Math 4. Class Work 7

Addition and subtraction of fractions with unlike denominators

- To add fractions, bring them to a Common denominator. The **common denominator** of fractions should be the multiple of these denominators – the **LCM** can do this task!

For example, $\frac{3}{8}+\frac{5}{12}=\frac{3\cdot3}{8\cdot3}+\frac{5\cdot2}{12\cdot2}=\frac{9}{24}+\frac{10}{24}=\frac{19}{24}$

If both numbers are prime, the least common multiple is their product.

Multiplication of fractions by a number.

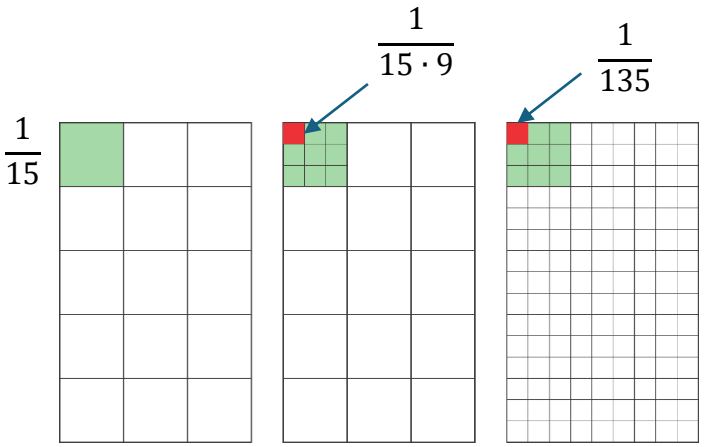
- To multiply a fraction by a number, simply multiply the numerator by the number:

$$\frac{2}{7}\cdot 3=\frac{2}{7}+\frac{2}{7}+\frac{2}{7}=\frac{2+2+2}{7}=\frac{3\cdot 2}{7}=\frac{6}{7}$$

Multiplication of fraction by a fraction.

If we want to take $\frac{1}{9}$ part of a $\frac{1}{15}$ chunk of a bar (green square) we have to divide it into 9 even smaller pieces to find $\frac{1}{9}^{\text{th}}$ of $\frac{1}{15}^{\text{th}}$.

$\frac{1}{15}:9=\frac{1}{15}\cdot\frac{1}{9}=\frac{1}{15\cdot9}=\frac{1}{135}$



- To multiply two fractions, we need to multiply the numerators, multiply the denominators and reduce the fractions, if possible.

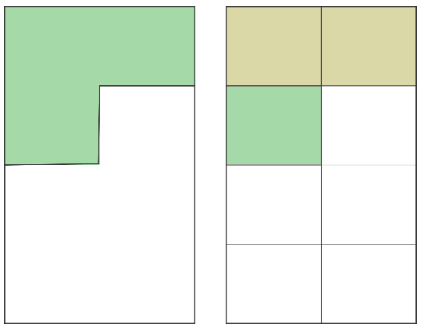
Examples: $\frac{3}{8}\cdot\frac{2}{7}=\frac{3\cdot2}{4\cdot2\cdot7}=\frac{3\cdot2}{4\cdot7\cdot2}=\frac{3}{4\cdot7}=\frac{3}{28}$

Division of fractions.

If the multiplication of fractions is: $\frac{3}{8}\cdot\frac{2}{3}=\frac{2}{8}=\frac{1}{4}$

Then, the division of $\frac{1}{4}$ by $\frac{2}{3}$ should give the quotient $\frac{3}{8}$.

$$\frac{1}{4}:\frac{2}{3}=\frac{3}{8}$$



We can turn the division into multiplication by switching the numerator and denominator of the second fraction the divisor)

Example $\frac{1}{4}:\frac{\mathbf{2}}{\mathbf{3}}=\frac{1}{4}\cdot\frac{\mathbf{3}}{\mathbf{2}}=\frac{3}{8}$

- To divide one fraction by another, we multiply the dividend by the **inverse fraction**.
- An inverse fraction has the numerator and denominator switched, so the product of the original and its inverse fraction is 1. Inverse fractions can also be called reciprocal.

Example: $\frac{4}{3}$ has a reciprocal of $\frac{3}{4}$, and $\frac{4}{3}\cdot\frac{3}{4}=1$

Warm-up (do on your own while waiting)

Represent as a mixed number:

$\frac{15}{4}=$; $\frac{18}{9}=$; $\frac{10}{3}=$

Represent as improper fractions:

$1\frac{4}{7}=$; $3\frac{1}{10}=$; $1\frac{9}{14}=$

Problems:

1. Addition and subtraction of mixed numbers – convert to improper fractions,

Example :

$$\frac{3}{8}+2\frac{1}{4}=\frac{3}{8}+\frac{9}{4}=\frac{3}{8}+\frac{9.2}{4.2}=\frac{3}{8}+\frac{18}{8}=\frac{3+18}{8}=\frac{21}{8}=2\frac{5}{8}$$

$$2\frac{1}{3}-1\frac{1}{2}=\frac{7}{3}-\frac{3}{2}=\frac{7.2}{3.2}-\frac{3.3}{2.3}=\frac{14}{6}-\frac{9}{6}=\frac{5}{6}$$

a) $\frac{1}{4}+3\frac{1}{6}=$ $4\frac{1}{5}-2\frac{3}{10}=$

b) $5\frac{5}{12}+3\frac{2}{9}=$ $7\frac{1}{9}-4\frac{1}{3}=$

c) $2\frac{4}{9}+\frac{1}{6}=$ $2\frac{2}{7}-1\frac{3}{5}=$

d) $4\frac{3}{5}+10\frac{1}{4}=$ $6\frac{1}{4}-3\frac{2}{5}=$

2. Multiply and divide the following fractions:

a) $\frac{4}{5}\cdot\frac{5}{7}=$ $\frac{2}{3}:\frac{5}{7}=$

b) $\frac{8}{9}\cdot\frac{3}{5}=$ $\frac{1}{4}:\frac{1}{2}=$

c) $\frac{9}{2} \cdot \frac{2}{9} =$ $\frac{4}{9} : \frac{8}{9} =$

d) $\frac{8}{21} \cdot \frac{7}{10} =$ $\frac{3}{4} : \frac{1}{2} =$

e) $\frac{4}{7} \cdot \frac{5}{24} : 1\frac{1}{14} =$ $25 \cdot \frac{7}{15} : \frac{7}{9} =$

3. Painter painted $\frac{2}{7}$ of the house is 4 days. How many days will it take him to paint the whole house? Represent with an equation.

4. Evaluate:

$$\frac{3}{7} \cdot 2; \qquad 3 \cdot \frac{1}{6}; \qquad 9 \cdot \frac{5}{6}; \qquad 2\frac{1}{3} \cdot 2; \qquad 4 \cdot 1\frac{1}{2};$$

5. A melon weighs 7 pounds, and a watermelon is $1\frac{1}{5}$ times heavier. By how many pounds is a watermelon heavier than a melon?

6. $4\frac{1}{2}$ kg. of candies were packed into $\frac{1}{2}$ kg packages. How many packages were the candies packed into?

7. Find the unknown:

$a)\ \frac{1}{3} \cdot x = \frac{1}{6}$ $b)\ \frac{2}{3} \cdot x = 1$ $c)\ 3 \cdot x = \frac{1}{3}$

If time allows, we can solve problems from our previous class work.