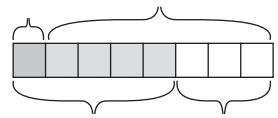
What to bring to class:
Ask students to bring PM 4A and 5A.

6.2 More Fraction Basics

Peter had 400 stamps. $\frac{5}{8}$ of them were Singapore stamps and the rest were U.S. stamps. He gave $\frac{1}{5}$ of the Singapore stamps to a friend. How many stamps did he have left?

T.S.



8 units = 400
1 unit = 50
7 units = 350

He had 350 stamps.

VI. (Grade 4) Improper and Mixed Numbers. (pgs. 52–57 4A)

Def (i) A mixed number is a whole number plus a fraction: $2\frac{1}{8}, 7\frac{3}{5}$ ← easy to understand

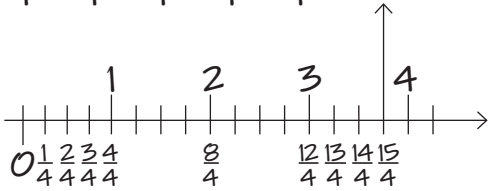
(Think: $2+\frac{1}{8}, 7+\frac{3}{5}$)

(ii) An improper fraction is a fraction $\frac{a}{b}$ with $a \geq b$, Ex. $\frac{17}{4}, \frac{112}{7}$ ← easy to calculate

Mixed numbers ⟷ convert ⟷ Improper Fractions.

Examples:

① $\frac{15}{4} = \frac{4}{4}+\frac{4}{4}+\frac{4}{4}+\frac{3}{4} = 3\frac{3}{4}$



② $4\frac{2}{3}$ is how many thirds?

14 thirds or $\frac{14}{3}$?

This is the same as $\frac{3 \times 4 + 2}{3} = 4 \overset{+}{\underset{\times}{}} \frac{2}{3}$

$$= \frac{3 \times 4}{3} + \frac{2}{3}$$

$$= \frac{3 \times 4 + 2}{3}$$

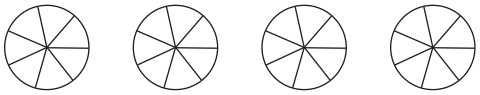
VII. Fractions from division

[SAY: Use word problems!] (SA, pages 33–35)

7 children want to share 4 cookies.

How many should each get?

[ASK: Is this partitive or measurement div.?]



Divide each cookie into sevenths ⇒ 4 whole cookies = 28 sevenths

⇒ Each child gets $4 \div 7 = 28 \text{ sevenths} \div 7 = 4 \text{ sevenths}$

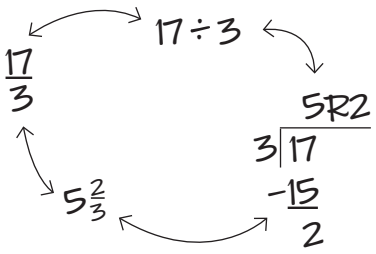
$\frac{4}{7}$ cookies each!!

This implies $4 \div 7 = \frac{4}{7}$.

Hence

Fraction Rule 3: $a \div b = \frac{a}{b}$

This shows equivalence of the following:



VII. Adding unlike denominators (SA, pg 37–44)

We can't add fractions until we have the same fractional unit. For unlike denominators, we need to rename both fractions.

1. Pictoral Approach

(a) $\frac{1}{2} + \frac{2}{5}$

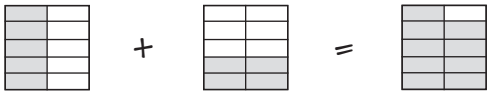
Can't add until we have same unit

Big box is Std. unit.

unit = $\frac{1}{2}$ unit = $\frac{2}{5}$

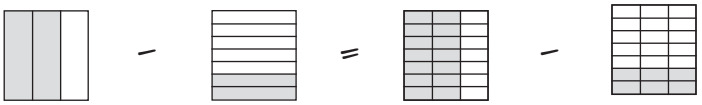
Fractional Units

Chop both ways to get common unit $\frac{1}{10}$.



$$\frac{5}{10} + \frac{4}{10} = \boxed{\frac{9}{10}}$$

(b) $\frac{2}{3} - \frac{2}{7}$ [student's do]



$$\frac{2}{3} - \frac{2}{7} = \frac{14}{21} - \frac{6}{21} = \boxed{\frac{8}{21}}$$

Note: Pictures show common unit = product of denominators.

(maybe not most efficient)

(2) Abstract Approach.

$$\frac{3}{8} + \frac{1}{6} = \frac{9}{24} + \frac{4}{24} = \frac{13}{24}$$

rename

LCM (8, 6) = 24.

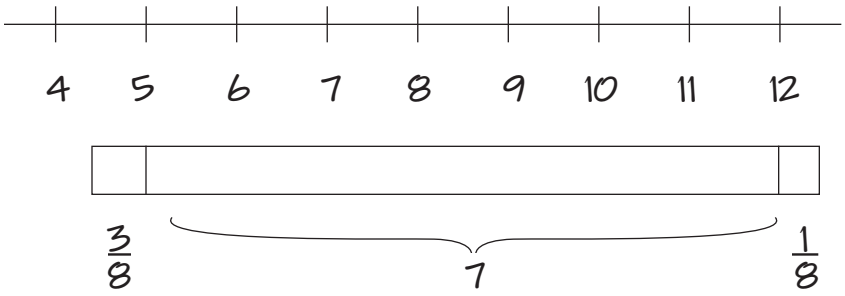
Fraction Rules 1 & 2 ⇒

$$\frac{a}{b} + \frac{c}{d} = \frac{ad}{bd} + \frac{bc}{bd} = \frac{ad+bc}{bd}$$

rule 1 — same denom. — Rule 2

[SAY: Do not just tell students this rule! Model it until students understand, use models to develop Abstract rule]

(3) Mixed Numbers: $12\frac{1}{8} - 4\frac{5}{8}$



$$12\tfrac{1}{8} - 4\tfrac{5}{8} = \tfrac{3}{8} + 7 + \tfrac{1}{8} = 7\tfrac{4}{8} = 7\tfrac{1}{2}$$

Common Error: Beth writes $\frac{1}{3} + \frac{2}{5} = \frac{3}{8}$.

Why? [SAY: She is thinking of fractions as pairs of numbers.]

Can help Beth by:

(a) "Proof by contradiction"

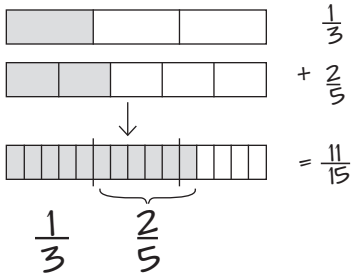
"Beth, your reasoning gives

$$\frac{1}{2} + \frac{1}{2} = \frac{2}{4} = \frac{1}{2}$$

Something is Wrong!!"

[SAY: "Proof by Contradiction" is a teaching technique as well as a proof method!]

(b) Pictures:



(c) Only then to correct arithmetic

$$\frac{1}{3} + \frac{2}{5} = \frac{\square}{15} + \frac{\square}{15} = \frac{\square}{15}$$

Lesson: When teaching fractions, don't move pictoral ⇒ abstract too fast!

HW Read § 6.2 very carefully! Do HW set 25

Bring SA to next class