

*degrees

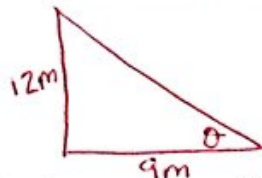
Name Key

Triangle Applications of Trigonometry Review

Use what you know about SOH-CAH-TO & Law of Sines, and Law of Cosines to solve each of the following. Round to the nearest tenth (one decimal place) unless otherwise indicated.

1. A 12 meter flagpole casts a 9 meter shadow. Determine the angle of elevation of the sun.

right Δ

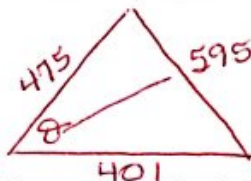


$$\tan \theta = \frac{12}{9}$$

$$\angle \theta = \tan^{-1}\left(\frac{12}{9}\right) = 53.13^\circ \sim 53.1^\circ$$

2. A triangular playground has sides of lengths 475 feet, 595 feet, and 401 feet. What is the measure of the largest angle between the sides, to the nearest tenth of a degree? *largest side opposite largest \angle

Law of Cosine



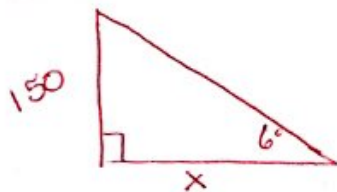
$$595^2 = 475^2 + 401^2 - 2(475)(401)\cos \theta$$

$$\cos \theta = .085$$

$$\theta = 85.12^\circ \sim 85.1^\circ$$

3. Max Power is walking to his office building which he knows is 150 feet high. The angle to the top of the building from his current location is 6° . How much further does he have to walk?

right Δ



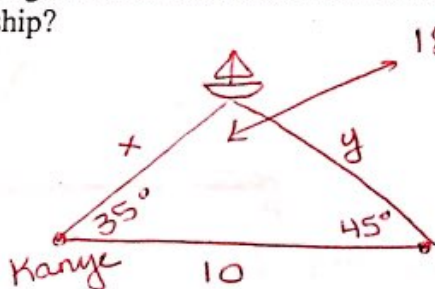
$$\tan 6^\circ = \frac{150}{x}$$

$$x = \frac{150}{\tan 6^\circ}$$

$$x = 1427.15 \text{ ft} \\ \sim 1427.2 \text{ ft}$$

4. Kanye and Kim are standing at the seashore 10 miles apart. The coastline is a straight line between them. Both can see the same ship in the water. The angle between the coastline and the line between the ship and Kanye is 35° . The angle between the coastline and the line between the ship and Kim is 45° . How far are Kanye and Kim from the ship?

Law of Sine



$$180 - 35 - 45 = 100^\circ$$

$$\frac{\sin 100}{10} = \frac{\sin 45}{x}$$

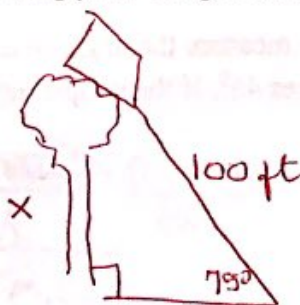
$$x = \frac{10 \sin 45}{\sin 100} = 7.18 \text{ mi} \\ \sim 7.2 \text{ mi}$$

$$\frac{\sin 35}{y} = \frac{\sin 100}{10}$$

$$y \sim 5.8 \text{ mi}$$

5. Suppose you're flying a kite and it gets caught at the top of a tree. You've let out all 100 feet of string for the kite, and the angle the string makes with the ground is 75° . Due to your inquisitive nature, you wonder, "How tall is that tree?" Using your vast precalculus know-how, determine the answer to that question.

right Δ

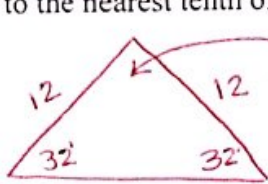


$$\sin 75 = \frac{x}{100}$$

$$100 \sin 75 = x$$

$$x = 96.6 \text{ ft}$$

6. An isosceles triangle has legs of length 12 inches and base angles that measure 32° each. Find the area of the triangle to the nearest tenth of a square inch.



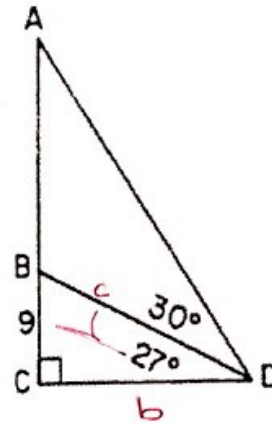
$$180 - 32 - 32 = 116^\circ$$

$$A = \frac{1}{2} (12)(12) \sin 116^\circ = 64.7 \text{ in}^2$$

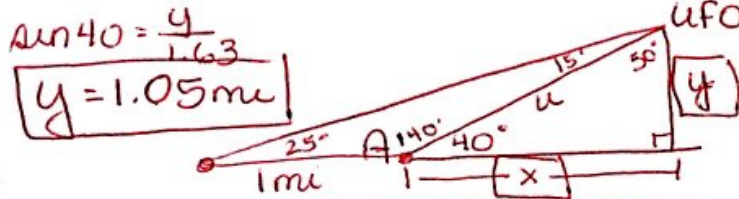
7. Using the accompanying diagram, determine the length of \overline{BD} .

$$\sin 27^\circ = \frac{9}{c}$$

$$c = \frac{9}{\sin 27^\circ} \approx 19.8$$



8. A person at point A looks due east and sees a UFO with an angle of elevation of 40° . At the same instant, another person, 1 mile due west of point A, looks due east and sights the same UFO with an angle of elevation of 25° . Determine the distance between point A and the UFO. How far is the UFO above the ground?



$$\sin 40^\circ = \frac{y}{1.63}$$

$$y = 1.05 \text{ mi}$$

$$\frac{\sin 25^\circ}{1} = \frac{\sin 25^\circ}{u}$$

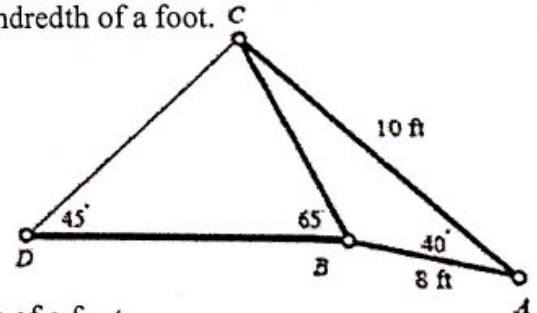
$$u = \frac{\sin 25^\circ}{\sin 15^\circ} \approx 1.63 \quad \cos 110^\circ = -0.34$$

$$x = 1.25 \text{ mi}$$

9. A crane is being created by four steel members (bold) and a cable, as shown in the diagram below.

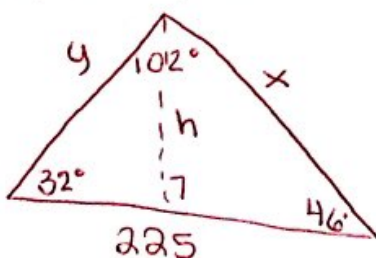
a. Determine the length of support member \overline{BC} to the nearest hundredth of a foot.

omit!



b. Determine the length of the cable \overline{CD} to the nearest hundredth of a foot.

10. An airplane flies directly overhead 2 people at the same time and they measure the angle of elevation. The airplane is between the two people. One angle is 32° and the other measures 46° . If the people are 225 feet apart, how high is the airplane?



$$\frac{\sin 102^\circ}{225} = \frac{\sin 32^\circ}{x}$$

$$x = 121.90 \text{ ft}$$

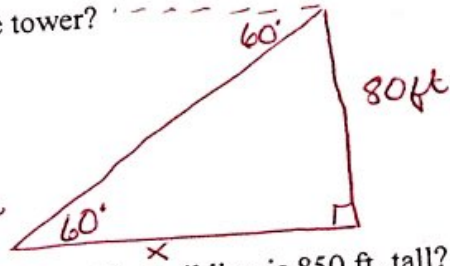
$$\frac{\sin 102^\circ}{225} = \frac{\sin 46^\circ}{y}$$

$$y = 165.47 \text{ ft}$$

$$\sin 46^\circ = \frac{h}{121.90} \Rightarrow h \approx 87.68 \text{ ft}$$

11. From the top of a tower, the angle of depression to a stake on the ground is 60° . The top of the tower is 80 feet above ground. How far is the stake from the foot of the tower?

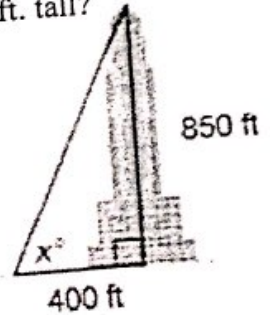
~~tan 60 =~~
 $\tan 60 = \frac{80}{x}$
 $x = 46.19 \text{ ft}$



12. Find the angle of elevation if you are standing 400 ft away and the building is 850 ft. tall?

$$\tan x = \frac{850}{400}$$

$$x = \tan^{-1}\left(\frac{850}{400}\right) \sim 64.80^\circ$$

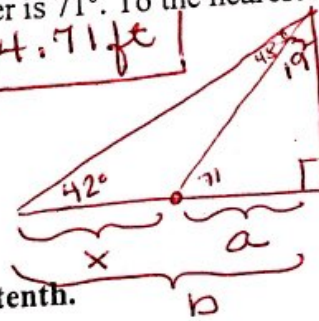


13. You are a block away from a skyscraper that is 750 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42° . The angle of elevation from your friend's position to the top of the skyscraper is 71° . To the nearest foot, how far are you from your friend?

$$x = b - a \sim 574.71 \text{ ft}$$

$$\tan 42 = \frac{750}{b}$$

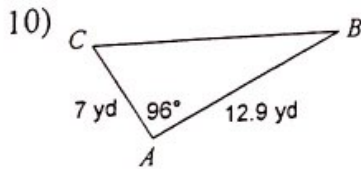
$$b \sim 832.96 \text{ ft}$$



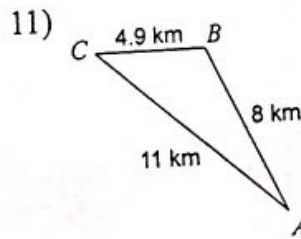
$$\tan 71 = \frac{750}{a}$$

$$a = 25.825$$

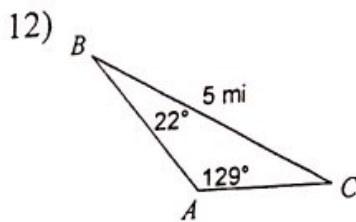
Find the area of each triangle to the nearest tenth.



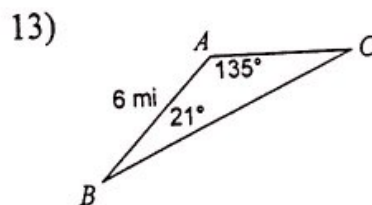
$$A = 44.9 \text{ yd}^2$$



$$A = 17.8 \text{ m}^2$$



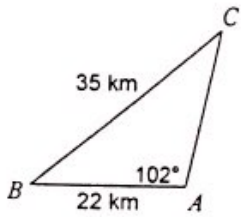
$$A = 2.9 \text{ m}^2$$



$$A = 11.2 \text{ m}^2$$

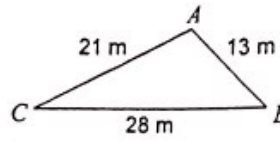
Solve each triangle. Round your answers to the nearest tenth.

1)



$\angle A = 102^\circ$ $a = 35 \text{ km}$
 $\angle B = 40.1^\circ$ $b = 23 \text{ km}$
 $\angle C = 37.9^\circ$ $c = 22 \text{ km}$

2)



$\angle A = 108.6^\circ$ $a = 28 \text{ m}$
 $\angle B = 45.3^\circ$ $b = 21 \text{ m}$
 $\angle C = 26.1^\circ$ $c = 13 \text{ m}$

3) $m\angle A = 83^\circ$, $c = 21 \text{ km}$, $a = 7 \text{ km}$

no Δ

4) $m\angle B = 64^\circ$, $a = 23 \text{ yd}$, $b = 22 \text{ yd}$ 2Δ

$\angle A = 70^\circ$	$a = 23$	}	$\angle A = 110^\circ$	$a = 23$
$\angle B = 64^\circ$	$b = 22$		$\angle B = 64^\circ$	$b = 22$
$\angle C = 46^\circ$	$c = 17.6$		$\angle C = 6^\circ$	$c = 2.6$

5) $b = 20 \text{ mi}$, $a = 10 \text{ mi}$, $m\angle C = 133^\circ$

$\angle A = 15.3^\circ$ $a = 10$
 $\angle B = 31.7^\circ$ $b = 20$
 $\angle C = 133^\circ$ $c = 27.8$

State the number of possible triangles that can be formed using the given measurements.

6) $m\angle C = 38^\circ$, $b = 31 \text{ in}$, $c = 24 \text{ in}$

2Δ

7) $m\angle C = 36^\circ$, $b = 28 \text{ mi}$, $c = 23 \text{ mi}$

2Δ

8) $m\angle C = 52^\circ$, $c = 15 \text{ km}$, $b = 13 \text{ km}$

1Δ

9) $m\angle A = 33^\circ$, $c = 24 \text{ ft}$, $a = 13 \text{ ft}$

none