LESSON

Solve real-world and mathematical problems involving area

Common Core Standard – 6.G.1

Curriculum lesson written and illustrated by

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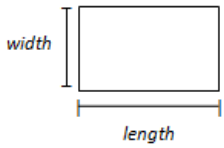
INTRODUCTION

Click on each word to see a short explanation. When you are ready to start the lesson click on the continue activity button. If you don't click on any words, the lesson will start on its own in about 10 seconds.

I-1

LESSON VOCABULARY

Area



Base

Height

Composite Figure

Quadrilaterals

Rectangle

Trapezoid

Parallelogram

Triangles

Right

Scalene

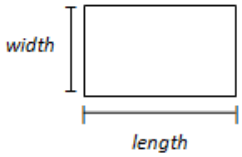
Isosceles

Equilateral

Obtuse

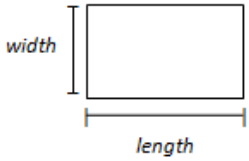
Acute

Area



I-2

Area



Area is the number of units needed to cover a plane shape.

Area rectangle/square: length x width

Area triangle: ½ (base x height)

Area parallelogram: base x height

Area trapezoid: ½ [(base top + base bottom) x height]

Base

I-3

Base

The base of a plane shape is the measurement of one side of a shape, usually the side across the bottom.

Height

I-4

Height

The height of a plane shape is the measurement of one side of a shape, usually from top to bottom.

Composite Figure

I-5

Composite Figure

A composite figure is a shape made up of a combination of other shapes.

Right Triangle

I-6

Right Triangle

A right triangle is a triangle that has 1 right (90˚) angle.

Scalene Triangle

I-7

Scalene Triangle

A scalene triangle is a triangle that has no equal sides and no equal angles.

Equilateral Triangle

I-8

Equilateral Triangle

An equilateral triangle is a triangle that has 3 equal sides and 3 equal angles.

Obtuse Triangle

I-9

Obtuse Triangle

An obtuse triangle is a triangle that has 1 angle that is more than 90˚.

Isosceles Triangle

I-10

Isosceles Triangle

An isosceles triangle is a triangle that has 2 equal sides and 2 equal angles.

Acute Triangle

I-11

Acute Triangle

An acute triangle is a triangle that has 3 angles that are all less than 90˚.

Rectangle

I-12

Rectangle

A rectangle is a quadrilateral that has 2 pairs of opposite equal parallel sides.

Rectangles also have 4 right angles.

Trapezoid

I-13

Trapezoid

A trapezoid is a quadrilateral that has 1 pair of parallel sides.

The parallel sides are called bases and the non-parallel sides are called legs.

Parallelogram

I-14

Parallelogram

A parallelogram is a quadrilateral that has equal opposite parallel sides and equal opposite angles.

Lesson
Solve real-world and mathematical problems involving area

I-15

LESSON:

Solve real-world and mathematical problems involving area

Brook: Hi. My name is Brook and these are my best friends Elaine, Jackie, and Evelyn. We are in the Art Club and we are going to paint a mural on our classroom wall.

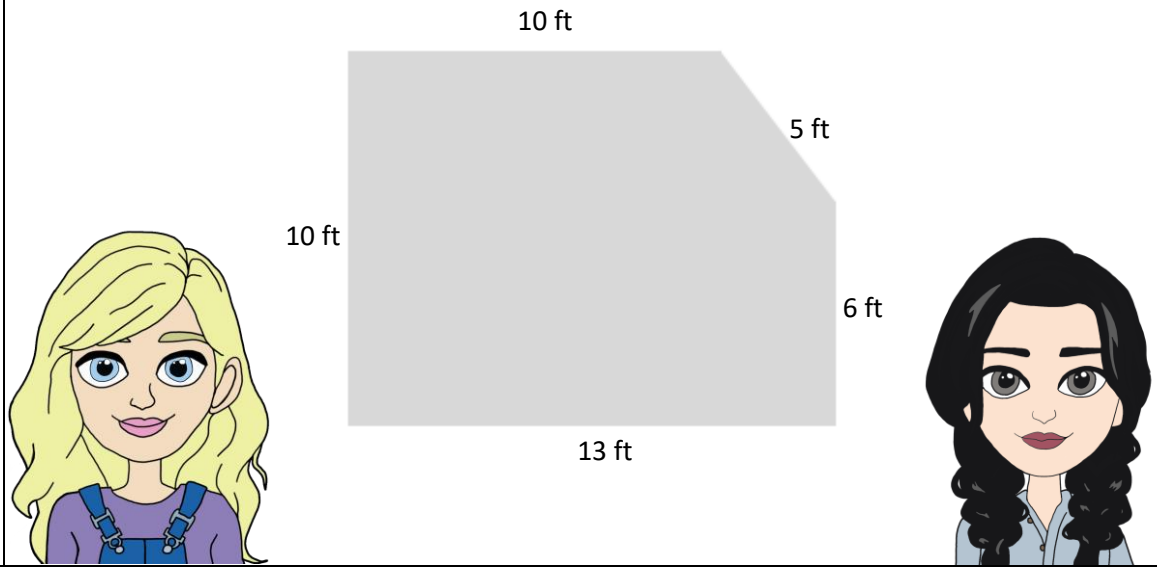
Elaine: We need to cover the wall in white paint before we start painting our mural. First, we need to find out the area of the wall so we will know how much white paint we will need to cover the wall.

I-16

Brook: We already measured the edge of the wall, but now we need to figure out the area of the wall in square feet.

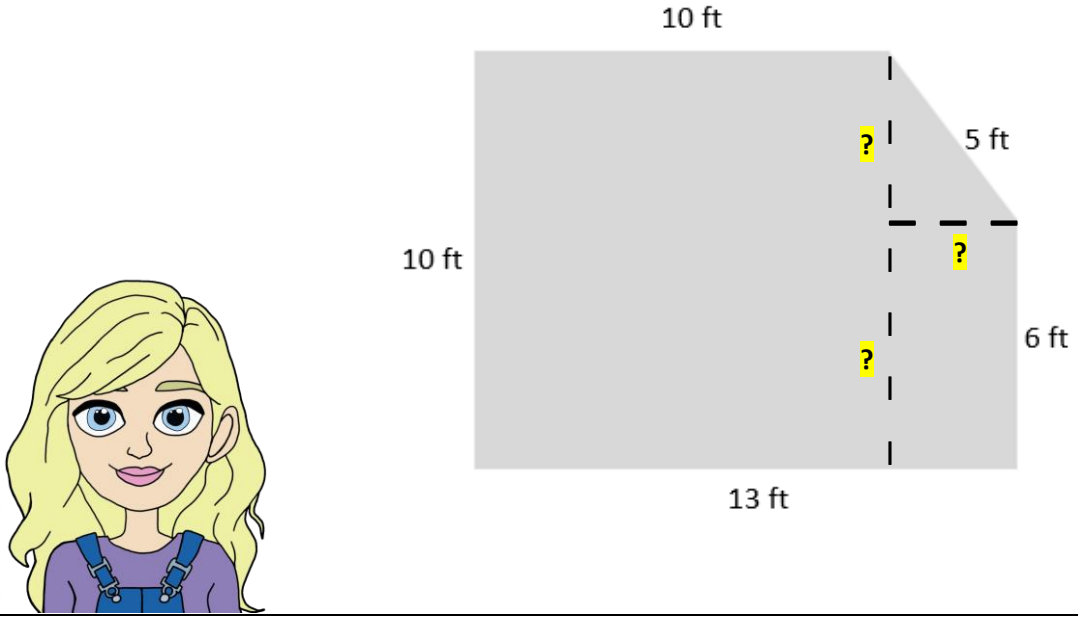
Elaine: Since this shape is a composite figure, it will be easiest to break it down, or decompose it, into simpler shapes that we have already worked with. Can you see the shapes inside this composite figure?

I-17

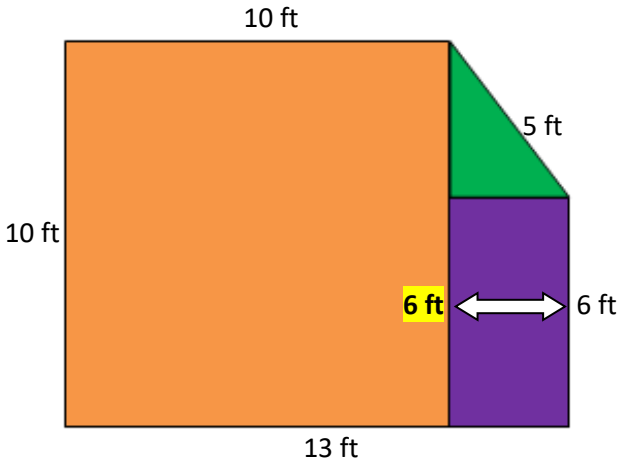


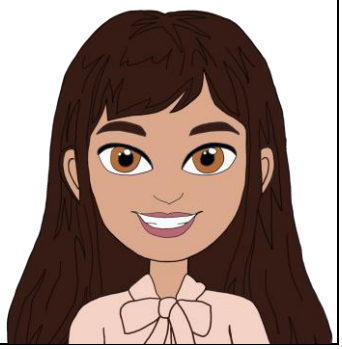
Brook: This composite figure can be broken down, or decomposed, into one square, one rectangle, and one triangle. Now we can find out the measurements of the missing sides.

I-18



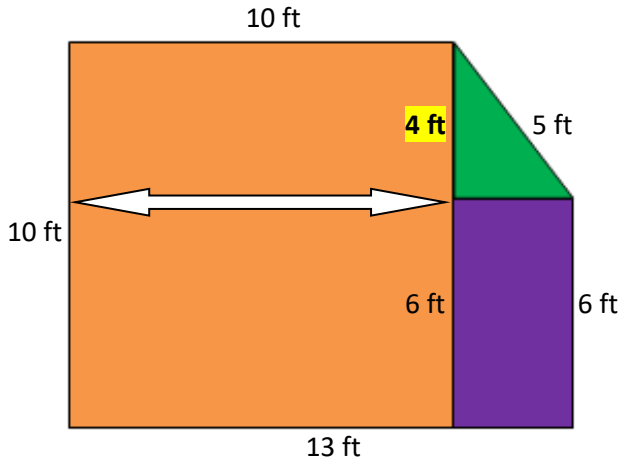
Evelyn: Since the purple shape is a rectangle, and rectangles have equal parallel sides, we know that the other side of the purple rectangle is also 6 feet.





I-19

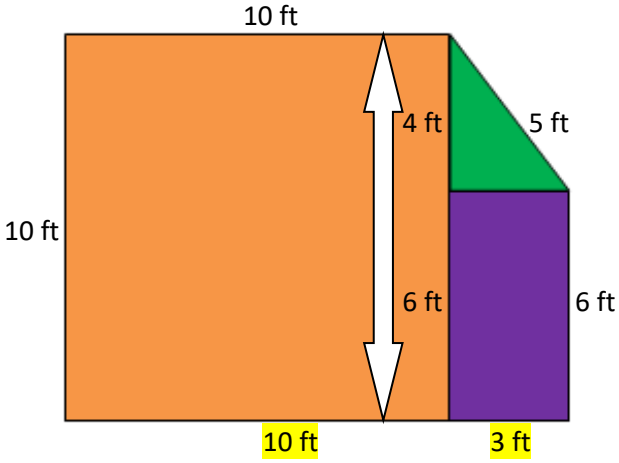
Jackie: Since the orange shape is a square, and squares have equal parallel sides, we know that each side of the square is 10 feet. We can find the height of the green triangle by subtracting the width of the purple rectangle, which is 6 feet, from the width of the orange square, which is 10 feet. The height of the green right triangle is 4 feet.



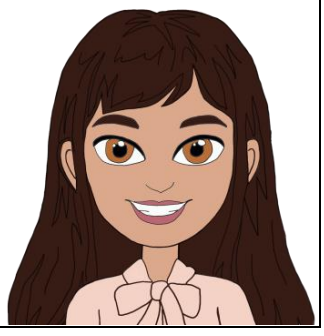
10 feet – 6 feet = 4 feet

I-20

Evelyn: Since the orange shape is a square, and each side of the square is 10 feet, we can find the length of the bottom side of the purple rectangle by subtracting the length of the orange square, which is 10 feet, from the total length across the bottom of the wall, which is 13 feet. The length of the purple rectangle is 3 feet.



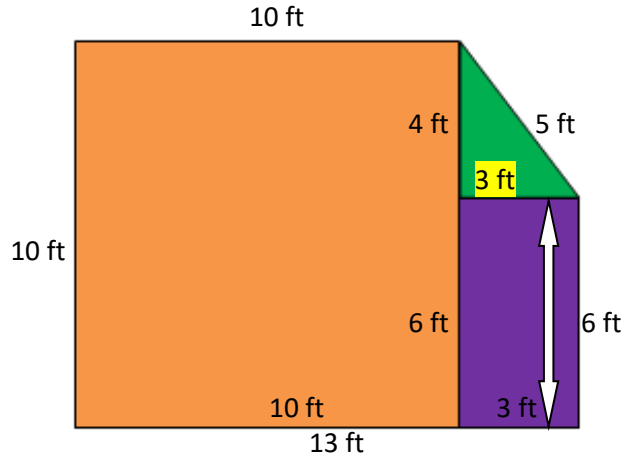
13 feet – 10 feet = 3 feet



I-21

Jackie: And finally, since the purple shape is a rectangle and rectangles have equal parallel sides, we know that the length of the purple rectangle is the same measurement as the base of the green right triangle. Since the length of the purple rectangle is 3 feet, the base of the green right triangle is also 3 feet.

I-22

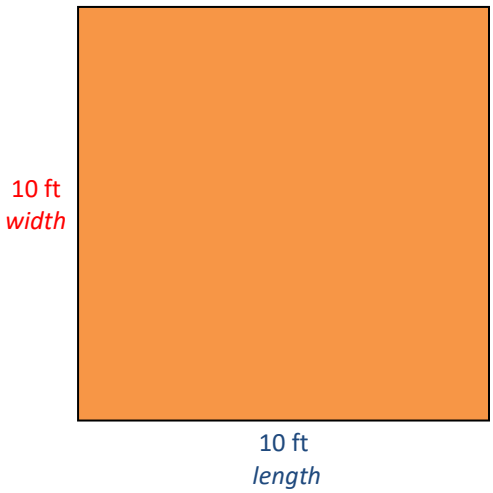


Brook: Now that we have found out the measurements of all of the sides for each shape, we can find the area of each shape.

Remember that the formula for the area of a rectangle or square is to multiply the length times the width.

The length of the orange square is 10 feet and the width is 10 feet. 10 times 10 is 100, so the area of the orange square is 100 square feet.

I-23



Rectangle Area = length x width

length = 10 ft

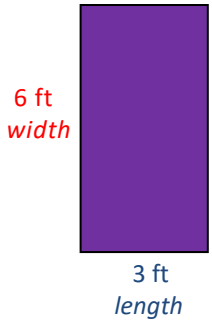
width = 10 ft

10 ft x 10 ft = 100 sq ft

Brook: We can find the area of the purple rectangle the same way that we found the area for the orange square since the formula is the same for both.

The length of the purple rectangle is 3 feet and the width is 6 feet. 3 times 6 is 18, so the area of the purple rectangle is 18 square feet.

I-24



Rectangle Area = length x width

length = 3 ft

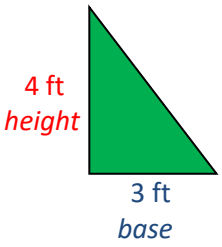
width = 6 ft

3 ft x 6 ft = 18 sq ft

Brook: Now let's find out the area for the green triangle.

Remember that the formula for the area of a triangle is one-half times the base times the height. It helps to remember that one-half times base times height is the same as base times height divided by 2. The base of the green right triangle is 3 feet and the height is 4 feet so we multiply 3 times 4 first. 3 times 4 is 12. Then, we divide 12 by 2. 12 divided by 2 is 6 so the area of the green triangle is 6 square feet.

I-25



Triangle Area = ½ (base x height)

½ (base x height) = (base x height) ÷ 2

base = 3 ft height = 4 ft

(3 x 4) ÷ 2 = 12 ÷ 2

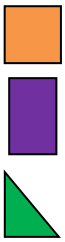
12 ÷ 2 = 6 sq ft

Brook: Since we have all of the areas, all that is left to do is to add all 3 of the areas together and then we will know the area of the wall.

Remember that the area of the orange square is 100 square feet, the area of the purple rectangle is 18 square feet, and the area of the green right triangle is 6 square feet.

100 plus 18 plus 6 equals 124 so we will need enough white paint to cover 124 square feet.

I-26



100 sq ft

18 sq ft

+ 6 sq ft

124 sq ft

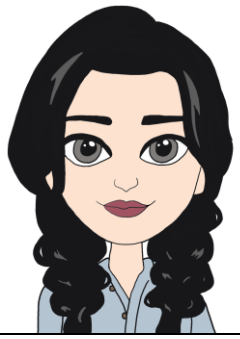
= 124 square feet

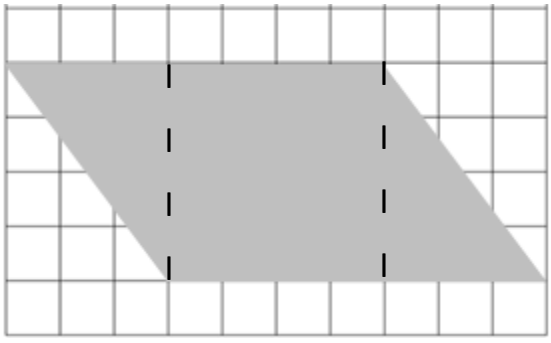
Elaine: Let's try a problem together.

We will find out the area for this parallelogram.

First, use the pen to draw lines on the grey shape to decompose the parallelogram into simpler shapes like triangles and rectangles.

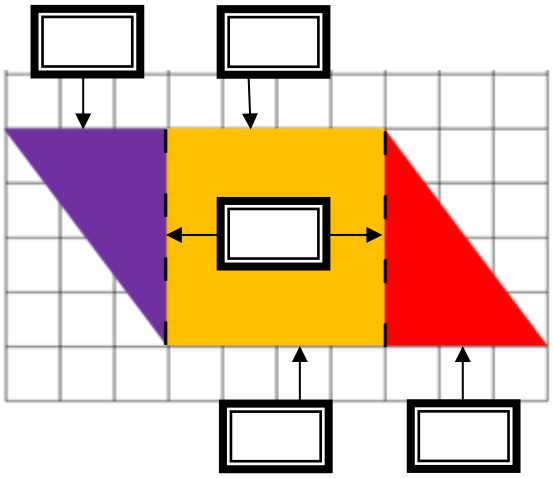
I-27





Elaine: Next, type the measurements you know into the boxes. Each square on the grid is worth one square inch.

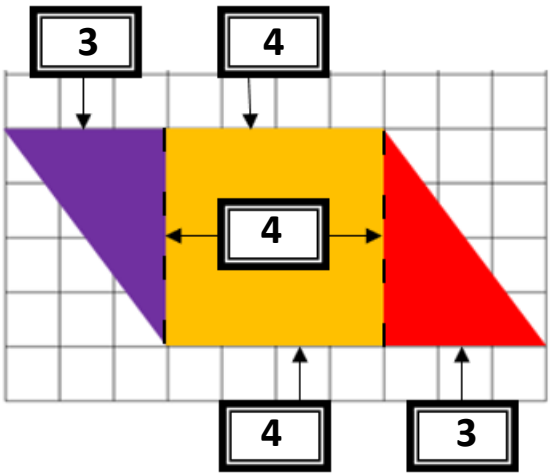
= 1 square inch



I-28

Elaine: That's right! Since we found out the measurements of all of the sides of the shapes, let's find out the areas for each shape.

= 1 square inch



I-29

Elaine: Use the information on the screen to find the area of the yellow square. Type your answers into the boxes.

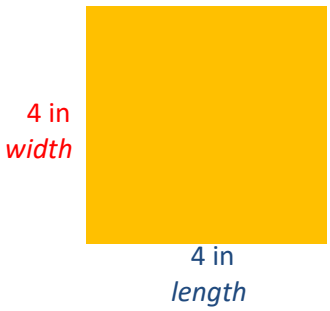
Rectangle Area = length x width

in X in = sq in

I-30

Elaine: Great job! The length of the yellow square is 4 inches and the width is 4 inches so when we multiply them together, we get an area of 16 square inches. Let's move on to finding the areas of the right triangles.

I-31

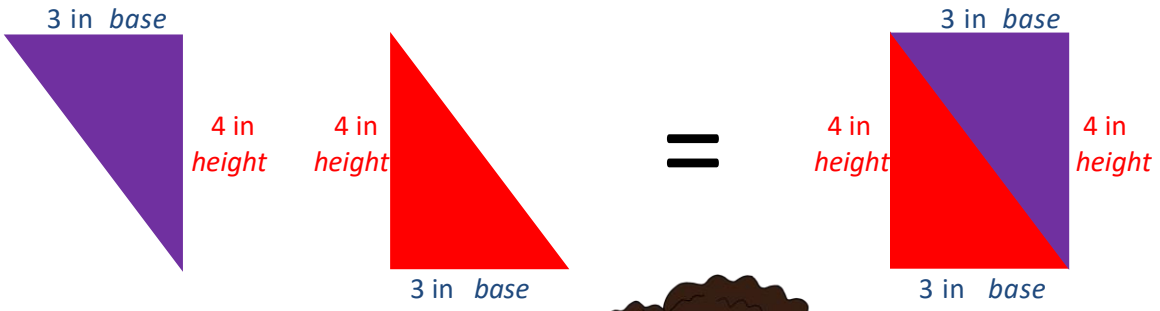


Rectangle Area = length x width

4 in X 4 in = 16 sq in

Jackie: You may have learned in the past that 2 right triangles that have the same base and height can be joined together to make one rectangle which makes it easier to find out the area. Let's try both ways to see if we get the same answer.

I-32

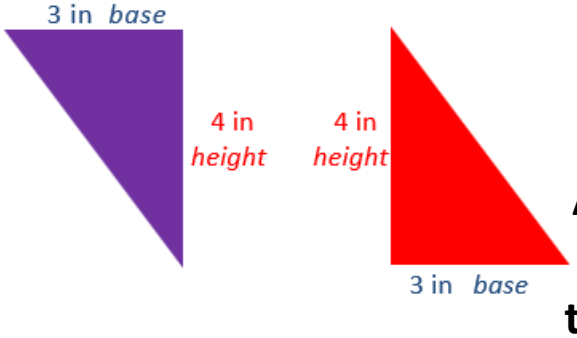


Jackie: Find the areas of the triangles using the information on the screen. Type your answers into the boxes.

I-33

Triangle Area = ½ (base x height) = (base x height) ÷ 2

(☐ x ☐) ÷ 2 = ☐ ÷ 2 = ☐ sq in



☐ ← Area

\+ ☐ ← Area

Area of both triangles ☐ sq in

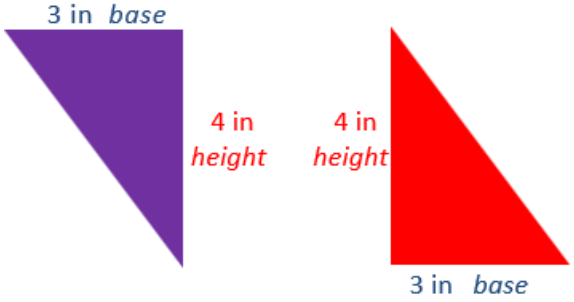
Jackie: Awesome! I knew you could do it. The area of each right triangle is 6 square inches so when we add them together, we get 12 square inches.

Now we can turn the 2 right triangles into a rectangle and see if we get the same answer.

I-34

Triangle Area = ½ (base x height) = (base x height) ÷ 2

(3 x 4) ÷ 2 = 12 ÷ 2 = 6 sq in



6 ← Area

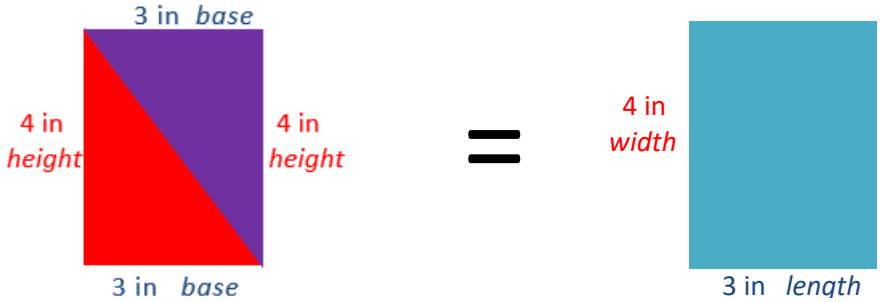
\+ 6 ← Area

Area of both triangles 12 **sq in**

Jackie: We can find the area of the 2 right triangles by joining them together and using the formula for a rectangle.

Find the area of the new rectangle using the information on the screen. Type your answers in the boxes.

I-35

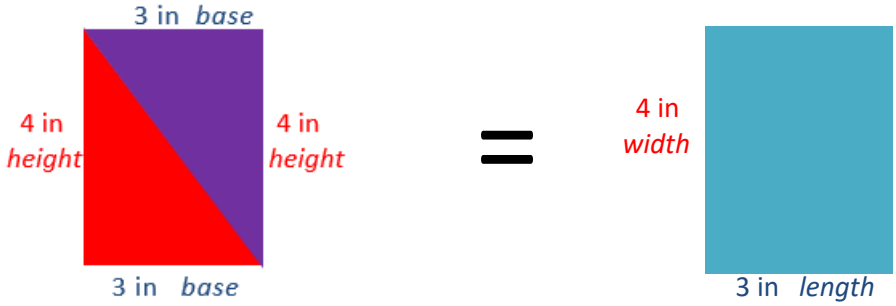


Rectangle Area = length x width

[ ] x [ ] = [ ] sq in

Jackie: Good job! The area of each of the 2 right triangles added together was 12 square inches and the area of the rectangle we made with the 2 right triangles was also 12 square inches. Since we ended up with the same area either way we did it, next time you have a problem like this one, you can do whichever way works best for you to find the answer. Just make sure that the 2 right triangles that you add together have the same measurements as each other.

I-36

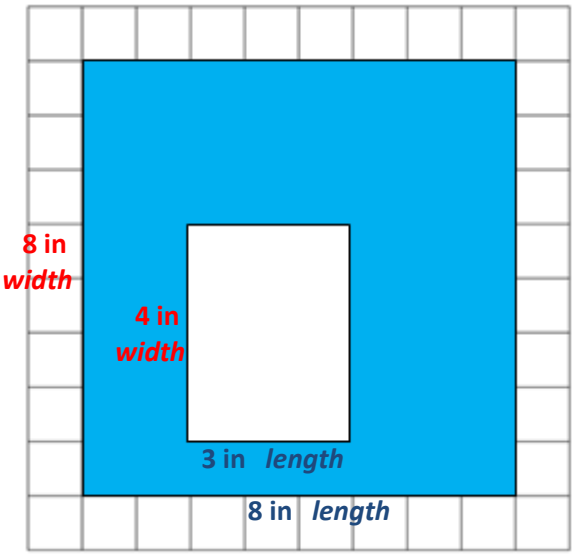


Rectangle Area = length x width

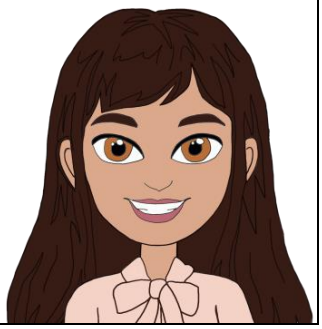
3 x 4 = 12 sq in

Evelyn: Did you know that you can find out the area of a shape using subtraction too?

If you have a shape that has a piece missing, all you need to do is find the area of the big shape and subtract the area of the missing shape.

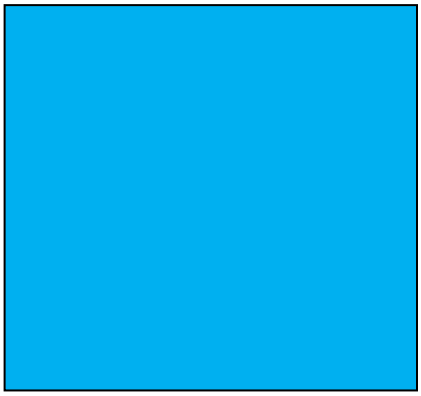


= 1 square inch



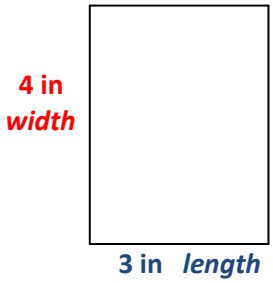
I-37

Evelyn: Use the information on the screen to find the area for each shape. Type your answers in the boxes.



in X in = sq in

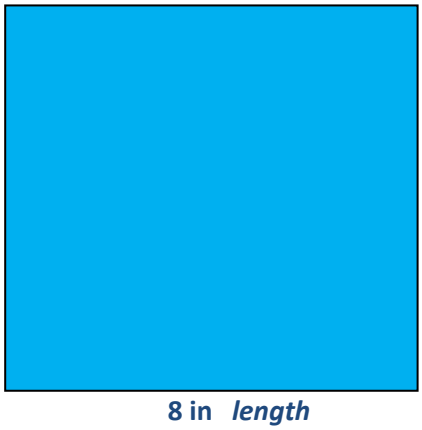
Rectangle Area = length x width



in X in = sq in

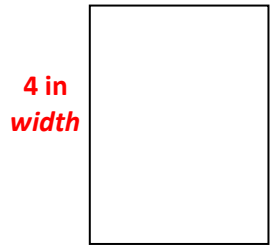
I-38

Evelyn: Great! The area of the blue square is 64 square inches and the area of the white rectangle is 12 square inches.



8 in X 8 in = 64 sq in

Rectangle Area = length x width



3 in X 4 in = 12 sq in

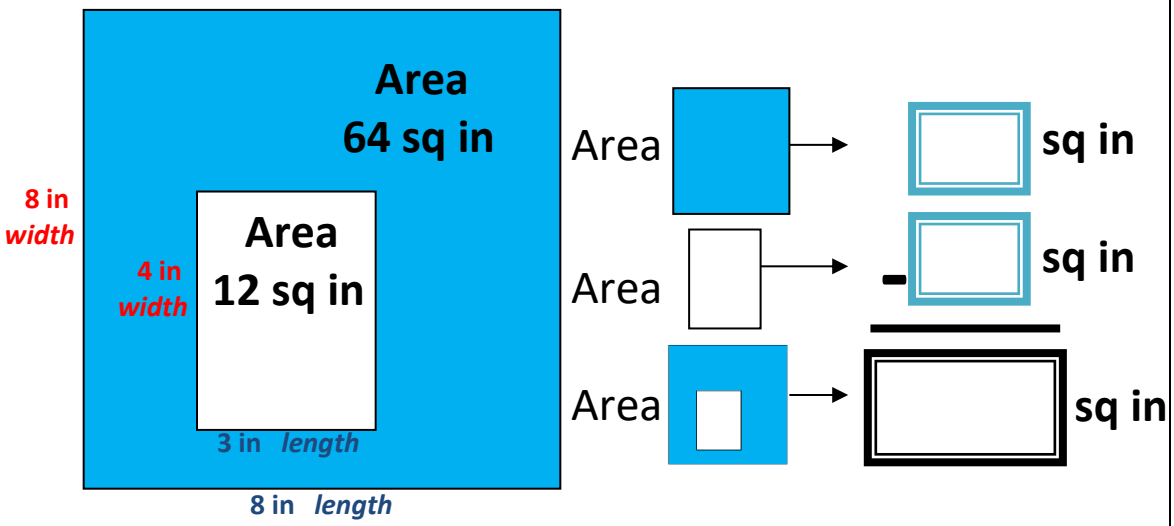
I-39

Evelyn: Now, imagine that the white rectangle is a hole in the blue square.

For this problem, we are going to find out the area of the blue space only. To do this, we need to subtract the area of the white space from the area of the blue space.

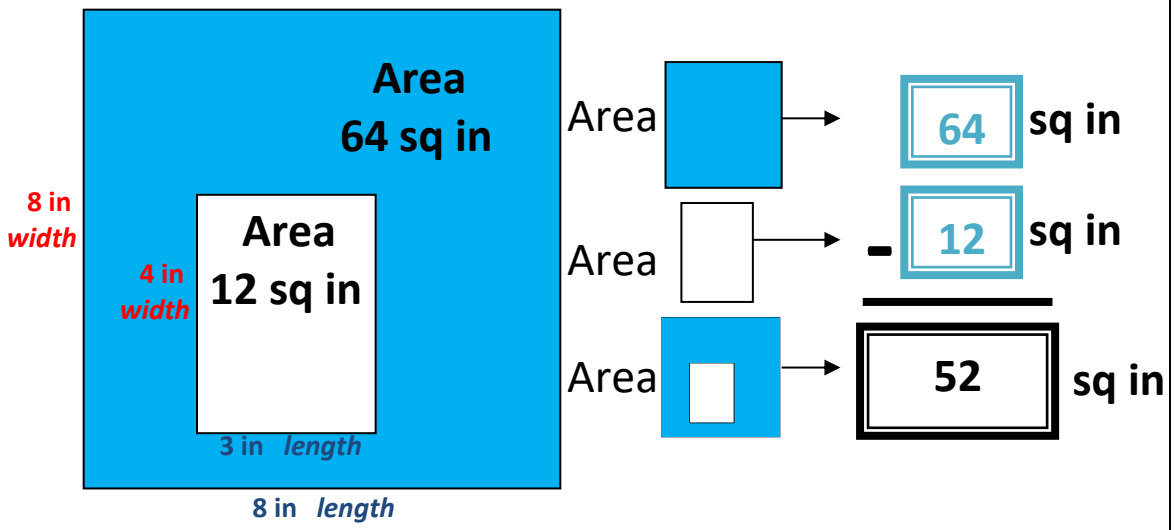
Use the information on the screen to find the area of only the blue space. Type your answers in the boxes.

I-40



Evelyn: That's right! We found out that the area of the blue square is 64 square inches and the area of the white rectangle is 12 square inches. When you subtract the area of the white rectangle from the area of the blue square, you end up with 52 square inches which is the area of blue space of the original shape.

I-41



Evelyn: We are so proud of your hard work! In the next section, you can practice what you have learned.

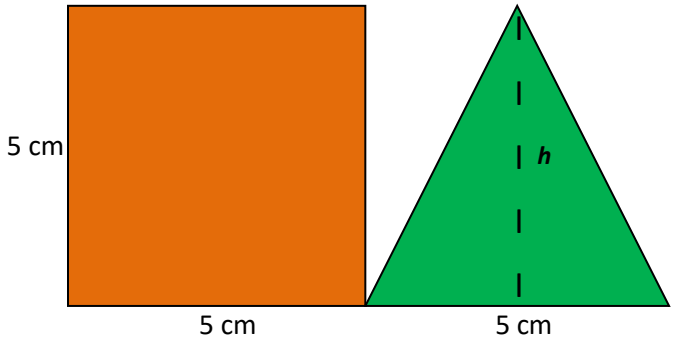
I-42

PRACTICE

Question 1 Fill in the missing height of the green isosceles triangle.

P-1

Question 1



Height = ☐ **cm**

Fill in the missing height of the green isosceles triangle.

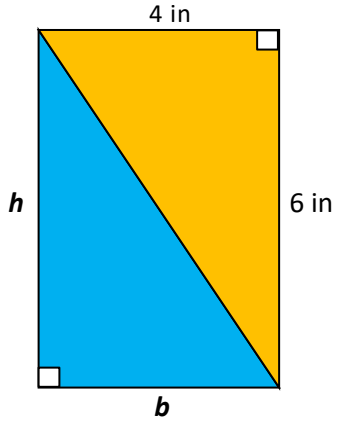
Question 2 Fill in the missing base and height of the blue right triangle.

P-2

Question 2

Base = ☐ **in**

Height = ☐ **in**



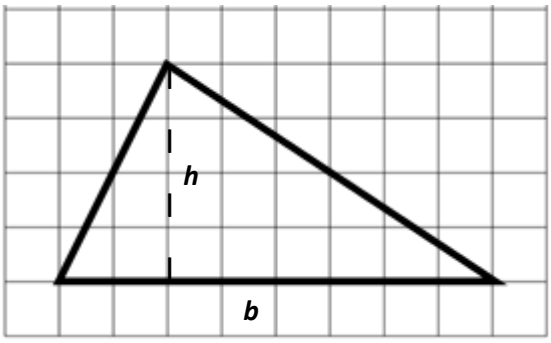
Fill in the missing base and height of the blue right triangle.

Question 3 Fill in the missing base and height for the scalene triangle.

P-3

Question 3

☐ = 1 square inch



Base = ☐ **in**

Height = ☐ **in**

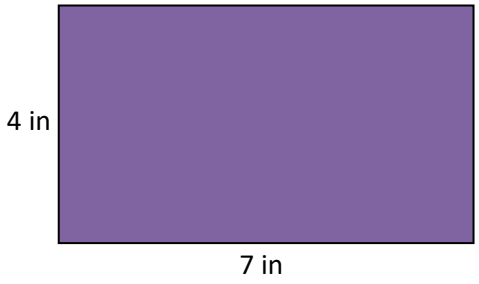
Fill in the missing base and height for the scalene triangle.

Question 4 Find the area of the purple rectangle.

P-4

Question 4

Area = □ **sq in**



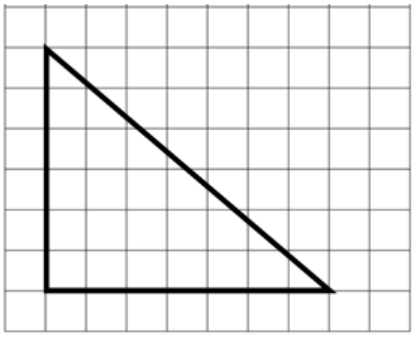
Find the area of the purple rectangle.

Question 5 Find the area of the right triangle.

P-5

Question 5

□ = 1 square inch



Area = □ **sq in**

Find the area of the right triangle.

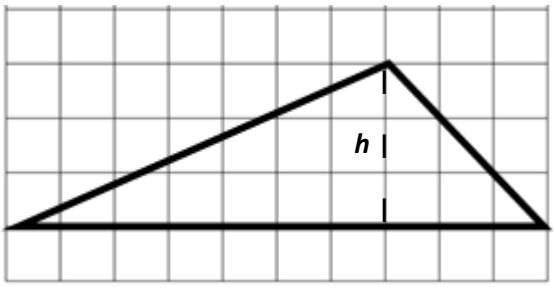
Question 6 Find the area of the obtuse triangle.

P-6

Question 6

□ = 1 square inch

Area = □ **sq in**



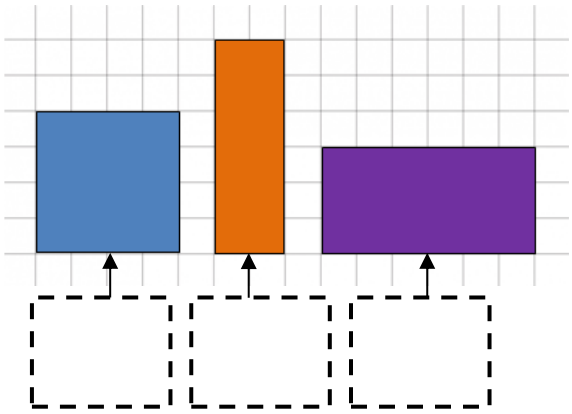
Find the area of the obtuse triangle.

Question 7 Find the area of each rectangle and then place the matching answer tile from the answer box under each rectangle.

P-7

= 1 square inch

Question 7



ANSWER BOX

18 sq in

16 sq in

12 sq in

Find the area of each rectangle and then place the matching answer tile from the answer box under each rectangle.

Question 8 Find the area of each triangle and then place the matching answer tile from the answer box under each triangle.

P-8

Question 8

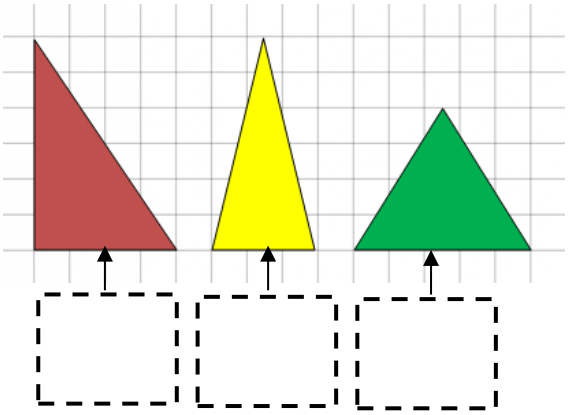
= 1 square inch

ANSWER BOX

9 sq in

10 sq in

12 sq in

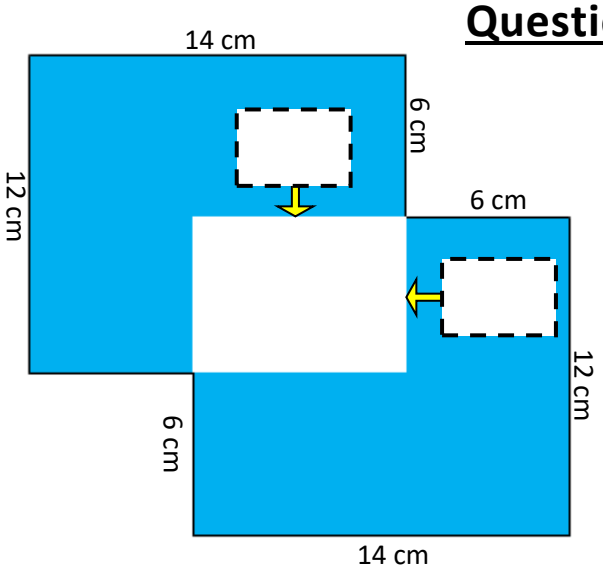


Find the area of each triangle and then place the matching answer tile from the answer box under each triangle.

Question 9 Find the length and the width of the white rectangle and place the matching answer tile from the answer box in the correct spot.

P-9

Question 9



ANSWER BOX

2 cm | 4 cm | 6 cm | 8 cm

Find the length and the width of the white rectangle and place the matching answer tile from the answer box into the correct spot.

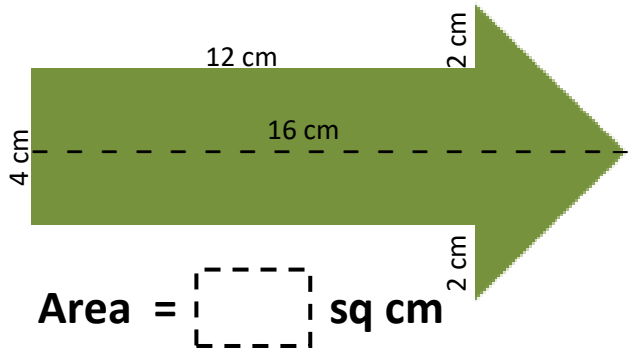
Question 10 Find the area of the green arrow by breaking it down into easier shapes, then place the matching answer tile from the answer box in the correct spot.

P-10

Question 10

ANSWER BOX

32	48
64	80



Area = ☐ **sq cm**

Find the area of the green arrow by breaking it down into easier shapes, and then place the matching answer tile from the answer box into the correct spot.

Questions 11-14 Select true or false for each statement.

P-11

Select true or false for each statement.

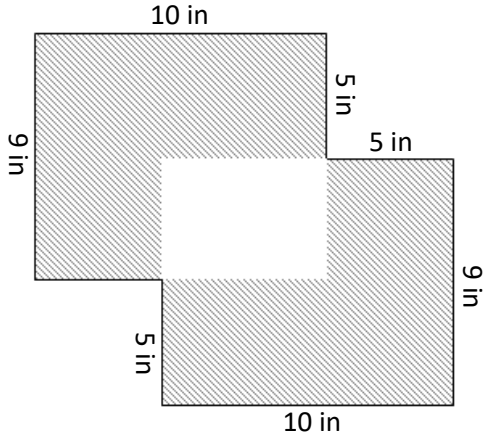
	Question	True	False
11	A parallelogram is made up of one rectangle and one right triangle.	O	O
12	A right triangle with a base of 6 and a height of 10 has an area of 60.	O	O
13	A composite figure is a shape made up of a combination of other shapes.	O	O
14	Squares and rectangles both have the same formula for finding the area.	O	O

Question 15 Find the area of the shaded space and then select the best answer.

P-12

Question 15

Find the area of the shaded region and then select the best answer.



A. 20 sq in
B. 53 sq in
C. 140 sq in
D. 180 sq in

Question 16 Find the area of the trapezoid and then select the best answer.

P-13

Question 16

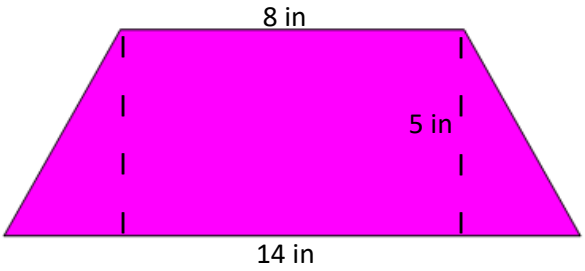
Find the area of the trapezoid and then select the best answer.

A. 32 sq in

B. 40 sq in

C. 55 sq in

D. 70 sq in

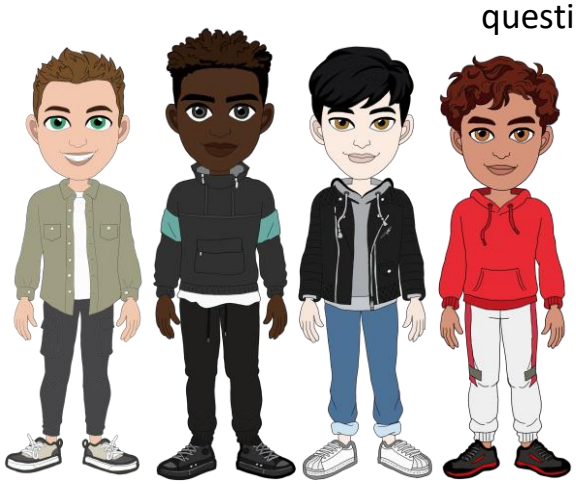


Question 17 Use what you have learned about area to answer the real-life math question.

P-14

Question 17

Use what you have learned about area to answer the real-life math question.



Jeff, Devyn, Daniel, and Gabe want to play soccer, but they need a space big enough to play. Devyn and Gabe have backyards that are big enough to play in, but they need to figure out which yard is the biggest so they have the most space to play. Use the information on the next pages to help them.

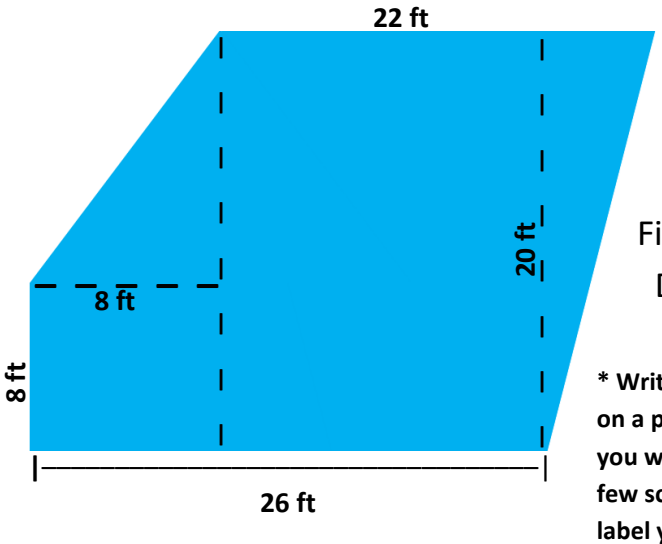
Next

Question 17 Cont'd Use the information on the screen to find the area of Devyn's yard.

Write down your answer on a piece of paper because you will use it for the next few screens. Make sure you label your answer.

P-15

Question 17



Area of Devyn's Yard

sq ft

Find the area of Devyn's yard.

*** Write down your answer on a piece of paper because you will use it for the next few screens. Make sure you label your answer.**

Question 17 Cont'd Use the information on the screen to find the area of Gabe's yard.

Write down your answer on a piece of paper because you will use it for the next screen. Make sure you label your answer.

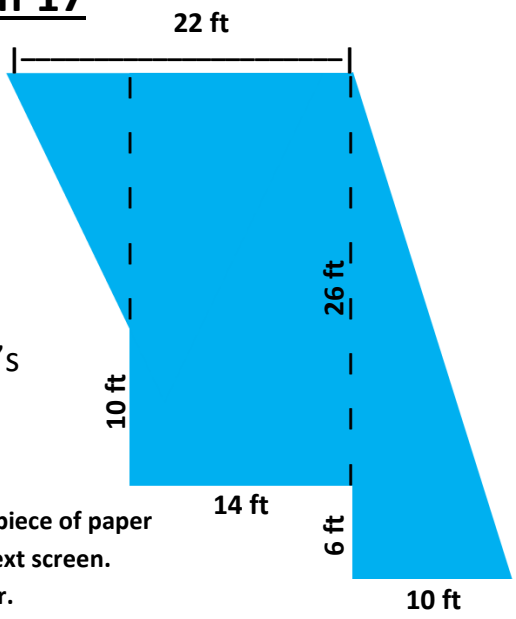
P-16

Question 17

Area of Gabe's Yard

☐ sq ft

Find the area of Gabe's yard.



*** Write down your answer on a piece of paper because you will use it for the next screen. Make sure you label your answer.**

Question 17 Cont'd Which yard has the biggest area for the friends to play soccer? Click on your answer.

P-17

Question 17

Area of Devyn's Yard ☐ sq ft

Area of Devyn's Yard ☐ sq ft

Which yard has the biggest area for the friends to play soccer?

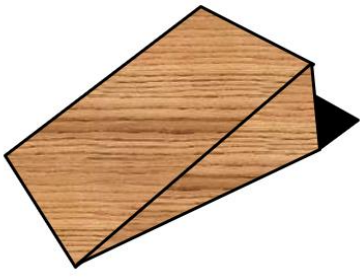
Devyn ⟵ Click on your answer ⟶ Gabe

Question 18 Use what you have learned about area to answer the real-life math question.

P-18

Question 18

Daniel and Jeff want to build a bike ramp. They want the ramp to be 3 feet high, 5 feet long, and 4 feet wide. Use the information on the next page to help them find out how much wood they will need to make their ramp.



Question 18 Cont'd Use the measurements to find out the area of wood that Daniel and Jeff will need for the bike ramp.

Write down your answers on a piece of paper because you will use them on the next screen. Make sure you label your answers.

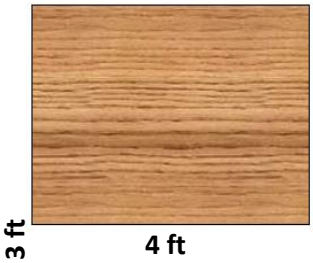
P-19

Question 18

Top and bottom of ramp

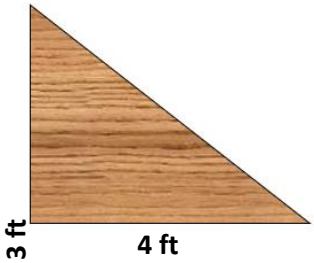
Area = ☐ sq ft

Back of ramp



Area = ☐ sq ft

Sides of ramp



Area = ☐ sq ft

***Write down your answers on a piece of paper because you will use them on the next screen. Make sure you label your answers.**

Question 18 Cont'd Use the areas you found out and the quantities, or amount, of each piece of wood to find the total area of wood that Daniel and Jeff will need for the bike ramp.

P-20

Question 18

Top and bottom of ramp: 2 pieces

Area = ☐ sq ft

x 2

☐ sq ft

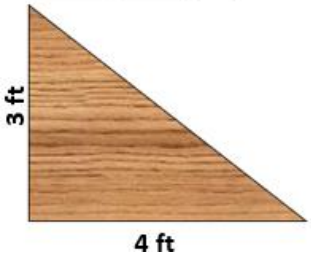
Back of ramp: 1 piece

Area = ☐ sq ft

x 1

☐ sq ft

Sides of ramp: 2 pieces



Area = ☐ sq ft

x 2

☐ sq ft

☐ + ☐ + ☐ = ☐ sq ft = Area of ramp wood

Activity Completed Great job!

P-21