# Sample High School Independent Practice Assignment Sheet: Geometry Unit

**Essential Learning Standards**

- I can prove theorems about triangles. (Section 3.1)
- I understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. (Section 3.2)
- I can define trigonometric ratios and solve problems involving right triangles. (Section 3.3)
- I can use trigonometric ratios and the Pythagorean theorem to solve right triangle in applied problems. (Section 3.4)

## Skill Practice

Solve.

- $a^2 - 5^2 = 10^2$
- $3^2 - b^2 = 15^2$
- $4^2 - 6^2 = c^2$

## Section 3.1

Two homeowners live on Elm Avenue and Main Street as shown in the following diagram. They want to separate and fence their plots of land. The property line will have a shared fence that needs to be 90 feet long. Both homeowners want to fence their property. The Elm Avenue side of the property is 103 feet long. What is the amount of fencing needed for each plot of land?

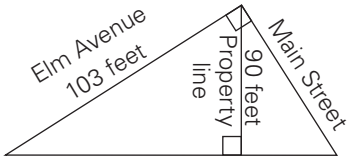
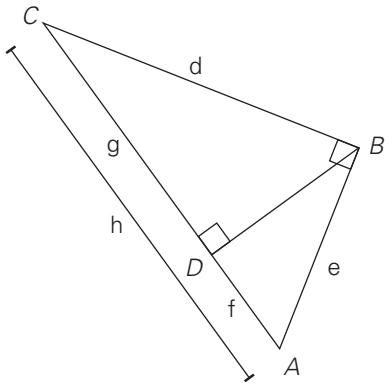



Figure not drawn to scale.




Given: $\Delta ABC$ is a right triangle, where angle B is the right angle and $\overline{BD} \perp \overline{AC}$.

Prove: $e^2 + d^2 = h^2$

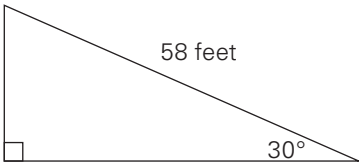
**Section 3.2**

Land surveyors use a tool called a transit to accurately determine distances and angle measures between selected points located on the ground. They are an invaluable resource to contractors, builders, and community planners.

The following image is from the notes of a local land surveyor. She was hired to determine which plot of land would be the best choice for building a new community road. The community planners indicate that the vertical rise of the road cannot exceed 60 feet due to local regulations.

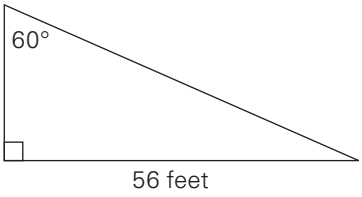
Review each of the plots surveyed and make a recommendation about which pieces of land would serve as viable options for the road. Use mathematics to defend your recommendation.

Plot 1:



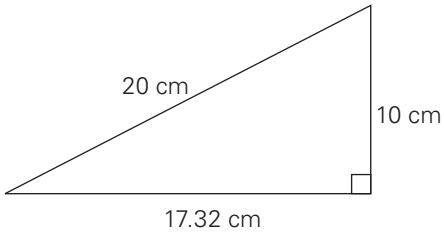

Plot 2:

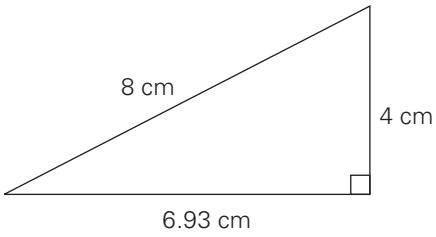

Plot 3:




Portia claims that for any 30-60-90 right triangle, the *sin* 302 = $\frac{1}{2}$. Examine the following pair of 30-60-90 right triangles.

Do the figures support Portia's claim? Why or why not?



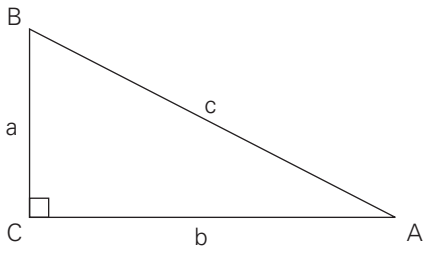




How tall is a tree that casts a 30m shadow that makes a 53° angle with the ground?

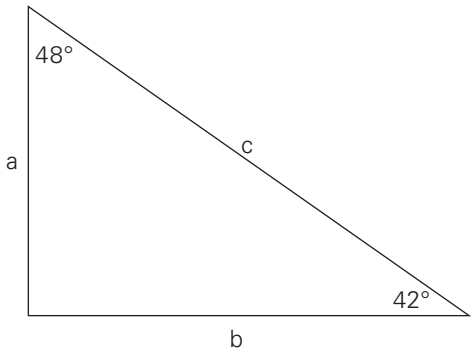
Two right triangles with different side lengths each have angles measuring 45°, 45°, and 90°. What might the side lengths of each of these triangles be?

**Section 3.3**

Given: ΔABC is a right triangle.
Prove: *sin* 0 = *cos*(90 – 0).




Draw and label a right triangle to justify why the *cos* 42° is equivalent to *sin* 402. Use words, numbers, and symbols in your justification.




For each sample, write an equivalent trigonometric expression.

*sin* 152 _____

*sin* 302 _____

*sin* 452 _____

*cos* 60° _____

*cos* 75° _____

*cos* 90° _____

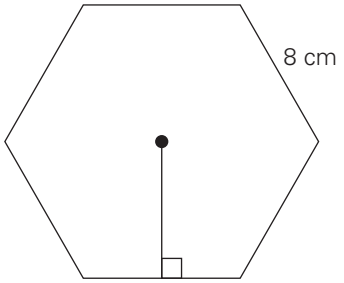
Create a graphic organizer to group all of the equivalent expressions below. (Note: Some expressions may belong to more than one group.)

| | | | |
|---|---|---|---|
| *sin* 60° | *sin* 30° | *cos* 15° | *cos* 75° |
| $\frac{1}{2}$ | *cos* 30° | 0.2588 | $\frac{\sqrt{3}}{2}$ |
| 0.9659 | 0.5 | *cos* 60° | *sin* 75° |
| *sin* 15° | 0.8660 | | |

**Section 3.4**

An airplane flying at 26,400 feet and heading for BWI has been commanded to land at the nearest airport due to a major weather event in Baltimore. The pilot takes two readings to determine which airport is closest at the time of the announcement. Pittsburgh International Airport is located to the north with an angle of elevation reading at 4°. Dulles International Airport is located to the southeast with an angle of elevation reading at 3°. Which airport is closest to the plane?

How might you use trigonometric ratios to calculate the area of the following regular polygon?

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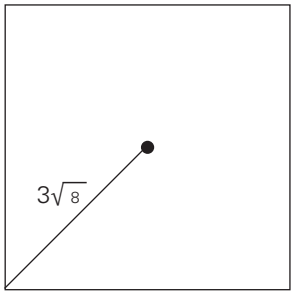
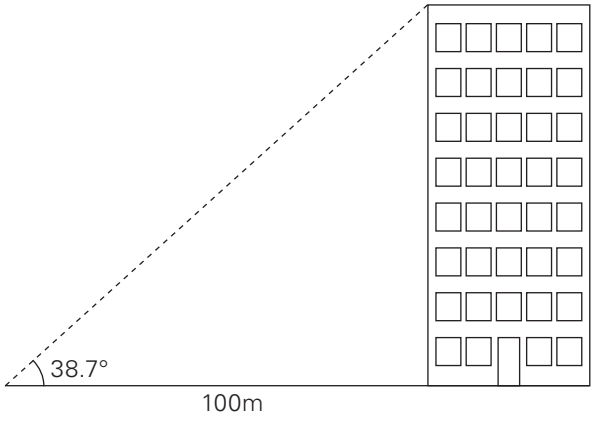



Use trigonometric ratios to estimate the height of the building.




*Source: Adapted from © 2015 by Howard County Public School System, Office of Mathematics.*