Write your name here

| Surname | | Other names | |
|---|---|---|---|

**In the style of:**
**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

Centre Number

Candidate Number

# Mathematics
## Algebra
## Model Answers

**Foundation Tier**

GCSE style questions arranged by topic

Paper Reference
**1MA1/1F**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

## Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

**1** Peter thinks of a number.

He multiplies the number by 3
He then adds 2

His answer is 20

(a) What number did Peter think of?

Work backwards from the answer,
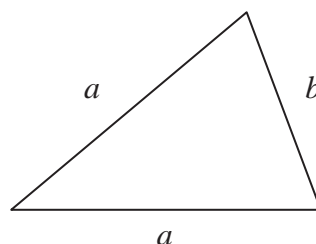reversing each operation.
$20 - 2 = 18$
$18 \div 3 = 6$

.................6.................

**(2)**

Sophie uses the formula $P = 2a + b$

to find the perimeter $P$ of this triangle.

(b) Find the value of $P$ when

$a = 6$ and $b = 4$

$P = 2a + b$
$\quad = (2 \times 6) + 4$
$\quad = 12 + 4$
$\quad = 16$

$a$ $b$ $a$

$P =$ .................16.................

**(2)**

**(Total for Question 1 is 4 marks)**

**2** (a) Work out the value of

(i) $4^2$

$4 \times 4 = 16$

.................16.................

(ii) $\sqrt{64}$

$8 \times 8 = 64$

.................8.................

(iii) $3 \times 2^3$

$3 \times 2 \times 2 \times 2 = 24$

.................24.................

**(3)**

(b) Work out

(i) $-3 + 5$

Think of this as $5 - 3 = 2$

.................2.................

(ii) $-2 - 3$

Add the numbers and call the answer minus

.................−5.................

**(2)**

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**3** The cost of hiring a car can be worked out using this rule.

$$\text{Cost} = \text{£80} + \text{50p per mile}$$

Bill hires a car and drives 90 miles.

(a) Work out the cost.

90 × 50 p $=$ £45
80 + 45 $=$ 125

£ 125

**(2)**

The cost of hiring a car and driving *m* miles is *C* pounds.

(b) Complete the formula for *C* in terms of *m*.

$C =$ £80 + £0.50*m*
$= 80 + 0.5m$

$C =$ 80 + 0.5*m*

**(2)**

**(Total for Question 3 is 4 marks)**

**4** (a) Complete this table of values for $y = 2x - 1$

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

(2)
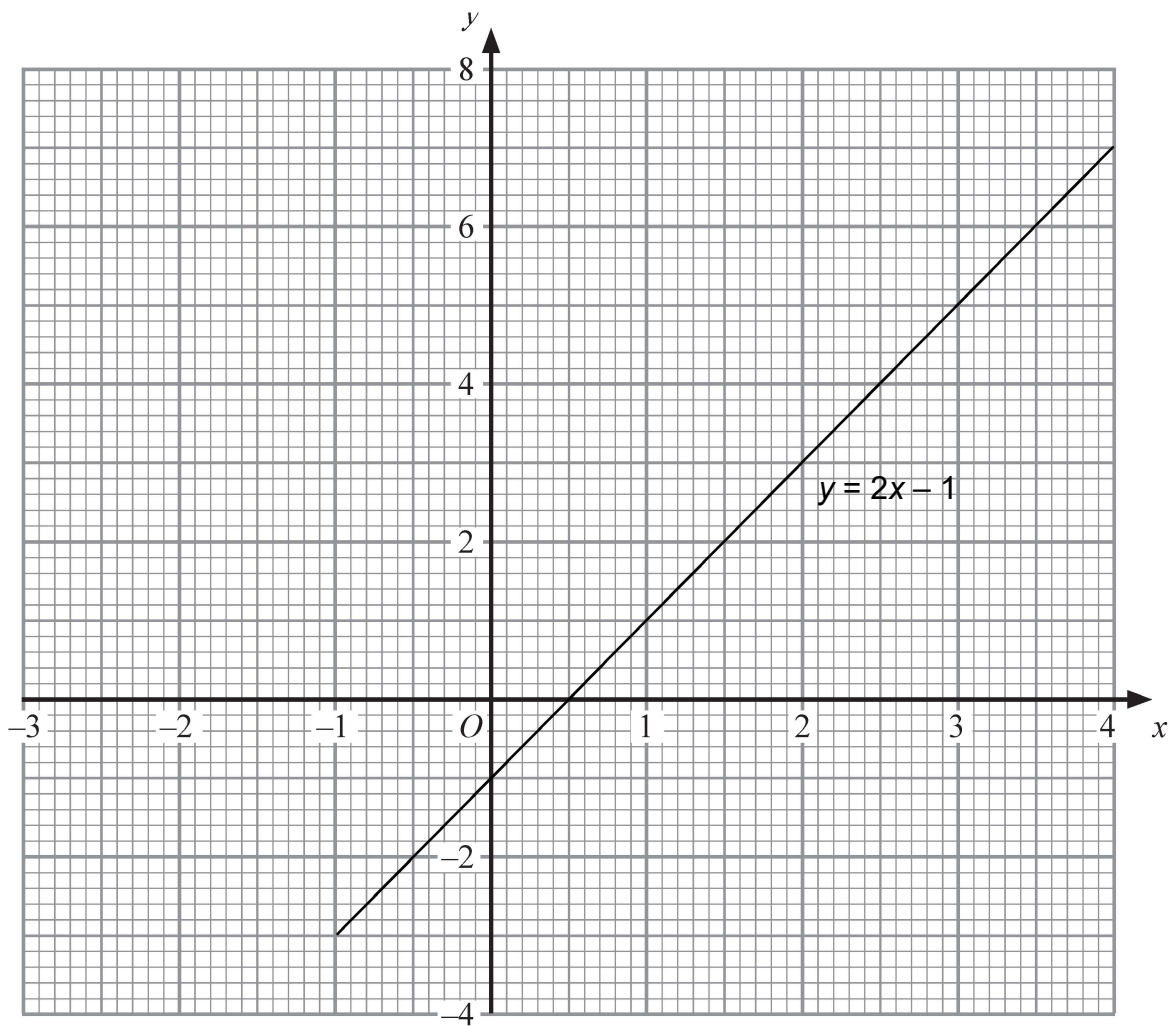


(2)

(b) On the grid, draw the graph of $y = 2x - 1$

**(Total for Question 4 is 4 marks)**

**5** Work out an estimate for the value of $\dfrac{31 \times 4.92}{0.21}$

or $\dfrac{30 \times 5}{0.2}$

$= \dfrac{150}{0.2}$

$= \dfrac{1500}{2}$    Multiply top and bottom by 10

$= 750$

.............750.............

**(Total for Question 5 is 4 marks)**

---

**6** (a) Expand $y(2y - 3)$

$2y^2 - 3y$

.............$2y^2 - 3y$.............
**(1)**

(b) Factorise $x^2 - 4x$

$x(x - 4)$

.............$x(x - 4)$.............
**(2)**

$k$ is an integer such that $-1 \leqslant k < 3$

(c) List all the possible values of $k$.

−1, 0, 1, 2    Remember 0 is an integer

−1, 0, 1, 2

.............−1, 0, 1, 2.............
**(3)**

**(Total for Question 6 is 6 marks)**

**7** (a) Factorise $x^2 - 5x$

$x(x - 5)$

..................$x(x - 5)$....

**(2)**

(b) Expand $3(5x - 2)$

$15x - 6$

.................$15x - 6$......

**(1)**

**(Total for Question 7 is 3 marks)**

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**8** A hotel has 64 guests.
40 of the guests are male.

(a) Work out 40 out of 64 as a percentage.

$$\frac{40}{64} \times \frac{100}{1} = 62.5$$

................$62.5$............ %

**(2)**

40% of the 40 male guests wear glasses.

(b) Write the number of male guests who wear glasses as a fraction of the 64 guests.
Give your answer in its simplest form.

10% of 40 is 4
So 40% of 40 is 16

$$\frac{16}{64} = \frac{1}{4}$$

....................$\frac{1}{4}$..........

**(4)**

**(Total for Question 8 is 6 marks)**

**9** (a) Simplify $8x - 4x$

$4x$

.........................$4x$...........
**(1)**

(b) Simplify $y \times y \times y$

$y^3$

.......................$y^3$...........
**(1)**

(c) Simplify $5y + 4x - 2x + 5x$

$5y + 7x$

..............$5y + 7x$.....
**(2)**

**(Total for Question 9 is 4 marks)**

**10** The two-way table gives some information about how 100 children travelled to school one day.

|          | Walk | Car | Dkng | Total |
|----------|------|-----|------|-------|
| **Boy**  | 15   | 25  | 14   | 54    |
| **Girl** | 22   | 8   | 16   | 46    |
| **Total**| 37   | 33  | 30   | 100   |

(a) Complete the two-way table.

**(3)**

One of the children is picked at random.

(b) Write down the probability that this child walked to school that day.

$$p(walked) = \frac{37}{100}$$

.................$\frac{37}{100}$.................

**(1)**

One of the girls is picked at random.

(c) Work out the probability that this girl did **not** walk to school that day.

$$p(girl\ not\ walked) = 1 - \frac{22}{46}$$

$$= \frac{46}{46} - \frac{22}{46}$$

.......$\frac{24}{46}$..........

**(2)**

**(Total for Question 10 is 6 marks)**

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**11** Apples cost *a* pence each.

Bananas cost *b* pence each.

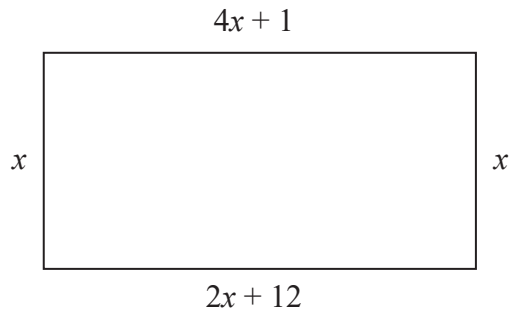Write down an expression for the total cost, in pence, of 2 apples and 4 bananas.

.................$2a + 4b$........ pence

**(Total for Question 11 is 2 marks)**

**12**

Diagram **NOT** accurately drawn

$4x + 1$

$x$             $x$

$2x + 12$

The diagram shows a rectangle.

All the measurements are in centimetres.

(a) Explain why    $4x + 1 = 2x + 12$

............Opposite sides of a rectangle are equal.................................................................

**(1)**

(b) Solve    $4x + 1 = 2x + 12$

$$4x - 2x = 12 - 1$$
$$2x = 11$$
$$x = 5.5$$

$x =$ ......5.5...........................

**(2)**

(c) Use your answer to part (b) to work out the perimeter of the rectangle.

Perimeter is the distance around the rectangle.

Perimeter $= 4x + 1 + x + 2x + 12 + x$

         $= 8x + 13$

Substitute $x = 5.5$

         $= (8 \times 5.5) + 13$

         $= 44 + 13$

         $= 57$

.....................57................. cm

**(1)**

**(Total for Question 12 is 5 marks)**

**13** (a)  Simplify  $5 + 2 - 4cd$

............$7 - 4cd$............
(1)

(b)  Simplify      $4c + 3d - 2c + 2d$

............$2c + 5d$............
(2)

(c)  Simplify      $x \times x \times x$

............$x^3$............
(1)

(d)  Simplify      $3q \times 2r$

............$6qr$............
(1)

(e)  Factorise      $5x + 10$

............$5(x + 2)$............
(1)

**(Total for question 13 is 6 marks**

**14** Expand and simplify $(x + 7)(x + 3)$

$$= x^2 + 3x + 7x + 21$$
$$= x^2 + 10x + 21$$

............ $x^2 + 10x + 21$ ............

**(Total for Question 14 is 2 marks)**

**15** Solve $4x + 5 = x + 26$

$$4x - x = 26 - 5$$
$$3x = 21$$
$$x = 7$$

$x =$ ........7............

**(Total for Question 15 is 2 marks)**

**16**(a) Tara buys $p$ packets of plain crisps and $c$ packets of cheese crisps.

Write down an expression for the total number of packets of crisps Tara buys.

............ $p + c$ ............
**(1)**

(b) Solve $\quad 3y - 5 = 9$

$$3y = 9 + 5$$
$$3y = 14$$
$$y = \frac{14}{3}$$
$$y = 4\frac{2}{3}$$

$y =$ ........ $4\frac{2}{3}$ ............

**(2)**

**(Total for Question 16 is 3 marks)**

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**17** Here is a parallelogram.
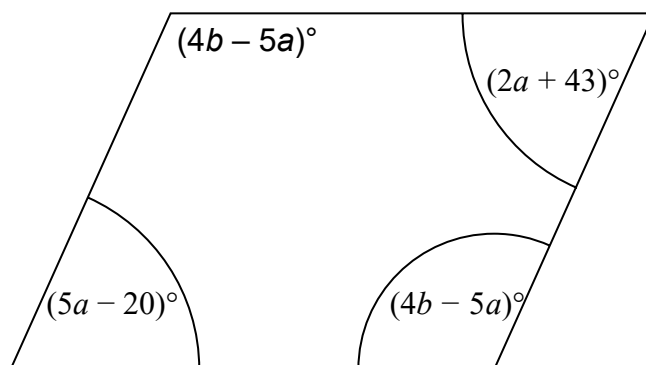


Work out the value of $a$ and the value of $b$.

Opposite angles are equal
$5a - 20 = 2a + 43$
$5a - 2a = 43 + 20$
$\quad 3a = 63$
$\quad\ a = 21$

The angles in a parallelogram add up to 360°
$\quad (5a - 20) + (4b - 5a) + (2a + 43) + (4b - 5a) = 360$
Subs $a = 21$
$(105 - 20) + (4b - 105) + (42 + 43) + (4b - 105) = 360$
$\qquad\qquad 85 + 4b - 105 + 85 + 4b - 105 = 360$
$\qquad\qquad\qquad\qquad\qquad\qquad 8b - 40 = 360$
$\qquad\qquad\qquad\qquad\qquad\qquad\quad 8b = 360 + 40$
$\qquad\qquad\qquad\qquad\qquad\qquad\quad 8b = 400$
$\qquad\qquad\qquad\qquad\qquad\qquad\quad\ b = 50$

$a = \underline{\quad 21 \quad\quad\quad\quad\quad}$

$b = \underline{\quad 50 \quad\quad\quad\quad\quad}$

**(Total for Question 17 is 5 marks)**

**18** (a) Factorise  $3f + 9$

..........................$3(f + 3)$..........................
**(1)**

(b) Factorise  $x^2 - 2x - 15$

$1 + 3$
$\underline{1 - 5}$
$3 - 5$

..........................$(x + 3)(x - 5)$..........................
**(2)**

**(Total for Question 18 is 3  marks)**

---

**19**  $q = \dfrac{p}{r} + s$

Make $p$ the subject of this formula.

$\dfrac{p}{r} \; + \; s = q$

Both sides × $r$
$p + rs = rq$
$p = rq - rs$

..........................$p = rq - rs$..........................

**(Total for Question 19 is 2 marks)**

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**20**  $f = 5x + 2y$
$x = 3$ and $y = -2$

Find the value of $f$.

$f = (5 \times 3) + (2 \times [-2])$
$\; = 15 - 4$
$\; = 11$

..........................11..........................
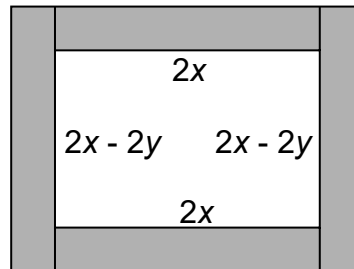
**(Total for Question 20 is 2 marks)**

**21** Here is a rectangle made of card.

$$2x$$

$$y$$
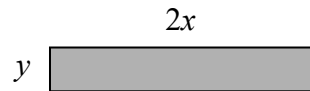
The measurements in the diagram are in centimetres.

Sophie fits four of these rectangles together to make a

frame.

$$2x$$

$$2x - 2y \qquad 2x - 2y$$

$$2x$$

The perimeter of the inside of the frame is $P$ cm.

(a) Show that $P = 8x - 4y$

$P = 2x + 2x - 2y + 2x + 2x - 2y$
$\quad = 8x - 4y$

(2)

(b) Georgina says,

"When $x$ and $y$ are whole numbers, $P$ is always a multiple of 4."

Is Georgina correct?

You must give a reason for your answer.

If the expression is factorised we get 4(2x - y)   The 4 outside the brackets shows it is a

multiple of 4.   Georgina is correct.

(2)

**(Total for Question 21 is 4 marks)**

**22** You should use a calculator for this question.

The value of a motorhome £$V$ is given by

$$V = 20\,000 \times 0.9^t$$

where $t$ is the age of the motorhome in complete years.

**(a)** Write down the value of $V$ when $t = 0$.

Any number to the power of 0 is 1.

20 000 × 1 = 20 000

**(a)** £ ..20 000..

(1)

**(b)** What is the value of $V$ when $t = 3$?

20 000 × 0.9³ = 14 580

**(b)** £ ..14 580...........

(2)

**(c)** After how many complete years will the motorhome's value drop below £10 000?

Try:
$t = 5$:   20 000 × 0.9⁵ = 11 809   Too large
$t = 6$:   20 000 × 0.9⁶ = 10 628  Too large
$t = 7$:   20 000 × 0.9⁷ = 9565     Below £10 000

**(c)** .........7...................

(2)

**(Total for Question 22 is 5 marks)**

**23** Six equations are shown below, each labelled with a letter.

| A |
|---|
| $y = {}^-6x$ |

| B |
|---|
| $x = \dfrac{1}{6}\,y$ |

| C |
|---|
| $y = \dfrac{{}^-3}{x}$ |

| D |
|---|
| $x = \dfrac{6}{y}$ |

| E |
|---|
| $y = 6x$ |

| F |
|---|
| $y = \dfrac{2}{x} + 2$ |

Choose the correct letters to make each statement true.

**(a)** Equation B and equation ....E...... are equivalent. **(1)**

**(b)** Equation .....C...... and equation .....D..... each show $x$ is inversely proportional to $y$. **(2)**

**(Total for Question 23 is 3 marks)**

---

**24** Joe went for a bike ride one evening.

He travelled $x$ kilometres in 5 hours.

Show that his average speed can be written as $\dfrac{x}{18}$ m/s. **(4)**

Average speed $= \dfrac{\text{Distance}}{\text{Time}}$

$\qquad\qquad = \dfrac{x}{5}$ km/h

$\qquad\qquad = \dfrac{1\,000x}{60 \times 60 \times 5}$

$\qquad\qquad = \dfrac{1\,000x}{18\,000}$

$\qquad\qquad = \dfrac{x}{18}$

**(Total for Question 24 is 4 marks)**

**25 (a)** Simplify.

$$x \times x \times x \times x \times x$$

(a) ......$x^5$...............................
(1)

**(b)** Solve.

$$3x + 7 = 19$$
$$3x = 19 - 7$$
$$3x = 12$$
$$x = 4$$

(b) $x$ = .....4.........................
(2)

**(c)** Here is a formula.

$$T = 5r + 3u$$

Work out the value of $T$ when $r = 8$ and $u = 9$.

$$T = (5 \times 8) + (3 \times 9)$$
$$= 40 + 27$$
$$= 67$$

(c) .........67...................
(2)

**(Total for Question 25 is 5 marks)**

**26 (a)** Complete this table for $y = 2x - 3$.

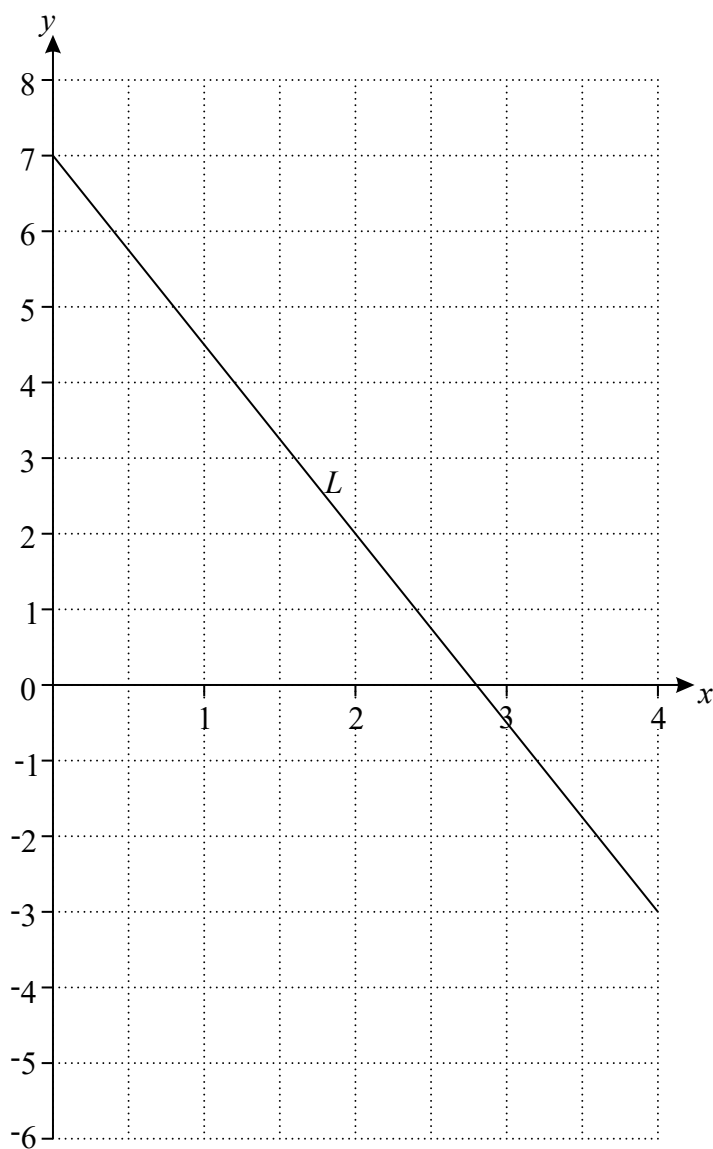| $x$ | 0  | 1  | 2 | 3 | 4 |
|-----|----|----|---|---|---|
| $y$ | -3 | -1 | 1 | 3 | 5 |

**(1)**

**(b)** On the grid below, draw the graph of $y = 2x - 3$ for values of $x$ from 0 to 4.
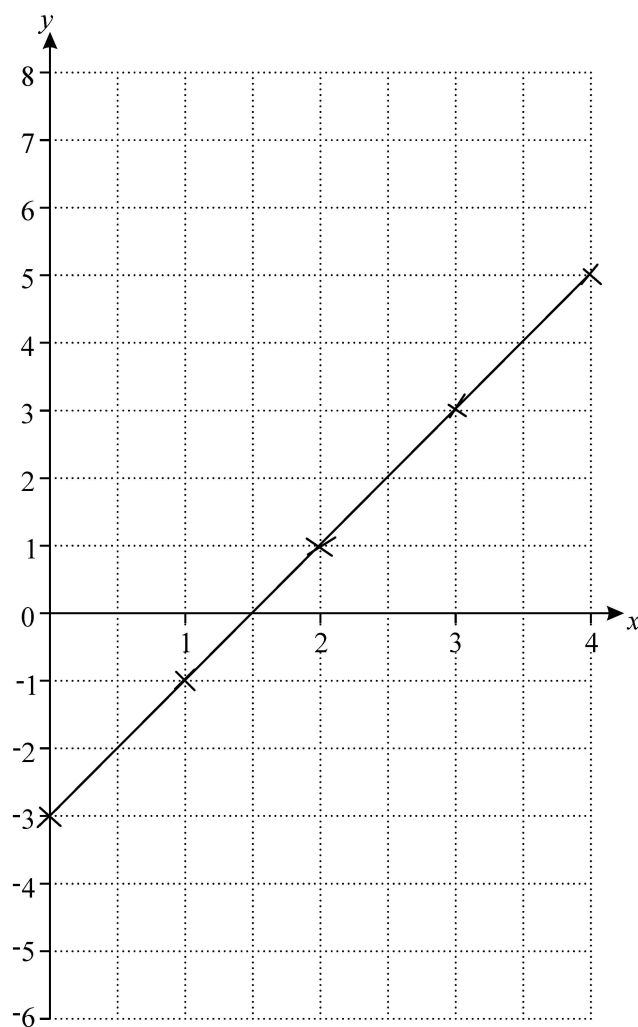


**(2)**

**(c)** Line $L$ is drawn on the grid below.



Work out the equation of line L.

$y = mx + c$

$m$ is the gradient, which is $\dfrac{\text{change in } y}{\text{change in } x}$

$m = \dfrac{-10}{4}$

$= -2.5$

$c$ is the $y$ intercept, which is where the graph crosses the $y$ axis

$c = 7$

subs $m = -2.5$ and $c = 7$ in $y = mx + c$

$y = -2.5x + 7$
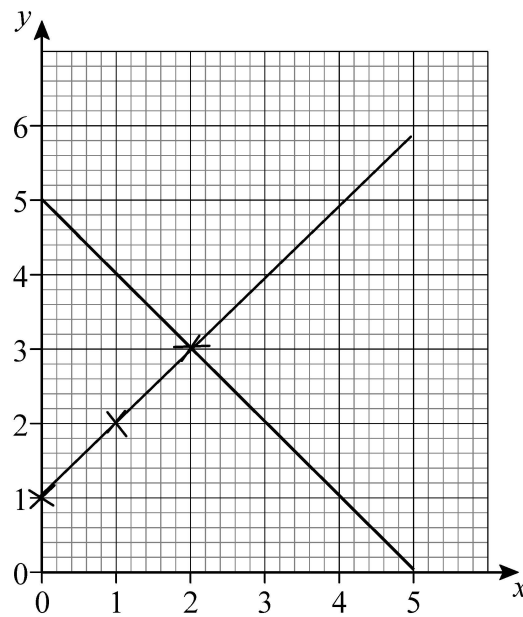
**(c)** ......$y = -2.5x + 7$............

**27**      Here is the graph of   $y = 5 - x$   for values of $x$ from 0 to 5



**27 (a)**     On the same grid, draw the graph of   $y = x + 1$   for values of $x$ from 0 to 5

                                                                   **(2)**

| $x$ | 0 | 1 | 2 |
|---|---|---|---|
| 1 | 1 | 1 | 1 |
| $y$ | 1 | 2 | 3 |

 

**(b)**     Use the graphs to solve the simultaneous equations

         $y = 5 - x$    and    $y = x + 1$

$$x = \underline{\quad 2 \quad\quad\quad\quad\quad\quad\quad}$$

$$y = \underline{\quad 3 \quad\quad\quad\quad\quad\quad\quad}$$

                                                               **(1)**

                           **(Total for Question 27 is 3 marks)**

**28** Here are three expressions.

$$\frac{y}{x} \qquad\qquad x - yx - y \qquad\qquad xy$$

When $x = 2$ and $y = -6$ which expression has the smallest value?

You **must** show your working..

$$\frac{y}{x} = \frac{-6}{2}$$
$$= -3$$
$$x - yx - y = 2 - (-6 \times 2) - (-6)$$
$$= 2 - (-12) - (-6)$$
$$= 2 + 12 + 6$$
$$= 20$$
$$xy = 2 \times (-6)$$
$$= -12$$

Answer.......$xy$....................

**(2)**

**(Total for Question 28 is 2 marks)**

---

**29** Simplify $5x - (2x + 6)$

Circle your answer.

$$3x + 6 \qquad\qquad 9x \qquad\qquad -3x \qquad\qquad \boxed{3x - 6}$$

**(Total for Question 29 is 1 mark)**

---

**30** Helen is trying to work out the two values of $w$ for which $3w - w^3 = 2$

Her values are 1 and $-1$. Are her values correct?

You **must** show your working.

Try $w = 1$
$3 - 1 = 2$
Try $w = -1$
$-3 - 1 = -4$
No. Her values are not correct.
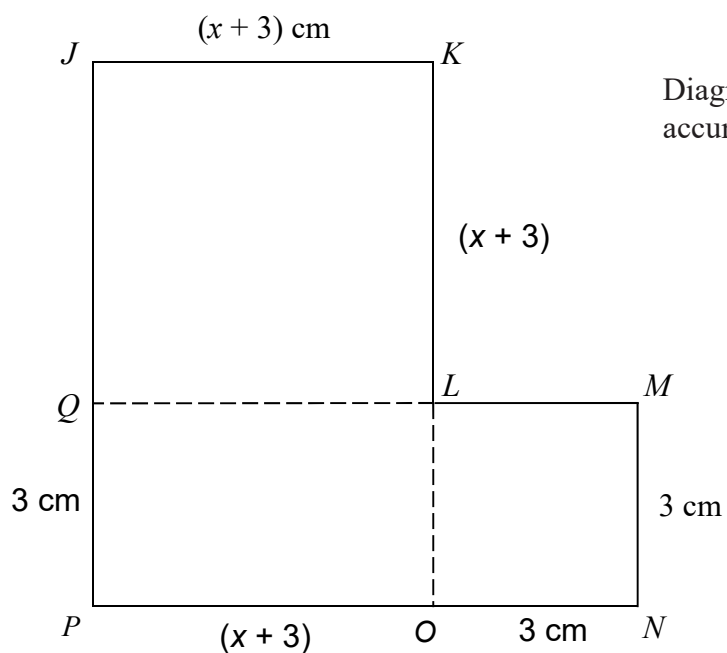
**(2)**

**(Total for Question 11 is 2 marks)**

**31**

*JKLQ* is a square.

*QLOP* is a rectangle.

*LMNO* is a square.

They are joined to make an L-shape.

$(x + 3)$ cm

*J*        *K*

Diagram **NOT** accurately drawn

$(x + 3)$

*Q*    *L*    *M*

3 cm      3 cm

*P*    $(x + 3)$    *O*    3 cm    *N*

Show that the total area of the L-shape, in cm², is    $x^2 + 9x + 27$

Area $= (x + 3)(x + 3) + 3(x + 3) + (3 \times 3)$
$= x^2 + 6x + 9 + 3x + 9 + 9$
$= x^2 + 9x + 27$

**(4)**

**(Total for Question 31 is 4 marks)**

---

**32**    Circle the equation with roots 4 and −8

$4x(x - 8) = 0$          $(x - 4)(x + 8)$

$x^2 - 32 = 0$          $(x + 4)(x - 8) = 0$

     **(Total for Question 32 is 1 mark)**