

10 Dec' 24

HW: (1) Do previous class HWs again  
in a new file. Don't look at the  
previous HWs. Don't use calculators.

Fractions: Divisions of the form  $\frac{\text{numerator}}{\text{denominator}}$

→ Numerator is the dividend & denominator  
is the divisor.

→ Eg: If we have 1 pizza & divide it  
among 3 people, each person  $\frac{1}{3}$  pizza.  
↓  
fraction

→ Eg: If we have 10 chocolates and divide among 3 people, each person gets 3 chocolates &  $\frac{1}{3}$  fraction of a chocolate.

$$= 3 \frac{1}{3} \text{ chocolates} = 3 + \frac{1}{3}$$

→ Eg: If we have 1 chocolate and 3 people, we can break it into 3 pieces and give each person  $\frac{1}{3}$  chocolate. Or we can break the chocolate into 9 pieces and give each person  $\frac{1}{9}$  chocolate.

Both are equal.

$$\frac{1}{3} = \frac{3}{9}$$

$$\frac{1}{3} = \frac{1}{3} \times 1 = \frac{1}{3} \times \frac{3}{3} = \frac{1 \times 3}{3 \times 3} = \frac{3}{9}$$

Proper fraction : If numerator < denominator

Eg:  $\frac{3}{8}, \frac{2}{5}, \frac{7}{9}, \frac{8}{11}, \frac{12}{13}$

Improper fractions : If numerator > denominator

Eg:  $\frac{8}{5}, \frac{11}{10}, \frac{19}{7}, \frac{23}{6}$

Mixed fractions : A whole number + proper fraction

Eg:  $3\frac{1}{3} = 3 + \frac{1}{3}, 5\frac{6}{7} = 5 + \frac{6}{7}, 11\frac{23}{42} = 11 + \frac{23}{42}$

→ Converting improper fraction to mixed fraction :

Eg:

$$\frac{8}{5} = 1 + \frac{3}{5} = 1\frac{3}{5}$$

$$5 \overline{)8} \\ \underline{5} \\ 3$$

Eg:

$$\frac{23}{7} = 3\frac{2}{7}$$

Eg:  $\frac{13}{3} = 4\frac{1}{3}$

For improper fractions with  $\text{num} > \text{den}$ ,

$$\frac{\text{num}}{\text{den}} = \text{quotient} + \frac{\text{remainder}}{\text{den}} = \text{quotient} \frac{\text{remainder}}{\text{den}}$$

after doing integer division.

→ Converting mixed fraction to improper fraction.

$$\text{Eg: } 1\frac{3}{5} = 1 + \frac{3}{5} = \frac{5}{5} + \frac{3}{5} = \frac{5+3}{5} = \frac{8}{5}$$

Division is right distributive

$$\text{Eg: } 3\frac{2}{7} = 3 + \frac{2}{7} = \frac{3 \times 7}{7} + \frac{2}{7} = \frac{21}{7} + \frac{2}{7} = \frac{23}{7}$$

If you have a mixed fraction  $a\frac{b}{c}$ , 'a' is the quotient, 'b' is remainder, 'c' is divisor

$$a\frac{b}{c} = \frac{axc+b}{c}$$

axc+b is dividend

→ Like fractions: Two fractions having the  
same denominator

Eg:  $\frac{2}{5}, \frac{3}{5}, \frac{1}{5}, \frac{11}{5}$  etc.

Like fractions can be added easily  
as division is right distributive

$$\frac{2}{5} + \frac{3}{5} = \frac{2+3}{5}$$

$$c(a+b)/c = \frac{a}{c} + \frac{b}{c}$$

$$0.4 + 0.6 = \frac{10}{5}$$

$$1 = 1$$

→ Unlike fractions: Two fractions with different  
denominators

Eg:  $\frac{2}{5}, \frac{3}{7}, \frac{9}{11}$  etc.

To add unlike fractions, we have to first convert them to like fractions.

$$\text{Eg: } \frac{3}{5} + \frac{2}{3} = \frac{3}{5} \times 1 + \frac{2}{3} \times 1$$

$$= \frac{3}{5} \times \frac{3}{3} + \frac{2}{3} \times \frac{5}{5}$$

$$= \frac{9}{15} + \frac{10}{15} = \frac{19}{15} = 1\frac{4}{15}$$

To add  $\frac{a}{b} + \frac{c}{d}$  where  $b \neq d$ , we multiply  $\frac{a}{b}$  with  $\frac{d}{d} = 1$  &  $\frac{c}{d}$  with  $\frac{b}{b} = 1$ , so both denominators become  $b \times d$ ;  $\frac{a}{b} + \frac{c}{d} = \frac{a \times d}{b \times d} + \frac{c \times b}{d \times b} = \frac{ad + cb}{bd}$

Unit fractions: Fractions with '1' in the numerator

Eg:  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$  etc.

⇒ Non-integer fractions: Mostly, we talk only about integer fractions, where num, den  $\in \mathbb{Z}$ . But they can also be non-integers like rational or irrational numbers.

Eg:  $\frac{1.2}{3.3}, \frac{6.2}{1.2}$  etc.

HW: (1) Convert these improper fractions to mixed fractions

$$\frac{11}{9}, \frac{12}{7}, \frac{13}{6}, \frac{23}{27}, \frac{32}{11}$$

(2) Convert to improper fractions

$$2\frac{3}{7}, 19\frac{23}{42}, 16\frac{2}{3}, 15\frac{9}{11}, 2\frac{7}{9}$$

(3) Compute the following using decimal divisions and then addition, as well as fractional addition and then decimal division

$$\text{Ex: } \frac{11}{5} + \frac{3}{10} = \frac{11 \times 10 + 3 \times 5}{5 \times 10} = \frac{125}{50}$$

$$2.2 + 0.3 = 2.5$$
$$2.5 = 2.5$$

$$(3.1) \quad \frac{3}{9} + \frac{2}{7}$$

$$(3.2) \quad \frac{6}{5} + \frac{13}{4}$$

$$(3.3) \quad \frac{12}{9} + \frac{17}{5}$$

$$(3.4) \quad \frac{16}{17} + \frac{2}{7}$$

$$(3.5) \quad \frac{15}{8} + \frac{7}{4}$$