MATH 5e: Class Work 4

Topics

- Arithmetic rules using subtraction

We can "open the brackets" in the following expressions:

$$a-(b+c)=a-b-c$$
$$a-(b-c)=a-b+c$$
$$a(b-c)=ab-ac$$
$$-a(b-c)=-ab+ac$$

$$-(b-a)=-b+a=a-b$$

- Algebraic expressions with negative numbers

Opening parenthesis, addition, and subtraction

$$+(-a)=-a \qquad -(-a)=+a$$

$$(-a)+(-b)=-a-b=-(a+b)$$
$$(-a)+(+b)=-a+b=+(b-a) \quad if\ |b|>|a|$$
$$=-(a-b),\ \ if\ |a|>|b|$$

- Solving simple equations

An *equation* has expressions on both sides of the equal sign. The letters *x, y,* and *z* represent the unknown variables we are trying to find. Given an equation, we can add or subtract the same number from both sides. For example:

$3x+5=20$ subtracting 5 from both sides of the original equation

$3x+5-5=20-5$

$3x=15$

We can multiply or divide both sides of an equation by the same number.

$3x=15$ dividing both sides by 3

$3x\div 3=15\div 3$

$x=5$

Problems

1. Open brackets, then solve the expressions with negative numbers.

   a) $1-4-(-9)=$
   b) $-3+(-7+5)=$
   c) $-\big(-8+(-4)\big)=$
   d) $7-(x-1)=$

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2. Algebraic expressions using the distributive property.
   Example: $2(b-2) = 2b - 2 \cdot 2 = 2b - 4$

   a) $3(a-5) =$
   b) $-2(2a-9) =$
   c) $12x - 3x(x+4) =$
   d) $5x - 5(7-a+x) =$

3. Solve the equations by using the distributive property to open the parenthesis.

   a) $2 + 2(x-1) = 5$

   b) $2x - 5(x-1) = 10$

   c) $13x - 7 = 2x$

4. Word problems, creating equations.

   A) A dog weighs 2 pounds more than a cat. Three cats and four dogs together weigh 43 pounds.

   How much does a dog weigh? How much does a cat weigh?

   B) A father is twice as old as his son. The sum of their ages is 48 years. How old is each of them?

   C) What is the difference between the smallest whole two-digit negative number and the largest whole negative two-digit number

   D) Fill in the missing numbers in the square

11		
	15	-7

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5. Expressions with fractions

⇒ Mixed fractions review first

$$3+\frac{2}{5}=3\frac{2}{5} \quad (\textit{omit the } +)$$

$$3+\frac{2}{5}=\frac{15}{5}+\frac{2}{5}=\frac{17}{5} \qquad \textit{same as} \quad \frac{3\cdot 5+2}{5}$$

⇒ Add mixed fractions

$$6\frac{2}{5}+7\frac{1}{2}=$$

a) $2a+\frac{1}{2}a=$
b) $2a-\frac{1}{2}a+3b=$
c) $5x+2x+\frac{1}{2}x+3=$
d) $-3\left(x-\frac{1}{3}\right)=$
e) $6\left(a-\frac{5}{6}-x\right)=$
f) $5a-8+\frac{9}{7x}+bc-\left(5a-\frac{9}{7x}-8+bc\right)=$

6. Solve the equations

a) $7\frac{5}{12}+x=15$

b) $9\frac{4}{15}-x=6\frac{8}{15}$

7. On a small farm with two cows, a black cow gives, on average, $37\frac{1}{2}$ liters of milk per day. The second cow, which is brown, gives $4\frac{4}{5}$ less than the black one. How many liters of milk does the farmer milk each day?