

Rules: ** If a number has no sign it means it is a positive number. **

Addition

SAME SIGNS

- 1) Add their absolute values.
- 2) Attach the common signs.

$$-4 + (-5) = -(4 + 5) = -9 \qquad 4 + 5 = 9$$

OPPOSITE SIGNS

- 1) Subtract the smaller absolute value from the larger absolute value.
- 2) Attach the sign of the number with the larger absolute value.

$$3 + (-9) = -(9 - 3) = -6 \qquad -3 + 9 = +(9 - 3) = 6$$

Subtraction

- 1) Adding the opposite of a number is equivalent to subtracting the number.
- 2) Change all problems to addition and follow the addition rules.

$$3 - 12 = 3 + (-12) = -(12 - 3) = -9$$

$$-7 - 1 = -7 + (-1) = -(7 + 1) = -8$$

$$-4 - (-10) = -4 + 10 = +(10 - 4) = 6$$

$$12 - (-8) = 12 + 8 = 20$$

NO CALCULATOR!

1. $7 + (-9) =$	2. $-12 + 15 =$
3. $2 - 4 =$	4. $12 - 19 =$
5. $-7 - (-5) =$	6. $7 + 27 =$
7. $-12 - (-4) =$	8. $0 - 8 =$
9. $0 - (-6) =$	10. $-8 - 2 =$
11. $-3 + 1 =$	12. $-7 + (-5) =$
13. $-9 - (-13) + (-4) =$	14. $-6 - 4 - (-8) =$
15. $25 - 21 + (-20) =$	16. $-39 - (-32) - 14 =$

Integers – Multiplying and Dividing

Rules:

- 1) If two numbers have the same sign, their product or quotient is positive.
 $(-7)(-5) = 35$ $6 \cdot 8 = 48$
- 2) If two numbers have opposite signs, their product or quotient is negative
 $9(-2) = -18$ $(-3)(4) = -12$

NO CALCULATOR!

1. $(-8)(3) =$	2. $(4)(-4) =$
3. $(20)(-65) =$	4. $-7 \cdot -5 =$
5. $-45 \div 9 =$	6. $\frac{-24}{-4} =$
7. $49 \div (-7) =$	8. $\frac{-99}{9} =$
9. $(5)(-2)(7) =$	10. $(-3)(-1)(4)(-6) =$
11. $-3740 \div (-10) =$	12. $\frac{56}{-7} =$
13. $(11)(-1)(-7)(-3) =$	14. $\frac{39}{13} =$
15. $(-72) \div (-12) =$	16. $(-9)(8)(-2)(5) =$

Rules:

- 1) Line up decimal points, if a number does not have a decimal point it is a whole number with the decimal point at the end.
- 2) Annex zeros to hold place.
- 3) Add or subtract vertically.
- 4) Bring down the decimal point.

$$4.1 + 3 + 5.61 + 21$$

$$16 - 7.498$$

$$4.10$$

$$16.000$$

$$3.00$$

$$- \underline{7.498}$$

$$5.61$$

$$8.502$$

NO CALCULATOR!

1. $5.1 + 2.23 + 8$

2. $9 + 3.3 + 0.781$

3. $6.7 - 3.987$

4. $5.21 + 6.5 + 8.123$

5. $9.8 - 2.0871$

6. $7.3 + 4.3 + 12 + 0.543$

7. $9.1 + 7.89 - 2.6$

8. $16 - 7.5 + 3.12$

9. $2.8 + 15 - 9.12$

10. $7.8 - 2.3 + 15$

11. $8 + 4.1 - 0.123$

12. $6.3 - 0.45 + 2.45$

Rules:

Multiplying

- 1) Line up digits, starting on the right.
- 2) Multiply
- 3) Place the decimal point in the answer by starting at the right and moving a number of places equal to the sum of the decimal places in both numbers multiplied.

$$\begin{array}{r}
 (6.432)(4.15) \\
 6.432 \text{ (3 decimal places)} \\
 \times 4.15 \text{ (2 decimal places)} \\
 \hline
 32160 \\
 64320 \\
 \hline
 2572800 \\
 26.69280 \text{ (5 decimal places)}
 \end{array}$$

Dividing

- 1) If the divisor is not a whole number, move the decimal point To the right to make it a whole number and move the decimal Point in the dividend the same number of places.
- 2) Divide.
- 3) Bring the decimal point up.

$$\begin{array}{r}
 27.216 \div 4.8 \\
 \hline
 5.67 \\
 48.)272.16 \\
 \underline{-240} \\
 321 \\
 \underline{-288} \\
 336 \\
 \underline{-336} \\
 0000
 \end{array}$$

NO CALCULATOR!

1. $5.4(0.5)$	2. $5.9(0.07)$	3. $0.68 \cdot 0.14$	4. $4.29 \cdot 0.4$
5. $69.3(0.7)$	6. $9.01(0.15)$	7. $36 \cdot 3.3$	8. $36.8 \cdot 0.55$
9. $0.24 \div 0.8$	10. $84.48 \div 0.88$	11. $\frac{8.3638}{1.9}$	12. $\frac{487.2}{0.56}$
13. $34.06 \div 0.13$	14. $147 \div 0.49$	15. $\frac{9.447}{6.7}$	16. $\frac{167.4}{0.093}$

Rules:

1) Find LCD.

2) Change to equivalent fractions.

3) Rename, if needed.

4) Add or Subtract.

5) Simplify

$$3\frac{1}{9} = 3\frac{2}{18} = 2\frac{20}{18}$$

$$-1\frac{5}{6} = -1\frac{15}{18} = -1\frac{15}{18}$$

$$4\frac{3}{4} = 4\frac{9}{12}$$

$$+ 5\frac{5}{6} = +5\frac{10}{12}$$

$$1\frac{5}{18}$$

$$9\frac{19}{12} = 10\frac{7}{12}$$

NO CALCULATOR!

1. $2\frac{3}{4} + 5\frac{5}{6}$	2. $9 - 4\frac{2}{5}$	3. $6\frac{1}{3} + 4\frac{3}{5}$	4. $8\frac{1}{9} - 2\frac{5}{6}$
5. $9 + 1\frac{1}{7}$	6. $6\frac{1}{2} + 2\frac{2}{3}$	7. $5\frac{1}{2} + 1\frac{3}{5}$	8. $1\frac{3}{4} - \frac{1}{2}$
9. $\frac{1}{5} + 1\frac{3}{4}$	10. $\frac{4}{5} - \frac{2}{3}$	11. $\frac{5}{7} + 1\frac{4}{5}$	12. $3\frac{5}{8} - 2\frac{1}{6}$

Rules:

- 1) Change all mixed numbers to improper fractions.
- 2) Multiplying across.
- 3) Simplify

$$2\frac{2}{3} \cdot 4\frac{1}{10} = \frac{8}{3} \cdot \frac{41}{10} = \frac{4}{3} \cdot \frac{41}{5} = \frac{164}{15} = 10\frac{14}{15}$$

- 1) Change all mixed numbers to improper fractions.
- 2) Take the reciprocal.
- 3) Multiply across.
- 4) Simplify

$$2\frac{3}{4} \div 3\frac{1}{2} = \frac{11}{4} \div \frac{7}{2} = \frac{11}{4} \cdot \frac{2}{7} = \frac{11}{2} \cdot \frac{1}{7} = \frac{11}{14}$$

NO CALCULATOR!

1. $2\frac{3}{4} \cdot 1\frac{5}{11}$	2. $9 \cdot 4\frac{2}{3}$	3. $1\frac{1}{3} \cdot 4\frac{1}{6}$	4. $1\frac{1}{9} \cdot 2\frac{2}{5}$
5. $9 \cdot 1\frac{1}{3}$	6. $6\frac{1}{2} \cdot 2\frac{1}{13}$	7. $5\frac{1}{2} \div 1\frac{3}{4}$	8. $1\frac{3}{4} \div \frac{1}{2}$
9. $\frac{1}{5} \div 1\frac{3}{4}$	10. $\frac{4}{5} \div \frac{2}{3}$	11. $\frac{9}{20} \div 1\frac{4}{5}$	12. $3\frac{2}{8} \div 2\frac{1}{6}$

Use rules of integers, decimals and fractions.

Examples:

$$-4.1 - (-2.51) = -4.1 + 2.51$$

opposite -4.10
signs +2.51
subtract -1.59

$$-1\frac{3}{4} + \left(-2\frac{5}{6}\right) = -\frac{7}{4} + \left(-\frac{17}{6}\right) = -\frac{21}{12} + \left(-\frac{34}{12}\right) = -\frac{45}{12} = -\frac{15}{4} = -3\frac{3}{4}$$

NO CALCULATOR!

1. $3.98 - 6$	2. $5.8 + (-2.5)$	3. $1.8 - (-3.7)$	4. $7 + (-2.8)$
5. $(-0.8) + (-7.2) - 5.4$	6. $1.7 - (-0.8) + 4.013$	7. $-1\frac{1}{2} + 1\frac{3}{5}$	8. $-1\frac{3}{4} - \left(-\frac{1}{2}\right)$
9. $-\frac{1}{5} + 1\frac{3}{4}$	10. $\frac{2}{5} - \frac{4}{5}$	11. $\frac{5}{7} + \left(-1\frac{4}{5}\right)$	12. $-1\frac{5}{8} - 2\frac{1}{6}$

Use rules of integers, decimals and fractions.

Examples:

$$-4.12(-5.3)$$

$$\begin{array}{r} -4.12 \\ \times -5.3 \\ \hline \end{array}$$

$$\begin{array}{r} 1236 \\ \underline{20600} \\ +21836 \end{array}$$

$$51 \div (-0.25)$$

$$\begin{array}{r} -205 \\ 025 \overline{)5100.} \\ \underline{50} \\ 100 \\ \underline{100} \end{array}$$

$$-2\frac{2}{3} \cdot 4\frac{1}{10} = -\frac{8}{3} \cdot \frac{41}{10} = -\frac{4}{3} \cdot \frac{41}{5} = -\frac{164}{15} = -10\frac{14}{15}$$

$$-2\frac{3}{4} \div -3\frac{1}{2} = -\frac{11}{4} \div -\frac{7}{2} = -\frac{11}{4} \cdot -\frac{2}{7} = \frac{11}{2} \cdot \frac{1}{7} = \frac{11}{14}$$

NO CALCULATOR!

1. -5.5×-4.87	2. $1.5(-7.1)$	3. $1.7(-3.1)$	4. -7.8×-5.1
5. $4.2 \div (-2.1)$	6. $-2 \div (-0.5)$	7. $\frac{-6.4}{0.04}$	8. $\frac{6.6}{-1.1}$
9. $-\frac{1}{5} \cdot 1\frac{3}{4}$	10. $\frac{2}{5} \cdot 1\frac{1}{4}$	11. $\frac{5}{7} \cdot (-1\frac{4}{5})$	12. $(-1\frac{5}{8})(-3\frac{1}{5})$
13. $-\frac{3}{2} \div -\frac{10}{7}$	14. $-2 \div -3\frac{4}{5}$	15. $\frac{1}{9} \div -1\frac{1}{3}$	16. $-3\frac{7}{10} \div 2\frac{1}{4}$

Parentheses (Grouping Symbols)	$[(7 - 4)^2 + 3] + 15$	$\frac{(9-7)^2 + 6}{11-6}$
Exponents	$= [3^2 + 3] + 15$	$= \frac{2^2 + 6}{5}$
Multiply or Divide, from left to right	$= [9 + 3] + 15$	$= \frac{4+6}{5}$
Add or Subtract, from left to right	$= 12 + 15$	$= \frac{10}{2}$
		$= 5$

NO CALCULATOR!

1. $6 \div 3 + 2 \cdot 7$	2. $5 + 8 \cdot 2 - 4$	3. $16 \div 8 \cdot 2^2$	4. $10 \div (3 + 2) + 9$
5. $7[(18 - 6) - 6]$	6. $3(2.7 \div 0.9) - 5$	7. $6(5 - 3)^2 + 3$	8. $[10 + (5^2 \cdot 2)] \div 6$
9. $\frac{1}{3}(9 \cdot 3) + 18$	10. $\frac{1}{2} \cdot 26 - 3^2$	11. $2.5 \cdot 0.5^2 \div 5$	12. $\frac{16}{8} + 2^3 - 10$
13. $\frac{9 \cdot 2}{4 + 3^2 - 1}$	14. $\frac{13 - 4}{18 - 4^2 + 1}$	15. $\frac{5^3 \cdot 2}{1 + 6^2 - 8}$	16. $\frac{7 \cdot 4}{8 + 7^2 - 1}$

Write the verbal phrase as an algebraic expression.	
Eleven less than the quantity four times a number x	$4(x - 11)$
Evaluate the expression	
$x^2 + 4 - x$, when $x = 6$	$6^2 + 4 - 6$ $= 36 + 4 - 6$ $= 40 - 6$ $= 34$

Write the verbal phrase as an algebraic expression.

1. four times a number x decreased by twelve	2. six less than double a number x
3. five squared minus a number x	4. three more than the product of five and number x
5. twenty-nine decreased by triple a number x	6. two cubed divided by a number x
7. the quotient of a number x and two-tenths	8. the difference of ten and a number x

NO CALCULATOR!

Evaluate the expression

9. $y \div 3 + 2$, when $y = 30$	10. $\frac{r}{s} \cdot 7$, when $r = 30$ and $s = 5$
11. $5x^2 - y$, when $x = 4$ and $y = 26$	12. $3r^2 - 17$, when $r = 6$
13. $\frac{4}{5} \div n + 13$, when $n = \frac{1}{5}$	14. $\frac{9}{10} \cdot y - \frac{3}{10}$, when $y = \frac{1}{2}$

The absolute value of a real number is the distance between the origin and point representing the number.

If a is a positive number, then $|a| = a$

If a is 0, then $|a| = 0$

If a is a negative number, then $|-a| = a$

$$|12| = 12$$

$$|0| = 0$$

$$|-12| = 12$$

$$|x| = 7, \text{ then } x = 7 \text{ and } -7$$

$$|x| = -5, \text{ then there is no solution}$$

1. $ 17 $	2. $ -4 $	3. $ -4.5 $	4. $\left \frac{2}{3}\right $
5. $\left -\frac{4}{5}\right $	6. $ 0 + 2$	7. $ 6.3 - 3.1$	8. $-\left -\frac{8}{9}\right $
9. $ -6.1 - 6.01$	10. $ -6.4 - 3.1$	11. $x = -9 $	12. $ x = -11$
13. $ x = 4$	14. $ x = 5$	15. $x = -3.8 $	16. $ -x = 1$

Distributive Property

$$a(c) = ab + bc$$

$$(b + c)a = ba + ca$$

$$a(b - c) = ab - ac$$

$$(b - c)a = ba - ca$$

$$3(2x + 1) = 6x + 3$$

$$(4x + 5)x = 4x^2 + 5x$$

$$-9(x - 8) = -9x + 72$$

$$(x^2 - 3)x = x^3 - 3x$$

Distribute

1. $3(x + 4)$	2. $(w + 6)4$	3. $5(y - 2)$	4. $(7 - m)8$
5. $-(y - 9)$	6. $(-2)(x + 6)$	7. $(2x - 4)(-3)$	8. $x(x + 1)$
9. $-9(a + 6)$	10. $4x(x + 8)$	11. $-2t(12 - t)$	12. $(3y - 2)5y$
13. $-2x(x - 8)$	14. $-9(-t - 3)$	15. $(6 - 3w)(-w^2)$	16. $-y(-y^2 + y)$