Order of Operations

Objective: To apply the rules for order of operations in simplifying expressions.

EXAMPLES **Here's how to simplify expressions having more than one kind of operation.**

Rule 1. First, do the operation(s) within grouping symbols
Rule 2. Do any exponents
Rule 3. Next, work from left to right doing any multiplication or division (whichever is first).
Rule 4. Last, work from left to right doing addition and subtraction (whichever is first).

3^{rd} 1^{st} 2^{nd}

A. $13 - (4 + 1) \times 2$
$13 - 5 \times 2$
$13 - 10$
3

3^{rd} 2^{nd} 1^{st}

B. $12 + 24 \div (3 \times 2)$
$12 + 24 \div 6$
$12 + 4$
16

2^{nd} 1^{st} 3^{rd}

C. $6 + 3x\ 10 - 2$
$6 + 30 - 2$
$36 - 2$
34

Simplify:

1. $18 - 30 \div 6$

2. $48 \div (8 + 4) - 3$

3. $2 + 3 \times 6 + 3$

4. $8 + 12 \times 3 - 6$

5. $6 - (8 \div 4)$

6. $13 - 2 - 11$

7. $1.5 - 0.5 + 2$

8. $5 + 0.2 \times 0.3$

9. $8 + 1.5 \times (10 - 3)$

10. $3.6 \times 8.1 \div 2$

11. $(0.8 + 0.2) \times 7$

12. $(30 - 2) \times (10 \div 5)$

Decimals – Estimation and Computation

Objective: To estimate then compute decimal products.

Heres how to estimate and compute decimal products.

A Estimate the product: 3.8 x 2.1

4 x 2 = 8 *(round each decimal to the nearest whole number and multiply.)*

B Compute the product: 3.8 x 2.1

Multiply as whole numbers.	Count the digits to the right of the decimal points (2)	Count off the number of digits in the product.
3.8 x 2.1 38 76 798	3.8 x 2.1 38 76 798	3.8 x 2.1 38 76 7.98

By estimating, find the three wrong calculator answers.

a. 0.52 x 3.4 = 1.768 **b**. 0.98 × 5 = 0.49 **c.** 6.8 x 5.2 = 3.536.01

d. 9.01 x 3.1 = 27.931 **e.** 0.85 x 19 = 1.615 **f.** 18 × 6.4 = 115.2

Multiply.

13. 3.9 x 2.3 **14.** 3 x 6.1 **15**. 0.54 x 8.2 **16.** 7.5 x 0.05

17. 2.01 x 0.99 **18.** 9.7 x 0.006 **19.** 88 x 3.7 **20.** 0.95 x 3.9

Dividing Decimals by Decimals

Objective: To divide a decimal by a decimal.

Here's how to divide a decimal by a decimal.

$02.3\overline{)32.683}$ $02.3\overline{)32.683}$

A. Multiply the divisor by 10 to make it a whole number.

B. Multiply the dividend by the same number.

$23\overline{)32.683}$ $23\overline{)326.83}$

C. Divide: $326.83 \div 23 = 14.21$

Place the decimal point in each quotient

21. $0.04\overline{)0.2\ 2\ 4}$ (5 6) **22.** $3.3\overline{)2\ 7\ 0.6}$ (8 2) **23.** $0.009\overline{)0.0351}$ (3 9) **24.** $0.56\overline{)0.2464}$ (4 4)

Divide.

25. 6.45 ÷ 0.3 **26.** 0.85 ÷ 0.005 **27.** 7.035 ÷ 3.5

28. $0.65 \div 1.3$

29. $1.587 \div 0.3$

30. $21.45 \div 3.3$

31. $14.49 \div 4.5$

32. $0.96 \div 1.6$

Addition and Subtraction of Mixed Numbers

Objective: To add and subtract mixed numbers with regrouping.

EXAMPLES: **Here's how to add and subtract mixed numbers with regrouping.**

$$\begin{array}{r} 6\frac{1}{3} = 6\frac{4}{12} \\ +2\frac{3}{4} = +2\frac{9}{12} \\ \hline \end{array} \qquad \begin{array}{r} 9 = 8\frac{?}{?} \\ -4\frac{4}{5} = 4\frac{4}{5} \\ \hline \end{array}$$

$$8\frac{13}{12} = 9\frac{?}{?} \qquad ?\frac{1}{5}$$

Add. Write the sum in simplest form.

33. $5\frac{1}{2} + 3\frac{3}{4}$

34. $7\frac{7}{8} + 2\frac{1}{4}$

35. $3\frac{1}{2} + 5\frac{2}{3}$

36. $3\frac{5}{6} + 7\frac{1}{3}$ **37.** $2\frac{4}{5} + 6\frac{1}{2}$ **38.** $11\frac{3}{4} + 3\frac{1}{3}$

Subtract. Write the difference in simplest terms.

39. $6\frac{1}{3} - 2\frac{1}{2}$ **40.** $8\frac{3}{8} - 4\frac{3}{4}$ **41.** $5\frac{1}{2} - 2\frac{2}{3}$

42. $7\frac{1}{8} - 3\frac{1}{4}$ **43.** $6\frac{1}{6} - 5\frac{2}{3}$ **44.** $9 - 5\frac{1}{4}$

18.

Multiplying Mixed Numbers

Objective: To multiply mixed numbers.

EXAMPLE Here's how to multiply mixed numbers**.**

$1\frac{1}{3} * 2\frac{1}{2} = ?$ Change each number to a mixed number -----→ $\frac{4}{3} * \frac{5}{2} = ?$

Reduce and multiple -----→ $\frac{2}{3} * \frac{5}{1} = \frac{10}{3}$; $= 3\frac{1}{3}$

Give each product in simplest form.

45. $1\frac{1}{2} * 1\frac{1}{2}$ **46.** $1\frac{1}{2} * 4\frac{1}{2}$ **47.** $2\frac{1}{2} * 3\frac{1}{2}$

48. $2\frac{3}{4} * 1\frac{1}{2}$

49. $1\frac{1}{2} * 1\frac{2}{3}$

Division of Mixed Numbers

Objective: To divide mixed numbers.

EXAMPLE **Here's how to divide mixed numbers.**

A. $1\frac{1}{3} \div 1\frac{7}{9} = ?$ **Change both numbers to improper fractions:** $\frac{4}{3} \div \frac{16}{9}$ **= ?**

Turn right hand numbers upside down (invert) and multiply: $\frac{4}{3} * \frac{9}{16}$ **= ?**

(reduce where possible)

Result: $\frac{1}{1} * \frac{3}{4} = \frac{3}{4}$

Give each quotient in simplest form.

50. $1\frac{1}{2} \div 2\frac{1}{4}$

51. $1\frac{1}{3} \div 1\frac{1}{15}$

52. $2\frac{1}{2} \div 3\frac{1}{4}$

53. $7\frac{2}{3} \div 2\frac{2}{9}$

54. $3\frac{1}{2} \div 8\frac{3}{4}$

55. $2\frac{2}{3} \div 1\frac{7}{9}$

56. $1\frac{2}{3} \div 4\frac{1}{6}$

57. $9\frac{3}{5} \div 4\frac{2}{3}$

58. $3\frac{2}{7} \div 2\frac{1}{9}$

Adding and Subtracting Integers

Add or subtract.

59. -4 - (4) = _____ **60.** -7 + 9 = _____ **61.** -9 - (-9) = _____

62. -25 - (-5) = _____ **63.** 0 + (-8) = _____ **64.** -8 - (-12) = _____

65. -9 + 22 = _____ **66.** -17 - 20 = _____ **67.** 15 - 42 = _____

Complete the tables.

	a	9 +a
68.	2	
69.	-2	
70.	-3	

	b	12 - b
71.		7
72.	0	
73.		-4

	c	c + 5
74.	-4	
75.	16	
76.		-12

Proportions

Objective: To solve proportions.

EXAMPLES: **Here's how to solve, a proportion by cross multiplication.**

$$\frac{x}{4} = \frac{5}{14}$$

$14x = 4 \bullet 5$ *The two products 4 • 5 and x • 14 are* called ***cross*** products

$14x = 20$.

$$\frac{14x}{14} = \frac{20}{14}$$

$$x = \frac{20}{14}; \quad x = 1\frac{3}{7}$$

Solve each proportion.

77. $\frac{a}{35} = \frac{3}{7}$ **78.** $\frac{15}{b} = \frac{3}{4}$ **79.** $\frac{3}{8} = \frac{c}{24}$

80. $\frac{2}{9} = \frac{12}{d}$ **81.** $\frac{e}{30} = \frac{5}{6}$ **82.** $\frac{24}{f} = \frac{4}{9}$

83. $\frac{r}{7} = \frac{3}{4}$ **84.** $\frac{8}{t} = \frac{7}{10}$

One Step Equations

Objective: To solve addition equations by subtracting the same number from both sides" "of the equation.

EXAMPLES: Here's how to solve an addition equation.

A. p + 6 = 11
p + 6 − **6 =** 11 **- 6**
p = *5*

CHECK:
p + 6 = 11
5 + 6 = 11
11 =11
It checks!

B. t + 10 = 23
t + 10 −10 = 23 −10
t = 13

CHECK:
t + 10 = 23
13 + 10 = 23
23 = 23
It checks!

Tell what number you would subtract from both sides to solve the equation.

85. c + 12 = 26 _____

86. n + 46 = 78 _____

87. y + 36.2 = 78.4 _____

Complete these examples.

m + 24 = 56
m + 24 - 24 = 56 − ?
m = 32

x + 50 = 77
x + 50 − ? = 77 − ?
x = 27

r + 6.7 = 49.9
r + 6.7 - 6.7 = 49.9 - ?
r = ?

Solve and check.

88. m + 13 20

89. *x* + 17 = 34

90. s + 6 = 77

91. e + 18 = 18

92. g + 78 = 90

93. v + 12 = 28

94. q + 6 = 94 **95**. b − 2.4 = 4.6 **96.** k − 1.3 = 7.9

97. u − 3.21 = 10.46 **98.** w − 0.84 = 0.. 99 **99.** z - 0.79 = 2.8

Example: How to solve one-step equations using multiplication and division.

Multiplication:

2y = 14 **Get the variable alone on one side of the equation – to do this – divide each side by 2**

$$\frac{2y}{2} = \frac{14}{2}$$

y = 7

Division:

$\frac{1}{2}y = 30$ **Multiply both sides of the equation by the reciprocal (2 divided by 1)**

$$\frac{2}{1} * \frac{1}{2} y = 30 * \frac{2}{1}$$

$y = 60$

Solve the following:

101. $3x = 24$

102. $4y = 16$

103. $5a = 65$

104. $2z = 130$

105. $10k = 200$

106. $4j = 28$

107. $\frac{1}{3}r = 12$

108. $\frac{a}{5} = 25$

109. $\frac{5}{7}x = 35$

Conversion:

1. 56% = What Fraction? 2. 56% = .56 (decimal equivalent -- move decimal two places to the left)
2. .56 = $\frac{56}{100}$ (fraction equivalent – move decimal two places to the right and place the number over 100).
3. Reduce: $\frac{56}{100} = \frac{16}{25}$

Compute the missing quantities.

Percentage	**Decimal**	**Fraction**

110.	**111.**	$\frac{3}{5}$
112.	.20	**113.**
.35	**114**.	**115.**
116.	.3	**117**
118.	**119.**	$\frac{2}{5}$
120	.85	**121.**