

Math 9
Integers Introduction Lesson 1

1. Classify each of the following numbers:

Number	Natural	Whole	Integer
-16			✓
7	✓	✓	✓
0		✓	✓
-40			✓

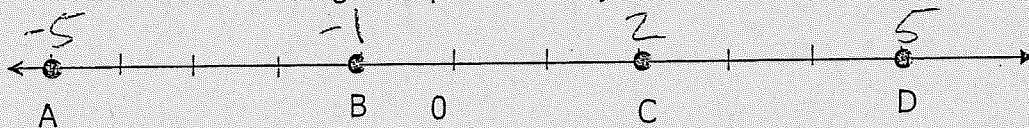
2. Write an integer to represent each of the following situations:

- a) David made \$100 *100*
- b) The car showed down 10 km/h *-10*
- c) 20° below zero *-20*

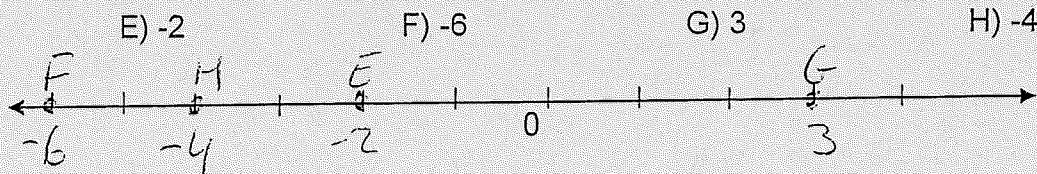
3. Determine an integer which is opposite in sign / direction:

- a) 30 *-30*
- b) -56 *56*
- c) 50 m below sea level *50 m above sea level*
- d) 42 *-42*
- e) -5 *5*
- f) 0 *0*

4. Determine the integers represented by each letter on the number line.



5. Place the following integers on the number line below:



6. Fill in the blanks with < or > in order to make the statement true:

- a) $5 > -8$
- b) $-12 < 14$
- c) $-10 < -8$
- d) $32 > -1$

7. Re-order the following integers from least to greatest:

-12, 3, -19, 0, 11, -32, -21, 8 → *-32, -21, -19, -12, 0, 3, 8, 11*

Math 9
Adding and Subtracting Integers

1. State an integer which represents the opposite of...
- a) a loss of \$40 *gain of 40*
 - b) an increase of 42% *decrease of 42%*
 - c) -36 *36*
 - d) a drop of 5°C *gain of 5 degrees*

2. State the least of the integers shown in each group.
- a) 5, -7, 0 *-7*
 - b) -8, 8, -2 *-8*
 - c) 3, 17, 6 *3*
 - d) -6, -14, -10 *-14*
 - e) 0, -18, 34, -12 *-18*
 - f) 3, -6, 14, -14, 21 *-14*

3. Simplify:
- a) $(-3) + (-4)$
 - b) $(-6) + 7$
 - c) $(-10) + (-6)$
 - d) $5 - (-2)$
 - e) $8 + (-14)$
 - f) $(-11) + (-7)$

4. Simplify:
- a) $(-3) + (-4) - (-5) + (-2)$
 - b) $5 + (-8) + (-9) - (-2)$
 - c) $6 + (-8) + (-15) + (-3)$
 - d) $(-6) + (-7) - (-2) + (-4)$

5. Simplify:
- a) $4 - 18$
 - b) $(-6) + 33$
 - c) $44 + (-51)$
 - d) $(-6) + (-12)$
 - e) $(-6) + (-8) + 11$
 - f) $18 + (-3) + 5 + (-20)$

6. Simplify:
- a) $(-4) - 2$
 - b) $(-5) - 7 - 12$
 - c) $10 - (-6)$
 - d) $(-8) - (-6)$
 - e) $3 - (-7)$
 - f) $(-11) - (-1)$
 - g) $5 - 12$
 - h) $(-2) - (-13)$
 - i) $(-6) - (-6)$

7. Simplify:
- a) $3 - 18$
 - b) $(-6) - 10$
 - c) $(-8) - 11$
 - d) $(-4) + 6 - 9$
 - e) $12 - 15 - 20$
 - f) $(-31) - 20 + 18 + 50$

8. Simplify
- a) $(-8 + 4) - (12 - 7)$
 - b) $(13 - 17) + (-6 - 7)$
 - c) $(15 - 10) + (7 - 3 - 9)$
 - d) $(-3 + 5 - 9) - (-4 - 5)$
 - e) $(-2 - 5 - 6) + (4 + 8 - 7)$
 - f) $(4 - 6 + 8) - (8 + 14 - 20)$

What Should You Do If You Are Surrounded By 20 Lions, 15 Tigers And 10 Leopards?



Do any exercise below and find your answer in one of the boxes at the bottom of the page. Write the letter of the exercise in this box. (To make it easier to find your answer, the answers are arranged in order from smallest to largest.) Keep working and you will discover the answer to the title question.

- Y** $-6 + 2 = -4$
- O** $3 - 7 = 10$
- D** $9 + 4 = 5$
- E** $-7 + -2 = -9$
- U** $-3 - -20 = 17$
- O** $-16 + 18 = 2$
- T** $1 - 12 = -11$
- A** $4 + -22 = -18$
- F** $-4 - 10 = -14$
- O** $31 - -6 = 37$
- A** $-3 + 15 = 12$
- T** $-4 + -25 = -29$
- P** $37 - 12 = 25$
- Q** $17 - 18 = -1$
- S** $10 + -2 = 8$
- E** $-11 - -4 = -7$
- U** $-30 - 20 = -50$
- O** $-1 - -8 = 7$
- T** $-17 + 2 = -15$
- N** $22 + -9 = 13$
- R** $-20 - -8 = -12$
- U** $-32 + 35 = 3$
- F** $60 - -15 = 75$
- J** $10 + 6 = 16$
- D** $-5 - -20 = 15$
- H** $4 - 14 = -10$
- T** $12 + -6 = 6$
- S** $-30 - 13 = -43$
- I** $-8 + -9 = -17$
- O** $-18 - -5 = -13$
- P** $14 + -3 = 11$
- F** $15 - -45 = 60$
- R** $-7 + 1 = -6$
- J** $-32 + -32 = -64$
- M** $-1 - -20 = 19$
- W** $5 + -25 = -20$
- N** $16 + -12 = 4$
- R** $-48 + 43 = -5$
- M** $2 - 10 = -8$
- T** $-6 + 15 = 9$
- R** $-69 - -69 = 0$
- G** $50 + -53 = -3$

22-24

-64	-50	-43	-29	-20	-18	-17	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-1
S	U	S	T	W	A	I	T	F	O	R	T	H	E	M	E	R	R	Y	6	O
0	2	3	4	5	6	7	8	9	10	11	12	13	15	16	17	19	25	37	60	75
R	O	U	W	D	T	O	S	T	O	P	A	N	D	J	U	M	P	O	F	F

Why Did the Snail Have an "S" Painted on His VW?

Do each exercise below and find your answer in the corresponding set of answer boxes. Print the letter of that exercise in the box containing the answer.

- (Y) $(-4)(3) = -12$
- (E) $(-5)(-8) = 40$
- (O) $-9 \cdot 7 = -63$
- (R) $-12(-4) = 48$
- (O) $16(-3) = -48$
- (E) $(-10)(4) = -40$
- (S) $-12(-1) = 12$
- (E) $(8)(-8) = -64$
- (N) $(-5)20 = -100$
- (V) $(-50)(-2) = 100$
- (L) $-3 \cdot 4 \cdot 2 = -24$
- (O) $(-3)(-4)(2) = 24$
- (U) $5(-1)(12) = -60$
- (D) $5(-1)(-12) = 60$
- (U) $(-3)(-3)(-3) = -27$
- (O) $(-4)(-5)(-6) = -120$
- (W) $(-9)(4)(-10) = 360$
- (S) $(5)(3)(-11) = -165$
- (T) $(-15)(-2)4 = 120$
- (H) $(-90)(-90)(0) = 0$

12	-48	-64	100	-40	48	-12	-63	-100	40	360	24	-27	-24	60	-165	0	-120	-60	120	
S	O	E	V	E	R	Y	O	N	E	W	O	U	L	D	S	H	O	U	T	

- (E) $(-40)(60) = -2400$
- (T) $(-80)(-20) = 1600$
- (O) $2(-360) = -720$
- (T) $(-4)(-4)(-4) = -64$
- (A) $(8)(-1)(12) = -96$
- (H) $(-7)(6)(-2) = 84$
- (L) $3(-25)(-2) = 150$
- (S) $(-2)(-4)8 = 64$
- (O) $-4 \cdot 7 \cdot 3 = -84$
- (K) $(10)(10)(-16) = -1600$
- (A) $(-5)(3)(-4)(10) = 600$
- (O) $(6)(-2)(-10)(-5) = -600$
- (B) $(3)(3)(-4)(20) = -720$
- (C) $(-5)(-40)(-4)(-1) = 800$
- (G) $(-80)(3)(-1)(3) = 720$



150	-84	-720	-1600	-96	1600	-64	84	-2400	64	800	600	-720	720	-600
L	O	O	K	A	T	T	H	E	S	C	A	R	G	O

$$\begin{aligned}
 1) \quad & 3 \times 8 - 4 \times 1 \div (4 - 2) \\
 & = 3 \times 8 - 4 \times 1 \div 2 \\
 & = 24 - 4 \div 2 \\
 & = 24 - 2 \\
 & = 22
 \end{aligned}$$

$$\begin{aligned}
 2) \quad & 8 + 5 \times 2 \\
 & \quad 8 + 10 \\
 & = 18
 \end{aligned}$$

$$\begin{aligned}
 3) \quad & \underline{6 \times 5} - \underline{2 \times 3} \\
 & \quad 30 - 6 \\
 & = 24
 \end{aligned}$$

$$\begin{aligned}
 4) \quad & \underline{7 \times 5} - \underline{3 \times 4} + 9 \\
 & \quad 35 - 12 + 9 \\
 & \quad \quad 23 + 9 \\
 & = 32
 \end{aligned}$$

$$\begin{aligned}
 5) \quad & \underline{12 \times 3} + \underline{4 \times 9} - 15 \\
 & \quad 36 + 36 - 15 \\
 & \quad \quad 72 - 15 \\
 & = 57
 \end{aligned}$$

$$\begin{aligned}
 6) \quad & \underline{7 \times 6} - \underline{15 \div 3} \\
 & \quad 42 - 5 \\
 & = 37
 \end{aligned}$$

$$\begin{aligned}
 7) \quad & 8 - 4 \div 2 \\
 & \quad 8 - 2 \\
 & = 6
 \end{aligned}$$

$$\begin{aligned}
 8) \quad & 8 \times 3 \div (10 + 2) \\
 & \quad 24 \div 12 \\
 & = 2
 \end{aligned}$$

$$\begin{aligned}
 9) \quad & 4 \times \underline{16 \div 2} - 10 + 4 \\
 & \quad 64 \div 2 - 10 + 4 \\
 & \quad \quad 32 - 10 + 4 \\
 & \quad \quad \quad 22 + 4 \\
 & \quad \quad \quad = 26
 \end{aligned}$$

$$\begin{aligned}
 10) \quad & 29 - \underline{16 \div 4} + 8 \\
 & \quad 29 - 4 + 8 \\
 & \quad \quad 25 + 8 \\
 & = 33
 \end{aligned}$$

$$\begin{aligned}
 11) \quad & \underline{8 \times 5} - \underline{21 \div 3} + 7 \\
 & \quad 40 - 7 + 7 \\
 & \quad \quad 33 + 7 \\
 & = 40
 \end{aligned}$$

$$\begin{aligned}
 12) \quad & 36 \div (15 + 3 - 9) \\
 & \quad 36 \div 9 \\
 & = 4
 \end{aligned}$$

13) $3+4 \times (3+2)$

$3+4 \times 5$

$3+20$

$=23$

14) $8-3 \times (5-4)$

$8-3 \times 1$

$8-3$

$=5$

15) $11-12 \div 4+2 \times (7-2)$

$11-3+2 \times 5$

$11-3+10$

$8+10$

$=18$

16) $\frac{3(6-4)+15}{8-1}$

$=\frac{3(2)+15}{7}$

$=\frac{6+15}{7}$

$=\frac{21}{7}$

$=3$

17) $15 \div (3+2)+7 \times 4-8 \times 3$

$15 \div 5+28-24$

$3+28-24$

$31-24$

$=7$

18) $14-8 \div 4+0 \times (5-3)$

$14-2+0 \times 2$

$14-2$

$=12$

19) $25+3 \times 4-8 \div 2$

$25+12-4$

$37-4$

$=33$

20) $\frac{7 \times 5-(3+2)}{(20 \div 2 \times 3) \div 2}$

$=\frac{35-5}{30 \div 2}$

$=\frac{30}{15}$

$=2$

$$1) \quad -5 + 4 \div 2$$

$$-5 + 2$$

$$= -3$$

$$2) \quad 7 \times 10 - 4 + 33$$

$$70 - 4 + 33$$

$$66 + 33$$

$$= 99$$

$$3) \quad 3 \times 3 + 3 \times -3$$

$$9 + (-9)$$

$$9 - 9$$

$$= 0$$

$$4) \quad 9(8+2) + 7$$

$$9(10) + 7$$

$$90 + 7$$

$$= 97$$

$$5) \quad 8 \div -4 + 7 \times 1 - 1$$

$$-2 + 7 - 1$$

$$5 - 1$$

$$= 4$$

$$6) \quad 44 - 2 \times 6$$

$$44 - 12$$

$$= 32$$

$$7) \quad (-19 + -2) \div 3 + 4$$

$$(-21) \div 3 + 4$$

$$-7 + 4$$

$$= -3$$

$$8) \quad 2 - 3 \times 5 \times 2 \div 6$$

$$2 - 15 \times 2 \div 6$$

$$2 - 30 \div 6$$

$$2 - 5$$

$$= -3$$

$$9) \quad 11 - (4+6) \times -3$$

$$11 - (10) \times -3$$

$$11 - (-30)$$

$$11 + 30$$

$$= 41$$

$$10) \quad 5 - 4 \times 7 + (2 \times 17)$$

$$5 - 28 + 34$$

$$-23 + 34$$

$$= 11$$

$$11) \quad -3(4 + -7) + 1$$

$$-3(-3) + 1$$

$$9 + 1$$

$$= 10$$

$$12) \quad -1 + 4 \div 4 + 9$$

$$-1 + 1 + 9$$

$$0 + 9$$

$$= 9$$

$$13) \quad (1+3) \times (4+5)$$

$$4 \times 9$$

$$= 36$$

$$14) \quad 9 - 3 \times 5 + 4 \div 2$$

$$9 - 15 + 2$$

$$-6 + 2$$

$$= -4$$

$$\begin{aligned}
 15) & 8(2+7) - 8 + 14 \div 7 \\
 & 8(9) - 8 + 2 \\
 & 72 - 8 + 2 \\
 & 64 + 2 \\
 & = 66
 \end{aligned}$$

$$\begin{aligned}
 16) & 1 + 2 - 3 \times 4 + 5 \\
 & 1 + 2 - 12 + 5 \\
 & 3 - 12 + 5 \\
 & -9 + 5 \\
 & = -4
 \end{aligned}$$

$$\begin{aligned}
 17) & \frac{4 \times 4(-2)}{2 + (7 \times 2)} \\
 & = \frac{16(-2)}{2 + (14)} \\
 & = \frac{-32}{16} = -2
 \end{aligned}$$

Super Duper Bonus Question

$$\begin{aligned}
 & [(4+5) \times (3+17)] + 52 - (6 \times 2) + 16 \div 4 - \{(-2)[(3+2) \times (-4+5)] - 4\} \\
 & [9 \times 20] + 52 - 12 + 4 - [(-2)(5 \times -1) - 4] \\
 & = 180 + 52 - 12 + 4 - [(-2)(-5) - 4] \\
 & = 180 + 52 - 12 + 4 - [10 - 4] \\
 & = 180 + 52 - 12 + 4 - 6 \\
 & = 214
 \end{aligned}$$

$= -168$

$$\begin{aligned}
 & = -74 - 12 + 4 - 86 \\
 & = -86 + 4 - 86 \\
 & = -82 - 86 \\
 & = -168
 \end{aligned}$$

$$\begin{aligned}
 18) & \frac{(-1)(2)(-3)(4) + 5}{6 \times 7 - 8} \\
 & \frac{24 + 5}{42 - 8} \\
 & = \frac{29}{34}
 \end{aligned}$$

$$\begin{aligned}
 19) & \frac{33}{11} + \frac{48}{-12} + \frac{-9}{-3} \\
 & = 3 - 4 + 3 \\
 & = -1 + 3 \\
 & = 2
 \end{aligned}$$

* each fraction can reduce to whole # (integer) *

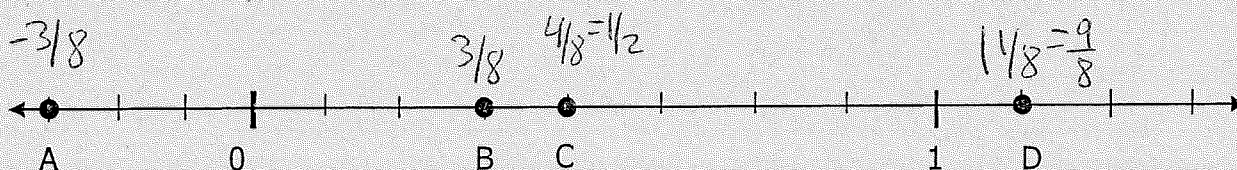
$$\begin{aligned}
 20) & \frac{72}{9} + \frac{-8}{4} - \frac{20}{5} + \frac{(3)(-4)(2)}{(2)(-2)(2)} \\
 & 8 + (-2) - 4 + \left(\frac{-24}{-8}\right) \\
 & = 8 - 2 - 4 + 3 \\
 & = 6 - 4 + 3 \\
 & = 2 + 3 \\
 & = 5
 \end{aligned}$$

Math 9
Rational Numbers Intro

1. Categorize the following numbers as being Natural, Whole, Integer, or Rational with a check mark. (✓) (a number can belong to more than one group)

Number	Natural	Whole	Integer	Rational
-5			✓	✓
2.5				✓
0		✓	✓	✓
$-3\frac{1}{4}$				✓
16	✓	✓	✓	✓
$\frac{2}{5}$				✓

2. Identify the rational numbers indicated on the number line. (each dash is $\frac{1}{8}$)



3. Reduce the following rational numbers into lowest terms:

$$\frac{12}{36} = \frac{1}{3}$$

$$\frac{-15}{21} = -\frac{5}{7}$$

$$4\frac{10}{25} = 4\frac{2}{5}$$

$$\frac{+24}{+30} = \frac{4}{5}$$

$$\frac{60}{72} = \frac{5}{6}$$

4. Convert the following improper fractions to mixed fractions:

$$\frac{11}{3} = 3\frac{2}{3}$$

$$\frac{21}{8} = 2\frac{5}{8}$$

$$-\frac{17}{3} = -5\frac{2}{3}$$

$$\frac{26}{11} = 2\frac{4}{11}$$

5. Convert the following mixed fractions to improper fractions:

$$2\frac{3}{5} = \frac{13}{5}$$

$$3\frac{1}{10} = \frac{31}{10}$$

$$-1\frac{4}{7} = -\frac{11}{7}$$

$$-5\frac{1}{4} = -\frac{21}{4}$$

6. Convert the following rational numbers into decimal form. Show as repeating decimals if necessary.

$$-\frac{3}{8} = -0.375 \quad \frac{21}{4} = 5.25 \quad 2\frac{7}{100} = 2.07 \quad \frac{11}{9} = 1.\overline{2}$$

7. Convert the following decimals into rational numbers, in lowest terms:

$$3.5 = 3\frac{1}{2} = \frac{7}{2} \quad -0.31 = -\frac{31}{100} \quad -1.003 = -\frac{1003}{1000} \quad 0.\overline{7} = \frac{7}{9}$$

8. Re-order the following rational numbers from smallest to largest:

$$\frac{34}{20}, \frac{1}{2}, \frac{8}{5}, \frac{11}{6}, \frac{7}{5} \rightarrow \frac{102}{60}, \frac{30}{60}, \frac{96}{60}, \frac{110}{60}, \frac{84}{60} \rightarrow \frac{7}{5}, 1\frac{1}{2}, \frac{8}{5}, \frac{34}{20}, \frac{11}{6}$$

LCD = 60

$$\left(\frac{34}{20}\right) \quad \left(1\frac{1}{2}\right) \quad \left(\frac{8}{5}\right) \quad \left(\frac{11}{6}\right) \quad \left(\frac{7}{5}\right)$$

9. Use <, >, or = to make each statement true

a) $-1.5 < 0$

b) $2\frac{3}{5} < \frac{27}{10}$
 $\frac{13}{5}$
 $\frac{26}{10}$

c) $-3\frac{1}{2} = -\frac{7}{2}$
 $-\frac{7}{2}$

d) $1.6 < 1\frac{3}{4}$
 1.75

e) $-2\frac{5}{8} = -\frac{21}{8}$
 $-\frac{21}{8}$

f) $1.\overline{4} > \frac{7}{5}$
 $1.\overline{4} \quad 1.4$

Math 9
Adding and Subtracting Fractions

1. Simplify

a) $\frac{3}{4} + \frac{2}{3}$
 $\frac{9}{12} + \frac{8}{12}$
 $= \frac{17}{12}$

b) $\frac{5}{7} - \frac{2}{5}$
 $\frac{25}{35} - \frac{14}{35}$
 $= \frac{11}{35}$

c) $\frac{3}{8} - \frac{5}{6}$
 $\frac{9}{24} - \frac{20}{24}$
 $= -\frac{11}{24}$

d) $\frac{-5}{12} + \left(\frac{-3}{8}\right)$
 $\frac{-10}{24} - \frac{9}{24}$
 $= -\frac{19}{24}$

e) $\frac{2}{-9} + \frac{5}{6}$
 $\frac{-2}{9} + \frac{5}{6}$
 $= \frac{-4}{18} + \frac{15}{18}$
 $= \frac{11}{18}$

f) $-\frac{4}{5} - \frac{2}{3}$
 $\frac{-12}{15} - \frac{10}{15}$
 $= -\frac{22}{15}$

g) $\frac{3}{-4} - \left(\frac{-2}{5}\right)$
 $\frac{-15}{20} + \frac{8}{20}$
 $= -\frac{7}{20}$

h) $\left(\frac{-3}{8}\right) - \left(\frac{5}{-4}\right)$
 $\frac{3}{8} + \frac{5}{4}$
 $= \frac{3}{8} + \frac{10}{8}$
 $= \frac{13}{8}$

2. Simplify

a) $-\frac{2}{3} + \left(\frac{1}{-4}\right)$
 $\frac{-8}{12} - \frac{3}{12}$
 $= -\frac{11}{12}$

b) $\left(\frac{-5}{6}\right) + \frac{3}{2}$
 $\frac{5}{6} + \frac{9}{6}$
 $= \frac{14}{6} = \frac{7}{3}$

c) $\left(\frac{3}{-8}\right) - \frac{3}{4}$
 $\frac{-3}{8} - \frac{6}{8}$
 $= -\frac{9}{8}$

d) $\frac{-5}{8} - \left(\frac{-1}{-6}\right)$
 $\frac{-5}{8} - \frac{1}{6}$
 $= \frac{-15}{24} - \frac{4}{24} = -\frac{19}{24}$

e) $\left(\frac{2}{-3}\right) - \frac{3}{10}$
 $\frac{2}{3} - \frac{3}{10}$
 $= \frac{20}{30} - \frac{9}{30} = \frac{11}{30}$

f) $\frac{3}{4} - \left(\frac{-5}{8}\right)$
 $\frac{6}{8} + \frac{5}{8}$
 $= \frac{11}{8}$

g) $\frac{9}{4} + \left(\frac{-7}{3}\right)$
 $\frac{27}{12} - \frac{28}{12}$
 $= -\frac{1}{12}$

h) $\frac{-20}{6} - \left(\frac{13}{3}\right)$
 $\frac{-20}{6} + \frac{26}{6}$
 $= \frac{6}{6} = 1$

3. Simplify

a) $\frac{7}{3} + \frac{21}{4}$
 $\frac{28}{12} + \frac{63}{12}$
 $= \frac{91}{12}$

b) $\frac{47}{8} - \frac{8}{3}$
 $\frac{141}{24} - \frac{64}{24}$
 $= \frac{77}{24}$

c) $\frac{13}{2} - \frac{49}{5}$
 $\frac{65}{10} - \frac{98}{10}$
 $= -\frac{33}{10}$

d) $\frac{17}{5} - \frac{35}{4}$
 $\frac{68}{20} - \frac{175}{20}$
 $= -\frac{107}{20}$

e) $-\frac{14}{3} + \frac{12}{5}$
 $\frac{-70}{15} + \frac{36}{15}$
 $= -\frac{34}{15}$

f) $\frac{9}{7} - \frac{9}{5}$
 $\frac{45}{35} - \frac{63}{35}$
 $= -\frac{18}{35}$

g) $-\frac{13}{5} + \frac{11}{6}$
 $\frac{-78}{30} + \frac{55}{30}$
 $= -\frac{23}{30}$

h) $\frac{43}{3} - \frac{47}{7}$
 $\frac{301}{21} - \frac{141}{21}$
 $= \frac{160}{21}$

4. Simplify

$$\begin{aligned} \text{a) } \frac{-7}{10} - \left(\frac{-7}{3}\right) \\ \frac{-21}{30} + \frac{70}{30} \\ = \frac{49}{30} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{-15}{4} - \frac{13}{6} \\ \frac{-45}{12} - \frac{26}{12} \\ = \frac{-71}{12} \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{13}{8} + \left(\frac{-3}{7}\right) \\ \frac{91}{56} - \frac{24}{56} \\ = \frac{67}{56} \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{25}{2} - \left(\frac{13}{4}\right) \\ \frac{50}{4} - \frac{13}{4} \\ = \frac{37}{4} \end{aligned}$$

$$\begin{aligned} \text{e) } \frac{-11}{4} + \left(\frac{-4}{3}\right) \\ \frac{-33}{12} - \frac{16}{12} \\ = \frac{-49}{12} \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{20}{9} - \left(\frac{-22}{3}\right) \\ \frac{20}{9} + \frac{66}{9} \\ = \frac{86}{9} \end{aligned}$$

$$\begin{aligned} \text{g) } \left(\frac{-11}{6}\right) - \left(\frac{11}{-18}\right) \\ \frac{33}{18} + \frac{11}{18} \\ = \frac{44}{18} = \frac{22}{9} \end{aligned}$$

$$\begin{aligned} \text{h) } \frac{14}{-5} + \left(\frac{-3}{7}\right) \\ \frac{-98}{35} - \frac{15}{35} \\ = \frac{-113}{35} \end{aligned}$$

$$\begin{aligned} \text{i) } \frac{-3}{11} + \frac{16}{3} \\ \frac{-9}{33} + \frac{176}{33} \\ = \frac{167}{33} \end{aligned}$$

5. Simplify

$$\begin{aligned} \text{a) } \frac{-2}{3} + \left(\frac{1}{-4}\right) - \left(\frac{-5}{6}\right) \\ \frac{-8}{12} - \frac{3}{12} + \frac{10}{12} \\ = \frac{-1}{12} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{3}{2} - \left(\frac{3}{-8}\right) - \frac{3}{4} \\ \frac{12}{8} + \frac{3}{8} - \frac{6}{8} \\ = \frac{9}{8} \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{5}{-8} + \left(\frac{-1}{-6}\right) - \left(\frac{2}{-3}\right) \\ \frac{-15}{24} + \frac{4}{24} + \frac{16}{24} \\ = \frac{5}{24} \end{aligned}$$

$$\begin{aligned} \text{d) } \frac{3}{-10} - \frac{3}{4} - \left(\frac{-5}{8}\right) \\ \frac{-12}{40} - \frac{30}{40} + \frac{25}{40} \\ = \frac{-17}{40} \end{aligned}$$

$$\begin{aligned}
 \text{e) } & \frac{9}{4} + \frac{17}{3} - \frac{29}{6} \\
 & \frac{27}{12} + \frac{68}{12} - \frac{58}{12} \\
 & = \frac{37}{12}
 \end{aligned}$$

$$\begin{aligned}
 \text{f) } & \frac{-3}{5} + \left(\frac{-7}{10}\right) - \frac{1}{2} \\
 & \frac{-6}{10} - \frac{7}{10} - \frac{5}{10} \\
 & = \frac{-18}{10} = -\frac{9}{5}
 \end{aligned}$$

$$\begin{aligned}
 \text{g) } & -\frac{7}{2} + \frac{4}{3} - \left(\frac{5}{6}\right) \\
 & \frac{-21}{6} + \frac{8}{6} - \frac{5}{6} \\
 & = \frac{-8}{6} = -\frac{4}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{h) } & -\frac{5}{9} - \left(\frac{2}{3}\right) + \left(\frac{-7}{6}\right) \\
 & \frac{-10}{18} + \frac{12}{18} - \frac{21}{18} \\
 & = \frac{-19}{18}
 \end{aligned}$$

$$\begin{aligned}
 \text{i) } & \frac{13}{2} + \left(\frac{-2}{3}\right) - \frac{7}{4} + \left(\frac{4}{-3}\right) \\
 & \frac{78}{12} - \frac{8}{12} - \frac{21}{12} - \frac{16}{12} \\
 & = \frac{33}{12} = \frac{11}{4}
 \end{aligned}$$

$$\begin{aligned}
 \text{j) } & \frac{4}{7} - \left(\frac{3}{-5}\right) + \left(\frac{-1}{2}\right) - \frac{3}{25} \\
 & \frac{200}{350} + \frac{210}{350} - \frac{175}{350} - \frac{42}{350} \\
 & = \frac{193}{350}
 \end{aligned}$$

Math 9
Rational Numbers---Multiply and Divide

1. Simplify completely

$$a) \frac{3}{5} \times \left(-\frac{8}{8}\right)^{-1} = -\frac{3}{8}$$

$$b) -\frac{2}{3} \times \frac{6}{7}^2 = -\frac{4}{7}$$

$$c) -\frac{1}{3} \times \left(-\frac{6}{5}\right)^{-2} = \frac{2}{5}$$

$$d) \frac{3}{5} \times \left(-\frac{8}{9}\right)^{-1} = -\frac{1}{3}$$

$$e) \frac{4}{1} \times \left(-\frac{3}{4}\right) = \frac{-3}{1} = -3$$

$$f) -\frac{2}{3} \times \left(-\frac{6}{1}\right)^{-2} = \frac{4}{1} = 4$$

$$g) 1\frac{2}{3} \times \left(-\frac{2}{5}\right)$$

$$\frac{1\cancel{8}}{3} \times \frac{-2}{\cancel{5}} = -\frac{2}{3}$$

$$h) -2\frac{1}{4} \times \left(-3\frac{1}{3}\right)$$

$$\frac{-2\cancel{4}}{4} \times \frac{-3\cancel{5}}{\cancel{3}} = \frac{15}{2}$$

$$i) -\frac{2}{3} \times \frac{1}{2} \times \frac{-6}{5}^{-2} = \frac{2}{5}$$

$$j) \left(-\frac{3}{4}\right) \times \left(-1\frac{1}{5}\right) \times \left(-\frac{5}{9}\right)$$

$$\frac{-3}{2\cancel{4}} \times \frac{-\cancel{6}^{-1}}{\cancel{5}} \times \frac{-\cancel{5}^{-1}}{\cancel{9}} = -\frac{1}{2}$$

2. Simplify completely

$$a) \frac{5}{6} \div \left(-\frac{2}{3}\right)$$

$$\frac{5}{2\cancel{6}} \times \frac{\cancel{3}^{-1}}{2} = -\frac{5}{4}$$

$$b) -\frac{1}{2} \div \left(-\frac{3}{2}\right)$$

$$\frac{-1}{\cancel{2}} \times \frac{\cancel{2}^{-1}}{3} = \frac{1}{3}$$

$$c) -\frac{3}{4} \div \frac{9}{4}$$

$$\frac{-3}{\cancel{4}} \times \frac{\cancel{4}^1}{9} = -\frac{1}{3}$$

$$d) \left(-\frac{3}{8}\right) \div \frac{5}{4}$$

$$\frac{-3}{2\cancel{8}} \times \frac{\cancel{4}^1}{5} = -\frac{3}{10}$$

$$e) \left(-\frac{4}{5}\right) \div \frac{4}{1}$$

$$\frac{-\cancel{4}}{5} \times \frac{1}{\cancel{4}} = -\frac{1}{5}$$

$$f) -3 \div \left(-\frac{9}{4}\right)$$

$$\frac{-3}{1} \times \frac{\cancel{4}}{\cancel{9}^3} = \frac{4}{3}$$

$$g) \left(-1\frac{1}{2}\right) \div 2\frac{3}{4}$$

$$\frac{-\cancel{3}}{\cancel{2}} \times \frac{\cancel{4}^2}{11} = -\frac{6}{11}$$

$$h) -1\frac{2}{3} \div \left(-2\frac{1}{5}\right)$$

$$\frac{-5}{3} \times \frac{5}{11} = \frac{25}{33}$$

$$i) -\frac{2}{3} \div \frac{-6}{5}$$

$$\frac{-\cancel{2}}{3} \times \frac{5}{\cancel{6}^3} = \frac{5}{9}$$

$$\begin{aligned}
 & \text{i) } -1\frac{3}{4} \div \left(-1\frac{1}{5}\right) \div \left(-\frac{5}{9}\right) \\
 & \quad -\frac{7}{4} \times \frac{5}{6} \times -\frac{9}{5} = -\frac{21}{8}
 \end{aligned}$$

3. Simplify completely

$$\begin{aligned}
 & \text{a) } \frac{4}{-9} \times \left(\frac{-21}{-32}\right) \times \left(\frac{-3}{14}\right) \\
 & \quad = \frac{1}{-1} \times \frac{-1}{-8} \times \frac{-1}{2} = \frac{+1}{+16} = \frac{1}{16}
 \end{aligned}$$

$$\begin{aligned}
 & \text{b) } \frac{-10}{27} \times \left(\frac{-8}{20}\right) \times \left(\frac{-45}{-28}\right) \\
 & \quad = \frac{-1}{3} \times \frac{-2}{7} \times \frac{-5}{-7} \\
 & \quad = \frac{-5}{-21} = \frac{5}{21}
 \end{aligned}$$

$$\begin{aligned}
 & \text{c) } \left(\frac{-6}{-25}\right) \div \left(\frac{-2}{-21}\right) \div \left(\frac{14}{-25}\right) \\
 & \quad = \frac{-3}{-25} \times \frac{3}{7} \times \frac{-25}{14} \\
 & \quad = \frac{-3}{-1} \times \frac{3}{1} \times \frac{-1}{2} \\
 & \quad = \frac{+9}{-2} = -\frac{9}{2}
 \end{aligned}$$

$$\begin{aligned}
 & \text{d) } \left(\frac{12}{-39}\right) \div \left(\frac{-10}{-9}\right) \div \left(\frac{18}{-5}\right) \\
 & \quad = \frac{2}{-13} \times \frac{9}{7} \times \frac{-5}{18} \\
 & \quad = \frac{-1}{-13} = \frac{1}{13}
 \end{aligned}$$

$$\begin{aligned}
 \text{e) } & \left(\frac{15}{-32}\right) \times \left(\frac{-4}{5}\right) \div \left(\frac{-9}{16}\right) \\
 & \frac{15}{-32} \times \frac{-4}{5} \times \frac{-16}{9} \\
 & \frac{1}{-1} \times \frac{-2}{1} \times \frac{-1}{3} \\
 & = \frac{2}{-3} = -\frac{2}{3}
 \end{aligned}$$

$$\begin{aligned}
 \text{f) } & \left(\frac{-12}{28}\right) \div \left(\frac{-8}{-15}\right) \times \left(\frac{-14}{-25}\right) \\
 & \frac{-12}{28} \times \frac{15}{8} \times \frac{14}{25} \\
 & = \frac{-3}{1} \times \frac{3}{4} \times \frac{1}{5} \\
 & = -\frac{9}{20}
 \end{aligned}$$

$$\begin{aligned}
 \text{g) } & \frac{5}{2} \div \left(\frac{-10}{3}\right) \times \frac{8}{3} \\
 & \frac{5}{2} \times \frac{-3}{10} \times \frac{8}{3} \\
 & = \frac{1}{1} \times \frac{-1}{2} \times \frac{4}{1} \\
 & = -\frac{2}{1} = -2
 \end{aligned}$$

$$\begin{aligned}
 \text{h) } & \left(\frac{-15}{4}\right) \times \frac{8}{5} \div \left(\frac{-6}{5}\right) \\
 & \frac{-15}{4} \times \frac{8}{5} \times \frac{-5}{6} \\
 & = \frac{5}{1} = 5
 \end{aligned}$$

$$\begin{aligned}
 \text{i) } & \left(\frac{20}{-3}\right) \div \left(\frac{-35}{9}\right) \times \left(\frac{-14}{-6}\right) \div \frac{4}{3} \\
 & \frac{20}{-3} \times \frac{9}{35} \times \frac{14}{6} \times \frac{3}{4} \\
 & = \frac{1}{-1} \times \frac{3}{-1} \times \frac{1}{1} \times \frac{1}{1} \\
 & = \frac{3}{1} = 3
 \end{aligned}$$

$$\begin{aligned}
 \text{j) } & \frac{22}{3} \times \left(\frac{-6}{77}\right) \times \left(\frac{-3}{-2}\right) \div \left(\frac{2}{-7}\right) \\
 & \frac{22}{3} \times \frac{-6}{77} \times \frac{3}{2} \times \frac{-7}{2} \\
 & = \frac{1}{1} \times \frac{-3}{1} \times \frac{1}{1} \times \frac{-1}{1} \\
 & = \frac{3}{1} = 3
 \end{aligned}$$

1. Simplify.

a. $\left(\frac{4}{-8}\right) \times \left(\frac{-21}{-32}\right) \times \left(\frac{-3}{14}\right)$

$$= \frac{1}{-1} \times \frac{-1}{-8} \times \frac{-1}{2} = \frac{1}{16}$$

b. $\left(\frac{-6}{-25}\right) \div \left(\frac{-2}{-21}\right) \div \left(\frac{14}{-25}\right)$

$$= \frac{-3}{-1} \times \frac{3}{1} \times \frac{-1}{2} = \frac{9}{-2} = -\frac{9}{2}$$

c. $\frac{5}{2} \div \left(\frac{-10}{-3}\right) \times \frac{8}{3}$

$$= \frac{1}{2} \times \frac{3}{1} \times \frac{8}{3} = \frac{1}{1} \times \frac{1}{2} \times \frac{4}{1} = 2$$

d. $\left(\frac{15}{-32}\right) \times \left(\frac{-4}{5}\right) \div \left(\frac{-9}{16}\right)$

$$= \frac{1}{-2} \times \frac{-2}{1} \times \frac{-1}{3} = \frac{-2}{-3} = \frac{2}{3}$$

e. $\left(\frac{20}{-3}\right) \div \left(\frac{-35}{9}\right) \times \left(\frac{14}{-6}\right) \div \frac{4}{3}$

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

2. Simplify.

a. $\frac{4}{5} \times \left(\frac{3}{8} + \frac{-7}{4}\right)^2$

$$= \frac{4}{5} \times \left(\frac{3-14}{8}\right)^2$$

$$= \frac{4}{5} \times \frac{-11}{8} = \frac{-11}{10}$$

b. $\left(\frac{-3^2 + 7}{7 + 2}\right) \div \frac{7}{-3}$

$$= \left(\frac{-6 + 49}{14}\right) \times \frac{-3}{7}$$

$$= \frac{43}{14} \times \frac{-3}{7} = \frac{-129}{98}$$

c. $\frac{6}{-7} \div \frac{3}{7} \times \frac{-16}{7}$

$$= \frac{6}{-7} + \frac{-12}{7}$$

$$= \frac{-6 - 12}{7} = \frac{-18}{7}$$

d. $\frac{-18}{5} \div \frac{27}{5} - \frac{6}{-11}$

$$= \frac{-2}{3} \div \frac{3}{11} - \frac{-6}{11}$$

$$= \frac{-2 \times 11}{3 \times 11} + \frac{6 \times 11}{11} = \frac{-22 + 66}{33} = \frac{44}{33} = \frac{4}{3}$$

e. $\left(\frac{-5^2 - 7}{9 - 6}\right) \times \frac{9}{5}$

$$= \left(\frac{-10 - 7}{18}\right) \times \frac{9}{5}$$

$$= \frac{-31}{2} \times \frac{9}{5} = \frac{-31}{10}$$

f. $\frac{-4}{9} \div \left(\frac{-3^3}{8} + \frac{4}{-3}\right)$

$$= \frac{-4}{9} \div \left(\frac{-9 - 32}{24}\right)$$

$$= \frac{-4}{9} \div \left(\frac{-41}{24}\right)$$

$$= \frac{-4}{9} \times \frac{24}{-41} = \frac{-32}{-123} = \frac{32}{123}$$