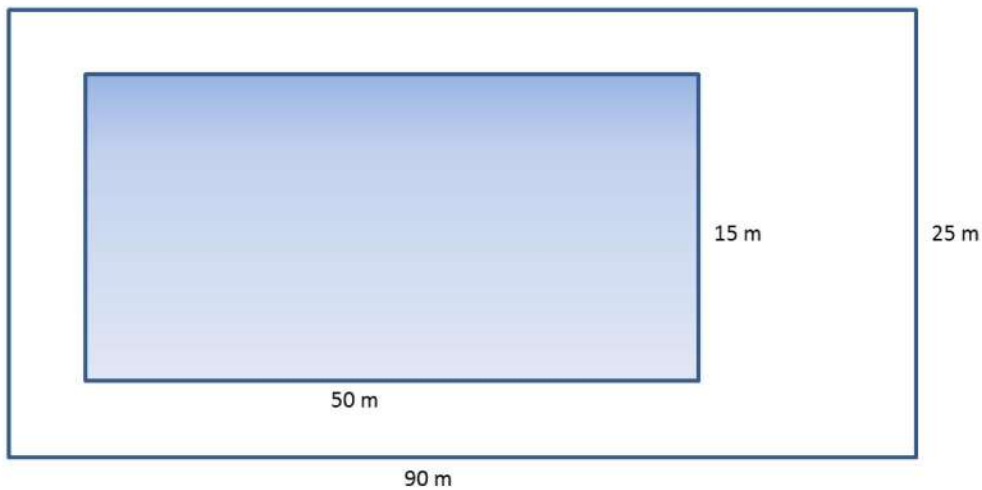
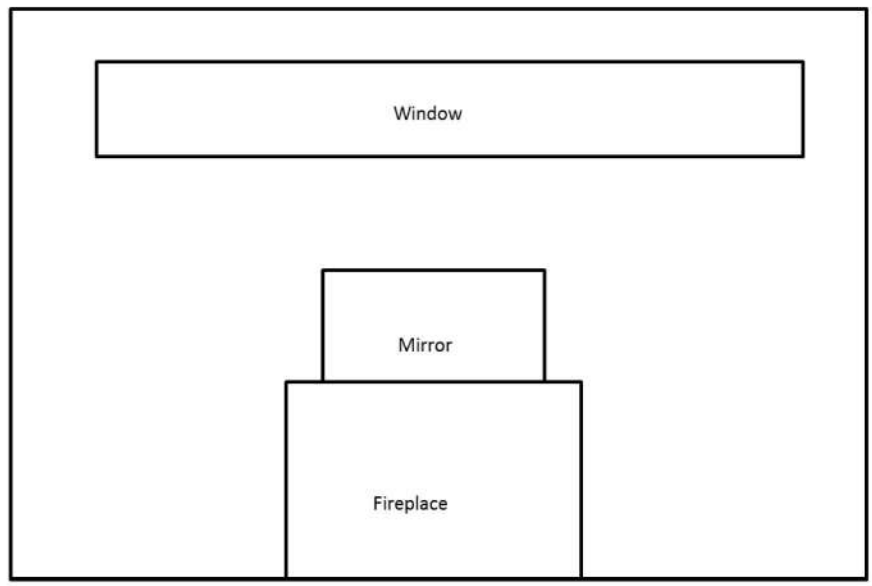
Name _____ Date _____

Area in the Real World

Find the area of the deck around this pool. The deck is the white area in the diagram.



1. Below is a drawing of a wall that is to be covered with either wallpaper or paint. The wall is 8 ft. high and 16 ft. long. The window, mirror, and fireplace will not be painted or papered. The window measures 18 in. by 14 ft. The fireplace is 5 ft. wide and 3 ft. high, while the mirror above the fireplace is 4 ft. by 2 ft.

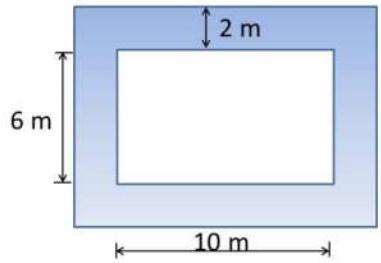


   a. How many square feet of wallpaper are needed to cover the wall?
   b. The wallpaper is sold in rolls that are 18 in. wide and 33 ft. long. Rolls of solid color wallpaper will be used, so patterns do not have to match up.
      i. What is the area of one roll of wallpaper?
      ii. How many rolls would be needed to cover the wall?
   c. This week, the rolls of wallpaper are on sale for \$11.99/roll. Find the cost of covering the wall with wallpaper.
   d. A gallon of special textured paint covers 200 ft^2 and is on sale for \$22.99/gallon. The wall needs to be painted twice (the wall needs two coats of paint). Find the cost of using paint to cover the wall.

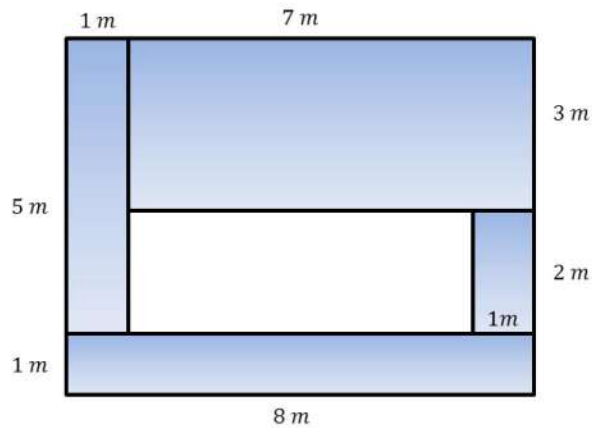
2. A classroom has a length of 20 ft. and a width of 30 ft. The flooring is to be replaced by tiles. If each tile has a length of 24 in. and a width of 36 in., how many tiles are needed to cover the classroom floor?

3. Challenge: Assume that the tiles from Problem 2 are unavailable. Another design is available, but the tiles are square, 18 in. on a side. If these are to be installed, how many must be ordered?

4. A rectangular flower bed measures 10 m by 6 m. It has a path 2 m wide around it. Find the area of the path.

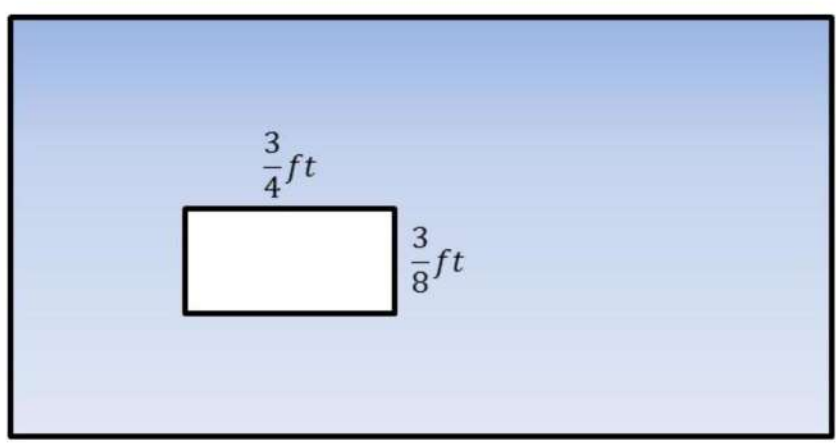


5. Tracy wants to cover the missing portion of his deck with soil in order to grow a garden.
   a. Find the missing portion of the deck. Write the expression and evaluate it.

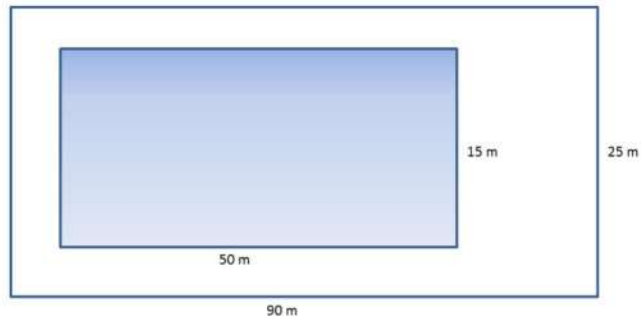


   b. Find the missing portion of the deck using a different method. Write the expression and evaluate it.
   c. Write your two equivalent expressions.
   d. Explain how each demonstrates a different understanding of the diagram.

6. The entire large rectangle below has an area of $3\frac{1}{2}$ ft^2. If the dimensions of the white rectangle are as shown below, write and solve an equation to find the area, A, of the shaded region.



Find the area of the deck around this pool. The deck is the white area in the diagram.



Area of Walkway and Pool

$A = bh$

$A = 90\text{ m} \times 25\text{ m}$

$A = 2250\text{ m}^2$

Area of Pool

$A = bh$

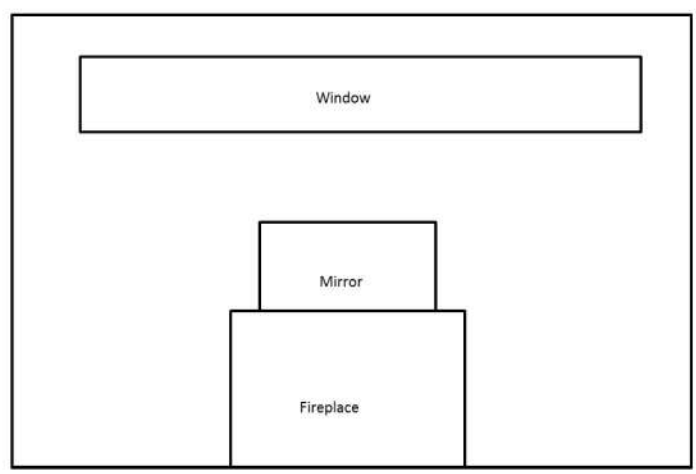
$A = 50\text{ m} \times 15\text{ m}$

$A = 750\text{ m}^2$

Area of Walkway

$2250\text{ m}^2 - 750\text{ m}^2 = 1500\text{ m}^2$

1. Below is a drawing of a wall that is to be covered with either wallpaper or paint. The wall is 8 ft. high and 16 ft. long. The window, mirror, and fireplace will not be painted or papered. The window measures 18 in. by 14 ft. The fireplace is 5 ft. wide and 3 ft. high, while the mirror above the fireplace is 4 ft. by 2 ft.



a. How many square feet of wallpaper are needed to cover the wall?

Total wall area $= 8\text{ ft.} \times 16\text{ ft.} = 128\text{ ft}^2$

Window area $= 14\text{ ft.} \times 1.5\text{ ft.} = 21\text{ ft}^2$

Fireplace area $= 3\text{ ft.} \times 5\text{ ft.} = 15\text{ ft}^2$

Mirror area $= 4\text{ ft.} \times 2\text{ ft.} = 8\text{ ft}^2$

Net wall area to be covered $128\text{ ft}^2 - (21\text{ ft}^2 + 15\text{ ft}^2 + 8\text{ ft}^2) = 84\text{ ft}^2$

b. The wallpaper is sold in rolls that are 18 in. wide and 33 ft. long. Rolls of solid color wallpaper will be used, so patterns do not have to match up.

i. What is the area of one roll of wallpaper?

Area of one roll of wallpaper: $33 \text{ ft.} \times 1.5 \text{ ft.} = 49.5 \text{ ft}^2$

ii. How many rolls would be needed to cover the wall?

$84 \text{ ft}^2 \div 49.5 \text{ ft}^2 \approx 1.7$; *therefore, 2 rolls would need to be purchased.*

c. This week, the rolls of wallpaper are on sale for $\$11.99$/roll. Find the cost of covering the wall with wallpaper.

We need two rolls of wallpaper to cover the wall, which will cost $\$11.99 \times 2 = \$23.98$.

d. A gallon of special textured paint covers 200 ft^2 and is on sale for $\$22.99$/gallon. The wall needs to be painted twice (the wall needs two coats of paint). Find the cost of using paint to cover the wall.

Total wall area$= 8 \text{ ft.} \times 16 \text{ ft.} = 128 \text{ ft}^2$

Window area$= 14 \text{ ft.} \times 1.5 \text{ ft.} = 21 \text{ ft}^2$

Fireplace area$= 3 \text{ ft.} \times 5 \text{ ft.} = 15 \text{ ft}^2$

Mirror area$= 4 \text{ ft.} \times 2 \text{ ft.} = 8 \text{ ft}^2$

Net wall area to be covered $128 \text{ ft}^2 - (21 \text{ ft}^2 + 15 \text{ ft}^2 + 8 \text{ ft}^2) = 84 \text{ ft}^2$

If the wall needs to be painted twice, we need to paint a total area of $84 \text{ ft}^2 \times 2 = 168 \text{ ft}^2$. *One gallon is enough paint for this wall, so the cost will be* $\$22.99$.

2. A classroom has a length of 20 ft. and a width of 30 ft. The flooring is to be replaced by tiles. If each tile has a length of 24 in. and a width of 36 in., how many tiles are needed to cover the classroom floor?

Area of the classroom: $20 \text{ ft.} \times 30 \text{ ft.} = 600 \text{ ft}^2$

Area of each tile: $2 \text{ ft.} \times 3 \text{ ft.} = 6 \text{ ft}^2$

$$\frac{\text{Area of the classroom}}{\text{Area of each tile}} = \frac{600 \text{ ft}^2}{6 \text{ ft}^2} = 100 \text{ tiles}$$

Allow for students who say that if the tiles are $2 \text{ ft.} \times 3 \text{ ft.}$, *and they orient them in a way that corresponds to the* $20 \text{ ft.} \times 30 \text{ ft.}$ *room, then they will have ten rows of ten tiles giving them* 100 *tiles. Using this method, the students do not need to calculate the areas and divide. Orienting the tiles the other way, students could say that they will need* 105 *tiles as they will need* $6\frac{2}{3}$ *rows of* 15 *tiles, and since* $\frac{2}{3}$ *of a tile cannot be purchased, they will need* 7 *rows of* 15 *tiles.*

3. Challenge: Assume that the tiles from Problem 2 are unavailable. Another design is available, but the tiles are square, 18 in. on a side. If these are to be installed, how many must be ordered?

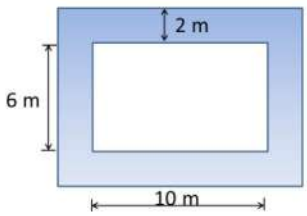
Solutions will vary. An even number of tiles fit on the 30 *foot width of the room* (20 *tiles), but the length requires* $13\frac{1}{3}$ *tiles. This accounts for a* 20 *tile by* 13 *tile array* $20 \text{ tiles} \times 13 \text{ tiles} = 260 \text{ tiles}$.

The remaining area is $30 \text{ ft.} \times 0.5 \text{ ft.}$ $(20 \text{ tiles} \times \frac{1}{3} \text{ tile})$

Since 20 *of the* $\frac{1}{3}$ *tiles are needed,* 7 *additional tiles must be cut to form* $\frac{21}{3}$. 20 *of these will be used with* $\frac{1}{3}$ *of* 1 *tile left over.*

Using the same logic as above, some students may correctly say they will need 280 *tiles.*

4. A rectangular flower bed measures 10 m by 6 m. It has a path 2 m wide around it. Find the area of the path.



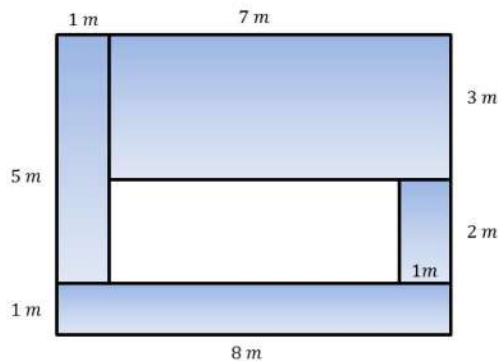
Total area: $14 \text{ m} \times 10 \text{ m} = 140 \text{ m}^2$

Flower bed area: $10 \text{ m} \times 6 \text{ m} = 60 \text{ m}^2$

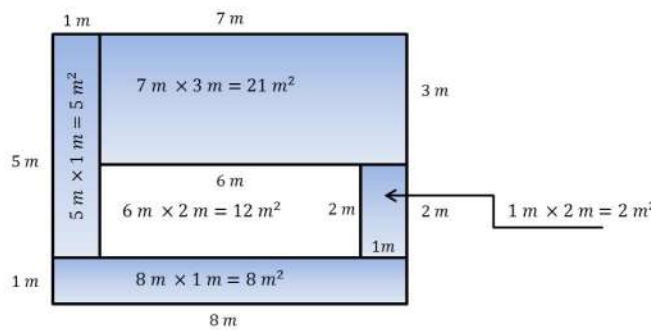
Area of path: $140 \text{ m}^2 - 60 \text{ m}^2 = 80 \text{ m}^2$

5. Tracy wants to cover the missing portion of his deck with soil in order to grow a garden.

a. Find the missing portion of the deck. Write the expression and evaluate it.



Students will use one of two methods to find the area: finding the dimensions of the garden area (interior rectangle, $6 \text{ m} \times 2 \text{ m}$) or finding the total area minus the sum of the four wooden areas, shown below.



$6 \text{ m} \times 2 \text{ m} = 12 \text{ m}^2$

OR

$8 \times 6 - 7 \times 3 - 5 \times 1 - 8 \times 1 - 2 \times 1 = 12$ *(All linear units are in meters; area is in square meters.)*

b. Find the missing portion of the deck using a different method. Write the expression and evaluate it.

Students should choose whichever method was not used in part (a).

c. Write your two equivalent expressions.

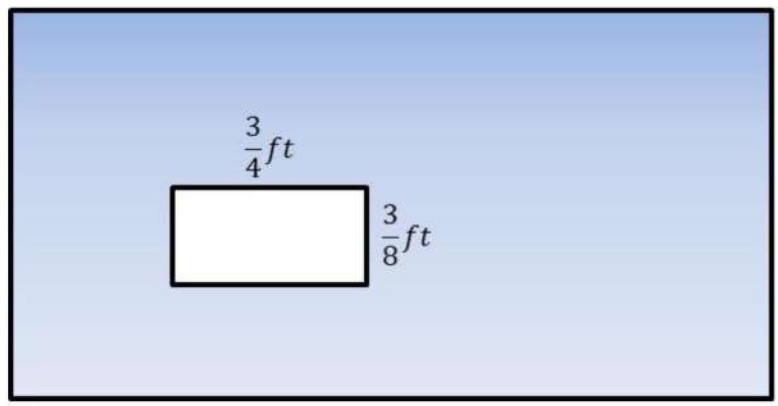
$8 \times 6 - 7 \times 3 - 5 \times 1 - 8 \times 1 - 2 \times 1$

6×2

d. **Explain how each demonstrates a different understanding of the diagram.**

One expression shows the dimensions of the garden area (interior rectangle, $6\text{ m} \times 2\text{ m}$), and one shows finding the total area minus the sum of the four wooden areas.

6. **The entire large rectangle below has an area of $3\frac{1}{2}\text{ ft}^2$. If the dimensions of the white rectangle are as shown below, write and solve an equation to find the area, A, of the shaded region.**



$$\frac{3}{4}\text{ft.} \times \frac{3}{8}\text{ft.} = \frac{9}{32}\text{ft}^2$$

$$\frac{9}{32}\text{ ft}^2 + A = 3\frac{1}{2}\text{ ft}^2$$

$$A = 3\frac{7}{32}\text{ ft}^2$$