <math>y = mx + c</math> where <math>m = -\frac{1}{5}, \frac{1}{5}</math> or <math>-5</math></p> <p><b>A1</b> <math>y = -\frac{1}{5}x + 4\frac{3}{5}</math> oe</p>
Total for Question: 4 marks				

M9.

	Answer	Mark	Additional Guidance
(a)	7, -2, 2	2	<b>B2</b> all three correct ( <b>B1</b> for any one or two correct)
(b)		2	<p><b>B2</b> fully correct graph</p> <p><b>OR</b></p> <p><b>B1</b> ft for 7 points plotted correctly <math>\pm 2</math> mm</p> <p><b>B1</b> for smooth curve drawn through their points provided <b>B1</b> awarded in (a).</p>
Total for Question: 4 marks			

M10.

	Working	Answer	Mark	Additional Guidance
(a)	$3t + 1 < t + 12$ $3t - t < 12 - 1$ $2t < 11$	$t < 5.5$	2	<b>M1</b> $3t - t < 12 - 1$ <b>A1</b> $t < 5.5$ oe <b>(B1</b> for $t = 5.5$ or $t > 5.5$ or $5.5$ or $t \leq 5.5$ or $t \geq 5.5$ on the answer line)
(b)		5	1	<b>B1</b> for 5 or ft (a)
Total for Question: 3 marks				

M11.

	Answer	Mark	Additional Guidance
(a)	$x = 2, y = 3$	1	<b>B1</b> cao
(b)	$y = \frac{1}{2}x + 4$	2	<b>M1</b> for $y = mx + 4$ or $y = \frac{1}{2}x + c$ , $c \neq 2$ , or $\frac{1}{2}x + 4$ <b>A1</b> for $y = \frac{1}{2}x + 4$ oe
Total for Question: 3 marks			

M12.

	Working	Answer	Mark	Additional Guidance
(a)		$a^2$ $6x^4y^6$	3	<b>B1</b> cao <b>B2</b> $6x^4y^6$ <b>(B1</b> for 2 out of 3 terms correct in a product)
(b)	$x^2 + 3x + 7x + 21$	$x^2 + 10x + 21$	2	<b>M1</b> 3 or 4 terms out of 4 correct in a 4 term expansion <b>A1</b> cao

(c)		$3p(q - 4p)$	2	<b>B2</b> cao  (B1 $p(3q - 12p)$ , $12p(\frac{1}{4}q - p)$ , $p(aq + bp)$ where $a$ and $b$ are numbers)
(d)(i)	$(3(x + 2) - 1)(x + 2 - 3)$	$(3y - 1)(y - 3)$	4	<b>B2</b> cao (B1 $(3y - m)(y - n)$ where $mn = \pm 3$ or $m + n = \pm 10$ )
(ii)	<b>OR</b> $3x^2 + 12x + 12 - 10x - 20 + 3$  $= 3x^2 + 2x - 5$	$(3x + 5)(x - 1)$		<b>M1</b> use of the factorised form with $y$ replaced twice by $3x + 2$ <b>A1</b> cao <b>OR</b> <b>B1</b> $3x^2 + 2x - 5$ <b>B1</b> cao
<b>Total for Question: 11 marks</b>				

**M31.**

	Working	Answer	Mark	Additional Guidance
(a)		$2x(2x - 3y)$	2	<b>B2</b> ( <b>B1</b> for $x(4x - 6y)$ or $2(2x^2 - 3xy)$ or $2x$ (two terms) or $4x(x - 1.5y)$ )
(b)	$x^2 - x + 6x - 6 = x(x - 1) + 6(x - 1)$	$(x + 6)(x - 1)$	2	<b>B2</b> cao ( <b>B1</b> $(x - 6)(x + 1)$ or $(x - 6)(x - 1)$ or $x(x - 1) + 6(x - 1)$ or $x(x + 6) - (x + 6)$ )
<b>Total for Question: 4 marks</b>				

**M13.**

Working	Answer	Mark	Additional Guidance
e.g. adding equations leads to $3x = 9$  substitute $x = 3$ into eqn(1) leads to $3y = -6$	$x = 3$	3	<b>M1</b> for adding equations or for coefficients of $x$ the same followed by subtracting the equations condone one arithmetical error <b>M1</b> (dep) for substituting found value in one equation <b>A1</b> cao <b>OR</b> <b>M1</b> for $2(9 + 3y) + 3y = 0$ , condone one arithmetic 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>Total for Question: 3 marks</b>			

**M14.**

Working	Answer	Mark	Additional Guidance
$\frac{x+3}{4} + \frac{x-5}{3}$ $= \frac{3(x+3) + (x-5)}{12}$	$\frac{7x-11}{12}$	3	<b>M1</b> resolution of denominator to 12 <b>M1</b> expansion and simplification of brackets <b>A1</b> cao
<b>Total for Question: 3 marks</b>			

**M15.**

Working	Answer	Mark	Additional Guidance
<p> <math>A = 3(x+1)(2x+7) - (x-4)(x+1)</math>  <math>= 3(2x^2 + 9x + 7) - (x^2 - 3x - 4)</math>  <math>= 5x^2 + 30x + 25</math>  Factorising gives  <math>5(x+1)(x+5)</math> </p> <p><b>OR</b></p> <p> Splitting shape A into rectangles, area to be added:  e.g.  <math>3(x+1)(x+11) + (x-4)(2x+2)</math>  <math>= 3(x^2 + 12x + 11) + (2x^2 - 6x - 8)</math>  <math>= 5x^2 + 30x + 25</math> </p>	<p> <math>5x + 5</math> by <math>x + 5</math>  or  <math>5x + 25</math> by <math>x + 1</math> </p>	6	<p> <b>M1</b> for attempting to subtract the area of small rectangle from area of large rectangle in A  <b>M1</b> for <math>3(x+1)(2x+7) - (x-4)(x+1)</math>  <b>A1</b> for <math>3(2x^2 + 9x + 7)</math> and <math>(x^2 - 3x - 4)</math>  <b>A1</b> for <math>5x^2 + 30x + 25</math>  <b>M1</b> for attempting to factorise “<math>5x^2 + 30x + 25</math>” to get dimensions of B  <b>A1</b> for <math>5x + 5</math> by <math>x + 5</math> or <math>5x + 25</math> by <math>x + 1</math> </p> <p><b>OR</b></p> <p> <b>M1</b> for attempting to add the area of two (or more) rectangles that make up the shape A  <b>M1</b> for <math>3(x+1)(x+11) + (x-4)(2x+2)</math> oe equivalent  <b>A1</b> for <math>3(x^2 + 12x + 11)</math> and <math>(2x^2 - 6x - 8)</math>  <b>A1</b> for <math>5x^2 + 30x + 25</math>  <b>M1</b> for attempting to factorise “<math>5x^2 + 30x + 25</math>” to get dimensions of B </p>

Factorising gives $5(x + 1)(x + 5)$			<b>A1</b> for $5x + 5$ by $x + 5$ or $5x + 25$ by $x + 1$
<b>Total for Question: 6 marks</b>			

**M16.**

Working	Answer	Mark	Additional Guidance
$\frac{x^2 - 2x - 15}{x^2 - 4x - 21} = \frac{(x-5)(x+3)}{(x-7)(x+3)}$	$\frac{x-5}{x-7}$	3	<b>M1</b> attempt to factorise numerator (at least one bracket correct) or $(x \pm 5)(x \pm 3)$ <b>M1</b> attempt to factorise denominator (at least one bracket correct) or $(x \pm 7)(x \pm 3)$ <b>A1</b> oe
<b>Total for Question: 3 marks</b>			

**M17.**

Working	Answer	Mark	Additional Guidance
$\frac{\cancel{(x+2)}(x+3)}{\cancel{(x+2)}(x-5)}$	$\frac{(x+3)}{(x-5)}$	3	$\frac{(x+3)}{(x-5)}$ <b>B3</b> for $\frac{(x+3)}{(x-5)}$ (otherwise award <b>B1</b> for $(x-2)(x+3)$ and / or <b>B1</b> for $(x-2)(x-5)$ , which may not appear in the context of a fraction)
<b>Total for Question: 3 marks</b>			

**M18.**

Working	Answer	Mark	Additional Guidance
$(2x - 2)(2x + 1)$ $+ \frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$ $4x^2 - 2x - 2 + x^2 + 4x - x - 4$ $= 5x^2 + x - 6$ <b>Or</b> $(2x - 2)(3x + 5)$ $- \frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$ $= 6x^2 - 6x + 10x - 10$ $- x^2 - 4x + x + 4$ $= 5x^2 + x - 6$	Show	4	<b>M1</b> for correct expression for a single rectangle area $(2x - 2)(2x + 1)$ or $(2x - 2)(3x + 5)$ <b>M1</b> for correct expression for triangle $\frac{1}{2} (2x - 2)((3x + 5) - (2x + 1))$ <b>M1</b> for all 4 terms correct with or without signs or 3 out of no more than four terms correct with signs in expansion of any two linear expressions. <b>C1</b> for $5x^2 + x - 6$ and all steps clearly shown in a logical progression <b>QWC: All steps need to be clearly laid out showing a logical progression</b>
Total for Question: 4 marks			

**M19.**

	Answer	Mark	Additional Guidance
(a)	(4, 3)	2	<b>B1</b> for (4, 3)
(b)	(2, 6)		<b>B1</b> for (2, 6)
Total for Question: 2 marks			

**M20.**

Working	Answer	Mark	Additional Guidance
$\frac{2x}{x-1} - \frac{7x-3}{x^2-1}$ $= \frac{2x(x+1)}{x^2-1} - \frac{7x-3}{x^2-1}$	$\frac{2x-3}{x+1}$	4	<b>B1</b> for $x^2 - 1 = (x + 1)(x - 1)$ <b>M1</b> for correct process to obtain any common denominator <b>M1</b> for correct expansion and





M22.

	Working	Answer	Mark	Additional Guidance
(a)		$(x + y)(x - y)$	1	<b>B1</b> cao
(b)	$((x + 1) - (y + 1)) \times$ $((x + 1) + (y + 1))$ $x^2 + 2x + 1 - (y^2 + 2y + 1)$ $= x^2 - y^2 + 2x - 2y$ $= (x - y)(x + y) + 2(x - y)$	$(x - y)(x + y + 2)$	2	<b>M1</b> for attempt to replace $x$ by $(x + 1)$ and $y$ by $(y + 1)$ <b>A1</b> cao <b>Alternative</b> <b>M1</b> for expanding both brackets to get $x^2 + 2x + 1$ <b>and</b> $y^2 + 2y + 1$ <b>A1</b> cao
Total for Question: 3 marks				

M23.

Working	Answer	Mark	Additional Guidance
<del><math>\frac{x+1}{x+2}</math></del> <del><math>\frac{x+1}{x+2}</math></del>	$\frac{x+1}{x+2}$	3	<b>M1</b> for $(x \pm 1)(x \pm 1)$ <b>M1</b> for $(x \pm 1)(x \pm 2)$ <del><math>\frac{x+1}{x+2}</math></del> <b>A1</b> for <del><math>\frac{x+1}{x+2}</math></del>
Total for Question: 3 marks			

M24.

	Working	Answer	Mark	Additional Guidance
(a)	$y^2 + 3y + 2y + 6$	$y^2 + 5y + 6$	2	<b>M1</b> for 3 terms out of $y^2$ , $3y$ , $2y$ , $6$ or $y^2 + 5y (+ c)$ or $(dy^2 +)5y + 6$ <b>A1</b> for $y^2 + 5y + 6$
(b)	$\frac{3(x-2)}{(x-2)(x-5)}$	$\frac{3}{x-5}$	2	<b>M1</b> for $(x \pm 2)(x \pm 5)$ <b>A1</b> cao
Total for Question: 4 marks				

M25.

Working	Answer	Mark	Additional Guidance
$\frac{x+3}{4} + \frac{x-5}{3}$ $\frac{3(x+3)+4(x-5)}{12}$ $= \frac{3x+9+4x-20}{12}$ $= \frac{7x-11}{12}$	$\frac{7x-11}{12}$	3	<b>M1</b> for adding with a common denominator of 12 and at least one equivalent fraction correct $\frac{3(x+3)+4(x-5)}{12}$ or $\frac{3x+9+4x-20}{12}$ <b>M1</b> for $\frac{7x-11}{12}$ <b>A1</b> for $\frac{7x-11}{12}$
Total for Question: 3 marks			

M26.

Working	Answer	Mark	Additional Guidance
$a(b-5) = 2 - 7b$ $ab - 5a = 2 - 7b$ $ab + 7b = 2 + 5a$ $b(a+7) = 2 + 5a$	$b = \frac{2+5a}{a+7}$	4	<b>M1</b> for $a(b-5)$ or $ab - 5a$ or $ab - 5$ <b>M1</b> for isolating $ab$ and $7b$ on one side to get $ab + 7b$ oe <b>M1</b> for correctly factorising $b$ from ' $ab + 7b$ ' (term in $ab$ must be present)

			<b>A1</b> for $b = \frac{2+5a}{a+7}$ or $b = \frac{-2-5a}{-a-7}$
<b>Total for Question: 4 marks</b>			

**M27.**

Working	Answer	Mark	Additional Guidance
$y^2 = (3x + 1)^2$ $x^2 + 9x^2 + 6x + 1 = 5$ $10x^2 + 6x + 1 = 5$ $10x^2 + 6x - 4 = 0$ $2(5x^2 + 3x - 2) = 0$ $2(5x - 2)(x + 1) = 0$	$x = 0.4$ $y = 2.2$  $x = -1$ $y = -2$	6	<b>M1</b> for $(3x + 1)^2$ seen or implied by sight of $9x^2 + 1$ <b>A1</b> for $x^2 + 9x^2 + 6x + 1 = 5$ or equivalent expanded form <b>M1</b> (dep) for correct attempt to solve a 3-term quadratic equation (condone omission of $= 0$ ) <b>A1</b> for $x = 0.4, x = -1$ <b>M1</b> (dep on previous Ms) for sub one value of $x$ into either equation <b>A1</b> for $y = 2.2, y = -2$ (correctly paired with $x$ values) [SC: <b>B1</b> for one correct pair of solutions if M0 scored]
<b>Total for Question: 6 marks</b>			

**M28.**

	Answer	Mark	Additional Guidance
(a)(i)	$\frac{\sqrt{3}}{2}$	2	<b>B1</b> cao
(ii)	$-\frac{\sqrt{3}}{2}$		<b>B1</b> cao

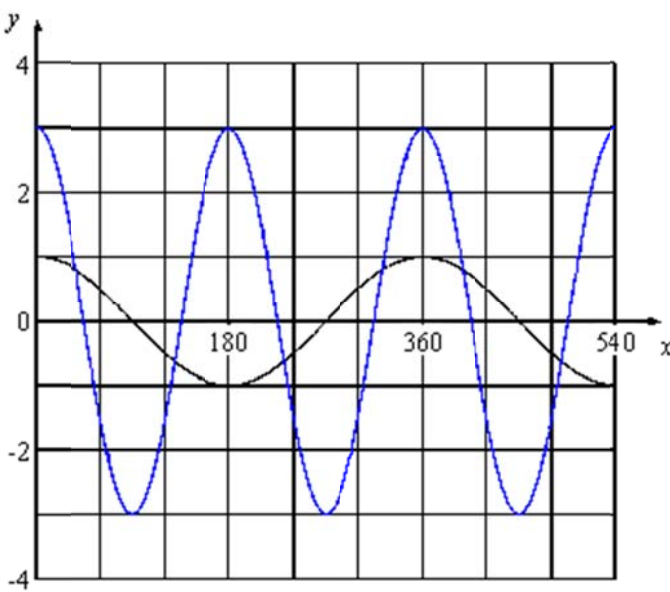
(b)		2	<b>B2</b> cao [ <b>B1</b> for sine curve, starting from the origin with amplitude 4, <b>OR</b> <b>B1</b> cuts $x$ axis at 90, 180, 270, 360 and starts from 0]
Total for Question: 4 marks			

**M29.**

	Working	Answer	Mark	Additional Guidance
(a)		$3x(2x + 3y)$	2	<b>B2</b> for fully correct (accept $(3x - 0)(2x + 3y)$ ) ( <b>B1</b> for $x(6x + 9y)$ or $3(2x^2 + 3xy)$ or $3x$ (a linear expression in $x$ and $y$ ))
(b)	$2x^2 - 4x + 5x - 10$	$2x^2 + x - 10$	2	<b>B2</b> for $2x^2 + x - 10$ ( <b>B1</b> for 3 out of 4 terms correct, with correct signs, or the 4 terms $2x^2$ , $4x$ , $5x$ and 10 seen, ignoring signs)
Total for Question: 4 marks				

**M30.**

	Answer	Mark	Additional Guidance
(a)	$y = f(x - 4)$	2	<b>B2</b> cao ( <b>B1</b> for $f(x - 4)$ or $y = f(x + a)$ , $a \neq -4$ , $a \neq 0$ )

(b)		2	<b>B2</b> cao <b>(B1</b> cosine curve with either correct amplitude or correct period, but not both)
Total for Question: 4 marks			

M31.

	Working	Answer	Mark	Additional Guidance
(a)	$\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{3}} = \frac{1}{f}$ $\frac{2}{5} + \frac{3}{10} = \frac{1}{f}$ $\frac{7}{10} = \frac{1}{f}$	$\frac{10}{7}$	3	$\frac{1}{2\frac{1}{2}} + \frac{1}{3\frac{1}{3}} = \frac{1}{f}$ <b>M1</b> <b>M1</b> correct addition of the fractions to get $\frac{7}{10}$ oe <b>A1</b> for $\frac{10}{7}$ oe
(b)	$\frac{1}{u} = \frac{1}{f} - \frac{1}{v}$ $\frac{1}{u} = \frac{v-f}{fv}$	$u = \frac{fv}{v-f}$	2	$\frac{1}{u} = \frac{v-f}{fv}$ oe or $vf + uf = uv$ oe or $\frac{1}{u} = \frac{f-v}{fv}$ <b>M1</b> $\frac{1}{u} = \frac{v-f}{fv}$ or $u = \frac{1}{\frac{v-f}{fv}}$ or $u = \frac{1}{\frac{1}{f} - \frac{1}{v}}$ <b>A1</b> $u = \frac{fv}{v-f}$ or $u = \frac{-fv}{f-v}$

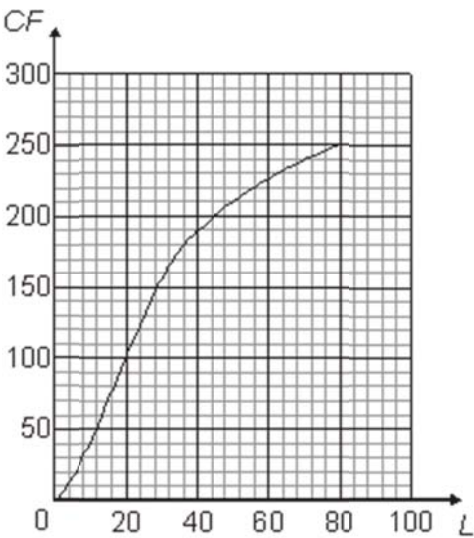
M32.

	Working	Answer	Mark	Additional Guidance
<b>QWC</b> ii, iii	$(2n+1)^2 - (2n-1)^2 =$ $4n^2 + 4n + 1 - (4n^2 - 4n + 1)$ $= 8n$  <b>OR</b> $(2n+1)^2 - (2n-1)^2 =$ $((2n+1) - (2n-1))(2n+1 + 2n-1)$ $= 2 \times 4n = 8n$	Fully algebraic argument, set out in a logical and coherent manner	6	<b>B2</b> the $n$ th term for consecutive odd numbers is $2n - 1$ oe <b>(B1)</b> $2n + k$ , $k \neq -1$ or $n = 2n - 1$ or $2x - 1$ <b>B1</b> use of $2n + 1$ and $2n - 1$ oe <b>M1</b> $(2n+1)^2 - (2n-1)^2$ <b>M1</b> $4n^2 + 4n + 1 - (4n^2 - 4n + 1)$ <b>C1</b> conclusion based on correct algebra <b>QWC: Conclusion should be stated, with correct supporting algebra.</b>  <b>OR</b> <b>B1</b> use of $2n + 1$ and $2n - 1$ oe <b>M1</b> $(2n+1)^2 - (2n-1)^2$ <b>M1</b> $((2n+1) - (2n-1))(2n+1 + 2n-1)$ <b>C1</b> conclusion based on correct algebra <b>QWC: Conclusion should be stated, with correct supporting algebra.</b>
Total for Question: 6 marks				

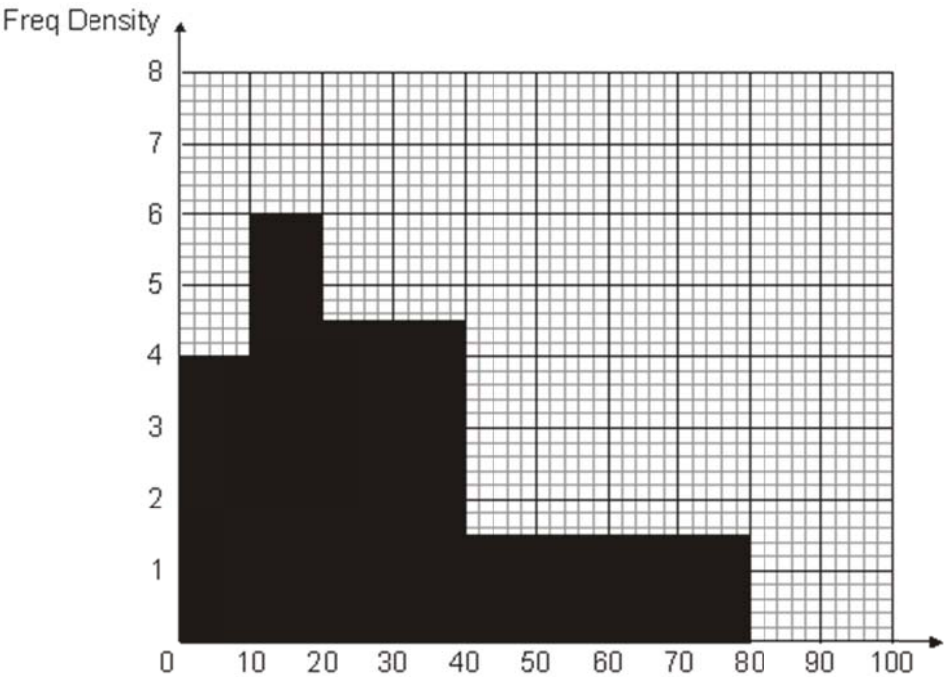
M33.

	Working	Answer	Mark	Additional Guidance
(a)		Smooth curve	2	<b>B1</b> correct plot of their values <b>B1</b> smooth curve through their points
(b)		$x = 3$ $y = 0$	3	<b>M1</b> attempts to draw circle at origin <b>M1</b> uses radius 3 cm (using graph scale correctly) <b>A1</b> cao <b>OR</b> <b>B1</b> for substituting a value of $x$ into $y = x(x - 3)$ and $x^2 + y = r^2$

				<b>B1</b> for substituting $y$ into $x = 3$ into $x(x - 3)$ and $x^2 + y = r^2$ <b>B1</b> cao
<b>Total for Question: 5 marks</b>				



OR



Working	Answer	Mark	Additional Guidance
$\frac{(3x+5)(x-7)}{(3x-5)(3x+5)}$	$\frac{x-7}{(3x-5)}$	3	<b>B1</b> $(3x+5)(x-7)$ <b>B1</b> $(3x-5)(3x+5)$ <b>B1</b> $\frac{x-7}{(3x-5)}$
Total for Question: 3 marks			