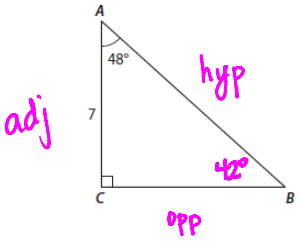
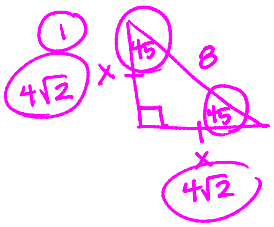
# 12.7 HW Pg. 457 #1-11

1. Solve an isosceles right triangle with a hypotenuse of 8 inches.
2. Solve $\triangle ABC$ for $AB$, $BC$, and $\angle B$.




adj hyp opp




$s\sqrt{2} = 8$

$s = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$s = 4\sqrt{2}$

2) $m\angle B = 42°$

$\tan 48 = \frac{BC}{7}$

$BC = 7 \cdot \tan 48$

$BC \approx 7.8$

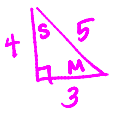
$\cos 48 = \frac{7}{AB}$

$AB \cdot \cos 48 = 7$

$AB = 7/\cos 48$

$AB \approx 10.5$

3. What are the acute angle measures of a 3-4-5 right triangle? (Round your answers to the nearest degree.)



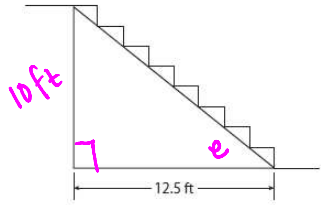

$\sin(S) = \frac{3}{5}$

$\angle S = \sin^{-1}(3/5)$

$\angle S \approx 37°$

$\angle M = 90 - 37$ so $\angle M \approx 53°$

4. A staircase, which takes up 12.5 feet of horizontal floor space, connects two floors that are 10 feet apart. What is the angle of elevation of the staircase?

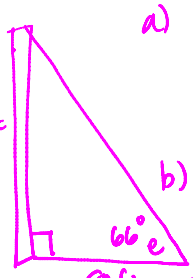



$\tan(e) = \frac{10}{12.5}$

$e = \tan^{-1}\left(\frac{10}{12.5}\right)$

$e \approx 39°$

5. One end of a cable is attached to the top of a tower, 180 feet above the ground. The other end of the cable is secured to the ground at a point 80 feet from the base of the tower.
   a. Assume that the cable is stretched tight. About what angle does the cable make with the ground?
   b. About what angle does the cable make with the tower?
   c. How long is the cable?




a) $\tan(e) = \frac{180}{80}$

$e = \tan^{-1}(9/4)$

$e \approx 66°$

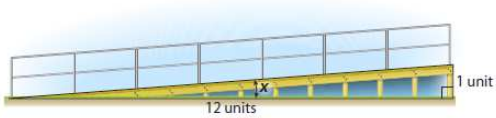
b) $90 - 66 = 24°$

c) $80^2 + 180^2 = c^2$

$38800 = c^2$

$c \approx 197$ feet

6. The Americans with Disabilities Act (ADA) of 1990 states that the slope of any ramp must be no greater than 1 : 12.




What is the maximum angle of elevation $x$ for a ramp that meets these specifications?

$\tan x = 1/12$

$x = \tan^{-1}(1/12)$

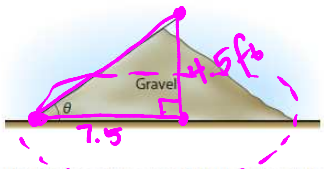
$x \approx 4.8°$

7. Which information would *not* be enough to solve a right triangle?
   A. the length of the hypotenuse and the length of a leg ✓
   B. the length of a leg and the measure of one acute angle ✓
   C. the measure of two acute angles ✗
   D. the length of the hypotenuse and the measure of one acute angle ✓

8. When a truck full of gravel is dumped on a flat surface such as a parking lot, it forms a pile similar to that shown in the figure below. The angle that the gravel makes with the surface is called the *angle of repose*, and it is denoted by the symbol theta, $\theta$. Note that if more gravel is dumped on the pile, the pile just spreads out

$\tan\theta = \frac{4.5}{7.5}$

a parking lot, it forms a pile similar to that shown in the figure below. The angle that the gravel makes with the surface is called the *angle of repose*, and it is denoted by the symbol theta, $\theta$. Note that if more gravel is dumped on the pile, the pile just spreads out and the angle of repose does not change.



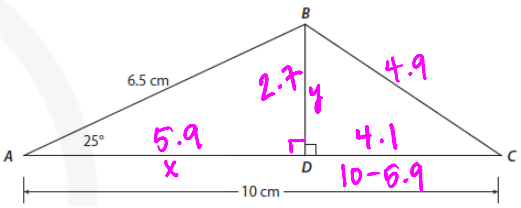

Find the angle of repose for gravel if the pile on the flat surface is 4.5 feet high and 15 feet in diameter. → radius = 7.5

$\tan\theta = \frac{4.5}{7.5}$

$\theta = \tan^{-1}\left(\frac{4.5}{7.5}\right)$

$\theta \approx 31°$

**9.** In order to drill holes at *A*, *B*, *C*, and *D*, the distances *AD*, *BD*, and *BC* must be determined. Find these distances to the nearest tenth.




$\cos 25 = \frac{AD}{6.5}$

$AD = 6.5\cos 25$

$AD \approx 5.9$ cm

$\sin 25 = \frac{BD}{6.5}$

$BD = 6.5\sin 25$

$BD \approx 2.7$ cm

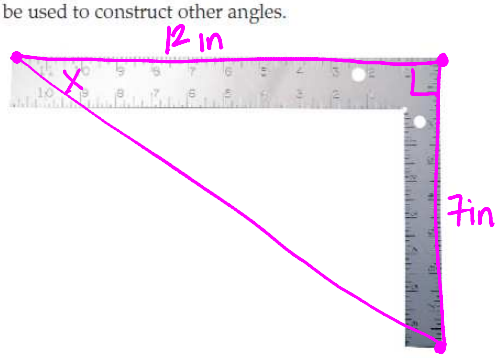
$(2.7)^2 + (4.1)^2 = (BC)^2$

$7.29 + 16.81 = (BC)^2$

$24.1 = (BC)^2$

$BC \approx 4.9$ cm

**10.** A carpenter's square is a tool used by people to mark off right angles. It is more than an L-shaped metal ruler. With skill it can also be used to construct other angles.



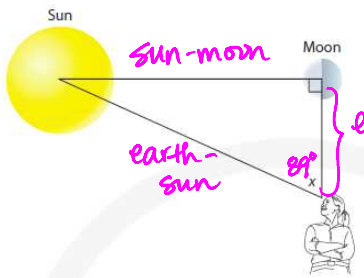

$\tan(x) = \frac{7}{12}$

$x = \tan^{-1}\left(\frac{7}{12}\right)$

$x \approx 30.3°$

For example, suppose a carpenter draws a line along one side of the square and places a mark at 12 inches. A second mark is placed at 7 inches along the other side of the square. Then the two marks are connected to form angle *x*, opposite the 7-inch side. What is the measure of this angle?

**11.** By observing the sun and a half-full moon when they are both visible at the same time and estimating the measure of the angle *x* between them, you can calculate the ratio of the earth-moon distance to the earth-sun distance.




sun-moon

earth-moon 239,000 mi

earth-sun

89°

**a.** Suppose you estimate the angle to be 89 degrees. What is the ratio of the earth-moon distance to the earth-sun distance?

**b.** The distance from the earth to the moon is about 239,000 miles. Use your ratio from Part (a) to find the distance from the earth to the sun.

a) $\frac{\text{earth-moon}}{\text{earth sun}} = \cos(89)$

$\cos(89) \approx .017452\ldots$

ratio of the earth-moon distance to the earth-sun distance.

**b.** The distance from the earth to the moon is about 239,000 miles. Use your ratio from Part (a) to find the distance from the earth to the sun.

$\cos(89) \approx .017452\ldots$

b) $\cos(89) = \frac{239{,}000}{\text{earth sun}}$

$\text{earth sun} \cdot \frac{\cos(89)}{\cos(89)} = \frac{239{,}000}{\cos(89)}$

$\text{earth sun} = \frac{239{,}000}{\cos(89)}$

distance from earth sun $\approx$ 13,694,387 miles for an $\angle$ of 89°.

Woah! ☺