Chapter 2

Algebra

01. 0607_m24_qp_42 Q: 2

Asif, Basheera and Chelsea make baskets.

(a) The selling price of a basket increases by 8%.
The new selling price is \$4.86 .

Find the original selling price of a basket.

\$ ..... [2]

(b) Asif earns \$4.70 per hour plus \$1.21 for each basket he makes.
Each week he works 8 hours a day for 5 days.
Each day Asif makes 18 baskets.

Calculate the total amount Asif earns in one week.

\$ ..... [3]

(c) One day Basheera and Chelsea make a total of 36 baskets.
They each work for 8 hours.
Basheera takes x minutes to make a basket.
Basheera takes 6 minutes longer than Chelsea to make a basket.

(i) Write down an expression in terms of x for the number of baskets Chelsea makes.

..... [1]

(ii) Write down an equation in terms of x and show that it simplifies to

$$3x^2 - 98x + 240 = 0.$$

[3]

(iii) Solve the equation $3x^2 - 98x + 240 = 0$.

$x =$ ..... or ..... [2]

(iv) Find the number of baskets Chelsea makes.

..... [2]

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02. 0607_m24_qp_42 Q: 11

(a) Solve.

$$3x+2 > 7x-8$$

..... [2]

(b) Factorise fully.

$$75x^2-3$$

..... [2]

(c) Simplify.

(i) $\frac{2}{3x}+\frac{1}{6x}-\frac{1}{5x}$

..... [2]

(ii) $\frac{2x^2+3x-2bx-3b}{2x^2-7x-15}$

..... [4]

03. 0607_s24_qp_41 Q: 1

(a) Solve the equations.

(i) $3x-2=-14$

$x =$ ..... [2]

(ii) $7x+11=26-3x$

$x =$ ..... [2]

(b) Solve the simultaneous equations.
You must show all your working.

$$5x+3y=-15$$
$$3x+5y=-17$$

$x =$ .....

$y =$ ..... [4]

(c) Solve the inequality.

$|2x+1|>9$

..... [4]

04. 0607_s24_qp_41 Q: 10

y varies inversely as the square root of $(x+1)$.
$y = 18$ when $x = 3$.

(a) (i) Find the value of y when $x = 8$.

$y =$ ..... [3]

(ii) Find the value of x when $y = 1.5$.

$x =$ ..... [2]

(b) w varies directly as the square root of $(x+1)$.
$w = 18$ when $x = 3$.

Find the value of $\sqrt{wy}$.

$\sqrt{wy} =$ ..... [3]

05. 0607_s24_qp_42 Q: 7

(a) Solve $63 = 8(3-2a)$.

$a =$ ..... [3]

(b) Solve the simultaneous equations.
You must show all your working.

$$\frac{p}{3} - q = \frac{5}{12}$$

$$2p + \frac{q}{2} = \frac{7}{8}$$

$p =$ .....

$q =$ ..... [3]

(c) **(i)** Factorise $c^2 - c - 56$.

..... [2]

(ii) Solve $c^2 - c - 56 = 0$.

$c =$ ..... or $c =$ ..... [1]

06. 0607_s24_qp_42 Q: 11

(a) Simplify.

$$\frac{9x^2-4y^2}{9x^2-6xy}$$

..... [3]

(b) $\frac{5}{2x-3}-\frac{7}{4-x}=2$

(i) Show that $4x^2-41x+65=0$.

[3]

(ii) Solve $\frac{5}{2x-3}-\frac{7}{4-x}=2$, giving your answers correct to 2 decimal places.

You must show all your working.

$x =$ ..... or $x =$ ..... [4]

07. 0607_s24_qp_43 Q: 9

(a) Solve.

(i) $2x+3=1-5x$

$x =$ ..... [2]

(ii) $|x+3|=2$

..... [2]

(b) Factorise completely.

$6x^3y^2-3x^2y^3$

..... [2]

(c) Write $\frac{5}{2x+3}-\frac{2}{x-5}$ as a single fraction in its simplest form.

..... [3]

(d) Solve $2x^2+3x=7$.
You must show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [3]

08. 0607_m23_qp_42 Q: 5

(a) $X = 3A + 5B$

Work out the value of B when $X = 48$ and $A = 4$.

$B =$ ..... [2]

(b) Solve $6(1-2x) = 2+4(x-1)$.

$x =$ ..... [3]

(c) Solve $\frac{3x-2}{5} = \frac{3+2x}{4} - 2$.

$x =$ ..... [3]

(d) Solve $4\log 2 - 2\log x + \log 4 = 2$.

You must show your working.

$x =$ ..... [4]

(e) Solve $x = 16 - 6x^2$.

Give your answers correct to 2 decimal places.

..... [3]

09. 0607_m23_qp_42 Q: 7

y varies inversely as the cube root of x.
$y = 10$ when $x = 8$.

(a) Find y in terms of x.

$y =$ ..... [3]

(b) Find the value of x when $y = 8$.

$x =$ ..... [2]

(c) w varies as the square of y.
$w = 18$ when $y = 3$.

Find w in terms of x.
Give your answer in the form $w = px^q$, where p and q are constants.

$w =$ ..... [4]

10. 0607_s23_qp_41 Q: 8

(a) The cost of a television is \$$t$ and the cost of a computer is \$$c$.
The total cost of 2 televisions and 1 computer is \$1470.
The total cost of 3 televisions and 2 computers is \$2480.

Use simultaneous equations to find the cost of a television.
You must show all your working.

\$ ..... [4]

(b) Jono spends \$9.69 on bags of potatoes.
When the cost of a bag is x cents he can buy 2 more bags than when the cost of a bag is $(x+6)$ cents.

(i) Show that $x^2+6x-2907=0$.

[3]

(ii) Solve the equation $x^2 + 6x - 2907 = 0$.

$x =$ ..... or $x =$ ..... [2]

(iii) Find the number of bags Jono can buy for \$9.69 when the cost of one bag is x cents.

..... [1]

11. 0607_s23_qp_42 Q: 1

For each of these sequences, find the next term and an expression for the nth term.

(a) 17 14 11 8 5 …

next term .....

nth term ..... [3]

(b) $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{4}{5}$ $\frac{5}{6}$ …

next term .....

nth term ..... [2]

(c) 4 8 16 32 64 …

next term .....

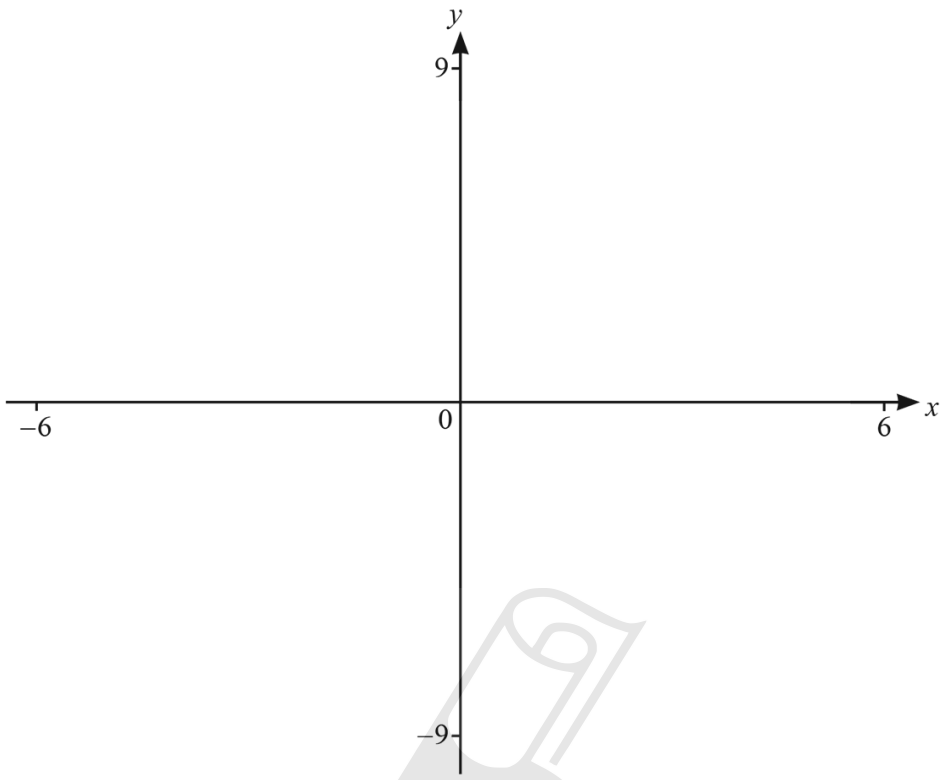
nth term ..... [3]

(d) −2 5 24 61 122 …

next term .....

nth term ..... [3]

12. 0607_s23_qp_42 Q: 6



$$f(x) = \frac{x^2 + 3x}{(x-2)(x+1)}$$

(a) On the diagram sketch the graph of $y = f(x)$ for values of x between -6 and 6. [3]

(b) Write down the equations of the asymptotes parallel to the y-axis.

..... [2]

(c) Find the zeros of the graph of $y = f(x)$.

..... [2]

(d) $g(x) = x - 3$

(i) On the diagram sketch the graph of $y = g(x)$ for $-6 \leqslant x \leqslant 6$. [1]

(ii) Use your graphs to solve $f(x) = g(x)$.

..... [3]

(iii) Solve $g(x) > f(x)$.

..... [3]

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13. 0607_s23_qp_42 Q: 10

(a) Simplify.

$$3x-5y+4x-6y$$

..... [2]

(b) Expand.

$$x(x+2)$$

..... [1]

(c) Factorise.

$$10ab+8ac-15b^2-12bc$$

..... [2]

(d) $$\frac{2}{2x+1}-\frac{5}{x-3}=3$$

(i) Show that $6x^2-7x+2=0$.

[4]

(ii) Solve $6x^2-7x+2=0$.
You must show all your working.

$x =$ ..... or $x =$ ..... [3]

14. 0607_s23_qp_43 Q: 6

(a) Solve.

$$7x - 5 = 3x + 13$$

$x =$ ..... [2]

(b) Solve.

$$4(2x - 3) = 3(1 - 2x)$$

$x =$ ..... [3]

(c) Solve.

$$\frac{3x+2}{8} = \frac{2}{3x+2}$$

$x =$ ..... or $x =$ ..... [3]

(d) Solve.

$$1 - 2x^2 = 5x - 1$$

Give your answer correct to two decimal places.

$x =$ ..... or $x =$ ..... [3]

(e) $\log x = 1 + 4\log y$

Find x in terms of y.

$x =$ ..... [3]

(f) There are 12 balls in a bag, n of them are blue.
A ball is taken from the bag at random and replaced.
The probability that the ball is blue is p.

6 more blue balls are added to the bag.
A ball is taken from the bag at random.
The probability that this ball is blue is $2p$.

Find the value of p.

$p =$ ..... [4]

15. 0607_s23_qp_43 Q: 8

(a) Solve the simultaneous equations.

$$5x-4y=13$$
$$3x+2y=-1$$

You must show all your working.

$x =$ .....

$y =$ ..... [3]

(b) $f(x)=3x+1$ $\quad g(x)=\frac{1}{2x-3}$, $\quad x \neq 1.5$

(i) Find $f(-2)$.

..... [1]

(ii) Find $f(f(x))$, giving your answer in its simplest form.

..... [2]

(iii) Solve $g(f(x))=\frac{1}{5}$.

$x =$ ..... [3]

16. 0607_w23_qp_41 Q: 10

(a) Simplify.

(i) $\frac{k}{2p} \times \frac{t}{3}$

..... [1]

(ii) $\frac{u}{7} + \frac{2u}{21}$

..... [2]

(b) Simplify.

$$\frac{x^2 - x - 42}{2x^2 - 98}$$

..... [4]

(c) Write as a single fraction in its simplest form.

$$\frac{g-1}{g+1}-\frac{2g}{5}+4$$

..... [3]

17. 0607_w23_qp_42 Q: 3

y is inversely proportional to the square of $(x+1)$.

(a) When $x = 5$, $y = 1$.

Find y in terms of x.

$y =$ ..... [2]

(b) Find y when $x = 3$.

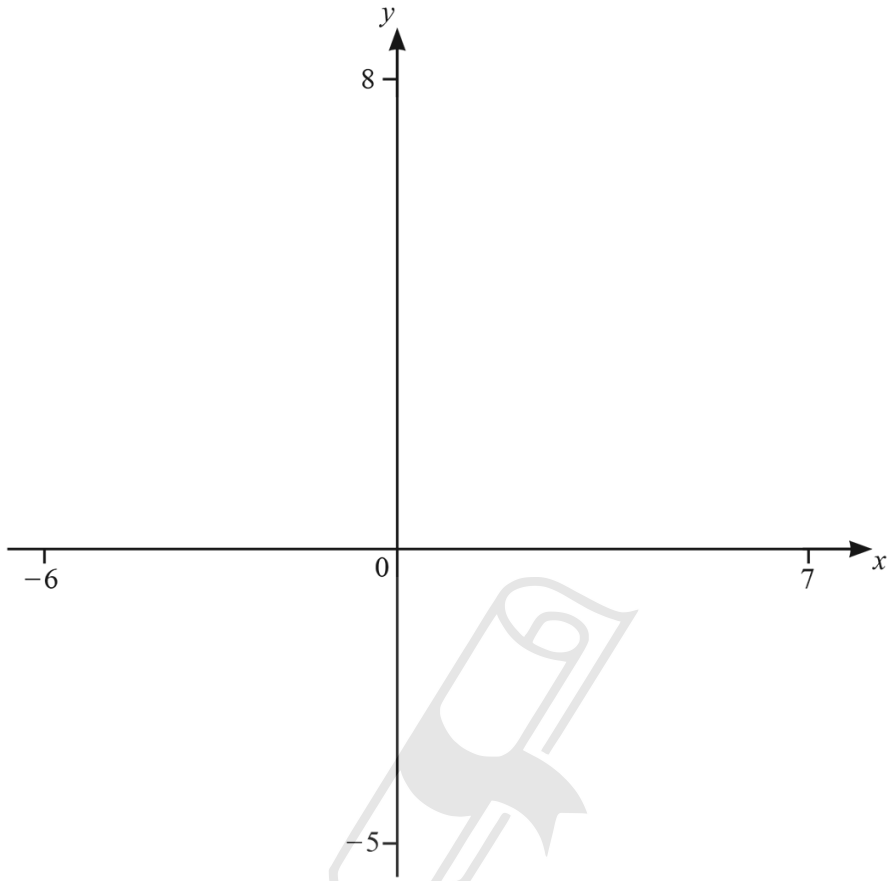
$y =$ ..... [2]

(c) Find the value of x when $y = (x+1)$.

$x =$ ..... [3]

18. 0607_w23_qp_42 Q: 5

(a)

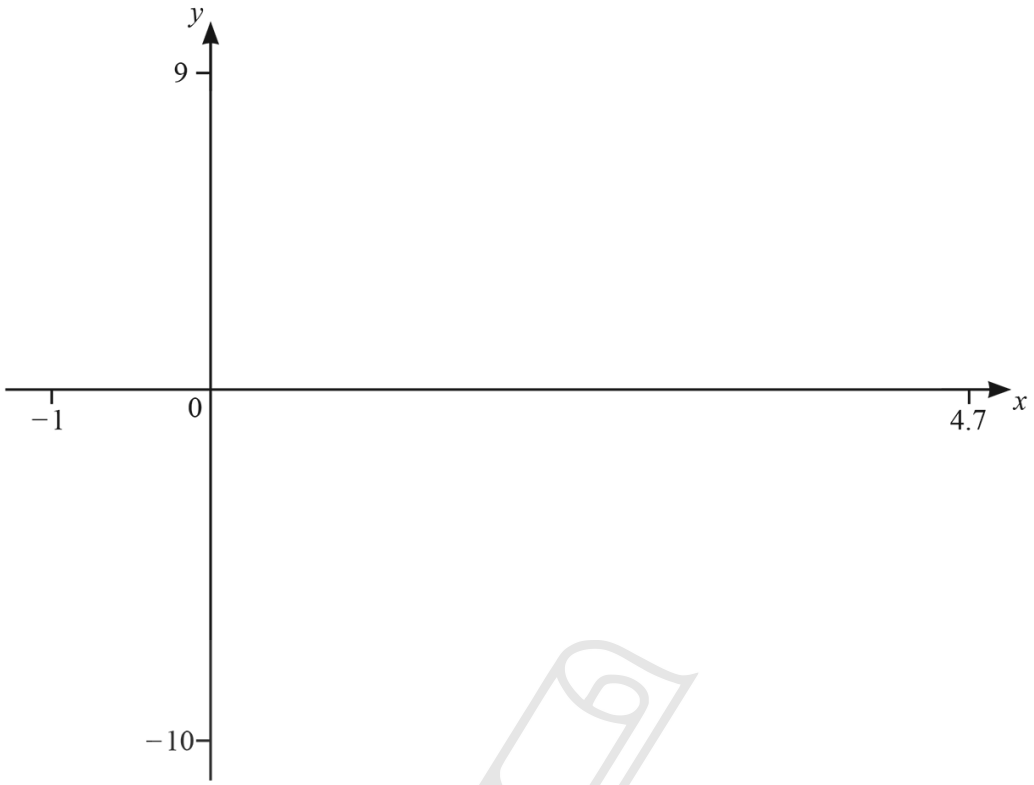


(i) On the diagram sketch the lines $y = -\frac{1}{2}x + 3$, $2y = x + 5$ and $y = x$ for $-6 \leqslant x \leqslant 7$. [4]

(ii) Show, by shading, the region that satisfies these inequalities.

$y > -\frac{1}{2}x + 3$ $\quad 2y < x + 5$ $\quad y > x$ [2]

(b)



$f(x) = (x-2)^3 - 5x + 12$ for $-1 \leqslant x \leqslant 4.7$

(i) On the diagram, sketch the graph of $y = f(x)$. [2]

(ii) Write down the coordinates of the local maximum.

(....., ...) [2]

(iii) The equation $(x-2)^3 - 5x + 12 = k$ has exactly 2 solutions.

Find the values of k.

$k =$ ..... or $k =$ ..... [2]

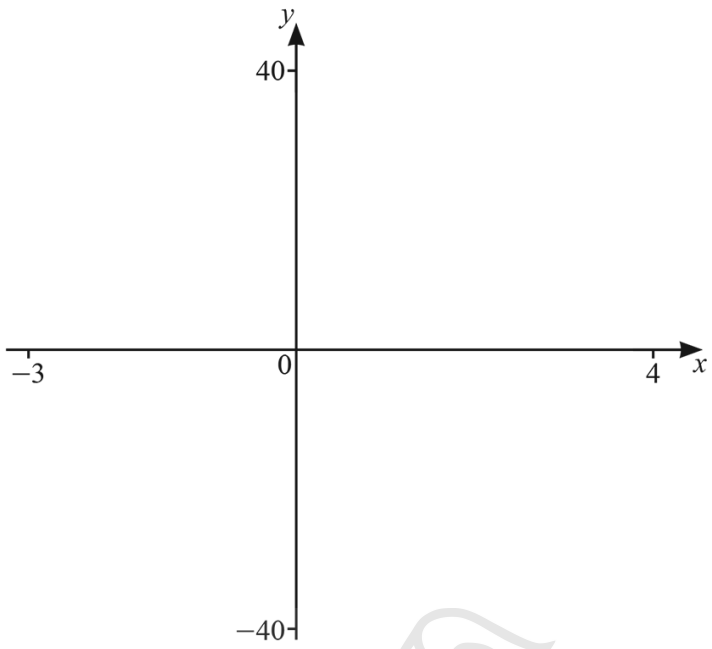
(iv) $g(x) = -(x-1)^2$ for $-1 \leqslant x \leqslant 4.7$

On the diagram, sketch the graph of $y = g(x)$. [2]

(v) Solve $f(x) = g(x)$.

$x =$ ..... [1]

19. 0607_w23_qp_43 Q: 4



$f(x) = 2x^3 - 3x^2 - 12x + 7$ for $-3 \leqslant x \leqslant 4$

(a) Sketch the graph of $y = f(x)$. [2]

(b) Solve $f(x) = 0$.

..... [3]

(c) Find the values of k for which $f(x) = k$ has exactly two solutions.

$k =$ ..... or $k =$ ..... [2]

(d) Find the range of values of x for which the gradient of $f(x)$ is negative.

..... [2]

20. 0607_w23_qp_43 Q: 8

(a) $v = u + at$

Find v when $u = 60$, $a = -32$ and $t = 3$.

$v =$ ..... [2]

(b) Solve.

(i) $6x + 2 = 9 - 4x$

$x =$ ..... [2]

(ii) $|2x - 3| = 7$

..... [3]

(c) Solve by factorisation.

$3x^2 - 11x + 6 = 0$

$x =$ ..... or $x =$ ..... [2]

(d) Rearrange $y = \frac{ax+3b}{5x}$ to make x the subject.

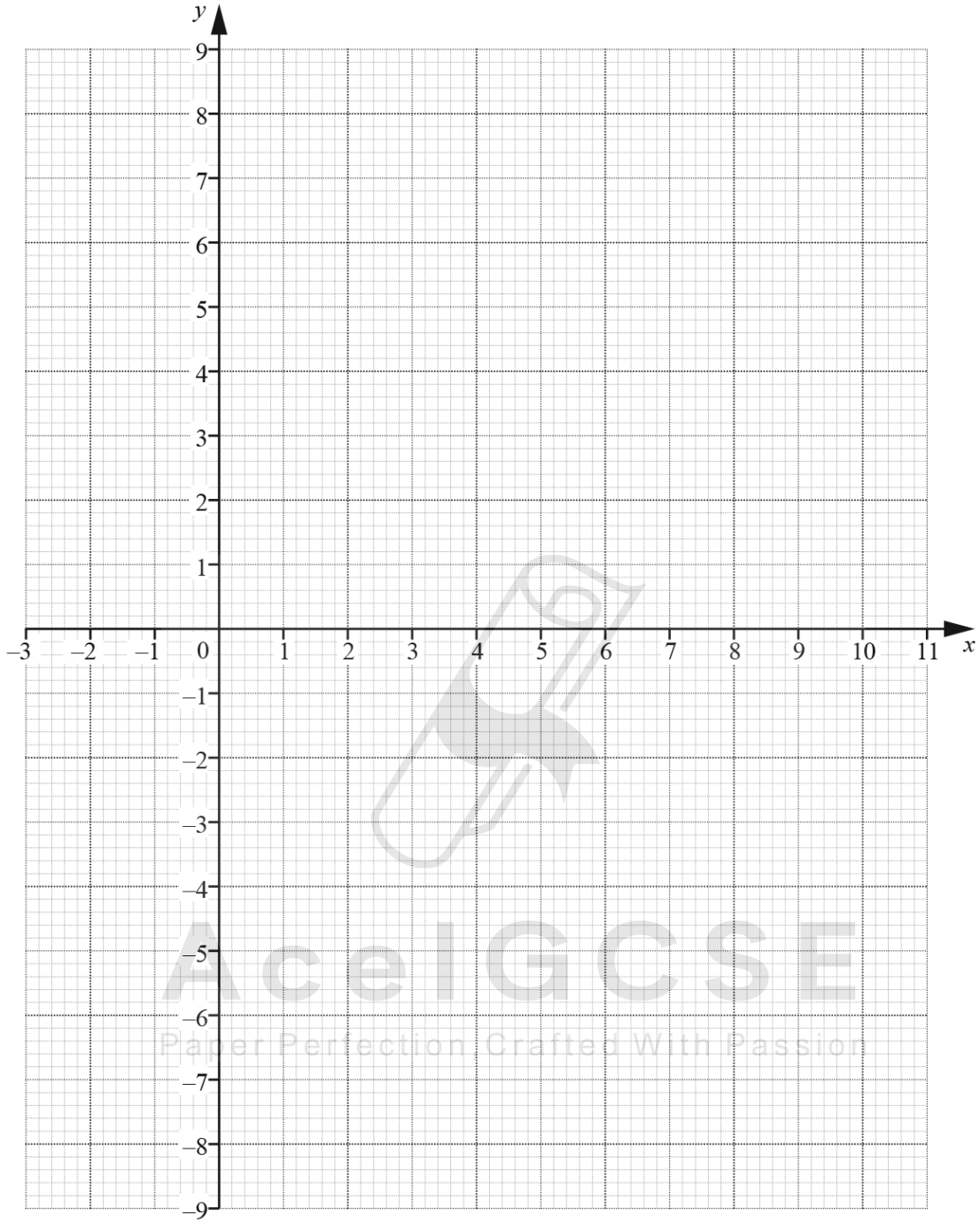
$x =$ ..... [3]

(e) Simplify.

$$\frac{ax-2bx+3ay-6by}{x^2-9y^2}$$

..... [4]

21. 0607_s15_qp_42 Q: 7



(a) On the grid, show clearly the region defined by these inequalities.

$x \geqslant -1$ $y \geqslant 2$ $y \geqslant 2x - 3$ $3x + 5y \leqslant 30$ [7]

(b) Use your diagram to estimate

(i) the greatest value of y in the region,

Answer(b)(i) ..... [1]

(ii) the greatest value of $x + y$ in the region.

Answer(b)(ii) ..... [1]

22. 0607_w19_qp_41 Q: 9

(a) Lionel runs 10.6 km in 94 minutes.

Calculate his average speed in km/h.

.....km/h [2]

(b) Monika walks 2 km at a speed of 4 km/h and then 3 km at a speed of 3 km/h.

Calculate Monika's overall average speed.

.....km/h [3]

(c) A train is travelling at v metres per second.

Find an expression, in terms of v, for the speed of the train in kilometres per hour.
Give your answer in its simplest form.

.....km/h [2]

(d) **(i)** A car travels 50 km at x km/h and then 80 km at $(x+10)$ km/h.

Find an expression, in terms of x, for the total time taken, T hours.
Give your answer as a single fraction, in its simplest form.

$T =$ ..... h [3]

(ii) When $T = 2$, show that $x^2 - 55x - 250 = 0$.

[2]

(iii) When $T = 2$, find the value of x.

$x =$ ..... [3]

23. 0607_s16_qp_41 Q: 2

The frequency of a radio wave, f, is inversely proportional to the wavelength, L metres.
A radio station broadcasts on a frequency of 93.7 and a wavelength of 3.2 m.

(a) Find a formula for f, in terms of L, writing any constants correct to 3 significant figures.

$f =$ ..... [3]

(b) Chat Radio broadcasts with a wavelength of 2.8 m.

Find the frequency of Chat Radio.

..... [1]

(c) Allsports Radio broadcasts with a frequency of 0.35 .

Find the wavelength of Allsports Radio.

..... m [2]

24. 0607_s16_qp_43 Q: 3

y is directly proportional to $(x+1)^3$.
$y = 32$ when $x = 3$.

(a) Find the value of y when $x = 4$.

$y =$ ..... [3]

(b) Find the value of x when $y = 13.5$.

$x =$ ..... [2]

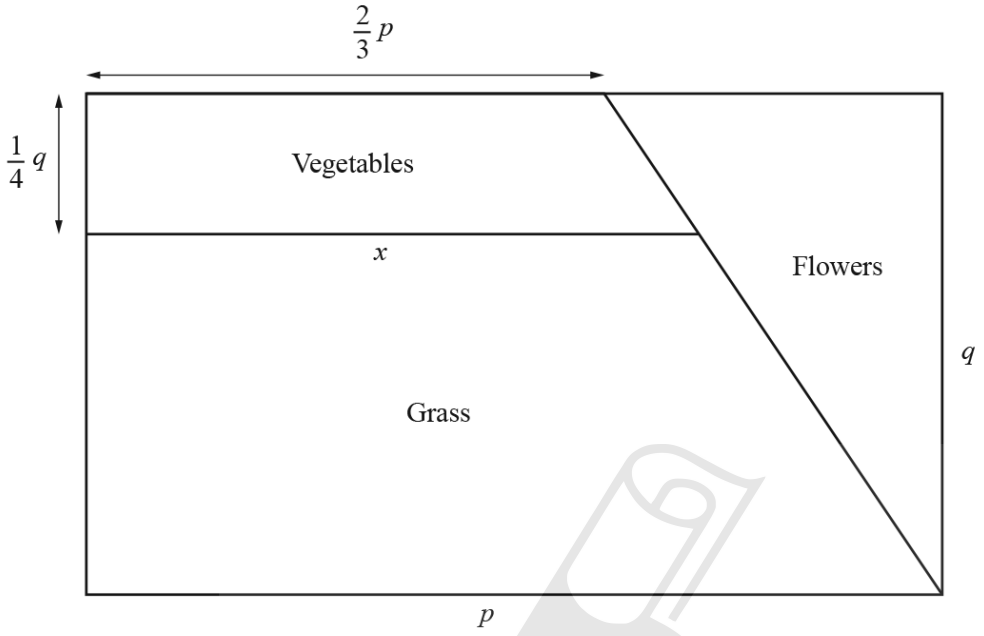
(c) Find x in terms of y.

$x =$ ..... [3]

25. 0607_s15_qp_41 Q: 14

In this question all measurements are in metres.

A rectangular garden has length p and width q.
The garden is divided into 3 sections as shown in the diagram.



(a) Write down an expression, in terms of p and q, for the area for flowers.

Answer(a) .....m^2 [1]

(b) Show that $x = \frac{3}{4}p$.

[2]

(c) Find an expression, in terms of p and q, for the area for grass.
Give your answer in its simplest form.

Answer(c) .....m^2 [2]

(d) Find the ratio area for vegetables : area for grass .

Answer(d) ..... : ..... [2]

26. 0607_w19_qp_42 Q: 4

(a) Solve the following equations.

(i) $2x - 3 = -11$

$x =$ ..... [2]

(ii) $\frac{36}{x} = -4$

$x =$ ..... [2]

(iii) $6x + 13 = 17 - 2x$

$x =$ ..... [2]

(b) Solve the simultaneous equations.
You must show all your working.

$$5x + 3y = -19$$
$$3x + 5y = -21$$

$x =$ .....

$y =$ ..... [4]

27. 0607_s17_qp_42 Q: 6

(a) **(i)** x is proportional to v.

Write down an expression for x in terms of v and a constant c.

$x =$ ..... [1]

(ii) y is proportional to v^2.

Write down an expression for y in terms of v and a constant k.

$y =$ ..... [1]

(iii) $d = x + y$

Write down an expression for d in terms of v, c and k.

$d =$ ..... [1]

(b) The table shows two values of v and the corresponding values of d.

v	d
12	750
20	2050

Using your answer to **part (a)(iii)**,

(i) show that $125 = 2c + 24k$,

[1]

(ii) write down a second equation connecting c and k.

..... [1]

(c) Solve the simultaneous equations in **part (b)** to find the value of c and the value of k.

c = ...

k = ... [3]

(d) Find the value of d when $v = 40$.

d = ... [2]

28. 0607_w17_qp_43 Q: 11

(a) Solve the simultaneous equations.
You must show all your working.

$$3x - 2y = 11$$
$$4x - 5y = 10$$

$x =$ .....

$y =$ ..... [4]

(b) Use your answers to **part (a)** to solve the simultaneous equations.

$$3a - 2b = 22$$
$$4a - 5b = 20$$

$a =$ .....

$b =$ ..... [2]

(c) **(i)** Use your answers to **part (a)** to find the exact answers to these simultaneous equations.

$$3 \times 10^p - 2 \times 10^q = 11$$
$$4 \times 10^p - 5 \times 10^q = 10$$

$p =$ .....

$q =$ ..... [3]

(ii) Find the value of $p + q$.

..... [1]

29. 0607_w16_qp_42 Q: 7

Solve the simultaneous equations.
You must show all your working.

$$3x + 4y = -8$$
$$5x - 6y = -7$$

$x =$ .....

$y =$ ..... [4]

30. 0607_s15_qp_41 Q: 2

Solve the simultaneous equations.
You must show all your working.

$$5x - 2y = 11.5$$
$$4x + 3y = 0$$

Answer $x =$ .....

$y =$ ..... [4]

31. 0607_s20_qp_41 Q: 5

(a) Expand the brackets and simplify.

(i) $5(2-p)-3(3+2p)$

..... [2]

(ii) $(7g-2h)(3g+11h)$

..... [3]

(b) Factorise completely.

(i) $2x^2y^3-4x^3y^2$

..... [2]

(ii) $49t^2-9u^2$

..... [2]

(iii) $6d^2+d-2$

..... [2]

32. 0607_w16_qp_41 Q: 10

(a) Solve.

$$7x + 2 = 11$$

$x =$ ..... [2]

(b) Write as a single fraction, in its simplest form.

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

..... [2]

(c) Simplify the following.

(i) $\dfrac{8x^4y^2}{4x^3y^4}$

..... [2]

(ii) $\dfrac{x^2-9}{x^2-2x-3}$

..... [4]

33. 0607_w15_qp_41 Q: 11

(a) Cakes cost x cents each and drinks cost y cents each.
2 cakes and 1 drink cost \$1.57 .
1 cake and 3 drinks cost \$2.96 .

Find the total cost of 3 cakes and 2 drinks.
Give your answer in dollars.

Answer(a) \$ ..... [6]

(b) A child's train ticket costs \$$x$.
An adult's train ticket costs \$(x + 5).
Claudia buys 11 tickets.
She spends \$24 on children's tickets and \$24 on adults' tickets.

Write down an equation in x and solve it to find the cost of a child's ticket.

Answer(b) \$ ..... [4]

34. 0607_w15_qp_42 Q: 14

A fraction P has denominator x.
The numerator of the fraction is 3 less than the denominator.

(a) Write down fraction P in terms of x.

Answer(a) ..... [1]

(b) The numerator and the denominator of fraction P are each increased by 3 to give fraction Q.

Write down fraction Q in terms of x.

Answer(b) ..... [1]

(c) $Q - P = \frac{9}{40}$

(i) Write down an equation in x and show that it simplifies to $x^2 + 3x - 40 = 0$.

[3]

(ii) Solve the equation $x^2 + 3x - 40 = 0$.

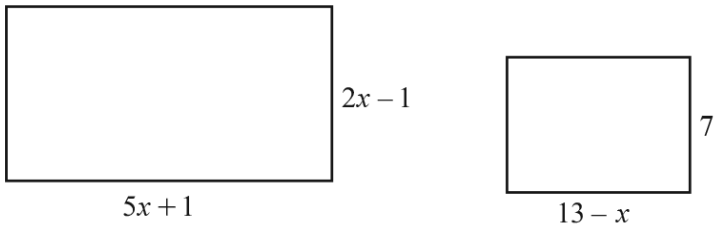
Answer(c)(ii) $x =$ ..... or $x =$ ..... [2]

(iii) Write down the original fraction, P.

Answer(c)(iii) ..... [1]

35. 0607_m22_qp_42 Q: 6

In this question all lengths are in centimetres.



NOT TO SCALE

The area of the larger rectangle is $84\,\text{cm}^2$ greater than the area of the smaller rectangle.

(a) Show that $5x^2 + 2x - 88 = 0$.

[4]

(b) Factorise $5x^2 + 2x - 88$.

..... [2]

(c) Find the area of the smaller rectangle.

..... cm^2 [2]

36. 0607_s21_qp_42 Q: 7

Roisin drives 250 km.
She drives the first 200 km at an average speed of x km/h.

(a) Write down an expression for the time, in hours, it takes to drive the 200 km.

..... h [1]

(b) For the remainder of the journey, Roisin is in heavy traffic and her average speed is 40 km/h less than for the first 200 km.

The total time for the journey is $3\frac{1}{2}$ hours.

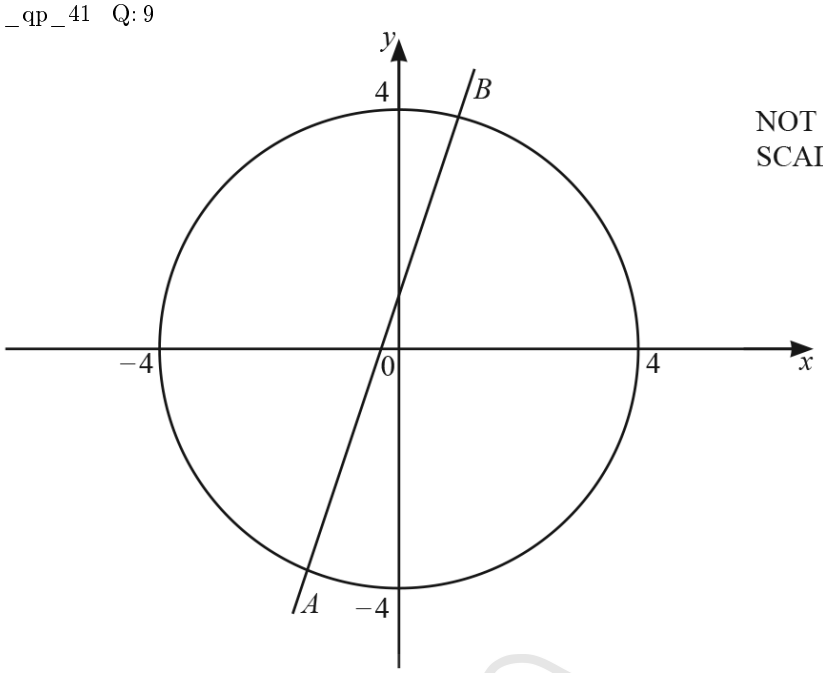
Show that $7x^2 - 780x + 16\,000 = 0$.

[4]

(c) Solve the equation $7x^2 - 780x + 16\,000 = 0$ to find the time taken to travel the first 200 km.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [5]

37. 0607_w21_qp_41 Q: 9



The equation of the circle is $x^2 + y^2 = 16$.
The equation of the straight line is $y = 3x + 1$.
The line crosses the circle at the points A and B.

(a) Use substitution to show that the x-coordinates of the points A and B satisfy the equation $10x^2 + 6x - 15 = 0$.

[3]

(b) Solve the equation $10x^2 + 6x - 15 = 0$ to find the coordinates of the points A and B.
Show your working and give your answers correct to 2 decimal places.

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

B (..... , ...) [4]

38. 0607_w21_qp_42 Q: 7

(a) The cost of a newspaper is $\$p$.
The cost of a magazine is $\$m$.

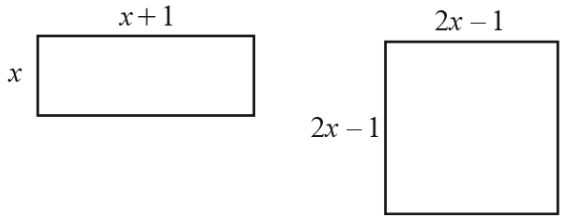
The total cost of 3 newspapers and 5 magazines is \$13.30 .
The total cost of 1 newspaper and 7 magazines is \$15.90 .

Find the value of p and the value of m.

$p =$ .....

$m =$ ..... [5]

(b)



NOT TO SCALE

The area of the rectangle is equal to the area of the square.

Find the value of x.

$x =$ ..... [7]

---

39. 0607_w20_qp_41 Q: 3

(a) Solve the simultaneous equations.
You must show all your working.

$$2x+5y=-12$$
$$7x-3y=-1$$

$x =$ .....

$y =$ ..... [4]

(b) Solve $(4x-1)(2x+3)=-5$.
You must show all your working.

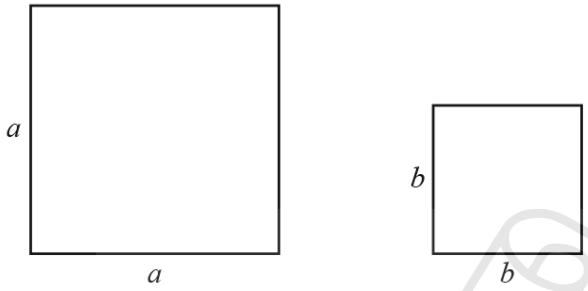
$x =$ ..... or $x =$ ..... [5]

40. 0607_w20_qp_43 Q: 7

(a) (i) Factorise $a^2 - b^2$.

..... [1]

(ii)



NOT TO SCALE

The diagram shows two squares.
The difference between the areas of the squares is $7.41\,\text{cm}^2$.
The difference between the lengths of the sides of the squares is 1.3 cm.

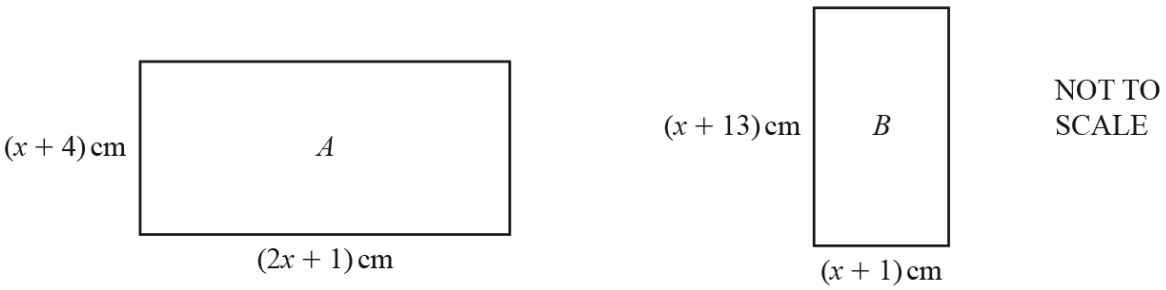
Find the area of the larger square.

..... cm^2 [5]

(b) (i) Factorise $x^2 - 5x - 24$.

..... [2]

(ii)



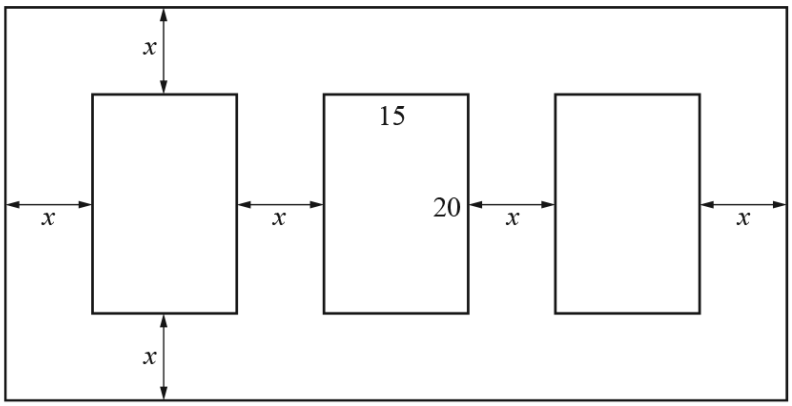
The area of rectangle A is $15\,\text{cm}^2$ greater than the area of rectangle B.

Find the area of rectangle A.

..... cm^2 [8]

41. 0607_s19_qp_41 Q: 9

In this question all lengths are in centimetres.



NOT TO SCALE

The diagram shows a picture frame with three pictures.
The frame and the pictures are rectangles.

Each picture measures 20 cm by 15 cm.
The width of the borders between each picture and between each picture and the frame are all x cm.
The total area of the frame is 2208 cm^2.

(a) Show that $4x^2 + 85x - 654 = 0$.

[3]

(b) Solve the equation $4x^2 + 85x - 654 = 0$.
You must show all your working.

$x =$ ..... or $x =$ ..... [3]

(c) Find the dimensions of the picture frame.

Length ..... cm

Height ..... cm [2]

---

42. 0607_s19_qp_42 Q: 10

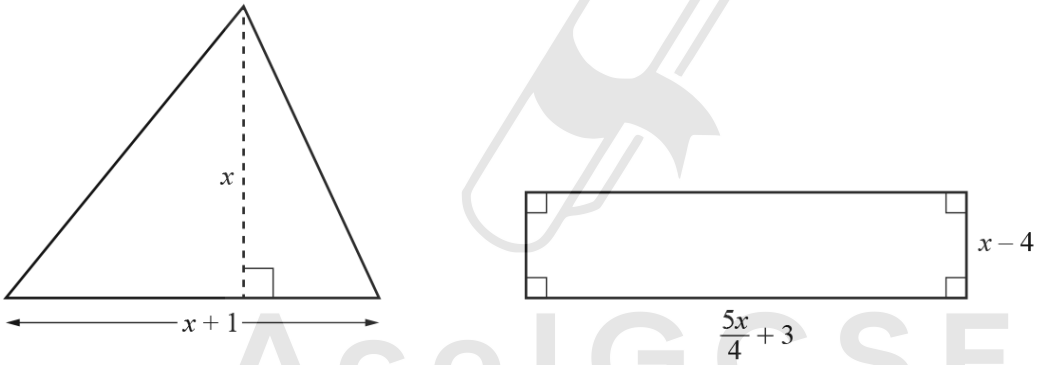
(a) Amy buys 3 pencils and 1 ruler and pays 67 cents.
Ben buys 2 pencils and 3 rulers and pays 96 cents.

Find the cost of 1 pencil and the cost of 1 ruler.
You must show all your working.

Pencil ..... cents

Ruler ..... cents [5]

(b) In this part, all measurements are in centimetres.



NOT TO SCALE

The area of the triangle is the same as the area of the rectangle.

(i) Show that $3x^2 - 10x - 48 = 0$.

[4]

(ii) Factorise $3x^2 - 10x - 48$.

..... [2]

(iii) Find the area of the triangle.

..... cm^2 [2]

43. 0607_w19_qp_42 Q: 7

(a) **(i)** Factorise $2x^2 - 11x - 6$.

..... [2]

(ii) Using your answer to **part (i)**, solve $2x^2 - 11x - 6 < 0$.

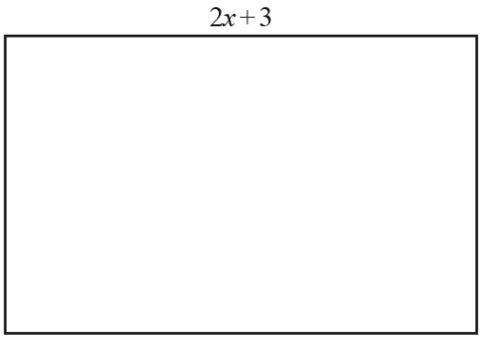
..... [2]

(b) Solve the equation $3x^2 - x - 5 = 0$.

Give your answers correct to 2 decimal places.
You must show all your working.

$x =$ ..... or $x =$ ..... [3]

44. 0607_w19_qp_43 Q: 10
All lengths in this question are in metres and all areas are in square metres.



NOT TO SCALE

The length of this rectangle is $(2x+3)$ and the area is 840.

(a) Write down an expression, in terms of x, for the width of the rectangle.

..... [1]

(b) The perimeter of the rectangle is 118.

Show that $2x^2 - 53x + 336 = 0$.

[3]

(c) Solve the equation $2x^2 - 53x + 336 = 0$.
Show all your working.

$x =$ ..... or ..... [3]

(d) Find the length and the width of the rectangle.

Length = ... m

Width = ... m [2]

---

45. 0607_s18_qp_43 Q: 10
Isabel drives from Geneva to Rome, a distance of 930 km.
Her average speed is x km/h.

(a) Write down an expression, in terms of x, for the time, in hours, the journey takes.

..... h [1]

(b) She returns from Rome to Geneva along the same route at an average speed of $(x + 5)$ km/h.

The journey takes $\frac{1}{2}$ hour less than the journey from Geneva to Rome.

(i) Write down an equation, in terms of x, and show that it simplifies to

$$x^2 + 5x - 9300 = 0.$$

[3]

(ii) Solve this equation.
Give your answers correct to 1 decimal place.

x = ... or x = ... [3]

(iii) Find the time taken for the journey from Rome to Geneva in hours and minutes.

..... h ..... min [2]

46. 0607_w18_qp_41 Q: 1

(a) Solve the following equations.

(i) $12 - x = 4$

$x =$ ..... [1]

(ii) $9x - 4 = 6x + 8$

$x =$ ..... [2]

(iii) $\frac{12}{x} + 5 = 9$

$x =$ ..... [2]

(b) (i) Solve $6x^2 - 5x + 1 = 0$.

$x =$ ..... or $x =$ ..... [3]

(ii) Use your answer to **part (b)(i)** to solve

$$6\sin^2 x - 5\sin x + 1 = 0 \quad \text{for } 0° \leqslant x \leqslant 90°.$$

$x =$ ..... or $x =$ ..... [3]

47. 0607_s17_qp_41 Q: 11

Vito lives in Sicily.
Table A shows the distances, in km, between different towns.
Table B shows the average speed, in km/h, that Vito drives his car between towns.

Table A (distances, in km)

	Agrigento	Catania	Messina	Palermo	Trapani
Agrigento		175	275	155	170
Catania	175		100	215	325
Messina	275	100		225	330
Palermo	155	215	225		110
Trapani	170	325	330	110	

Table B (average speeds, in km/h)

	Agrigento	Catania	Messina	Palermo	Trapani
Agrigento		90	110	75	100
Catania	90		120	95	$90+x$
Messina	110	120		105	80
Palermo	75	95	105		$30+2x$
Trapani	100	$90+x$	80	$30+2x$	

(a) (i) Write down the distance from Agrigento to Messina.

..... km [1]

(ii) Find the time taken for Vito to drive from Agrigento to Messina.

..... hours [2]

(b) On another day, Vito drives from Agrigento to Trapani.
He arrives at Trapani at 1042.

At what time did he leave Agrigento?

..... [3]

(c) One day Vito drives from Catania to Palermo.
Vito's car uses fuel at the rate of 12.5 km/litre.
The cost of fuel is 1.432 euros per litre.

Find the cost of this journey.

.....euros [3]

(d) The time for Vito to drive from Catania to Trapani is $1\frac{1}{2}$ hours longer than the time for Vito to drive from Palermo to Trapani.

(i) Show that $x^2 - 75x + 1400 = 0$.

[5]

(ii) Find the two possible average speeds that Vito drives from Catania to Trapani.

.....km/h, ...km/h [3]

48. 0607_w17_qp_43 Q: 10

(a) Solve the equation $4x^2 = 12 - 3x$.

Give your answers correct to 2 decimal places.
You must show all your working.

$x =$ ..... or $x =$ ..... [4]

(b) Solve the inequality $4x^2 > 12 - 3x$.

..... [2]

(c) Solve the inequality $4x^2 + 5 \leqslant 12 - 3x$.

..... [4]

49. 0607_s16_qp_43 Q: 2

(a) Factorise.

$$3x^2 - 10x - 8$$

..... [2]

(b) Solve the inequality.

$$3x^2 - 10x - 8 < 0$$

..... [2]

(c) Solve the equation.

$$3\sin^2 x - 10\sin x - 8 = 0 \quad \text{for} \quad 0° < x < 360°$$

..... [3]

50. 0607_w16_qp_43 Q: 9

Justine travels 760 km in her car.

(a) Justine's average speed for the journey is 77 km/h.

Calculate the time Justine takes to complete the journey.
Give your answer in hours and minutes correct to the nearest minute.

..... h ..... min [3]

(b) Justine travels 270 km on main roads and 490 km on autoroutes.
On main roads her car travels x km on each litre of fuel.
On autoroutes her car travels $(x+4)$ km on each litre of fuel.

(i) Write down an expression, in terms of x, for the fuel that Justine's car uses on main roads on this journey.

..... litres [1]

(ii) Altogether Justine's car uses 62 litres of fuel for the whole journey.

Write down an equation in x and show that it simplifies to $31x^2 - 256x - 540 = 0$.

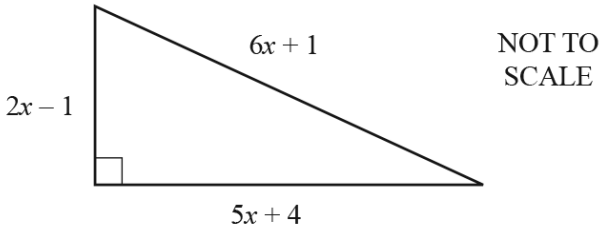
[3]

(iii) Solve the equation $31x^2 - 256x - 540 = 0$ to find the distance Justine's car travels on 1 litre of fuel on autoroutes.

..... km [4]

51. 0607_s15_qp_41 Q: 13

In this question all lengths are in centimetres.



(a) Write down a quadratic equation, in terms of x, and show that it simplifies to

$$7x^2 - 24x - 16 = 0.$$

[3]

(b) Factorise $7x^2 - 24x - 16$.

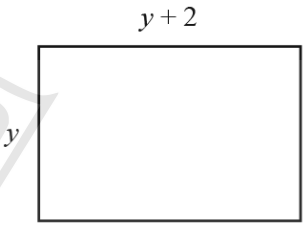
Answer(b) ..... [2]

(c) Show that the area of the triangle is $84\,cm^2$.

[2]

(d) The area of this rectangle is equal to the area of the triangle.

Find the value of y.



NOT TO SCALE

Answer(d) $y =$ ..... [4]

52. 0607_s21_qp_41 Q: 3

Find the next term and the nth term in each of the following sequences.

(a) 13, 18, 23, 28, 33, …

next term = ...

nth term = ... [3]

(b) –9, –6, –1, 6, 15, …

next term = ...

nth term = ... [3]

(c) 1089, 2178, 3267, 4356, 5445, …

next term = ...

nth term = ... [2]

(d) 2, –4, 8, –16, 32, …

next term = ...

nth term = ... [3]

53. 0607_w21_qp_41 Q: 7

(a) The nth term of a sequence is $\frac{n(n+1)(2n+1)}{6}$.

Find the first three terms of this sequence.

..... , ... , ... [2]

(b) For each of the following sequences:

- find the next two terms
- find an expression for the nth term.

(i) 11 8 5 2

Next two terms ..... , ...

nth term ..... [3]

(ii) −2 −2 0 4 10 18

Next two terms ..... , ...

nth term ..... [3]

(iii) 3 5 9 17 33

Next two terms ..... , ...

nth term ..... [3]

54. 0607_s20_qp_41 Q: 4

Find the nth term of each sequence.

(a) 16, 25, 36, 49, 64, ...

..... [2]

(b) 3, 10, 29, 66, 127, ...

..... [2]

(c) 64, 32, 16, 8, 4, ...

..... [2]

55. 0607_w20_qp_42 Q: 10

y is inversely proportional to the square root of x.
When $x = 25$, $y = 4$.

(a) Find y in terms of x.

$y =$ ..... [2]

(b) Find y when $x = 0.25$.

$y =$ ..... [1]

(c) Find x when $y = 5$.

$x =$ ..... [2]

(d) z is proportional to $y + 2$.
When $x = 4$, $z = 84$.

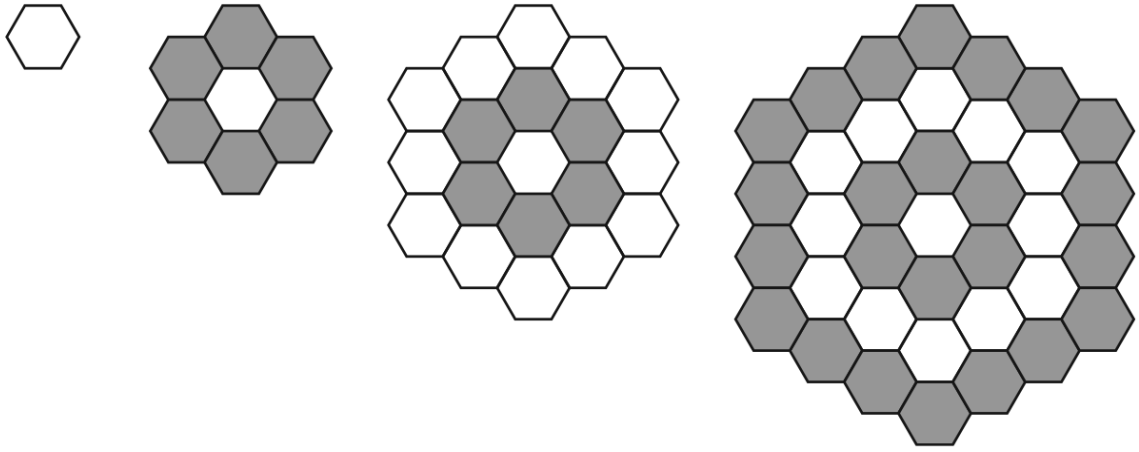
Find z in terms of x.

$z =$ ..... [3]

56. 0607_s19_qp_41 Q: 12

Here is a sequence of patterns made using identical regular hexagons.

Pattern 1 Pattern 2 Pattern 3 Pattern 4



Pattern number	1	2	3	4	5	6
Number of white hexagons	1	1	13	13		
Number of grey hexagons	0	6	6	24		
Total number of hexagons	1	7	19	37	61	

(a) Complete the table for Pattern 5 and Pattern 6. [5]

(b) The nth term of the sequence for the total number of hexagons is $3n^2 + pn + q$.

Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [2]

57. 0607_s19_qp_42 Q: 8

Find the *n*th term of each sequence.

(a) 7, 14, 21, 28, ...

..... [1]

(b) 10, 7, 4, 1, ...

..... [2]

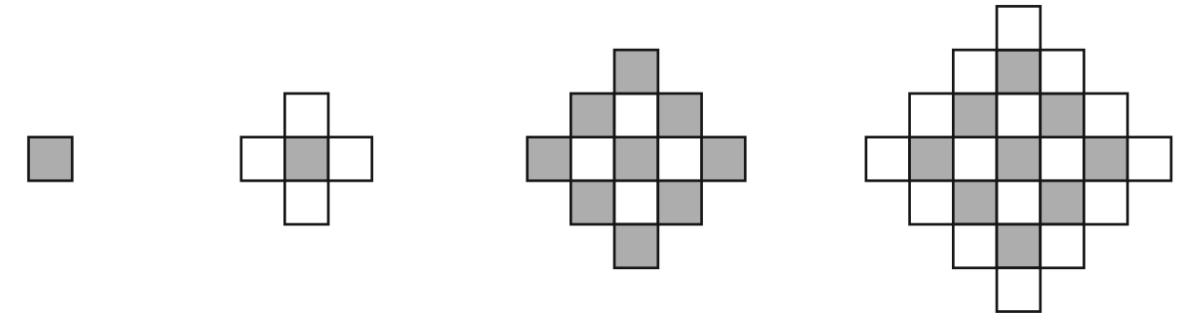
(c) 8, 16, 32, 64, ...

..... [2]

(d) 2, 6, 12, 20, ...

..... [2]

58. 0607_s18_qp_43 Q: 9



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Complete the table for the sequence of patterns above.

Pattern number	1	2	3	4	5	6
Number of grey tiles	1	1	9	9		
Number of white tiles	0	4	4	16		
Total number of tiles	1	5	13			

[3]

(b) Find the number of each colour of tiles in

(i) Pattern 15,

Grey .....

White ..... [2]

(ii) Pattern 20.

Grey .....

White ..... [2]

(c) Find an expression, in terms of n, for the total number of tiles in Pattern n.

..... [2]

59. 0607_w18_qp_41 Q: 7

(a) Find an expression for the nth term for each of these sequences.

(i) 80, 77, 74, 71, …

..... [2]

(ii) 128, 64, 32, 16, …

..... [2]

(b) The nth term of a sequence is $n^2 - 1$.

Find the first four terms of this sequence.

....., ..., ..., ... [2]

(c) The nth term of a sequence is $|n-3|$.

Find the first four terms of this sequence.

....., ..., ..., ... [2]

(d) The nth term of a sequence is $n^2 + n + 41$.

(i) Find the first three terms of this sequence.

....., ..., ... [2]

(ii) Show that when $n = 41$ the number in this sequence is not prime.

[1]

60. 0607_s17_qp_41 Q: 1

(a) Find the next term and the nth term in each of the following sequences.

(i) 4, 8, 12, 16, 20, …

next term = ...

nth term = ... [2]

(ii) −1, −3, −5, −7, −9, …

next term = ...

nth term = ... [3]

(iii) 3, 12, 27, 48, 75, …

next term = ...

nth term = ... [3]

(iv) 1, 8, 27, 64, 125, …

next term = ...

nth term = ... [2]

(b) Use your answers to **part (a)**, to find the next term and the nth term in the following sequence.

7, 25, 61, 121, 211, …

next term = ...

nth term = ... [3]

61. 0607_w17_qp_41 Q: 3

(a) The nth term of a sequence is $n^2 + 3n$.

Find the first four terms of this sequence.

..... , ... , ... , ... [2]

(b) These are the first four terms of another sequence.

5 7 9 11

(i) Write down the next two terms.

..... , ... [1]

(ii) Find the nth term of this sequence.

..... [2]

(c) Using the sequences in **part (a)** and **part (b)**, or otherwise, find the nth term of this sequence.

14, 24, 36, 50, …

Write your answer as simply as possible.

..... [2]

62. 0607_w17_qp_42 Q: 1

(a) These are the first four terms of a sequence.

27 20 13 6

(i) Write down the next two terms.

..... , ... [2]

(ii) Find the nth term.

..... [2]

(b) These are the first four terms of another sequence.

8 16 32 64

(i) Write down the next two terms.

..... , ... [2]

(ii) Find the nth term.

..... [2]

63. 0607_s16_qp_41 Q: 6

(a) These are the first four terms of a sequence.

5 8 11 14

Write down an expression in terms of n for the nth term, s_n, of the sequence.

$s_n =$ ..... [2]

(b) The nth term, t_n, of another sequence is $2n^2 + n - 6$.

Write down the first four terms of this sequence.

..... , ... , ... , ... [2]

(c) The nth term of a third sequence, u_n, is given by

$$u_n = \frac{t_n}{n+2}.$$

Find an expression for u_n, in terms of n, giving your answer in its simplest form.

$u_n =$ ..... [3]

(d) The nth term of a fourth sequence is given by $s_n + u_n$.

Is 501 a term of this fourth sequence?
Give your reasons.

..... because .....

..... [2]

64. 0607_s16_qp_42 Q: 12

(a) Find the nth term of the sequence.

1, 8, 27, 64, 125, …

..... [1]

(b) **(i)** Find the next term in the sequence.

2, 12, 36, 80, 150, 252, …

..... [2]

(ii) Find the nth term of the sequence.

2, 12, 36, 80, 150, 252, …

..... [2]

65. 0607_w16_qp_42 Q: 11

Find the next term and the nth term in each of these sequences.

(a) 1, 8, 27, 64, 125, ...

Next term =.....

nth term =..... [2]

(b) 3, 7, 13, 21, 31, ...

Next term =.....

nth term =..... [4]

(c) –2, 1, 14, 43, 94, ...

Next term =.....

nth term =..... [4]

66. 0607_s15_qp_43 Q: 6

(a) **(i)** Find an expression for the nth term of this sequence.

$$2, \quad 6, \quad 10, \quad 14, \quad \ldots$$

Answer(a)(i) ..... [2]

(ii) Use your answer to **part (a)(i)** to find an expression for u, the nth term of this sequence.

$$2 \times 10^2, \quad 6 \times 10^3, \quad 10 \times 10^4, \quad 14 \times 10^5, \quad \ldots$$

Answer(a)(ii) $u =$ ..... [1]

(b) The nth term, t, of another sequence, is given by $t = 2 \times 10^{(3-2n)}$.

(i) Write down the first 4 terms in this sequence, giving your answers in standard form.

Answer(b)(i) ..... , ... , ... , ... [2]

(ii) Using your answer to **part (a)(ii)**, find and simplify an expression for $\frac{u}{t}$.

Answer(b)(ii) ..... [3]

67. 0607_w15_qp_42 Q: 5

Find the next term and the nth term in each of the following sequences.

(a) 27, 20, 13, 6, – 1, ...

Answer(a) next term = ...

nth term = ... [3]

(b) 1024, 512, 256, 128, 64, ...

Answer(b) next term = ...

nth term = ... [3]

68. 0607_m22_qp_42 Q: 5

(a) **(i)** Expand and simplify $(2x+3)^2$.

..... [2]

(ii) The equation $4x^2+12x+5=0$ can be written as $(2x+3)^2=k$.

Find the value of k.

$k=$ ..... [1]

(iii) Use your answer to **part(ii)** to solve the equation $4x^2+12x+5=0$.

$x=$ ..... or $x=$ ..... [2]

(b) x varies inversely as the square root of $(w - 1)$.
When $w = 10$, $x = 2$.

(i) Find x in terms of w.

$x =$ ..... [2]

(ii) Find x when $w = 3.25$.

$x =$ ..... [1]

(iii) Find w in terms of x.

$w =$ ..... [3]

69. 0607_m21_qp_42 Q: 6

(a) y is inversely proportional to the square of x.

(i) When $x = 2$, $y = 8$.

Find y in terms of x.

$y =$ ..... [2]

(ii) Find the value of y when $x = 4$.

$y =$ ..... [1]

(iii) Find the value of x when $y = 128$.

$x =$ ..... [2]

(b) r is directly proportional to the cube of $(p + 1)$.
When $p = 1$, $r = 16$.

Find the value of r when $p = 4$.

$r =$ ..... [3]

70. 0607_s21_qp_42 Q: 8

(a) y is inversely proportional to the square root of x.
When $x = 25$, $y = 0.05$.

(i) Show that $y = \frac{1}{4\sqrt{x}}$.

[2]

(ii) Find y when $x = 9$.

..... [1]

(iii) Find x in terms of y.

$x =$ ..... [2]

(iv) Find x when $y = \frac{1}{2}$.

..... [1]

(b) b is inversely proportional to a^3.
When $a = P$, $b = 24$.

Find b when $a = 2P$.

..... [2]

71. 0607_w21_qp_42 Q: 9

(a) Complete the table for each sequence.

Sequence	1st term	2nd term	3rd term	4th term	5th term		nth term
A	7	5	3	1			
B	16	25	36	49			
C	$\frac{1}{2}$	1	2	4			

[9]

(b) $y \propto \frac{1}{\sqrt{x}}$ and $z \propto y^3$.

When $x = 36$, $y = 2$ and $z = 24$.

Find z in terms of x.

$z =$ ..... [4]

72. 0607_w21_qp_43 Q: 7

y varies inversely as the square of x.
$y = 5$ when $x = 3$.

(a) (i) Find y in terms of x.

$y =$ ..... [2]

(ii) Find the value of x when $y = 20$.

$x =$ ..... [2]

(b) z varies directly as the square root of y.
$z = 12$ when $y = 9$.

Use your answer to **part (a)(i)** to find z in terms of x.

$z =$ ..... [3]

73. 0607_s19_qp_41 Q: 6

y is inversely proportional to $\sqrt{x}$.
When $x = 9$, $y = 6$.

(a) **(i)** Find an equation connecting x and y.

..... [2]

(ii) Calculate y when $x = 30$.

..... [1]

(iii) Calculate x when $y = 15$.

..... [2]

(b) For the three variables x, y and z, z is also proportional to $(y + 5)$.
When $x = 9$, $z = 33$.

Find an equation connecting x and z.

..... [2]

74. 0607_s19_qp_43 Q: 12

(a) y varies directly as the square root of $(x + 1)$.
$y = 8$ when $x = 24$.

(i) Find the value of y when $x = 15$.

$y =$ ..... [3]

(ii) Find the value of x when $y = 16$.

$x =$ ..... [2]

(b) Find the next term in each of the following sequences.

(i) 18, 13, 8, 3, –2, …

..... [1]

(ii) 3, 6, 11, 18, 27, …

..... [1]

(iii) –1000, 100, –10, 1, …

..... [1]

(iv) 0, 0, 0, 6, 24, 60, …

..... [2]

75. 0607_s18_qp_42 Q: 3

(a) y varies directly as the square root of x.
$y = 32$ when $x = 16$.

(i) Find y in terms of x.

$y =$ ..... [2]

(ii) Find the value of y when $x = 4$.

$y =$ ..... [1]

(iii) Find x in terms of y.

$x =$ ..... [2]

(b) p varies inversely as $q + 2$.
$p = 3$ when $q = 2$.

Find the value of p when $q = 4$.

$p =$ ..... [3]

76. 0607_w18_qp_42 Q: 4

(a) y varies directly as the square of $(x + 2)$.
When $x = 3$, $y = 100$.

(i) Find an equation connecting x and y.

..... [2]

(ii) Find the value of y when $x = 18$.

..... [1]

(iii) Find the values of x when $y = 25$.

..... [2]

(b) z varies inversely as $\sqrt{w}$.
When $w = A$, $z = 18$.

Find the value of z when $w = \frac{A}{9}$.

..... [2]

77. 0607_s17_qp_41 Q: 6

y varies inversely as the square of x.
$y = 32$ when $x = 2$.

(a) Find the value of y when $x = 4$.

$y =$ ..... [3]

(b) Find the value of x when $y = 512$.

$x =$ ..... [2]

(c) Find x in terms of y.

$x =$ ..... [3]

78. 0607_w16_qp_43 Q: 12

y is inversely proportional to the square root of x.
When $x = 25$, $y = 2$.

(a) Find y in terms of x.

$y =$ ..... [2]

(b) Find the value of x when $y = 3$.

..... [2]

(c) $z = ax^n$

z is proportional to the cube of y.
When $x = 4$, $z = 500$.

Find the value of a and the value of n.

$a =$ .....

$n =$ ..... [3]

01. 0607_m24_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)	4.5[0]	**2**	**M1** for $A\times\left(1+\frac{8}{100}\right)=4.86$ oe
(b)	296.9[0]	**3**	**M1** for 8 [× 5] × 4.7[0] oe **M1** for [5 ×] 18 × 1.21 oe
(c)(i)	$\frac{480}{x-6}$ oe	**1**	
(c)(ii)	$\frac{480}{x}+\frac{480}{x-6}=36$ oe	**M1**	Allow $\frac{480}{x}+their(\text{i})=36$
	$480(x-6)+480x=36x(x-6)$ oe	**M1**	Clearing fractions correctly (Dep on two fractions with different algebraic denominators)
	Completion to $3x^2-98x+240$ [= 0] with no errors	**A1**	

Question	Answer	Marks	Partial Marks
(c)(iii)	30, $\frac{8}{3}$ oe	**2**	**M1** for suitable sketch of parabola with 2 positive solutions or $(3x-8)(x-30)=0$ or $\frac{-(-98)\pm\sqrt{(-98)^2-4(3)(240)}}{2\times3}$
(c)(iv)	20	**2**	**M1** for $\frac{480}{their30-6}$

02. 0607_m24_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)	$x < 2.5$ oe final answer	2	**M1** for $2 + 8 > 7x - 3x$ oe or **B1** for x * 2.5 where * is =, >, ≤ or ≥
(b)	$3(5x + 1)(5x - 1)$ final answer	2	**B1** for $3(25x^2 - 1)$ or $(15x + 3)(5x - 1)$ or $(15x - 3)(5x + 1)$
(c)(i)	$\frac{19}{30x}$ cao final answer	2	**B1** for any equivalent or **M1** for correct use of common denominator e.g. $\frac{20+5-6}{30x}$, $\frac{20x+5x-6x}{30x^2}$ etc. oe
(c)(ii)	$\frac{x-b}{x-5}$ final answer	4	**B3 f**or $(x - b)(2x + 3)$ and $(x - 5)(2x + 3)$ or **B2** for $(x - b)(2x + 3)$ or for $(x - 5)(2x + 3)$ or **B1** for $x(2x + 3) - b(2x + 3)$ or $2x(x - b) + 3(x - b)$ or $x(2x + 3) - 5(2x + 3)$ or $2x(x - 5) + 3(x - 5)$ or $(2x + c)(x + d)$ where $c + 2d = -7$ or $cd = -15$

03. 0607_s24_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	–4	**2**	**M1** for $3x = -14 + 2$ or $x - \frac{2}{3} = \frac{-14}{3}$
(a)(ii)	1.5 or $\frac{15}{10}$ oe	**2**	**M1** for $7x + 3x = 26 - 11$ oe or better
(b)	Correctly equating coefficients or sketch of one equation with negative slope and y intercept	**M1**	If 0 scored, **SC1** for answers that satisfy one equation. **SC1** for two correct answers with no working
	Correct method to eliminate one variable or sketch of other equation with negative slope and y intercept	**M1**	
	$x = -1.5$ oe	**A1**	
	$y = -2.5$ oe	**A1**	
(c)	$x > 4$ and $x < -5$ Mark final answer	**4**	**M2** for correct sketch showing both answers or **M1** for appropriate sketch of $y = \lvert 2x+1 \rvert$ OR **M2** for $2x + 1 > 9$ oe and $2x + 1 < -9$ oe or **M1** for either correct inequality or for $2x + 1 = 9$ and $2x + 1 = -9$ oe **B1** for $x > 4$ or $x < -5$ Mark final answer

04. 0607_s24_ms_41 Q: 10

Question	Answer	Marks	Partial Marks
(a)(i)	12	**3**	**M1** for $y = \frac{k}{\sqrt{x+1}}$ oe **A1** for $k = 36$ OR **M2** for $18 \div \sqrt{\frac{8+1}{3+1}}$ oe or **M1** for $\frac{y}{18} = \sqrt{\frac{3+1}{8+1}}$ oe
(a)(ii)	575	**2**	**M1** for $\sqrt{x+1} = \frac{their\ k}{1.5}$ or better
(b)	18 NFWW	**3**	**M1** for $18 = c \times \sqrt{3+1}$ oe or better **M1** for $wy = their 9\sqrt{x+1} \times \frac{their 36}{\sqrt{x+1}}$ oe

05. 0607_s24_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	$-\frac{39}{16}$ oe or –2.44	3	**B1** for [63 =] 24 – 16a **M1** for *their* 16a = *their* 24 – 63 oe or better
(b)	Correctly equating coefficients	**M1**	Allow 1 arithmetic slip
	Correct method to eliminate one variable	**M1**	Allow 1 further arithmetic slip
	$[p =]\ \frac{1}{2}$ oe $[q =]\ -\frac{1}{4}$ oe	**B1**	If 0 scored, **SC1** for answers that satisfy one equation
(c)(i)	$(c+7)(c-8)$ oe	2	**B1** for $(c+a)(c+b)$ where $ab = -56$ or $a + b = -1$ or $c(c+7)-8(c+7)$ or $c(c-8)+7(c-8)$
(c)(ii)	–7, 8	1	**FT** *their* **(i)**

06. 0607_s24_ms_42 Q: 11

Question	Answer	Marks	Partial Marks
(a)	$\frac{3x+2y}{3x}$ or $1+\frac{2y}{3x}$ final answer	3	**B1** for $(3x+2y)(3x-2y)$ isw **B1** for $3x(3x-2y)$ isw

Question	Answer	Marks	Partial Marks
(b)(i)	$5(4-x)-7(2x-3)=2(2x-3)(4-x)$ or better	**M1**	Correctly clearing fractions
	$[(2x-3)(4-x)]=8x-12-2x^2+3x$ or $2[(2x-3)(4-x)]=16x-24-4x^2+6x$	**B1**	
	Leading to $4x^2-41x+65=0$ with no errors or omissions	**A1**	
(b)(ii)	$\frac{-(-41)\pm\sqrt{(-41)^2-4\times4\times65}}{2\times4}$ or sketch with both answers indicated	**M2**	**M1** for $\sqrt{(-41)^2-4\times4\times65}$ or $\frac{-(-41)+\text{or}-\sqrt{p}}{2\times4}$ or suitable sketch which would lead to answers
	1.96 , 8.29 cao	**B2**	**B1** for each or for 1.960... and 8.289 to 8.290

Question	Answer	Marks	Partial Marks
(a)(i)	$-\frac{2}{7}$	**2**	**M1** for $2x + 5x = 1 - 3$ or better
(a)(ii)	-5 -1	**2**	**B1** for each or **M1** for $x + 3 = \pm 2$
(b)	$3x^2y^2(2x - y)$ Final answer	**2**	**B1** for correctly extracting 2 or more factors
(c)	$\frac{x-31}{(2x+3)(x-5)}$ or $\frac{x-31}{2x^2-7x-15}$ Final answer	**3**	**B1** for $5(x - 5) - 2(2x + 3)$ oe ISW **B1** for denominator $(2x + 3)(x - 5)$ oe

Question	Answer	Marks	Partial Marks
(d)	$\frac{-3 \pm \sqrt{3^2 - 4 \times 2x - 7}}{2 \times 2}$ or suitable sketch(es) with both answers indicated	**M2**	**M1** for $\sqrt{3^2 - 4 \times 2 \times -7}$ or **M1** for $\frac{-3 + \sqrt{p}}{2 \times 2}$ or $\frac{-3 - \sqrt{p}}{2 \times 2}$ Denominator must be shown as 2×2 to earn the second M1 but a denominator of 4 is condoned for M2
	1.27 and –2.77 cao	**B1**	

08. 0607_m23_ms_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)	7.2 oe	2	**M1** for $48 = 3\times4+5B$
(b)	0.5 oe	3	**M1** for $6-12x$ or $2+4x-4$ **M1** for correctly collecting *their* terms e.g. $-12x-4x=2-4-6$ oe
(c)	–8.5 oe	3	**M1** for eliminating fractions **M1** for expanding brackets and collecting *their* terms **M1** for correctly solving *their* equation of the form $ax=b$ Max 2 marks for incorrect answer
(d)	0.8 oe	4	**B1** for $2=2\log10$ or $\log100$ **M1** for a correct use of $\log a+\log b=\log ab$ or $\log a-\log b=\log\frac{a}{b}$ **M1** for a correct use of $\log a^b=b\log a$
(e)	$x=-1.72$ $x=1.55$	3	**M2** for sketch indicating correct roots or $x=\frac{-1\pm\sqrt{1^2-4\times6\times(-16)}}{2\times6}$ or **M1** for $6x^2+x-16$ [=0] or reverse signs If 0 scored, **SC1** for one correct answer

09. 0607_m23_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	$y=\frac{20}{\sqrt[3]{x}}$	3	**M1** for $y=\frac{k}{\sqrt[3]{x}}$ **B1** for $k=10\times\sqrt[3]{8}$
(b)	15.625 oe	2	**M1** for $\sqrt[3]{x}=\frac{their\ 20}{8}$ or **M1** for $10\times\sqrt[3]{8}=8\times\sqrt[3]{x}$ oe
(c)	$w=800x^{-\frac{2}{3}}$ cao	4	**B2** for $w=2y^2$ or **B1** for $w=ky^2$ and **M1** for $w=their\,k\left(their\left(\frac{20}{\sqrt[3]{x}}\right)\right)^2$

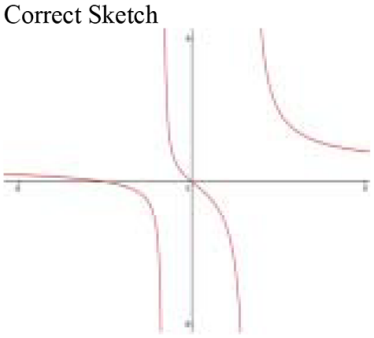
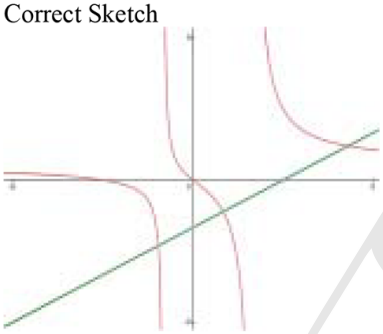
10. 0607_s23_ms_41 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$2t + c = 1470$	**B1**	
	$3t + 2c = 2480$	**B1**	
	Correctly eliminating one variable	**M1**	
	460	**B1**	
(b)(i)	$\frac{969}{x} = \frac{969}{x+6} + 2$ oe	**M1**	
	$969(x + 6) = 969x + 2x(x + 6)$ oe	**M1**	**dep** fractions cleared from equation with two algebraic fractions with linear denominators
	Leading to $x^2 + 6x - 2907$ [= 0]	**A1**	With at least one step and no errors or omissions
(b)(ii)	–57 and 51	**B2**	**M1** for $(x + 57(x - 51)$ or $\frac{-6 \pm \sqrt{(-6)^2 - 4(1)(-2907)}}{2 \times 1}$ or sketch of parabola (+ve x^2) with one positive x intercept and one negative
(b)(iii)	19	**B1**	**FT** $\frac{969}{\textit{their}\ 51}$ FT only if *their* 51 and answer are positive integers

11. 0607_s23_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)	2	**1**	
	$20 - 3n$ oe final answer	**2**	**M1** for $k - 3n$ or for correct answer seen but then spoiled
(b)	$\frac{6}{7}$	**1**	
	$\frac{n}{n+1}$ oe final answer	**1**	
(c)	128	**1**	
	2^{n+1} oe final answer	**2**	**M1** for 2^{n+k} oe
(d)	213	**1**	
	$n^3 - 3$ oe final answer	**2**	**B1** for any cubic seen or **M1** for third differences = 6 or for correct answer seen but then spoiled

12. 0607_s23_ms_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)	Correct Sketch 	3	**B1** for each branch correct
(b)	$x = 2$, $x = -1$	2	**B1** for each
(c)	–3, 0	2	**B1** for each
(d)(i)	Correct Sketch 	1	
(d)(ii)	–1.16 or –1.162... 1 5.16 or 5.162...	3	**B1** for each
(d)(iii)	$-1.16 < x < -1$ $1 < x < 2$ $x > 5.16$	3	**B1FT** from *their* **(d)(ii)** and *their* **(b)** for each. **FT** dep on answers to **(d)(ii)** that lead to three equivalent inequalities Same accuracy as **(d)(ii)**

13. 0607_s23_ms_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$7x - 11y$ Final answer	**2**	**B1** for $7x - ky$ or $kx - 11y$ k not zero
(b)	$x^2 + 2x$ Final answer	**1**	
(c)	$(5b + 4c)(2a - 3b)$ Final answer	**2**	**M1** for $2a(5b + 4c) - 3b(5b + 4c)$ or $5b(2a - 3b) + 4c(2a - 3b)$ or correct answer seen but spoiled
(d)(i)	$2(x - 3) - 5(2x + 1) = 3(2x + 1)(x - 3)$ oe or better	**M1**	
	$2x - 6 - 10x - 5$ or better	**B1**	
	$[3](2x^2 - 6x + x - 3)$ oe or better	**B1**	
	completion to $6x^2 - 7x + 2$ [= 0]	**A1**	at least one step with no errors or omissions
(d)(ii)	$(2x - 1)(3x - 2)$ [= 0] or sketch of parabola showing two positive solutions or $\frac{-(-7) \pm \sqrt{(-7)^2 - 4(6)(2)}}{2 \times 6}$	**M2**	**M1** for pair of brackets giving two terms correct or sketch of any parabola for +ve x^2 or correct formula with $\frac{-(-7)}{2 \times 6}$ or $\sqrt{(-7)^2 - 4(6)(2)}$ seen
	$\frac{1}{2}, \frac{2}{3}$ oe	**B1**	

14. 0607_s23_ms_43 Q: 6

Question	Answer	Marks	Partial Marks
(a)	4.5 oe	**2**	**B1** for $7x - 3x = 13 + 5$ oe

Question	Answer	Marks	Partial Marks
(b)	$\frac{15}{14}$ oe	3	**B1** for $8x-12=3-6x$ oe **M1** for correctly collecting terms in an equation
(c)	$\frac{2}{3}$, -2 oe	3	**B2** for $3x+2=\pm4$ oe or for $[3](3x-2)(x+2)[=0]$ oe or for $\frac{-4\pm\sqrt{4(3)(-4)}}{2(3)}$ oe or **M1** for $(3x+2)^2=8\times2$ oe
(d)	0.35 –2.85	3	**B2** for –2.851 to –2.850 and 0.350 to 0.351 OR **M2** for correct sketch indicating both roots or for $\frac{-5\pm\sqrt{5^2-4(2)(-2)}}{2(2)}$ or **M1** for $2x^2+5x-2[=0]$ or $-2x^2-5x+2[=0]$
(e)	$[x=]\,10y^4$	3	**M1** for $\log y^4$ **B1** for $1=\log10$
(f)	$\frac{1}{4}$ oe	4	**B3** for $n=3$ or **M2** for $2\frac{n}{12}=\frac{n+6}{18}$ or for $12p=36p-6$ oe or **M1** for $p=\frac{n}{12}$ or $2p=\frac{n+6}{18}$ or for $\frac{n}{12}$ **and** $\frac{n+6}{18}$ seen

15. 0607_s23_ms_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	Correct method to eliminate one variable	**M1**	
	$[x =] 1$ $[y =] -2$	**A2**	If 0 scored, **SC1** for answers that satisfy one equation
(b)(i)	–5	**1**	
(b)(ii)	$9x + 4$ final answer	**2**	**M1** for $3(3x+1)+1$ oe
(b)(iii)	1	**3**	**M2** for $2(3x+1)-3=5$ oe or **M1** for $\frac{1}{2(3x+1)-3}=\frac{1}{5}$ oe OR **M2** for $f(x)=4$ oe or **M1** for $\frac{1}{2f(x)-3}=\frac{1}{5}$

16. 0607_w23_ms_41 Q: 10

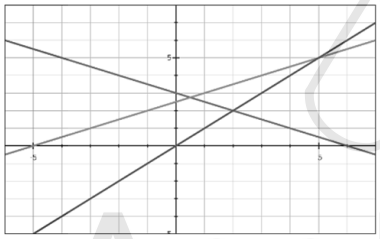
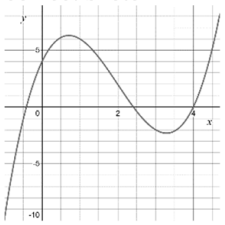
Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{kt}{6p}$ final answer	**1**	
(a)(ii)	$\frac{5u}{21}$ final answer	**2**	**M1** for correct use of common denominator $\frac{3uk}{21k}+\frac{2uk}{21k}$
(b)	$\frac{x+6}{2(x+7)}$ or $\frac{x+6}{2x+14}$ final answer	**4**	**B2** for $(x+6)(x-7)$ or **B1** for $(x+a)(x+b)$ with $ab=-42$ or $a+b=-1$ or for $x(x+6)-7(x+6)$ or $x(x-7)+6(x-7)$ **B1** for $2(x+7)(x-7)$ or $(2x+14)(x-7)$ or $(2x-14)(x+7)$
(c)	$\frac{-2g^2+23g+15}{5(g+1)}$ final answer	**3**	**B1** for $5(g-1)-2g(g+1)+5\times4(g+1)$ oe or better **B1** for common denominator seen $5(g+1)$ or $5g+5$

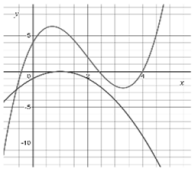
17. 0607_w23_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)	$[y =]\frac{36}{(x+1)^2}$	2	**M1** for $\frac{k}{(x+1)^2}$
(b)	2.25 oe	2	**M1** for $\frac{their36}{(3+1)^2}$ or better

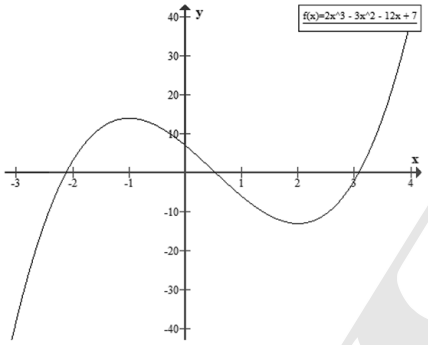
Question	Answer	Marks	Partial Marks
(c)	2.3[0…]	3	**M2** for $x+1=\sqrt[3]{their36}$ or **M1** for $x+1=\frac{their36}{(x+1)^2}$ **M1** for sketch of a cubic crossing x axis once with a positive x intercept

18. 0607_w23_ms_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	correct sketch 	4	**B1** for correct sketch of $2y=x+5$ **B1** for correct sketch of $y=-\frac{1}{2}x+3$ **B1** for correct sketch of $y=x$ passing through (0,0) **B1** for all intersections in 1st quadrant
(a)(ii)	correct region indicated	2	**FT** their lines **B1** for region satisfying 2 inequalities or for shading shown but region not clearly indicated
(b)(i)	correct sketch 	2	**M1** for positive cubic curve with a maximum and minimum
(b)(ii)	(0.709, 6.3[0])	2	**B1** for one correct coordinate
(b)(iii)	–2.3[0], *their* 6.3[0]	2	**B1** for each

Question	Answer	Marks	Partial Marks
b(iv)	correct sketch 	2	**M1** for negative quadratic curve
b(v)	–0.599 or –0.5987 to –0.5986	1	

19. 0607_w23_ms_43 Q: 4

Question	Answer	Marks	Partial Marks
(a)	Correct sketch 	2	**B1** for any cubic with positive x^3

Question	Answer	Marks	Partial Marks
(b)	–2.12 or –2.116... 0.537 or 0.5370... 3.08 or 3.079...	3	**B1** for each
(c)	14 and –13 cao	2	**B1** for each or **B1** for both14 and -13 seen
(d)	$-1 < x < 2$	2	**B1** for each

20. 0607_w23_ms_43 Q: 8

Question	Answer	Marks	Partial Marks
(a)	–36	2	**M1** for 60 + (– 32) × 3 oe or **B1** for 96 seen
(b)(i)	0.7 oe	2	**M1** for $6x + 4x = 9 - 2$ or better
(b)(ii)	5 and -2 nfww	3	**B2** for –2 nfww **B1** for 5 or **M1** for $2x - 3 = -7$ or $2x - 3 = \pm 7$ or **M1** for a correct diagram
(c)	$(3x - 2)(x - 3)$	**M1**	
	$[x =]\frac{2}{3}$ oe , 3	**B1**	

Question	Answer	Marks	Partial Marks
(d)	$\frac{3b}{5y - a}$ oe final answer	3	**M1** for $5xy = ax + 3b$ **M1FT** for $5xy - ax = 3b$ **M1FT** for factorising and division Incorrect answers score M2 maximum.
(e)	$\frac{a - 2b}{x - 3y}$ oe final answer	4	**B2** for $(x + 3y)(a - 2b)$ or **B1** for $x(a - 2b) + 3y(a - 2b)$ oe **B1** for $(x + 3y)(x - 3y)$

21. 0607_s15_ms_42 Q: 7

Qu.	Answer	Mark	Part Marks
(a)	$x = -1$ ruled	1	
	$y = 2$ ruled	1	
	$y = 2x - 3$ ruled	2	**B1** for line with gradient 2 or y-intercept –3
	$3x + 5y = 30$ ruled	2	**B1** for line with negative gradient through (0, 6) or through (10, 0)
	Correct region clearly indicated cao	1	
(b) (i)	6.5 to 6.7 cao	1	
(ii)	7.2 to 7.6 cao	1	

22. 0607_w19_ms_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	6.77 or 6.765 to 6.766	**2**	**M1** for $10.6 \div 94$ or $94 \div 60$
(b)	3.33 or 3.333... or $3\frac{1}{3}$	**3**	**M2** for $\frac{2+3}{\frac{2}{4}+\frac{3}{3}}$ or **M1** for $\frac{2}{4}$ oe or $\frac{3}{3}$ oe
(c)	$\frac{18v}{5}$ or $3.6v$ or $3\frac{3}{5}v$	**2**	**M1** for $\times (60 \times 60)$ oe or for $\div 1000$
(d)(i)	$\frac{130x+500}{x(x+10)}$ or $\frac{130x+500}{x^2+10x}$	**3**	**M1** for $\frac{50}{x}+\frac{80}{x+10}$ **B1** for common denominator $x(x + 10)$ oe

Question	Answer	Marks	Partial Marks
(d)(ii)	$130x + 500 = 2x(x + 10)$ oe	**M1**	i.e. fraction with linear numerator and quadratic denominator removed correctly
	$130x + 500 = 2x^2 + 20x$ leading to $x^2 - 55x - 250 = 0$	**A1**	i.e. equation with four terms no errors or omissions
(d)(iii)	59.2 or 59.22... only	**3**	**M2** for correct graph of quadratic showing positive root or for $\frac{-(-55) \pm \sqrt{(-55)^2 - 4(1)(-250)}}{2(1)}$ oe or **M1** for appropriate quadratic graph or for $\sqrt{(-55)^2 - 4(1)(-250)}$ oe or for $\frac{-(-55)}{2(1)}$ oe in correct formula

23. 0607_s16_ms_41 Q: 2

Question	Answer	Mark	Part Marks
(a)	$\frac{300}{L}$ oe	3	**M1** for $f = \frac{k}{L}$ soi oe **M1** (Dep on 1st **M1**)for substituting $f = 93.7$ and $L = 3.2$ soi by 299.8 or 299.84
(b)	107 or 107.0 to 107.1 …	1FT	**FT** $\frac{their\ k}{L}$ oe only
(c)	857 or 856.5 to 857.1 …	2FT	**FT** $\frac{their\ k}{L}$ oe only **M1** for $0.35 = \frac{their\ k}{L}$

24. 0607_s16_ms_43 Q: 3

Question	Answer	Mark	Part Marks
(a)	62.5	3	**B1** for $y = k(x+1)^3$ **B1** for $k = 0.5$ OR **M2** for $\frac{y}{32} = \frac{(4+1)^3}{(3+1)^3}$
(b)	2	2	**B1FT** for $x + 1 = \sqrt[3]{their\ 27}$
(c)	$x = \sqrt[3]{2y} - 1$ oe final answer	3	**M1** for division by *their k* **M1** for cube root **M1** for subtracting 1, must be final step

25. 0607_s15_ms_41 Q: 14

Qu.	Answer	Mark	Part Marks
(a)	$\frac{1}{6}pq$ oe final answer	1	
(b)	$\frac{2}{3}p + \frac{1}{4} \times \frac{1}{3}p$ oe	M2	**M1** for $\frac{1}{4} \times \frac{2}{3}p$ or for $\frac{3}{4} \times \frac{1}{3}p$
(c)	$\frac{21}{32}pq$ final answer	2	**M1** for $\frac{3}{4}q \times \frac{3}{4}p + \frac{1}{2} \times \frac{1}{4}p \times \frac{3}{4}q$ oe
(d)	17 : 63 cao	2	isw attempt to change form of 17 : 63 to e.g. $1 : \frac{17}{63}$ **M1** for *pq* – *their* **(a)** – *their* **(c)** oe soi by any equivalent ratio

26. 0607_w19_ms_42 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	–4	**2**	**M1** for $2x = -11 + 3$ or $x - \frac{3}{2} = \frac{11}{2}$ oe
(a)(ii)	–9	**2**	**M1** for $36 = -4x$ or $\frac{36}{-4} = x$ oe
(a)(iii)	0.5 oe	**2**	**M1** for $6x + 2x = 17 - 13$ oe
(b)	Correctly equating one set of coefficients OR $x = \ldots$ or $y = \ldots$ from one equation	**M1**	Allow correct sketches, i.e. two lines with negative gradients
	Correct method for eliminating one variable OR correct substitution into other equation	**M1**	
	$[x =] -2$ $[y =] -3$	**B2**	**B1** for each If 0 scored, **SC1** for correct substitution in one of the original equations to find other variable

27. 0607_s17_ms_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)	$[x =] cv$ oe	**1**	
(a)(ii)	$[y =] kv^2$ oe	**1**	
(a)(iii)	$[d =] cv + kv^2$ or $v(c + kv)$ oe	**1**	**FT**
(b)(i)	$750 = 12c + 12^2 k$ oe	**M1**	isw any cancelling
(b)(ii)	$2050 = 20c + 20^2 k$ oe	**1**	isw any cancelling
(c)	$[c =]$ 2.5 oe cao $[k =]$ 5 cao	**3**	**M1** for correctly eliminating one variable from *their* equations in this part. or sketches of lines **A1** for either solution If zero scored **SC1** for *their* values satisfying one equation.
(d)	8100	**2**	**M1** for correct substitution of 40 into *their* (a)(iii) containing *their* values of c and k.

28. 0607_w17_ms_43 Q: 11

Question	Answer	Marks	Partial Marks
(a)	[x =] 5 [y =] 2 with correct working	**4**	**M1** for correctly equating one set of coefficients **M1** for correct method to eliminate one variable OR **M1** for equation $x =$ or $y =$ from one equation **M1** for correct substitution into other equation **B1** for $x = 5$ **B1** for $y = 2$ If zero scored **SC1** for correct subst into one of original equs and evaluation to find other variable
(b)	[a =] 10 [b =] 4	**2**	**B1** for each **FT** *their* (a) × 2

Question	Answer	Marks	Partial Marks
10(c)(i)	[p =] log 5 and [q =] log 2 Final answers	**3**	**B2 FT** *their* (a) for either seen or **B1 FT** for each correct decimal answer 0.699 or 0.6989 to 0.6990 0.301 or 0.3010... or **M1** for $10^p = their\,5$ or $10^q = their\,2$
10(c)(ii)	1 cao	**1**	

29. 0607_w16_ms_42 Q: 7

Question	Answer	Mark	Part Marks
	Correctly equating one set of coefficients	**M1**	Equation $x =$ or $y =$ from one equation Note – a correct sketch showing intersection in third quadrant scores **M2** (other sketches may score the **M1** for $y =$ … seen)
	Correct method to eliminate one variable	**M1**	Correct substitution into other equation
	$x = -2$ $y = -\frac{1}{2}$	**B2**	**B1** for each If zero scored **SC1** for correct substitution into one of original equations and evaluation to find other variable

30. 0607_s15_ms_41 Q: 2

Qu.	Answer	Mark	Part Marks
	Correctly equating one set of coefficients Correct method to eliminate one variable $x = 1.5$ $y = -2$	M1 M1 B1 B1	or making x or y the subject of one equation or substituting into other equation or sketch of their two lines If 0 scored, **SC1** for correct substitution into one of original equations to find other variable

31. 0607_s20_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	$1 - 11p$ final answer	2	**B1** for $1 + kp$ or for $k - 11p$
(a)(ii)	$21g^2 + 71gh - 22h^2$ final answer	3	**B2** for 3 from $21g^2, 77gh, -6gh, -22h^2$ or **B1** for 2 from $21g^2, 77gh, -6gh, -22h^2$
(b)(i)	$2x^2y^2(y - 2x)$ final answer	2	**B1** for any correct partially factorised expression
(b)(ii)	$(7t + 3u)(7t - 3u)$ final answer	2	**B1** for $(at + b)(ct + d)$ with two of $ac = 49, bc + ad = 0, bd = -9$ correct or for $(7t + 3)(7t - 3)$ or $(7 + 3u)(7 - 3u)$
(b)(iii)	$(2d - 1)(3d + 2)$ final answer	2	**B1** for $(pd + q)(rd + s)$ with two of $pr = 6, ps + qr = 1, qs = -2$ correct or for $2d(3d + 2) - (3d + 2)$ or $3d(2d - 1) + 2(2d - 1)$

32. 0607_w16_ms_41 Q: 10

Qu.	Answer	Mark	Part Marks
(a)	$\frac{9}{7}$ oe	2	**M1** for $7x = 11 - 2$ oe
(b)	$\frac{5x+1}{6}$ final answer	2	**M1** for $3(x + 1) + 2(x - 1)$ seen
(c) (i)	$\frac{2x}{y^2}$ final answer	2	**B1** for 2 terms correct
(ii)	$\frac{x+3}{x+1}$ final answer	4	**B1** for $(x - 3)(x + 3)$ **B2** for $(x - 3)(x + 1)$ or or **SC1** for $(x + a)(x + b)$ where $ab = -3$ or $a + b = -2$

33. 0607_w15_ms_41 Q: 11

Question	Answer	Mark	Part Marks
(a)	2.79 cao nfww 6	6	**B1** for $2x + y = 157$ oe **B1** for $x + 3y = 296$ oe **M1** for eliminating one variable or appropriate sketch **B1** for $[x =] 35$ oe **B1** for $[y =] 87$ oe or **M1** for x and y working in one equation
(b)	3 nfww 4	4	**M2** for $\frac{24}{x} + \frac{24}{x+5} = 11$ oe or **B1** for $\frac{24}{x}$ or $\frac{24}{x+5}$ **M1** for full method e.g. sketch of graph showing solution or quadratic with correct factors or $\frac{-7 \pm \sqrt{7^2 - 4(11)(-120)}}{2 \times 11}$ **Note that $x + x + 5 = 11$ is wrong working**

34. 0607_w15_ms_42 Q: 14

Question	Answer	Mark	Part Marks
(a)	$\frac{x-3}{x}$	1	
(b)	$\frac{x}{x+3}$	1FT	
(c) (i)	All correct with no errors $\frac{x}{x+3}-\frac{x-3}{x}=\frac{9}{40}$	M1	*their Q – their P*
	$\frac{x^2-(x-3)(x+3)}{x(x+3)}\left[=\frac{9}{40}\right]$ oe or better	M1	
	$360=9x^2+27x$ oe		
	$x^2+3x-40=0$	A1	i.e. at least one more correct line and no errors or omissions
(ii)	-8	1	
	5	1	
(iii)	$\frac{2}{5}$	1	Allow final answer $\frac{-11}{-8}$ but not $\frac{11}{8}$

35. 0607_m22_ms_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)	$(5x + 1)(2x – 1) – 7(13 – x) = 84$ oe	M1	Correct first statement without brackets expanded
	$10x^2 – 5x + 2x – 1$	B1	
	$– 91 + 7x$	B1	on LHS or $91 – 7x$ on RHS
	$10x^2+4x-176=0$ oe leading to $5x^2+2x-88=0$ with no errors or omissions	A1	
(b)	$(5x+22)(x-4)$	2	**B1** for $(5x + a)(x + b)$ with $ab = –88$ or $a + 5b = 2$ or for $5x(x – 4) + 22(x – 4)$ or for $x(5x + 22) – 4(5x + 52)$
(c)	63	2	**M1** for solving *their* factorised quadratic, allowing omission of negative root. **FT** (13 – *their* positive root) × 7 if $\frac{1}{2} < x < 13$

36. 0607_s21_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	$\frac{200}{x}$	**1**	
(b)	$\frac{200}{x}+\frac{50}{x-40}=\frac{7}{2}$ oe	**M1**	
	$400(x-40)+100x = 7x(x-40)$ oe	**M2**	**FT** only an equation of the correct form with equivalent difficulty **M1FT** for $\frac{200(x-40)+50x}{x(x-40)}$ or better
	Completion to $7x^2 - 780x + 16000 = 0$ with no errors or omissions	**A1**	With at least one intermediate step
(c)	2 [h] 22 [min]	**5**	**B4** for 2.37 or 2.371 to 2.372 or 2h 22 to 22.3... min or 142 to 142.3... or **B3** for 27.1 or 27.10 to 27.11 and 84.3 or 84.3... , or **M2** for $\frac{-(-780)\pm\sqrt{(-780)^2-4\times7\times16000}}{2\times7}$ or sketch of parabola (positive x^2) with two positive zeros or **M1** for $\sqrt{(-780)^2-4\times7\times16000}$ or $\frac{-(-780)\pm\sqrt{p}}{2\times7}$ and **M1** for $200 \div$ *their* solution from *their* quadratic if > 40

37. 0607_w21_ms_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$x^2 + (3x + 1)^2 = 16$	**M1**	
	$9x^2 + 3x + 3x + 1$ or $9x^2 + 6x + 1$	**B1**	
	Completion to $10x^2 + 6x - 15 = 0$ with no errors	**A1**	
(b)	$\frac{-6 \pm \sqrt{(6)^2 - 4(10)(-15)}}{2 \times 10}$ or sketch of parabola (+ve x^2) with x intercepts opposite sign	**M2**	**M1** for $\frac{-6 \pm \sqrt{D}}{2 \times 10}$ or $\frac{p \pm \sqrt{(6)^2 - 4(10)(-15)}}{q}$ or sketch of any U shaped parabola
	(–1.56, –3.68) (0.96, 3.88)	**A2**	**A** marks depend on **M2** **A1** for both x-values correct or one coordinate pair correct or both y-values correct FT *their x* If **M0** scored, **SC1** for correct answers with wrong or no working.

38. 0607_w21_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	[p =] [0].85 [m =] 2.15	**5**	**B1** for $3p + 5m = 13.30$ **B1** for $p + 7m = 15.90$ **M1** for correctly eliminating one variable from *their* equations in terms of p and m or correct sketch **B1** for p = [0].85 **B1** for m = 2.15 If **M0** scored then **SC1** for values satisfying one of *their* equations

Question	Answer	Marks	Partial Marks
(b)	1.43 or 1.434... only	7	**B6** for 1.43 or 1.434... and 0.232 or 0.2324... OR **M1** for $(2x-1)^2 = x(x+1)$ **B1** for $4x^2 - 2x - 2x + 1$ oe **B1** for $x^2 + x$ **M1** for correct three term quadratic from *their* areas **M1** for $\frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(1)}}{2(3)}$ for *their* quadratic or sketch leading to roots of *their* quadratic

39. 0607_w20_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)	Correctly equating one set of coefficients or correctly expressing one variable in terms of the other	**M1**	
	Correct method to eliminate one variable	**M1**	
	[x =] –1	**A1**	
	[y =] –2	**A1**	If 0 scored **SC1** for correct substitution into one of original equations and evaluation to find other variable, or for 2 correct answers with no working

Question	Answer	Marks	Partial Marks
(b)	Algebraic method. $8x^2+12x-2x-3$ [$=-5$]	**M1**	Correct Expansion
	$8x^2+10x+2=0$ or better	**M1**	Correctly equating *their* quadratic to zero
	$(4x+1)(2x+2)$ [$=0$] oe $(8x+2)(x+1)$ [$=0$]	**M1**	or correct use of formula with *their* 3 term quadratic or correct sketch of parabola
	[$x=$] -1 and [$x=$] -0.25 oe	**B2**	**A1 dep on 3rd M1** for either
	OR GDC method 	**M3**	**M2** for parabola intersecting $y=-5$ twice or **M1** for parabola OR **M3** for correct graph of *their* rearranged equation
	[$x=$] $-1$and [$x=$] -0.25 oe	**B2**	**A1** for either

40. 0607_w20_ms_43 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)	$(a-b)(a+b)$	**1**	
(a)(ii)	12.25	**5**	**B4** for $2a=7$ or $2.6a=9.1$ or better or **B3** for $2b=4.4$ or $2.6b=5.72$ or better OR **M1** for $a^2-b^2=7.41$ oe **M1** for $a-b=1.3$ oe **M1** for $a+b=7.41\div 1.3$ or for a or b correctly eliminated
(b)(i)	$(x-8)(x+3)$	**2**	**B1** for $(x+a)(x+b)$ with $ab=-24$ or $a+b=-5$ or for $x(x+3)-8(x+3)$ or for $x(x-8)+3(x-8)$

Question	Answer	Marks	Partial Marks
(b)(ii)	204	**8**	**B7** for $x = 8$ isw $x = -3$ OR **M1** for $(x+1)(x+13)$ or for $(x+4)(2x+1)$ **B1** for $2x^2 + 8x + x + 4$ **B1** for $x^2 + x + 13x + 13$ **M1** for $(x+4)(2x+1) - (x+1)(x+13) = 15$ oe **A1** for $x^2 - 5x - 24 = 0$ reached without any error or omission **M1** for $(2 \times$ *their* $x + 1)$(*their* $x + 4$) evaluated correctly OR **M6** for graph(s) which would lead to correct value of x. or **M3** for appropriate graph(s) but not leading to value of x. or **M1** for setting up input for graphics calculator

41. 0607_s19_ms_41 Q: 9

Question	Answer	Marks	Partial Marks
(a)	$(45 + 4x)(20 + 2x) = 2208$	**M1**	
	$900 + 90x + 80x + 8x^2$	**B1**	For expansion
	Completion to $4x^2 + 85x - 654 = 0$ with no errors or omissions	**A1**	
(b)	$\frac{-85 \pm \sqrt{85^2 - 4(4)(-654)}}{2 \times 4}$	**M1**	or $(x - 6)(4x + 109)$ or sketch of parabola $(+x^2)$ with one positive zero and one negative
	6, –27.25 oe	**B2**	**B1** for each
(c)	Length = 69 Height = 32	**B2**	**B1FT** for each

42. 0607_s19_ms_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$3p + r = 67$ oe $2p + 3r = 96$ oe	**B2**	**B1** for each Accept words in equations, using + and =.
	correctly eliminating one variable	**M1**	
	[pencil =] 15	**B1**	
	[ruler =] 22	**B1**	If M0 scored in addition to B0 (for answers) scored then award **SC1** for answers satisfying one of *their* two original equations in 2 variables
(b)(i)	$\frac{1}{2}(x+1)x = \left(\frac{5x}{4}+3\right)(x-4)$ oe	**M2**	**M1** for $\frac{1}{2}(x+1)x$ or $\left(\frac{5x}{4}+3\right)(x-4)$
	$\frac{5x^2}{4} - 5x + 3x - 12$ oe	**B1**	i.e. correct expansion for rectangle
	$3x^2 - 10x - 48 = 0$ reached with no errors or omissions including at least one line of working	**A1**	Dependent on B1
(b)(ii)	$(3x + 8)(x - 6)$	**2**	**B1** for $3x(x-6) + 8(x-6)$ or $x(3x+8) - 6(3x+8)$ or $(3x + a)(x + b)$ with $ab = -48$ or $a + 3b = -10$
(b)(iii)	21	**2**	**FT** $\frac{1}{2} \times (\textit{their}\ \text{positive}\ x) \times (\textit{their}\ \text{positive}\ x+1)$ if $x > 4$ **M1** $\frac{1}{2}$ × (*their* positive x) × (*their* positive x + 1) if $x > 4$

43. 0607_w19_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)	$(2x+1)(x-6)$ final answer	**2**	**M1** for $(2x+a)(x+b)$ where $ab=-6$ or $a+2b=-11$ or $2x(x-6)+x-6$ or $x(2x+1)-6(2x+1)$ or correct answer seen
(a)(ii)	$-0.5 < x < 6$	**2**	**FT** *their* **(i)** only from factors giving positive x^2 term **B1** for each or –0.5 and 6 seen
(b)	Appropriate sketch indicating answers (one positive and one negative) or correct substitution in formula or correct completion of square	**M1**	Allow $\sqrt{61}$ for $\sqrt{(-1)^2-4(3)(-5)}$
	1.47 –1.14	**B2**	**B1** for each or both correct but not rounded to 2dp 1.468… , –1.135…

44. 0607_w19_ms_43 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$\frac{840}{2x+3}$	**1**	
(b)	$2(2x+3)+2$ *their* $\times\frac{840}{2x+3}=118$ oe	**M1**	
	$2(2x+3)^2+1680=118(2x+3)$ oe	**M1**	Clearing fractions
	Correct completion to $2x^2-53x+336=0$	**A1**	No errors or omissions
(c)	$(2x-21)(x-16)=0$	**M1**	or $x=\frac{-(-53)\pm\sqrt{(-53)^2-4(2)(336)}}{2\times 2}$ or sketch of parabola (+ve x^2, +ve zeros)
	10.5, 16	**B2**	**B1** for each
(d)	35 24	**2**	**B1** for each If 0 scored, **SC1** for a pair of values with a product of 840 or a sum of 59

45. 0607_s18_ms_43 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$\frac{930}{x}$	**1**	
(b)(i)	$\frac{930}{x} - \frac{930}{x+5}$ soi	**M1**	
	$1860(x + 5) - 1860x = x(x + 5)$ oe	**M1**	**FT** dep on 1st M1with $\frac{1}{2}$ as separate term in equation
	Completion to $x^2 + 5x - 9300 = 0$ with no errors	**A1**	
(b)(ii)	94[.0] or 93.96 to 93.97 –99[.0] or –98.97 to –98.96	**3**	**M1** for $\frac{5 \pm \sqrt{5^2 - 4(1)(-9300)}}{2}$ or sketch of parabola **B1** for 1 correct
(b)(iii)	9 [h] 24 or 23 to 24 [min]	**2**	**M1** for 930 ÷ (*their* 94 + 5) oe If 0 scored **SC1** for 9 h 53min to 9 h 54 min

46. 0607_w18_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	8	**1**	
(a)(ii)	4	**2**	**M1** for correct 1st step
(a)(iii)	3	**2**	**M1** for correct 1st step
(b)(i)	$[x =] \frac{1}{2}, \frac{1}{3}$	**3**	**M2** for $(3x-1)(2x-1)\,[=0]$ or **M1** for $(ax \pm 1)(bx \pm 1)$ where $ab = 6$ or $a + b = -5$ or $3x(2x-1) - 1(2x-1)$ or $2x(3x-1) - 1(3x-1)$ OR **M2** for correct sketch or **M1** for any U-shaped parabola crossing x-axis twice OR **M2** for $\frac{5 \pm \sqrt{(-5)^2 - 4 \times 6[\times 1]}}{2 \times 6}$ or **M1** for $\frac{b}{2a}$ or $b^2 - 4ac$ correct
(b)(ii)	30, 19.5 or 19.47…	**3**	**B2 FT** for one correct answer **M1** for $\sin x = their\left(\frac{1}{2}\right)$ or $\sin x = their\left(\frac{1}{3}\right)$

47. 0607_s17_ms_41 Q: 11

Question	Answer	Marks	Partial Marks
(a)(i)	275	**1**	
(a)(ii)	2.5 oe	**2**	**M1** for 275 ÷ 110

Question	Answer	Marks	Partial Marks
(b)	09 00 oe	**3**	**B2** for 1 h 42 mins or 102 mins soi or **M1** for 170 ÷ 100 oe If 0 scored, **SC1** for correct conversion of *their* decimal time into hours and mins
(c)	24.6 or 24.63...	**3**	**M2** for $\frac{215}{12.5} \times 1.432$ or **M1** for $\frac{215}{12.5}$ or 215×1.432 or $\frac{1.432}{12.5}$ soi
(d)(i)	$\frac{325}{90+x} - \frac{110}{30+2x} = \frac{3}{2}$ oe	**M2**	or **M1** for $\frac{325}{90+x}$ or $\frac{110}{30+2x}$
	$650(30 + 2x) - 220(90 + x)$ $= 3(90 + x)(30 + 2x)$ oe	**M1**	**Dependent on first equation containing the three terms.** Correctly eliminating fractions
	Correct completion to $x^2 - 75x + 1400$ with no errors or omissions	**A2**	**B1** for $2700 + 180x + 30x + 2x^2$ soi
(d)(ii)	125 and 130	**3**	**B2** for one or for 35 and 40 or **B1** for 35 or 40 or **M1** for $\frac{-(-75) \pm \sqrt{(-75)^2 - (4)(1)(1400)}}{2 \times 1}$ or sketch of parabola with two positive zeros or $(x - 35)(x - 40)$

48. 0607_w17_ms_43 Q: 10

Question	Answer	Marks	Partial Marks
(a)	appropriate sketch giving one positive and one negative answer or fully correct use of formula	**M2**	**M1** for sketch of parabola or parabola and straight line or $\sqrt{3^2 - 4(4)(-12)}$ or $\frac{-3 \pm \sqrt{.....}}{2(4)}$ oe
	1.4[0] and –2.15 final answers	**B2**	**B1** for each If 0 scored **B1** for 1.397… and –2.147... or **SC1** for 2.15 and –1.4[0]
(b)	$x > 1.40$ and $x < -2.15$	**2**	**FT** $[x] > \textit{their}$ max(a), $[x] < \textit{their}$ min(a) **B1** for each
(c)	$-1.75 \leqslant x \leqslant 1$ nfww	**4**	**B3** for 1, -1.75 oe **B2** for 1 inequality correct **B1** for 1 correct value seen or **M2** for appropriate sketch or correct factorising or correct use of formula or **M1** for $4x^2 + 3x - 7 \leqslant 0$

49. 0607_s16_ms_43 Q: 2

Question	Answer	Mark	Part Marks
(a)	$(3x+2)(x-4)$	2	**SC1** for $(3x+a)(x+b)$ where $ab = -8$ or $a+3b = -10$
(b)	$-\frac{2}{3} < x < 4$	2FT	**B1** for either correct
(c)	221.8 or 221.8… 318.2 or 318.18 to 318.19	3	**B2** for either correct or **M1** for $\sin x = their\left(-\frac{2}{3}\right)$ where $-1 < their\left(-\frac{2}{3}\right) < 1$ or **M1** for sketch or **M1** for 41.8 or –41.8 seen

50. 0607_w16_ms_43 Q: 9

Question	Answer	Mark	Part Marks
(a)	9 hours 52 mins	3	**B2** for 9.870… or **M1** for 760 ÷ 77
(b) (i)	$\frac{270}{x}$	1	
(ii)	$\frac{270}{x} + \frac{490}{x+4} = 62$ oe	M1	
	$270(x+4) + 490x = 62x(x+4)$ oe	M1	Could be over common denominator
	Completion with no errors	A1	Must be at least one intermediate step
(iii)	$(31x+54)(x-10)$	M1	or correct substitution into formula or reasonable sketch
	10 and $-\frac{54}{31}$ or 10 because x cannot be negative	B2	or **B1** for either 10 without support scores only the **B1**
	14 cao	B1	

51. 0607_s15_ms_41 Q: 13

Qu.	Answer	Mark	Part Marks
(a)	$(6x + 1)^2 = (5x + 4)^2 + (2x – 1)^2$ oe Any one of $36x^2 + 6x + 6x + 1$ oe $25x^2 + 20x + 20x + 16$ oe $4x^2 – 2x – 2x + 1$ oe Completion to $7x^2 – 24x – 16 = 0$ with no errors or omissions	M1 B1 A1	
(b)	$(x – 4)(7x + 4)$	2	**B1** for $(x + a)(7x + b)$ where $ab = – 16$ or $7a + b = –24$
(c)	$0.5 \times 7 \times 24$ [=84]	M2	**B1** for $x = 4$
(d)	8.22 or 8.219 to 8.22[0]	4	**B1** for $y(y + 2) = 84$ oe **M2** for $\frac{-2 \pm \sqrt{(2)^2 - 4(1)(-84)}}{2 \times 1}$ oe or suitable sketch or **M1** for formula with 1 error or $(y + 1)^2 – 1 = 84$ oe

52. 0607_s21_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)	38	1	
	$5n + 8$ oe	2	**M1** for $5n + c$ or $kn + 8$, $k \neq 0$
(b)	26	1	
	$n^2 – 10$ oe	2	**M1** for any quadratic expression or 2nd differences of 2
(c)	6534	1	
	$1089n$ oe	1	
(d)	–64	1	
	$-(-2)^n$ or $2 \times (-2)^{n-1}$ oe	2	**M1** for an expression that gives powers of 2 with alternating signs. If 0 scored, **SC1** for $2 \times -2^{n-1}$

53. 0607_w21_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	1, 5, 14,	**2**	**B1** for 2 correct
(b)(i)	–1, –4	**B1**	
	$14 - 3n$ oe final answer	**B2**	**B1** for $k - 3n$ oe or $14 + cn$, $c \neq 0$ or correct answer spoiled
(b)(ii)	28, 40	**B1**	
	$n^2 - 3n$ oe final answer	**B2**	**B1** for any quadratic or **M1** for common second differences = 2
(b)(iii)	65, 129	**B1**	
	$2^n + 1$ oe final answer	**B2**	**B1** for 2^n seen

54. 0607_s20_ms_41 Q: 4

Question	Answer	Marks	Partial Marks
(a)	$(n+3)^2$ oe	**2**	**B1** for any quadratic
(b)	$n^3 + 2$	**2**	**B1** for any cubic
(c)	2^{7-n} oe	**2**	**B1** for 2^{an+b} oe or $\left(\frac{1}{2}\right)^{an+b}$ oe $a \neq 0$

55. 0607_w20_ms_42 Q: 10

Question	Answer	Marks	Partial Marks
(a)	$[y =] \frac{20}{\sqrt{x}}$ oe	**2**	**M1** for $\frac{k}{\sqrt{x}}$ oe
(b)	40	**1**	**FT** incorrect k only
(c)	16	**2**	**M1** *their* $20 = 5\sqrt{x}$ or better

Question	Answer	Marks	Partial Marks
(d)	$[z =]7\left(\frac{20}{\sqrt{x}}+2\right)$ oe final answer	3	**M2** for $z = K\left(\frac{their\,20}{\sqrt{x}}+2\right)$ or for $84 = K\left(\frac{their\,20}{\sqrt{4}}+2\right)$ oe or **M1** for $z = K(y + 2)$ oe

56. 0607_s19_ms_41 Q: 12

Question	Answer	Marks	Partial Marks
(a)	(5) (6) 37 37 24 54 (61) 91	5	**B1** for each
(b)	$[p =] -3$ $[q =] 1$	2	**B1** for each

57. 0607_s19_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)	$7n$ oe	1	
(b)	$13 - 3n$ oe	2	**B1** for $k - 3n$ or $13 - kn$ oe
(c)	2^{n+2} oe	2	**B1** for $[c\times]\ 2^{n+k}$ where c is a power of 2 and k is any integer (including 0) seen
(d)	$n^2 + n$ oe	2	**B1** for quadratic expression or for second differences = 2 seen

58. 0607_s18_ms_43 Q: 9

Question	Answer	Marks	Partial Marks
(a)	25 25 16 36 25 41 61	3	**B1** for each row
(b)(i)	225 196	2	**B1** for each
(b)(ii)	361 400	2	**B1** for each
(c)	$n^2 + (n-1)^2$ oe	2	**M1** for 2nd differences all 4 or quadratic expression

59. 0607_w18_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)	$-3n+83$ oe	2	**B1** for $-3n+k$ or $-kn+83$
(a)(ii)	$128\left(\frac{1}{2}\right)^{n-1}$ oe or 2^{8-n} oe	2	**B1** for $128\left(\frac{1}{2}\right)^{k}$ or 2^{k-n} or 2^{kn+c} oe
(b)	0, 3, 8, 15	2	**B1** for 3 correct no extras
(c)	2, 1, 0, 1	2	**B1** for 3 correct no extras
(d)(i)	43, 47, 53	2	**B1** for 2 correct no extras
(d)(ii)	41(41 + 1 + 1) oe	1	

60. 0607_s17_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	24 $4n$ final answer	2	**B1** for each
(a)(ii)	–11 $-2n+1$ oe final answer	3	**B1** for –11 **M1** for $kn+1$ (where $k<0$) or $-2n+k$
(a)(iii)	108 $3n^2$ oe final answer	3	**B1** for 108 **M1** for kn^2 [+ q]
(a)(iv)	216 n^3 oe final answer	2	**B1** for each
(b)	337 $n^3 + 3n^2 + 2n + 1$ oe final answer	3	**B1** for 337 **M1** for adding *their* nth terms or 3rd differences = 6 and a cubic with numerical coefficients for the answer

61. 0607_w17_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)	4, 10, 18, 28	2	**B1** for any 2 in correct position or 0, 4, 10, 18
(b)(i)	13, 15	1	
(b)(ii)	$2n + 3$ oe	2	**B1** for $2n$ [+ c], or $kn + 3$, $k \neq 0$
(c)	$n^2 + 7n + 6$ or $(n + 6)(n + 1)$	2	**M1** for 2 *their* $(2n + 3) + n^2 + 3n$ or 2nd differences = 2, 2, [2] and quadratic or correct unsimplified

62. 0607_w17_ms_42 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	– 1 – 8	2	**B1** for each
(a)(ii)	$-7n + 34$ oe final answer	2	**B1** for $-7n + k$ or $-kn + 34$ oe or correct unsimplified seen
(b)(i)	128, 256	2	**B1** for each
(b)(ii)	2^{n+2} oe final answer nfww	2	**M1** for $k \times 2^p$ $(k \neq 0)$ seen, k numerical and $p = f(n)$

63. 0607_s16_ms_41 Q: 6

Question	Answer	Mark	Part Marks
(a)	$3n + 2$ oe final answer	2	**B1** for $3n + k$ or $kn + 2$ oe
(b)	–3, 4, 15, 30	2	**B1** for 2 or 3 correct in correct place or –6, –3, 4, 15
(c)	$2n - 3$ oe final answer	3	**M2** for $(2n - 3)(n + 2)$ or **SC1** for $(2n + a)(n + b)$ where $ab = -6$ or $a + 2b = 1$ OR **B1** for –1, 1, 3, 5 **B1** for answer $2n + k$ or $kn - 3$
(d)	No **and** e.g. 502 not a multiple of 5 oe nfww	2	Dep on 5n – 1 **M1dep** for *their* $(3n + 2)$ + *their* $(2n - 3) = 501$ oe Dependent on (a) and (c) linear

64. 0607_s16_ms_42 Q: 12

Question	Answer	Mark	Part Marks
(a)	n^3 cao	1	
(b) (i)	392	2	**B1** for second differences 14, 20, 26 and 32
(ii)	$n^3 + n^2$ oe	2	**M1** for cubic expression but not n^3 or kn^3 only

65. 0607_w16_ms_42 Q: 11

Question	Answer	Mark	Part Marks
(a)	216 n^3 oe	1 1	
(b)	43 $n^2 + n + 1$ oe	1 3	**M2** for $pn^2 + qn + c$ $p, q, c \neq 0$ or **M1** for second differences = 2 or $pn^2 + c$ or $pn^2 + qn$
(c)	173 $n^3 - n^2 - n - 1$ oe	1 3	**FT** *their* (a) – *their* (b) **FT** *their* (a) – *their* (b) **M2** for $pn^3 + qn^2 + rn + c$ $p, q, r, c \neq 0$ or n^3 – *their* (b) or **M1** for third differences = 6 or for $pn^3 + qn^2 + c$ or $pn^3 + qn^2 + rn$ or $pn^3 + rn + c$

66. 0607_s15_ms_43 Q: 6

Qu.	Answer	Mark	Part Marks
(a) (i)	$4n - 2$	2	**B1** for $4n + k$
(ii)	$(4n - 2) \times 10^{(n+1)}$ oe	1FT	*their* **(a)** $\times 10^{(n+1)}$
(b) (i)	$2 \times 10^{[1]}$, 2×10^{-1}, 2×10^{-3}, 2×10^{-5}	2	**B1** for 2 correct or 2×10^{-3}, 2×10^{-1}, $2 \times 10^{[1]}$, 2×10^{-3}
(ii)	$(2n - 1) \times 10^{(3n-2)}$	3	**B1** for $2n - 1$ **B2FT** for $10^{(3n-2)}$ or **M1** for $10^{(n+1)-(3-2n)}$ FT dep on **(a)(ii)** in correct form

67. 0607_w15_ms_42 Q: 5

Question	Answer	Mark	Part Marks
(a)	–8	1	
	$34-7n$ oe	2	**M1** for $-7n+k$ or $34+kn$ oe $k\neq 0$
(b)	32	1	
	$2048\times\left(\frac{1}{2}\right)^{n}$ oe e.g. $1024\times\left(\frac{1}{2}\right)^{n-1}$ or 2^{11-n}	2	**M1** for $\left(\frac{1}{2}\right)^{n+k}$ oe soi, where k is an integer

68. 0607_m22_ms_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	$4x^2+12x+9$ final answer	2	**B1** for three of $4x^2$, $6x$, $6x$, 9 or for correct answer seen
(a)(ii)	4	1	**FT** *their* 9 – 5
(a)(iii)	$2x+3=\pm\sqrt{\textit{their } 4}$	M1	*their* 4 > 0
	$-2\frac{1}{2}$, $-\frac{1}{2}$ oe	B1	
(b)(i)	$\frac{6}{\sqrt{w-1}}$ final answer	2	**M1** for $[x=]\frac{k}{\sqrt{w-1}}$ oe
(b)(ii)	4	1	**FT** only incorrect k
(b)(iii)	$\frac{36}{x^2}+1$ or $\frac{36+x^2}{x^2}$ or $\left(\frac{6}{x}\right)^2+1$ final answer	3	**M1** for correct multiplication of term in w **M1** for correct squaring **M1** for correctly isolating w Max M2 if incorrect answer

69. 0607_m21_ms_42 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)	$\frac{32}{x^2}$	2	**M1** for $y = \frac{k}{x^2}$
(a)(ii)	2	1	**FT** *their k* **dependent** on $\frac{k}{x^2}$
(a)(iii)	[±] $\frac{1}{2}$	2	**M1** for $x^2 = \frac{their 32}{128}$ soi by $\frac{1}{4}$ oe
(b)	250	3	**B2** for $r = 2(p + 1)^3$ or **M1** for $r = k(p + 1)^3$ oe OR **M2** for $\frac{r}{(4+1)^3} = \frac{16}{(1+1)^3}$ oe

70. 0607_s21_ms_42 Q: 8

Question	Answer	Marks	Partial Marks
(a)(i)	$0.05 = \frac{k}{\sqrt{25}}$ oe	M1	
	$k = 0.25$ and $y = \frac{1}{4\sqrt{x}}$	A1	

Question	Answer	Marks	Partial Marks
(a)(ii)	$[\pm]\frac{1}{12}$ oe	1	
(a)(iii)	$\frac{1}{16y^2}$ or $\frac{1}{(4y)^2}$ oe	2	**M1** for $4y\sqrt{x} = 1$ or better or for $y^2 = \frac{1}{16x}$
(a)(iv)	$\frac{1}{4}$ oe cao	1	
(b)	3	2	**B1** for 2^3 soi

71. 0607_w21_ms_42 Q: 9

Question	Answer	Marks	Partial Marks
(a)	Sequence A -1 $9-2n$ oe final answer	3	**B1** for -1 **B1** for $k-2n$ or $9-cn$, $c \neq 0$ or correct answer spoiled
	Sequence B 64 $(n+3)^2$ oe final answer	3	**B1** for 64 **B1** for $(n+k)^2$, k any integer or **M1** for second differences = 2
	Sequence C 8 2^{n-2} oe final answer	3	**B1** for 8 **B1** for 2^{n+k}, k any integer
(b)	$\frac{5184}{x^{\frac{3}{2}}}$ oe	4	**B3** for $z = \frac{k}{x^{\frac{3}{2}}}$ or for $y = \frac{12}{\sqrt{x}}$ **and** $z = 3y^3$ or **B2** for $y = \frac{12}{\sqrt{x}}$ or $z = 3y^3$ or **M1** for $y = \frac{k}{\sqrt{x}}$ or $z = ky^3$

72. 0607_w21_ms_43 Q: 7

Question	Answer	Marks	Partial Marks
(a)(i)	$[y =] \frac{45}{x^2}$	2	**M1** for $y = \frac{k}{x^2}$ oe
(a)(ii)	$[\pm]\, 1.5$ oe	2	**M1** for $x^2 = \frac{their\,45}{20}$ or better
(b)	$[z =] 4\sqrt{\frac{45}{x^2}}$ oe	3	**B2** for $z = 4\sqrt{y}$ oe or **M1** for $z = k\sqrt{y}$

73. 0607_s19_ms_41 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)	$y = \frac{18}{\sqrt{x}}$ oe	2	**M1** for $y = \frac{k}{\sqrt{x}}$ oe
(a)(ii)	3.29 or 3.286...	1	**FT** wrong k only
(a)(iii)	1.44 oe	2	**M1** for $\sqrt{x} = \frac{their18}{15}$ or $225 = \frac{(their18)^2}{x}$
(b)	$z = 3\left(\frac{18}{\sqrt{x}} + 5\right)$ oe	2	**M1** for $z = K\left(their\left(a(i)\right) + 5\right)$ $K \neq 1$ or for $z = 3(y + 5)$

74. 0607_s19_ms_43 Q: 12

Question	Answer	Marks	Partial Marks
(a)(i)	6.4	3	**M2** for $y = 1.6\sqrt{x+1}$ or **M1** for $y = k\sqrt{x+1}$ OR **M2** for $y = \frac{8\sqrt{16}}{\sqrt{25}}$ or **M1** for $\frac{8}{\sqrt{25}} = \frac{y}{\sqrt{16}}$

Question	Answer	Marks	Partial Marks
(a)(ii)	99	2	**FT M1** for $\sqrt{x+1} = \frac{16}{their1.6}$ oe only FT $\sqrt{x+1}$
(b)(i)	–7	1	
(b)(ii)	38	1	
(b)(iii)	–0.1 oe	1	
(b)(iv)	120	2	**B1** for row of 0 6 12 18 reached or **M1** for $(n-2)^3 - (n-2)$ or $(n-1)(n-2)(n-3)$ oe

75. 0607_s18_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	$8\sqrt{x}$ oe	**2**	**M1** for $y = k\sqrt{x}$
(a)(ii)	16	**1**	
(a)(iii)	$\frac{y^2}{64}$ or $\left(\frac{y}{8}\right)^2$ or $\frac{y^2}{8^2}$	**2**	**FT** only if wrong k, k numeric and $k \neq 1$ **M1** for $\frac{y}{their\ k} = \sqrt{x}$ or $y^2 = \left(their\ k\sqrt{x}\right)^2$ $k \neq 1$ or better **SC1** for answer $\frac{y^2}{k^2}$ or $\left(\frac{y}{k}\right)^2$

Question	Answer	Marks	Partial Marks
(b)	2	**3**	**M2** for $p = \frac{12}{q+2}$ oe or $p = \frac{12}{4+2}$ oe or **M1** for $p = \frac{k}{q+2}$ OR **M2** for $p = \frac{3(2+2)}{4+2}$ or **M1** for $p(4+2) = 3(2+2)$

76. 0607_w18_ms_42 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	$y = 4(x+2)^2$	**2**	**B1** for $y = k(x+2)^2$
(a)(ii)	1600	**1**	**FT** (*their k*) $\times 20^2$ **dep** on $k(x+2)^2$

Question	Answer	Marks	Partial Marks
(a)(iii)	$\frac{1}{2}$ oe , $-\frac{9}{2}$ oe	**2**	**B1** for 0.5 or $-\frac{9}{2}$ oe or **M1** for 25 = (*their k*)$(x+2)^2$
(b)	54	**2**	**B1** for 3 soi by answer 6

77. 0607_s17_ms_41 Q: 6

Question	Answer	Marks	Partial Marks
(a)	8	**3**	**M1** for $y = \frac{k}{x^2}$ oe **A1** for $k = 128$ OR **M2** for $32 \div \left(\frac{4}{2}\right)^2$ oe or **M1** for $\frac{y}{32} = \frac{\frac{1}{4^2}}{\frac{1}{2^2}}$ oe
(b)	$[\pm]\ \frac{1}{2}$ oe	**2**	**M1** for $x^2 = \frac{their\ k}{512}$ oe or $2 \times \sqrt{\frac{32}{512}}$ oe
(c)	$[x = \pm]\ \sqrt{\frac{128}{y}}$ oe final answer	**3**	**M1** for multiplication by x^2 **M1** for division by y or for square root

78. 0607_w16_ms_43 Q: 12

Question	Answer	Mark	Part Marks
(a)	$y = \frac{10}{\sqrt{x}}$	**2**	**M1** for $y = \frac{k}{\sqrt{x}}$
(b)	$\frac{100}{9}$ oe	**2FT**	**M1** for $3\sqrt{x} = their\ k$
(c)	$a = 4000, n = -\frac{3}{2}$	**3**	**B2** for either or **M1** for $z = c\left(\frac{their\ k}{\sqrt{x}}\right)^3$ oe