| BIG PICTURE of this UNIT: | - How do I determine the measure of angles in geometric shapes, without direct measurement? <br> - How do I solve for sides or angles in right triangles? <br> - How can I solve problems that require geometric models using right triangles?? |
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## Part 1 - Skills Review

1. Sketch the function $f(x)=2 x$ and then determine:
a. the slope of the line
b. the measure of the angle that the line makes with the $x$-axis.
c. Now graph the line $y=2 x+4$ and determine the measure of the angle that the line makes with the $x$-axis.
d. Then graph the line $y=2 x-3$ and determine the measure of the angle that the line makes with the $x$-axis.
2. Determine the angle that the line $2 x-5 y=20$ makes with the positive $x$-axis.
3. Determine the point at which the lines $2 x-5 y=20$ and $y=2 x+4$ intersect and determine the angle between the two lines at their intersection point.

## Part 2 - Skills \& Concept Practice

1. The altitude of an equilateral triangle is 5 cm . What is the length of a side of the triangle?
2. Find the length of the altitude of an isosceles triangle with base 4.24 feet. The vertex angle of the triangle measures $85^{\circ}$. Hence, determine the area of the triangle.
3. Find the length of the side labeled $x$. Round intermediate values to the nearest tenth. Use the rounded values to calculate the next value. Round your final answer to the nearest tenth. Also, determine the area of each triangle.
Find area of this triangle
4. Solve for the specified unknown angles:
b)
5. Solve for the specified sides in the triangles:
Find the length of RS

## Part 3 - Skills \& Concept Applications

6. A plane is flying at an elevation of 35,000 feet within sight of the Gateway Arch in St. Louis, Missouri. The pilot would like to estimate her distance from the Arch. She finds that the angle of depression to a point on the ground below the arch is $22^{\circ}$.
a. What is the distance between the plane and the arch?
b. What is the distance between a point on the ground directly below the plane and the arch? (along the ground)
7. From the top of a 200 foot lighthouse, the angle of depression to a ship on the ocean is $23^{\circ}$. How far is the ship from the base of the lighthouse?
8. To evacuate some refugees, a bridge needs to be built across a river. The first step is to find out how wide the river is. A surveyor is on one side of the river with a transit mounted on a tripod 1.2 m above the ground. An assistant stands on the other side of the river holding a 3 m pole vertically. The angle of elevation from the transit to the top of the pole is $8.5^{\circ}$. How wide is the river?
9. The angle of elevation from the top of a 16 m building to the top of a second building is $48^{\circ}$. The buildings are 30 meters apart. What is the height of the taller building?
10. Two watchtowers at an historic fort are located 375 meters apart. The first tower is 14 m tall and the second tower is 30 m tall.
a. What is the angle of Elevation from the top of the first tower to the top of the second tower.
b. The guards in the towers simultaneously spot a suspicious car parked between the towers. The angle of depression from the lower tower is $7.7^{\circ}$ while the angle of depression from the higher tower is $6.3^{\circ}$. Which guard is closer to the car? Explain how you know.

## Part 4 - Challenge Problem

## Problem D <br> A Point of Division

The line $y=-\frac{3}{4} x+9$ crosses the $x$-axis at $P$ and the $y$-axis at $Q$.
Point $T(r, s)$ lies on the line segment $P Q$ such that the area of $\triangle P O Q$ is three times the area of $\triangle T O P$.

Determine the values of $r$ and $s$, the coordinates of $T$.


