Tuesday January 10, 2017
Take out your notebook for today's warm-up!
There are 12 school days left until the end of the quarter.
HW #10 p624 / 1 - 22 due TODAY

angle of depression

angle of elevation

SOH
CAH
TOA
The Freedom Tower stands 1776 ft above the streets of Manhattan. Marcus measures an angle of elevation of $24.2^0$ to the top of the tower from where he is standing. How far is he from the bottom of the tower?
\[
\frac{1776}{x} = \tan 24.2^\circ
\]

\[
x = \frac{1776}{0.4474}
\]

\[
x = 3952 \text{ ft.}
\]
Looking down from a 400 ft. cliff, Butch and Sundance can see the Marshall and his posse off in the distance. They measure the angle of depression at $2.4^\circ$. How far away is the Marshall and his posse?

\[
\tan 2.4^\circ = \frac{400}{x} \quad \Rightarrow \quad x \approx 9544 \text{ ft}
\]
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## Exercise 12 - 22

1. Use calculators to find each trigonometric ratio to nearest thousandth places.
   - \( \sin 37^\circ = \) ______
   - \( \cos 60^\circ = \) ______
   - \( \tan 45^\circ = \) ______

2. Select the correct option for each trigonometric ratio.
   - \( \sin A = \) ______
   - \( \cos A = \) ______
   - \( \tan A = \) ______

3. Use the Pythagorean Theorem to find the missing side lengths. Then, find the trigonometric values below.
   - \( \sin A = \) ______
   - \( \cos A = \) ______
   - \( \tan A = \) ______

4. Use the coordinates on the graph to determine the trigonometric ratios below.
   - \( \sin \theta = \) ______
   - \( \cos \theta = \) ______
   - \( \tan \theta = \) ______

5. Find the area of each triangle to the nearest degree.
   - \( \sin A = 0.5 \)
   - \( \cos B = 0.6 \)
   - \( \tan C = 0.5773 \)
   - \( \sin \beta = \frac{48}{106} \)

For Exercises 14 – 22, find the value of \( a \) or \( \theta \) accurate to the nearest whole number.

14. \( a = 30 \) cm

15. \( a = 12 \) cm

16. \( a = 10 \) cm

17. \( a = 20 \) ft

18. \( a = 30 \) ft

19. \( a = 25 \) ft

20. \( a = 30 \) ft

21. Find the perimeter of this quadrilateral.

22. Find \( x \).
For Exercises 14–23, find the values of $a$, $b$, and $c$ accurate to the nearest whole number.

14. $35$ cm

15. 17 cm

16. $40^0$

17. $48$ cm

18. $36$ in

19. $56$ in

20. $18$ in

21. Find the perimeter of the quadrilateral.

22. Find $x$. 

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\[ s/t, r/t, s/r \]

7/25 24/25
24/25 7/25
7/24 24/7

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\[ 0.6018, 0.8746, 0.1405 \]
9. Use the Pythagorean Theorem to find the missing side length, then find the trigonometric ratios below:

24² + 7² = c²

\[
\sin A = \frac{7}{25} \quad \sin B = \frac{24}{25}
\]

\[
\cos A = \frac{24}{25} \quad \cos B = \frac{7}{25}
\]

\[
\tan A = \frac{3}{4} \quad \tan B = \frac{24}{7}
\]
\[ \cos 70^\circ = \frac{36}{c} \]
\[ \tan d = \frac{107}{128} = 0.835 \]
\[ \tan^{-1}(0.835) \approx 40^\circ \]
\[ \sin \theta = \frac{9}{42} \]
21. Find the perimeter of this quadrilateral.

\[ \sin 35 = \frac{x}{85} \]
\[ x \approx 48.8 \]

\[ \cos 35 = \frac{y}{85} + \frac{62.6}{85} \]
\[ y = 69.6 \text{ m} \]
22. Find $x$.

Given:
- $75^\circ$ angle
- $280$ ft
- $55^\circ$ angle
- $121$ ft

Solution:
1. **First Triangle**
   - $\tan 75 = \frac{280}{y}$
   - $y = 75$

2. **Second Triangle**
   - $\tan 55 = \frac{280}{z}$
   - $z = 196$ ft

$X = 2 - y = 121$ ft

**Diagram**
5. APPLICATION A meteorologist shines a spotlight vertically onto the bottom of a cloud formation. He then places an angle-measuring device 65 meters from the spotlight and measures a 79° angle of elevation from the ground to the spot of light on the clouds. How high are the clouds?

7. APPLICATION A ship's officer sees a lighthouse at a 42° angle to the path of the ship. After the ship travels 1000 m, the lighthouse is at a 90° angle to the ship's path. What is the distance between the ship and the lighthouse at this second sighting?

For Exercises 8-14, find each length or angle measure accurate to the nearest whole unit.

8. \( a = \overline{\text{__}} \) 9. \( a = \overline{\text{__}} \)

10. \( c = \overline{\text{__}} \)

11. \( c = \overline{\text{__}} \)

12. \( a = \overline{\text{__}} \)

13. \( f = \overline{\text{__}} \)
1. According to a Chinese legend from the Han dynasty (206 B.C.E.-220 C.E.), General Han Xin flew a kite over the palace of his enemy to determine the distance between his troops and the palace. If the general let out 800 meters of string and the kite was flying at a 35° angle of elevation, how far away was the palace from General Han Xin's position?
1. According to a Chinese legend from the Han dynasty (206 B.C.E.-220 C.E.), General Han Xin flew a kite over the palace of his enemy to determine the distance between his troops and the palace. If the general let out 800 meters of string and the kite was flying at a 35° angle of elevation, how far away was the palace from General Han Xin's position?

\[
\frac{x}{800} = \cos 35°
\]

\[x = 655.3 \text{ m}\]
2. Benny is flying a kite directly over his friend, Frank, who is 125 meters away. When he holds the kite string down to the ground, the string makes a $39^\circ$ angle with the level ground. How high is Benny’s kite?

\[
\tan 39^\circ = \frac{X}{125}
\]
3. **APPLICATION** The angle of elevation from a ship to the top of a 42-meter lighthouse on the shore measures 33°. How far is the ship from the shore? (Assume the horizontal line of sight meets the bottom of the lighthouse.)
4. **APPLICATION** A salvage ship’s sonar locates wreckage at a $12^\circ$ angle of depression. A diver is lowered 40 meters to the ocean floor. How far does the diver need to walk along the ocean floor to the wreckage?

\[ \tan 12^\circ = \frac{40}{x} \]
5. **APPLICATION** A meteorologist shines a spotlight vertically onto the bottom of a cloud formation. He then places an angle-measuring device 65 meters from the spotlight and measures a $74^\circ$ angle of elevation from the ground to the spot of light on the clouds. How high are the clouds?

\[
\tan 74^\circ = \frac{X}{65}
\]

\[
3.4874
\]

\[
X = \frac{3.4874 \times 65}{1}
\]
7. **APPLICATION** A ship’s officer sees a lighthouse at a 42° angle to the path of the ship. After the ship travels 1800 m, the lighthouse is at a 90° angle to the ship’s path. What is the distance between the ship and the lighthouse at this second sighting?
8. \( a \approx \frac{17 \text{ cm}}{\sin 32^\circ} \)
9. $x \approx \ ?$
10. $r \approx \underline{?}$
11. $e \approx \ ?$
12. \( d_1 \approx \frac{?}{h} \)

\[
d_1 = 2 \cdot x
\]
13. \( f \approx ? \)

\[
\frac{\text{OPP}}{\text{adj}} = \tan f
\]

\[
\frac{16}{14} = \tan f
\]