

Trigonometry Chapter 2

Sections 4 & 5

I. Vocabulary

Complete each statement:

1. To SOLVE A TRIANGLE means to find the measures of all three _____ and all three _____ of the triangle.
2. When solving a triangle, you should always use _____ values rather than previously rounded values when possible.
3. In a RIGHT TRIANGLE THE _____ is always the side opposite the right angle.
4. When labeling a right triangle, the _____ is always labeled first.
5. Both the ANGLE OF ELEVATION and the ANGLE OF DEPRESSION are always measured against the _____, never against the _____.
6. MATT FOSS'S RULES FOR SOLVING WORD PROBLEMS.
 - I. _____ the problem.
You may repeat Step I at any time, NO PENALTY.
 - II. _____ what you are asked to find.
Introduce variable(s) to represent these values.
Confused? Goto _____.
 - III. _____ equations using the variables from Step II.
If confusion prevails, see _____.
 - III. _____ . Be sure to find all values you are asked to find.
Repeating _____ might help with this.

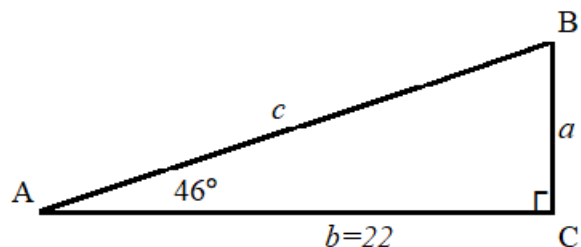
- II. Solve each triangle. In each case, ASSUME $\angle C$ IS THE RIGHT ANGLE. Express length answers in the given units, rounded to one decimal place, Express angle answers in degrees rounded to one decimal place. Do not use the Pythagorean Theorem.

Example:

Given: $\angle A = 46^\circ$, $b = 22in$

Solution:

Draw and label a triangle. Remember that the triangle is NOT NECESSARILY TO SCALE.



Write down all values to be found. Remember that $\angle C = 90^\circ$ is given.

Find:

$\angle B =$

$a =$

$c =$

$\angle B:$

$a:$

$c:$

$$\angle B = (90 - 46)^\circ$$

$$= \boxed{44^\circ}$$

$$\tan(46^\circ) = \frac{a}{22}$$

$$\Rightarrow \frac{\tan(46^\circ)}{1} = \frac{a}{22}$$

$$\Rightarrow 1 \cdot a = 22 \cdot \tan(46^\circ)$$

$$\Rightarrow a = 22 \cdot (1.0355303...)$$

$$= 22.7816669...$$

$$= \boxed{22.8in}$$

$$\cos(46^\circ) = \frac{22}{c}$$

$$\Rightarrow \frac{\cos(46^\circ)}{1} = \frac{22}{c}$$

$$\Rightarrow 1 \cdot 22 = c \cdot \cos(46^\circ)$$

$$\Rightarrow c = \frac{22}{\cos(46^\circ)}$$

$$= \frac{22}{(.6946583...)}$$

$$= 31.6702438...$$

$$= \boxed{31.7in}$$

6. Given: $\angle A = 67^\circ$, $a = 18.4cm$

8. Given: $\angle A = 55^\circ$, $b = 36.2m$

10. Given: $\angle B = 20^\circ$, $b = 88.8cm$

7. Given: $\angle B = 25.3^\circ$, $c = 149ft$

9. Given: $\angle B = 79^\circ$, $a = 9.2in$

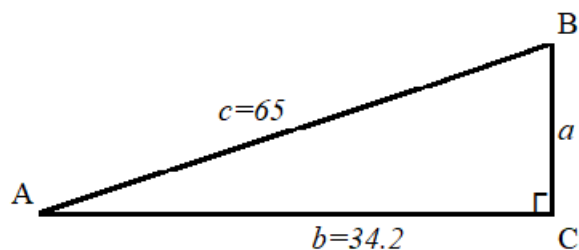
11. Given: $\angle B = 16^\circ$, $c = 46m$

Example:

Given: $c = 65cm$, $b = 34.2cm$

Solution:

Draw and label a triangle.



Write down all values to be found. Remember that $\angle C = 90^\circ$ is given.

Find:

$$\angle A =$$

$$\angle B =$$

$$a =$$

$$\angle A:$$

$$\cos(A) = \frac{34.2}{65}$$

$$\Rightarrow \cos(A) = (.5261538...)$$

$$\Rightarrow \angle A = \cos^{-1}(.5261538...)$$

$$= 58.2540478...$$

$$= \boxed{58.3^\circ}$$

$$\angle B:$$

$$\angle B = (90 - 58.3)^\circ$$

$$= \boxed{31.7^\circ}$$

$$a:$$

$$\sin(58.3^\circ) = \frac{a}{65}$$

$$\Rightarrow \frac{\sin(58.3^\circ)}{1} = \frac{a}{65}$$

$$\Rightarrow 1 \cdot a = 65 \cdot \sin(58.3^\circ)$$

$$\Rightarrow a = 65 \cdot (.8508111...)$$

$$= 55.3027221...$$

$$= \boxed{55.3cm}$$

12. Given: $a = 66.4cm$, $c = 108.4cm$

13. Given: $a = 42m$, $b = 35m$

14. Given: $a = 8.4\text{cm}$, $b = 11.3\text{cm}$

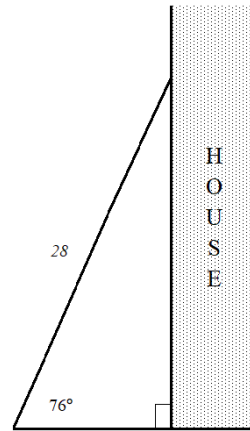
15. Given: $b = 65\text{m}$, $c = 77\text{m}$

III. Solve each problem. Express length answers in the given units, rounded to one decimal place, Express angle answers in degrees rounded to one decimal place.

Do not use the Pythagorean Theorem.

Example:

A 28 ft ladder is leaning against a house. See picture. If the ladder forms a 76° angle with the ground, at what height is the top of the ladder touching the wall?



Solution:

Let x the height at which the ladder touches the wall.

So we have:

$$\sin(76^\circ) = \frac{x}{28}$$

$$\Rightarrow \frac{\sin(76^\circ)}{1} = \frac{x}{28}$$

$$\Rightarrow x = 28 \cdot \sin(76^\circ)$$

$$\Rightarrow a = 28 \cdot (.9702957...)$$

$$= 27.1682803...$$

$$= \boxed{27.2\text{ ft}}$$

16. Kelly is 158 meters due north of Chris. Terry is due east of Chris, and the three of them form a triangle. If the angle at Terry's vertex is 27.7° , how far is it (a) between Chris and Terry, and (b) between Kelly and Terry?

17. From a point 226 ft from the base of a flagpole, the angle of elevation to the top of the flagpole is 11.3° . How tall is the flagpole?

18. Sandy is flying a kite which is 41.3m above the ground. Assuming the string is perfectly straight and there is 50.1 m of string, what is Sandy's angle of elevation to the kite?

19. The Coyote is on a vertical cliff with an anvil and sees the Roadrunner on the canyon floor with an angle of depression of 27.6° . If the Roadrunner is 143 ft from the base of the cliff, (a) what is the Roadrunner's angle of elevation to the Coyote, and (b) how high is the cliff?

20. A helicopter is hovering directly above a tree at the height of 56.4m . The pilot sees a hiker on the ground with an angle of depression of 17.2° . How far is the hiker from the tree?

21. Two buildings are on opposite sides of a boulevard. From a window 33 ft above ground in building #1, the angle of depression to the base of building #2 is 19.7° and the angle of elevation to the top of building #2 is 71.8° . How tall is building #2?