

Notes: Unit 7 → Using the Trig Ratios (SOH-CAH-TOA) to solve for missing parts of a right triangle

I. SOHCAHTOA

- a. SOHCAHTOA is used to help find missing sides and angles in a right triangle when Pythagorean Theorem does not work!

S (sine)      O (opposite)      H (hypotenuse) →

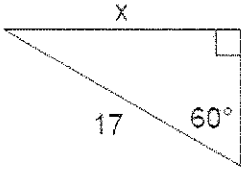
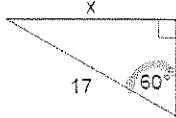
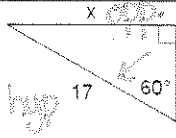
C (cosine)      A (adjacent)      H (hypotenuse) →

T (tangent)      O (opposite)      A (adjacent) →

$\sin \theta = \frac{\text{opp.}}{\text{hyp.}}$
$\cos \theta = \frac{\text{adj.}}{\text{hyp.}}$
$\tan \theta = \frac{\text{opp.}}{\text{adj.}}$

- b. Setting up Trigonometry Ratios and Solving for Sides

- Identify the reference angle (NOT the right angle)
- label your sides (Opposite, Adjacent, Hypotenuse)
- decide which ratio to use:
  - ✓ sin if we have the opposite and hypotenuse
  - ✓ cos if we have the adjacent and the hypotenuse
  - ✓ tan if we have the opposite and the adjacent
- iv. Set up the proportion and solve for x!

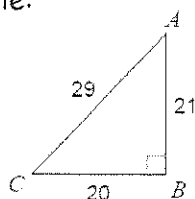
Example:	
1. Select a given angle	
2. Label your sides	
3. Decide which Trig to use	$\sin \theta = \frac{\text{opp.}}{\text{hyp.}}$
4. Set up the proportion	$\sin(60) = \frac{x}{17}$
5. Solve the proportion	$x = 17 \sin(60)$
6. Check your work!	$x = 14.72$

## II. Setting up Trigonometry Ratios and Solving for Angles

- Select a given angle (NOT the right angle)
- Label your sides (Opposite, Adjacent, Hypotenuse)
- Decide which trig function you can use:
  - SOH if we have the opposite and hypotenuse
  - CAH if we have the adjacent and the hypotenuse
  - TOA if we have the opposite and the adjacent
- Solve the equation ... remember to use your inverses!

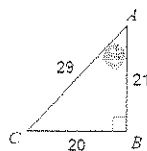
same steps

Example:

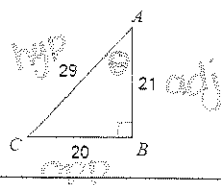


Find the measure of angle A.

- Select a given angle:  
*the missing angle.*



- Label your sides



- Decide which Trig to use

- Set up the proportion

$$\sin \theta = \frac{21}{29} \quad \cos \theta = \frac{20}{29} \quad \tan \theta = \frac{21}{20}$$

- Solve the equation

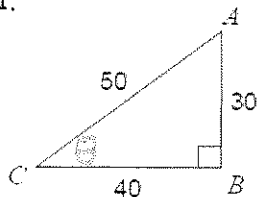
$$\theta = \sin^{-1}\left(\frac{21}{29}\right) \quad \theta = \cos^{-1}\left(\frac{20}{29}\right) \quad \theta = \tan^{-1}\left(\frac{21}{20}\right)$$

- Check your work!

$$\theta = 43.6^\circ$$

## III. Find the measure of both missing angles: \* MULTIPLE WAYS TO SOLVE THIS!! \*

1.



$$\angle C = 36.9^\circ$$

$$\angle A = 53.1^\circ$$

$$\sin \theta = \frac{30}{50}$$

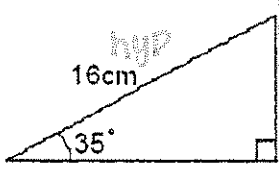
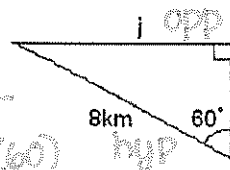

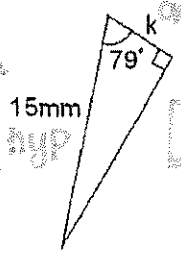
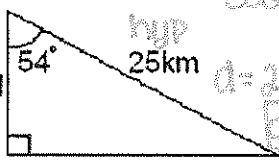
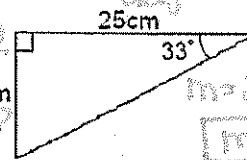

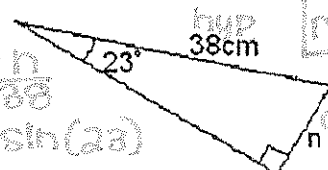
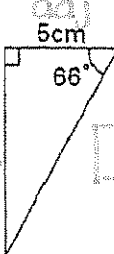
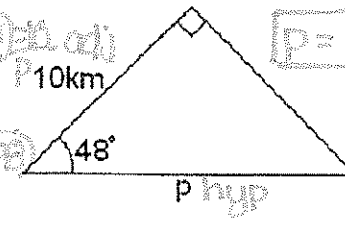
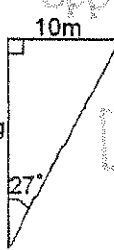
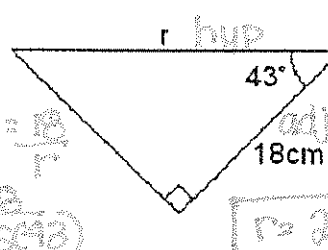
$$\theta = \sin^{-1}\left(\frac{30}{50}\right)$$

$$\theta = 36.9^\circ$$

$$90 - 36.9 = 53.1^\circ$$

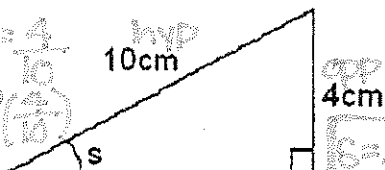
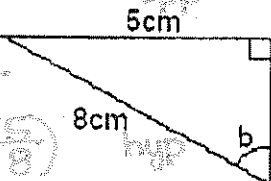
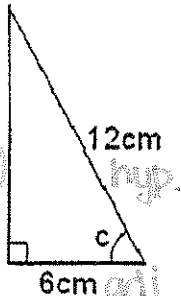

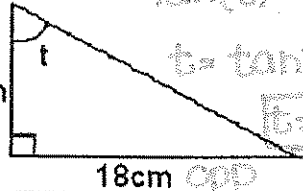
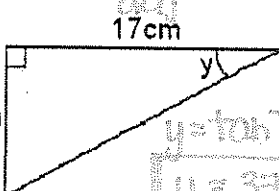
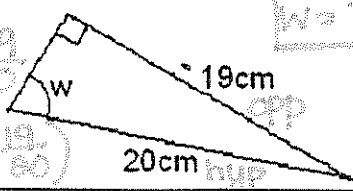
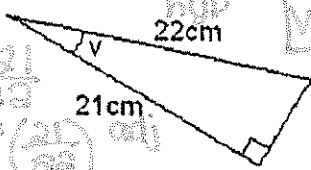
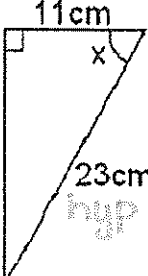
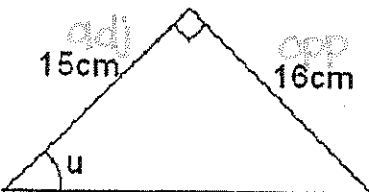
# Trigonometry Worksheet T3 – Calculating Sides

Work out the sides labelled. Questions 1 and 2 require Sine, questions 3 and 4 require Cosine, question 5 and 6 require Tangent. The rest .... you will need to work out which to use and how! (Worksheet T1 may help you!!)

<p>1.</p>  <p><math>\sin(35) = \frac{b}{16}</math></p> <p><math>b = 9.2</math></p>	<p>7.</p>  <p><math>\sin(60) = \frac{i}{8}</math></p> <p><math>i = 8 \sin(60)</math></p> <p><math>i = 6.9</math></p>
<p>2.</p>  <p><math>\sin(67) = \frac{8}{c}</math></p> <p><math>c = \frac{8}{\sin(67)}</math></p> <p><math>c = 8.7</math></p>	<p>8.</p>  <p><math>\cos(79) = \frac{k}{15}</math></p> <p><math>k = 15 \cos(79)</math></p> <p><math>k = 2.9</math></p>
<p>3.</p>  <p><math>\cos(54) = \frac{d}{25}</math></p> <p><math>d = 25 \cos(54)</math></p> <p><math>d = 14.7</math></p>	<p>9.</p>  <p><math>\tan(33) = \frac{m}{25}</math></p> <p><math>m = 25 \tan(33)</math></p> <p><math>m = 16.2</math></p>
<p>4.</p>  <p><math>\cos(71) = \frac{7}{e}</math></p> <p><math>e = \frac{7}{\cos(71)}</math></p> <p><math>e = 21.5</math></p>	<p>10.</p>  <p><math>\sin(23) = \frac{n}{38}</math></p> <p><math>n = 38 \sin(23)</math></p> <p><math>n = 14.8</math></p>
<p>5.</p>  <p><math>\tan(66) = \frac{f}{5}</math></p> <p><math>f = 5 \tan(66)</math></p> <p><math>f = 11.2</math></p>	<p>11.</p>  <p><math>\cos(48) = \frac{p}{10}</math></p> <p><math>p = \frac{10}{\cos(48)}</math></p> <p><math>p = 14.9</math></p>
<p>6.</p>  <p><math>\tan(27) = \frac{10}{g}</math></p> <p><math>g = \frac{10}{\tan(27)}</math></p> <p><math>g = 19.6</math></p>	<p>12.</p>  <p><math>\cos(43) = \frac{18}{r}</math></p> <p><math>r = \frac{18}{\cos(43)}</math></p> <p><math>r = 24.6</math></p>

## Trigonometry Worksheet T4 – Calculating Angles

Work out the angles labelled. Question 1 requires Sine, question 2 requires Cosine, and question 3 requires Tangent. The rest .... you will need to work out which to use!

<p>1.</p>  <p> <math>\sin(s) = \frac{4}{10}</math>  <math>s = \sin^{-1}\left(\frac{4}{10}\right)</math>  <math>s = 23.6^\circ</math> </p>	<p>6.</p>  <p> <math>\sin(b) = \frac{5}{8}</math>  <math>b = \sin^{-1}\left(\frac{5}{8}\right)</math>  <math>b = 38.7^\circ</math> </p>
<p>2.</p>  <p> <math>\cos(c) = \frac{6}{12}</math>  <math>c = \cos^{-1}\left(\frac{6}{12}\right)</math>  <math>c = 60^\circ</math> </p>	<p>7.</p>  <p> <math>\tan(z) = \frac{7}{24}</math>  <math>z = \tan^{-1}\left(\frac{7}{24}\right)</math>  <math>z = 16.3^\circ</math> </p>
<p>3.</p>  <p> <math>\tan(t) = \frac{18}{9}</math>  <math>t = \tan^{-1}\left(\frac{18}{9}\right)</math>  <math>t = 63.4^\circ</math> </p>	<p>8.</p>  <p> <math>\tan(y) = \frac{13}{17}</math>  <math>y = \tan^{-1}\left(\frac{13}{17}\right)</math>  <math>y = 37.4^\circ</math> </p>
<p>4.</p>  <p> <math>\sin(w) = \frac{19}{20}</math>  <math>w = \sin^{-1}\left(\frac{19}{20}\right)</math>  <math>w = 71.8^\circ</math> </p>	<p>9.</p>  <p> <math>\cos(v) = \frac{21}{22}</math>  <math>v = \cos^{-1}\left(\frac{21}{22}\right)</math>  <math>v = 17.3^\circ</math> </p>
<p>5.</p>  <p> <math>\cos(x) = \frac{11}{23}</math>  <math>x = \cos^{-1}\left(\frac{11}{23}\right)</math>  <math>x = 61.4^\circ</math> </p>	<p>10.</p>  <p> <math>\tan(u) = \frac{15}{16}</math>  <math>u = \tan^{-1}\left(\frac{15}{16}\right)</math>  <math>u = 46.8^\circ</math> </p>