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 ……..

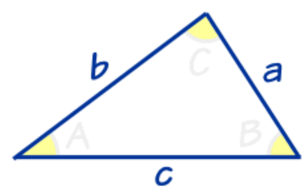
Congruent or Similar?

So, if the shapes become the same:

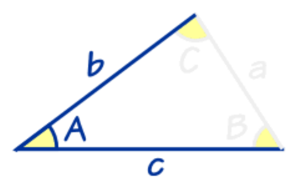
When you ...		Then the shapes are ...
... only Rotate, Reflect and/or Translate		**Congruent**
... also need to Resize		**Similar**

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

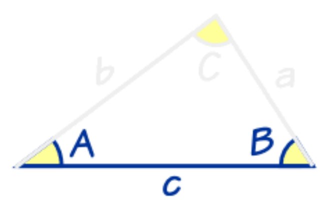
1. **3 Sides are equal (SSS)**



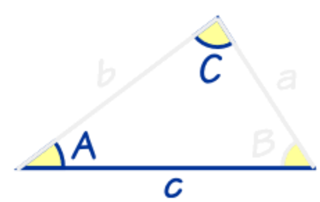
2. **Side Angle Side are equal (SAS)**



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

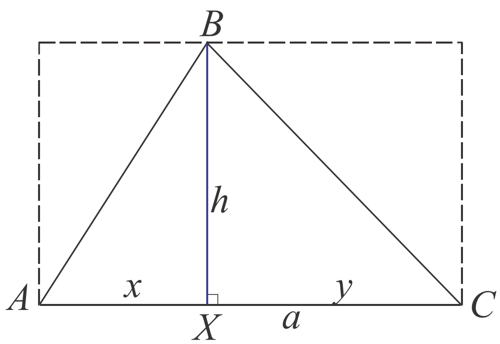


4. **Angle Angle Side are equal (AAS)**



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.



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

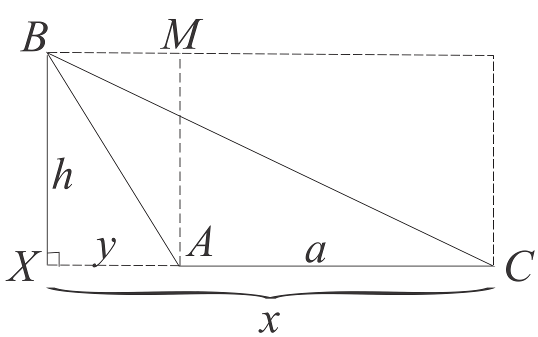
The area of a triangle is equal to half of the product of its height and the base, corresponding to this height.

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.

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

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