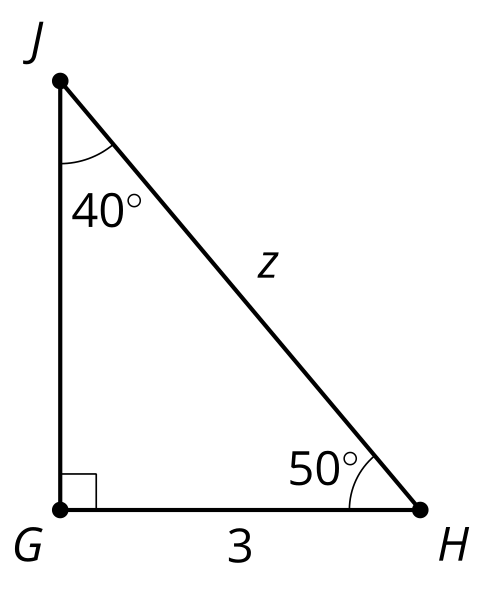
## Lesson 6: Working with Trigonometric Ratios

* Let’s solve problems using cosine, sine, and tangent.

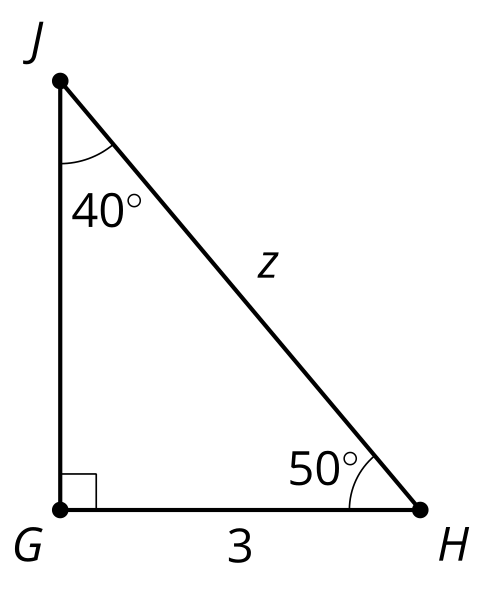
### 6.1: This Time with Strategies

Estimate the value of .



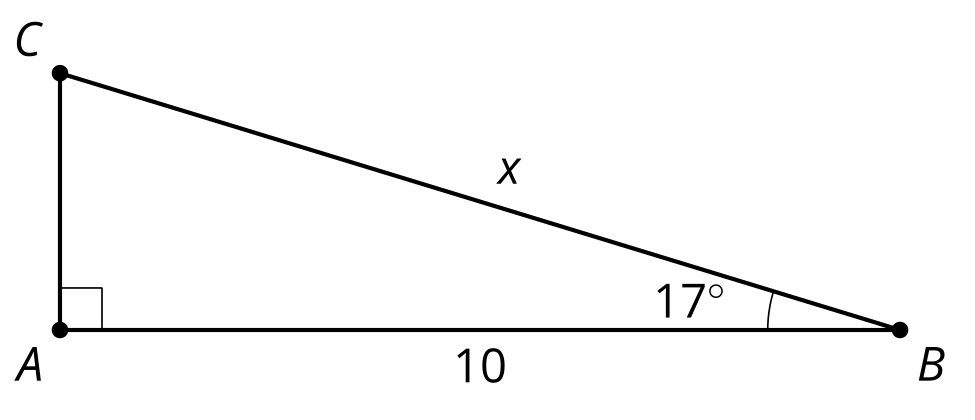
### 6.2: New Names, Same Ratios

1. Use your calculator to determine the values of , , and .
2. Use your calculator to determine the values of , , and .
3. How do these values compare to your chart?
4. Find the value of .

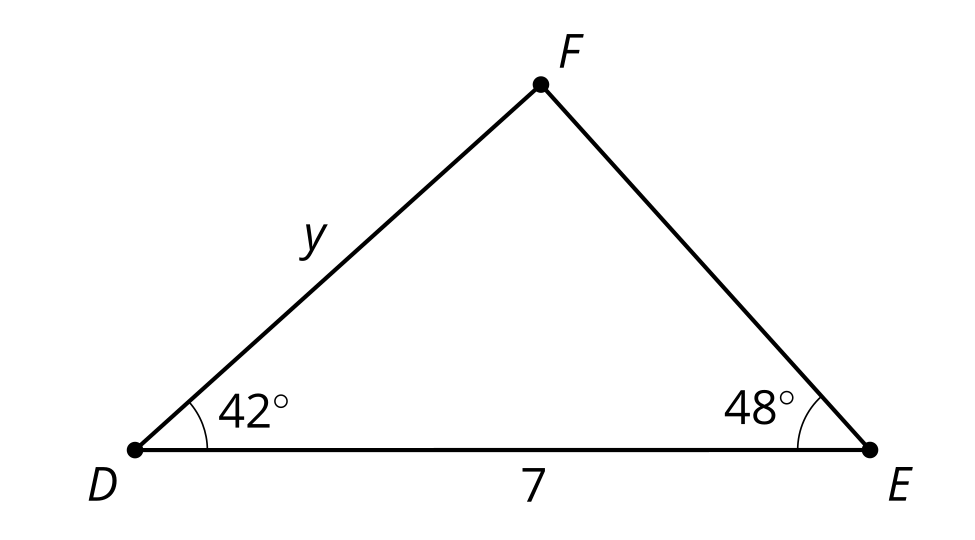


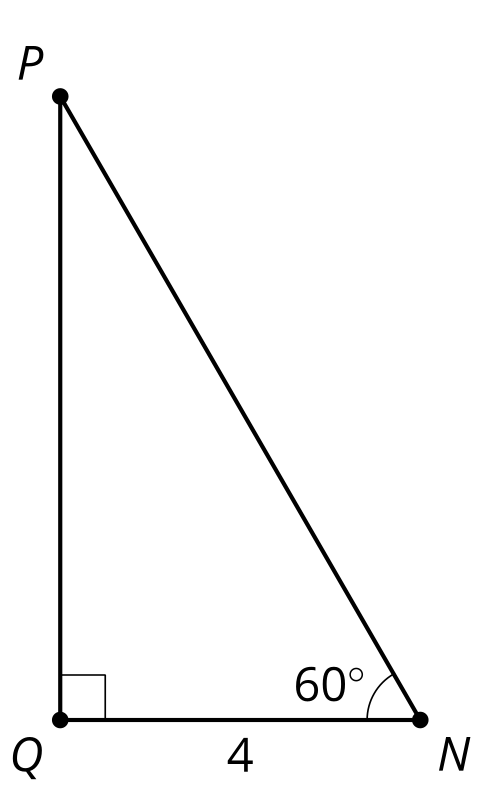
### 6.3: Solve These Triangles

1. Solve for .

* 

1. Solve for .

* 

1. Find all the missing sides and angle measures.
   1. The measure of angle is 90 degrees and angle is 12 degrees. Side has length 2 cm.
   2. 
   3. The measure of angle is 90 degrees and angle is 71 degrees. Side has length 20 cm.

#### Are you ready for more?

Complete the table.

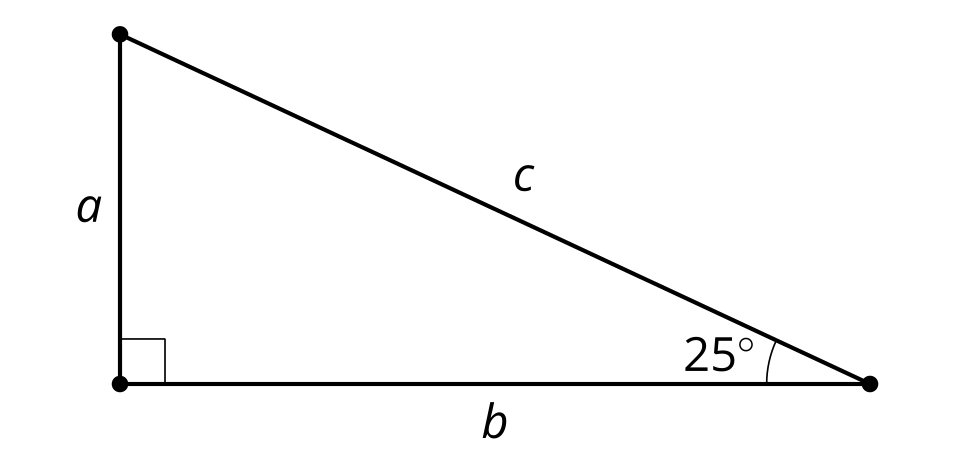
| angle | cosine | sine | tangent |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Based on this information, what do you think are the cosine, sine, and tangent of 90 degrees? Explain or show your reasoning.

### Lesson 6 Summary

We have a column in the right triangle table for "adjacent leg  hypotenuse." We use this ratio so frequently it has a name. It is called the **cosine** of the angle. We write to say the cosine of 25 degrees. A scientific calculator can display the cosine of any angle. This means we can more precisely calculate unknown side lengths rather than estimating using the table. The right triangle table is sometimes called a trigonometry table since cosine, **sine**, and **tangent** are **trigonometric ratios**. Here is what the table looks like with the ratios labeled with their special names:

|  | cosine | sine | tangent |
| --- | --- | --- | --- |
| angle | adjacent leg  hypotenuse | opposite leg  hypotenuse | opposite leg adjacent leg |
|  |  |  |  |



If the length  is 7, we can find by solving the equation . So  is about 7.7 units. To solve for we have 3 choices: the Pythagorean Theorem, sine, and tangent. Let’s use tangent by solving the equation . So  is about 3.3 units. We can check our answers using the Pythagorean Theorem. It should be true that . The two expressions are almost equal, which makes sense because we expect some error due to rounding.



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