➤ This is true for all squares.

64 square units
= 8² square units

8 units = $\sqrt{64}$ units
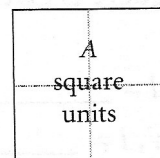
A square units

$l = \sqrt{A}$ units

$l = \sqrt{A}$ units

➤ In the square:
  • the side length is 8 units and the area is 8² square units
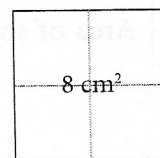 • the area is 64 square units and the side length is $\sqrt{64}$ units

➤ In the square:
  • the side length is l units and the area is l^2 square units
  • the area is A square units and the side length is $\sqrt{A}$ units

➤ Squares can have areas that are not square numbers. The side length of this square is $\sqrt{8}$ cm and the area is $(\sqrt{8})^2 = 8$ cm²
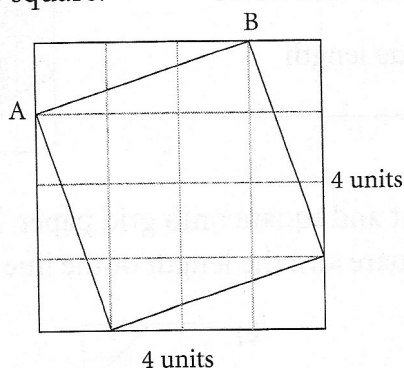The area is 8 cm² and the side length is $\sqrt{8}$ cm.

8 cm² $l = \sqrt{8}$ cm

➤ You can find the length of a line segment AB on a grid by constructing a square on the segment. The length AB is the square root of the area of the square.

Draw an enclosing square around the square containing AB.
Then find the area of the enclosing square, and subtract the sum of the areas of the triangles.

Tip
The square of the square root of a number is that number. For example, $(\sqrt{2})^2 = 2$. $\sqrt{8}$ is not a whole number. It is called an irrational number.

B

A

4 units

4 units

The area of the enclosing square is 4² square units = 16 square units

Each triangle has area $\frac{1}{2} \times 1$ unit $\times 3$ units = 1.5 square units

4 triangles have area 4×1.5 square units = 6 square units
The area of the square with AB as a side is
16 square units − 6 square units = 10 square units
So, the length of AB is $\sqrt{10}$ units.

HINT
Use the formulas $A = s^2$ for the area of a square and $A = \frac{1}{2}bh$ for the area of a triangle.

Practice

1. Circle the correct answer for each question.

   a) $16^2 = ?$ 4   256   b) $\sqrt{100} = ?$ 50   10   c) $25^2 = ?$ 5   625

2. The area of a square is given. Find its side length. Which of the side lengths are whole numbers?

   a) $A = 81$ cm², $l = $ _____   b) $A = 30$ cm², $l = $ _____

   c) $A = 144$ mm², $l = $ _____   d) $A = 58$ m², $l = $ _____

3. The side length of a square is given. Find its area.

   a) $l = 7$ cm, $A = $ _____   b) $l = 15$ m, $A = $ _____   c) $l = \sqrt{36}$ cm, $A = $ _____

   d) $l = \sqrt{50}$ mm, $A = $ _____   e) $l = \sqrt{24}$ cm, $A = $ _____   f) $l = \sqrt{121}$ mm, $A = $ _____

4. Find the area of each shaded square. Then write the side length of the square.
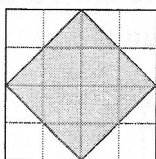
   a)   Area of large square   = _____ square units
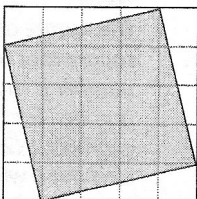
   Area of each triangle   = _____ square units

   Area of shaded square = area of large square − _____ × area of each triangle

   = _____
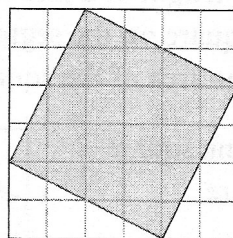
   = _____

   Side length = _____

   b)   Area of square

   _____

   Side length

   _____

   c)   Area of square
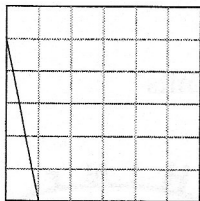
   _____

   Side length

   _____

5. Copy each line segment and square onto grid paper. Draw a square on each line segment. Find the area of the square and the length of the line segment.
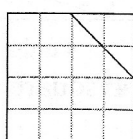
   a)   Area of square
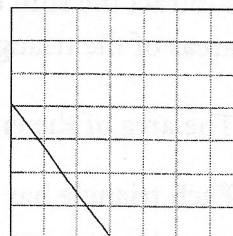
   _____

   Length of line segment

   _____

   b)   Area of square

   _____

   Length of line segment

   _____

   c)   Area of square

   _____

   Length of line segment

   _____