

Math 4. Class Work 15

Variables/Equation

- When we need to write the mathematical expression but don't know the exact numbers to use, we use variables. It can be any symbol, but it's very convenient to use letters: $a, b, m, n \dots$

Example: the number of books on one shelf is n , and the number of books on the other shelf is m , then the total number of books on both shelves is $n + m$.

- Equation is an equality with one or more variables, we usually use $x, y, z \dots$. To solve an equation means to find such value of the variable(s) that the equation will become a true equality ($x = \text{number}$). We can keep the equality true by adding or subtracting the same quantity (term) on both sides of the equal sign

Example: $3x + 4 = 13$ | subtract -4 on both sides of the equal sign

$$\begin{array}{r} -4 \quad -4 \\ 3x + 4 = 13 \\ \hline 3x = 9 \end{array}$$

| divide by 3 both sides (remember $9:3 = 9/3$)

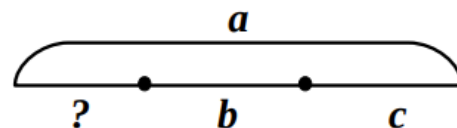
$$\begin{array}{r} \frac{3}{3} x = \frac{9}{3} \\ x = 3 \end{array}$$

- Equations help solve word problems. We can relate variables to solve equations. (Problem 5)

Problems

1. Subtracting a sum: $a - (b + c) = a - b - c$

- $3x - 2 \cdot (x + 1) =$
- $3x - 2 \cdot (x - 1) =$
- $3x + 2 \cdot (x + 1) =$
- $3x + 2 \cdot (x - 1) =$



2. Write the expression for the following problems using variables

- 3 packages of cookies cost a dollars. How many dollars do 5 of the same packages cost?
- 5 bottles of juice cost b dollars. How many bottles can one buy with c dollars?

3. Moving additive terms across equal signs in equations. Write the equation into a standard form where the unknown is alone on the left side of the equation

a) $6x - 7 = 3x + 2$

b) $x + 4 = 8 - 3x$

c) $5x - 1 = 2x + 1$

d) $2x + 1 = 11 - 4x$

e) $5 - x = 1 + 2x$

f) $7x - 9 = 3x + 3$

4. Simplify and solve the equation using the following steps:

- Open parenthesis;
- Collect all x-terms on the left and all free terms on the right side of the equation;
- Simplify each side of the equation;
- Find x and check your answer!

a) $2 \times (3x - 1) = 3 \cdot (x + 2) + x - 2$

b) $6x - 12 : 2 = (4x + 8) \times 12$

5. (Solving equations using substitution) There are 27 pencils in two boxes altogether. There are 5 more pencils in one of the boxes than in the other. How many pencils are there in each box?

Geometry: definitions

A circle is defined by a point – its center, and a segment length – its radius.

Geometry notations: $k = \text{Circ}(M, r = 4 \text{ cm})$ is a circle with a center at point M and a radius 4 cm.

$\{P, Q, R\}$ - a list of points is written as

\cap - intersection symbol,

\in - belongs to, an element of a list or object,

$|AB| = 3 \text{ cm}$ – the size of a segment \overline{AB}

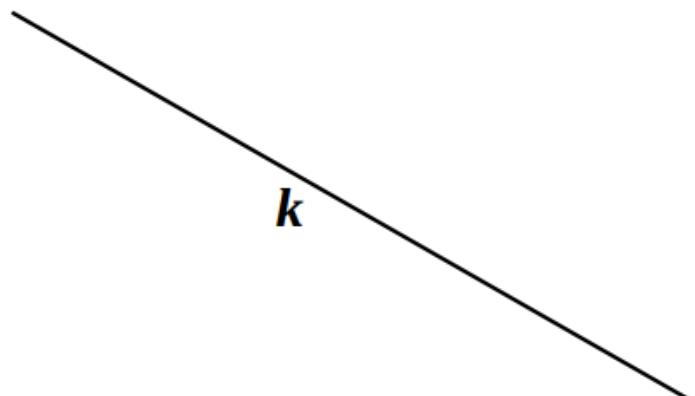
We use a compass to draw a circle. We can also use a compass to measure the size of a segment!

6. Follow the instructions below:

1. Plot $w = \text{Circ}(A, 5 \text{ cm})$. Label the circle
2. Plot a line k
3. Find $\{B, D\} = w \cap k$
4. Plot $h = \text{Circ}(B, 5 \text{ cm})$
5. Plot $g = \text{Circ}(D, 5 \text{ cm})$
6. Find $C \in h \cap g$

What shape is ABCD?

A •



If time:

7. A teacher opened a box with candies in her classroom to treat her students. If each student takes 4 candies, 19 candies will be left in the box. If each student takes 5 candies, 2 students will be left with only 4 candies. How many candies are there in the box?

8. An apple costs x dollars and a pear costs y dollars. Explain the expressions below:

$$x + y, \quad x - y, \quad 3x, \quad 8y, \quad 3x + 8y, \quad y : x, \quad 120 : y$$

9. Write the following as a mathematical expression. If this expression is an equation, solve it.

- a. Sum of the number x and 15 equals 20.
- b. Product of y and 10.
- c. The difference between three times z and 4 is equal to 12.
- d. Half of the number b is equal to 1.5
- e. Product of the numbers of 5 and x is less than 12.