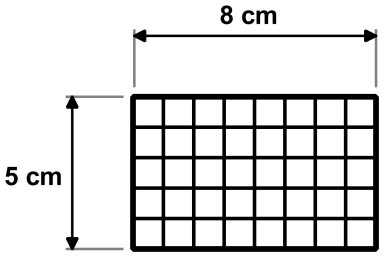
Name: _____ Date: _____

# THE AREA OF POLYGONS
## COMMON CORE GEOMETRY

Perimeter and circumference are easy concepts to understand because they represent a distance. Area, on the other hand, is trickier. It is a **measurement** of the **amount of space** inside a two-dimensional object. It is typically measured by the number of square units (square inches, square feet, square meters, etc) that can fit inside of it.

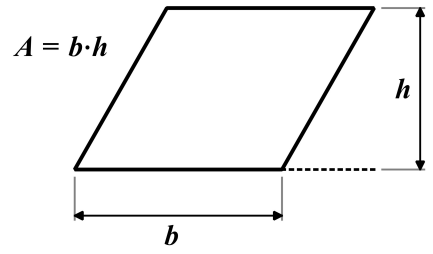
***Exercise* #1:** If a rectangle has a length of 8 centimeters and a width of 5 centimeters, then what is the area of the rectangle in square centimeters?

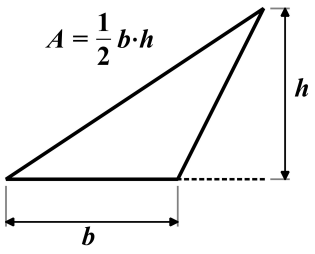



The area formulas for rectangles, triangles, and parallelograms have been developed in earlier courses and will only be reviewed in this lesson. The formulas for the area of a parallelogram and triangle are given below.

**AREA FORMULAS**

**Parallelogram and Triangle**

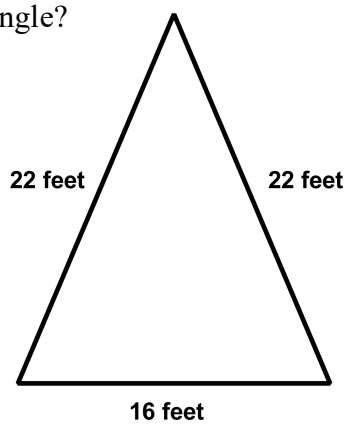



***Exercise* #2:** A patio is to be made in the shape of an isosceles triangle as shown.

(a) Why would the calculation $A = \frac{1}{2}(22)(16)$ not result in the correct area of the triangle?

(b) Determine the area of the patio to the nearest square foot.




(c) If the patio is to be covered by stone that costs $12.25 per square foot, what will be the total cost of covering the patio with stone?

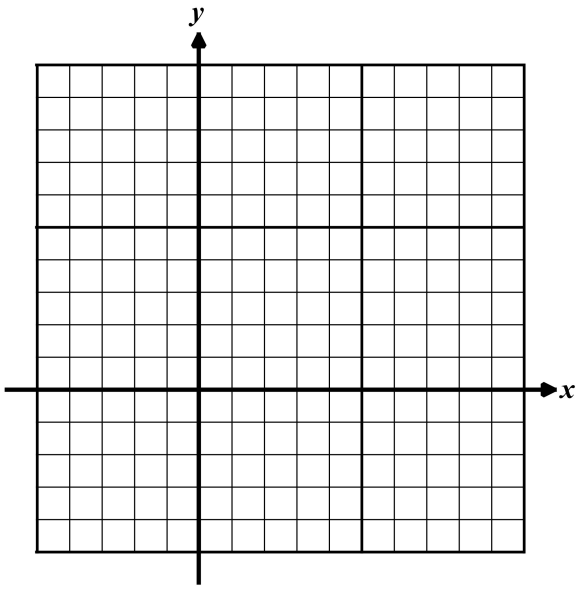
We can certainly work with area in the coordinate grid, where we have convenient measuring tools built into the system.

***Exercise* #3:** Parallelogram *ABCD* has vertices at $A(0,6)$, $B(9,6)$, and $C(6,-2)$.

(a) What are the coordinates of vertex *D*?

(b) Determine the area of *ABCD*. Show the calculation that results in your answer.

(c) Which is the longer side, $\overline{AB}$ or $\overline{BC}$. Support your answer.

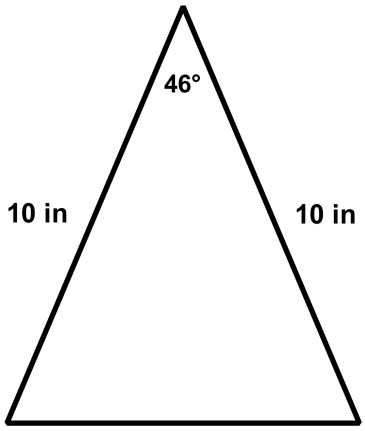



And, of course, our friend **trigonometry** can also come into play.

***Exercise* #4:** An isosceles triangle is shown below whose legs each measure 10 inches and whose vertex angle measures $46^\circ$. We want to find the area of this triangle.

(a) Find an expression involving a trigonometric ratio for the height of the triangle. Leave unevaluated.

(b) Find an expression involving a trigonometric ratio for the length of the base of this triangle. Leave unevaluated.



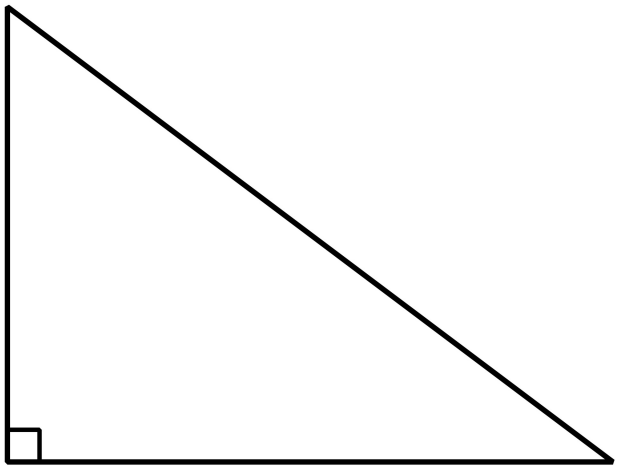

(c) Determine the area of the isosceles triangle to the nearest square inch.

Name: _____ Date: _____

# THE AREA OF POLYGONS
# COMMON CORE GEOMETRY HOMEWORK

## MEASUREMENT AND CONSTRUCTION

1. Determine the area of the following right triangle in square centimeters. Show your measurements and calculation.



## PROBLEM SOLVING

2. A rectangle has a length that is 4 inches longer than its width. Its perimeter is 36 inches. Which of the following is its area?

(1) 54 (3) 77

(2) 64 (4) 81

_____

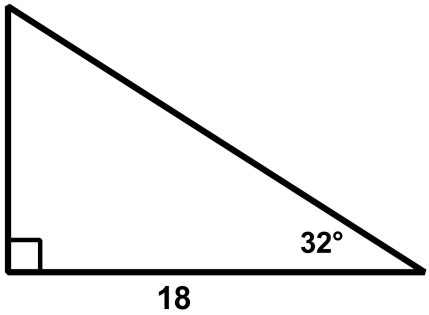
3. Which of the following expressions would correctly calculate the area of the right triangle shown below?

(1) $\frac{1}{2}(18)^2 \sin 32^\circ$

(2) $\frac{1}{2}(18)^2 \tan 32^\circ$

(3) $\frac{1}{2}(18)^2 \cos 32^\circ$

(4) $\frac{1}{2}(18)^2 \sin 32^\circ \cos 32^\circ$



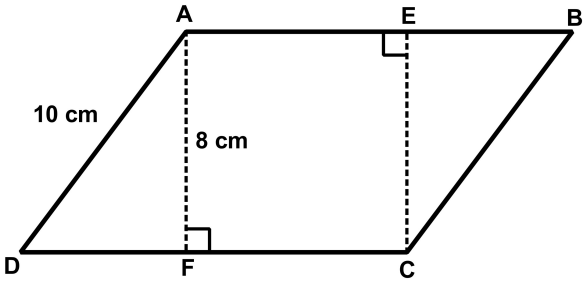

_____

4. A triangle plotted in the coordinate plane has vertices at $(2,3)$, $(\sqrt{15},3)$ and $(4,8)$. Which of the following is closest to its area?

(1) 4.68 (3) 7.12

(2) 5.93 (4) 8.76

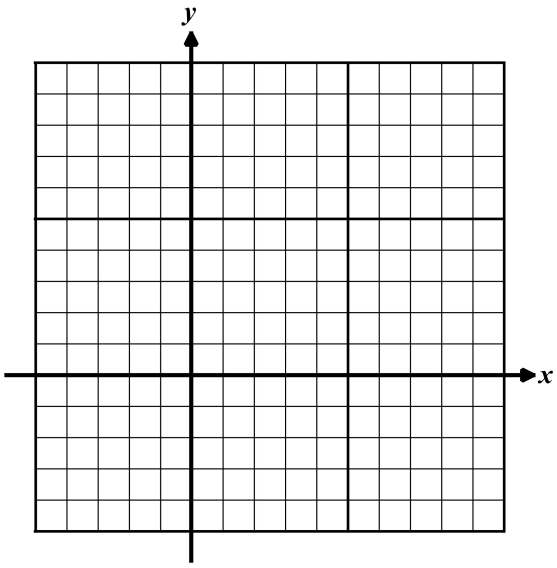
5. Parallelogram *ABCD* is shown below with $AD = 10$ cm and *AECF* is a square with side a side length of 8 cm. Determine the area of *ABCD* in square centimeters. Show how you arrived at your answer.




## REASONING

6. A quadrilateral has vertices at $A(-5,2)$, $B(7,6)$, $C(9,0)$, and $D(-3,-4)$.

(a) Calculate the slopes of all four sides of *ABCD* and explain how these slopes prove that *ABCD* is a rectangle.




(b) Determine the lengths of the base and height of this rectangle in simplest radical form.

(c) What is the area of this rectangle? Show the calculation(s) that result in your answer.