Math 4. Classwork #25

## Review of operations with fractions:

**Fraction addition:** $\frac{5}{12}+\frac{2}{15}=$

1. Find common denominator, which is LCM.
2. Add, simplify if needed.

$$\frac{5}{12}+\frac{2}{15}=\frac{5\cdot5}{60}+\frac{2\cdot4}{60}=\frac{25+8}{60}=\frac{33}{60}=\frac{33}{60}:\frac{3}{3}=\frac{11}{20}$$

**Fraction subtraction:** $3\frac{2}{15}-\frac{5}{12}=$

1. Find common denominator, which is LCM.
2. Borrow 1 if needed,
3. Subtract, simplify if needed.

$$3\frac{2}{15}-\frac{5}{12}=3\frac{2\cdot4}{60}-\frac{5\cdot5}{60}=3\frac{8}{60}-\frac{25}{60}=2\frac{68}{60}-\frac{25}{60}=2\frac{43}{60}$$

**Fraction multiplication**: $\frac{3}{4}\cdot\frac{2}{3}=$

1. Multiply numerators and denominators: $\frac{3}{4}\cdot\frac{2}{3}=\frac{3\cdot2}{4\cdot3}$
2. Simplify by using number prime factorization: $\frac{3}{4}\cdot\frac{2}{3}=\frac{3\cdot2}{4\cdot3}=\frac{3\cdot2}{2\cdot2\cdot3}=\frac{1}{2}$

**Fraction division:** $\frac{1}{2}\div\frac{2}{3}=$

1. Find a **reciprocal (inverse)** of the divisor. **Reciprocal** of $\frac{2}{3}$ is $\frac{3}{2}$.
2. Turn division into multiplication and simplify by using prime factorization:

$$\frac{1}{2}\div\frac{2}{3}=\frac{1}{2}\cdot\frac{3}{2}=\frac{1\cdot3}{2\cdot2}=\frac{3}{4}$$

Exponents review:

$$b^n \times b^m = b^{n+m}$$

$$(b^2)^3 = (b \cdot b)^3 = (b \cdot b) \cdot (b \cdot b) \cdot (b \cdot b) = b^{2 \cdot 3} = b^6$$

$$(b^n)^m = b^{n \cdot m}$$

$$(a \cdot b)^3 = (a \cdot b) \cdot (a \cdot b) \cdot (a \cdot b) = a \cdot a \cdot a \cdot b \cdot b \cdot b = a^3 b^3$$

$$(a \cdot b)^n = a^n b^n$$

$$a^{-n} = \frac{1}{a^n}$$

1. Compute: (*Remember the common denominator is LCM, borrow 1 from the wholes if needed, DO NOT convert the entire whole number into a fraction.*)

(a) $4\frac{5}{12} - \frac{8}{9} =$ (b) $1\frac{1}{30} + \frac{5}{24} =$

2. Compute: (*First make all fractions irregular; then multiply*)

(a) $\frac{9}{16} \cdot \frac{4}{45} =$ (b) $3\frac{3}{7} \cdot \frac{7}{24} =$

3. Compute: (*First make all fractions irregular; then divide*)

(a) $1\frac{1}{4} \div 2\frac{1}{2} =$ (b) $\frac{4}{13} \div \frac{11}{13} =$

4. Compute:

$\frac{2^3 \cdot 3^2 \cdot 6^8}{2^{10} \cdot 3^6} =$ $\frac{2^5}{2^{-5}} - \frac{2^{11}}{2} =$

**Geometry:**

We have discussed **congruent** objects. Two objects are **congruent** if ……..

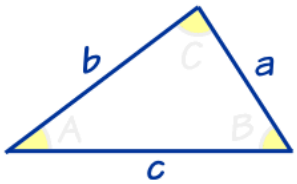
# Congruent or Similar?

So, if the shapes become the same:

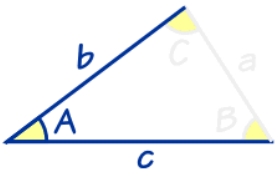
| When you ... | | Then the shapes are ... |
|---|---|---|
| ... only Rotate, Reflect and/or Translate | ➡ | **Congruent** |
| ... also need to Resize | ➡ | **Similar** |

**<u>Congruent Triangles Rules</u>** : ( ≅ *Congruent symbol)*

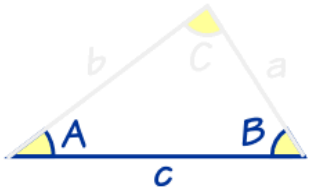
1. **3 Sides are equal (SSS)**



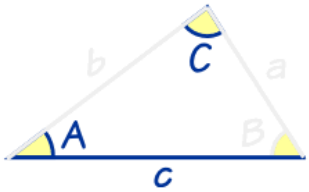

2. **Side Angle Side are equal (SAS)**




3. **Angle Side Angle are equal (ASA)**

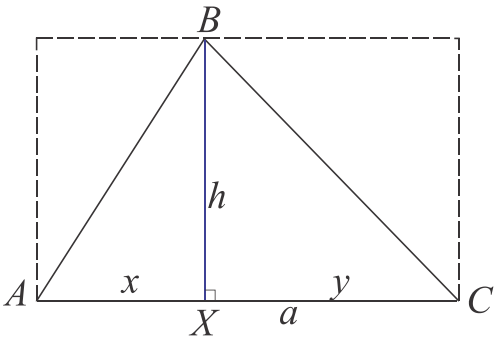



4. **Angle Angle Side are equal (AAS)**



**Angle Angle Angle (AAA):** When three angles of the triangles are equal, we can say that the two triangles are similar triangles. That is, the corresponding angles are having equal measurement.

**Area of a triangle.**




$$S_{\Delta} = \frac{1}{2}h \times a$$

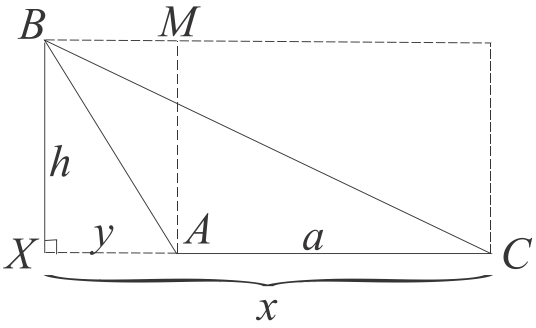
The area of a triangle is equal to half of the product of its height and the base, corresponding to this height.

For the acute triangle it is easy to see.

$$S_{\square} = h \times a = x \times h + y \times h$$

$$S_{\Delta ABX} = \frac{1}{2}h \times x, \qquad S_{\Delta XBC} = \frac{1}{2}h \times y, \qquad S_{\Delta ABC} = S_{\Delta ABX} + S_{\Delta XBC}$$

$$S_{\Delta ABC} = \frac{1}{2}h \times x + \frac{1}{2}h \times y = \frac{1}{2}h(x + y) = \frac{1}{2}h \times a$$




For an obtuse triangle, for one out of the three heights, it is not so obvious.

$$S_{\Delta XBC} = \frac{1}{2}h \times x, \qquad S_{\Delta XBA} = \frac{1}{2}h \times y$$

$$S_{\Delta ABC} = S_{\Delta XBC} - S_{\Delta XBA} = \frac{1}{2}h \times x - \frac{1}{2}h \times y$$
$$= \frac{1}{2}h \times (x - y) = \frac{1}{2}h \times a$$

## Homework # 25

1. You just got a free ticket for a boat ride, and you can bring along 2 friends! However, you have 6 friends who want to come along. **How many different groups of friends could you take with you?**

2. William is packing his bags for his vacation. He has 8 unique books, but only 5 books fit in his bag. **How many different sets of 5 books can he take?**

3. **Compute:**

$(-35) \times \frac{-1}{7} =$

$17 \times \frac{-1}{-17} =$

$\frac{-35}{\frac{5}{-7}} \times \frac{-1}{7} =$

4. Two towns on the opposite banks of the same river are 30 km apart. It takes a motor-boat 2 hours to get from one side to another and 1 hour 30 min to return. Assuming the boat is traveling with the same speed (call it x) and the river's current is the same (call it y) try to write down system of equations for x and y and to solve it for x and y.

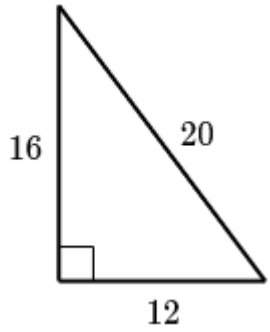
5. Solve equations:

$(-5)x + (-34) = -(-16)$ $\quad\quad$ $-7 + (-14)x = -(-441)$

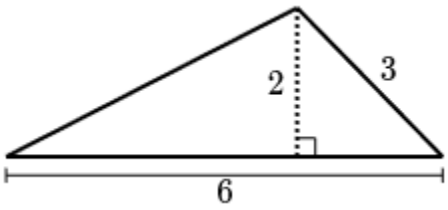
$0.25(x + 0.2) = 10$ $\quad\quad$ $3.14\ x + 5 = 5.628$

6. Find the area ($S$) of the triangles

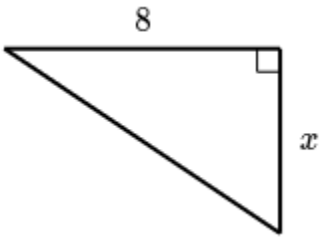
A




B




7. The area of the triangle depicted below is 24 cm$^2$. Find $x$.




8. Please write down what is the most confusing topic we discussed this year. If nothing comes to mind – write down what topic you would like to review or learn

**9.** Compute:

$a)\ 50\ (0.3 + 0.3 - 0.2) =$

$b)\ (0.456 - 0.356)\ 748\ =$

$c)\ 76\ (3.14 - 0.23) - 0.23\ (76 + 10) =$

10. Simplify:

$$\frac{1}{(1-x)x} - \frac{1}{x} - \frac{1}{1-x} =$$

11. Solve the following system of equations

$$\begin{cases} x + 3y = 11 \\ 10x + 20y = 90 \end{cases}$$

12. Calculate:

$$\frac{\mathbf{5^{10} - 5^9}}{\mathbf{5^8}} =$$

$$\mathbf{15} - (\ \mathbf{16} \times (-\mathbf{2})^{-\mathbf{3}}\ ) =$$

$$\frac{\mathbf{3^8 \cdot 8^{11} \cdot 12^2}}{\mathbf{27^3 \cdot 16^8}} =$$