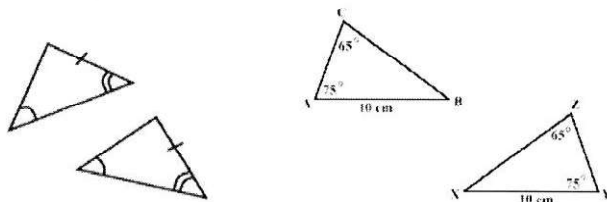
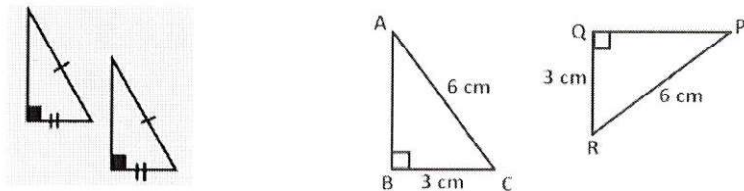


- Angle – Angle – Side
 - AAS

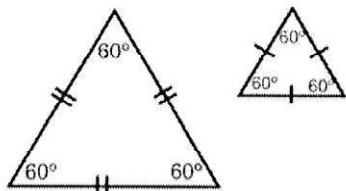


- Hypotenuse – Leg

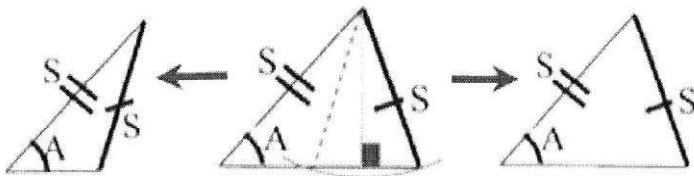
- HL
- Remember: This one only works with RIGHT triangles!!!!



- Also → remember you can't use AAA or ASS to prove congruence of two triangles. Only the ones above work!!!



PROOF that AAA doesn't work...both of these triangles have the same angles, but different sides.

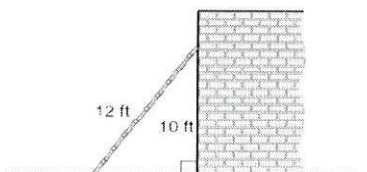


PROOF that ASS doesn't work...basically you can make an isosceles triangle inside the bigger one and then two triangles form that have ASS but the triangles aren't congruent.

Unit 5 – Trigonometry

Pythagorean Theorem

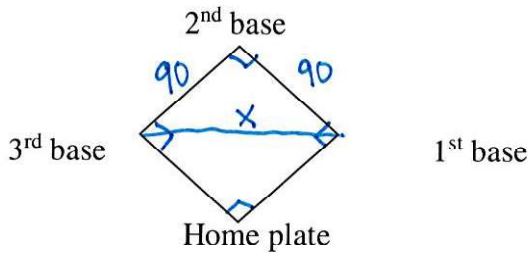
123. A 12-foot ladder is leaning against the side of a building. The top of the ladder reaches 10 feet up the side of the building. Approximately how far is the bottom of the ladder from the base of the building?



$$10^2 + x^2 = 12^2$$

$$x = \sqrt{44} \approx 6.63$$

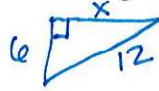
124. A baseball diamond is a square with a side length of 90 feet. To the nearest foot, what is the distance between first base and third base?



$$90^2 + 90^2 = x^2$$

$$x = 127$$

125. A flower garden is in the shape of a right triangle. One leg of the triangle is 6 ft long and the hypotenuse is 12 ft long. What is the length of the other leg?



$$x = \sqrt{108} \approx 10.39$$

126. Which of the following sets of numbers represents a Pythagorean Triple?

- A { 10, 5, 12 }
- B { 2, 4, 5 }
- C { 1, 2, 3 }
- D { 14, 48, 50 }

127. Which of the following sets of numbers does NOT represent a Pythagorean Triple?

- A { 34, 16, 30 } ✓
- B { 10, 24, 26 } ✓
- C { 19, 21, 23 } ✓
- D { 5, 12, 13 } ✓

128. A right triangle has legs of lengths 9 cm and 12 cm. What is the length of the hypotenuse?

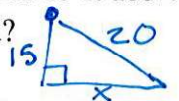
$$x = 15$$

129. A triangle has legs which measure 15 inches and 20 inches. Find the length of the hypotenuse.

$$x = 25$$

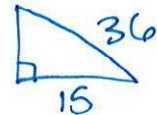
130. A 20-ft-long wire is used to support a television antenna. The wire is connected to the antenna 15 ft above the ground. How far away from the base of the tower will the other end of the wire be located?

$$\approx 13.23 \text{ ft}$$

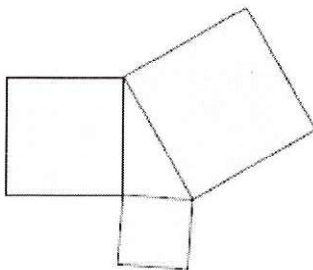


131. Gina is making a quilt in the shape of a right triangle. The measurement of the diagonal of the quilt is 36 in. long. The width of the quilt is 15 in. long. What is the approximate length?

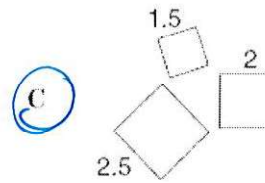
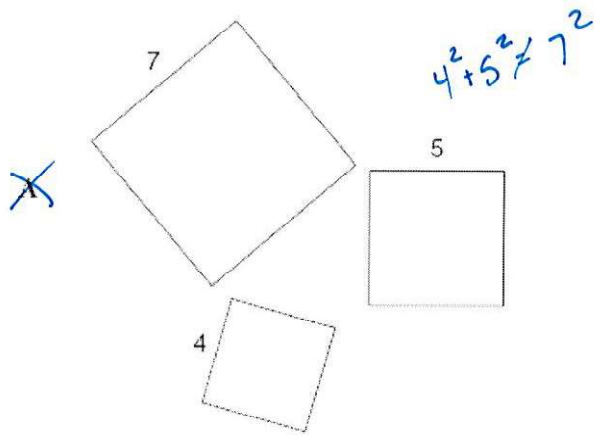
$$\approx 32.73 \text{ m.}$$



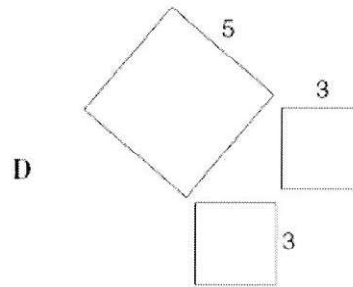
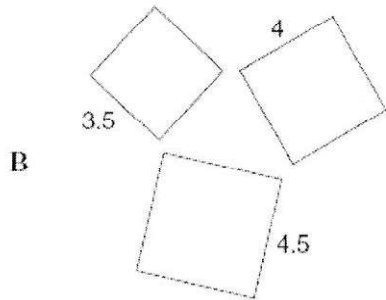
132. The drawing shows how three squares can be joined to form a triangle.



Which set of squares could form a right triangle?



$$1.5^2 + 2^2 = 2.5^2 \checkmark$$



SOH CAH TOA

Use this when you are trying to find the side of a right triangle.

Sine

Opposite

Hypotenuse

$$\sin(\theta) = \frac{opp}{hyp}$$

Cosine

Adjacent

Hypotenuse

$$\cos(\theta) = \frac{adj}{hyp}$$

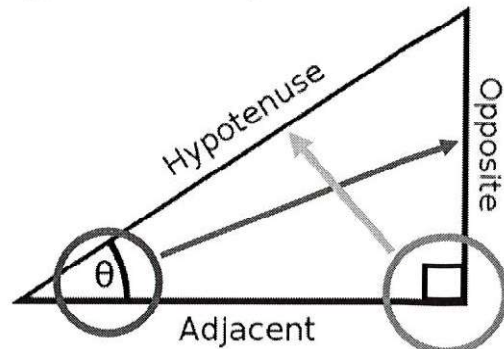
Tangent

Opposite

Adjacent

$$\tan(\theta) = \frac{opp}{adj}$$

How to label the sides as opposite, hypotenuse, and adjacent.

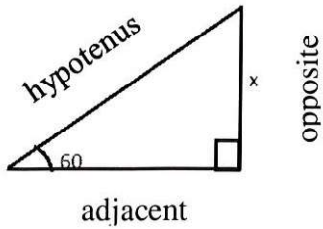


Straight across from the angle we are using (the angle that is measured or labeled) is the opposite side.

Straight across from the right angle is the hypotenuse.

The third side that is left is the adjacent side.

Examples:



Solve for x.

Step 1. Label sides as opposite, hypotenuse, and adjacent.

Step 2. Choose which trig function (sine, cosine, or tangent) to use based on which sides are labeled.

Tangent uses the angle, the opposite, and adjacent sides to solve for the variable.

$$\tan(\theta) = \frac{\text{opp}}{\text{adj}}$$

$$\tan(60) = \frac{x}{13}$$

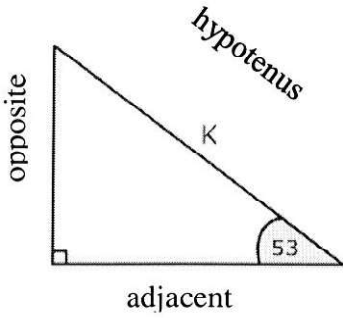
$$13 * \tan(60) = x$$

$$22.5167 = x$$

So the opposite side measures 22.5167 cm

Step 3. Set up the right equation.

Step 4. Solve for the variable.

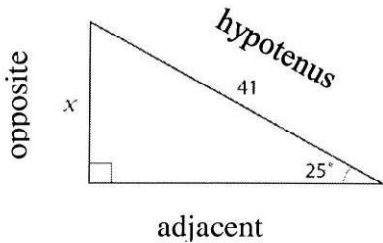


$$\cos(53) = \frac{45}{k}$$

$$k * \cos(53) = 45$$

$$k = \frac{45}{\cos(53)}$$

$$k = 74.7738$$



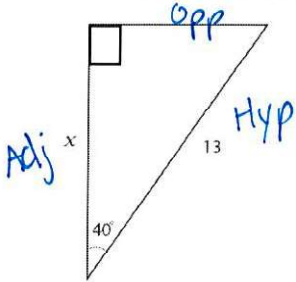
$$\sin(25) = \frac{x}{41}$$

$$41 * \sin(25) = x$$

$$17.3273 = x$$

You try these:

133. Solve for x.

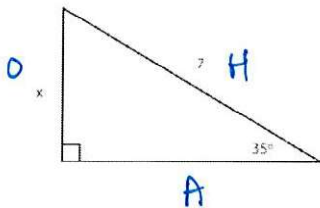


Degree Mode

$$\cos 40 = \frac{x}{13}$$

$$x = 9.96$$

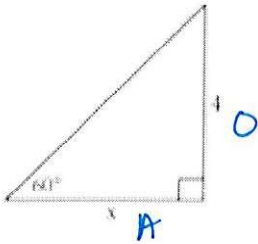
134. Solve for x.



$$\sin 35 = \frac{x}{7}$$

$$x = 4.02$$

135. Solve for x.



$$\tan 60 = 4/x$$

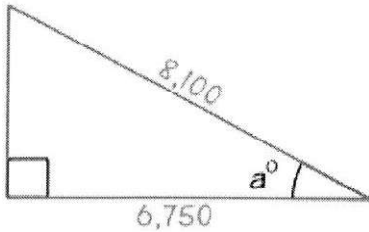
$$x = 4/\tan 60$$

$$x = 2.31$$

SOH CAH TOA inverse

You use the same equations as SOHCAH TOA, but you have to use the inverses when solving for an angle.

Example:



Solve for a.

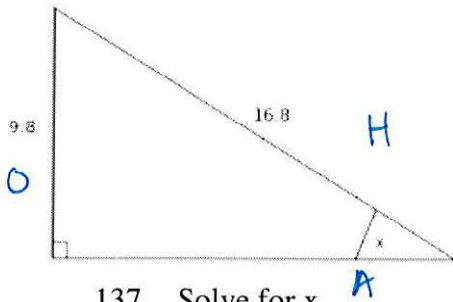
$$\cos(a) = \frac{6,750}{8,100}$$

$$\cos^{-1}\left(\frac{6,750}{8,100}\right) = a$$

$$34^\circ = a$$

You try these.

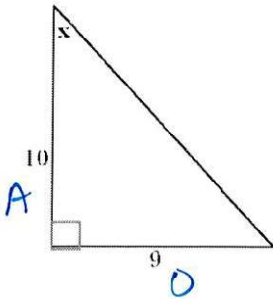
136. Solve for x.



$$\sin^{-1}(9.8/16.8)$$

$$x \approx 35.7^\circ$$

137. Solve for x.



$$\tan^{-1}(9/10)$$

$$x \approx 42^\circ$$

SOH CAH TOA word problems

You use the same methods as SOHCAH TOA, but you have to first set up the picture/problem.

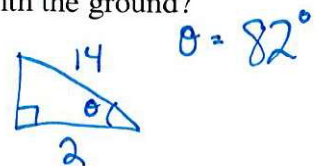
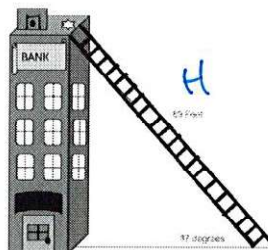
You try these:

138. A ladder 14 feet long rests against the side of a building. The base of the ladder rests on level ground 2 feet from the side of the building. What angle does the ladder form with the ground?

139. How tall is the bank?

$$\sin$$

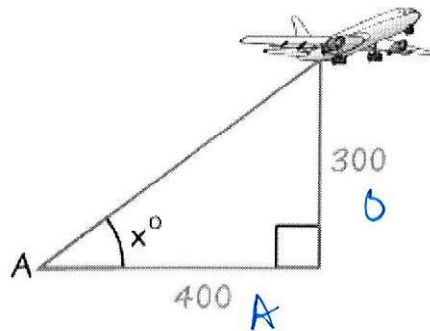
$$x = 88.88$$



140. A 24-foot ladder leaning against a building forms an 18° angle with the side of the building. How far is the base of the ladder from the base of the building?



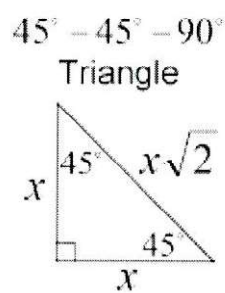
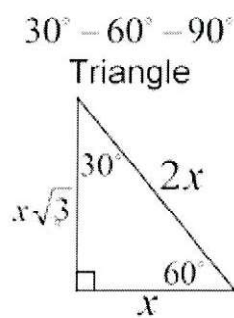
141. What's the angle of elevation from the ground to the plane?



Handwritten calculation for problem 141: $\tan^{-1}(300/400)$
 $x = 36.87^\circ$

Special Right Triangles

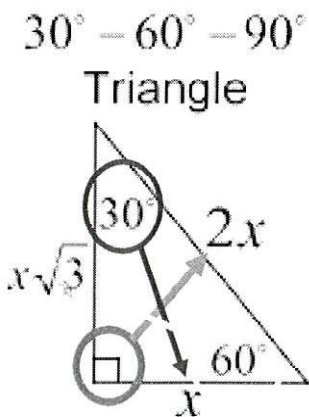
You can use these shortcuts when you know the triangle is either a 30-60-90 or a 45-45-90.



30-60-90 Rules:
 Short leg * $\sqrt{3}$ = long leg
 Short leg * 2 = hypotenuse

45-45-90 Rules:
 Leg * $\sqrt{2}$ = hypotenuse

How to label the sides of a 30-60-90 triangle.

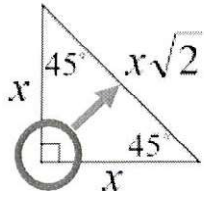


Straight across (opposite) from the right angle is the hypotenuse.
 Straight across (opposite) from the 30 degree angle is the short leg.
 Straight across (opposite) from the 60 degree angle is the long leg.

How to label the sides of a 45-45-90 triangle.

$$45^\circ - 45^\circ - 90^\circ$$

Triangle

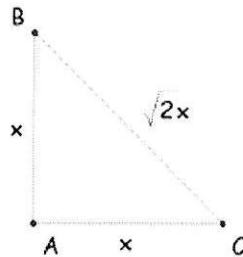


Straight across (opposite) from the right angle is the hypotenuse.

The other two sides are the legs.

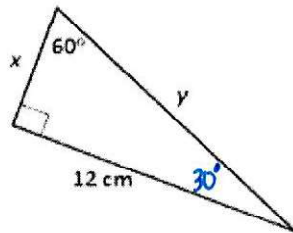
You try these:

142. Solve for x.



$$x = x$$

143. Solve for x and y.



$$x = 4\sqrt{3}$$

$$y = 8\sqrt{3}$$

Unit 6 – Probability

Theoretical Probability

A tube of sweets contains 20 red candies, 8 blue candies, 8 green candies and 4 orange candies. If a sweet is taken at random from the tube, what is the probability that it is:

144. P(red)? $\frac{1}{2}$

145. P(orange)? $\frac{1}{10}$

146. P(blue or green)? $\frac{2}{5}$

147. P(not green)? $\frac{4}{5}$

In a bag of 40 pieces of candy, 45% are Hershey's Kisses, 20% are Twix and the remaining pieces are Skittles.

148. Madison picks a piece of candy, find the probability she selects either a Hershey Kiss or Twix. $\frac{13}{20}$

149. Madison picks a piece of candy, eats it, and then picks another piece. Find the probability her 1st candy is a Hershey Kiss and her second is a Skittle. $\frac{21}{130}$

150. Madison picks a piece of candy and then replaces it. Find the probability of her first selecting Skittles and then selecting Twix. $\frac{7}{100}$

151. In a bag of Reese's Pieces, there are 12 yellow, 14 orange and 18 brown pieces. I only want to eat the brown ones, however if I pick the wrong color, I put it back in the bag. What's the probability that on my 1st three tries, I get a brown piece of candy? $\frac{204}{3311}$