

# Lesson 8

1 Write the expressions for the problems below:

a) A river flow carries a boat 5 km every hour.  
How far will the boat drift in 4 hours?

\_\_\_\_\_

b) A river flow carries a boat 5 km every hour.  
How far will the boat drift in  $t$  hours?

\_\_\_\_\_

c) A river flow carries a boat  $v$  km every hour.  
How far will the boat drift in  $t$  hours?

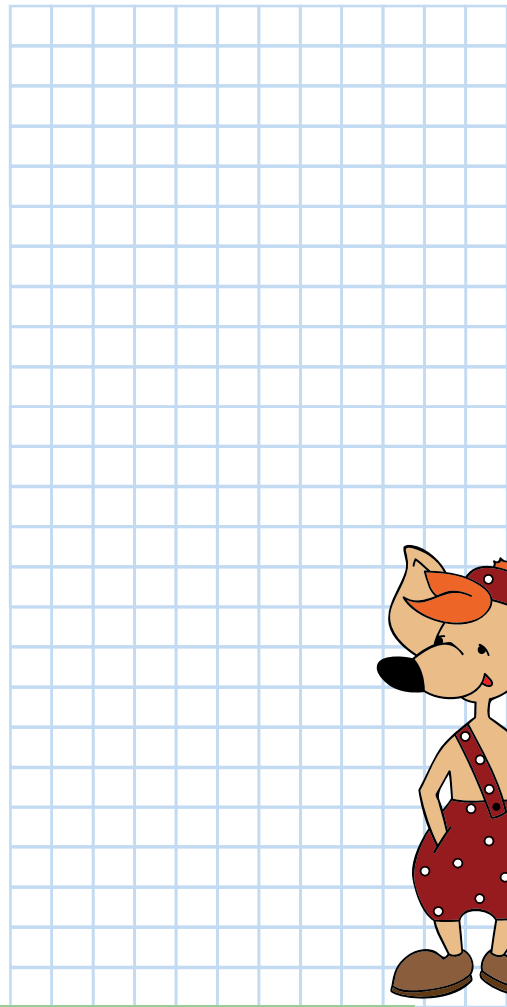
\_\_\_\_\_

d) A river flow carries a boat 5 km every hour.  
How long will it take the boat to drift 30 km?

\_\_\_\_\_

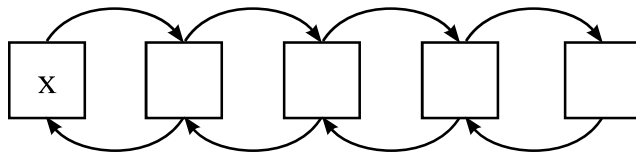
e) A river flow carries a boat 5 km every hour.  
How long will it take the boat to drift  $s$  km?

\_\_\_\_\_

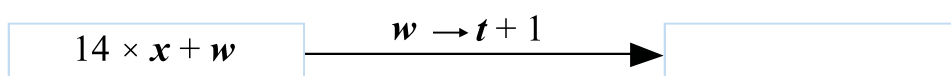
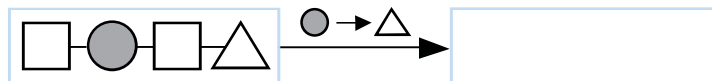


2 Analyze the operations and undo them to solve the equation:

$x$	$\times$	3	$\div$	4	$\times$	2	$=$	1	2
$x$	$=$								
$x$	$=$								

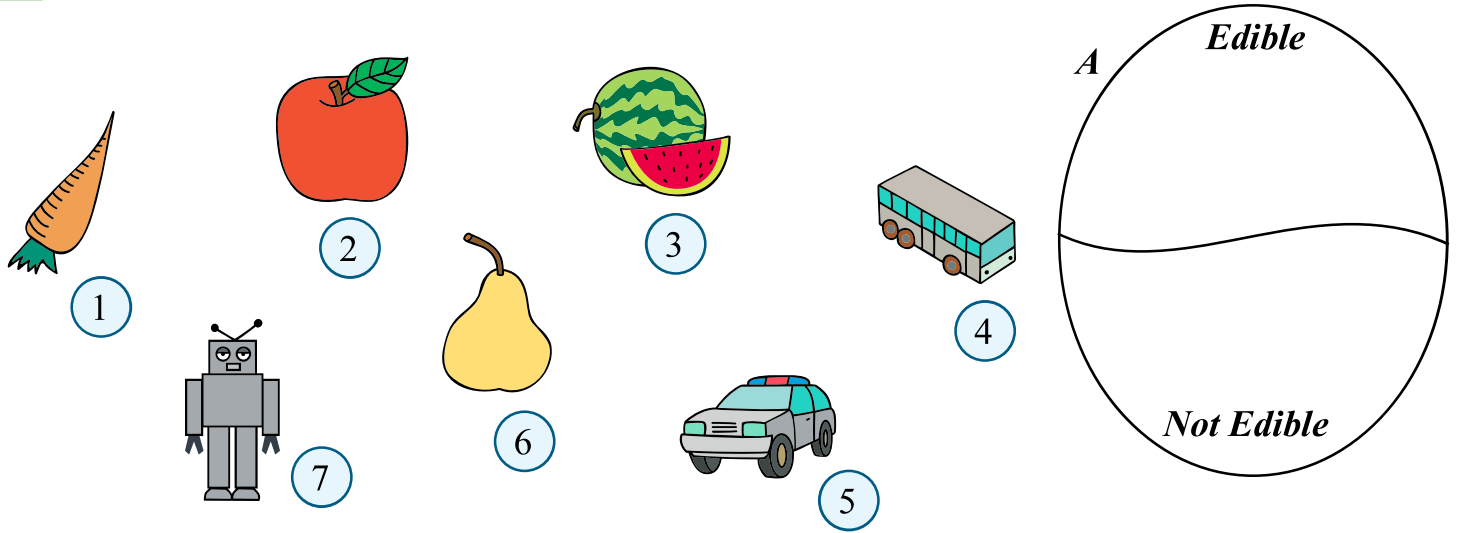


3 Replace:



## Sets and Classifications

4 Divide set  $A$  into subsets: things that you can eat, and things you cannot eat.



Division of a set into subsets that do not intersect is called **classification**.

These subsets are called **classes**.

A property used to divide the set is called **base of classification**.

5 Classify the shapes in different ways. State the base of classification in each case.

Base: _____	Base: _____	Base: _____

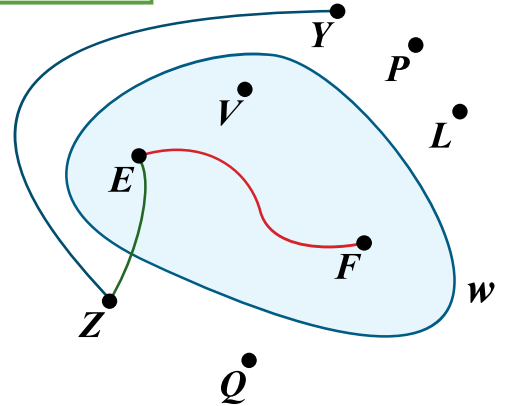
What base of classification produces three classes?

## Classes in Geometry

**6** Any closed curve splits a plane into *inside* and *outside* areas.

If two points are on the **opposite** sides of a closed curve then **any** path connecting these points **intersects** this curve

If **there is** a path connecting two points that **does not intersect** the closed curve, then these points are on the same side of the curve.



Show that points  $Q$  and  $P$  are on the same side of curve  $w$ .

Are they inside or outside?

\_\_\_\_\_

Are points  $V$  and  $Q$  on the same side of curve  $w$ ?

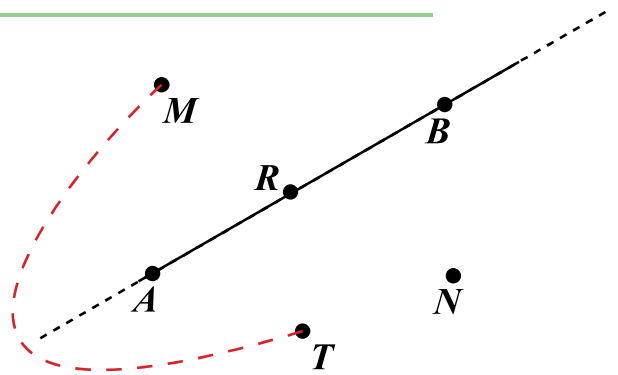
\_\_\_\_\_

A closed curve splits the plane into three classes:  
 line itself  
 inside the curve  
 outside the curve  
 What about an **open** curve?

**7** A straight line splits the rest on the plane into two classes of points located on its two sides.

Does the red path from point  $M$  to point  $T$  intersect the straight line  $AB$ ? \_\_\_\_\_

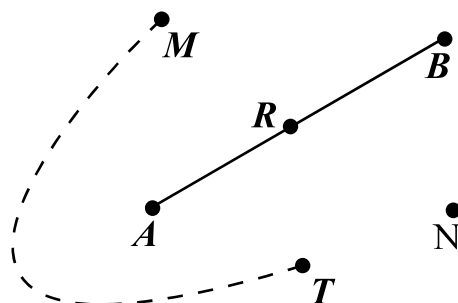
The letters  $A$  and  $R$  are written on the opposite sides of the line  $AB$ . Are the points  $A$  and  $R$  located on opposite sides? \_\_\_\_\_



**8** Let's see the difference between a straight line and a line segment:

Does line segment  $AB$  split the plane into two areas?  
 \_\_\_\_\_

Can any line segment split a plane into two areas?  
 \_\_\_\_\_



## Union of Sets

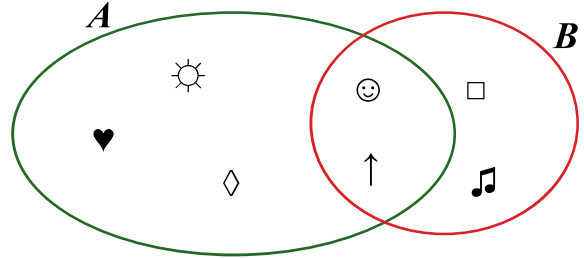
Union of sets  $A$  and  $B$  consists of the elements of  $A$  and the elements of  $B$ .  
The symbol for a union of two sets is  $\cup$ .

9 Set  $A = \{\heartsuit, \diamond, \odot, \uparrow, \text{☀}\}$

Set  $B = \{\square, \text{♪}, \uparrow, \odot\}$

$A \cap B = \{\odot, \uparrow\}$

$A \cup B = \{\heartsuit, \diamond, \odot, \uparrow, \text{☀}, \square, \text{♪}\}$



Set	$A$	$B$	$A \cap B$	$A \cup B$
# of elements	5			

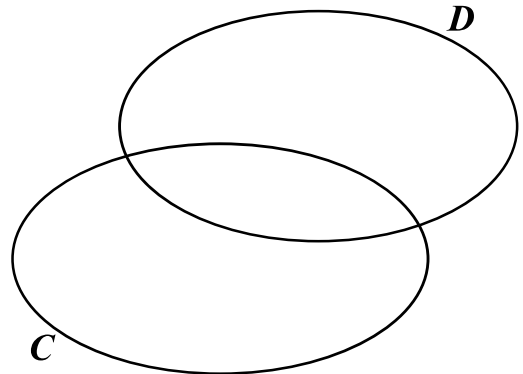
10  $C = \{1, 3, 5, 7\}$      $D = \{4, 5, 6\}$

Mark the elements on the Venn Diagram

Write down the union and the intersection of the sets  $C$  and  $D$ .

$C \cap D = \{ \underline{\hspace{2cm}} \}$

$C \cup D = \{ \underline{\hspace{2cm}} \}$



11 There are a total of 25 students learning French and 27 students learning Spanish in a class. 18 students are learning both languages.

a) How many students are learning languages?

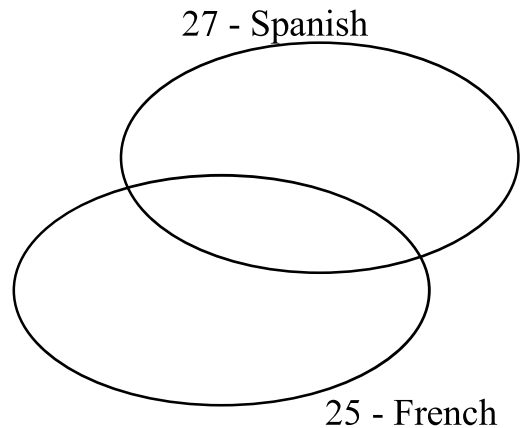
\_\_\_\_\_

b) How many students are learning Spanish only?

\_\_\_\_\_

c) How many students are learning French only?

\_\_\_\_\_



12 Set  $R$  contains  $y$  elements. Set  $Q$  contains  $x$  elements. There are  $w$  elements in the intersection of these sets.

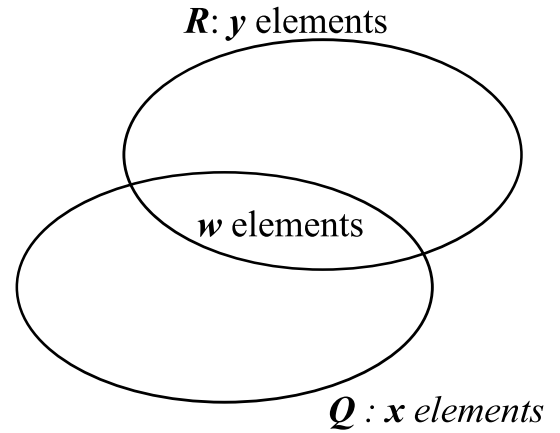
a) How many elements belong to set  $R$  only?

\_\_\_\_\_

b) How many elements belong to set  $Q$  only?

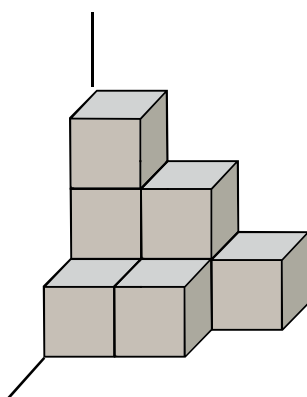
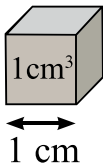
\_\_\_\_\_

c) How many elements are in the union of the two sets?

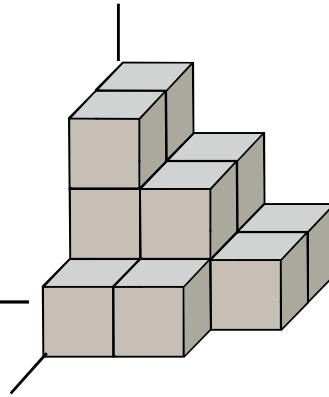


### Volume of 3D Shapes

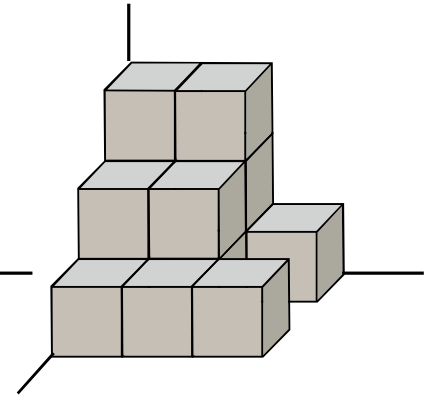
13 Find the volume of each shape on the drawing:



$V = \underline{\hspace{2cm}}$   $\text{cm}^3$



$V = \underline{\hspace{2cm}}$   $\text{cm}^3$



$V = \underline{\hspace{2cm}}$   $\text{cm}^3$

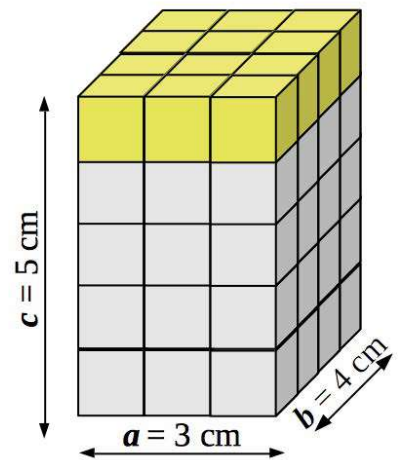
14 All layers of cubes in the parallelepiped on the right are the same.

a) What is the volume of each layer? \_\_\_\_\_

b) How many layers does the parallelepiped have? \_\_\_\_\_

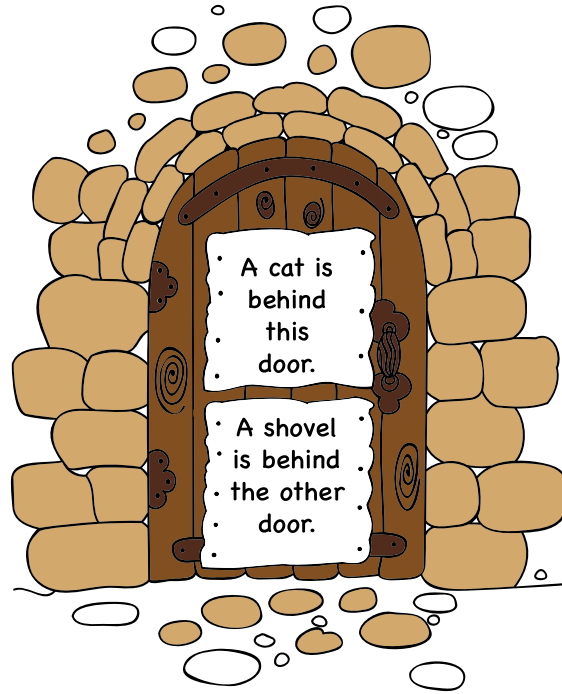
c) What is the volume of the parallelepiped? \_\_\_\_\_

$3 \text{ cm} \times 3 \text{ cm} \times 5 \text{ cm} = 45 \text{ cm}^3.$



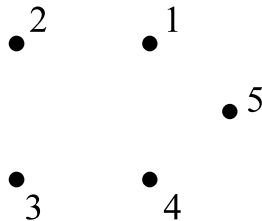
$V = a \times b \times c$

- 15 In order to get into the Cheese factory the four brothers need a shovel, which is behind one of these doors. One of the door labels is TRUE, while the other is FALSE. Find the shovel.



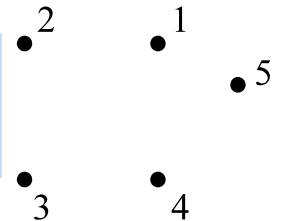
- 16 The brothers dug themselves 4 mouse holes. JM took hole #1, LJ – #2, PY – #3, and FT – #4. Cheese factory is #5. The brothers decided to connect the holes and the Cheese Factory with underground corridors. Each brother came up with his own plan of these corridors.

JM: connect all holes whose numbers' sum is an odd number



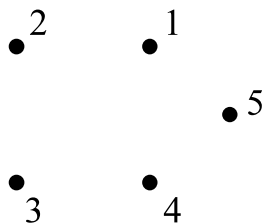
# of edges (tunnels): \_\_\_\_\_

LJ: connect all holes whose numbers are different exactly by 1.



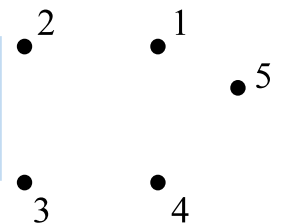
# of edges (tunnels): \_\_\_\_\_

PY: connect all holes that have a product of their numbers not greater than 6.



# of edges (tunnels): \_\_\_\_\_

FT: connect all holes that have sum of their numbers less than 5.



# of edges (tunnels): \_\_\_\_\_

## Adding and Subtracting Segments

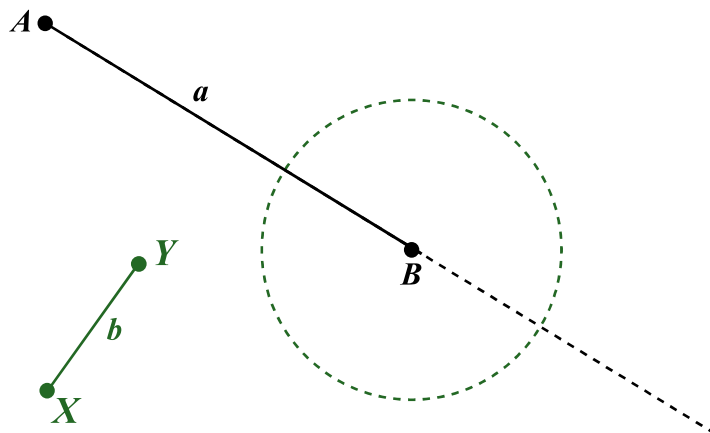
**17**  $|AB| = a \quad |XY| = b$

Analyze the procedure for adding and subtracting segments  $a$  and  $b$ :

1. Plot  $g = \text{Circ}(B, b)$
2. Find  $\{C, D\} = g \cap AB$

Insert the correct sign (“+” or “-”):

$|AD| = a \square b \quad |AC| = a \square b$

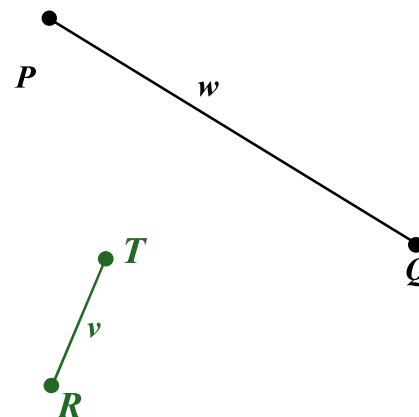


**18** Plot the line segment  $[PS]$  that is equal to the difference between  $[PQ]$  and  $[RT]$ :

$|PS| = |PQ| - |RT| = w - v$

Procedure:

1. Plot  $h = \text{Circ}(Q, \underline{\quad})$
2. Find  $S \in h \cap PQ$



**19** Plot the line segment  $[FR]$  that is  $x$  cm longer than the segment  $[ER]$ :

$|FR| = |ER| + x$

Procedure:

1. Plot  $f = \text{Circ}(E, \underline{\quad})$
2. Find  $F \in f \cap \underline{\quad}$

