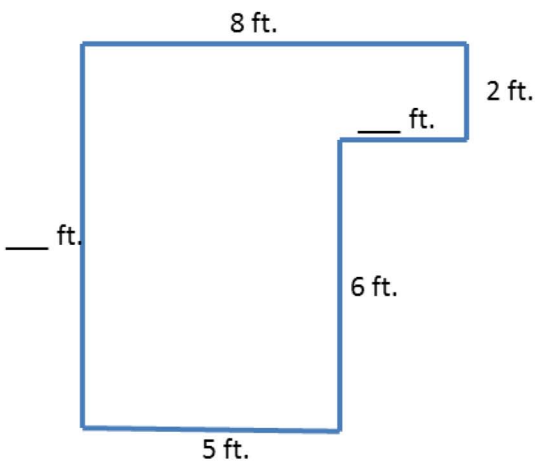
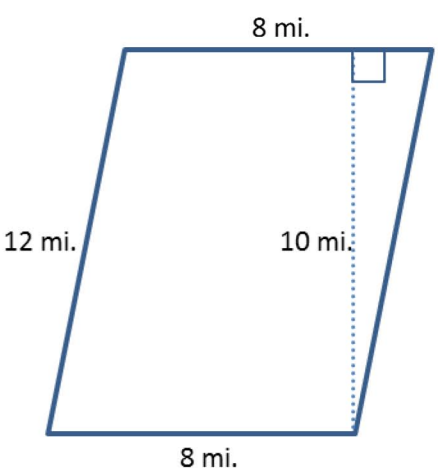
Name _____ Date_____

The Area of Polygons Through Composition and Decomposition

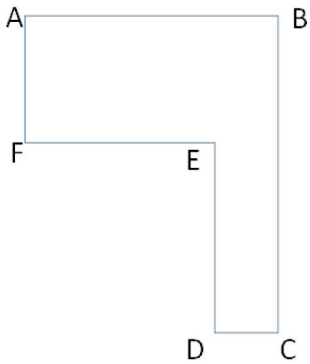
1. Find the missing dimensions of the figure below, and then find the area. The figure is not drawn to scale.



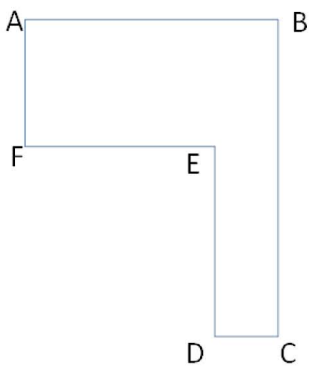
2. Find the area of the parallelogram below. The figure is not drawn to scale.



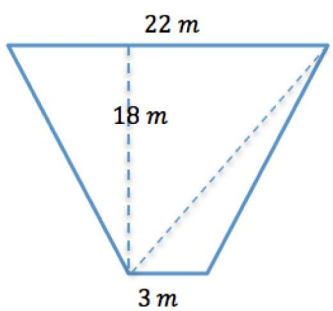
1. If $AB = 20$, $FE = 12$, $AF = 9$, and $DE = 12$, find the length of both other sides. Then, find the area of the irregular polygon.



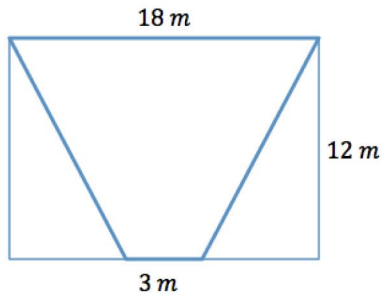
2. If $DC = 1.9$ cm, $FE = 5.6$ cm, $AF = 4.8$ cm, and $BC = 10.9$ cm, find the length of both other sides. Then, find the area of the irregular polygon.



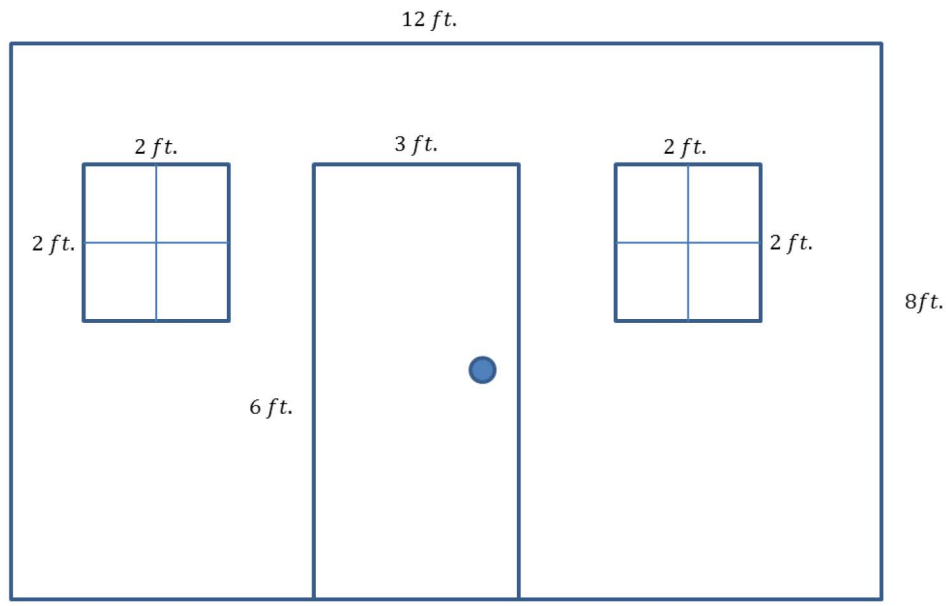
3. Determine the area of the trapezoid below. The trapezoid is not drawn to scale.



4. Determine the area of the isosceles trapezoid below. The image is not drawn to scale.



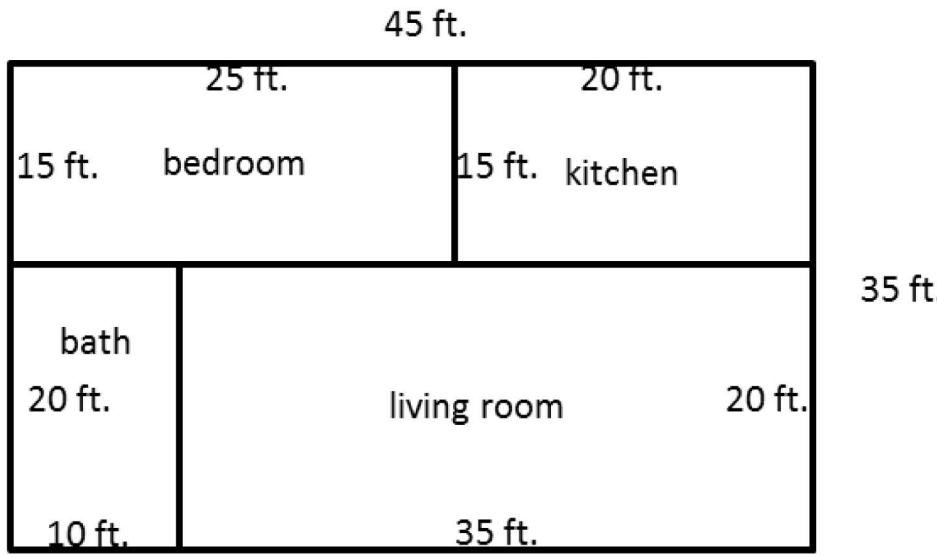
5. Here is a sketch of a wall that needs to be painted:



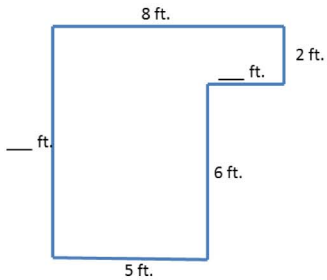
a. The windows and door will not be painted. Calculate the area of the wall that will be painted.

b. If a quart of Extra-Thick Gooey Sparkle paint covers $30\ \text{ft}^2$, how many quarts must be purchased for the painting job?

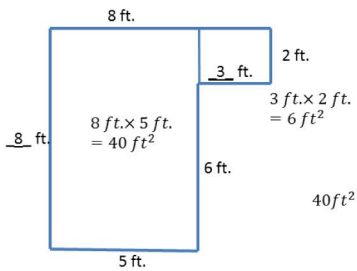
6. The figure below shows a floor plan of a new apartment. New carpeting has been ordered, which will cover the living room and bedroom but not the kitchen or bathroom. Determine the carpeted area by composing or decomposing in two different ways, and then explain why they are equivalent.



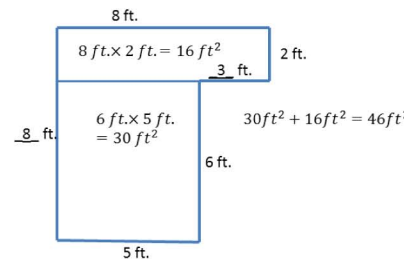
1. Find the missing dimensions of the figure below, and then find the area. The figure is not drawn to scale.



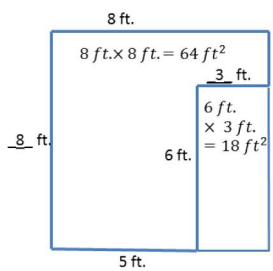
Solutions can be any of the below.



$40ft^2 + 6ft^2 = 46ft^2$

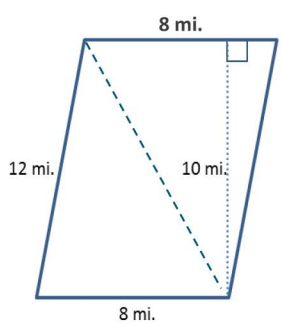


$30ft^2 + 16ft^2 = 46ft^2$



$64ft^2 - 18ft^2 = 46ft^2$

2. Find the area of the parallelogram below. The figure is not drawn to scale.



Area of Triangle 1

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \times 8 \text{ mi.} \times 10 \text{ mi.}$$

$$A = 40 \text{ mi}^2$$

Area of Triangle 2

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \times 8 \text{ mi.} \times 10 \text{ mi.}$$

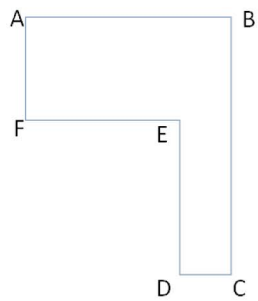
$$A = 40 \text{ mi}^2$$

Area of Parallelogram = Area of Triangle 1 + Area of Triangle 2

$$A = 40 \text{ mi}^2 + 40 \text{ mi}^2 = 90 \text{ mi}^2$$

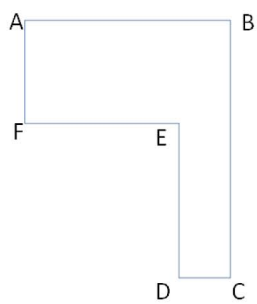
The area of the parallelogram is 80 mi^2.

1. If $AB = 20$, $FE = 12$, $AF = 9$, and $DE = 12$, find the length of both other sides. Then, find the area of the irregular polygon.



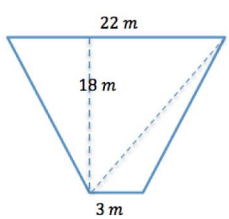
$CD = 8,\ BC = 21,\ \text{Area} = 276\ \text{units}^2$

2. If $DC = 1.9\ \text{cm}$, $FE = 5.6\ \text{cm}$, $AF = 4.8\ \text{cm}$, and $BC = 10.9\ \text{cm}$, find the length of both other sides. Then, find the area of the irregular polygon.



$AB = 7.5\ \text{cm}$, $DE = 6.1\ \text{cm}$, $\text{Area} = 47.59\ \text{cm}^2$

3. Determine the area of the trapezoid below. The trapezoid is not drawn to scale.



Area of Triangle 1

$A = \frac{1}{2}bh$

$A = \frac{1}{2} \times 22\ \text{m} \times 18\ \text{m}$

$A = 198\ \text{m}^2$

Area of Triangle 2

$A = \frac{1}{2}bh$

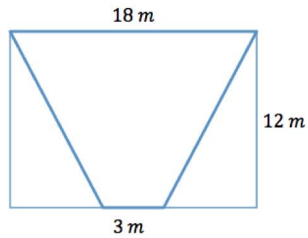
$A = \frac{1}{2} \times 3\ \text{m} \times 18\ \text{m}$

$A = 27\ \text{m}^2$

$\text{Area of Trapezoid} = \text{Area of Triangle 1} + \text{Area of Triangle 2}$

$\text{Area} = 198\ \text{m}^2 + 27\ \text{m}^2 = 225\ \text{m}^2$

4. Determine the area of the isosceles trapezoid below. The image is not drawn to scale.



Area of Rectangle

$A = bh$

$A = 18\text{ m} \times 12\text{ m}$

$A = 216\text{ m}^2$

Area of Triangles 1 and 2

$A = \frac{1}{2}bh$

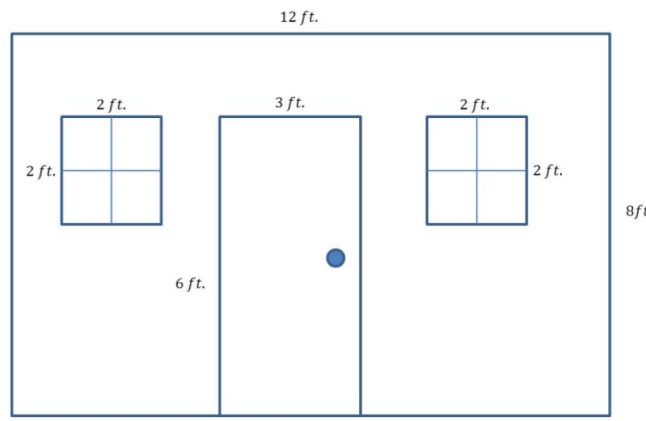
$A = \frac{1}{2} \times 7.5\text{ m} \times 12\text{ m}$

$A = 45\text{ m}^2$

$\text{Area of Trapezoid} = \text{Area of Rectangle} - \text{Area of Triangle 1} - \text{Area of Triangle 2}$

$A = 216\text{ m}^2 - 45\text{ m}^2 - 45\text{ m}^2 = 126\text{ m}^2$

5. Here is a sketch of a wall that needs to be painted:



a. The windows and door will not be painted. Calculate the area of the wall that will be painted.

Whole wall: $12\text{ ft.} \times 8\text{ ft.} = 96\text{ ft}^2$

Window: $2\text{ ft.} \times 2\text{ ft.} = 4\text{ ft}^2$ *There are two identical windows,* $4\text{ ft}^2 \times 2 = 8\text{ ft}^2$

Door: $6\text{ ft.} \times 3\text{ ft.} = 18\text{ ft}^2$

$96\text{ ft}^2 - 8\text{ ft}^2 - 18\text{ ft}^2 = 70\text{ ft}^2$

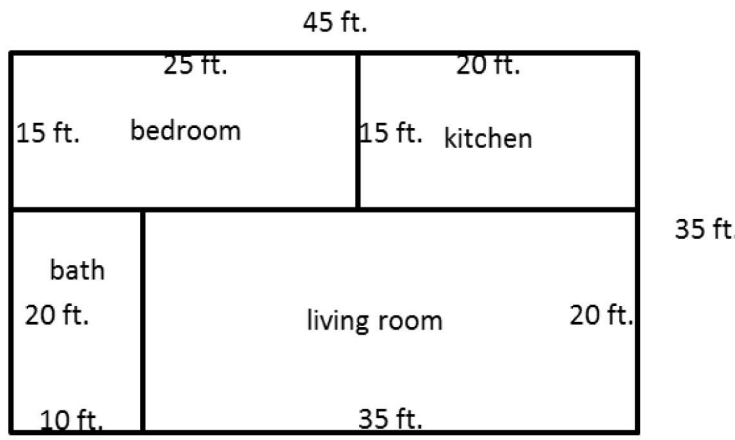
b. If a quart of Extra-Thick Gooey Sparkle paint covers 30 ft^2, how many quarts must be purchased for the painting job?

$70 \div 30 = 2\frac{1}{3}$

Therefore, 3 quarts must be purchased.

MP.7

6. The figure below shows a floor plan of a new apartment. New carpeting has been ordered, which will cover the living room and bedroom but not the kitchen or bathroom. Determine the carpeted area by composing or decomposing in two different ways, and then explain why they are equivalent.



Answers will vary. Sample student responses are shown.

Bedroom: $15 \text{ ft.} \times 25 \text{ ft.} = 375 \text{ ft}^2$

Living room: $35 \text{ ft.} \times 20 \text{ ft.} = 700 \text{ ft}^2$

Sum of bedroom and living room: $375 \text{ ft}^2 + 700 \text{ ft}^2 = 1075 \text{ ft}^2$

Alternatively, the whole apartment is $45 \text{ ft.} \times 35 \text{ ft.} = 1575 \text{ ft}^2$

Subtracting the kitchen and bath (300 ft^2 *and* 200 ft^2) *still gives* 1075 ft^2.

The two areas are equivalent because they both represent the area of the living room and bedroom.