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Math 9 – Unit 1: Real Numbers

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Lesson #3: Adding and Subtracting Fractions

Date: Nov 16, 2022

Learning Goal: We are learning to add and subtract fractions by using a common denominator.

If you had a third of a pizza and a quarter of another pizza (assuming same sized pizza), how much pizza would you have left? This question can be done in two ways. One way is to estimate, which might be okay when eating pizza, but we are much more interested in an exact answer. To get a full answer, you would need to make sure all the pizza slices are the same size. Let's analyze these questions with fractions:

$\frac{1}{3}+\frac{1}{4}=?$ To solve this addition problem, we cannot have different denominators, so we must create equivalent fractions with the same (or common) denominator. Equivalent fractions are fractions that have the same value, such as $\frac{3}{6}$ and $\frac{5}{10}$ or $\frac{7}{8}$ and $\frac{14}{16}$. To create an equivalent fraction, you need to multiply the numerator AND denominator by the same number.

Finally, let's find out how much pizza we have:

$\frac{1^{\times 4}}{3_{\times 4}}+\frac{1^{\times 3}}{4_{\times 3}}$ CD: $3\times 4=12$

$=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$

⊗ Do not add or subtract the denominators.

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

Subtracting fraction is done is the exact same way as adding. Find a common denominator, create equivalent fractions, then subtract. Let's practice!

a) $\frac{4}{5}+\frac{3}{4}$ ($\times 4$, $\times 5$) CD: $5\times 4=20$

(cannot reduce when adding and subtracting)

$=\frac{16}{20}+\frac{15}{20}$

$=\frac{31}{20}$

b) $\frac{-8}{3}+\frac{6}{7}$ ($\times 7$, $\times 3$) CD: $3\times 7=21$

$=\frac{-56}{21}+\frac{18}{21}$

$=\frac{-38}{21}$

c) $\frac{11}{2}-5$ ($\times 2$) CD: $2\times 1=2$

$=\frac{11}{2}-\frac{10}{2}$

$=\frac{1}{2}$

d) $\frac{7}{6}-\frac{9}{4}$ ($\times 4$, $\times 6$) CD: $6\times 4=24$

$=\frac{28}{24}-\frac{54}{24}$

$=\frac{-26\div 2}{24\div 2}=\frac{-13}{12}$

$\frac{7^{\times 2}}{6}-\frac{9^{\times 3}}{4}$ CD: 12

$=\frac{14}{12}-\frac{27}{12}$

$=\frac{-13}{12}$

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e) $\frac{-3}{5} - \frac{2}{7} + \frac{3}{2}$ (×14, ×10, ×35) CD: 5×7×2 = 70

$= \frac{-42}{70} - \frac{20}{70} + \frac{105}{70}$

$= \frac{43}{70}$

f) $\frac{5}{6} - \frac{2}{5} - \frac{1}{15}$ (×5, ×6, ×2) CD = 30

$= \frac{25}{30} - \frac{12}{30} - \frac{2}{30}$

$= \frac{11}{30}$

CD: 6×5×15 = 450

6	5	15
12	10	30
18	15	45
24	20	60
30	25	
36	30	
42	35	

g) $\frac{4}{3} + \frac{3}{1} - \frac{2}{9}$ (×3, ×9, ×9) CD = 9 or 3×1×9 = 27

$= \frac{12}{9} + \frac{27}{9} - \frac{2}{9}$

$= \frac{37}{9}$

h) $\frac{5}{12} + \frac{7}{8} - \frac{7}{6}$ (×2, ×3, ×4) CD = 24

$= \frac{10}{24} + \frac{21}{24} - \frac{28}{24}$

$= \frac{3}{24} \div 3$

$= \frac{1}{8}$

12	8	6
24	16	12
	24	18
	32	24
		30

Application:

About $\frac{2}{5}$ of Canada's gold production come from Ontario. About $\frac{3}{10}$ comes from Quebec and $\frac{1}{10}$ from British Columbia. What fraction of Canada's gold production comes from the rest of the country? Write your answer in lowest terms.

Ontario + Quebec + BC

$\frac{2}{5} + \frac{3}{10} + \frac{1}{10}$

$\frac{4}{10} + \frac{3}{10} + \frac{1}{10} = \frac{8}{10} \div 2 = \frac{4}{5}$

∴ The rest of the country produces $\frac{1}{5}$ of the gold

Success Criteria:

- I can find the common denominator between 2+ fractions
- I can create equivalent fractions using common denominators
- I can recognize that when adding/subtracting, only the numerator is added/subtracted