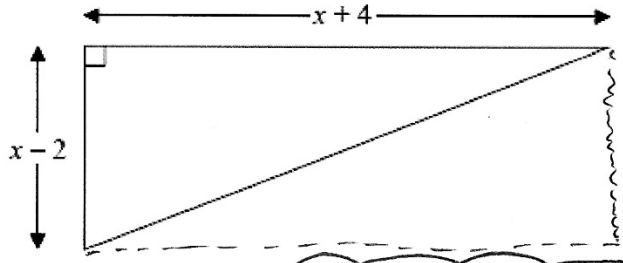
Quadratic Questions

Example and Explanation

The diagram shows a right-angled triangle.




All the measurements are in centimetres.

The area of the triangle is 27.5 cm$^2$

Work out the length of the shortest side of the triangle.
You must show all your working.

Double the area means we can work more easily on a rectangle.

Area of rectangle = length × breadth = 2 × Area of triangle

$= (x+4)(x-2) = 55$ ... $27.5 \times 2 = 55$

$\therefore (x+4)(x-2) = x^2 + 4x - 2x - 8 = 55$

$\therefore x^2 + 2x - 8 = 55$

$\Rightarrow x^2 + 2x - 63 = 0$ ...

We like quadratic equations to equal zero as this allows us to solve them.

Factors of $63 = \{(1,63),(3,21),(7,9)\}$

$x^2 + 2x - 63 = (x+9)(x-7) = 0$

$(x+m)(x+n)$
$m \times n = -63$
$m+n = +2$

$\therefore x = -9$ or $x = +7$

As we cannot have a negative length, we discount $x = -9$ to yield the solution, $x = 7$.

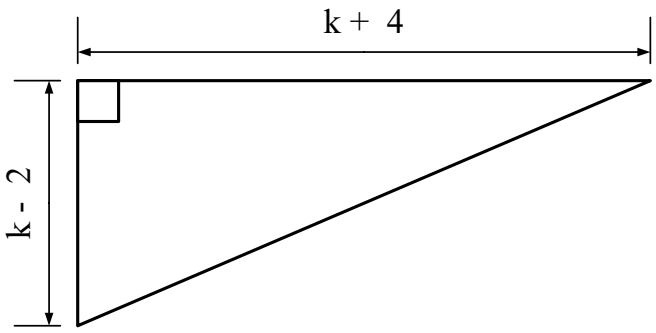
$\Rightarrow$ The shortest length $= x - 2 = 7 - 2 = 5$ cm.

..... cm

**(Total for question = 4 marks)**

**Q1**

The diagram shows a right-angled triangle.




All the measurements are in metres.

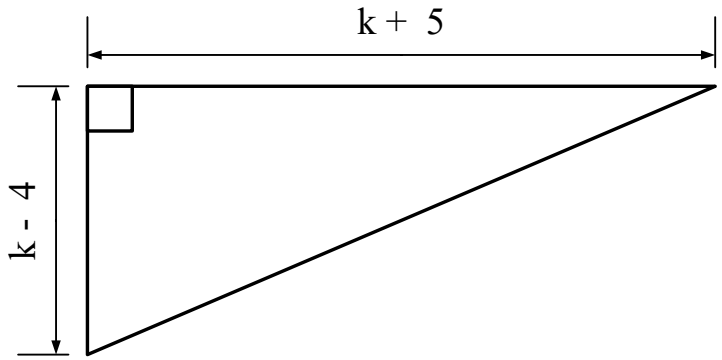
The area of the triangle is 27.5 $m^2$.

Work out the length of the shortest side of the triangle.

You must show all your working.

**Q2**

The diagram shows a right-angled triangle.




All the measurements are in metres.

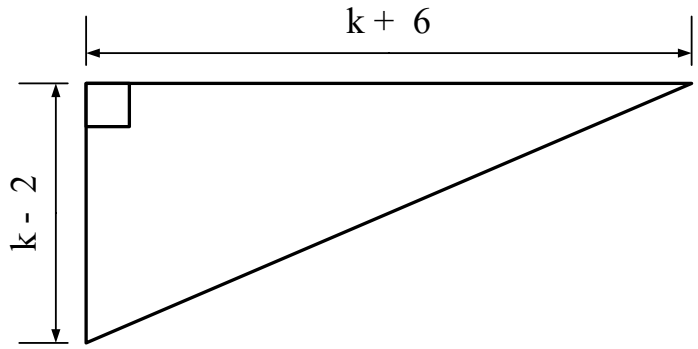
The area of the triangle is 26 $m^2$.

Work out the length of the shortest side of the triangle.

You must show all your working.

**Q3**

The diagram shows a right-angled triangle.




All the measurements are in centimetres.

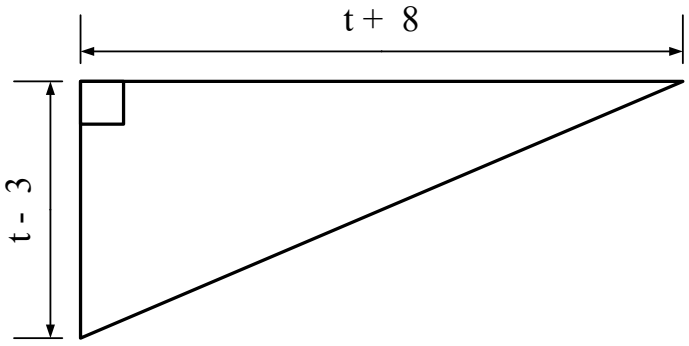
The area of the triangle is 4.5 $cm^2$.

Work out the length of the shortest side of the triangle.

You must show all your working.

**Q4**

The diagram shows a right-angled triangle.




All the measurements are in millimetres.

The area of the triangle is 30 $mm^2$.

Work out the length of the longest side of the triangle.

You must show all your working.

Knowledge Test

1 Write an example of a binomial expression.

2 What polynomial has a term where the highest order is:

i. 2

ii. 5

iii. 3

iv. 1

3 For which shapes are these the formulae? State the meaning of each letter.

$$Area = \pi r^2$$

$$Area = lb$$

$$Area = \frac{1}{2}(a + b)$$

$$Area = \frac{1}{2}bh$$