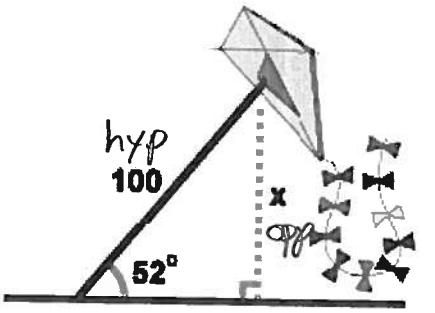
Name_____

Chapter 8 Worksheet

Find all values to the nearest tenth.



1. Jimmy flies a kite with a 100 foot string. The angle of elevation of the string is 52 °. Jimmy writes the equation ~~cos~~ sin $(52°) = (x/100)$. How high off the ground is the kite?

$X = 100 \sin 52°$

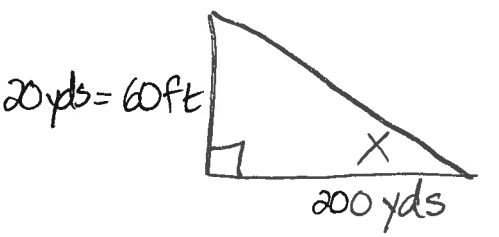
78.8 ft

2. Kaitlyn is flying an airplane that takes off 200 yards in front of a 60 foot building. Using the equation $\tan(x) = \frac{60}{200}$ Kaitlyn calculates her angle of ascent. The plane stalls if she climbs at an angle of over 10°. Will Kaitlyn survive this experience? Explain in detail. (Assume that the airplane flies in a straight line and the angle of elevation remains constant until the airplane flies over the building.)

$\tan x = \frac{20}{200}$

$\tan^{-1}\left(\frac{20}{200}\right) = 5.7$

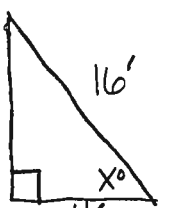
She's good



3. Grace owns a construction company. According to OSHA,
Non-self-supporting ladders, which must lean against a wall or other support, are to be positioned at such an angle that the horizontal distance from the top support to the foot of the ladder is about 1/4 the working length of the ladder.
Draw a picture for Grace's workers and calculate the optimal angle of elevation for a ladder.

$\cos x = \frac{4}{16}$

$\cos^{-1}\left(\frac{1}{4}\right) = 75.5°$



Grace's workers usually use twenty foot ladders. How far must they place the ladder from the base of the building to be at the optimal angle of elevation?

$\frac{1}{4}(20) = 5$

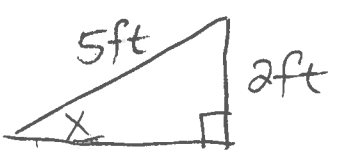
$\cos 75.5° = \frac{x}{20}$

$x = 20 \cos 75.5 =$ 5ft

4. A ramp is needed to allow vehicles to climb a 2 foot wall. The angle of elevation in order for the vehicles to safely go up must be 30 ° or less, and the longest ramp available is 5 feet long. Can this ramp be used safely?

$\sin x = \frac{2}{5}$

$\sin^{-1}\left(\frac{2}{5}\right) = 23.6°$ ☺ yes, it's less than 30°

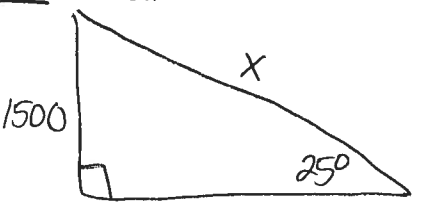


5. Hunter is going snowboarding. He rode the ski lift to the top of the mountain, which is at an altitude of 1500 feet. The angle of elevation from the bottom to the top of the mountain is 25°. What is the length of the Hunter's run (his trip down the hill)? Round your answer to the nearest tenth of a foot.

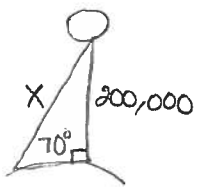
$\frac{\sin 25^\circ}{1} = \frac{1500}{x}$

$x \sin 25^\circ = 1500$

$x = \frac{1500}{\sin 25^\circ} =$ **3549.3 ft**



6. David is going to the moon. To get there, he has to travel at a 70 degree angle of elevation. If the moon was straight above the earth, it would be 200,000 miles away (in other words, the vertical distance from the earth to the moon is 200,000 miles). Find the distance that David travels to get to the moon. Round to the nearest tenth.



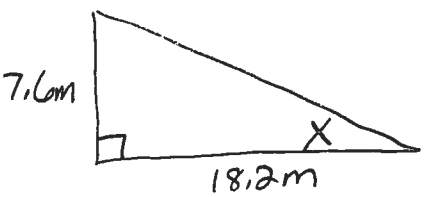
$\sin 70^\circ = \frac{200{,}000}{x}$

$x = \frac{200{,}000}{\sin 70^\circ} =$ **212,835.6 miles**

7. Find the angle of elevation of the sun when a 7.6-meter flagpole casts a 18.2-meter shadow. Round to the nearest tenth of a degree.

$\tan x = \frac{7.6}{18.2}$

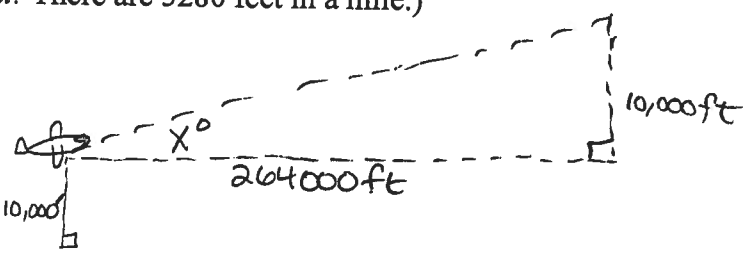
$x = 22.7^\circ$



8. A pilot is flying at 10,000 feet (Altitude) and wants to take the plane up to 20,000 feet over the next 50 miles (horizontal). What should be his angle of elevation to the nearest tenth? (*Hint:* There are 5280 feet in a mile.)

$\tan x = \frac{10{,}000}{264{,}000}$

$\tan^{-1}\left(\frac{10}{264}\right) =$ **2.2°**



9. $m\angle A = 14x - 3$, $m\angle B = 3x - 14$, $m\angle C = 32 - 2x$
List the sides of triangle ABC in order from shortest to longest.

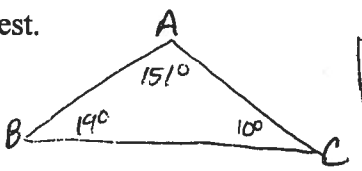
$14x - 3 + 3x - 14 + 32 - 2x = 180$

$15x + 15 = 180$

$15x = 165$

$x = 11$

$m\angle A = 151^\circ$
$m\angle B = 19^\circ$
$m\angle C = 10^\circ$



$\overline{AB}, \overline{AC}, \overline{BC}$

10. $m\angle A = 11x - 4$, $m\angle B = 4x - 11$, $m\angle C = 63 - 4x$
List the sides of triangle ABC in order from longest to shortest.

$11x - 4 + 4x - 11 + 63 - 4x = 180$

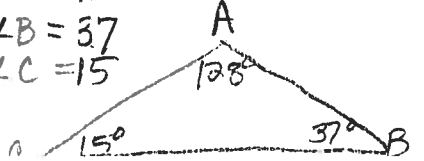
$11x + 48 = 180$

$11x = 132$

$x = 12$

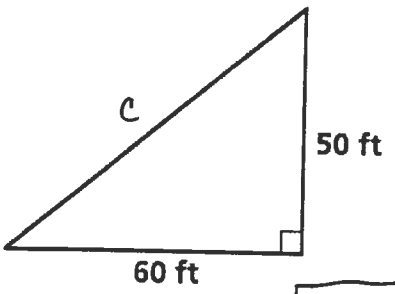
$m\angle A = 128$
$m\angle B = 37$
$m\angle C = 15$

$\overline{BC}, \overline{AC}, \overline{AB}$



Solve for the missing side. Leave answer in simplified radical form.

11.



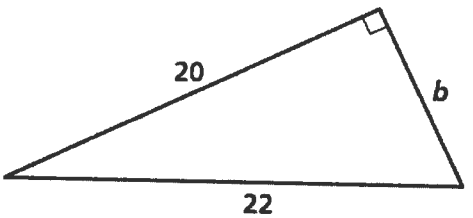
$60^2+50^2=c^2$

$6100=c^2$

$c=\sqrt{6100}=\sqrt{100}\cdot\sqrt{61}$

$C=10\sqrt{61}$

12.



$20^2+b^2=22^2$

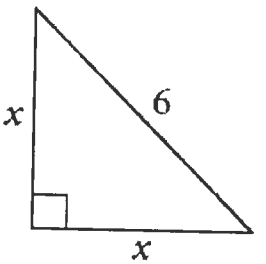
$400+b^2=484$

$b^2=84$

$b=\sqrt{84}=\sqrt{4}\cdot\sqrt{21}$

$b=2\sqrt{21}$

13.



$x^2+x^2=6$

$2x^2=6$

$x^2=3$

$x=\sqrt{3}$

14. Write an inequality for x that must be true for these values to be the sides of a triangle. (4x – 5 is the longest side.)

x + 3, 2x + 4, 4x – 5

$(x+3)+(2x+4)>4x-5$

$3x+7>4x-5$

$7>x-5$

$12>x$

$x<12$

15. Write an inequality for x that must be true for these values to be the sides of a triangle. (5x is the longest side.)

x, 3x, 5x

$x+3x>5x$

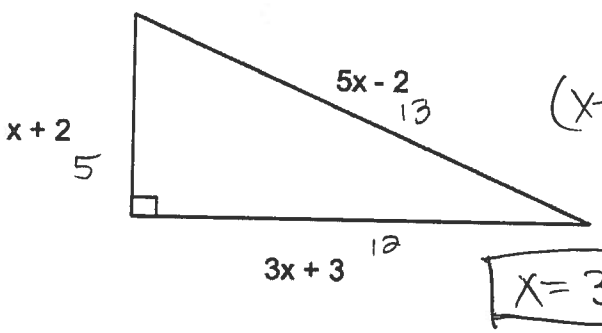
$4x>5x$

$0>x$

$x<0$

Makes No sense!

16. Solve for x in the right triangle.



$(x+2)^2+(3x+3)^2=(5x-2)^2$

$x^2+4x+4+9x^2+18x+9=25x^2-20x+4$

$10x^2+22x+13=25x^2-20x+4$

$0=15x^2-42x-9$

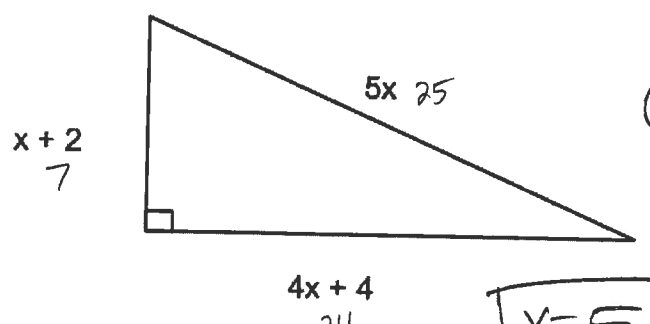
$=3(5x^2-14x-3)$

$3(5x+1)(x-3)$

$x=-\frac{1}{5}$ or 3

$x=3$

17. Solve for x in the right triangle.



$(x+2)^2+(4x+4)^2=(5x)^2$

$x^2+4x+4+16x^2+32x+16=25x^2$

$17x^2+36x+20=25x^2$

$0=8x^2-36x+20$

$=4(2x^2-9x+5)$

$=4(2x+1)(x-5)$

$x=-\frac{1}{2}, 5$

$x=5$