Early Start: Worksheet #1

I. Perform the operations; simplify completely.

a) \(8 - (+4) - (-7) + (-13)\)

b) \((11 - 16)^2 - (17 - 10)3\)

c) \(-3| -7| - |4 - 6|\)

d) \(12 - 6\sqrt{5^2 - 3^2}\)

e) \(-2^4 - 3 \cdot 2^1 + 2^3\)

f) \(36 \div 9(2) - 10 + 2\)

g) \(-\frac{5}{6} - \frac{5}{6} + 3\)

h) \(2\frac{1}{3} + \frac{5}{6} - \frac{4}{3}\)

i) \(\left(-\frac{5}{6}\right)^2 + \left(\frac{35}{21}\right)\)

j) \(8.2 - 4.62 + 3.05\)

k) \(0.2(1.4) + (0.2)^3\)

l) \(\frac{6}{2.7}\)
II. *Operations with Integer Exponents:* Perform the operations; simplify completely.

a) $-4 \cdot 10^{-2}$  
b) $\frac{-8^0 \cdot 6^{-2}}{3^{-3}}$  
c) $\frac{(4^6)^2}{4^9}$

d) $6^{-3}(-9)^2$  
e) $2^{-1} - 2^0 + 2^{-2}$  
f) $10(7 + 5)^{-1} - 2^{-3}$

III. Simplify the expressions; solve the equations.

a) $2y - 3[5 - (6 - 4y)] + y$  
b) $\frac{-60}{26} n = \frac{35}{13}$  
c) $\frac{1}{5}(-30r) + \frac{5}{4}(12r + 20) = -9$

d) $\frac{3}{10} a^3 - \frac{5}{8} ab + ab + \frac{4}{15} a^3$  
e) $2.4n - n - 0.17 = 0.43$  
f) $0.2c + 0.06c - 1.2 + 0.35$
IV. Evaluate the formula at the given values.  
\[ C = \frac{5}{9}(F - 32); \]

i) \( F = 68 \) 
ii) \( C = -15 \)

V. Evaluate the expression at the given values.  
\[ c^3d - d^2 - cd; \ c = -2, \ d = 6 \]

VI. Evaluate each function at the given value. Write result as an (Ordered, Pair).

a) \( f(x) = -x^4 - 3x^3 + 17; \ x = -2 \) 
   b) \( g(x) = 4x + 3; \ x = -\frac{1}{2} \) 
   c) \( f(x) = x^3 - 4x^2; \ x = 0.3 \)

VII. Solve and simplify. Use the Quadratic Formula: If \( ax^2 + bx + c = 0 \), then 
\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}. \]

a) \( 25x^2 - 10x + 1 = 0 \) 
   b) \( 3x^2 + 8x - 3 = 0 \)
I. Divide: a) Write result as a mixed number. b) Write result as a decimal rounded to tenth.

i) \( \frac{57}{12} = \) ________

ii) \( \frac{2}{0.07} = \) ________

i) \( \frac{35}{23} = \) ________

ii) \( \frac{7.5}{0.8} = \) ________

c) Write as a decimal number.

i) \( 8 \frac{7}{100} = \) ________

ii) \( 14 \frac{301}{10000} = \) ________

iii) \( 2 \frac{38}{10000} = \) ________

iv) \( 7 \frac{1}{10} = \) ________

d) Write as a decimal with a repeat bar.

i) \( \frac{4}{11} = \) ________

ii) \( \frac{11}{6} = \) ________

i) \( 0.028 = \) ________ %

= ________ fr.

ii) \( 4.45 = \) ________ %

= ________ fr.

e) Write as: simplified fraction; per cent.

II. Divide the polynomials; when appropriate, write with a rational remainder.

a) \( \frac{21y^2 - 23y + 6}{3y - 2} \)

b) \( \frac{2a^3 - 7a - 11}{a + 2} \)
III. Write each as a decimal.
   i) 0.043% = ____________ ii) $\frac{23}{50} = \______________$ iii) $6\frac{3}{4}\% = \______________$ iv) $\frac{9}{200} = \______________$

IV. Convert to a %:

   b) with a fractional remainder.
   a) $\frac{3}{7} = \______________$ (tenth of a %)  
   i) $\frac{5}{16} = \______________$ ii) $\frac{3}{41} = \______________$
   = \______________$ (nearest %)

   c) Convert $13\frac{3}{4}\%$ to a simplified fraction.

V. In an office of 36 employees, 15 are men. Eighteen of the 24 employees who are lawyers are women.
   a) How many women work in the office? _________  b) How many male lawyers are there? _________
   c) What simplified fraction of the:  i) employees is female? _________ ii) lawyers is male? _________
   d) What percent of the:  i) men are lawyers? _________ ii) lawyers are women? _________
   e) What percent of the employees is male? (Express as mixed number %, e.g., $7\frac{5}{8}\%$ ) _________
   f) What percent of the women are not lawyers? (Round % to nearest tenth. e.g., 31.2\%) _________

   Do work on back!

VI. Find each percent by moving the decimal point; do as much “mentally” as possible!

   $\$42$:
   \[
   \begin{align*}
   100\% & = \______________ \\
   10\% & = \______________ \\
   1\% & = \______________ \\
   2\% & = \______________ \\
   30\% & = \______________ \\
   0.1\% & = \______________ \\
   200\% & = \______________ \\
   50\% & = \______________ \\
   \end{align*}
   \]

VII. Assume the standard tip at a restaurant is 15%. Round the bill, then estimate a tip. Bill = $37.84
   a) Round bill to nearest ten dollars.  b) Round bill to nearest dollar.
   tip = $\______________$  tip = $\______________$
VIII. a) A clothing store pays its supplier $28 per shirt. Find the retail price if the store desires a markup of:
   i) $10 _______________   ii) 10% _______________   iii) 25% _______________

   b) Decrease $230 by a % using “Mental Math” skills.
      10% _______________   50% _______________   100% _______________   1% _______________

c) Cynthia earns $3,600/month. Determine her take-home pay if she pays 3% in state taxes, 12% in federal taxes, and $450 for health insurance. [Hint: Deduct taxes first, then the cost of health insurance.]

IX. Multiply/Divide by moving the decimal point – avoid arithmetic!
   a) 100(0.0416)       b) 94.3×10⁻³       c) \( \frac{2.479}{0.01} \)       d) \( -851×10^4 \)
      _______________   _______________   _______________   _______________

X. Graph each set, then express solution in [Interval, Notation).
   1) \( x < 1.8 \)       2) \( w \geq -0.42 \)       3) \( -\frac{2}{5} \leq c \leq \frac{1}{5} \)

XI. a) Round 752,493 to the nearest:
        _______________ ten
        _______________ thousand
        _______________ hundred
        _______________ ten thousand
        _______________ ten million
        _______________ million
        _______________ hundred thousand

   b) Ralph wants to purchase six tacos at 89 cents/each, two bean burritos at 69 cents/each, and a medium drink at $1.49. If sales tax is 9%, can he afford this bountiful buffet if he has only $10? SHOW!

XII. a) Round the measurements of the rectangular room to the nearest unit. Then, estimate:
   i) Perimeter \( 13.7 \) feet   ii) Area \( 8.2 \)

   b) Suppose the floor shall be covered with tile that costs $2.79 per square foot and sales tax is 9%. Estimate the tile cost by rounding the tile price to the nearest dollar and the sales tax to the nearest unit. Do you think this estimate is higher or lower than the actual amount? Explain!
Divisibility Rules – the most common cases

* A number is divisible by:  
  - 2 if it is **even** (i.e., it ends with 0, 2, 4, 6 or 8)  
  - 3 if 3 divides the **sum** of the number’s digits  
  - 4 if 4 divides the number’s first **two** digits  
  - 5 if the number **ends** with 0 or 5  
  - 6 if 2 divides number and 3 divides number  
  - 8 if 8 divides the number’s first **three** digits  
  - 9 if 9 divides the **sum** of the number’s digits  
  - 10 if the number **ends** with 0

I. a) Determine the **divisibility** of each number.  
   b) Find the **Prime factorization** of each number.

i) 702  Circle divisors: 2 3 4 5 6 8 9 10

ii) 420  Circle divisors: 2 3 4 5 6 8 9 10

Prime factorization = ______________________  Prime factorization = ______________________

iii) 784  Circle divisors: 2 3 4 5 6 8 9 10

iv) 1,485  Circle divisors: 2 3 4 5 6 8 9 10

Prime factorization = ______________________  Prime factorization = ______________________

v) 97  Circle divisors: 2 3 4 5 6 8 9 10

c) **Simplify** the fractions.

i) \( \frac{420}{702} \)  

ii) \( \frac{784}{420} \)

Prime factorization = ______________________
II. a) Determine the Least Common Multiple of each collection of numbers by listing multiples.
   i) 12, ________________________________          ii) 30, ________________________________
       16, ________________________________          36, ________________________________
       32, ________________________________          45, ________________________________

b) Use the above results and the fact that the LCM = LCD to simplify the expressions.
   i) \( \frac{5}{16} - \frac{13}{32} + \frac{7}{12} \)
   ii) \( \frac{7}{30} + \frac{8}{45} - \frac{11}{36} \)

III. i) Prime factor the given numbers;          ii) Determine the GCF; simplify the fraction.
   iii) Determine the LCD; simplify the expression.

a) i) 36 = ______________ 60 = ______________;   i) 48 = ______________ 72 = ______________;
   ii) GCF = ___________ \( \frac{36}{60} \) = ____________
   ii) GCF = ___________ \( \frac{72}{48} \) = ____________
   iii) LCD = \( \frac{7}{60} + \frac{11}{36} \)
   iii) LCD = \( \frac{25}{48} - \frac{17}{72} \)

IV. Determine the LCD, then simplify the expression.

a) LCD = ____________
   \( \frac{x}{16} - \frac{x-3y}{32} + \frac{4x+y}{12} \)
V. Determine the LCD, then use it to solve the equation.

a) LCD = ______________
\[ \frac{2}{5}x - \frac{3}{8}x = -\frac{1}{4} \]

b) LCD = ______________
\[ 1.5c - 6 - 0.1c = 2.4 \]

c) LCD = ______________
\[ 0.01a - (0.2a - 1) = -8.5 \]

d) LCD = ______________
\[ \frac{5}{6v} + \frac{1}{12} = \frac{7}{8v} \]

e) LCD = ______________
\[ \frac{y - 3}{4y + 16} - \frac{7}{y^2 + 4y} = \frac{1}{4y} \]

f) LCD = ______________
\[ \frac{r}{30} - \frac{8 - r}{18} = \frac{28}{45} \]
Key terms in translation

**Addition**
- 1.45 more than a number: \(1.45 + x\)
- eight plus some number: \(8 + n\)
- K increased by 23: \(K + 23\)
- 275 added to H: \(H + 275\)
- the sum of two numbers: \(a + b\)
- the total of w and 14: \(w + 14\)

**Subtraction**
- six less than \(r\): \(r - 6\)
- a number minus five: \(t - 5\)
- seven decreased by \(x^2\): \(7 - x^2\)
- y reduced by three: \(y - 3\)
- a subtracted from 10: \(10 - a\)
- the difference of 12 and m: \(12 - m\)

**Multiplication**
- the product of d and 0.24: \(0.24d\)
- six multiplied by \(\sqrt{y}\): \(6\sqrt{y}\)
- a number times 76: \(76r\)
- 17% of some number: \(\frac{17}{100}p \ or \ 0.17p\)
- Two-thirds of \(n^3\): \(\frac{2}{3}n^3\)

**Division**
- the quotient of 18 and \(x\): \(\frac{18}{x} \ or \ 18 \div x\)
- F divided by 2,000: \(\frac{F}{2000}\)
- the ratio of two numbers: \(\frac{a}{b}\)

I. Translate each sentence fragment into an algebraic expression.

1) 100 more than \(A\) _________ 6) the square of 4% of a number _________
2) a number reduced by 40 _________ 7) the sum of three times a number and two _________
3) 15 less than a number _________ 8) three times the sum of a number and two _________
4) a number increased by nine _________ 9) the quotient of 5 more than a number and the number _______
5) 4% of a squared number _________ 10) the quotient of a number and 5 more than the number _______

II. Translate then simplify each expression.

i) the difference of a number increased by eight and 10 less than twice the number
ii) the total of a number decreased by 12 and the number subtracted from six

iii) eight decreased by 20% iv) a number increased by 25%
v) one-sixth a cubed number added to nine-tenths the cubed number

vi) one-half the square root of $B$ subtracted from five-eighths the square root of $B$

Terminology Common to Inequalities
- Sara has *more* than $8,000 in her 401K account. $x > 8000$
- The population of Elbow, Nevada is *at most* 68. $P \leq 68$
- *Fewer* than seven clients called during lunchtime. $C < 7$
- *Thirty or more* students chose the CR/NC option. $S \geq 30$
- The temperature was *no more* than 90°F. $t \leq 90$
- Dinner costs *at least* $15, *but less* than $25. $15 \leq t < 25$

III. Translate each sentence to an equation or inequality; solve.
i) Nine added to twice a number is fifteen. ii) Seven less than two-thirds a number is at most 11.

iii) The difference of a number and six is three-fifths the number.

iv) Four percent of some number is less than 1.2.

v) The quotient of eight more than twice a number and the number decreased by one is nine halves.

vi) A number decreased by 40% is greater than 36.

IV. a) Perform the operation; write result in feet, inches. **Facts:** 12 inches = 1 foot; 3 feet = 1 yard

i) (3 feet, 8 inches) + (6 feet, 2 inches) \hspace{1cm} ii) (2 feet, 9 inches) + (3 feet, 7 inches) + (4 feet, 11 inches)

iii) (8 feet, 10 inches) - (3 feet, 6 inches) \hspace{1cm} iv) (6 feet, 3 inches) - (2 feet, 4 inches)
b) Calculate the sum; convert to the desired unit type. When necessary, express as a mixed number.

\[ 87 \text{ inches} + 4 \text{ feet} + 2 \text{ yards} \]

i) inches = _____________  
ii) feet = _____________  
iii) yards = _____________

c) A rectangular poster measures 20 inches by 30 inches. Find the poster’s:

i) **perimeter** in inches; convert that to feet (express as a mixed number).

ii) **area** in square inches; convert that to \( ft^2 \) (express as a mixed number).

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V. Convert the Rates of Change. Facts: 32 ounces = 1 quart = 2 pints

a) \( \frac{45 \text{ feet}}{\text{min.}} = \_\_\_\_\_ \frac{\text{inches}}{\text{sec.}} \)

b) \( \frac{15 \text{ feet}}{4 \text{ hours}} = \_\_\_\_\_ \frac{\text{yards}}{\text{day}} \)

c) \( \frac{12 \text{ oz.}}{10 \text{ sec.}} = \_\_\_\_\_ \frac{\text{quarts}}{\text{min.}} \)

e) \( \frac{16 \text{ pints}}{25 \text{ min.}} = \_\_\_\_\_ \frac{\text{quarts}}{\text{hour}} \)

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VI. Find the **perimeter** and **area** of each rectangle. Use correct units.

a) \[
\begin{array}{c}
0.36 \text{ cm} \\
0.2
\end{array}
\]

b) \[
\begin{array}{c}
7\frac{1}{2} \text{ yards} \\
3\frac{3}{4}
\end{array}
\]
c) The perimeter is 106 cm.
   i) Find $x$.
   ii) Find area of rectangle.

d) The perimeter is 102 in.
   i) Find $n$.
   ii) Find area of rectangle.

VII. A living room floor plan is pictured.

i) Find: $a = \underline{\hspace{2cm}}$; $b = \underline{\hspace{2cm}}$

ii) Find the perimeter and area. Use correct units.

a) Area = \underline{\hspace{2cm}}
   b) Perimeter = \underline{\hspace{2cm}}

VIII.

a) Find the volume of the box (in feet):

\[ V = \underline{\hspace{2cm}} \]

(Use correct units!)

b) Convert the volume to cubic yards. Write the result as a mixed number.

c) Find the surface area of the box (in feet):

\[ SA = \underline{\hspace{2cm}} \]  
(Use correct units!)

d) Convert the surface area to square yards. Write the result as a mixed number.