

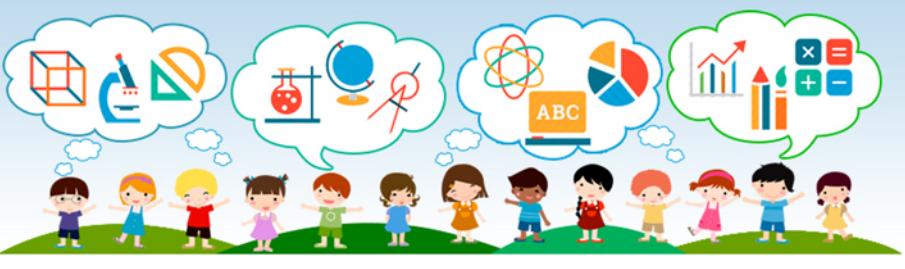
## SIMILARITY AND SCALE

**Similarity** refers to similar figures and the ability to compare them using proportions.

- Similar figures have **equal corresponding angles and corresponding sides** that are in proportion.
- A **proportion equation** can be used to prove two figures to be similar.
- If two figures are similar, the proportion equation can be used to find a missing side of one of the figures.

Scal...  
of co...  
on a...  
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- S...
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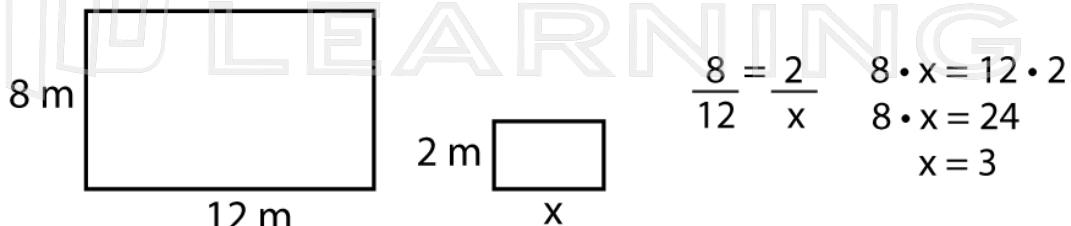
As similar figures use ratios to find the measure of missing sides of a figure, **trigonometric ratios** can be used to find the measure of missing sides or angles of a **right triangle**.

- The trigonometric ratios are **sine, cosine and tangent**. Each stands for a certain ratio that when used can determine the measure of a missing side or angle of a right triangle.

## How to use similarity and scale

When two figures are said to be **similar**, it means that their sides are in proportion and their angles are equal.

If these two rectangles are similar, what is the length of the missing side?



Map



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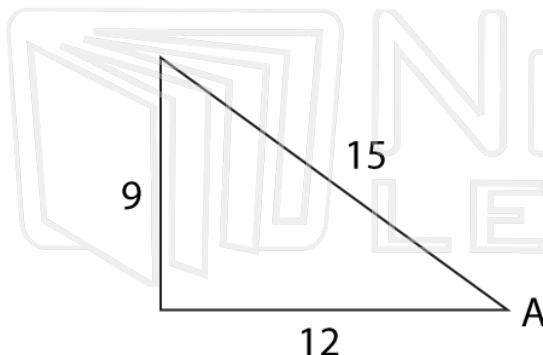
- With proportional equations, it is very important that the correct units are lined up in order to find the correct result. The same proportion equations can be used with scale models.

**Trigonometric ratios** can be used to find the measure of missing sides or angles of a right triangle. The trigonometric ratios are sine, cosine and tangent. Each refers to a ratio of a right triangle.

- The sine is the opposite side/hypotenuse.
- The cosine is the adjacent side/hypotenuse.
- The tangent is the opposite side/adjacent side.
- This is often remembered by various sayings such as, **Some Old Horse Caught Another Horse Taking Oats Away**.

To find the ratios, a certain angle must be specified.

For example, what are the trigonometric ratios for angle A?



$$\sin A = o/h = 9/15$$

$$\cos \angle A = a/h = 12/15$$

$$\tan \angle A = o/h = 9/12$$

- The trigonometric ratios can be used to solve for missing sides or angles.

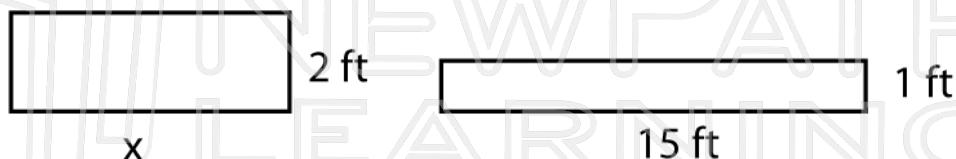


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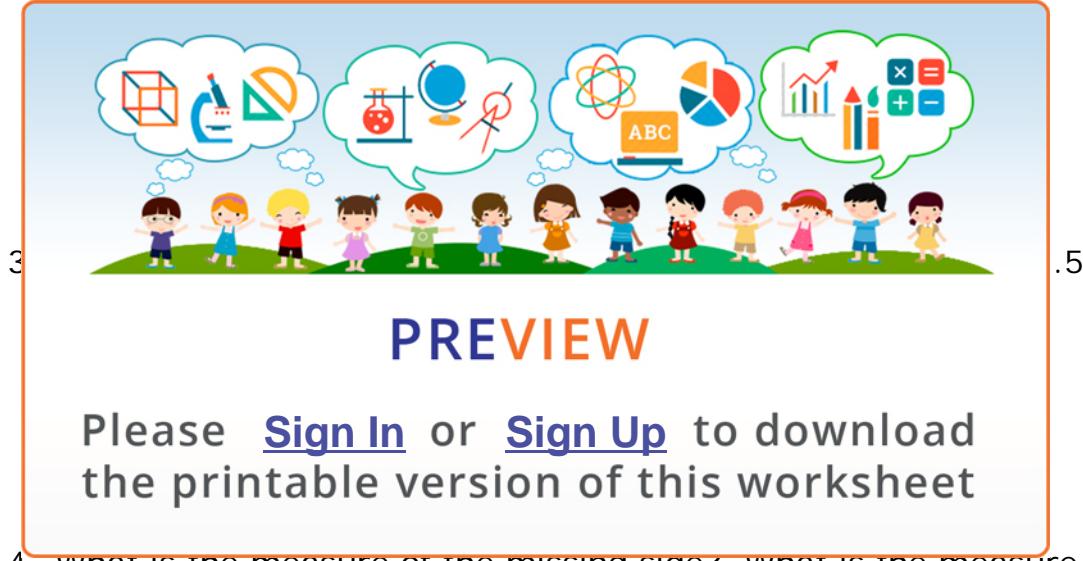
To find the measure of  $\sin 36^\circ$ , use a calculator. To find what angle B is, use a calculator to find the inverse sin of .3846, this will give the needed information to solve for angle B.

## Try This!

1. Two rectangles are **similar**; what is the length of the missing side?



2. A map has a **scale** of  $\frac{1}{2}$  inch = 12 miles. If two cities are 65 miles apart, how far is that on a ruler?



A decorative illustration featuring a group of diverse children standing on a grassy hill under a blue sky with white clouds. Four thought bubbles above them contain various educational icons: geometric shapes (cube, triangle, circle), scientific instruments (microscope, test tube), a globe, a atom model, a book labeled 'ABC', and a bar chart with mathematical symbols.

3 .5

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4. What is the measure of the missing side? What is the measure of angle A?

