

Edexcel GCSE
Mathematics (Linear) – 1MA0

ALGEBRA:
FORMING AND
SOLVING EQUATIONS

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil



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 be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

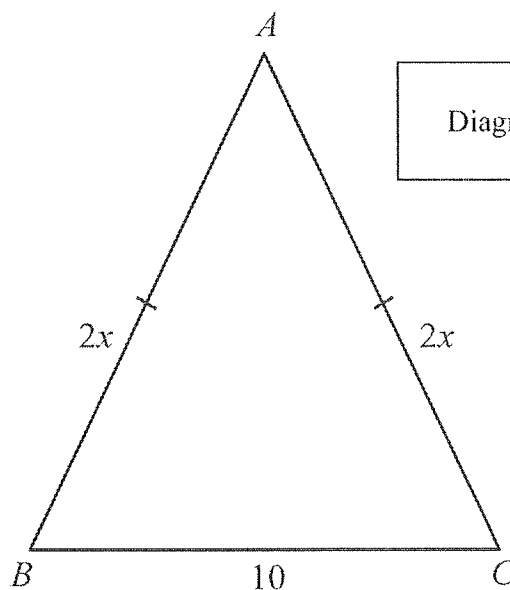
Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

Check your answers if you have time at the end.

1.



In the diagram, all measurements are in centimetres.

ABC is an isosceles triangle.

$$AB = 2x$$

$$AC = 2x$$

$$BC = 10$$

- (a) Find an expression, in terms of x , for the **perimeter** of the triangle.
Simplify your expression.

$$2x + 2x + 10$$

$$\underline{4x + 10}$$

(2)

The perimeter of the triangle is 34 cm.

- (b) Find the value of x .

$$4x + 10 = 34$$

$$\textcircled{-10}$$

$$4x = 24$$

$$\textcircled{\div 4}$$

$$x = 6$$

$$x = \underline{6\text{cm}}$$

(2)

(4 marks)

2.

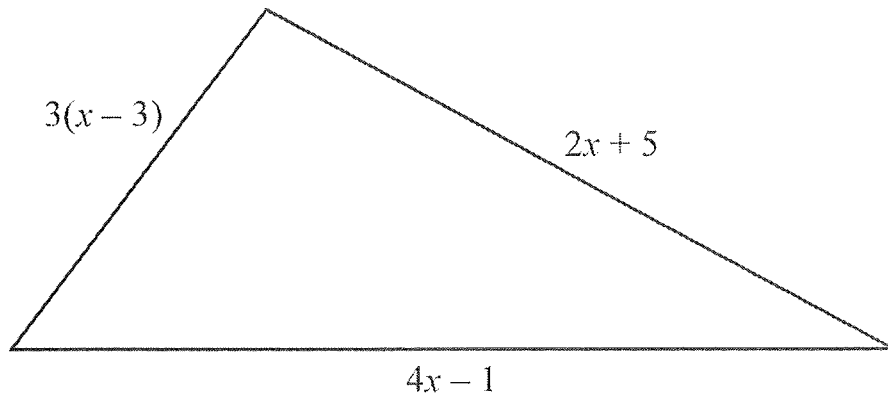


Diagram **NOT** accurately drawn

The lengths, in cm, of the sides of the triangle are $3(x-3)$, $4x-1$ and $2x+5$

(a) Write down, in terms of x , an expression for the perimeter of the triangle.

$$\begin{aligned}
 & 3(x-3) + 2x + 5 + 4x - 1 \\
 & \textcircled{3x} - 9 + \textcircled{2x} + 5 + \textcircled{4x} - 1 \\
 & 9x - 5
 \end{aligned}$$

$9x - 5 \dots \text{cm}$

(2)

The perimeter of the triangle is 49 cm.

(b) Work out the value of x .

$$\begin{aligned}
 & 9x - 5 = 49 \\
 & \textcircled{+5} \quad 9x = 54 \\
 & \textcircled{\div 9} \quad x = 6
 \end{aligned}$$

$$x = \dots 6 \text{ cm}$$

(2)

(4 marks)

3.

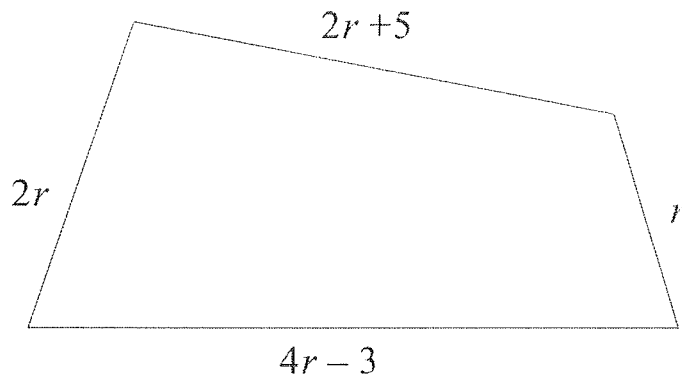


Diagram **NOT** accurately drawn

In the diagram, all measurements are in centimetres.

The lengths of the sides of the quadrilateral are

$$\begin{array}{l} 2r + 5 \\ 2r \\ 4r - 3 \\ r \end{array}$$

- (a) Find an expression, in terms of r , for the perimeter of the quadrilateral.
Give your expression in its simplest form.

$$\begin{array}{l} 2r + 5 + 2r + 4r - 3 + r \\ 9r + 2 \end{array}$$

$$\underline{9r + 2}$$

(2)

The perimeter of the quadrilateral is 65 cm.

- (b) Work out the value of r .

$$\begin{array}{l} 9r + 2 = 65 \\ \textcircled{-2} \quad 9r = 63 \\ \textcircled{\div 9} \quad r = 7 \end{array}$$

$$r = \underline{7 \text{ cm}}$$

(2)

(4 marks)

4.

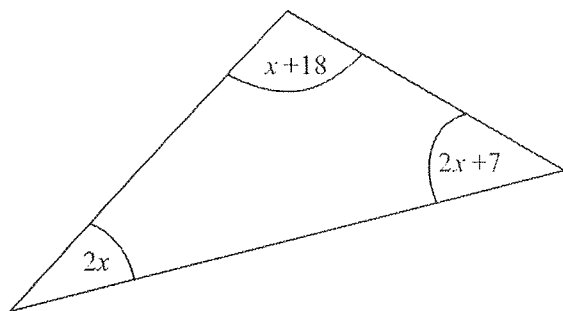


Diagram NOT
accurately drawn

The sizes of the angles, in degrees, of the triangle are

$$2x + 7$$

$$2x$$

$$x + 18$$

(a) Use this information to write down an equation in terms of x .

$$2x + 7 + 2x + x + 18 = 180$$

$$5x + 25 = 180$$

$$5x + 25 = 180$$

(2)

(b) Use your answer to part (a) to work out the value of x .

$$\begin{array}{rcl} 5x + 25 & = & 180 \\ \textcircled{-25} & & \\ 5x & = & 155 \\ \textcircled{\div 5} & & \\ x & = & 31 \end{array}$$

$$x = 31$$

(2)

(4 marks)

5.

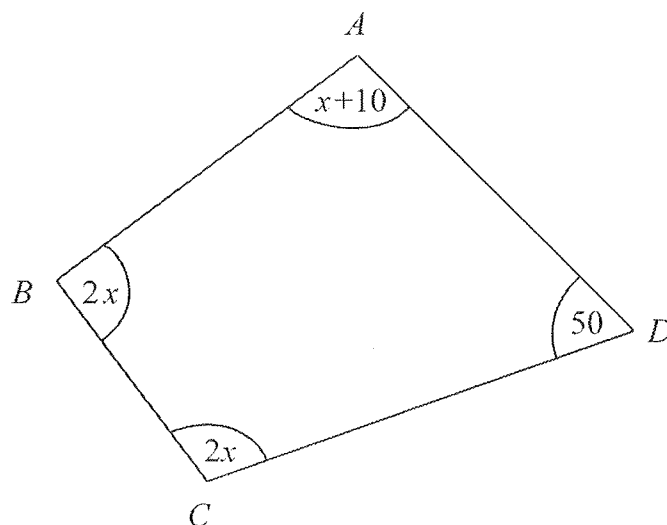


Diagram **NOT** accurately drawn

In this quadrilateral, the sizes of the angles, in degrees, are

$x + 10$
 $2x$
 $2x$
 50

- (a) Use this information to write down an equation in terms of x .

$$x + 10 + 2x + 2x + 50 = 360$$

$$5x + 60 = 360$$

$$5x + 60 = 360$$

(2)

- (b) Work out the value of x .

$$\begin{array}{rcl} 5x + 60 & = & 360 \\ \textcircled{-60} & & \\ 5x & = & 300 \\ \textcircled{\div 5} & & \\ x & = & 60 \end{array}$$

$$x = 60^\circ$$

(3)

(5 marks)

6.

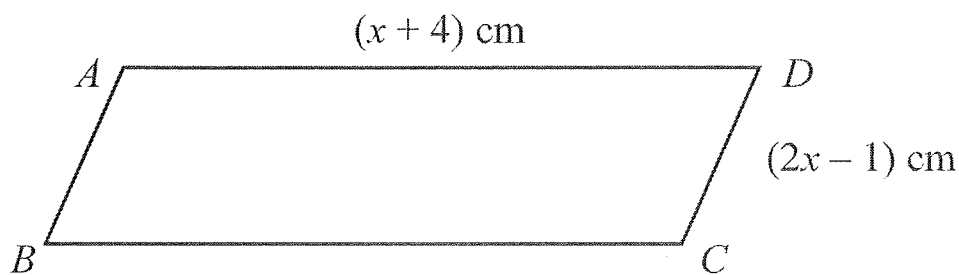


Diagram **NOT** accurately drawn

$ABCD$ is a parallelogram.

$AD = (x + 4)$ cm,

$CD = (2x - 1)$ cm.

The perimeter of the parallelogram is 24 cm.

- (i) Use this information to write down an equation, in terms of x .

$$x + 4 + x + 4 + 2x - 1 + 2x - 1 = 24$$

$$6x + 6 = 24$$

$$6x + 6 = 24$$

- (ii) Solve your equation.

$$\textcircled{-6} \quad 6x + 6 = 24$$

$$6x = 18$$

$$\textcircled{\div 6} \quad x = 3$$

$$x = 3 \text{ cm}$$

(4 marks)

7. The perimeter of this triangle is 19 cm.
All lengths on the diagram are in centimetres.

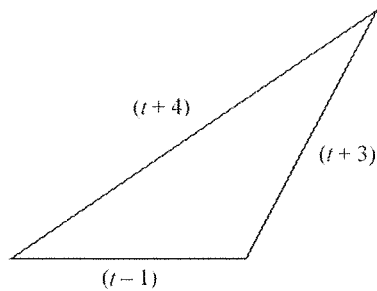


Diagram NOT accurately drawn

$$t+4+t+3+t-1=19$$

$$3t+6=19$$

$$\begin{array}{r} \textcircled{-6} \\ 3t = 13 \end{array}$$

$$\begin{array}{r} \textcircled{\div 3} \\ t = 4\frac{1}{3} \end{array}$$

Work out the value of t .

$$t = 4\frac{1}{3} \text{ or } 4.\bar{3}$$

(3 marks)

8.

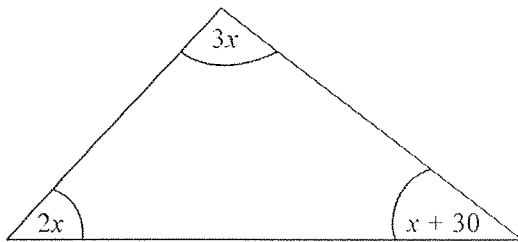


Diagram NOT accurately drawn

The diagram shows a triangle.
The sizes of the angles, in degrees, are

$$3x$$

$$2x$$

$$x+30$$

Work out the value of x .

$$3x+2x+x+30=180$$

$$6x+30=180$$

$$\begin{array}{r} \textcircled{-30} \\ 6x = 150 \end{array}$$

$$\begin{array}{r} \textcircled{\div 6} \\ x = 25 \end{array}$$

$$x = 25^\circ$$

(3 marks)

9.

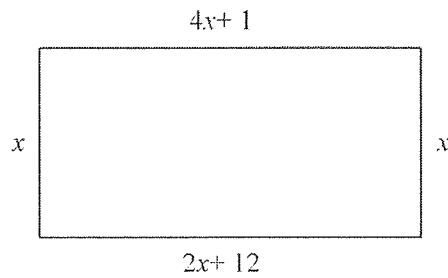


Diagram **NOT** accurately drawn

The diagram shows a rectangle.
All the measurements are in centimetres.

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

Because opposite sides on a rectangle are equal.

(1)

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

$$\begin{aligned} & \textcircled{-2x} \quad 2x + 1 = +12 \\ & \textcircled{-1} \quad 2x = 11 \\ & \textcircled{\div 2} \quad x = 11/2 = 5.5 \end{aligned}$$

$$x = 5.5 \text{ or } 5\frac{1}{2}$$

(2)

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

$$\begin{aligned} & 2(4x + 1 + 2x) \\ & 2(5x + 1) \\ & 2(5 \times 5.5 + 1) \\ & 2 \times 28.5 = 57 \end{aligned}$$

$$57 \text{ cm}$$

(2)

(5 marks)