

# 13.1. Advanced Algebra

## Right $\Delta$ Trigonometry (Part 1)

DATE: 4/25

*Target 9A. Solve right triangles and extend knowledge of sine, cosine, and tangent ratios to their respective reciprocals.*



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

$\downarrow$   
leg
 $\downarrow$   
leg
 $\downarrow$   
hyp.

leg  
a

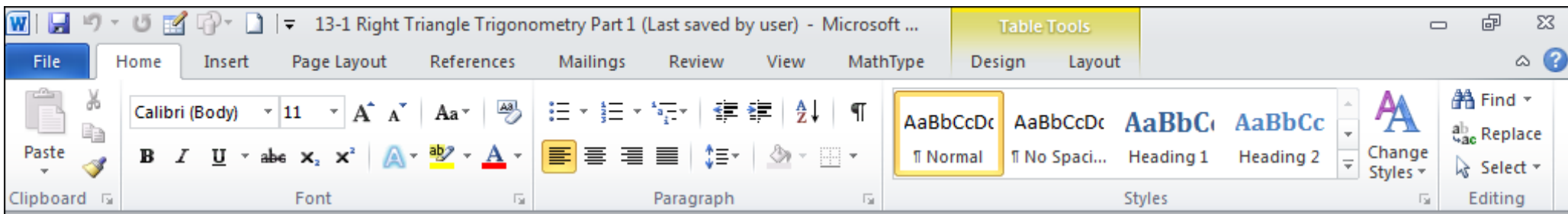
leg  
b

(Ogden)  
hypotenuse : c

- ① Always the longest side
- ② Always across from  $90^\circ \alpha$ .

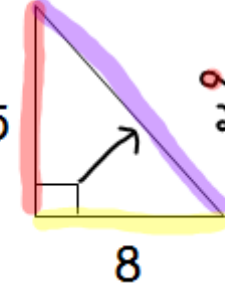
**Pythagorean Theorem Review:** When given two sides of a right triangle, the third side can be found using the Pythagorean Theorem,  $a^2 + b^2 = c^2$ , where a and b are legs and c is the hypotenuse.

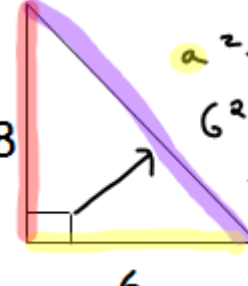
Find the missing side of each of the following right triangles to the nearest tenth.

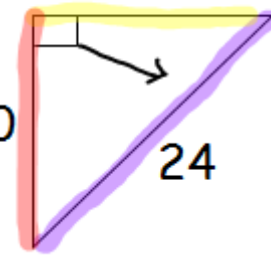


In a right triangle, the third side can be found using the Pythagorean theorem,  $a^2 + b^2 = c^2$ , where  $a$  and  $b$  are legs and  $c$  is the hypotenuse.

Find the missing side of each of the following right triangles to the nearest tenth.

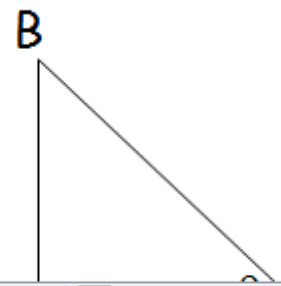
1.   $a^2 + b^2 = c^2$   
 $25^2 + 8^2 = c^2$   
 $625 + 64 = c^2$   
 $689 = c^2$   
 $26.2 = c$

2.   $a^2 + b^2 = c^2$   
 $6^2 + 8^2 = c^2$   
 $36 + 64 = c^2$   
 $100 = c^2$   
 $10 = c$

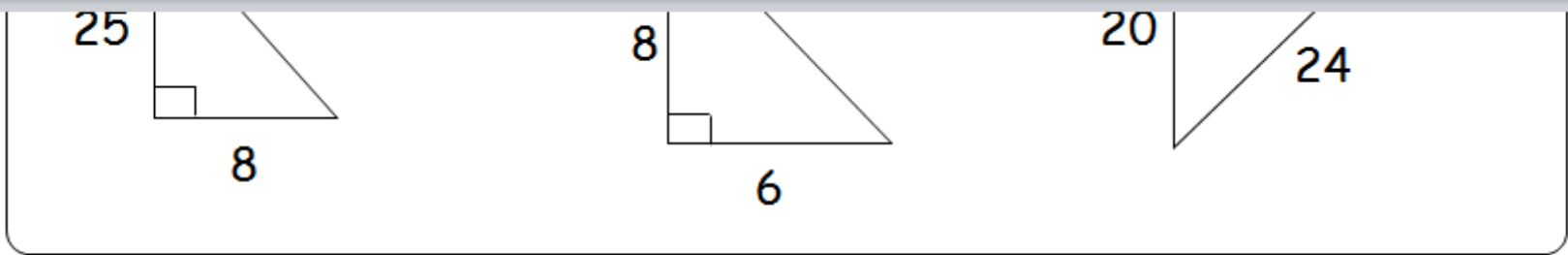
3.   $a^2 + b^2 = c^2$   
 $20^2 + b^2 = 24^2$   
 $400 + b^2 = 576$   
 $-400$   
 $b^2 = 176$   
 $b = 13.2$

Trigonometry is the study of the relationships among the angles and sides of a right triangle.

Consider the right  $\triangle ABC$  in which the measure of acute angle  $A$  is identified by the Greek letter theta, \_\_\_\_\_. The sides of the triangle are the \_\_\_\_\_, the leg \_\_\_\_\_, the leg \_\_\_\_\_, and the hypotenuse \_\_\_\_\_.

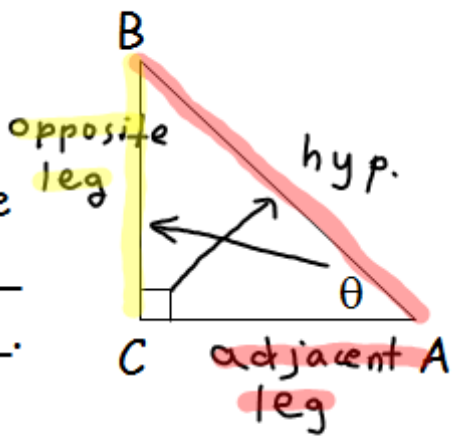


Microsoft Word interface showing the ribbon with File, Home, Insert, Page Layout, References, Mailings, Review, View, MathType, Design, and Layout tabs. The Font section includes options for Calibri (Body), size 11, bold, italic, underline, and text color. The Paragraph section includes bullet points, numbered lists, and indentation. The Styles section includes Normal, No Spacing, Heading 1, and Heading 2. The right side of the ribbon includes Find, Replace, Select, and Editing options.



Trigonometry is the study of the relationships among the angles and sides of a right triangle.

Consider the right  $\triangle ABC$  in which the measure of acute angle  $A$  is identified by the Greek letter theta,  $\theta$ . The sides of the triangle are the hypotenuse, the leg opposite  $\theta$  and the leg adjacent to  $\theta$ .



13-1 Right Triangle Trigonometry Part 1 (Last saved by user) - Microsoft ...

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Calibri (Body) 11 A A Aa Paste B I U abc x<sub>2</sub> x<sup>2</sup> Paragraph Styles

AaBbCcDc AaBbCcDc AaBbCc AaBbCc Normal No Spaci... Heading 1 Heading 2 Find Replace Select Editing

Using these sides, you can define six Trigonometric Functions: sine (sin), cosine (cos), tangent (tan), cosecant (csc), secant (sec), and cotangent (cot).

"Definitions"

Trigonometric Functions (SOH-CAH-TOA)

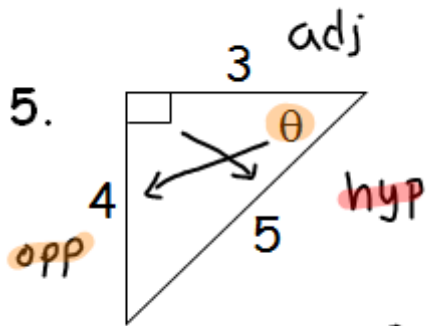
$\sin \theta = \frac{\text{opp.}}{\text{hyp}}$	flip ↔	$\csc \theta = \frac{\text{hyp.}}{\text{opp.}}$
$\cos \theta = \frac{\text{adj.}}{\text{hyp}}$	flip ↔	$\sec \theta = \frac{\text{hyp.}}{\text{adj.}}$
$\tan \theta = \frac{\text{opp.}}{\text{adj.}}$	flip ↔	$\cot \theta = \frac{\text{adj.}}{\text{opp.}}$

Examples

Microsoft Word interface showing the ribbon with File, Home, Insert, Page Layout, References, Mailings, Review, View, MathType, Design, and Layout tabs. The Font section is active, showing Calibri (Body) font, size 11, and various formatting options like bold, italic, underline, and text color.

### Examples

Find the values of the six trigonometric functions for angle  $\theta$ .



①  $\sin \theta = \frac{4}{5} = \frac{4}{5}$  ✓

②  $\cos \theta = \frac{3}{5} = \frac{3}{5}$  ✓

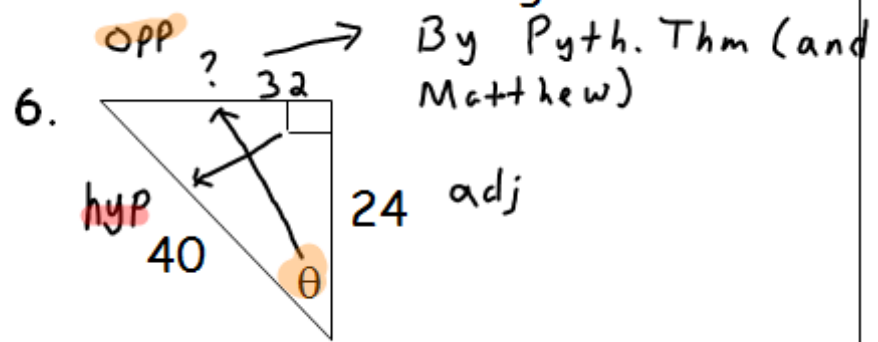
③  $\tan \theta = \frac{4}{3} = \frac{4}{3}$  ✓

④  $\csc \theta = \frac{5}{4}$  ✓

⑤  $\sec \theta = \frac{5}{3}$  ✓

⑥  $\cot \theta = \frac{3}{4}$  ✓

flip



①  $\sin \theta = \frac{32}{40} = \frac{4}{5}$  ✓

②  $\cos \theta = \frac{24}{40} = \frac{3}{5}$  ✓

③  $\tan \theta = \frac{32}{24} = \frac{4}{3}$  ✓

④  $\csc \theta = \frac{40}{32} = \frac{5}{4}$  ✓

⑤  $\sec \theta = \frac{40}{24} = \frac{5}{3}$  ✓

⑥  $\cot \theta = \frac{24}{32} = \frac{3}{4}$  ✓

