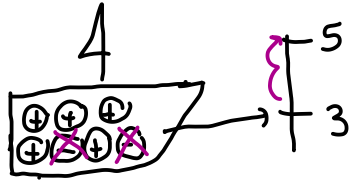


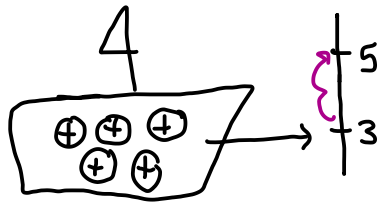
Practice problems for Math 247 test 1:

1. Explain why subtracting a negative is equivalent to as adding a positive:

a. Using a combined chip/number line model such as a weight/float model show and explain how to solve $3 - (-2)$



b. Using the same model you used in (a), show and explain how to solve $3 + 2$



c. Use the processes in a and b to explain why it make sense that subtracting a negative is equivalent to adding a positive.

Option 1:

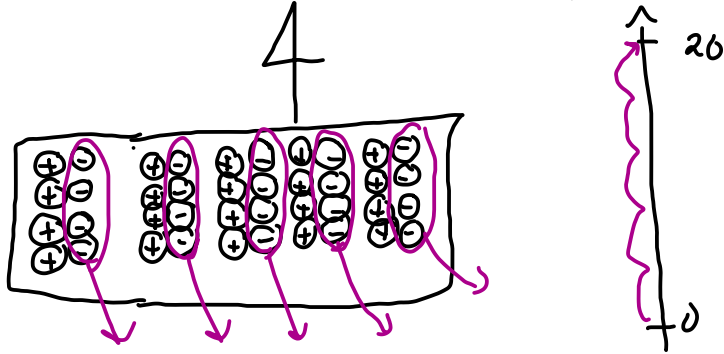
When you take away two negatives from two zero pairs, then what is left is two positives (that are not cancelled out). So what you are left with is two more positives than you had when you started.

Option 2:

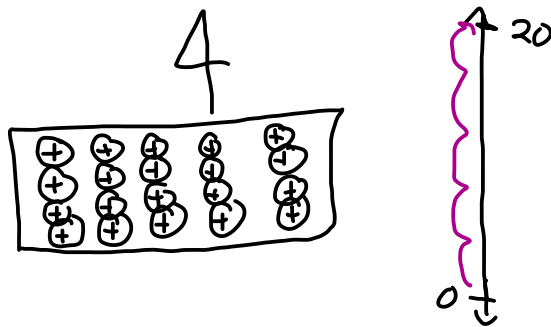
Taking off two weights makes the boat lighter, so it moves higher. Adding two floats makes the boat more buoyant so it moves higher.

2. Explain why multiplying two negatives results in a positive product:

a. Using a combined chip/number line model such as a weight/float model show and explain how to solve $(-4) \times (-5) \rightarrow$ do the opposite of putting on 5 groups of -4 : which is take off 5 groups of -4




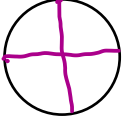
b. Using the same model you used in (a), show and explain how to solve 4×5 put on 4 sets of 5




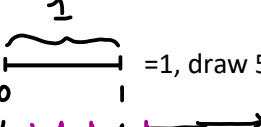
c. Use the processes in a and b to explain why it make sense that multiplying two negatives is equivalent to multiplying two positives.


If I take off 5 groups of -4 by removing negatives from zero-pairs, then there are 5 groups of $+4$ left (that are not balanced out by negatives).

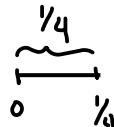
3. If  =1, draw $4/5$

If  =1, draw $5/4$


if  =1, draw $4/5$

if  =1, draw $5/4$

4. If  = $1/3$, draw 1

if  = $1/4$, draw 1

 = 1



5. Explain how to compare these pairs of fractions using one of the comparison strategies that don't involve finding a common denominator:

a. $\frac{5}{7}$ and $\frac{6}{8}$

These fractions can be compared using the residual strategy.

Both fractions are missing two pieces to make a whole. $5/7$ is missing $2/7$, and $6/8$ is missing $2/8$.

Sevenths are bigger than eighths so $2/7$ is bigger than $2/8$.

That means $6/8$ is closer to 1, so $6/8$ is bigger than $5/7$

note: here I use number of missing pieces
here I use size of missing pieces

b. $\frac{3}{20}$ and $\frac{4}{20}$

These fractions can be compared using the same denominator strategy because the pieces are the same size: 4 twentieths is bigger than 3 twentieths because it has one more twentieth.

c. $\frac{2}{9}$ and $\frac{2}{7}$

These fractions can be compared using the same numerator strategy.

Sevenths are bigger than ninths because you are sharing a whole into fewer pieces.

That means 2 sevenths is bigger than 2 ninths.

writing $\frac{2}{9}$ instead of 2 ninths is OK.

d. $\frac{4}{7}$ and $\frac{2}{5}$

These fractions can be compared to $1/2$, and they can be compared to each other using the transitive strategy.

4 is a little more than half of 7, so $4/7$ is bigger than $1/2$

2 is less than half of 5, so $2/5$ is less than $1/2$

So I know $2/5 < 4/7$

6. For each of the word problems below, draw out solutions in 3 ways, and write the fractional answers that match your pictures (3 sets of fractions, 3 sets of pictures for each)

Strategies to show:

- Share large pieces first
- Share one item at a time
- Factors or breaking into groups

a. Six children are sharing 9 brownies. How much does each child get?

$1/2$

$3/6$

$3/2$

b. Six brownies are shared by 9 children. How much does each child get?

$\frac{1}{2} + \frac{1}{9} + \frac{1}{18}$

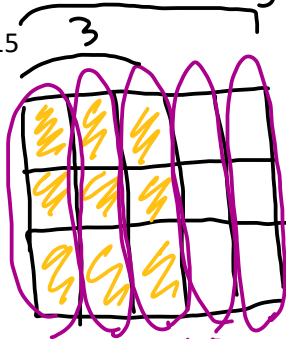
all answers should start with $\frac{1}{2}$. After that there are different likely solutions

$6/9$

$2/3$

7. Show how to visually simplify each fraction by grouping. Label your pictures or write an explanation to show how the original fraction is related to the simplified fraction. Write the equation that corresponds to your pictures and labels.

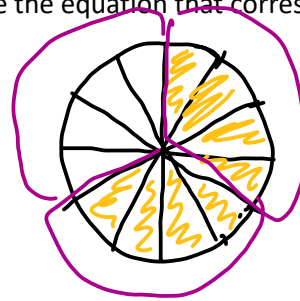
a. $9/15$



$$\frac{9}{15} = \frac{9 \div 3}{15 \div 3} = \frac{3}{5}$$

3 groups shaded
5 groups in a whole

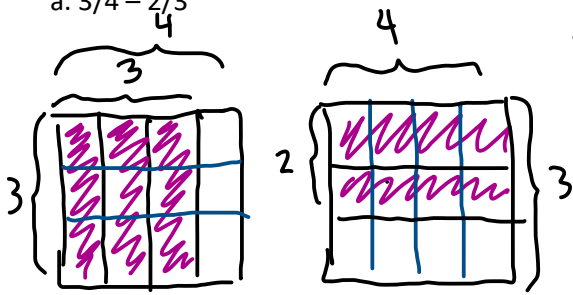
b. $8/12$



$$\frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

8. For the fraction sums and differences below, show how to use squares to find the equivalent fractions that have the same size pieces (common denominator). Your equivalent fraction should have pieces that are the same shape and size for both fractions. Label your pictures or write an explanation to show how the equivalent fraction names correspond using multiplication. Write an equation or equations that correspond to your pictures and labels.

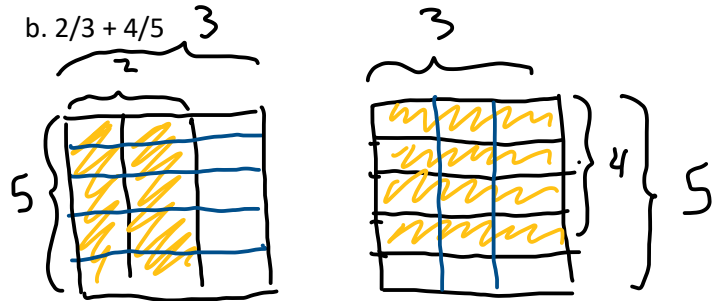
a. $3/4 - 2/3$



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

$$= \frac{9}{12} - \frac{8}{12}$$

b. $2/3 + 4/5$



$$\frac{2}{3} + \frac{4}{5} = \frac{2 \times 5}{3 \times 5} + \frac{4 \times 3}{5 \times 3} =$$

$$\frac{10}{15} + \frac{12}{15}$$