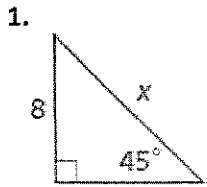
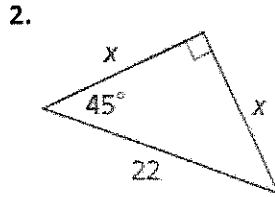


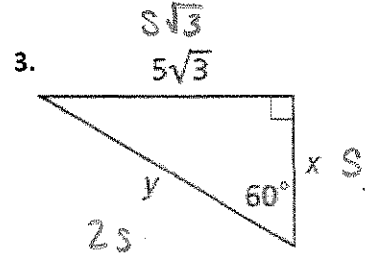
Find the missing variable in each triangle.



$8 = l$
 $x = l\sqrt{2}$
 $x = 8\sqrt{2}$

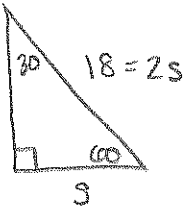


$l\sqrt{2} = 22$
 $\frac{l}{\sqrt{2}} = \frac{22}{\sqrt{2}}$
 $l = \frac{22 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{22\sqrt{2}}{2} = 11\sqrt{2}$
 $x = 11\sqrt{2}$



$s\sqrt{3} = 5\sqrt{3}$
 $s = 5$
 $x = 5$
 $y = 10$

4. Given a 30-60-90 Triangle, if the length of the hypotenuse is 18, find the area of the entire triangle.

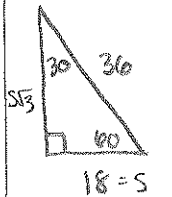


$A = \frac{1}{2}bh$
 $A = \frac{1}{2}(9)(9\sqrt{3})$
 $A = \frac{81\sqrt{3}}{2} \text{ units}^2$

$2s = 18$
 $\frac{2s}{2} = \frac{18}{2}$
 $s = 9$
 $s\sqrt{3} = 9\sqrt{3}$

70/11

5. Given a 30-60-90 Triangle, if the length of the side length across from the 30° angle is 18 inches, find the area of the entire triangle.

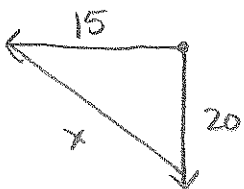


$A = \frac{1}{2}(18)(18\sqrt{3})$
 $A = 162\sqrt{3} \text{ in}^2$

$s\sqrt{3} = 18\sqrt{3}$

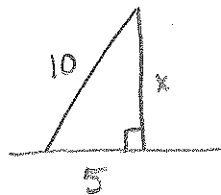
280.6 in²

6. You and a friend start at the same point. You walk west 15 miles and your friend walks south 20 miles. How far apart are you?



$15^2 + 20^2 = c^2$
 $\sqrt{625} + \sqrt{400}$
 $25 = c$

7. A 10 ft ladder is up against a wall. The base of the ladder is 5 feet away from the wall. How high up on the wall is the ladder?



$x^2 + 5^2 = 10^2$
 $x^2 + 25 = 100$
 $\sqrt{x^2} = \sqrt{75}$

$x = 8.66 \text{ feet}$

8. A nearby college is installing a walkway through the middle of a patch of grass so that students will not have to walk so far to get to class. How much farther (to the nearest foot) is it for students to walk around from point A to point B than it is to walk on the new walkway?

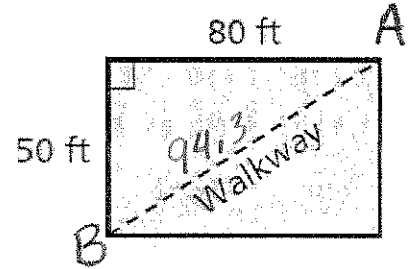
$$80^2 + 50^2 = c^2$$

$$6400 + 2500 = c^2$$

$$8900 = c^2$$

$$94.3 = c$$

$$\begin{array}{r} 130 \\ -94.3 \\ \hline 35.7 \approx 36 \text{ feet} \end{array}$$



9. Given the triangle with vertices $A(2,0), B(2,-5), C(1,-5)$, find all side lengths and angle measures.

$$AB = 5$$

$$BC = 1$$

$$AC = 5.1$$

$$m\angle B = 90^\circ$$

$$m\angle A = 11^\circ$$

$$m\angle C = 79^\circ$$

$$5^2 + 1^2 = c^2$$

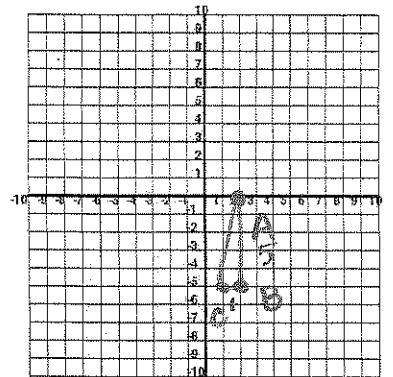
$$26 = c^2$$

$$5.1 = c$$

To find $m\angle A$

$$\tan^{-1}\left(\frac{1}{5}\right) = 11^\circ$$

$$m\angle C = 90 - 11 = 79^\circ$$



10. You and a friend just bought walkie-talkies with 6-mile range. If you are standing at the point $(3, 2)$ and your friend is at the point $(-1, -2)$, will you be able to hear each other? Show work to defend your answer.

$$4^2 + 4^2 = c^2$$

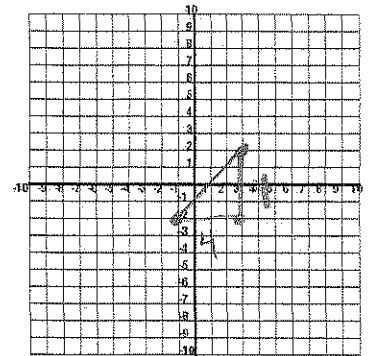
$$16 + 16 = c^2$$

$$32 = c^2$$

$$\sqrt{32} = \sqrt{c}$$

$$5.7 = c$$

Yes, because he is only 5.7 miles away.



Use the given trigonometric ratio to determine which angle of the triangle is "Angle A".

11. $\tan A = \frac{5}{12} = .42$

12. $\cos A = \frac{12}{13} = .92$

13. $\sin A = \frac{5}{13} = .38$

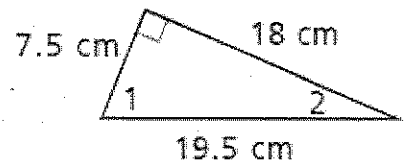
$$\tan L2 = \frac{7.5}{18} = .42$$

$$\cos L2 = \frac{18}{19.5} = .92 \quad \sin L2 = \frac{7.5}{19.5} = .38$$

$$L2 = A$$

$$L2 = A$$

$$L2 = A$$

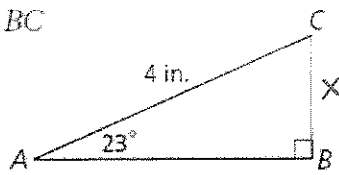


$$\frac{7.5}{19.5} = .38 \quad \frac{18}{19.5} = .92$$

$$\frac{7.5}{18} = .42$$

14. Find the length of BC.

BC



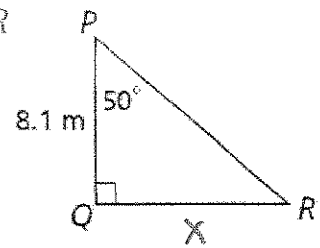
$$\sin 23 = \frac{X}{4}$$

$$4(\sin 23) = X$$

$$\boxed{1.56 \text{ in} = X}$$

15. Find the length of QR.

QR



$$\tan 50 = \frac{X}{8.1}$$

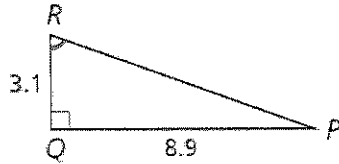
$$8.1(\tan 50) = X$$

$$\boxed{9.65 \text{ m} = X}$$

16. Find the measure of angle R and angle P.

mLR

$$\tan^{-1}\left(\frac{8.9}{3.1}\right) = \boxed{71.8^\circ}$$

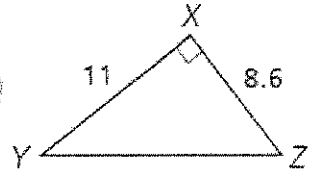


$$m\angle P = 90 - 71.8 = \boxed{18.2^\circ}$$

17. Find the measure of angle Y and angle Z.

mLY

$$\tan^{-1}\left(\frac{8.6}{11}\right) = \boxed{38^\circ}$$



$$m\angle Z = 90 - 38 = \boxed{52^\circ}$$

18. Joe is trying to find the height of a flagpole. The distance from the ground to his eyes is 6 feet and the distance from Joe to the flagpole is 10 feet. The angle formed from his horizontal line of sight to the top of the flagpole is 56.31°. Find the height of the flagpole.

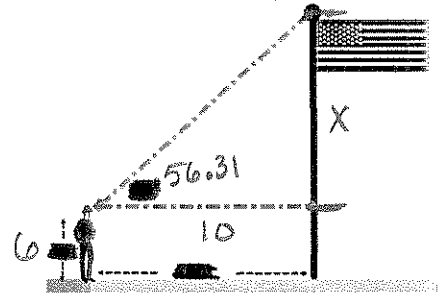
$$\tan 56.31 = \frac{X}{10}$$

$$\text{So, } 15 + 6 = 21$$

$$10 \cdot \tan 56.31 = X$$

$$15 = X$$

$$\boxed{21 \text{ feet}}$$



19. A telephone pole is supported by steel cables as shown in the figure. If the phone company were planning on installing another cable on the other side 17 feet from the pole, how much total steel cable is used for both of the steel cables combined?

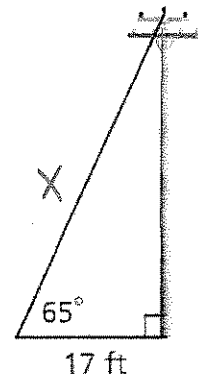
$$\cos 65 = \frac{17}{X}$$

$$X = \frac{17}{\cos 65}$$

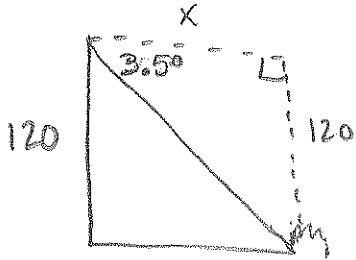
$$X = 40.22$$

To find the total for both wires...

$$(40.22)(2) = \boxed{80.5 \text{ feet}}$$



20. A forest ranger in a 120 foot observation tower sees a fire. The angle of depression to the fire is 3.5° . What is the horizontal distance between the tower and the fire? round to the nearest foot.



$$\tan 3.5 = \frac{120}{X}$$

$$X = \frac{120}{\tan 3.5}$$

$$X = 1,962 \text{ feet}$$

21. A ramp is leaned on a porch that is 1.5 feet off the ground. If the angle a ramp makes with the ground is 14.5° , find the length of the ramp.

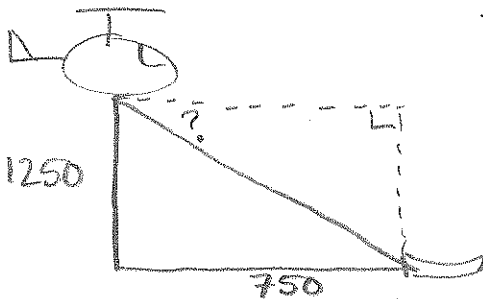


$$\sin 14.5 = \frac{1.5}{X}$$

$$X = \frac{1.5}{\sin 14.5}$$

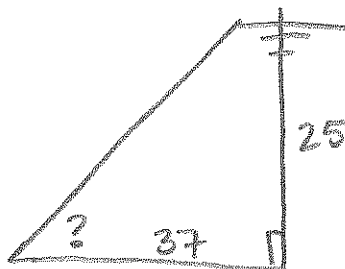
$$X = 6 \text{ feet}$$

22. The pilot of a rescue helicopter is flying over the ocean at an altitude of 1250 feet. The pilot sees a life raft about 750 feet away (Horizontal distance). What is the angle of depression from the helicopter to the life raft to the nearest degree?



$$\tan^{-1}\left(\frac{1250}{750}\right) = 59^\circ$$

23. A 25 foot tall light pole casts a shadow on the ground that is 37 feet long. What is the angle of elevation from the end of the shadow to the top of the light pole?



$$\tan^{-1}\left(\frac{25}{37}\right) = 34^\circ$$

24. Using triangle HJK, find all of the missing side lengths and angles.

To find HJ, use Pythagorean Thm

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

$$7^2 + 10.5^2 = c^2$$

$$49 + 110.25 = c^2$$

$$\sqrt{159.25} = \sqrt{c^2}$$

$$12.6 = c = HJ$$

$$m\angle H = \tan^{-1}\left(\frac{10.5}{7}\right)$$

$$m\angle H = 56^\circ$$

$$m\angle J = 90 - 56 = 34^\circ$$

