Arithmetic Review

Section R1: Order of Operations

Section R2: Fractions

Section R3: Operations on Fractions

Section R4: Signed Numbers

KEY TERMS AND CONCEPTS	
Look for the following terms and concepts as you work through the Media Lesson. In the space below, explain the meaning of each of these concepts and terms *in your own words*. Provide examples that are not identical to those in the Media Lesson.	
Order of Operations	
Absolute Value	
Numerator	
Denominator	

Common Denominator	
Equivalent Fractions	
Reduced Fraction	
Improper Fraction	
Mixed Number	
Reciprocal	

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Arithmetic Review: Media Lesson

Section R1: Order of Operations

PEMDAS

If we are working with a mathematical expression that contains more than one operation, then we need to understand how to simplify. The acronym ***PEMDAS*** stands for *P*arentheses, *E*xponents, *M*ultiplication, *D*ivision, *A*ddition, *S*ubtraction.

P	Terms inside parenthesis ( ) or brackets [ ]
E	Exponents and roots
MD	Multiplication and division (**from Left to Right**).
AS	Addition and subtraction (**from Left to Right**).

Use the order of operations to evaluate each of the following expressions.
Use your calculator to check your answers.

Example 1: $(2 \cdot 5)^2$ $2 \cdot 5^2$

$10 - 7 + 1$ $10 - (7 + 1)$

Example 2: $24 \div (4 - 2)^3$

Example 3: $4 + 5(1 + 12 \div 6)^2$

Example 4: $\frac{15-3}{1+5}$

Section R1: You Try

Use the order of operations to evaluate each of the following expressions. Show all steps as in the media examples. Use your calculator to check your answers.

a. $11 + 3(7 - 2)^2$

b. $\frac{6+8}{4-2}$

Section R2: Fractions

Improper Fractions and Mixed Numbers

Converting a mixed number to an improper fraction:

1. Multiply the denominator and the whole number
2. Add the numerator
3. Write the result over the denominator

 **Example 1:** Express as an improper fraction.

$3\frac{2}{7}$ $12\frac{1}{3}$

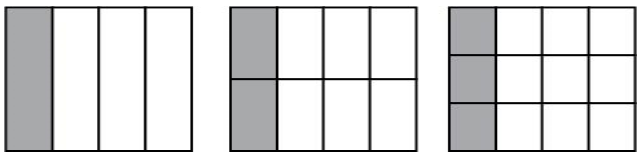
Converting an improper fraction to a mixed number:

1. Divide the numerator by the denominator
2. The quotient becomes the whole number part of the mixed number
3. Write the remainder over the denominator

 **Example 2:** Express an improper fraction as a mixed number.

$\frac{42}{5}$ $\frac{53}{9}$

Equivalent Fractions



Example 3: Find two fractions equivalent to $\frac{2}{7}$.

Fractions in Simplest Form

Example 4: Write the following fractions in simplest form.

$\frac{3}{18}$ $\frac{42}{54}$

ONE and ZERO

Example 5: $\frac{1}{4} =$ $\frac{4}{1} =$

$\frac{4}{4} =$ $\frac{0}{4} =$

$\frac{4}{0} =$

Section R2 – YOU TRY

Complete the problems below. Show all steps as in the media examples.

a. Reduce the fraction $\frac{24}{36}$ to lowest terms.

b. Rewrite the mixed number $4\frac{1}{5}$ as an improper fraction.

c. Rewrite the improper fraction $\frac{35}{11}$ as a mixed number.

d. Find two fractions equivalent to $\frac{3}{5}$.

Section R3: Operations on Fractions

Addition and Subtraction of Fractions

Adding and Subtracting Fractions:

1. Rewrite mixed numbers and whole numbers as improper fractions.
2. Find a common denominator
3. Rewrite the fractions as equivalent fractions with the common denominator
4. Add or subtract the numerators
5. Be sure to reduce your answer to simplest form!

Example 1: Perform the indicated operations

a. $\frac{1}{2}+\frac{1}{3}$

b. $\frac{11}{15}-\frac{5}{12}$

c. $4\frac{3}{5}-1\frac{5}{6}$

d. $2-\frac{8}{5}$

Multiplication and Division of Fractions

Multiplying Fractions:

1. Rewrite mixed numbers and whole numbers as improper fractions.
2. Multiply straight across (Multiply the numerators with the numerators, and the denominators with the denominators) NOTE: There is no need to find a common denominator when multiplying.
3. Be sure to reduce your answer to simplest form!

Example 2: Multiply. Write your answers in simplest form

a. $\frac{2}{3} \times \frac{3}{4}$

b. $\frac{12}{25} \times \frac{35}{48}$

c. $\frac{7}{8} \times 5$

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

Dividing Fractions:

1. Rewrite mixed numbers and whole numbers as improper fractions.
   NOTE: There is no need to find a common denominator when dividing.
2. Change the **second** fraction (the divisor) to its reciprocal
3. Multiply
4. Be sure to reduce your answer to simplest form!

Example 3: Divide. Write your answers in simplest form.

a. $\frac{1}{2} \div \frac{3}{5}$

b. $8 \div \frac{4}{5}$

Order of Operations with Fractions

Example 4: Perform the indicated operations. $\frac{1}{2}+\frac{3}{2}\times\frac{2}{5}$

Section R3 – You Try

Perform the indicated operations. Show all steps as in the media examples. Each answer must be written as a **reduced** fraction. Where appropriate, write your answer as **both** a mixed number **and** an improper fraction.

a. $\frac{3}{5}+\frac{2}{3}$

b. $\frac{3}{5}\left(\frac{2}{3}\right)$

c. $\frac{3}{5}\div\frac{2}{3}$

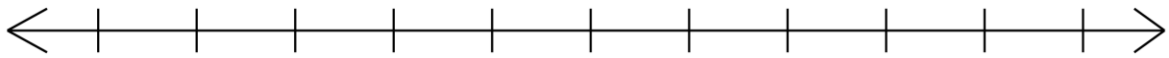
d. $3-\frac{12}{5}$

e. $\frac{3}{7}\div 5$

f. $\frac{3}{4}\div\frac{4}{5}\times\frac{5}{6}$

Section R4: Signed Numbers

The Number Line



Absolute Value

The ABSOLUTE VALUE of a number is the distance that number is from 0 on the number line.

Example 1: Find the absolute value:

a. $|-3|$ b. $|3|$ c. $-|-3|$ d. $|0|$

MATHEMATICAL OPERATIONS WITH SIGNED NUMBERS

Some hints for working with signed numbers:

- Use ( ) to separate numbers with negative signs
- When two signs are given together, use these rules to resolve the signs:
  (–)(–) = + (–)(+) = – (+)(–) = – (+)(+) = +
- Use the number line to add and subtract

Example 2: Perform the indicated operations.

a. 3 + (–2) b. –3 + 2 =

c. –3 – (–2) d. –3 + (–2)

Example 3: Multiply and divide.

a. (–5)(–6) b. 3(–4)

c. $\frac{-24}{8}$ d. $\frac{2}{3}\left(-\frac{1}{5}\right)$

Example 4: Evaluate the following exponents:

$(-5)^2$ -5^2

$(-5)^3$ -5^3

Example 5: Perform the indicated operations.

$-8 \div (-2)^3 - (-3) - 5^2$

SIMPLIFIED FORM FOR A SIGNED FRACTION

The following fractions are all equivalent (meaning they have the same value):

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

Notice that only the placement of the negative sign is different.

HOWEVER, only the last one, $-\frac{1}{2}$ is considered to be in simplest form.

Section R4 – You Try

Complete the problems below. Show all steps as in the media examples. Use your calculator to check your answers.

a. Find the absolute value: $|-5|$=_____ $-|-5|$=_____

b. $(-2)^3 - 2^3$

c. $6 + 12 \div 3 \times 4 - (-2) - 4$

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Arithmetic Review: Practice Problems

Skills Practice

1. Evaluate using the correct order of operations. Show all of your work. Use your calculator to check your answer. Write your answers as integers or reduced fractions.

   a. $8 \times 3^2 \times 2 \div 4$

   b. $24 \div (1 + 2)^3$

   c. $20 - (8 - 2) \div 3 \cdot 4$

   d. $10 \times 3^2 + \frac{15-3}{3\times2}$

   e. $\left(\frac{8+2}{7-2}\right)^2$

   f. $2 + 4 \times 8 - (2 + 3)^2$

2. Express the following fractions as improper fractions. Write your answer in simplest form.

   a. $2\frac{3}{8}$ b. $-2\frac{3}{4}$ c. $4\frac{2}{6}$

3. Express the following fractions as mixed numbers. Write your answer in simplest form.

   a. $\frac{43}{8}$ b. $\frac{38}{12}$ c. $\frac{70}{6}$

4. For each of the following pairs, circle the **larger** number.

a. $\frac{5}{7}$ $\frac{5}{8}$ b. $\frac{5}{7}$ $\frac{7}{5}$ c. $\frac{5}{7}$ $\frac{6}{7}$

d. $\frac{4}{7}$ $\frac{1}{2}$ e. $\frac{5}{6}$ $\frac{6}{7}$ f. $\frac{1}{7}$ $\frac{7}{1}$

5. Write each of the following in simplest form.

a. $\frac{54}{72}$ b. $\frac{165}{345}$ c. $4\frac{12}{28}$

6. Show the each step involved in evaluating each of the following. Write your answers in simplest form.

a. $\frac{1}{6}+\frac{2}{9}$ b. $\frac{5}{8}-\frac{6}{12}$

c. $\frac{1}{3}+\frac{2}{7}$ d. $\frac{8}{9}-\frac{6}{12}$

e. $2\frac{3}{4}+3\frac{4}{5}$ f. $2\frac{2}{5}-1\frac{1}{3}$

7. Evaluate each of the following. Show all steps. Write your answers in simplest form.

a. $\frac{24}{3} \times \frac{27}{8}$ b. $8 \times \frac{3}{24}$ c. $\frac{1}{4} \times \frac{3}{5} \times \frac{2}{9}$

d. $\frac{24}{3} \div \frac{8}{3}$ e. $\frac{3}{5} \div \frac{9}{15}$ f. $2\frac{1}{3} \div 1\frac{1}{2}$

8. Evaluate using the correct order of operations. Show all of your work. Use your graphing calculator to check your answer

a. $(-2)^2 - 2^2$ b. $2(-3)^3 \times 8 \div 4$

c. $-\frac{2}{3} - \frac{8}{3} \times \frac{3}{2}$ d. $\frac{2}{5}\left(-\frac{5}{8}\right)^2$

e. $(-4)^2 - 12 \div 3 \times 9$ f. $\frac{8-(1+3)^2}{4-(-5)}$

Applications

9. Sam takes out a $25,000 student loan to pay his expenses while he is in college. After graduation, he will begin making payments of $167.68 per month for the next 20 years to pay off the loan. How much more will Sam end up paying for the loan than the original value of $25,000? Show all of your work. Write your answer in a complete sentence.

10. Abie makes $39,000 a year, and spends about $250 each month on entertainment. What fraction of her annual income is spent on entertainment? Show all of your work. Write your answer in a complete sentence.

11. Last year, the daily high temperatures in northern Washington for the first week of January were $-8^{\circ}, -5^{\circ}, -4^{\circ}, 0^{\circ}, 8^{\circ}, 7^{\circ}, -5^{\circ}$ Fahrenheit. What was the average daily high temperature for that week? Show all of your work. Write your answer in a complete sentence.

12. Michelle wants to make cupcakes for her daughter's birthday. The recipe calls for ¾ cup of brown sugar, 1½ cups of white sugar, and 2 cups of powdered sugar, and will make 12 cupcakes. How much sugar will be in each cupcake? Show all of your work. Write your answer in a complete sentence.

13. Judy took Jen and Bill to the casino. Bill and Jen each won $100 playing the nickel slots. To say thanks, Jen gave Judy $1/4^{th}$ of her winnings and Bill gave Judy $1/5^{th}$ of his winnings. Who gave Judy more money? How much more? Show all of your work. Write your answer in a complete sentence.

14. So far this season, a hockey team has won 8 games and lost 4 games. This team has won what fraction of the games that it has played? Show all of your work. Write your answer in a complete sentence.

15. Marta earns $12.50 per hour during a 40-hour work week. If she works overtime, she earns time and a half pay for every additional hour that she works. This week, she has worked 46 hours. Determine her pay for this week. Show all of your work. Write your answer in a complete sentence.

16. At a store, there is a display of 240 boxes of cereal. Of the 240 boxes, 3/5 are brand A and 2/5 are brand B. How many boxes of brand B cereal must be added so that the display has 1/2 of each brand? Show all of your work. Write your answer in a complete sentence.

17. Sara buys a bag of candy. In the bag, 1/2 of the candies are red, 1/5 are green, and the remainder are white. What fraction of the candies are white? Show all of your work, Write your answer in a complete sentence.

Extension

18. If  represents 1, what would $\frac{2}{3}$ look like?

19. If  represents $\frac{2}{3}$, what would 1 look like?

20. If  represents $\frac{4}{3}$, what would $\frac{1}{3}$ look like?

21. If  represents 1, what would $\frac{4}{3}$ look like?

22. If  represents $\frac{4}{3}$, what would 1 look like?

23. Complete the table below.

Fraction	Decimal	Percent
$\frac{3}{5}$		
	0.02	
		72%
	0.025	
$4\frac{1}{2}$		

24. Find the reciprocal of each of the numbers below.

a. $\frac{2}{3}$

b. $-\frac{7}{9}$

c. 8

d. –8

e. $\frac{1}{5}$

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

g. Why does zero not have a reciprocal?

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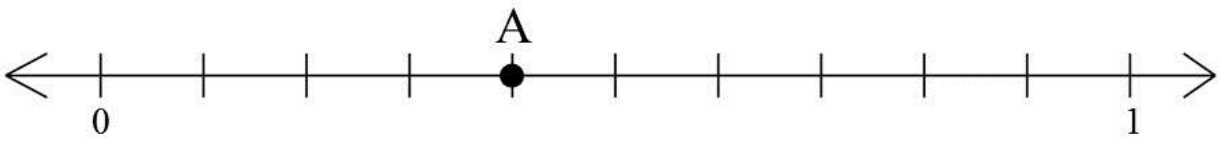
Arithmetic Review

1. Write $2\frac{5}{8}$ as an improper fraction. _____

2. Write $\frac{29}{3}$ as a mixed number. _____

3. On the scale below, the letter A represents the fraction _____



4. For each of the following pairs, circle the **larger** number.

a. $\frac{1}{7}$ $\frac{1}{8}$ b. $\frac{5}{7}$ $\frac{7}{5}$ c. $\frac{5}{7}$ $\frac{6}{7}$

d. $\frac{4}{7}$ $\frac{1}{2}$ e. 1 $\frac{8}{9}$ f. $\frac{16}{3}$ 5

5. (8 points) Simplify each of the following fractions if possible. Write "DNE" if the answer does not exist.

$\frac{5}{1}$ = _____ $\frac{5}{5}$ = _____ $\frac{5}{15}$ = _____ $\frac{0}{5}$ = _____

6. Perform the indicated operations.

a. $-5 + 3 =$ _____

b. $-5 - 3 =$ _____

c. $-5 + (-3) =$ _____

d. $5 - (-3) =$ _____

e. $5(-3) =$ _____

f. $-5(-3) =$ _____

g. $(-5)^2 =$ _____

h. $-5^2 =$ _____

i. $(-5)^3 =$ _____

7. Add, subtract, multiply and divide as indicated. Each answer must be written as a **reduced** fraction or whole number. Where appropriate, write your answer as **both** an improper fraction **and** a mixed number.

a. $\frac{35}{8}\left(-\frac{12}{5}\right)$

b. $\frac{2}{5} - 3$

c. $6\frac{1}{2} + \left(-\frac{3}{5}\right)$

d. $\frac{3}{5} \div 7$

8. Evaluate using the correct order of operations. Show all of your work.

a. $\frac{1}{2} \div \frac{2}{3} \times \frac{3}{4}$

b. $8 + 3(5 - 7)^2$