

Step 1 USING A PROTRACTOR

Place your protractor so the center of rotation is along the bottom line.



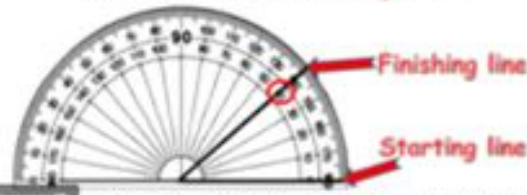
Step 2

Decide if you are using the **inside** protractor or the **outside**.



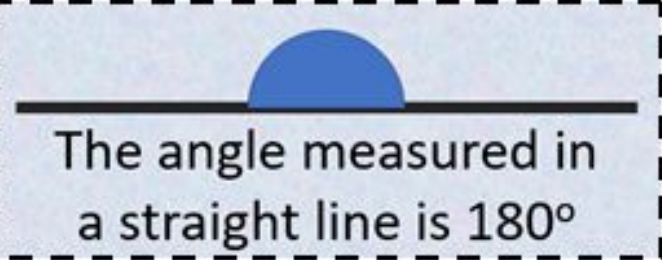
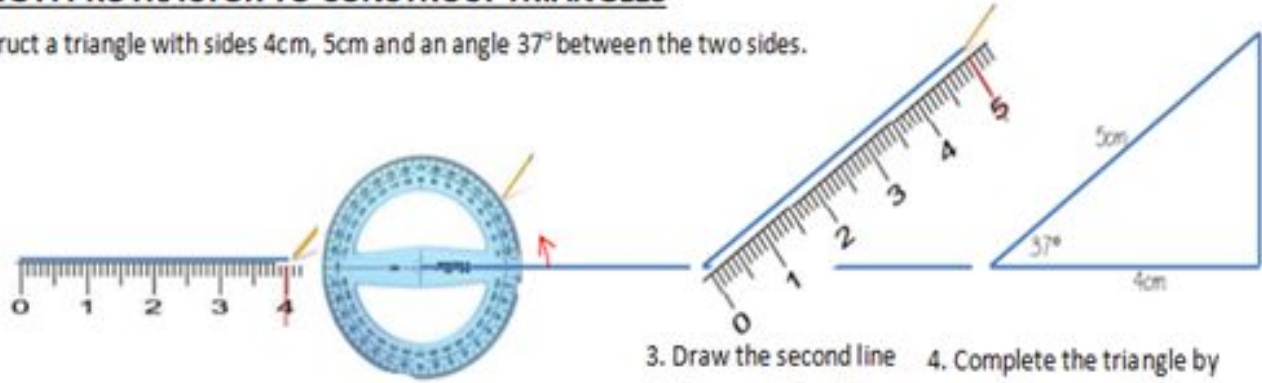
Step 3

Start at 0. Measure how many degrees it is from the **starting** line to the **finishing** line



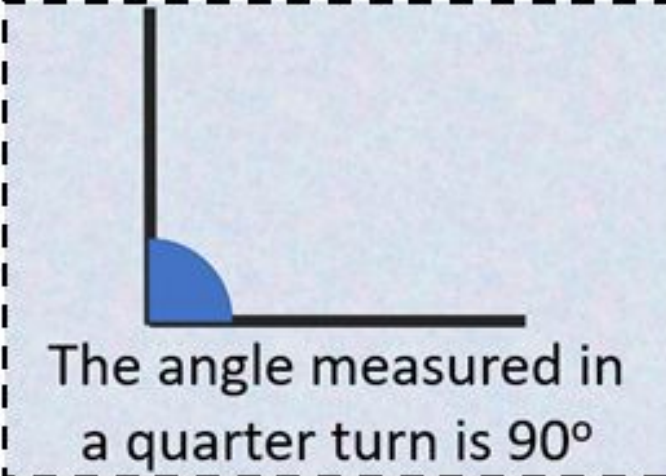
USING A PROTRACTOR TO CONSTRUCT TRIANGLES

Construct a triangle with sides 4cm, 5cm and an angle 37° between the two sides.



The angle measured in a straight line is 180°

You should estimate the size of your angle before you measure it to ensure you are using the correct scale on your protractor.



The angle measured in a quarter turn is 90°

Video



Exam Questions

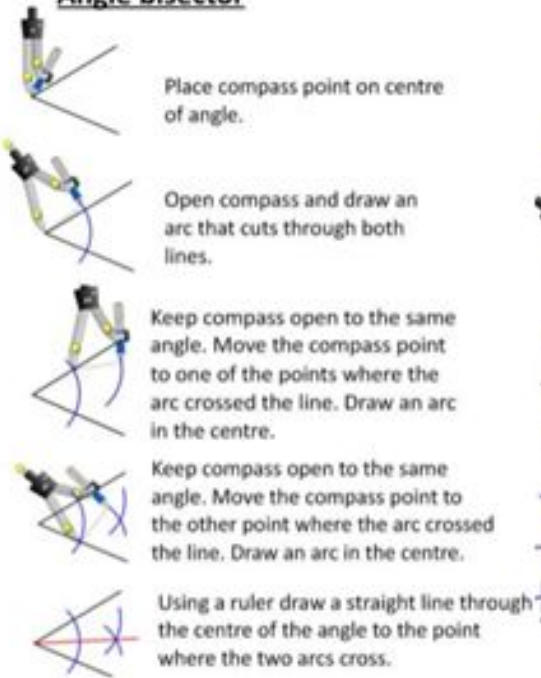


Answers

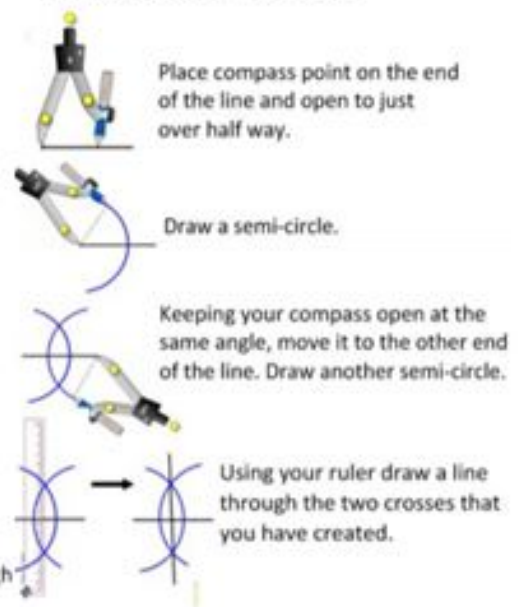


Construction

Angle bisector



Perpendicular bisector



KEYWORDS

CONSTRUCT: To draw a shape, line or angle accurately using a compass and ruler or a protractor and ruler.

ANGLE: A measure of turn, measured in degrees or $^{\circ}$

VERTEX: A point where two or more curves, lines, or edges meet. The plural is vertices.

PERPENDICULAR: A line meeting another at a right angle, or 90° .

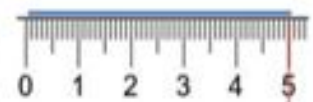
BISECTOR: A Line that splits an angle into two equal angles.

ARC: Part of a circle, often drawn with a compass

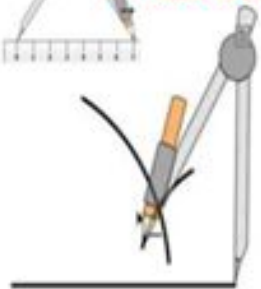
USING A COMPASS TO CONSTRUCT TRIANGLES

Construct a Triangle with sides 5cm, 3cm and 7cm

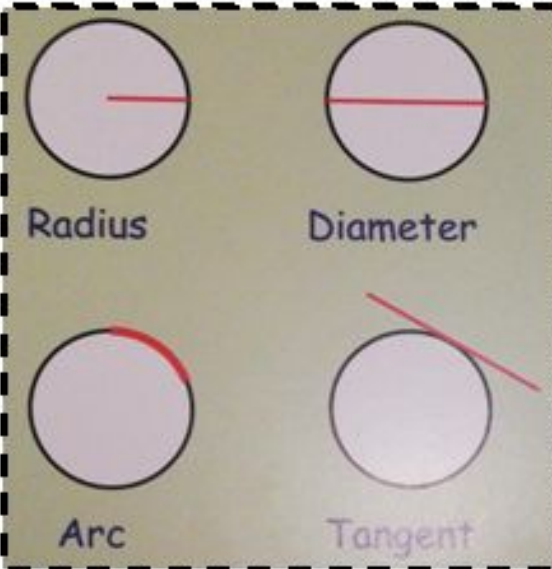
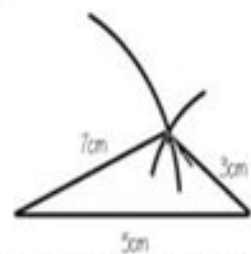
1. Use a ruler to draw any line as the base.



2. Measure the distance of the compass against a ruler and construct the 3cm and 7cm arcs.



3. Join the intersection with either end of the base.



KEYWORDS

LOCUS: The point, or set of points that satisfy a set of conditions regarding their position in relation to other objects. The plural of LOCUS is LOCI

BISECTOR: A Line that splits an angle into two equal angles.

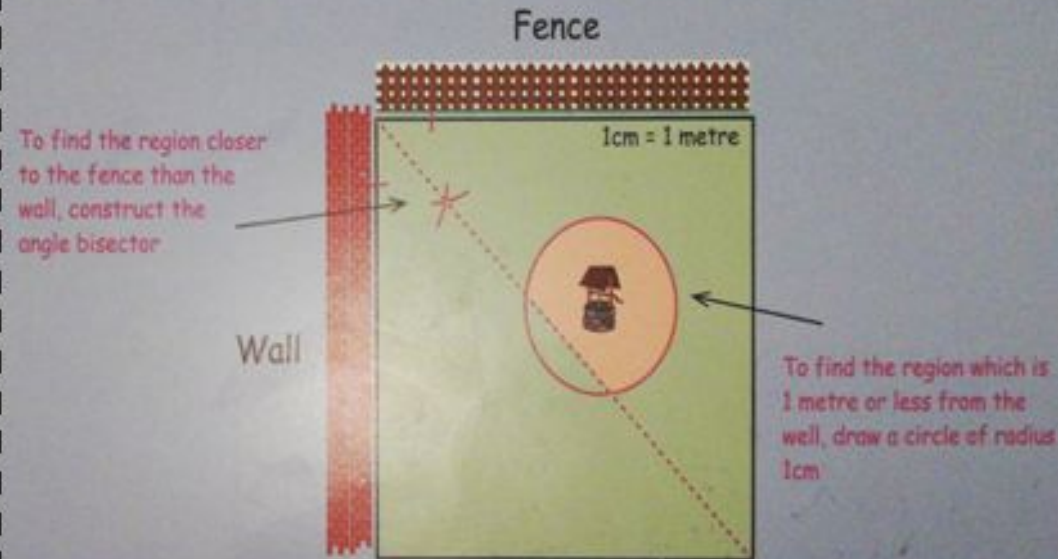
The locus of points can be a single point, a line, a curve or a shaded area.



Find the locus of points 3cm from AB



A tree is planted closer to the fence than the wall
The tree is no more than 1 metre from the well.
Shade the possible area where the tree could be



If a line is included in the locus you draw it as a solid line. If the line is not included, but just shows the edge of the locus you draw it as a broken, or dashed, line.

Video



Exam Questions

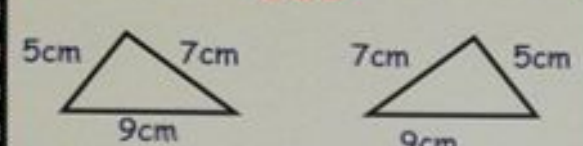
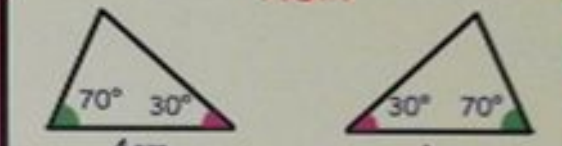

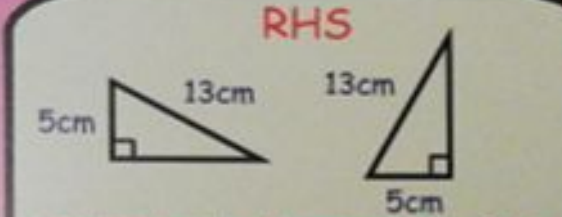


Answers

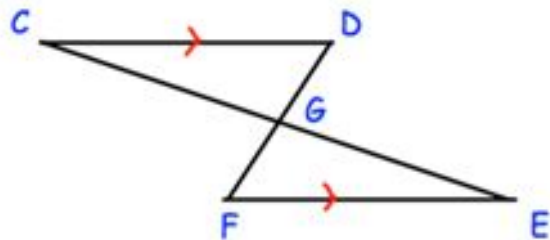


Congruence is used to solve problems and prove that shapes are the same. To prove it, write a series of logical statements. Each statement needs to be supported by a mathematical reason.

There are four ways to prove that two triangles are congruent.

<p>SSS</p>  <p>Side - Side - Side</p>	<p>ASA</p>  <p>Angle - Side - Angle</p>
<p>SAS</p>  <p>Side - Angle - Side</p>	<p>RHS</p>  <p>Right Angle - Hypotenuse - Side</p>

8. In the diagram, the lines CE and DF intersect at G.
CD and FE are parallel and $CD = FE$.



Prove that triangles CDG and EFG are congruent.

Angle DCG and GEF are _____ because they are _____ angles

Angle GFE and GDC are _____ because they are _____ angles

$CD = FE$, so Triangle CDG and EFG are congruent because _____

KEYWORDS

CONGRUENT: Two shapes are Congruent if they are the same shape and the same size. Each side and each angle must be the exact same

SIMILAR: Two shapes are Similar if they are the same shape but different sizes. All Angles must be the same and all sides must be in the same proportion.

Video



Exam Questions

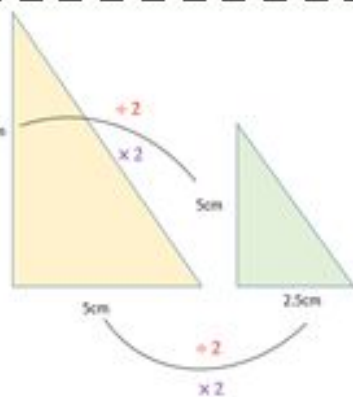


Answers



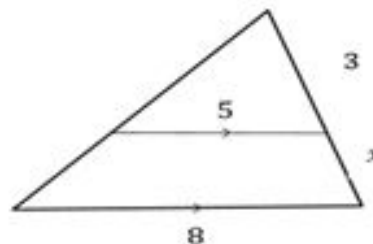
Shapes are similar if:

- They are the same shape
- They have the same sized angles
- Each length is directly proportional to the length of the corresponding shape



The yellow triangle is twice as large as the green triangle.
The ratios of the lengths are the same, therefore the triangles are similar.

Finding a missing side in a similar shape



Steps:

- 1) Split the shapes into two
- 2) Highlight the corresponding sides
- 3) Divide the longer side by the shorter side (this gives you the scale factor)

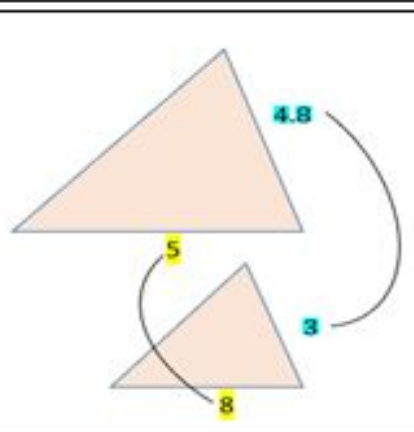
$$8 \div 5 = 1.6$$

- 4) Multiply the smaller side by the scale factor to find the missing side

$$3 \times 1.6 = 4.8$$

- 5) Subtract 3 from 4.8 to get x

$$4.8 - 3 = 1.8$$



KEYWORDS

SIMILAR: Two shapes are Similar if they are the same shape but different sizes. All Angles must be the same and all sides must be in the same proportion.

SCALE FACTOR: The size of an enlargement is described by a scale factor. For example, a scale factor of 2 means that the new shape is Twice the size of the original.

Video



Exam Questions



Answers



Indices

Combining indices

When multiplying indices with the same base value, **add the powers**:

$$2^2 \times 2^3 = \underline{2 \times 2} \times \underline{2 \times 2 \times 2}, \text{ so}$$

$$2^2 \times 2^3 = 2^{(2+3)} = 2^5$$

When dividing indices with the same base value, **subtract the powers**:

$$3^6 \div 3^2 = \frac{3 \times 3 \times 3 \times 3 \times 3 \times 3}{3 \times 3}$$

$$3^6 \div 3^2 = 3^{(6-2)} = 3^4$$

Negative indices

Raising something to a negative power is the same as raising the **reciprocal** (see left) to the positive power.

$$3^{-2} = \left(\frac{1}{3}\right)^2 = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} = \frac{1}{3^2}$$

It's no coincidence!

$$\text{Negative power} = \frac{1}{\text{positive power}}$$

Power of 0

Anything to the power of 0 is equal to 1, no matter what it is! We can show this by dividing two identical indices:

$$3^2 \div 3^2 = 3^{(2-2)}$$

$$3^2 \div 3^2 = 3^0$$

Since dividing a value by itself always gives the answer 1, we also know that:

$$3^2 \div 3^2 = 1, \text{ therefore } 3^0 = 1$$

This works for all numbers AND letters!

Fractional indices

Raising something to a fractional power is the same as taking a root.

The power of $\frac{1}{2}$ means square root:

$$25^{\frac{1}{2}} = 5$$

$$x^{\frac{1}{n}} = \sqrt[n]{x} \quad x^{\frac{m}{n}} = (\sqrt[n]{x})^m$$

KEYWORDS

RECIPROCAL: The reciprocal of a number is found by calculating 1 divided by the number

POWER: Much like "Index" the word power represents repeated multiplication

Video



Exam Questions



Answers



Standard form is a way of writing very large or small numbers using powers of 10 (multiplying/dividing by 10 until the decimal point is in the right place). The base number must always be between 1 and 10.

E.G 5000000000000000

Could be written as

$$5 \times 1000000000000000$$

or

$$5 \times 10^{15}$$

E.G 0.000000000061

Could be written as

$$61 \div 1000000000000$$

or

$$6.1 \times 10^{-11}$$

N is any positive or negative integer

$$A \times 10^n$$

$1 \leq A < 10$

KEYWORDS

INDEX: Repeated multiplication of the same number

PLACE VALUE: How much a digit in a number is worth. For example, the 3 in 237 is worth thirty.

BASE: The number between 1 and 10 which is multiplied by a power of 10 to create standard form.

OPERATIONS WITH STANDARD FORM

a $(3 \times 10^5) \times (2 \times 10^6)$

When multiplying two Standard Form numbers, multiply the bases first, then the powers of 10 before adjusting:

$$3 \times 2 \times 10^5 \times 10^6 = 6 \times 10^{11}$$

$$\frac{2.8 \times 10^6}{1.4 \times 10^4}$$

When Dividing two numbers in Standard Form, Divide the bases then the powers of 10 before adjusting

$$\frac{2.8}{1.4} \times \frac{10^6}{10^4} = 2 \times 10^2$$