Chapter 12: Indirect Measurement

Solve for x:

1.

60 $14 = 2s$
7 s
30
x
$s\sqrt{3}$
$\boxed{7\sqrt{3}}$

2.

45 $6 = s\sqrt{2}$
s
45
x
s

$s\sqrt{2} = 6$
$s = \frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
$s = 3\sqrt{2}$
$\therefore \boxed{x = 3\sqrt{2}}$

3.

15 (5)
(3) 9
$\boxed{x = 12}$
$(4) \times 3$

4.

60 $x = 2s$
s
30
$6\sqrt{2} = s\sqrt{3}$

$s\sqrt{3} = 6\sqrt{2}$
$s = \frac{6\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$
$s = 2\sqrt{6}$
$\therefore x = 2 \cdot 2\sqrt{6}$
$\boxed{x = 4\sqrt{6}}$

5.

62 x hyp
15 opp

$\sin 62 = \frac{15}{x}$
$x \cdot \sin 62 = 15$
$x = \frac{15}{\sin 62}$
$\boxed{x \approx 16.99}$

6.

x 10 hyp
adj 9

$\cos x = \frac{9}{10}$
$x = \cos^{-1}(9/10)$
$\boxed{x \approx 25.84°}$
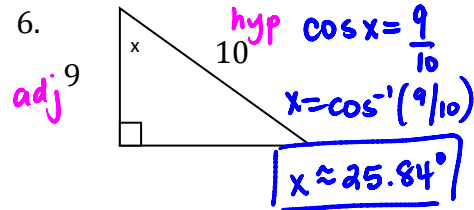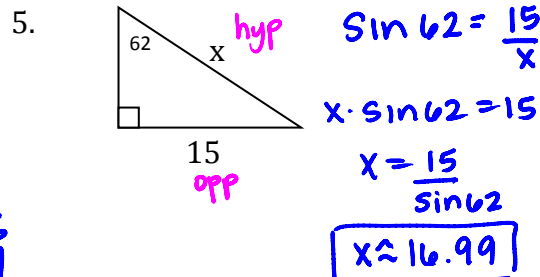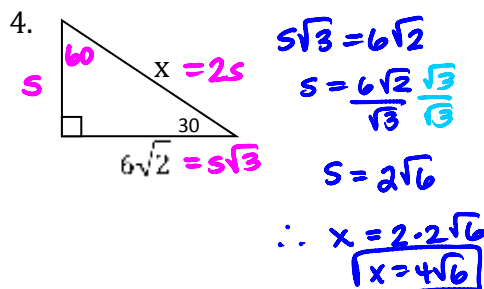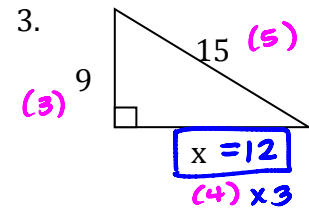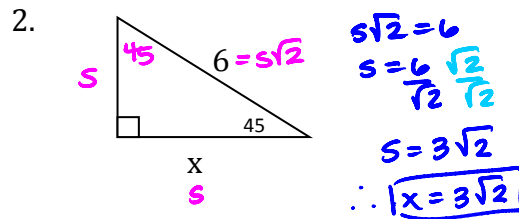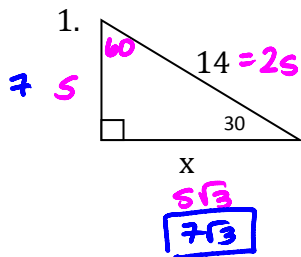
7. Sweet little Savannah decided to brave the deep end at the swimming pool, but she wanted her mommy to catch her! Savannah is 3 feet tall and was looking down at her mom at an angle of depression of 40°. How far away is she from her mom?
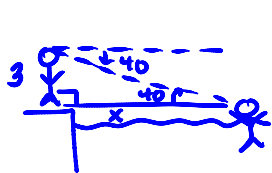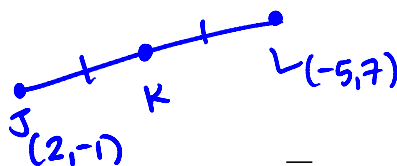
$\tan 40 = \frac{3}{x}$
$x \cdot \tan 40 = 3$
$x = \frac{3}{\tan 40}$ so $\boxed{x \approx 3.58 \text{ feet away}}$

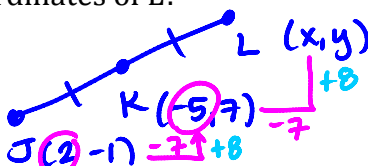**8.** K is the midpoint of $\overline{JL}$. J has coordinates (2, -1), and L has coordinates (-5, 7). What are the coordinates of K?

$L(-5,7)$
K
$J(2,-1)$

$K = \left(\frac{2 + -5}{2}, \frac{-1 + 7}{2}\right)$
$\boxed{K = (-3/2, 3)}$

9. K is the midpoint of $\overline{JL}$. J has coordinates (2, -1), and K has coordinates (-5, 7). What are the coordinates of L?

$L (x,y)$
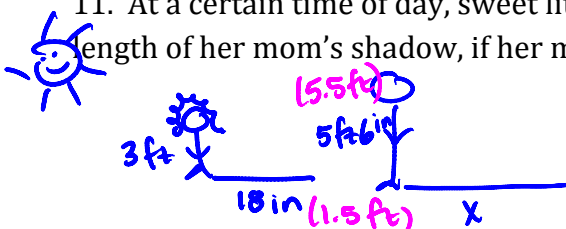$K(-5,7)$ $+8$ -7
$J(2,-1)$ -7 $+8$

$\boxed{(-12, 15)}$

10. Find the distance between J and L if J has coordinates (2, -1) and K has coordinates (-5, 7).

$D = \sqrt{(2 + (-5))^2 + (-1 + 7)^2}$
$= \sqrt{49 + 64}$
$= \sqrt{113}$
$\boxed{\sqrt{113}}$

11. At a certain time of day, sweet little Savannah who is 3 feet tall casts an 18 inch shadow. What is the length of her mom's shadow, if her mom is 5 feet 6 inches tall?

$(5.5 ft)$
$5 ft 6 in$
$3 ft$
$18 in (1.5 ft)$ x

$\frac{\text{height}}{\text{shadow}}$ $\frac{3}{1.5} = \frac{5.5}{x}$

$3x = 8.25$
$\boxed{x = 2.75 ft}$
or $\boxed{2 ft\ 9 in}$

12. Explain why the triangles are similar. Then find DE.

$\triangle CGD \sim \triangle CFE$ Reflexive Prop. by AA~
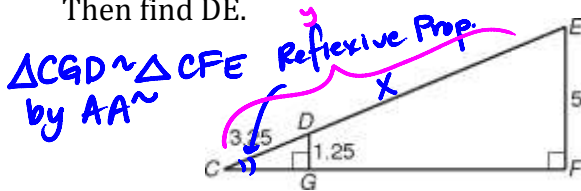
$$\text{base } \frac{1.25}{3.25} = \frac{5}{3.25+x}$$

so $1.25(3.25+x) = 5(3.25)$ OR $\frac{1.25}{3.25} = \frac{5}{y}$
$4.0625+1.25x = 16.25$
$1.25x = 12.1875$
$x = 9.75$
so $\boxed{DE = 9.75}$

$1.25y = 16.25$
$y = 13$
So DE = 13 - 3.25
$\boxed{DE = 9.75}$

13. The triangles are similar for the same reason as 12. Find DE.

ok to use "short cut"
$$\frac{3.25}{1.25} = \frac{x}{5}$$
$1.25x = 16.25$
$x = 13$ so $\boxed{DE = 13}$

Chapter 13: Indirect Measurement

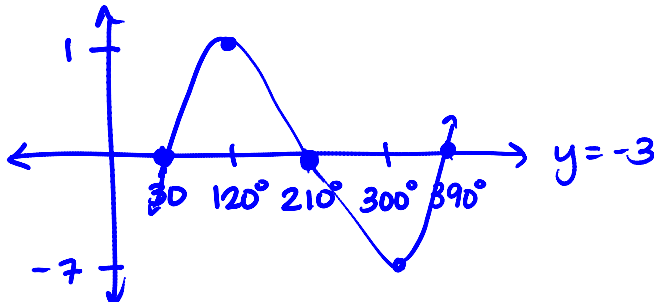14. When will the cos x = ½ if 0° ≤ x ≤ 360°?
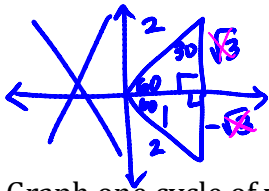
$60°, 360° - 60° = 300°$
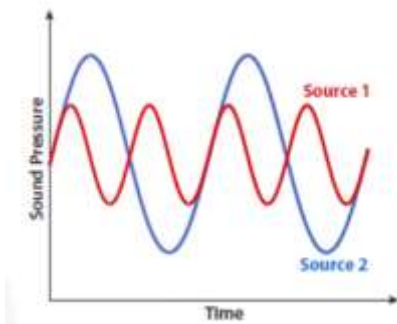
$\boxed{60°, 300°}$

15. Graph one cycle of y = 4sin(x – 30) – 3

$y = -3$

16. Graph one cycle of y = -3cos(x+50) + 2

$y = 2$
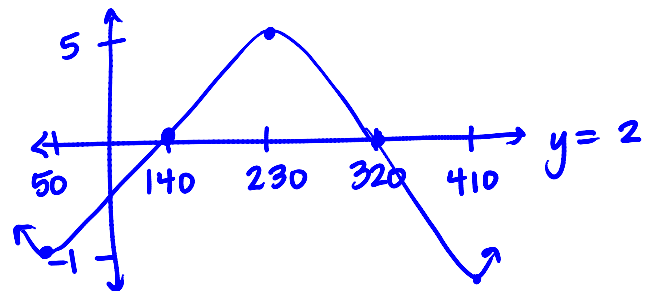
17. When using a CBL with a microphone, the data below was collected.

a) Which source was not as loud as the other? How do you know?

Source 1, blc the amplitude is smaller

b) Which source had the lower pitch? How do you know?

Source 2, blc it has fewer cycles (less frequency) than Source 1.

18. A group wanted to use a bottle to produce a tone with a frequency of 300 Hz. They collected data using a CBL and microphone, and used the TRACE feature on a calculator to find the two sets of coordinates shown below. Should they add or remove water to get closer to the desired frequency?
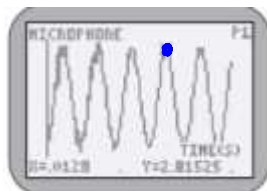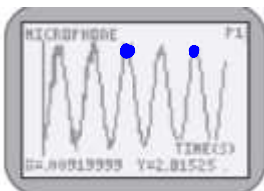
★ .0128 – .0092 = .0036 ← period = time it takes to complete 1 cycle

★ $\frac{1}{.0036} \approx 277.77$ Hz They should add water to get closer to the desired frequency