What You'll Learn

To compose and decompose polygons to solve problems involving area

🔊 **New Vocabulary** compose, decompose

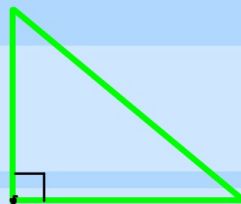Please get a clicker and your notebook.

Get ready for the warm-up problems.

The length of the perpendicular segment from a vertex to the base opposite that vertex is the _____ of the triangle.
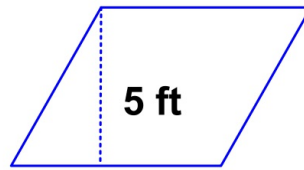
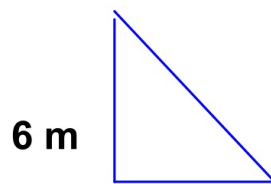(A) base

(B) height

(C) side

(D) length

Find the area

5 ft

5.5 ft

A 25.5 feet squared

B 10.5 feet squared

C 27.5 feet squared

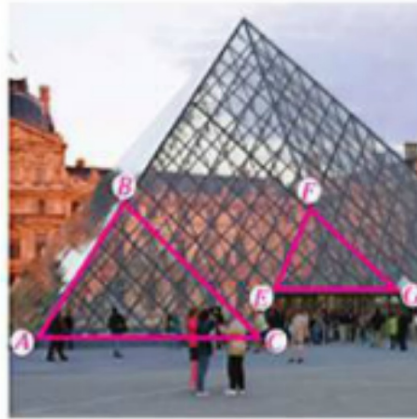**D** 275 feet squared

Find the area

6 m

6 m

A 36 m sq

**B** 12 m sq

C 6 m sq

D 18 m sq

Why Learn This?

Draftspersons make detailed diagrams of the buildings architects design. The labeled measurements on the diagrams can be used to find the areas of different parts of the buildings.

EXAMPLE   **Making Simpler Shapes**

1 Multiple Choice Karl drew this diagram of a deck he's going to build. What is the area of the deck?

- Ⓐ 134.4 square feet
- Ⓑ 206.4 square feet
- Ⓒ 268.8 square feet
- Ⓓ 748.8 square feet

10.4 ft
12 ft
12 ft
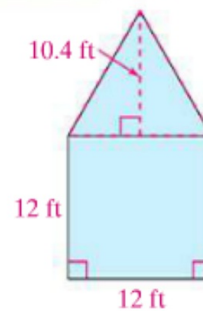
The deck is in the shape of a pentagon. You can think of the pentagon as a triangle and a square that share an edge.

To find the area of the deck, find the sum of the areas of the square and the triangle

Square

$A = b \times h$
$= 12 \times 12$
$= 144$

Triangle

$A = \frac{1}{2} \times b \times h$
$= \frac{1}{2} \times 10.4 \times 12$
$= 62.4$

Sum of the areas: $144 + 62.4 = 206.4$

The total area is 206.4 square feet. The correct answer is choice B.

8.5 ft

20 ft

10 ft

8.5 ft

✓ **Quick Check**

● **1.** Find the area of the deck at the left.

To **compose** means to join together. To **decompose** means to take apart. Composing and decomposing figures into simpler shapes can sometimes help you find the total area of a polygon.

Vocabulary Tip

The prefix *de-* means to do or make the opposite of. So *compose* is to join and *decompose* is to do the opposite or take apart.

Composing a Polygon to Find Area

2 Haley drew a diagram of the two sections of her garden.
Find the total area of her garden.

10 yd   8 yd

8 yd   8 yd   8 yd
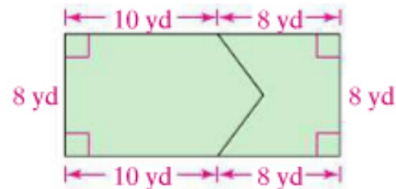
3 yd

10 yd   3 yd
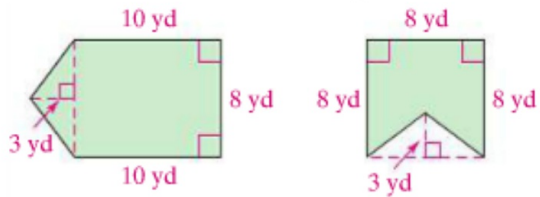
Step 1 Compose the two polygons into
one rectangle.

Step 2 Find the area of the new
rectangle.

$$A = b \times h$$
$$= (10 + 8) \times 8 = 18 \times 8 = 144$$
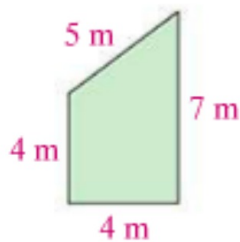
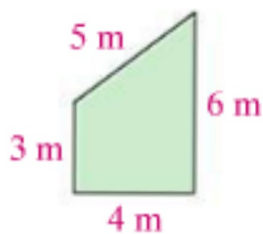The total area of Haley's garden is 144 square yards.

|←— 10 yd —→|←— 8 yd —→|

8 yd   8 yd

|←— 10 yd —→|←— 8 yd —→|

Table talk about this, then enter your answer in your clicker.
_____ m^2

5 m

7 m

4 m

4 m

✓ **Quick Check**

2. Tyler's garden has the two sections shown at the left. Find the
total area of Tyler's garden.

5 m

6 m

3 m

4 m

Decomposing a Polygon to Find Area

3 Find the area of the polygon.

Decompose the polygon into two rectangles and a triangle.

Area of smaller rectangle: $b \times h = 2 \times 3$, or 6 in.²

Area of larger rectangle: $b \times h = 4 \times 5$, or 20 in.²

Area of triangle: $\frac{1}{2} \times b \times h = \frac{1}{2} \times 5 \times 3$, or 7.5 in.²
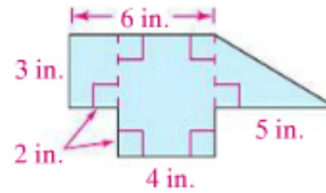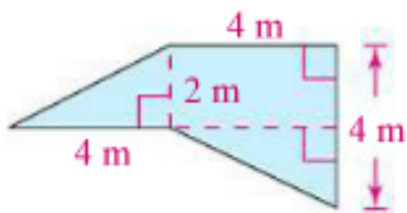
The total area is $6 + 20 + 7.5$, or 33.5 in.².

Table talk about this problem, then enter your answer in your clickers. _____ m²

✓ **Quick Check**

3. Find the area of the figure at the left.

Let's work through this problem together

Joe is having a concrete patio installed in the shape of the regular pentagon shown at the right. The cost of the finished patio is $2.75 per square foot. How much will Joe pay for the patio?
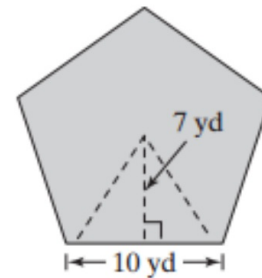
Understand

1. What are you being asked to do?

   _____

2. What will you need to know to solve this problem?

   _____

Plan and Carry Out

3. The cost is given per square foot, so first convert yards to feet. What are the base and height of the triangle in feet?

   _____

4. What is the area of the triangle-shaped section of the pentagon?

   _____

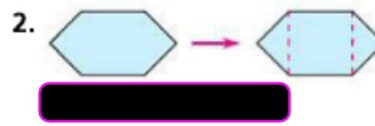5. How can you use the area of one triangle to find the total area?

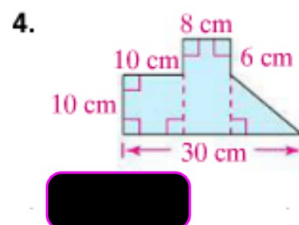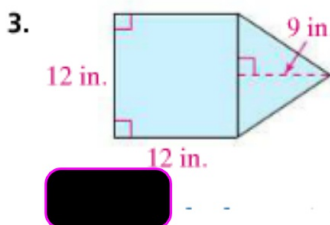   _____

6. What is the total area of the patio?

   _____

7. How can you find the total cost? What is the total cost?

7 yd

|← 10 yd →|

✓ **Check Your Understanding**

Vocabulary Write *decomposing* or *composing* to describe what each diagram shows.
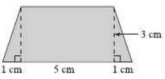
1.

2.

Find the area of each polygon.

3.
12 in.
9 in.
12 in.

4.
8 cm
10 cm   6 cm
10 cm
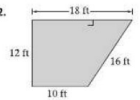|← 30 cm →|

You can power down your clickers and put them away.

We have an assignment worksheet, and time to begin working on it.
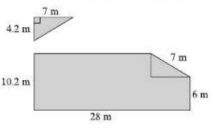

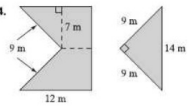Name _____ Class _____ Date _____

Practice 8-2

Areas of Polygons

Find the area of the shaded polygon.

1.

3 cm
1 cm   5 cm   1 cm

2.

18 ft
12 ft
16 ft
10 ft
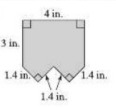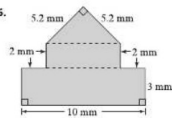
Find the total area of the shaded polygons.

3.

7 m
4.2 m
7 m
10.2 m
6 m
28 m

4.

7 m
9 m
9 m
12 m
9 m
14 m
9 m

Find the area of the shaded polygon.

5.

4 in.
3 in.
1.4 in.   1.4 in.
1.4 in.

6.

5.2 mm   5.2 mm
2 mm → ← 2 mm
3 mm
10 mm

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7. Martha is covering this trapezoid-shaped board with fabric. How many square feet of fabric does Martha need?

3 ft
4 ft
6 ft

8. A garden in the shape of a regular hexagon has sides that are each 5 meters long. If the height of each of the congruent triangles within the hexagon is about 4.33 meters, what is the area of the garden?

Practice

Course 1 Lesson 8-2   **259**