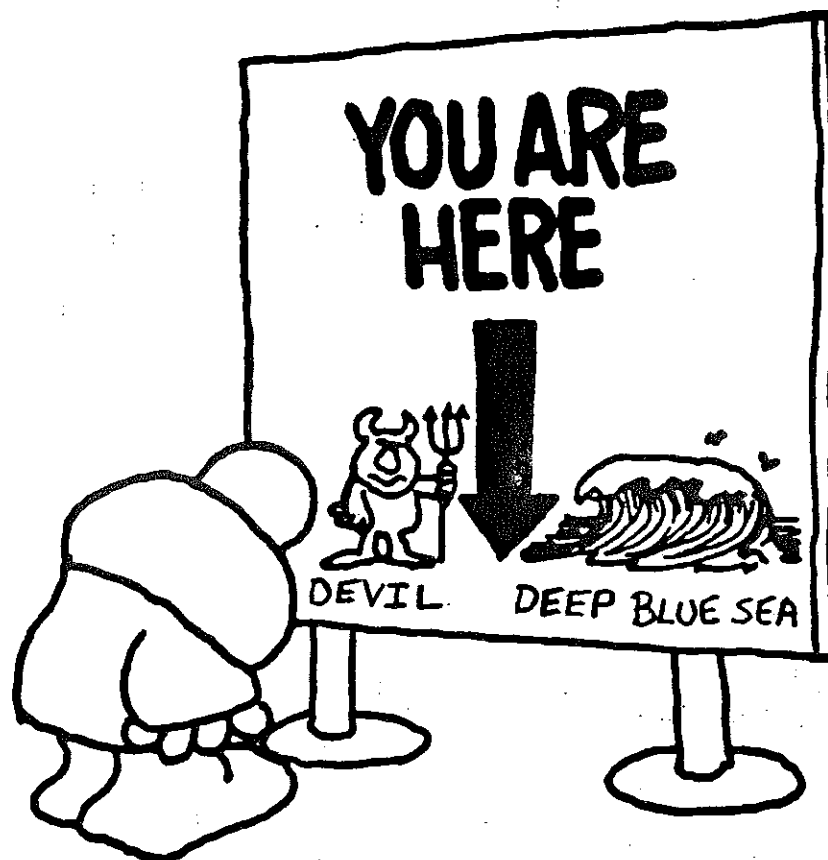


Friendship Junior High School Advanced Math Summer Program



*Introduction To Algebra
Equations*

Introduction To Algebra

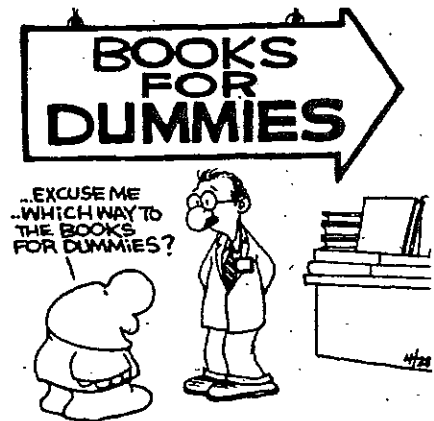
1. INTEGER OPERATIONS

Solve, Show steps for problems involving subtraction:

- | | |
|----------------------|----------------------|
| ① $(+7) - (-5)$ | ⑪ $(-12) - (-8)$ |
| ② $(-3) + (-2)$ | ⑫ $(-14) + (+9)$ |
| ③ $(+18) \div (-3)$ | ⑬ $(-17) (-1)$ |
| ④ $(-4) \times (-4)$ | ⑭ $(+3) \div (-3)$ |
| ⑤ $(-6) \cdot (+2)$ | ⑮ $(-2) - (+5)$ |
| ⑥ $(-8) - (+7)$ | ⑯ $(-2)(-3)(-1)$ |
| ⑦ $(+3) - (-5)$ | ⑰ $(-8) - (+5)$ |
| ⑧ $(-4) \div (+4)$ | ⑱ $(+4) \cdot (-7)$ |
| ⑨ $(-8) - (-5)$ | ⑲ $(-3) - (-3)$ |
| ⑩ $(+9) \div (-3)$ | ⑳ $(-2) \times (-4)$ |

- ⑳ $(-4) + (-7) + (+3) + (-7) - (+5)$
- ㉑ $(-2) - (+6) - (-5) + (+4) + (-2)$
- ㉒ $(-6) - (-8) + (-3) - (+4) - (-5)$
- ㉓ $(-5) + (-4) - (+3) + (+7) - (-12)$
- ㉔ $(-8) - (-4) - (-2) + (+7) + (-5)$

- ㉕ $(-2)(-3)(+2)(-1)(+3)$
- ㉖ $(-3)(+2)(+5)(-2)(+1)$
- ㉗ $(-10) \div (-2)(-3) \div (-1)(-4)$
- ㉘ $(-3)(+4) \div (-2) \div (-3)(-6)$
- ㉙ $(+15) \div (-3)(+4) \div (-2) \div (-5)$



2. ORDER OF OPERATIONS

Show all steps:

- | | |
|------------|-------------|
| ① $(-2)^2$ | ⑦ -4^3 |
| ② $(-3)^3$ | ⑧ -7^2 |
| ③ -2^2 | ⑨ $(-3)^4$ |
| ④ -3^3 | ⑩ $(-5)^3$ |
| ⑤ -5^0 | ⑪ $(-10)^3$ |
| ⑥ $(-7)^0$ | ⑫ $(-10)^4$ |

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13 $(-10)^5$

14 -10^6

15 $(-2)^5$

16 $(-8)^2$

17 -8^2

18 $(-3) + (-4) \cdot (-2) - (-3)$

19 $(-2)(-3) - (-4)(+5) - (-4)$

20 $(-2) + (-6) \div (+2) - (-4)$

21 $(+8) \div (-2) - (-3) + (-4)(-1)$

22 $(-3) - (+4) - (-6) \cdot (-2) \cdot (-1)$

23 $(-10) \div (+10) + (-3) \cdot (-2) - (-4)$

24 $(-2) - (+5)(-3) + (-2) \div (-2)$

25 $(-1)(-1)(-1) \div (-1) - (-1)(-1)$

26 $(-1)^3$

27 $(-1)^4$

28 -1^5

29 -1^0

...I'M NOT SURE,
BUT OFF-HAND I'D
SAY THAT IT'S SOME
NEW TYPE OF
COMPUTER VIRUS!!



30 -1^2

31 $(-1)^0$

32 $-(-(-1))$

33 $-[-(-(-1))]$

34 $(-1)^2 - (-2)^3 - 2^2 - 2$

35 $(-2)^2 - 3^2 + (-4)^0$

36 $(-1)^3 + (-2)^2 - 1^4 + (-2)^3$

37 $(-3)^2 - (-5)^0 + (-7) - (-2)^4$

38 $(-4) + (-2)^2 - (-1)^4 + (-2)$

39 $(-2)^3 - 2^3 - 3^2 + (-1)^6$

40 $-[-(-(-2)^2)]$

41 $-[-(-(-3))]^2$

42 $\frac{(-3) - (-2)^0 + (-1)^2}{(-2) - (-1)^2}$

43 $\frac{(-2) - (-1)^3 - 2^3}{(-3)^2 - (-5) - 13}$

44 $\frac{(-2)^2 - (-2)^3 + (-2)}{-10^2}$

3. EVALUATING EXPRESSIONS

Evaluate for:

$a = -2$ $b = -1$ $c = 3$

1 $a + b$

2 $b - c$

3 abc

4 $ac - b$

5 $a + bc$

6 $b - ab$

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Evaluate for :

$$x = -1 \quad y = 2 \quad z = -2$$

⑦ $2x - y$

⑬ $x^2 - 2y^2$

⑧ $xy - z$

⑭ $3x + z^3$

⑨ $3x + 2y$

⑮ $2x^2y$

⑩ $3xy - z$

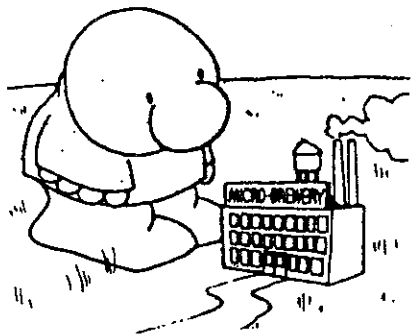
⑯ $xy - 3z^2$

⑪ $-2xz - y$

⑰ $x^2y^2 - 3x^3$

⑫ $-3xyz$

⑱ $3xy^2 - 2z$



Order of Operations
Review:

⑲ -3^2

⑳ -2^2

㉑ -4^0

㉒ $(-3)^2$

㉓ $(-2)^3$

㉔ $(-4)^2$

㉕ $(-3)^2 - (-1)(-4) + (-2)^3$

㉖ $(-2)^4 \div (-8) - (-1)^5 - 6^0$

㉗ $(-(-2)^2)^3$

㉘ -10^5

㉙ $-[-(-1)^2]^3$

㉚ $(-10)^3$

4. SIMPLIFYING EXPRESSIONS

Simplify:

① $2a + 3a + a$

② $3x + 5x - 12x$

③ $4a + 7b - 2a - 3b$

④ $5n - 3m - 7m + 4$

⑤ $6x - 2y + 7 - 3y - 9$

⑥ $4a - 3b - a - 12$

⑦ $8a^2 + 3a - 5a^2$

⑧ $4 - 6x + 2x^2 - 3x$

⑨ $8a - 2ab + 3b - 4ab$

⑩ $4xy - 2y + 3xy - 5y$

⑪ $2(3a + 3) - 1$

⑫ $3n + 2(n - 3)$

⑬ $5(n - 1) + 2(2n - 2)$

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- ⑭ $6n - 3(4n - 2)$
 ⑮ $5n - 2(3n + 4) - 2$
 ⑯ $2x(x - 4) + 3x^2$
 ⑰ $x(x + y) - 2(x^2 + 1)$
 ⑱ $3a(a - 2b) - a(2a + b)$
 ⑲ $2(x^2 - xy) - 3x(x - y)$
 ⑳ $2ab - 3a(a + b) - a^2$

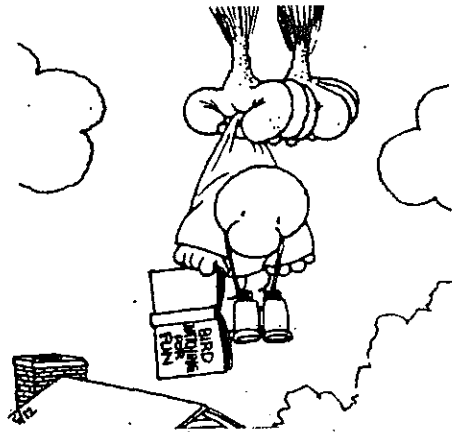
Evaluate for:

$a = -1$ $b = -2$ $c = -3$

- ㉑ $ab - 2b^2$
 ㉒ $3a^2b + c - b$
 ㉓ $ab^2 - bc$
 ㉔ $(a + b) - (b + c)$
 ㉕ $a^2 - b^3 - (a + c)$
 ㉖ $2a - bc^2$
 ㉗ $a - b - c - ab$
 ㉘ $a^2 - a^3 - a^4$
 ㉙ $2ab - 3bc$
 ㉚ $a^3b^2 + abc$

Order of Operations
Review:

- ㉛ $-2^2 - (-3)(-2) + (-2)^2$
 ㉜ $(-3)(-6) \div (-2) - (-1)^3 - (-2)$
 ㉝ $(-2)(+4) - (-6) \div (-2) - 3^0$
 ㉞ $(-8) - (-4) \div (-2) - (-1)(-2)(-3)$



5. REVIEW & PRACTICE

Integer operations:

- ① $(-3) - (-4)$ ⑥ $(-2)(-3)(-2)$
 ② $(-8) \div (+4)$ ⑦ $(-9) - (-5)$
 ③ $(+6) + (-8)$ ⑧ $(+12) + (-8)$
 ④ $(-10) \cdot (-3)$ ⑨ $(-16) \div (-2)$
 ⑤ $(-1) - (+7)$ ⑩ $(-7) - (+4)$

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$$\textcircled{11} (-3) + (-4) - (-2) + (+7) - (+4)$$

$$\textcircled{12} (+7) + (-3) - (-5) - (+7) + (-2)$$

Order of operations:

$$\textcircled{13} -3^2 \quad \textcircled{17} (-2)^3 \quad \textcircled{21} (-10)^2$$

$$\textcircled{14} (-4)^2 \quad \textcircled{18} (-2)^4 \quad \textcircled{22} 5^3$$

$$\textcircled{15} -6^0 \quad \textcircled{19} -2^2 \quad \textcircled{23} 7^2$$

$$\textcircled{16} -1^3 \quad \textcircled{20} -10^3 \quad \textcircled{24} -2^5$$

$$\textcircled{25} (-3) - (-2)(-4) + (-2)$$

$$\textcircled{26} (-8) \div (-4) - (-10) \div (+2)$$

$$\textcircled{27} -3^2 - (-2)^3 + (-1)^5$$

$$\textcircled{28} -4 - (-2)^2 - (-8)^0$$

$$\textcircled{29} (-1)(-2)(-1)^4 - (-12)$$

$$\textcircled{30} (-3) \div (-1)^0 - (-2)^3 - 2^3$$

Evaluate for:

$$a = -2 \quad b = -3 \quad c = -1$$

$$\textcircled{31} 2a - b$$

$$\textcircled{32} 3a - (b+c)$$

$$\textcircled{33} 2a^2 - bc^3$$

$$\textcircled{34} 2a - abc$$

$$\textcircled{35} a - bc^2 - bc^3$$

$$\textcircled{36} 2(a+b) - 2c$$

$$\textcircled{37} a^2 + b^2 - c^2$$

$$\textcircled{38} a + 2b + 3c$$

$$\textcircled{39} abc^2 - a^2c^4$$

$$\textcircled{40} a^2 - 3(a+b+c)$$

Simplify:

$$\textcircled{41} 2a - 3(a+2b) - 3b$$

$$\textcircled{42} 4(a+2b) - 2(3a-b)$$

$$\textcircled{43} x(x+2) - 3x(x+4)$$

$$\textcircled{44} x(2x-y) - y(x+2)$$

$$\textcircled{45} ab - a(b+2a) - 3a^2$$

$$\textcircled{46} 2x - 3x^2 - 2x + 4x^2 - 1$$

$$\textcircled{47} 3a - 2ab - a + 4ab + 2a$$

$$\textcircled{48} 2xy - 3x^2 - 2x(y-3x)$$

$$\textcircled{49} 2b^2 - 3ab - b(a-b)$$

$$\textcircled{50} a - ab - a(2a+b) + a^2$$

Introduction To Algebra

Extra Practice Problems

(A)

Order of Operations

(B)

Eval. Expressions

$a = -2$ $b = -1$ $c = 2$

(C)

Simplifying Expressions

- ① $(-3)^0 + (-2)(-3)^2 + (-1)$
- ② $-4^2 - (-2)^3 \cdot (-1)^2$
- ③ $-[-(-3)^2] + (-4)^2$
- ④ $(-2)(-1)^3 - (-3)^2(-2)$
- ⑤ $-4^2 - 2^3 - (-2)^2$
- ⑥ $(-4)^2 - (-1)(-2)^3 - (-2)$
- ⑦ $-3^3 + (-1)^4(-5)$
- ⑧ $-(-3)^2 - (-(-2)^2)$
- ⑨ $(-1)^4(-3)^2 - 3^2 \cdot (-1)$
- ⑩ $-(-2)^2 - 3^3 + (-4)^0$

- ① $a^2 - bc$
- ② $3a + 4c^3$
- ③ $2ab^2 + 3c$
- ④ $2a^2b - 4bc$
- ⑤ $3(a+b)$
- ⑥ $2b - 2(b+c)$
- ⑦ $3abc - b^2$
- ⑧ $a^2b^2c^2$
- ⑨ $-3(a+b)^2$
- ⑩ $-2a(b+c)^2$

- ① $x^2 + 3x - 2x^2 + 6x - 3$
- ② $4b - 2(a-b) - 3a + b$
- ③ $2a(a-b) - 3b(2a+b)$
- ④ $4n^2 - 2n(n-1) - 6n$
- ⑤ $2ab + 3a - 4ab - 5 - a$
- ⑥ $3n - 4(n-m) - 3m + n$
- ⑦ $-5x(y-2x) - 3y(x-2y)$
- ⑧ $2a^2 - 3a(a+2b) - 5ab$
- ⑨ $6x - 2(3x-5) - 1$
- ⑩ $x(3-y) + 2xy - 3x(y+1)$

- ⑪ $(-3)^2 + (-2)(-2)^2 + (-1)$
- ⑫ $-2^2 - (-2)^3 \cdot (-3)$
- ⑬ $-[-(-2)]^2 - (-(-3))$
- ⑭ $(-3)^3(-4)^0 - 5^2 \cdot (-1)$
- ⑮ $-6^2 - (-7)^0 + (-3)^2$
- ⑯ $(-5)^0 - (-3)(-1)^5 - (-2)$
- ⑰ $-5^2 + (-3)^2(-2)$
- ⑱ $-[-(-2)^3] - (-(-4))$
- ⑲ $(-2)^3 \cdot (-2) - 2^3 \cdot (-2)$
- ⑳ $-(-3)^2 + (-4)^2 - (-20)$

- ⑪ $ab^2 - c^2b$
- ⑫ $2b - 5ac$
- ⑬ $3ac^2 + 2b^3$
- ⑭ $4a(a+b)$
- ⑮ $-2c(b+c)^3$
- ⑯ $-2a^3b^0$
- ⑰ $4b^3c - ab$
- ⑱ $3a^2b^4 - c^2$
- ⑲ $2abc - b^2c$
- ⑳ $3(a+b)^2$

- ⑪ $2a^2 - 5 - 4a^2 - 3a - 1$
- ⑫ $2x - 3(x-2y) - y - 4x$
- ⑬ $3n(2n-1) - 4n(3-n)$
- ⑭ $3x^2 - 4x(2x-y) - 3xy$
- ⑮ $2y - 3x(2y+4) - xy$
- ⑯ $8x(y-3) + 2y(5-3x)$
- ⑰ $2y(3-5x) - y(2y-x)$
- ⑱ $5x(2x-y) - y(3-2x)$
- ⑲ $7ab + 2(3-2ab) - 2$
- ⑳ $2x - 3(4x-2) - 5$

UNIT 3

Equations

1. BASIC EQUATIONS

① $x - 7 = -20$

② $5 = a - 15$

③ $14 - n = -9$

④ $8 - n = 12$

⑤ $2x = 22$

⑥ $18 = -3x$

⑦ $3x + 2 = 11$

⑧ $4a + 5 = -15$

⑨ $\frac{2n}{3} - 1 = 3$

⑩ $\frac{-3x}{4} - 3 = -9$

⑪ $-11 = 4 - \frac{3a}{2}$

⑫ $3x - 4 + 7x = 18 - x$

⑬ $4a - 6 = 2a - 4 + 4a$

⑭ $2x - 3 + 7 = x + 6 - 2$

⑮ $5n = 3n - 4n + 12$

2. COMPLEX EQUATIONS

① $2(x+1) = 16$

② $4 + 3(4+2n) = 10$

③ $8x - 2(3x+2) = 0$

④ $6(3-2x) - 2(x+2) = -14$

⑤ $3(n+4) = 2(n-1) - 2$

⑥ $3x - 3 = 5 - 2(x+4)$

⑦ $6(a+2) - 3(3a+1) = 0$

⑧ $4n - \frac{2n}{3} = -10$

⑨ $5 + 2x = \frac{3x}{4}$

⑩ $4(n-2) = \frac{4n}{3}$

⑪ $\frac{3x}{2} - x = 2(x-3)$



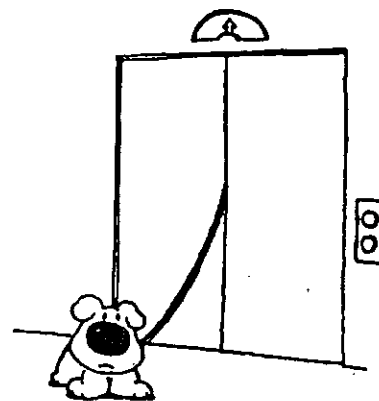
Equations

3. CONSECUTIVE INTEGERS

- ① Find three consecutive integers whose sum is 87.
- ② Find four consecutive integers whose sum is 130.
- ③ Find two consecutive odd integers whose sum is 64.
- ④ Find three consecutive even integers whose sum is 72.
- ⑤ Find the middle of three consecutive odd integers whose sum is -15.

Equation Review:

- ⑥ $4(3n-2) = -20$
- ⑦ $3(2a+5) = 4a-1$
- ⑧ $6-2(n-3) = 12$
- ⑨ $4a - \frac{3a}{2} = 5$
- ⑩ $2n + \frac{5n}{3} = -11$
- ⑪ $2x - 3(x-1) = \frac{2x}{3} - 2$
- ⑫ $n - 3(n-4) = \frac{n}{2} - 3$



4. PROBLEM SOLVING

- ① Find the largest of three consecutive even integers if three times the smallest is two more than twice the largest.
- ② Find the middle of three consecutive odd integers if twice the largest is seven more than the smallest.
- ③ Find the largest of three consecutive integers if three times the middle integer is ten less than four times the largest.
- ④ Find the middle of three consecutive integers if twice the middle one decreased by three times

Equations

the smallest equals four less than the largest.

- ⑤ Four times a number increased by seven is thirty-nine. Find the number.
- ⑥ Three less than twice a number equals eleven less than four times the number. Find the number.
- ⑦ Twice a number decreased by two more than the number is negative five. Find the number.
- ⑧ A number increased by eleven is seven less than three times the number. Find the number.
- ⑨ Three times a number decreased by two less than twice the number is negative two. Find the number.
- ⑩ Four more than twice a number decreased by three less than the number is nine more than twice the number. Find the number.



5. REVIEW & PRACTICE

Solve each equation:

① $4n = -28$

② $\frac{3x}{4} = 9$

③ $5a - 3 = -13$

④ $3n - 5 + n = 2 - 4n + 1$

⑤ $11 - 2x - 3 + 4x = 7 - x - 8$

⑥ $\frac{2n}{3} - n = n - 12$

⑦ $4 - \frac{n}{2} = 3n - 10$

⑧ $2(3x - 1) = 7x + 1$

⑨ $7 - 2(2x - 2) = 10 - 3x$

UNIT 3

Equations

⑩ $2(n-3) - 3(2n-1) = -23$

~~⑪~~ $2(x+6) = \frac{x}{2}$

~~⑫~~ $4(n+5) = \frac{2n}{3}$

Set up an equation to solve.
Check your answer with
the words in the problem:

⑬ Find three consecutive integers whose sum is eighteen.

⑭ Find the middle of three consecutive even integers if the largest is four less than twice the middle one.

⑮ Find the largest of three consecutive odd integers if twice the middle integer is one less than three times the largest.

⑯ Find the smallest of three consecutive integers if four times the smallest decreased by the largest is five more than twice the middle one.

⑰ Find the middle of three consecutive odd integers if three times the smallest decreased by twice the

largest is three.

⑱ Twice a number decreased by four is ten. Find the number.

⑲ Three times a number decreased by two more than the number is ten. Find the number.

⑳ Two more than twice a number decreased by three less than the number is one. Find the number.

㉑ Four less than three times a number is five more than twice the number. Find the number.

㉒ Four times a number decreased by seven more than the number is two less than twice the number. Find the number.

