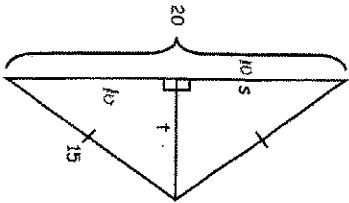DATE DUE : _____   Name : _Key_   Period : _____

Chapter 9 sec 1-2 Review

1. Find s and t. Express answers in reduced radical form.
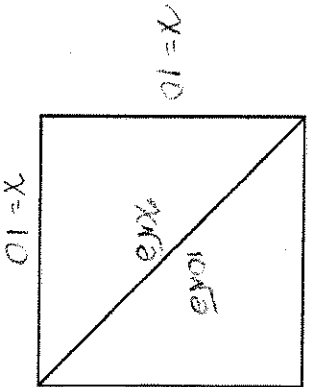Show all work.

s = $\underline{10}$

t = $\underline{5\sqrt{5}}$

$t^2 + 10^2 = 15^2$

$(9,100) = 225$

$t^2 = 125$

$t = \sqrt{125}$

$t = 5\sqrt{5}$

2. The length of a diagonal of a square is $10\sqrt{2}$ inches. Find the length of the sides and the perimeter of the square. Label the picture. Show all work.
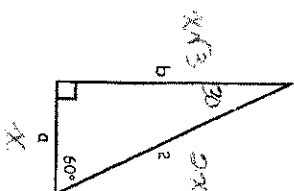
Side Length = $\underline{10\ in}$

Perimeter = $\underline{40\ in}$

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3. Find a and b. Show all work.

a = $\underline{\sqrt{3}}$

b = $\underline{\sqrt{3}}$

4. The perimeter of the square is 60mm. Find k, m and n. Show all work.

k = $\underline{15}$

m = $\underline{15}$

n = $\underline{15\sqrt{2}}$

$60 \div 4 = 15$
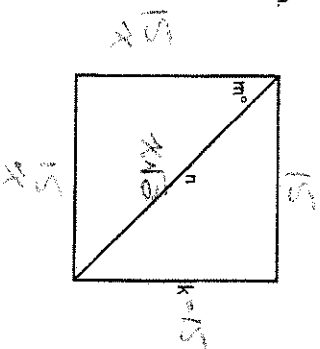
5. Find r and s. Show all work.

r = $\underline{\frac{9}{2}}$

s = $\underline{\frac{9\sqrt{3}}{2}}$
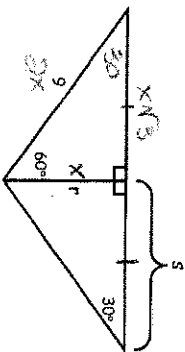
6. What is a Pythagorean Triple? Include an example.

A set of positive integers that satisfy the equation $c^2 = a^2 + b^2$

$(3,4,5)$ $(6,8,10)$

How can you determine if a set of numbers is a Pythagorean Triple?

Use $c^2 = a^2 + b^2$ where c is the largest number. If c^2 is equal to a^2+b^2 then it is a triple

For #7-12, determine whether the given sets of numbers represent a Pythagorean Triple. Justify your answer.

7. 10, 6, 8   (Yes)/No
$10^2 = 6^2 + 8^2$
$100 = 36 + 64$
$100 = 100$ ✓

8. 5, 9, 5   Yes/(No)
$9^2 = 5^2 + 5^2$
$81 = 25 + 25$
$81 \neq 50$ X

9. 21, 72, 75   (Yes)/No
$75^2 = 21^2 + 72^2$
$5625 = 441 + 5184$
$5625 = 5625$ ✓

10. 8, 14, 17   Yes/(No)
$17^2 = 8^2 + 14^2$
$289 = 64 + 196$
$289 \neq 260$ X

11. 12, 20, 16   (Yes)/No
$20^2 = 12^2 + 16^2$
$400 = 144 + 256$
$400 = 400$ ✓

12. 12, 9, 15   (Yes)/No
$15^2 = 12^2 + 9^2$
$225 = 144 + 81$
$225 = 225$ ✓
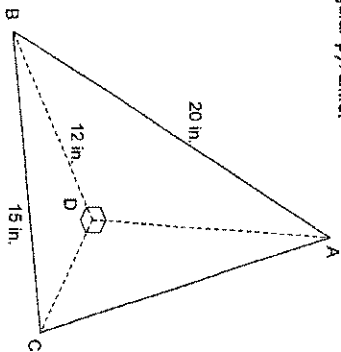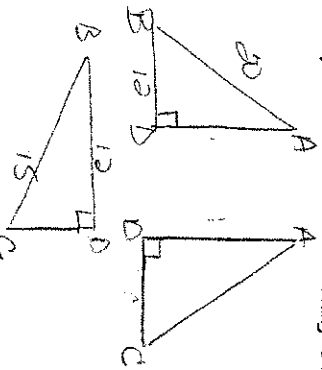

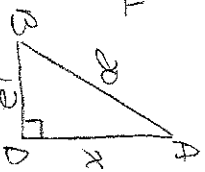13. Three right triangles are joined to form a triangular pyramid.

a) Redraw and label the triangles separately.

b) Find the length of AD, DC, and AC. Round your answer to the nearest tenth. Show all work.
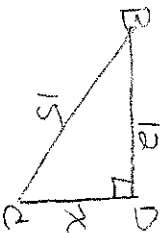
AD = __16 in__
$x^2 + 12^2 = 20^2$
$x^2 = 256$
$\boxed{x = 16}$

DC = __9 in__
$12^2 + x^2 = 15^2$
$x^2 = 81$
$\boxed{x = 9}$
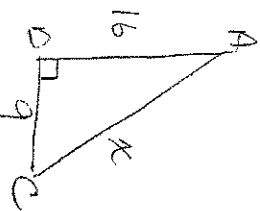
AC = __18.4 in__
$16^2 + 9^2 = x^2$
$337 = x^2$
$18.35 = x$

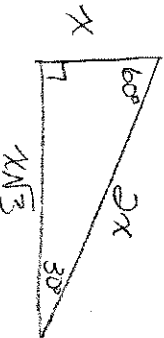14. What is the ratio of the sides of a 45-45-90 triangle?

Draw and label a picture, include all angle measures and side ratios.

Ratio : $x : x : x\sqrt{2}$
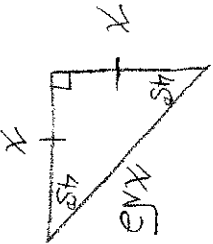
15. What is the ratio of the sides of a 30-60-90 triangle?

Draw and label a picture, include all angle measures and side ratios.

Ratio : $x : x\sqrt{3} : 2x$

16. Classify the triangle with side lengths of 5, 6, 10 by sides and angles.

Justify your answer.

Classified by Sides: _Scalene_

Classified by Angles: _Obtuse_

$c^2 \square a^2 + b^2$

$10^2 \square 5^2 + 6^2$

$100 \square 25 + 36$

$100 > 61$

---

17. Classify the triangle with side lengths of 7, 10, 11 by sides and angles.

Justify your answer.

Classified by Sides: _Scalene_

Classified by Angles: _Acute_

$c^2 \square a^2 + b^2$

$11^2 \square 7^2 + 10^2$

$121 \square 49 + 100$

$121 < 149$

18. Classify the triangle with side lengths of 14, $7\sqrt{2}$, $7\sqrt{2}$ by sides and angles.

Justify your answer.

Classified by Sides: _Isoceles_

Classified by Angles: _Right_

$c^2 \square a^2 + b^2$

$14^2 \square (7\sqrt{2})^2 (7\sqrt{2})^2$

$196 \square 98 + 98$

$196 = 196$

For # 19-22, Determine whether the given side lengths will create a triangle. If they create a triangle, classify the triangle by its angles. Justify your answer. Show all work.

19. 6, 12, 6 $6 + 6 = 12$ 20. 17, 8, 15 $8 + 15 > 17$

Triangle? Yes/**No**   Triangle? **Yes**/No

Right/Acute/Obtuse   **Right**/Acute/Obtuse

$c^2 \square a^2 + b^2$

$17^2 \square 8^2 + 15^2$

$289 = 289$

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21. 9, 13, 8 $8+9>13$

Triangle? **Yes**/No

Right/Acute/**Obtuse**

$c^2 \square a^2+b^2$

$13^2 \square 8^2+9^2$

$169 > 145$

22. 12, 14, 16 $12+14>16$

Triangle? **Yes**/No

Right/**Acute**/Obtuse

$c^2 \square a^2+b^2$

$16^2 \square 12^2+14^2$

$256 < 340$

23. A flag is attached to the top of a 30-foot pole similar to the one shown below. Three wires are attached to the pole 16 feet above the ground and are anchored to the ground 12 feet from the base. How many total feet of wire are needed to secure the flag pole?

Length of Each Wire = __20 ft__

Total Length of Wire = __60 ft__

$12^2+16^2=x^2$

$400=x^2$

$20=x$

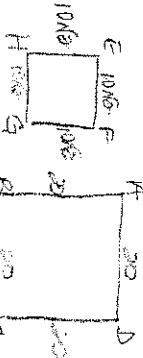$\begin{array}{r}20\\ \times\ 3\\ \hline 60\end{array}$
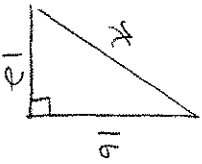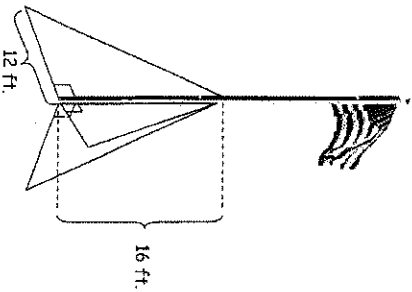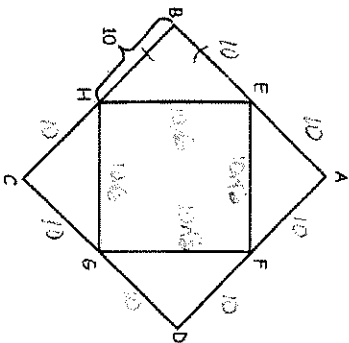
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24. ABCD and EFGH are squares. EFGH was created by connecting the midpoints of the sides of ABCD.

a) Redraw the squares separately. Label all side lengths and angle measures.

b) What is the side length of EFGH?

Side Length_EFGH = $10\sqrt{2}$

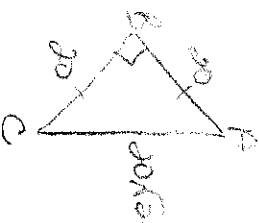c) What is the perimeter of EFGH?

Perimeter_EFGH = $40\sqrt{2}$

$4 \cdot 10\sqrt{2} = 40\sqrt{2}$

d) What is the length of each diagonal in ABCD?

Diagonal_ABCD = $20\sqrt{2}$

e) What is the length of each diagonal in EFGH?

Diagonal_EFGH = $10\sqrt{2}$

Chapter 9 sec 4-6   Review (Part 1)

For #1-6, find the measure of the angle to the nearest degree.

1. cos X = 0.9396

$X = \cos^{-1}(0.9396)$

$\boxed{X = 20°}$

2. tan Y = 3.7320

$Y = \tan^{-1}(3.7320)$

$\boxed{Y = 75°}$

3. sin Z = 0.5735

$Z = \sin^{-1}(0.5735)$

$\boxed{Z = 35°}$

4. tan A = 0.2679

$A = \tan^{-1}(0.2679)$

$\boxed{A = 15°}$

5. cos B = 0.0349

$B = \cos^{-1}(0.0349)$

$\boxed{B = 88°}$

6. sin C = 0.2588

$C = \sin^{-1}(0.2588)$

$\boxed{C = 15°}$

7. Pierre is standing at horizontal ground level with the base of the Eiffel Tower in Paris. The angle formed by the ground and his view of the top of the tower is 55.1°. The height of the Eiffel Tower is 1063 ft. What is Pierre's distance from the base of the Eiffel Tower? Draw and label the picture. Round your answer to the nearest foot.

Distance = __742 ft__

$\tan 55.1 = \dfrac{1063}{x}$
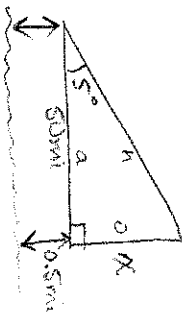
$x = \dfrac{1063}{\tan 55.1}$

$\boxed{x = 741.55}$
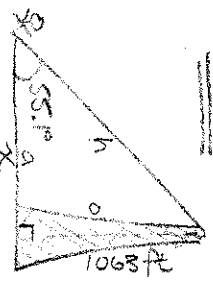
8. An airplane is 0.5 miles above the ocean when it starts to ascend at a constant angle of 5° for the next 50 ground miles. Approximately how far above the ocean is the plane when it finishes ascending? Draw and label the picture. Round your answer to the nearest tenth of a mile.

Height = __4.9 mi__

$x = 50 \cdot \tan 5°$ $\dfrac{x}{50}$

$\boxed{x = 4.37}$

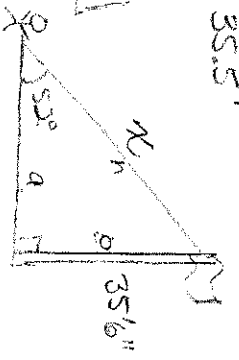$\begin{array}{r} 4.37 \\ +0.5 \\ \hline 4.87 \approx 4.9 \end{array}$

9. Garrett is looking up at the flag at the top of the flag pole. The angle of elevation from Garrett to the flag is 52°. The height of the flag pole is 35' 6". What is the distance from Garrett to the flag? Draw and label the picture. Round your answer to the nearest foot.

Distance = __45 ft__

$\sin 52° = \dfrac{35.5}{x}$

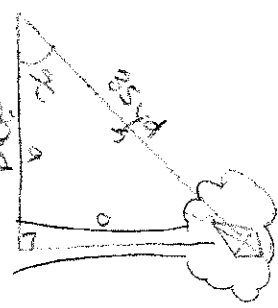$x = \dfrac{35.5}{\sin 52}$

$\boxed{x = 45.05}$

35' 6" = 35.5'

10. Mackenzie is flying a kite when it gets stuck up in a tree. She is 20 yards from the tree and the length of the string when she pulls it tight is 35 yards. What is the angle of elevation of the kite? Draw and label the picture. Round your answer to the nearest degree.

Angle of Elevation = __55°__

$\cos^{-1} x = \dfrac{20}{35}$

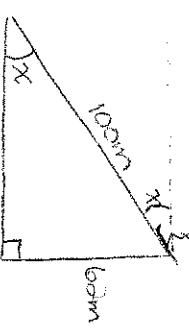$x = \cos^{-1}\left(\dfrac{20}{35}\right)$

$\boxed{x = 55.15}$

11. The Olympic ski jump in Sochi is 100m long with a vertical drop of 62m. Find the angle of depression of the ski jump. Draw and label the picture. Round your answer to the nearest degree.

Angle of Depression = __38°__

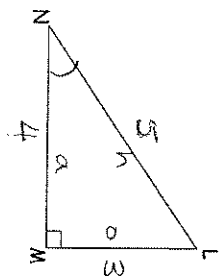$\sin x = \dfrac{62}{100}$

$x = \sin^{-1}\left(\dfrac{62}{100}\right)$

$\boxed{x = 38.31}$

12. Given △LMN with LM = 3, MN = 4, LN = 5. Find the ratios for the sine, cosine, and tangent for angle N

$\sin N = \dfrac{3}{5}$

$\cos N = \dfrac{4}{5}$

$\tan N = \dfrac{3}{4}$

$\sin N = \dfrac{opp}{hyp}$

$\cos N = \dfrac{adj}{hyp}$

$\tan N = \dfrac{opp}{adj}$

13. The Pike's Peak Cog Railway travels 8.9 miles up the mountain at an angle of 9.1°. What is the change in elevation? Draw and label the picture. Round your answer to the nearest tenth of a mile.
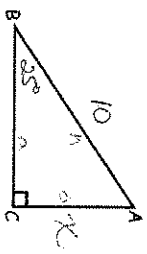
Change in Elevation = 1.4 mi

$\sin 9.1 = \dfrac{x}{8.9}$

$\boxed{X = 1.407}$

14. If m∠B = 25° and BA = 10 cm, find the measure of $\overline{AC}$. Label the picture. Show all work. Round your answer to the nearest tenth.

AC = 4.2 cm

$10 \cdot \sin 25 = \dfrac{x}{10} \cdot 10$

$\boxed{X = 4.22}$

15. Ricardo is driving a truck that is pulling a trailer with a boat on it. On the road in front of him he sees a tunnel. He needs to calculate the height of the tunnel to ensure that his boat will fit through it. His truck is currently 250 feet away from the tunnel when the top of the tunnel is at an angle of elevation of 3.9°. Draw and label the picture. Show all work.

a) How tall is the tunnel? Round the answer to the nearest tenth of a foot.

Height of the Tunnel = 17 ft

$250 \tan 3.9 = \dfrac{x}{250} \cdot 250$

$\boxed{X = 17.04}$
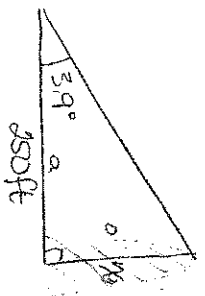
b) If the height of his boat on the trailer is 16'5", will it fit in the tunnel without any damage? (Yes)/No
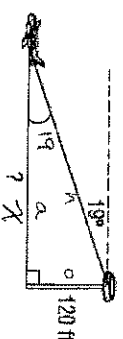
Reasoning: 16'5" < 17'

16. From the top of a 120 foot tall tower, an air traffic controller observes an airplane on the runway at an angle of depression of 19°. How far from the base of the tower is the airplane? Show all work. Round your answer to the nearest tenth.

Distance = 348.5 ft

$x = \dfrac{\tan 19}{\tan 19} = \dfrac{120}{x} \cdot \dfrac{x}{\tan 19}$

$x = \dfrac{120}{\tan 19}$

$\boxed{X = 348.50}$

Chapter 9 sec 4-6 Review (Part 2)

17. During the Fourth of July celebration, the fireworks are set off 300 feet west of where you are sitting. You look up at the fireworks at an angle of 63°. Draw and label the picture. Show all work.

a) To take a clear picture of the fireworks, you need to find the distance from you to the fireworks. Round your answer to the nearest tenth of a foot.

Distance = 660.8 ft
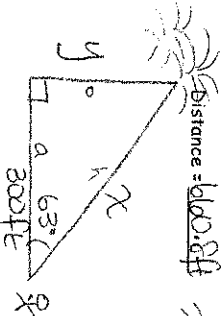
$$\cos 63 = \frac{300}{x}$$
$$\frac{\cos 63}{\cos 63} = \frac{300}{x} \cdot \frac{x}{\cos 63}$$
$$x = \frac{300}{\cos 63}$$

$$\boxed{x = 660.80}$$

b) Find the approximate altitude of the fireworks when you take the picture. Round your answer to the nearest tenth of a foot.

Altitude = 588.8 ft
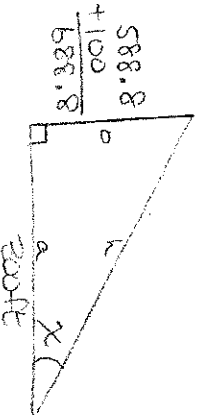
$$\tan 63 = \frac{y}{300}$$
$$\boxed{y = 588.78}$$

c) During the Grand Finale, some of the fireworks are 100 feet higher than the rest of them. What is the new angle of elevation? Draw and label the picture. Round your answer to the nearest degree.

Angle of Elevation = 66°

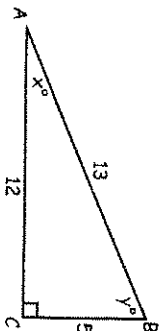$$\begin{array}{r} 588.8 \\ +100 \\ \hline 688.8 \end{array}$$

$$\tan x = \frac{688.8}{300}$$
$$x = \tan^{-1}\left(\frac{688.8}{300}\right)$$
$$\boxed{x = 66.46}$$

18. Find the Trigonometric Ratios for the indicated angles.

$$\sin x = \frac{5}{13} \qquad \sin y = \frac{12}{13}$$
$$\cos x = \frac{12}{13} \qquad \cos y = \frac{5}{13}$$
$$\tan x = \frac{5}{12} \qquad \tan y = \frac{12}{5}$$

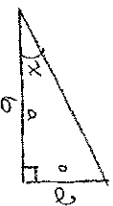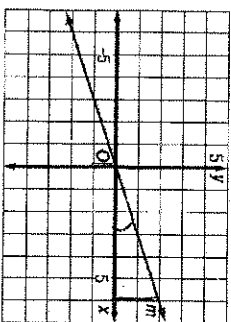19. What angle does m make with the x-axis? Show all work. Round your answer to the nearest degree.

Angle = 18°

$$\tan x = \frac{2}{6}$$
$$x = \tan^{-1}\left(\frac{2}{6}\right)$$
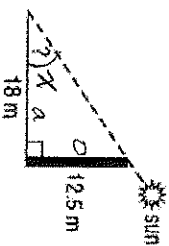$$\boxed{x = 18.43}$$

20. Find the angle of elevation of the sun when a 12.5 meter tall telephone pole casts an 18 meter long shadow.

Angle of Elevation = 35°

$$\tan x = \frac{12.5}{18}$$
$$x = \tan^{-1}\left(\frac{12.5}{18}\right)$$
$$\boxed{x = 34.77}$$
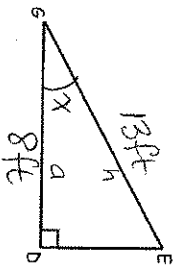
21. If GD = 8 ft, and GE = 13 ft, find m∠G. Label the picture. Show all work. Round your answer to the nearest degree.

m∠G = __52°__

$\cos x = \dfrac{8}{13}$

$x = \cos^{-1}\left(\dfrac{8}{13}\right)$

$\boxed{x = 52.02}$

For #22-24, find the value of each ratio to the nearest hundredth.

22. sin 14°

0.2419

$\boxed{0.24}$

23. cos 51°

0.6293
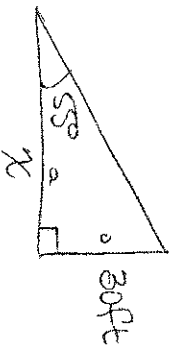
$\boxed{0.63}$

24. tan 5°

0.0874

$\boxed{0.09}$

25. A roofer props a ladder against a wall so that the top of the ladder reaches a 30 foot roof that needs repair. If the angle of elevation from the bottom of the ladder to the roof is 55°, how far is the ladder from the base of the wall? Draw and label the picture. Show all work. Round your answer to the nearest foot.

Distance = __21 ft__

$x \cdot \tan 55 = \dfrac{30 \cdot x}{x \tan 55}$

$x = \dfrac{30}{\tan 55}$

$\boxed{x = 21.0}$

For #26-28, find the missing value. Round side lengths to the nearest tenth and angle measures to the nearest degree.

26. x = __19.3__

27. y = __60°__

28. z = __28.5__

26.
$x \cdot \tan 25 = \dfrac{9}{x \tan 25}$

$x = \dfrac{9}{\tan 25}$
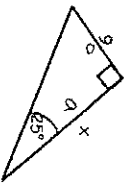
$\boxed{x = 19.30}$

27.
$\cos y = \dfrac{33}{67}$

$y = \cos^{-1}\left(\dfrac{33}{67}\right)$

$y = 60.49$

$\boxed{y = 60.49}$

28.
$110 \cdot \sin 15 = \dfrac{z}{40}$

$\boxed{z = 28.47}$

29. A person whose eyes are 5 feet above the ground is standing on the runway of an airport 100 feet from the control tower. They observe an air traffic controller at the window of the 132 foot tower. What is the angle of elevation? Show all work. Round your answer to the nearest degree.

Angle of Elevation = __52°__

$\tan x = \dfrac{127}{100}$

$x = \tan^{-1}\left(\dfrac{127}{100}\right)$

$\boxed{x = 51.78}$

Chapter 9 sec 4-6 Review (Part 3)
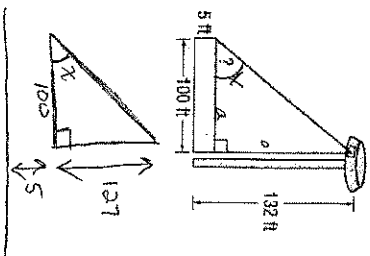
For #30-32, find the measure of each angle to the nearest degree.

30. tan A = 2.00035

$A = \tan^{-1}(2.00035)$
$A = 63.47$

$\boxed{63°}$

31. cos B = 0.7980

$B = \cos^{-1}(0.7980)$
$B = 37.06$
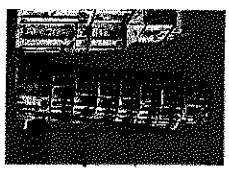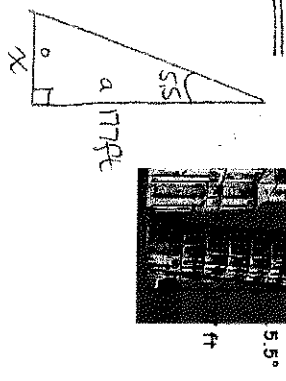
$\boxed{37°}$

32. sin C = 0.7660

$C = \sin^{-1}(0.7660)$
$C = 49.99$

$\boxed{50°}$

33. The Leaning Tower of Pisa leans about 5.5° from vertical. How far from the base of the tower will an object dropped from the tower land? Show all work. Round to the nearest foot.
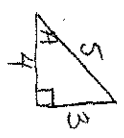
Distance = 17 ft

$177, \tan 5.5 = \dfrac{x}{177}$

$\boxed{x = 17.04}$

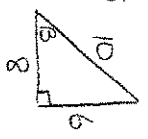For #34-37, draw and label the picture. Show all work.

34. Find sin A when tan A = $\frac{3}{4}$
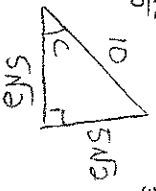

$\boxed{\sin A = \dfrac{3}{5}}$

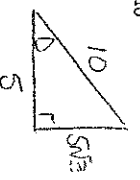35. Find tan B when cos B = $\frac{8}{10}$

$\boxed{\tan B = \dfrac{6}{8}}$

36. Find tan C when sin C = $\frac{5\sqrt{2}}{10}$

$\tan C = \dfrac{5\sqrt{2}}{5\sqrt{2}}$

$\boxed{\tan C = 1}$

37. Find cos D when sin D = $\frac{5\sqrt{3}}{10}$

$\cos D = \dfrac{5}{10}$

$\boxed{\cos D = \dfrac{1}{2}}$

38. The angle of elevation to an airplane viewed from the control tower at an airport is 7°. The tower is 200 feet high and the pilot reports that the altitude is 5200 feet. How far away from the control tower is the airplane? Draw and label the picture. Show all work. Round your answer to the nearest foot.

Distance = 41028 ft

$x, \sin 7 = \dfrac{5000}{x} \cdot \dfrac{x}{\sin 7}$
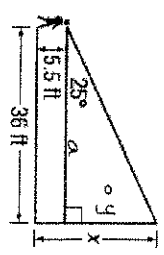
$x = \dfrac{5000}{\sin 7}$

$\boxed{x = 41027.54}$

39. Carolyn wants to determine the height of a flag pole. Her eye level is 5.5 feet from the ground and she stands 36 feet from the flagpole. If the angle of elevation is 25°, what is the height of the flagpole to the nearest tenth of a foot? Show all work.

Height = 22.3 ft $36 \tan 25 = \dfrac{y}{36} \cdot 36$

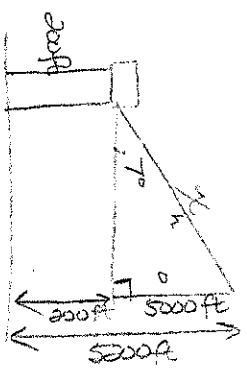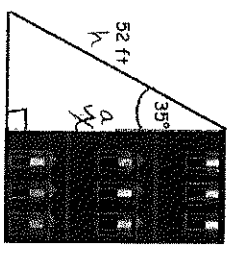$y = 16.787$
$+ 5.5$

$\boxed{22.28}$

40. Find the height of the building to the nearest tenth of a foot. Show all work.
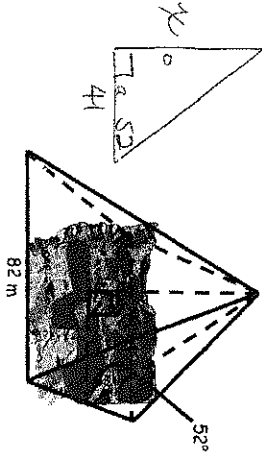
Height = 42.6 ft

$52, \cos 35 = \dfrac{x}{52}$

$\boxed{42.59 = x}$

41. All but two of the pyramids built by the ancient Egyptians have faces inclined at 52° angles. Suppose an archaeologist discovers the ruins of a pyramid. Most of the pyramid has eroded, but she is able to determine that the length of a side of the square base is 82 m. How tall was the pyramid? Show all work. Round to the nearest meter.

Height = __52 m__

41. $\tan 52 = \dfrac{x}{41}$ ·41

$52.47 = x$

42. A 25 foot ladder is leaned against a wall making a 72° angle with the ground. How high up on the wall does the ladder reach? Show all work. Round your answer to the nearest tenth.
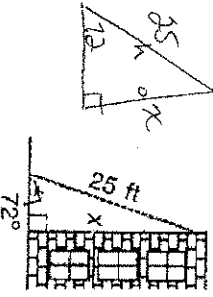
Height = __23.8 ft__

$25 \cdot \sin 72 = \dfrac{x}{25} \cdot 25$

$x = 23.77$

43. A ship is sailing toward a small island 800 miles away. If the ship is 2° off course, by how many miles will it miss the island? Show all work. Round your answer to the nearest mile.
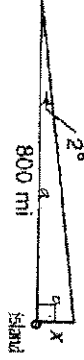
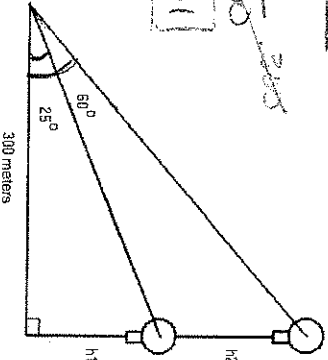Number of miles = __28 mi__

$800 \cdot \tan 2° = \dfrac{x}{800} \cdot 800$

$x = 27.93$

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44. A cable from the top of a 200 foot telephone tower makes a 50° angle with the ground. How long is the cable? Show all work.

Length = __261.14__

$x \cdot \sin 50 = \dfrac{200}{\sin 50} \cdot \dfrac{x}{\sin 50}$
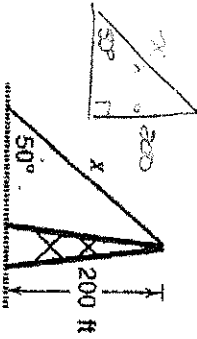
$x = \dfrac{200}{\sin 50}$ $x = 261.08$

45. The angle of elevation of a hot air balloon, climbing vertically, changes from 25° at 10:00 am to 60° at 10:02 am. The point of observation is situated 300 meters away from the take off point. What is the upward speed, assumed constant, of the balloon? Give the answer in meters per second. Show all work. Round your answer to the nearest tenth.

Upward speed = __3.16 m/s__

$300 \tan 60 = y$ $300 \tan 25 = x$

$y = 519.61$

519.6
-139.9
$h_2 = 379.7 m$

$y = 519.61$

$x = 139.89$

$h_1 = 139.9$

$2 \min = 120 \sec$

$379.7 \div 120 = 3.16$

$3.16 \, m/sec$