OxBridge Centre

ENGLAND

Facebook Live

Wednesday 29th April 2020

Square Numbers

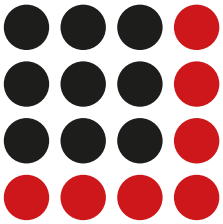
What is a square number?

Simply put - you are able to arrange a square number into a square!

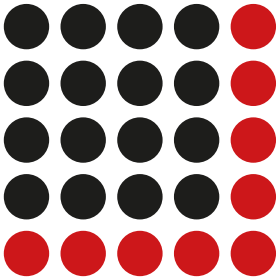
1 1^2 **1x1**

4 2^2 **2x2**

9 3^2 **3x3**



16 4^2 **4x4**



25 5^2 **5x5**

Challenge: can you find 2 square numbers that have the sum of another square number?

Square Any 2-digit Number

How to Square like a speed demon!

This is a trick that "human calculators" use to square any 2-digit number mentally.

EG: 18^2	EG: 35^2
10 x 10 = 100 8 x 8 = 64 10 x 8 x 2 = 160 = 324	30 x 30 = 900 5 x 5 = 25 30 x 5 x 2 = 300 = 1225

Now you try!

1. 26^2
2. 54^2
3. 83^2
4. 17^2

Square Root Any Number

Finding square roots is tough...! They are often 'irrational' numbers, too.

Lucky for you - here is a quick method to estimate any square root.

$\sqrt{}$

EG: $\sqrt{132} \approx 11\frac{11}{22}$

$11^2=121$

EG: $\sqrt{76} \approx 8\frac{12}{16}$

$8^2=64$

Now you try!

1. $\sqrt{26}$
2. $\sqrt{40}$
3. $\sqrt{83}$
4. $\sqrt{17}$

Application

How much energy in a car crash?

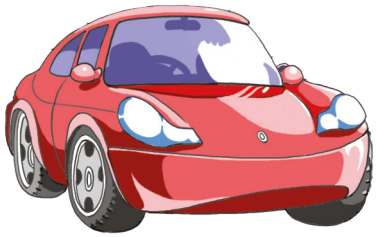
$$\text{Energy} = 1/2 \times \text{mass} \times \text{speed}^2$$

Car safety features can protect the driver from 200,000J of crash energy...

Will the driver be protected?

Lets look at some different speeds:

1. 1m/s
2. 5m/s
3. 11m/s
4. 23m/s
5. 36m/s



In most real life crashes you are protected at the faster speeds because you don't stop instantly

You can work out your kinetic energy at home! Work out your speed, weigh yourself and you can use the formula to calculate how much kinetic energy you have!

Application

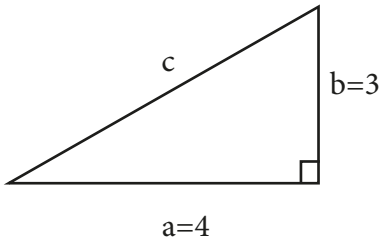
Is the room 'square'?

In this instance square means are all the corners = 90°

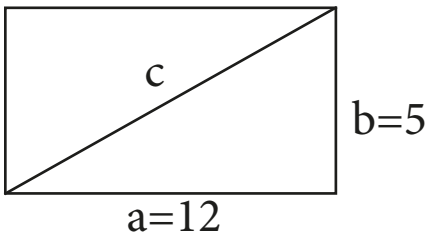
Most buildings need to be rectangular or square to stand up. When building them, an easy way to measure is using a maths trick.

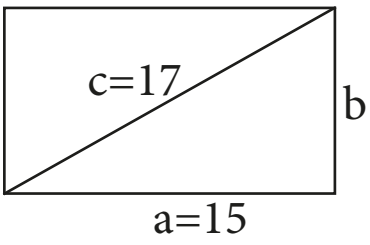
*(some of you may have seen this before - this trick was invented by a clever greek mathematician called pythagoras - it is called ***Pythagoras' theorem***)*

$a^2 + b^2 = c^2$

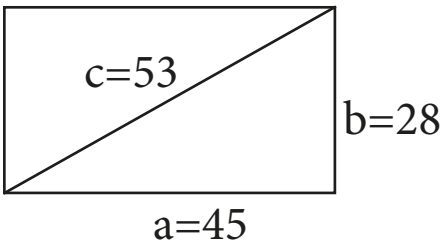


What length should the missing measure be for these walls?





Is this room 'square'?



You can check this with your rooms at home! Are they square? Did your builder do a good job?