

## MATH 190 IS PORTFOLIO ASSIGNMENT TRINITY WESTERN UNIVERSITY

Submitted by: Jasnoor Grewal 616318

Submitted to: Stephen Benecke

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#### TOPIC 1: FRACTIONAL MULTIPLICATION

Learning Outcomes and introduction:

Fractions are used to describe:

- a) the relationship between a part and a whole (e.g., one-fourth of a pan of pizza)
- b) the relationship between a part and a part (e.g., we need one-third as much concentrate as water to make apple juice)
- c) a division situation (e.g., when 2 bags of chocolates are shared evenly by 5 children, each receives 2/5 of the bags)
- d) when we change or "operate on" a quantity (e.g., cutting a paper sheet to 2/3 of its height)

Therefore, a fraction represents a *number* and it is read as a number, so we say "two-thirds" and not "two over three." This number describes a relationship between two *numbers*.

When we multiply fractions, we:

- a) write the fractions in their simplest forms
- b) multiply the numbers on the top (the numerators) to get their product
- c) Multiply numbers at the bottom (the denominators) to get their product

#### TOPIC 2: MIXED NUMBERS OR FRACTIONS

A Mixed Fraction is a whole number and a proper fraction combined.

Such as:  $3\frac{2}{5}$ 

A fraction a/b will be called an improper fraction if a>b>1

Converting Improper Fractions to Mixed Fractions:

To convert an improper fraction to a mixed fraction, follow these steps:

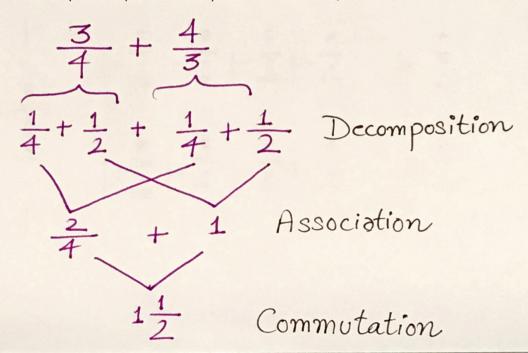
- •Divide the numerator by the denominator.
- •Write down the whole number answer
- •Then write down any remainder above the denominator.

#### Instructional plan:

We can represent fractions using different manipulatives, visuals, and stories. Cuisenaire rods can help students understand, operate, and place fractions on a number line in order to further understand operations including fractions. Fraction cards could be used to explain students about different possibilities of making the same value of a fraction but by just changing numerators of denominators, i.e. renaming fractions.

Strategies like decomposition, commutation, and association could be used when operating fractions.

When teaching multiplication, it is important to state, to avoid any confusions, that the product of two fractions will be greater than both the factors ONLY WHEN the factor fractions are greater than one. Area models with shaded and unshaded parts could also help understand multiplication of fractions concept. When teaching division, students should be introduced to multiplicative inverses, meaning we can use one operation (between multiplication and division) to undo the effect of the other.



#### **Multiply Fractions**

Make a model to find the product.

1. 
$$\frac{1}{2} \times 6$$

2. 
$$\frac{2}{5} \times \frac{1}{2}$$

1. 
$$\frac{1}{2} \times 6$$
 2.  $\frac{2}{5} \times \frac{1}{2}$  3.  $\frac{1}{8} \times \frac{1}{2}$  4.  $10 \times \frac{1}{2}$  5.  $\frac{1}{2} \times \frac{1}{3}$ 

4. 
$$10 \times \frac{1}{2}$$

5. 
$$\frac{1}{2} \times \frac{1}{3}$$

Multiply. Write the answer in simplest form.

**6.** 
$$\frac{1}{4} \times \frac{1}{6}$$
 **7.**  $\frac{1}{5} \times \frac{1}{2}$  **8.**  $\frac{3}{8} \times \frac{1}{4}$  **9.**  $\frac{3}{5} \times \frac{1}{4}$  **10.**  $\frac{4}{5} \times \frac{1}{2}$ 

7. 
$$\frac{1}{5} \times \frac{1}{2}$$

8. 
$$\frac{3}{8} \times \frac{1}{4}$$

9. 
$$\frac{3}{5} \times \frac{1}{4}$$

$$\frac{1}{5} \times \frac{1}{4}$$

10. 
$$\frac{1}{5} \times \frac{1}{2}$$

11. 
$$\frac{1}{4} \times \frac{8}{9}$$

12. 
$$\frac{3}{4} \times \frac{2}{7}$$

11. 
$$\frac{1}{4} \times \frac{8}{9}$$
 12.  $\frac{3}{4} \times \frac{2}{7}$  13.  $\frac{5}{9} \times \frac{9}{10}$  14.  $\frac{5}{6} \times \frac{2}{5}$  15.  $\frac{6}{7} \times \frac{2}{3}$ 

14. 
$$\frac{5}{6} \times \frac{2}{5}$$

16. 
$$\frac{3}{4} \times \frac{8}{9}$$

16. 
$$\frac{3}{4} \times \frac{8}{9}$$
 17.  $\frac{3}{4} \times \frac{8}{15}$  18.  $\frac{1}{6} \times \frac{8}{9}$  19.  $\frac{7}{8} \times 24$  20.  $\frac{3}{8} \times \frac{1}{3}$ 

18. 
$$\frac{1}{6} \times \frac{8}{9}$$

19. 
$$\frac{7}{8} \times 24$$

$$\frac{1}{24} \times \frac{12}{2}$$

25. 
$$\frac{9}{11} \times \frac{9}{11}$$

21. 
$$\frac{3}{6} \times \frac{3}{10}$$

$$22\frac{9}{10}\times\frac{2}{3}$$

23. 
$$30 \times \frac{7}{5}$$

21. 
$$\frac{5}{6} \times \frac{3}{10}$$
 22  $\frac{9}{10} \times \frac{2}{3}$  23.  $30 \times \frac{4}{5}$  24.  $\frac{1}{2} \times \frac{12}{13}$  25.  $\frac{9}{11} \times \frac{22}{27}$ 

Compare. Write <, >, or = for  $\bullet$ .

**26.** 
$$\frac{1}{2} \times \frac{2}{3} \bullet \frac{2}{3}$$

27. 
$$\frac{3}{4} \times 8 \bullet 6$$



#### **Mixed Review**

Write each mixed number as a fraction.

**29.** 
$$4\frac{2}{5}$$

31. 
$$2\frac{8}{11}$$

32. 
$$5\frac{3}{5}$$

Write each fraction as a mixed number.

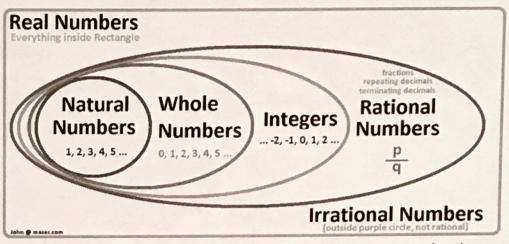
33. 
$$\frac{12}{7}$$

34. 
$$\frac{41}{12}$$
3  $\frac{5}{12}$ 

**35.** 
$$\frac{25}{6}$$

36. 
$$\frac{50}{9}$$

# TOPIC 3: NATURAL NUMBERS AND WHOLE NUMBERS



Learning Outcomes: Students will be able to identify and compare natural and whole numbers.

Instructional plan and introduction: The natural numbers, also known as the counting numbers, are represented by the blue circle. Start counting: 1, 2, 3, 4, 5 ...  $\rightarrow$  Keep going until you stop.

Every natural number is inside the blue circle.

The whole numbers are the numbers 0, 1, 2, 3, 4, 5 ...  $\rightarrow$  You might think of them as the numbers we'd get if we started counting with zero.

Every whole number is inside the red circle.

So is every natural number also a whole number? Yes!

(teach via visual representations as above.)

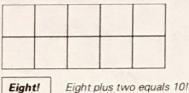
#### TOPIC 4: THINKING ABOUT 2'S

Learning Outcomes: Students will be able to skip count by two, increase a quantity by 2, and think of subtraction (involving 2 less) as a difference of two (would get the minuend if we add 2 to subtrahend).

Instructional plan and introduction: Plus 2 Facts: 3+2, 2+3, 4+2, 2+4, 5+2, 2+5, 6+2, 2+6, 7+2, 2+7, 8+2, 2+8, etc.

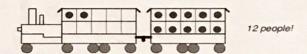
For any number involving + 2, think of skip counting by 2s or to count from the larger number. An addition table and a number line can be used to help visualize skip counting.

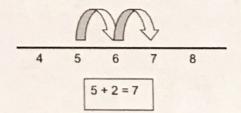
This can also be efficiently learned using 5 FRAMES and 10 FRAMES.



Visualize Combinations on a Five Frame







#### Thinking about 2's

1 Fill in the missing numbers. Then color in the count-by-twos numbers, starting with 2 (2, 4, 6, 8, and so on).

/	2	2)		5	6	7	1/100	9	46_
11	42	13	19	15	B	17	18	19	20
2.0	R	23	24	25	26	27	28	29	100
31	32	33	34	35	34	37	38	39	40

2 Add:

$$6 + 2 = 8$$
  $2 + 10 = 12$   $24 + 2 = 26$   $2 + 12 = 14$ 

$$2 + 10 = 12$$

$$24 + 2 = 26$$

$$2 + 12 = 14$$

$$18 + 2 = 20$$

$$30 + 2 = 32$$

$$14 + 2 = 16$$

$$18 + 2 = 20$$
  $30 + 2 = 32$   $14 + 2 = 16$   $8 + 2 = 10$ 

3 Subtract:

$$8 - 2 = 6$$

$$8-2=6$$
  $12-2=10$   $16-2=14$   $10-2=8$ 

$$16 - 2 = 19$$

$$10 - 2 = 8$$

$$28 - 2 = 26$$
  $36 - 2 = 34$   $24 - 2 = 22$   $40 - 2 = 38$ 

$$36 - 2 = 34$$

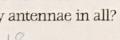
$$24 - 2 = 22$$

$$40 - 2 = 38$$

**4** Fill in the blanks.



a 9 leaf cutter ants How many antennae in all?





**b** 12 butterflies How many wings in all?

24



C 7 elephants How many ears in all?

### TOPIC 5: SUBTRACTION

Learning Outcomes: Students will be able to think of subtraction as giving away or getting rid of, find patterns, thinking addition, visualize quantities taken away using manipulatives, etc..

Instructional plan and introduction: Subtraction happens when a subtrahend is taken away from a minuend. In 6-2, 6 is the minuend and 2 is the subtrahend.

It can also be thought as "think addition." 15-8 and should encourage students to think, "8 plus what equals 15? 8 and 2 makes 10, and 5 more makes 15 so that's 7 altogether."

In Ten-Frame Visualization method, students should be able to complete many of the subtraction facts to 10, by visualizing the first number (the minuend) on a ten-frame and "removing" the number of dots (the subtrahend) to get the result (the difference).

Rounding in Addition and Subtraction strategy for addition and subtraction involves rounding the highest place value in each number and then adding or subtracting the rounded numbers. To help support short-term memory, it will be necessary for most students to first jot down the rounded numbers and then do the computation mentally. Example: to estimate 27 + 31, think, "27 rounds to 30 and 31 rounds to 30, so 30 plus 30 is 60," and to estimate 87 - 32, think, "87 rounds to 90 and 32 rounds to 30, so 90 subtract 30 is 60."

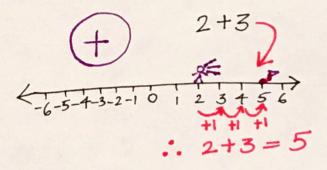
Number line method teaches subtraction using a number line.

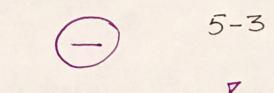
Chip model is another way of understanding subtraction.

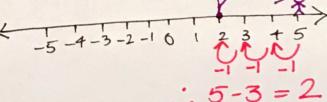
• •		•	•	•	
•	•				

	7 - 3 =
1	7-5=
1	7-6=
1	7 - 2 =

•	•	•	•	•
•	•	•		



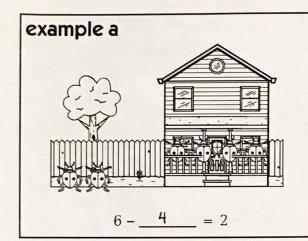


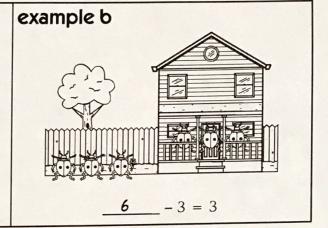


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#### Bugs in the House Subtraction





1 Fill in the blank.

$$6 - \underline{5} = 1$$
  $6 - \underline{9} = 2$   $6 - \underline{2} = 4$ 

$$6 - 4 = 2$$

**2** Solve the subtraction problems.

$$\frac{5}{-3}$$

$$\frac{4}{-1}$$

$$\frac{3}{-1}$$

$$\frac{4}{-4}$$

#### TOPIC 6: GRAPHING

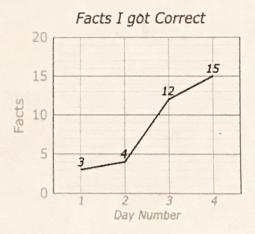
#### Learning Outcomes:

- draw and interpret scale diagrams
- ii. extract information from tables
- iii. draw, interpret and compare pie charts, bar charts and frequency diagrams
- iv. use and interpret coordinates
- v. plot points and draw graphs, using suitable axes and scales.

You are learning facts about dogs, and each day you do a short test to see how good you are. These are the results:

Table: Facts I got Correct						
Day 1	Day 2	Day 3	Day 4			
3	4	12	15			

And here is the same data as a Line Graph:



#### Instructional plan:

- a) Explaining Scale of a graph.
- b) Explaining coordinates and axes.
- c) Explaining how to locate and plot coordinates/points, and describe terminology like ordered pairs, origin, etc.
- d) Explaining how to interpret information on graphs.
- e) Explaining types of graphs, and how each type can be used to display certain information.

Materials required: Prepared graphs or graphs showing information, grid paper, graph paper, pencils, rulers, compass, etc.

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#### **Bamboo Shoot Growth Graph**

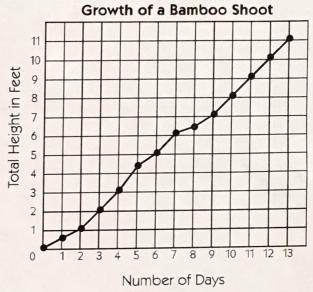
In the spring, new bamboo shoots can grow up to 1 foot per day. Once they reach their full height, the shoots stop growing. The graph below shows how one shoot grew for 13 days.

1 How tall was the shoot on the 13th day?

2 On what day was the shoot about  $6\frac{1}{2}$  feet tall?

**3** Did the shoot ever get shorter in the 13 days?

NO



**4a** Did the shoot grow the same amount every day?

No

**b** Explain how you can tell.

There is no fall in the graph, it's always in creasing.



#### CHALLENGE

5 There are 36 inches in 1 yard. The shoot was 84 inches on the ninth day. Was it more or less than 2 yards tall? Exactly how much more or less? Show all your work.

Shoot was more than 2 yards by 12 inches

DATE

#### **Apricots & Carrots**

**1** Gregory bought some apricots for his 3 sisters. Each apricot cost 15¢. He bought 3 apricots for each sister. How much did he spend altogether? Show all your work.



**2** Lucia is buying carrots that are 75¢ per pound. How much would 3 pounds of carrots cost? Show all your work.





#### CHALLENGE

**3** Nancy is doing laundry in her apartment building. It costs \$1.00 to run the washing machine and \$1.25 to run the dryer. Nancy has 27 quarters. How many loads of laundry can she put through the washer and dryer? Show all your work.

#### TOPIC 7: USING FACTS TO SOLVE LARGER PROBLEMS

Learning Outcomes: Students understand the concept of multiplication, answer simple daily life problems based on need to multiply or repeatedly add, estimate bigger products, predict answers when multiplied by 0, 1, 10, 100, etc., know how any type of complex multiplication equation can be solved by knowing simple facts, and think of division as inverse of multiplication as a bonus outcome.

Instructional plan: This topic could be taught by various strategies like Math talks, assessing prior knowledge, asking simple multiplication problems, asking students to help you count worksheets for groups, manipulatives (Cuisenaire rods, base ten blocks, pattern blocks, geoboards, etc.), using arrays (rows and columns), using fingers, showing relationship between multiplication and addition, and between multiplication and division, and slowly building to bigger factor numbers.

# BASIC FACTS TO SOLVE LARGER PROBLEMS

BASIC MULTIPLICATION AND BASIC DIVISION



https://youtu.be/ZvPXIjWZIeC