## Algebra exam review

**1** Here are some patterns made from dots.

Pattern number 1    Pattern number 2    Pattern number 3    Pattern number 4

Write down a formula for the number of dots, *d*, in terms of the Pattern number, *n*.

(Total 2 marks)

**2** David and Clare are studying a number pattern.
The first three numbers in the pattern are 1, 2 and 6.

David says the next two numbers are 13 and 23.
Clare says the next two numbers are 15 and 31.

   **i** Explain why David could be right.

(1)

   **ii** Explain why Clare could be right.

(1)

(Total 2 marks)

**3** The *n*th term of a sequence is given by this formula.

$$n\text{th term} = 20 - 3n$$

   **a** Work out the 8th term of the sequence.

...........................

(1)

**b** Find the value of $n$ for which $20 - 3n = -22$

$n$ = ...........................

(2)

Here are the first five terms of a different sequence.

$$8 \quad 11 \quad 14 \quad 17 \quad 20$$

**c** Find an expression, in terms of $n$, for the $n$th term of this sequence.

$n$th term = ...........................

(2)

(Total 5 marks)

**4** The table shows the first three terms of a sequence.

| Term number | 1 | 2 | 3 | | |
|---|---|---|---|---|---|
| Term | 2 | 5 | 10 | | |

The rule for this sequence is

$$\text{Term} = (\text{Term number})^2 + 1$$

**a** Work out the next two terms of this sequence.

..........., ...........

(2)

**b** One term of this sequence is 101.
Find the term number of this term.

...........................

(2)

(Total 4 marks)

**5** Solve the equation $3x^2 + 2x - 6 = 0$
Give your answers correct to 3 significant figures.

...........................

(Total 3 marks)

**6** Here are the first five terms of a number sequence.

$$3 \quad 7 \quad 11 \quad 15 \quad 19$$

**a** Write down an expression, in terms of $n$, for the $n$th term of this sequence.

...........................

(2)

Adeel says that 319 is a term in the number sequence.

**b** Is Adeel correct?
You must justify your answer.

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .

(2)

(Total 4 marks)

**7** The table shows some rows of a number pattern.

| Row 1 | $1^2$ | – | $(0 \times 2)$ |
|---|---|---|---|
| Row 2 | $2^2$ | – | $(1 \times 3)$ |
| Row 3 | $3^2$ | – | $(2 \times 4)$ |
| Row 4 | $4^2$ | – | $(3 \times 5)$ |
| | | | |
| | | | |
| Row $n$ | | | ................................... |

**a** In the table, write down an expression, in terms of $n$, for Row $n$.

(1)

**b** Simplify fully your expression for Row $n$.
You must show your working.

...................................

(2)

(Total 3 marks)

**8 i** Factorise $x^2 - 7x + 12$

...................................

**ii** Solve the equation
$x^2 - 7x + 12 = 0$

...................................

(Total 3 marks)

**9** The diagram below shows a 6-sided shape.
All the corners are right angles.
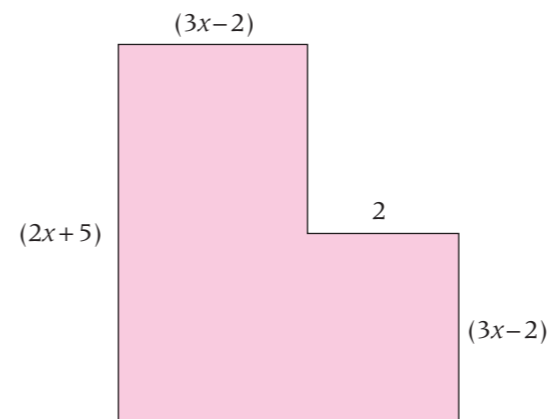All measurements are given in centimetres.



Diagram **NOT**
accurately drawn

$(3x-2)$

$(2x+5)$

$2$

$(3x-2)$

The area of the shape is 25 cm$^2$.

**a** Show that $6x^2 + 17x - 39 = 0$

(3)

**b i** Solve the equation
$6x^2 + 17x - 39 = 0$

$x =$ .............. or  $x =$ ..............

**ii** Hence work out the length of the longest side of the shape.

.....................cm

(4)

(Total 7 marks)

**10** Solve the equation

$$\frac{7}{x+2} + \frac{1}{x-1} = 4$$

...............................

(Total 7 marks)