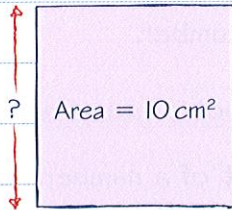


A*
A
B
C
D

Surds

You can give exact answers to calculations by leaving some numbers as square roots.



This square has a side length of $\sqrt{10}$ cm. You can't write $\sqrt{10}$ exactly as a decimal number. It is called a SURD.

Rules for simplifying square roots

These are the most important rules to remember when dealing with surds.

$$\sqrt{ab} = \sqrt{a} \times \sqrt{b} \quad \sqrt{8} = \sqrt{4} \times \sqrt{2} = 2\sqrt{2}$$

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \quad \sqrt{\frac{3}{25}} = \frac{\sqrt{3}}{\sqrt{25}} = \frac{\sqrt{3}}{5}$$

You need to remember these rules for your exam. They are NOT given on the formula sheet.

Worked example

grade A

Write $\sqrt{45}$ in the form $k\sqrt{5}$ where k is an integer.

$$\begin{aligned} \sqrt{45} &= \sqrt{9 \times 5} \\ &= \sqrt{9} \times \sqrt{5} \\ &= 3\sqrt{5} \end{aligned}$$

$$k = 3$$

Do not leave an answer as a square root if it can be written as an integer.

1. Look for a factor of 45 which is a square number: $45 = 9 \times 5$.
2. Use the rule $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ to split the square root into two square roots.
3. Write $\sqrt{9}$ as a whole number.

RATIONALISING THE DENOMINATOR of a fraction means making the denominator a whole number.

You can do this by multiplying the top AND bottom of the fraction by the surd part in the denominator.

$$\frac{5}{3\sqrt{2}} = \frac{5\sqrt{2}}{6}$$

The surd part of the denominator is $\sqrt{2}$

Remember that $\sqrt{2} \times \sqrt{2} = 2$
So $3\sqrt{2} \times \sqrt{2} = 3 \times 2 = 6$

Good form

Most surd questions ask you to write a number or answer in a certain FORM.

This means you need to find INTEGERS for all the letters in the expression.

$6\sqrt{3}$ is in the form $k\sqrt{3}$.

$$k = 6$$

The integers can be positive or negative.

$4 - 9\sqrt{2}$ is in the form $p + q\sqrt{2}$.

$$p = 4 \text{ and } q = -9$$

You can check your answer by writing down the integer value for each letter.

Now try this

edexcel

grade A

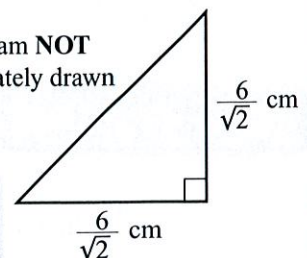
- (a) Express $\frac{6}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are positive integers. (2 marks)

The diagram shows a right-angled isosceles triangle. The length of each of its equal sides is $\frac{6}{\sqrt{2}}$ cm.

grade A*

- (b) Find the area of the triangle. Give your answer as an integer. (2 marks)

Diagram NOT accurately drawn



Remember to use the correct formula for the area of a triangle.