Charles County Public Schools

It's All About Teaching and Learning

CHARLES COUNTY PUBLIC SCHOOLS

APEX MATH
Grade 6 and 6C
Learning Packet #2
Week 3 and Week 4
April 20 – May 1, 2020

E-Learning

Middle School Math
Grade 6 and Grade 6C
Week 3 and Week 4

Name _____ School _____ Teacher _____

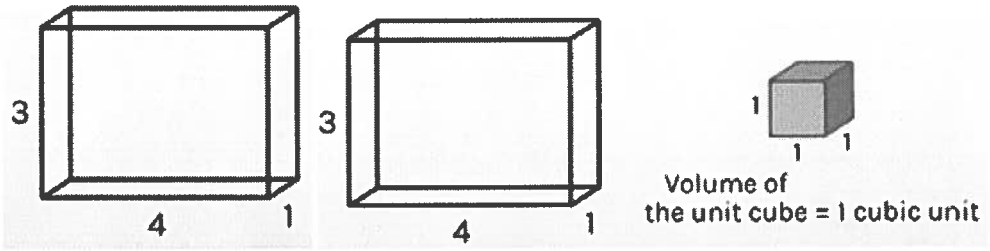
You can use a calculator with this packet.

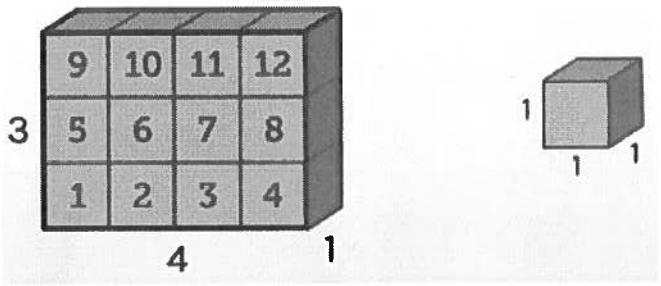
3.2.1 – Volume

Computing Volume of Rectangular Prisms

To find the volume of a rectangular prism, count the number of unit cubes it takes to fill the prism.

A rectangular prism is 3 units high, 4 units long and 1 unit deep. What is the volume of the prism?

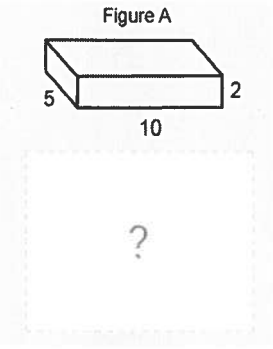


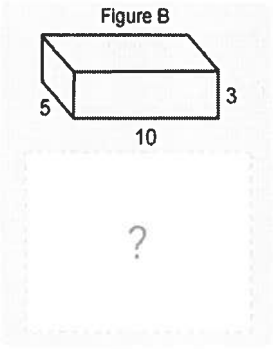


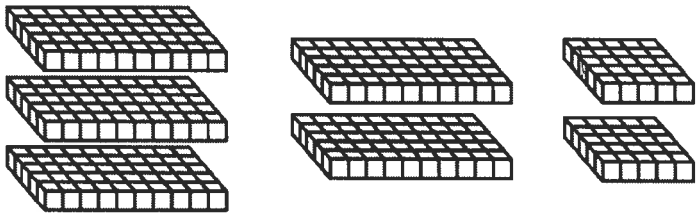
It takes 12 unit cubes to fill the prism. Therefore, the volume is 12 cubic units.

Check Your Understanding

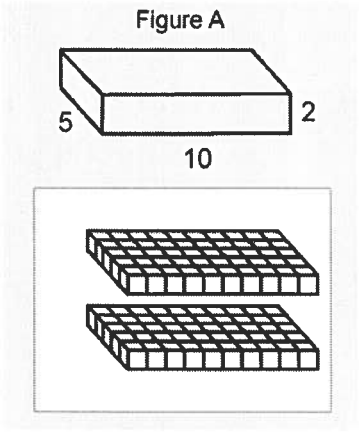
Which set of unit cubes can be used to fill each of the rectangular prisms?

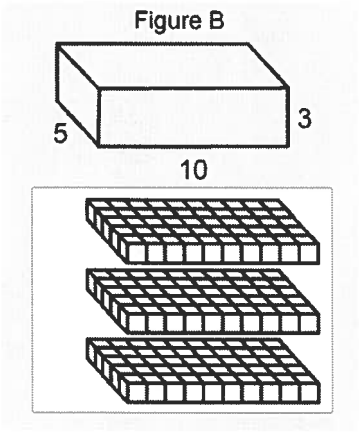




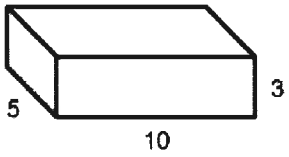


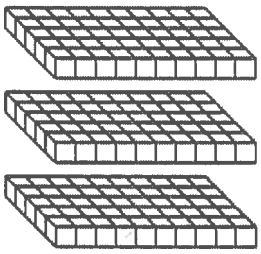
ANSWER:





Use the figure to complete the statements about the volume of the prism.





There are 10 unit cubes along the length of the figure, _____ unit cubes along the width and _____ unit cubes along the height.

To find the total volume, multiply the edge lengths _____ (10 • 5 • 3,

10 • 10 • 3, 10 • 5).

The total volume of the object is _____ cubic units.

ANSWER: There are 10 unit cubes along the length of the figure, **5** unit cubes along the width and **3** unit cubes along the height. To find the total volume, multiply the edge lengths **10 • 5 • 3**. The total volume is **150** cubic units.

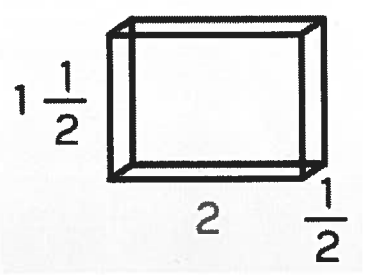
The formula for finding the volume of any rectangular prism is

V = Length · Width · Height

Or

V = LWH

You can use the formula to find the volume of a rectangular prism that has fractional edge lengths.



In the figure, the edge length of the prism is 2, the edge width of the prism is $\frac{1}{2}$, and the edge height of the prism is $1\frac{1}{2}$.

To find the volume, simply multiply all of the edge dimensions. Remember to rewrite any mixed numbers as improper fractions before you multiply.

$$V = 2 \cdot \frac{1}{2} \cdot 1\frac{1}{2}$$

$$V = \frac{2}{1} \cdot \frac{1}{2} \cdot \frac{3}{2}$$

$$V = \frac{2 \cdot 1 \cdot 3}{1 \cdot 2 \cdot 2} = \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}\ cubic\ units$$

Check Your Understanding

Find the volume of each of the prisms.

Figure A

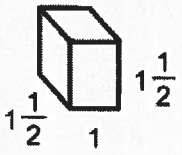
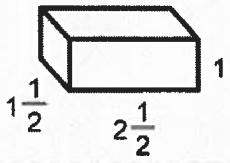


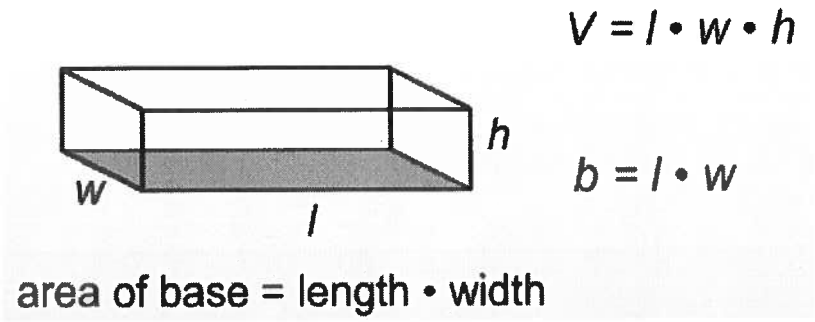
Figure B



ANSWER: The volume of Figure A is $2\frac{1}{4}$ cubic units. The volume of Figure B is $3\frac{3}{4}$ cubic units.

The Volume Formula V = Bh

Another way to write the volume formula for prisms is V = B•h, where B represents the Area of the Base of the prism.



You can find the area of the base by multiplying the length • width.

Check Your Understanding

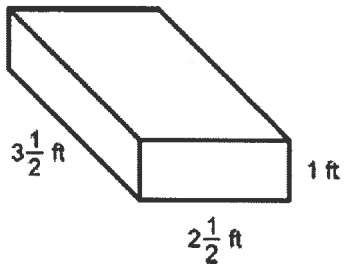
Match each base and height to the volume of a prism.

$b = 6$ square units, $h = 12$ units	?	$V = 112$ cubic units
$b = 14$ square units, $h = 8$ units	?	$V = 72$ cubic units
$b = 9$ square units, $h = 11$ units	?	$V = 105$ cubic units
$b = 15$ square units, $h = 7$ units	?	$V = 99$ cubic units

ANSWER:

$b = 14$ square units, $h = 8$ units	$V = 112$ cubic units
$b = 6$ square units, $h = 12$ units	$V = 72$ cubic units
$b = 15$ square units, $h = 7$ units	$V = 105$ cubic units
$b = 9$ square units, $h = 11$ units	$V = 99$ cubic units

Find the volume of the prism.



ANSWER: $8\frac{3}{4}$ cubic feet

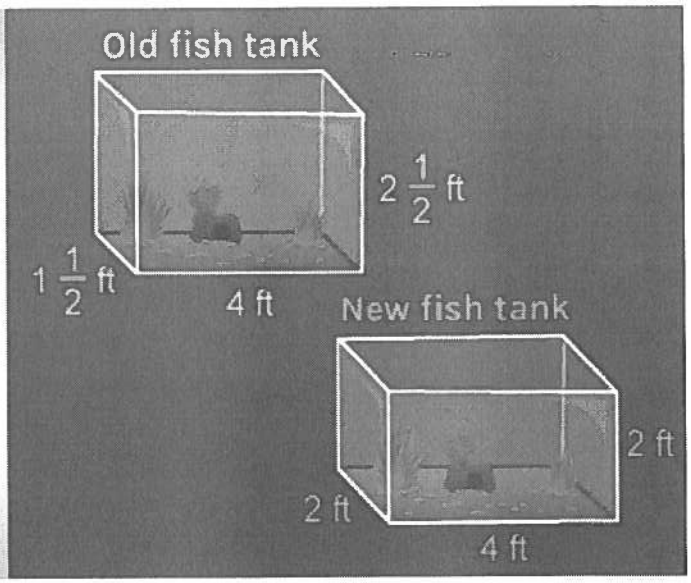
Using Volume to Solve Real World Problems

A fishing expedition

A doctor replaces the fish tank in her office.

Do the fish have more room to swim in the new tank?

Find the volume of each tank to find out.



Check Your Understanding

Find the volume of the old fish tank.

ANSWER: 15 cubic feet.

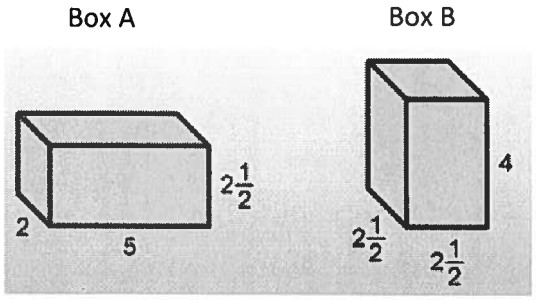
Find the volume of the new fish tank.

ANSWER: 16 cubic feet

The new fish tank is bigger than the old fish tank.

Two cardboard boxes are shown.

Which box has a greater volume?

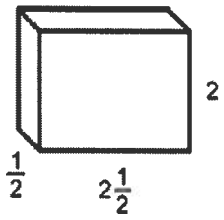


ANSWER: Both boxes have a volume of 25 cubic units.

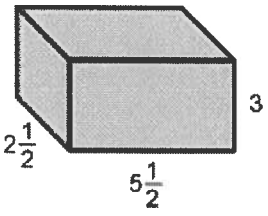
Check-up

Use your knowledge of volume to answer each of the questions.

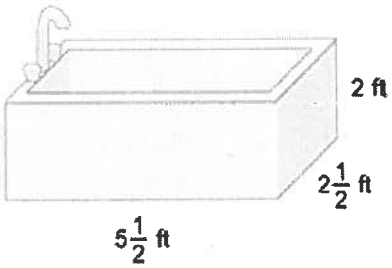
1. What is the volume of this rectangular prism?



2. What is the volume of this rectangular prism?



3. This is Julian's bathtub.



He wants to buy a larger tub.

Select all of the dimensions that have a greater volume than his current bathtub.

A. 5 ft. • 2 ft. • 2 ft.

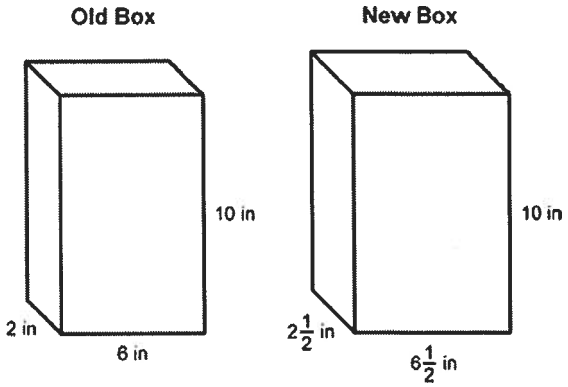
B. 5 ft. • 3 ft. • 2 ft.

C. 6 ft. • 3 ft. • 2 ft.

D. 6 ft. • 2 ft. • 2 ft.

4. A cracker company plans to increase the volume of its cracker box.

What is the increase in volume?



ANSWERS

1. $2\frac{1}{2}$ cubic units
2. $41\frac{1}{4}$ cubic units
3. B, C
4. $42\frac{1}{2}$ cubic inches

Review

I'm working for a professional baseball team, and one of my projects is to maintain our stock of signed baseballs. A lot of responsibility. These balls are stored in boxes that are one-half foot by one-half foot by one-half foot. They're stacked on shelves in the team's storage area. This week, we're moving the boxes to a new set of shelves. I have 56 boxes to move. I'm hoping they will all fit on the new shelves. Before I start moving, I'll do a few calculations to find out.

So each new shelf is three and a half feet by one-half foot by one foot. When I start filling the first shelf, I will be able to put seven boxes across the length. That's because two half-foot boxes will fit in each foot of the shelf. I can only fit one box across the width. That means each layer will have seven boxes. Since the shelf is one foot tall, I can fit two layers of boxes on the shelf. Two layers of seven boxes gives me 14 boxes of signed balls on each shelf.

Since I know the number of half-unit boxes that fill the shelf, I can use this to find the volume of the shelf space. One way to find volume is to count the number of unit-cubes that fit in the space. My boxes aren't unit cubes, but I can still use them to find the volume.

There are eight half-unit cubes in each unit cube. I have 14 half-unit cubes. Dividing 14 by eight gives me the number of unit cubes. This means that the volume of shelf space is one and three-quarters cubic feet. So I know the volume of each shelf, and the number of boxes that will fit. So now I just need to see if my 56 boxes of signed balls will fit on the four shelves.

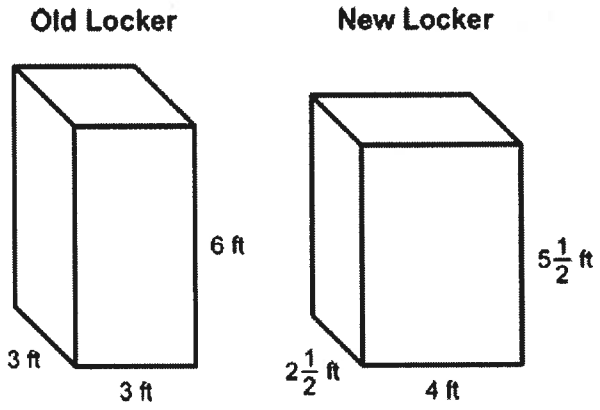
So, 14 boxes on each shelf. That gives me a total of 56 boxes. Well, what do you know? Guess I'd better start stacking. Oh, if I finish early, I can go watch batting practice. Ha, this is like the best job ever!

Practice

Marcella is switching to a new storage locker.

Which locker has more storage space?

Answer the questions to compare the sizes of the lockers.



1. What is the volume of the old locker? Show your work, and be sure to include units with your answer.

2. What is the volume of the new locker? Show your work, and be sure to include units with your answer.

3. Which locker is larger? By how much?

ANSWERS:

Volume of Old Locker: 54 cubic feet

Volume of New Locker: 55 cubic feet

The new locker is larger by 1 cubic foot

Middle School Math
Grade 6 and Grade 6C
Week 3 and Week 4

Quiz – Volume

You may use a calculator and your notes to complete the quiz and throughout the packet. Answer each question to the best of your ability.

1. Marco has a sandbox that is $3\frac{1}{2}$ feet wide, 5 feet long and $\frac{1}{2}$ foot deep. How many cubic feet of sand does he need to fill the sandbox completely?

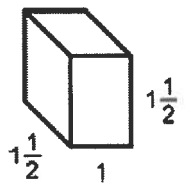
A. $3\frac{3}{4}$

B. $8\frac{3}{4}$

C. $17\frac{1}{2}$

D. 9

2. Calculate the volume of the prism.

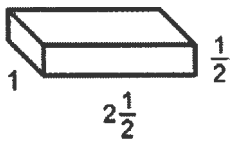


A. $2\frac{1}{4}$ cubic units

B. $4\frac{1}{4}$ cubic units

C. 9 cubic units

3. Calculate the volume of the prism.

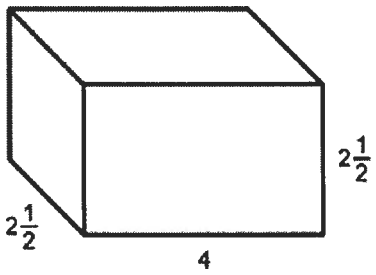


A. $1\frac{1}{4}$ cubic units

B. 5 cubic units

C. $2\frac{1}{2}$ cubic units

4. What is the volume of this prism?



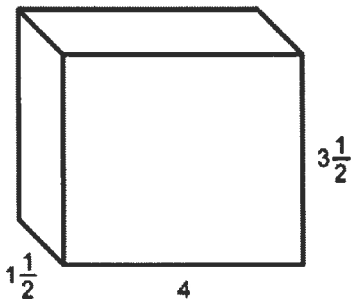
A. 25 cubic units

B. 9 cubic units

C. 50 cubic units

D. $12\frac{1}{2}$ cubic units

5. Calculate the volume of this prism.



A. 27 cubic units

B. 42 cubic units

C. 9 cubic units

D. 21 cubic units

3.3.1 – Coordinate Geometry

A polygon is a closed figure with three or more sides. The number of vertices is equal to the number of sides. For example, a triangle has 3 sides and 3 vertices.

Check Your Understanding

Match each figure with its description.

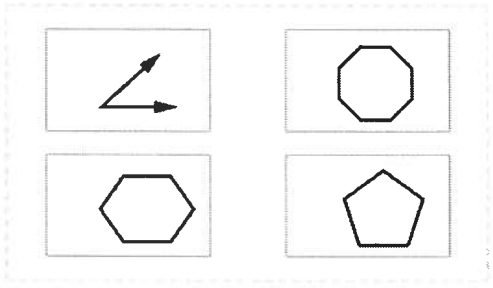
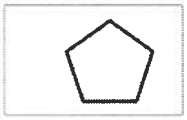
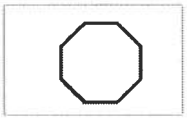
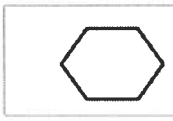
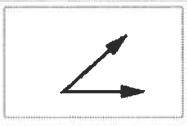


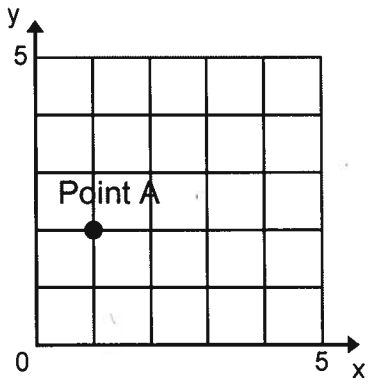
Figure	Description
?	5 sides, 5 vertices
?	8 sides, 8 vertices
?	6 sides, 6 vertices
?	2 sides, 1 vertex

ANSWER:

Figure	Description
	5 sides, 5 vertices
	8 sides, 8 vertices
	6 sides, 6 vertices
	2 sides, 1 vertex

Graphing Polygons on the Coordinate Plane

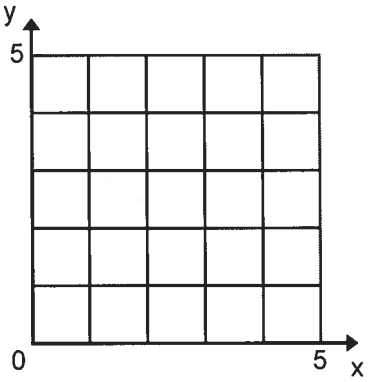
Remember that a point is represented by an x-coordinate and a y-coordinate. For example, Point A is located at (1, 2).



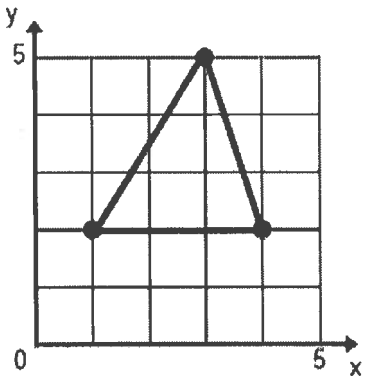
To graph a polygon on the coordinate plane, plot each of the vertices and then draw lines to connect the plotted points.

Check Your Understanding

Graph a triangle with vertices at A(1, 2), B(4, 2), and C(3,5).

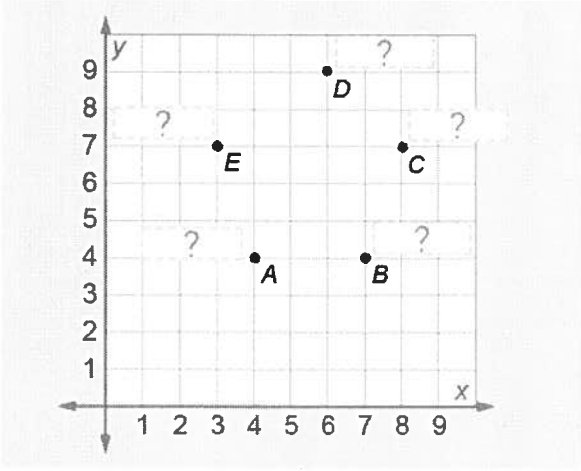


Answer:



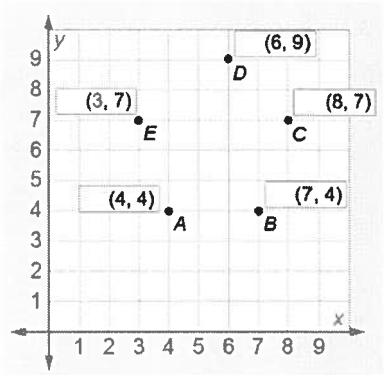
Check Your Understanding

Match each ordered pair with the point on the graph.



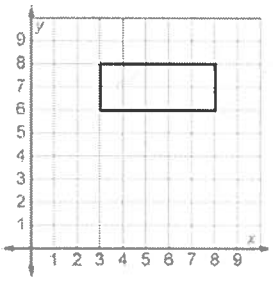
(8, 7) (7, 4) (6, 9) (4, 4) (3, 7)

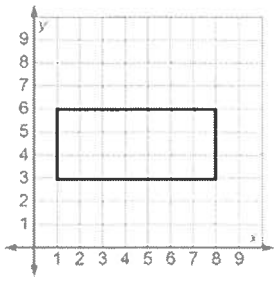
ANSWER:

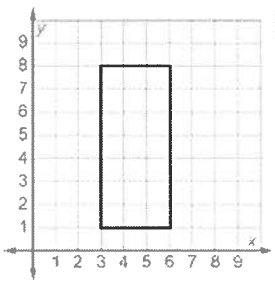


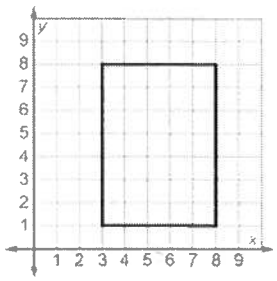
Which polygon has these vertices?

(1, 3), (1, 6), (8, 3), (8, 6)

A. 

B. 

C. 

D. 

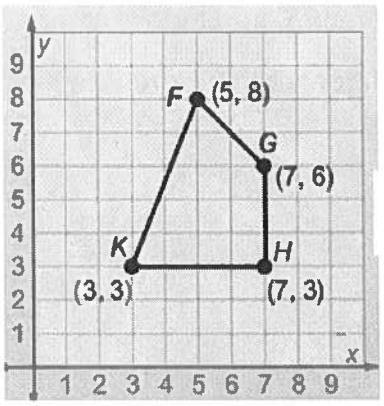
ANSWER: The correct answer is B

Finding Vertical Distance on the Coordinate Plane

You can determine the length of the side of a polygon by finding the distance between vertices.

Look at the polygon on the right.

Determine the length of side GH.

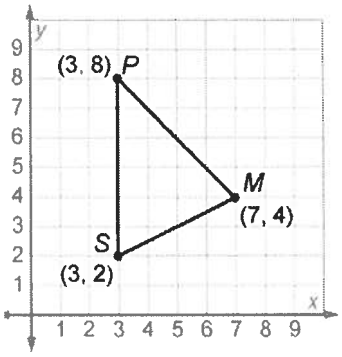


ANSWER: Because both Point G and Point H have the same x-coordinate, you can find the length of GH by subtracting the y-coordinates of each point.

6 – 3 = 3 The length of GH is 3 units.

Check Your Understanding

Use the coordinates to find the length of side PS of the triangle.



Point P and Point S have _____ (the same, different) x-coordinates.

Point P and Point S have _____ (the same, different) y-coordinates.

To find the length of PS, subtract _____ and _____.

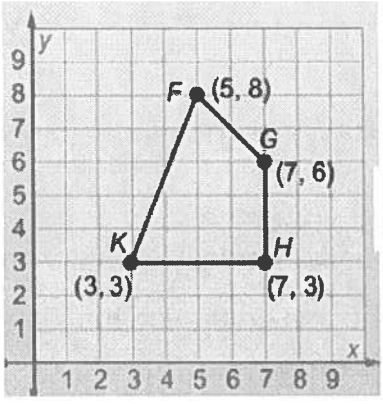
The length of PS is _____.

ANSWER: Point P and Point S have the same x-coordinates. Point P and Point S have different y-coordinates. To find the length of PS subtract 8 and 2. The length of PS is 6.

Finding Horizontal Distance on the Coordinate Plane

Look at the polygon on the right.

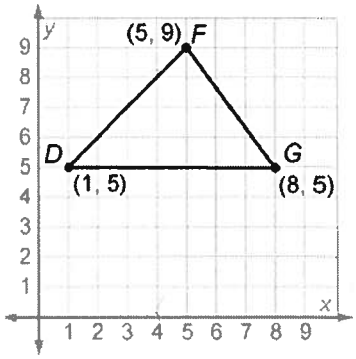
Find the length of side KH.



Because Point K and Point H have the same y-coordinates, you can find the length of KH by subtracting the x-coordinates.

7 – 3 = 4 The length of KH is 4 units.

Check Your Understanding



Use the coordinates to find the length of side DG.

Point D and Point G have _____ (the same, different) x-coordinates.

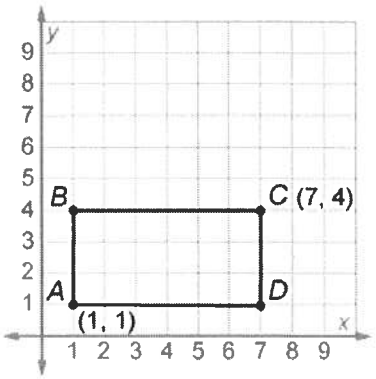
Point D and Point G have _____ (the same, different) y-coordinates.

To find the length of DG, subtract _____ and _____.

The length of DG is _____.

ANSWER: Point D and Point G have different x-coordinates. Point D and Point G have the same y-coordinates. To find the length of DG subtract 8 and 1. The length of DG is 7.

Determine the coordinates for Point D and then find the length of side AD.



ANSWER: Point D has coordinates (7, 1)

The length of side AD is 6 units.

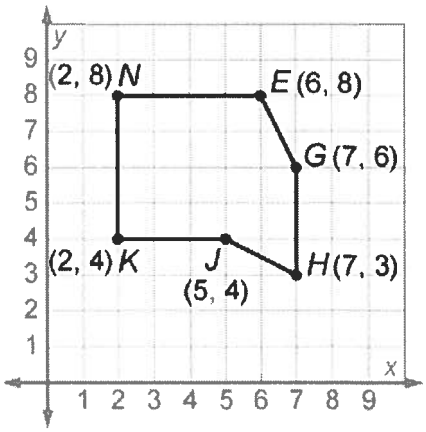
Find the side lengths.

Length of NK _____

Length of KJ _____

Length of HG _____

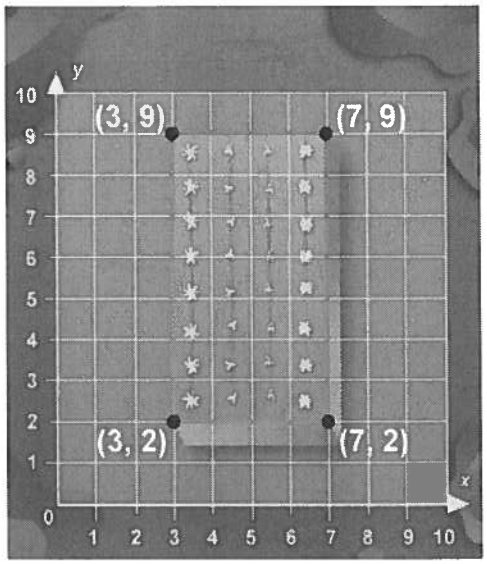
Length of NE _____



ANSWER: NK = 4; KJ = 3; HG = 3; NE = 4

Solving a Real World Problem

Mai is building a new raised garden bed in her backyard. She needs to know the length of each side of the garden bed to find the lengths of wood she needs to cut. Mai draws a sketch to show where the garden bed will go in her yard. The length of one unit in the coordinate plane is equal to 1 foot.



Find the length of the longer sides of the garden.

ANSWER: Because the longer sides have the same x-coordinates, subtract the values of the y coordinates. 9 – 2 = 7. The length of one side of the garden is 7 feet.

Now find the length of the two shorter sides.

ANSWER: Because the shorter sides have the same y-coordinates, subtract the values of the x coordinates. 7 – 3 = 4. The length of the other side of the garden is 4 feet.

Determine the amount of wood Mai needs to make her garden.

ANSWER: Since two sides are each 7 feet long and two sides are each 4 feet long, the total amount of wood is 7 feet + 7 feet + 4 feet + 4 feet = 22 feet.

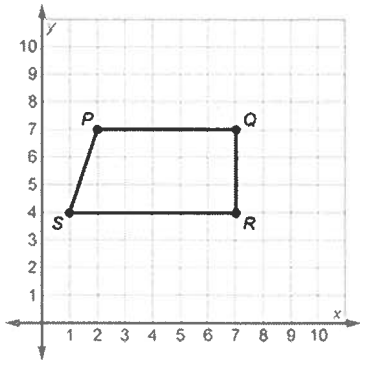
Find the length of RS.

The coordinates of Point R are _____.

The coordinates of Point S are _____

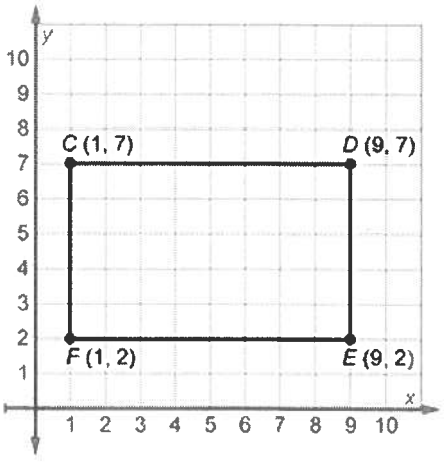
To find the length of RS subtract the _____ (x-coordinates, y-coordinates).

The length of RS is _____



ANSWER: The coordinates of Point R are (7, 4). The coordinates of Point S are (1, 4). To find the length of RS subtract the x-coordinates. The length of RS is 6 units.

Meghan designs a playhouse for her brother. She draws a sketch to show where the playhouse will go in the yard. The length of one unit in the coordinate plane is equal to one foot.



What is the horizontal side length of the playhouse?

A. 5 feet

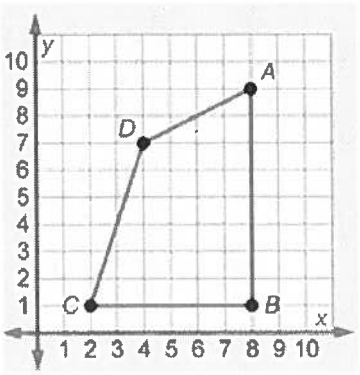
B. 6 feet

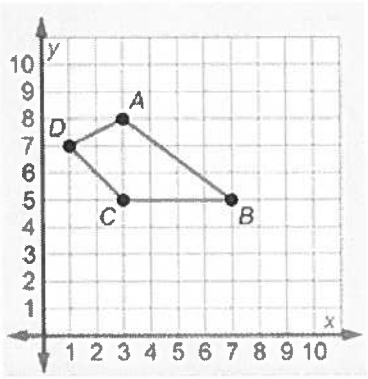
C. 7 feet

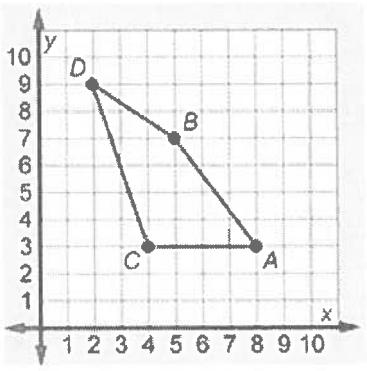
D. 8 feet

ANSWER: D

Match each set of vertices with the correct polygon.

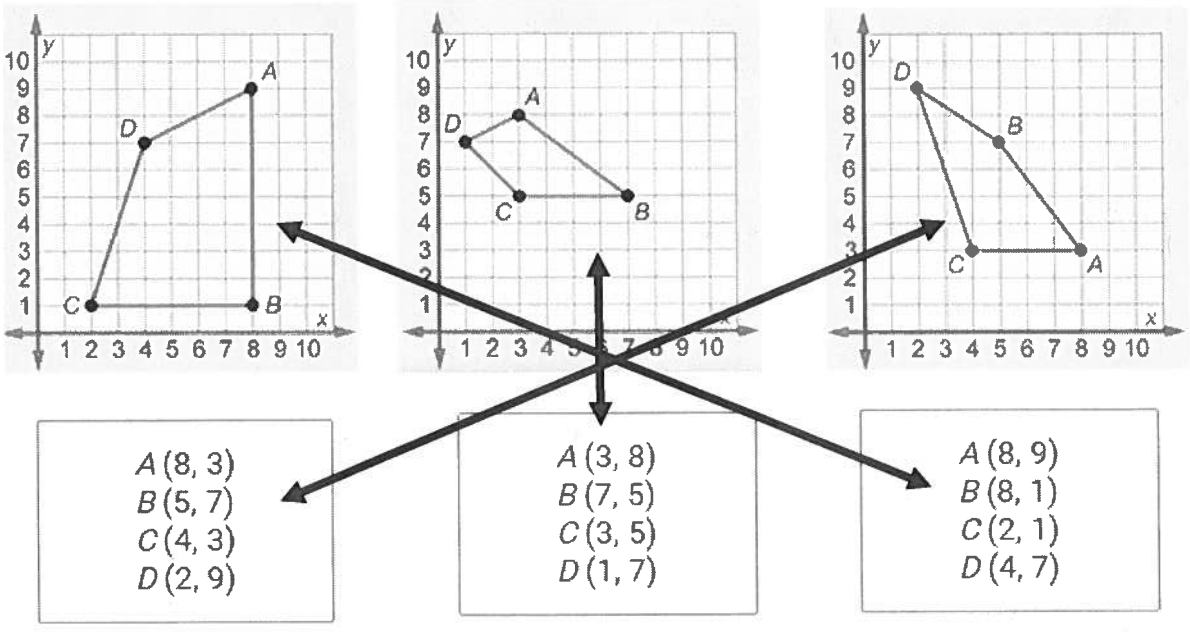




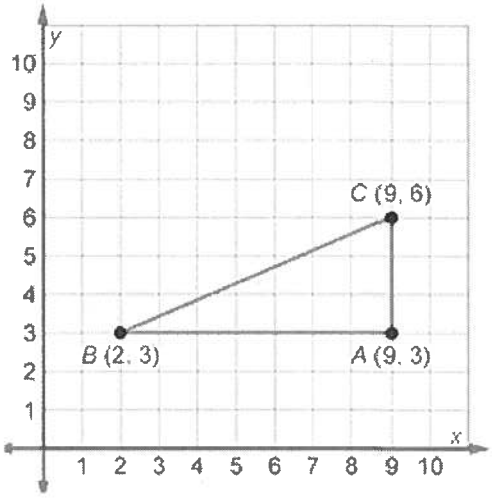


A (8, 3) *B* (5, 7) *C* (4, 3) *D* (2, 9)	*A* (3, 8) *B* (7, 5) *C* (3, 5) *D* (1, 7)	*A* (8, 9) *B* (8, 1) *C* (2, 1) *D* (4, 7)

ANSWER:



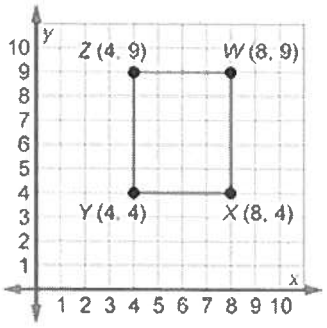
Determine the length of side AB and AC of this triangle.

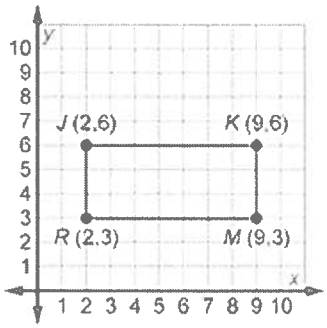


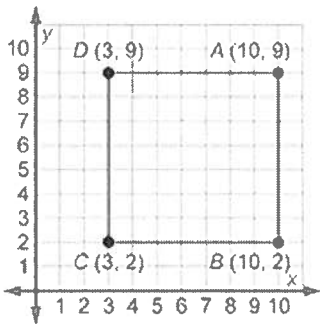
ANSWER: Side AB is 7 units. Side AC is 3 units.

Farah is designing a deck. To fit in her backyard, each side of the deck can be no longer than 5 meters. Which of the drawings could be the design for Farah's deck?

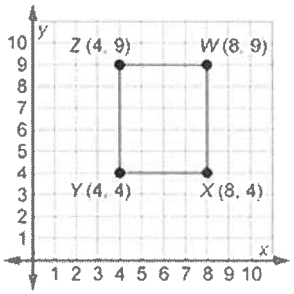
For all graphs, the length of one unit in the coordinate plane is equal to 1 meter.



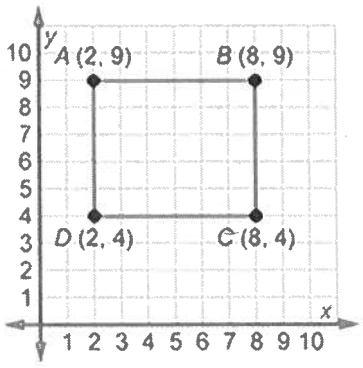




ANSWER:



Olivia decorates her room by stringing lights around her window. The graph shows the location of the widow on the wall. Each unit on the graph represents 1 foot.

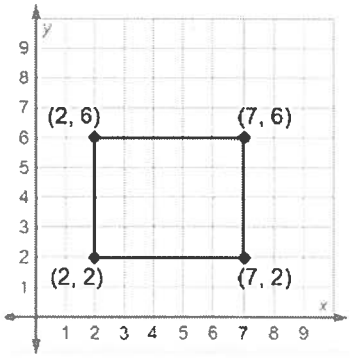


Oliva needs to know the many feet of lights she will need to go around the window.

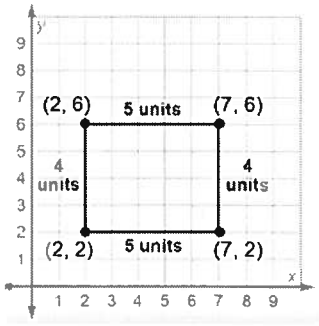
What is the total length of lights needed?

ANSWER: 22 feet

I've saved some money to redesign my room. To help me with my plans, I've sketched the shape of my room on graph paper. Putting my sketch on a coordinate plane will help me figure out the lengths of each side.



When using a coordinate plane to graph the shape of my room, each vertex of the rectangle will have a pair of numbers that shows the location of the point. To find the coordinates of each vertex, I can use the *x*- and *y*-axes. For example, the bottom left vertex is at $x = 2$ and $y = 2$. Two, two. The top left vertex is at $x = 2$ and $y = 6$. The top right vertex is at $x = 7$ and $y = 6$. And finally, the bottom right vertex is at $x = 7$ and $y = 2$.



Now I can use these coordinates to find the length of each side of the rectangle. I'm going to look at the bottom side first. There are 5 squares between the two vertices. Hey, check this out. For the bottom two vertices, the *y*-value is the same. And if I find the difference in the two *x*-values, I get 5. I wonder if that works for the other vertices and sides of this rectangle. Hmmm. And for the top side, the *x*-values are also 7 and 2. So the difference is 5, and there are 5 squares between the two vertices.

For the two vertical sides, the *x*-values are the same. The *y*-values are both 6 and 2. So the lengths of each of these sides must be 4 units. Counting the squares between — yup, they're each 4 units long. So that's pretty cool. To find the length of each side of this rectangle, I just need to subtract the values that are different in the coordinates.

Of course, my work isn't done yet. I know how many units long each side is on the coordinate plane. Well, I still need to find the actual dimensions of my room. Then I get to pick my paint color, see if I have enough money for a new rug and bedspread, and move my furniture around. It's very exciting. It's my own room and it'll be new. I can't wait.