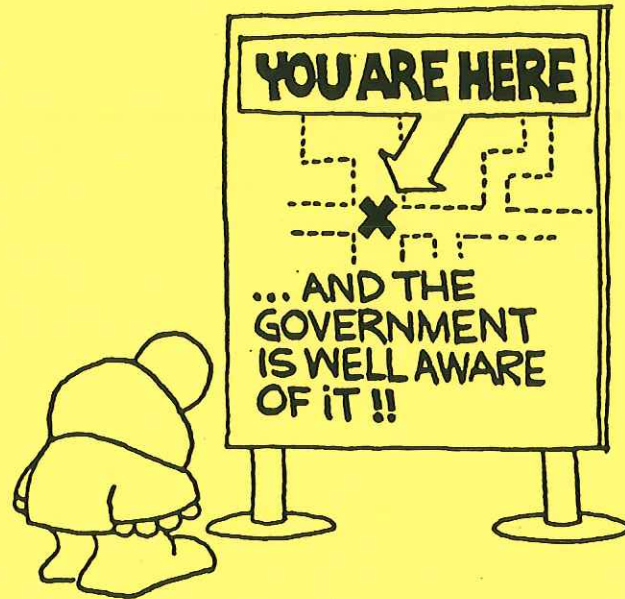


Friendship Junior High School  
Sixth Grade Accelerated Math Program

Room 102A (Mr. Lavine)

3



3rd Quarter Units of Study

Equations & Inequalities  
Number Lines & Radicals  
Angles & Triangles  
Volume & Surface Area

UNIT 8

# Equations & Inequalities

## 1. SIMPLE EQUATIONS

$$\textcircled{1} \quad x - 3 = 12$$

$$x = 15$$

$$\textcircled{7} \quad 6 = 6 + a$$

$$0 = a$$

$$a = 0$$

$$\textcircled{2} \quad x + 15 = 2$$

$$x = -13$$

$$\textcircled{8} \quad -9 = a - 4$$

$$-5 = a$$

$$a = -5$$

$$\textcircled{3} \quad x - 7 = -20$$

$$x = -13$$

$$\textcircled{2} \quad 17 = -3x$$

$$\left(-\frac{1}{3}\right)(17) = \left(-\frac{1}{3}\right)(-3x)$$

$$-\frac{17}{3} = x$$

$$x = -\frac{17}{3}$$

$$\textcircled{4} \quad 6 + n = -15$$

$$n = -21$$

$$\textcircled{9} \quad 5 = a - 15$$

$$20 = a$$

$$a = 20$$

$$\textcircled{3} \quad 6n = 21$$

$$\left(\frac{1}{6}\right)(6n) = \left(\frac{1}{6}\right)(21)$$

$$n = \frac{21}{6}$$

$$n = \frac{7}{2}$$

$$\textcircled{5} \quad 8 - n = 12$$

$$-n = 4$$

$$n = -4$$

$$\textcircled{10} \quad 12 = 12 - a$$

$$0 = -a$$

$$a = 0$$

$$\textcircled{4} \quad 18 = -4n$$

$$\left(-\frac{1}{4}\right)(18) = \left(-\frac{1}{4}\right)(-4n)$$

$$-\frac{18}{4} = n$$

$$n = -\frac{9}{2}$$

$$\textcircled{6} \quad 14 - n = -9$$

$$-n = -23$$

$$n = 23$$

$$\textcircled{5} \quad \frac{2}{5}a = 10$$

$$\left(\frac{5}{2}\right)\left(\frac{2}{5}a\right) = \left(\frac{5}{2}\right)(10)$$

$$a = \frac{50}{2}$$

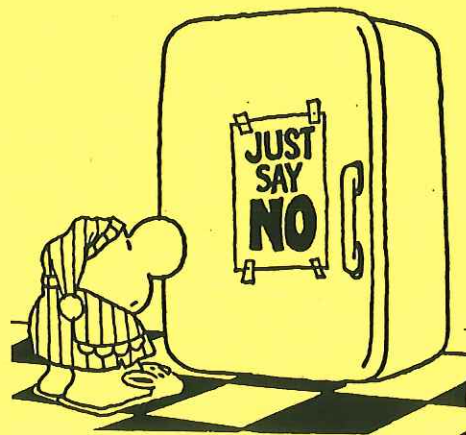
$$a = 25$$

## 2. WITH COEFFICIENT

$$\textcircled{1} \quad 2x = 22$$

$$\left(\frac{1}{2}\right)(2x) = \left(\frac{1}{2}\right)(22)$$

$$x = 11$$



$$\textcircled{6} \quad 9 = \frac{1}{3}a$$

$$(3)(9) = (3)\left(\frac{1}{3}a\right)$$

$$27 = a \quad \boxed{a=27}$$

$$\textcircled{7} \quad \frac{2x}{3} = 8$$

$$\left(\frac{3}{2}\right)\left(\frac{2x}{3}\right) = \left(\frac{3}{2}\right)(8)$$

$$x = \frac{24}{2} \quad \boxed{x=12}$$

$$\textcircled{8} \quad \frac{x}{4} = -6$$

$$(4)\left(\frac{x}{4}\right) = (4)(-6)$$

$$\boxed{x=-24}$$

$$\textcircled{9} \quad -\frac{9n}{10} = \frac{3}{4}$$

$$\left(\frac{-10}{9}\right)\left(-\frac{9n}{10}\right) = \left(\frac{-10}{9}\right)\left(\frac{3}{4}\right)$$

$$n = \frac{-30}{36} \quad \boxed{n=-\frac{5}{6}}$$

$$\textcircled{10} \quad \frac{2}{5} = \frac{4n}{7}$$

$$\left(\frac{7}{4}\right)\left(\frac{2}{5}\right) = \left(\frac{7}{4}\right)\left(\frac{4n}{7}\right)$$

$$\frac{14}{20} = n \quad \boxed{n=7/10}$$

### 3. TWO-STEP EQUATIONS

$$\textcircled{1} \quad 3x + 2^{-2} = 11^{-2}$$

$$3x = 9$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(9) \quad \boxed{x=3}$$

$$\textcircled{2} \quad 4a^{-3} = -15^{+3}$$

$$4a = -12$$

$$\left(\frac{1}{4}\right)(4a) = \left(\frac{1}{4}\right)(-12)$$

$$\boxed{a=-3}$$

$$\textcircled{3} \quad 8^{+3} = 2n^{-3}$$

$$11 = 2n$$

$$\left(\frac{1}{2}\right)(11) = \left(\frac{1}{2}\right)(2n)$$

$$\frac{11}{2} = n \quad \boxed{n=11/2}$$

$$\textcircled{4} \quad -6^{+6} = 5x - 6^{+6}$$

$$0 = 5x$$

$$\left(\frac{1}{5}\right)(0) = \left(\frac{1}{5}\right)(5x)$$

$$0 = x \quad \boxed{x=0}$$

$$\textcircled{5} \quad \frac{2}{3}n^{-1} = -4^{+1}$$

$$\frac{2}{3}n = -3$$

$$\left(\frac{3}{2}\right)\left(\frac{2}{3}n\right) = \left(\frac{3}{2}\right)(-3)$$

$$\boxed{n=-\frac{9}{2}}$$

$$\textcircled{6} \quad \frac{-3}{4}x^{-3} = -6^{+3}$$

$$\frac{-3}{4}x = -3$$

$$\left(\frac{-4}{3}\right)\left(\frac{-3}{4}x\right) = \left(\frac{-4}{3}\right)(-3)$$

$$x = \frac{12}{3} \quad \boxed{x=4}$$

$$\textcircled{7} \quad 8^{-8} - 2n = 8^{-8}$$

$$-2n = 0$$

$$\left(-\frac{1}{2}\right)(-2n) = \left(-\frac{1}{2}\right)(0)$$

$$\boxed{n=0}$$

$$\textcircled{8} \quad 14^{-14} - 6x = -2^{-14}$$

$$-6x = -16$$

$$\left(-\frac{1}{6}\right)(-6x) = \left(-\frac{1}{6}\right)(-16)$$

$$x = \frac{16}{6} \quad \boxed{x=8/3}$$

$$\textcircled{9} \quad 4^{-2} = \frac{-2n}{3} + 2^{-2}$$

$$2 = \frac{-2n}{3}$$

$$\left(\frac{-3}{2}\right)(2) = \left(\frac{-3}{2}\right)\left(\frac{-2n}{3}\right)$$

$$-3 = n \quad \boxed{n=-3}$$

$$\textcircled{10} \quad 8^{-4} = 4^{-4} - \frac{3a}{2}$$

$$4 = -\frac{3a}{2}$$

$$\left(\frac{-2}{3}\right)(4) = \left(\frac{-2}{3}\right)\left(-\frac{3a}{2}\right)$$

$$-\frac{8}{3} = a$$

$$\boxed{a=-8/3}$$



#### 4. COMBINING TERMS

$$\textcircled{1} \quad 4a - 6 = 2a - 5 + 4a$$

$$4a - 6 = 6a - 5$$

$$-2a - 6 = -5$$

$$-2a = 1$$

$$\left(-\frac{1}{2}\right)(-2a) = \left(-\frac{1}{2}\right)(1) \quad \boxed{a = -\frac{1}{2}}$$

$$\textcircled{2} \quad 3x - 4 + 7x = 18 - x$$

$$10x - 4 = 18 - x$$

$$11x - 4 = 18$$

$$11x = 22$$

$$\left(\frac{1}{11}\right)(11x) = \left(\frac{1}{11}\right)(22) \quad \boxed{x = 2}$$

$$\textcircled{3} \quad 5n = 3n - 4n + 8$$

$$5n = -n + 8$$

$$6n = 8$$

$$\left(\frac{1}{6}\right)(6n) = \left(\frac{1}{6}\right)(8) \quad \boxed{n = \frac{4}{3}}$$

$$\textcircled{4} \quad 2x - 3 + 7 = x + 6 + (-2)$$

$$2x + 4 = x + 4$$

$$2x = x$$

$$\boxed{x = 0}$$

$$\textcircled{5} \quad 3n - n + 4 = -2 - 5n$$

$$2n + 4 = -2 - 5n$$

$$7n + 4 = -2$$

$$7n = -6$$

$$\left(\frac{1}{7}\right)(7n) = \left(\frac{1}{7}\right)(-6) \quad \boxed{n = -\frac{6}{7}}$$

$$\textcircled{6} \quad 8 - a + 4 = 3a - 2 - a$$

$$12 - a = 2a - 2$$

$$12 - 3a = -2$$

$$-3a = -14$$

$$\left(-\frac{1}{3}\right)(-3a) = \left(-\frac{1}{3}\right)(-14) \quad \boxed{a = \frac{14}{3}}$$

#### 5. DISTRIBUTIVE PROP

$$\textcircled{1} \quad 2(x+1) = 16$$

$$2x + 2 = 16$$

$$2x = 14$$

$$\left(\frac{1}{2}\right)(2x) = \left(\frac{1}{2}\right)(14) \quad \boxed{x = 7}$$

$$\textcircled{2} \quad 2(3n+3) = -12$$

$$6n + 6 = -12$$

$$6n = -18$$

$$\left(\frac{1}{6}\right)(6n) = \left(\frac{1}{6}\right)(-18)$$

$$n = -3$$

$$\boxed{n = -3}$$

$$\textcircled{3} \quad 4 + 3(4+2c) = 22$$

$$4 + 12 + 6c = 22$$

$$16 + 6c = 22$$

$$6c = 6$$

$$\left(\frac{1}{6}\right)(6c) = \left(\frac{1}{6}\right)(6) \quad \boxed{c = 1}$$

$$\textcircled{4} \quad 3a + 5(2a-1) = 21$$

$$3a + 10a - 5 = 21$$

$$13a - 5 = 21$$

$$13a = 26$$

$$\left(\frac{1}{13}\right)(13a) = \left(\frac{1}{13}\right)(26)$$

$$a = 2$$

$$\boxed{a = 2}$$

$$\textcircled{5} 8x - 2(3x + 2) = 0$$

$$8x - 6x - 4 = 0$$

$$2x - 4 = 0$$

$$2x = 4$$

$$\left(\frac{1}{2}\right)(2x) = \left(\frac{1}{2}\right)(4)$$

$$x = 2$$

$$\textcircled{10} -3n = 3(2n - 4) - 6$$

$$-3n = 6n - 12 - 6$$

$$-3n = 6n - 18$$

$$-9n = -18$$

$$\left(\frac{1}{9}\right)(-9n) = \left(\frac{1}{9}\right)(-18)$$

$$n = 2$$

$$\textcircled{6} 6(3 - 2x) - 2(x + 2) = 0$$

$$18 - 12x - 2x - 4 = 0$$

$$14 - 14x = 0$$

$$-14x = -14$$

$$\left(\frac{-1}{14}\right)(-14x) = \left(\frac{-1}{14}\right)(-14)$$

$$x = 1$$

$$x = 1$$

$$\textcircled{11} 4(2a - 1) = 18 - 2(3 - 2a)$$

$$8a - 4 = 18 - 6 + 4a$$

$$8a - 4 = 12 + 4a$$

$$8a = 16 + 4a$$

$$4a = 16$$

$$\left(\frac{1}{4}\right)(4a) = \left(\frac{1}{4}\right)(16)$$

$$a = 4$$

$$\textcircled{7} 5(2a - 1) = 5a$$

$$10a - 5 = 5a$$

$$-5 = -5a$$

$$\left(\frac{-1}{5}\right)(-5) = \left(\frac{-1}{5}\right)(-5a)$$

$$a = 1$$

$$\textcircled{12} 4n - 6 = 2(n - 3)$$

$$4n - 6 = 2n - 6$$

$$4n = 2n$$

$$2n = 0$$

$$\left(\frac{1}{2}\right)(2n) = \left(\frac{1}{2}\right)(0)$$

$$n = 0$$

$$\textcircled{8} 3(n + 4) = 2(n - 1) - 2$$

$$3n + 12 = 2n - 2 - 2$$

$$3n + 12 = 2n - 4$$

$$n + 12 = -4$$

$$n = -16$$

$$n = -16$$

$$\textcircled{9} 3x - 3 = 5 - 2(x + 4)$$

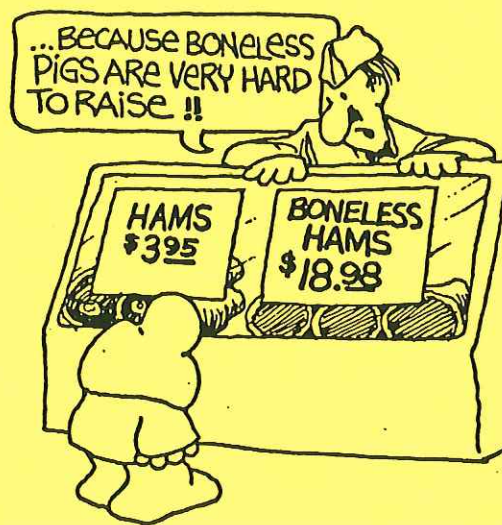
$$3x - 3 = 5 - 2x - 8$$

$$3x - 3 = -3 - 2x$$

$$3x = -2x$$

$$5x = 0$$

$$x = 0$$



(4)

$$\textcircled{13} \quad 4(2x+3) - 3(2x-1) = -x$$

$$8x + 12 - 6x + 3 = -x$$

$$2x + 15 = -x$$

$$15 = -3x$$

$$\left(\frac{1}{3}\right)(15) = \left(\frac{1}{3}\right)(-3x)$$

$$-5 = x$$

$$\boxed{x = -5}$$

$$\textcircled{14} \quad 6(a+2) - 3(3a+1) = 0$$

$$6a + 12 - 9a - 3 = 0$$

$$-3a + 9 = 0$$

$$-3a = -9$$

$$\left(\frac{1}{3}\right)(-3a) = \left(\frac{1}{3}\right)(-9)$$

$$a = 3$$

$$\boxed{a = 3}$$

### 6. WITH DENOMINATOR

$$\textcircled{1} \quad 4n - \frac{2n}{3} = 20$$

$$3 \left[ 4n - \frac{2n}{3} = 20 \right]$$

$$12n - 2n = 60$$

$$10n = 60$$

$$\left(\frac{1}{10}\right)(10n) = \left(\frac{1}{10}\right)(60)$$

$$n = 6$$

$$\boxed{n = 6}$$

$$\textcircled{2} \quad 5 + 2x = \frac{3x}{4}$$

$$4 \left[ 5 + 2x = \frac{3x}{4} \right]$$

$$20 + 8x = 3x$$

$$20 = -5x$$

$$\left(\frac{1}{5}\right)(20) = \left(\frac{1}{5}\right)(-5x)$$

$$-4 = x$$

$$\boxed{x = -4}$$

$$\textcircled{3} \quad \frac{a}{5} - 2 = a - 10$$

$$5 \left[ \frac{a}{5} - 2 = a - 10 \right]$$

$$a - 10 = 5a - 50$$

$$-4a - 10 = -50$$

$$-4a = -40$$

$$\left(\frac{1}{4}\right)(-4a) = \left(\frac{1}{4}\right)(-40)$$

$$a = 10$$

$$\boxed{a = 10}$$

$$\textcircled{4} \quad 3(n+4) = \frac{2n}{5} - 1$$

$$3n + 12 = \frac{2n}{5} - 1$$

$$5 \left[ 3n + 12 = \frac{2n}{5} - 1 \right]$$

$$15n + 60 = 2n - 5$$

$$13n + 60 = -5$$

$$13n = -65$$

$$\left(\frac{1}{13}\right)(13n) = \left(\frac{1}{13}\right)(-65)$$

$$n = -5$$

$$\boxed{n = -5}$$

$$\textcircled{5} \quad \frac{3x}{2} - 2x = 11 - 2(x+1)$$

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

$$2 \left[ \frac{3x}{2} - 2x = 9 - 2x \right]$$

$$3x - 4x = 18 - 4x$$

$$-x = 18 - 4x$$

$$3x = 18$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(18)$$

$$\boxed{x = 6}$$

(5)

$$\begin{aligned} \textcircled{6} \quad \frac{8n}{7} - 3(n+1) &= 10 \\ 7 \left[ \frac{8n}{7} - 3n - 3 \right] &= 70 \\ 8n - 21n - 21 &= 70 \\ -13n &= 91 \\ \left(\frac{-1}{13}\right)(-13n) &= \left(\frac{-1}{13}\right)(91) \\ \boxed{n = -7} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad 9 &= 2a - \frac{7a}{5} \\ 5 \left[ 9 = 2a - \frac{7a}{5} \right] & \\ 45 &= 10a - 7a \\ 45 &= 3a \\ \left(\frac{1}{3}\right)(45) &= \left(\frac{1}{3}\right)(3a) \\ \boxed{a = 15} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad -5 &= 3x - \frac{4x}{3} \\ 3 \left[ -5 = 3x - \frac{4x}{3} \right] & \\ -15 &= 9x - 4x \\ -15 &= 5x \\ \left(\frac{1}{5}\right)(-15) &= \left(\frac{1}{5}\right)(5x) \\ \boxed{x = -3} \end{aligned}$$

## 7. INEQUALITIES

$$\begin{aligned} \textcircled{1} \quad 3x &< 6 \\ \left(\frac{1}{3}\right)(3x) &< \left(\frac{1}{3}\right)(6) \\ \boxed{x < 2} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 4n &\geq 8 \\ \left(\frac{1}{4}\right)(4n) &\geq \left(\frac{1}{4}\right)(8) \\ \boxed{n \geq 2} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad -2a &> 6 \\ \left(\frac{-1}{2}\right)(-2a) &< \left(\frac{-1}{2}\right)(6) \\ \boxed{a < -3} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad -\frac{2}{3}n &\leq 6 \\ \left(\frac{-3}{2}\right)\left(-\frac{2}{3}n\right) &\geq \left(\frac{-3}{2}\right)(6) \\ \boxed{n \geq -9} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad -4 &> 2(n-3) \\ -4 &> 2n-6 \\ 2 &> 2n \\ 1 &> n \quad \boxed{n < 1} \end{aligned}$$

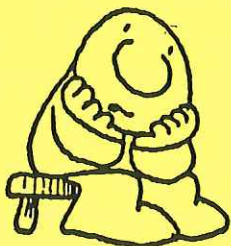
$$\begin{aligned} \textcircled{6} \quad -8 &< -2(x+2) \\ -8 &< -2x - 4 \\ -4 &< -2x \\ \left(\frac{1}{2}\right)(-4) &> \left(\frac{1}{2}\right)(-2x) \\ 2 &> x \quad \boxed{x < 2} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad \frac{3x}{2} - 2x &> 8 \\ 2 \left[ \frac{3x}{2} - 2x \right] &> 16 \\ 3x - 4x &> 16 \\ -x &> 16 \quad \boxed{x < -16} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad n - \frac{3n}{2} &\leq -4 \\ 2 \left[ n - \frac{3n}{2} \right] &\leq -8 \\ 2n - 3n &\leq -8 \\ -n &\leq -8 \quad \boxed{n \geq 8} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad 2(a+3) &< 3(2a-1)+1 \\ 2a+6 &< 6a-3+1 \\ 2a+6 &< 6a-2 \\ -4a+6 &< -2 \\ -4a &< -8 \\ \left(\frac{-1}{4}\right)(-4a) &> \left(\frac{-1}{4}\right)(-8) \\ \boxed{a > 2} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad 3(4-n) + 1 &\geq 2(n-1) \\ 12-3n+1 &\geq 2n-2 \\ 13-3n &\geq 2n-2 \\ 13-5n &\geq -2 \\ -5n &\geq -15 \\ \left(\frac{-1}{5}\right)(-5n) &\leq \left(\frac{-1}{5}\right)(-15) \\ \boxed{n \leq 3} \end{aligned}$$



..EVERY NOW AND THEN  
I WISH IT WAS THEN  
INSTEAD OF NOW..

$$\textcircled{11} \frac{z}{3} > \frac{4n}{3}$$

$$\left(\frac{3}{4}\right)\left(\frac{z}{3}\right) > \left(\frac{3}{4}\right)\left(\frac{4n}{3}\right)$$

$$\frac{1}{2} > n \quad \boxed{n < \frac{1}{2}}$$

$$\textcircled{12} \frac{-4}{5} \leq \frac{-x}{10}$$

$$\left(\frac{10}{1}\right)\left(\frac{-4}{5}\right) \geq \left(\frac{10}{1}\right)\left(\frac{-x}{10}\right)$$

$$8 \geq x \quad \boxed{x \leq 8}$$

$$\textcircled{13} \frac{2x}{3} - 2(x-1) > 2$$

$$3\left[\frac{2x}{3} - 2x + 2 > 2\right]$$

$$2x - 6x + 6 > 6$$

$$-4x + 6 > 6$$

$$-4x > 0$$

$$\left(\frac{-1}{4}\right)(-4x) < \left(\frac{-1}{4}\right)(0)$$

$$\boxed{x < 0}$$

...THAT'S RIGHT MR. ZIGGY... WE ARE AN EQUAL OPPORTUNITY EMPLOYER, ...BUT IN YOUR CASE WE'VE DECIDED TO MAKE AN EXCEPTION !!!



$$\textcircled{14} \frac{3a}{4} - 2(a+3) < 4$$

$$4\left[\frac{3a}{4} - 2a - 6 < 4\right]$$

$$3a - 8a - 24 < 16$$

$$-5a - 24 < 16$$

$$-5a < 40$$

$$\left(\frac{-1}{5}\right)(-5a) > \left(\frac{-1}{5}\right)(40)$$

$$\boxed{a > -8}$$

## 8. INTEGER PROBLEMS

$$\textcircled{1} \begin{array}{l} 6 \\ 7 \\ 8 \end{array} \begin{array}{l} x \\ x+1 \\ x+2 \end{array}$$

$$(x) + (x+1) + (x+2) = 21$$

$$3x + 3 = 21$$

$$3x = 18$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(18)$$

$$x = 6$$

$$\textcircled{2} \begin{array}{l} -5 \\ -4 \\ -3 \\ -2 \end{array} \begin{array}{l} x \\ x+1 \\ x+2 \\ x+3 \end{array}$$

$$(x) + (x+1) + (x+2) + (x+3) = -14$$

$$4x + 6 = -14$$

$$4x = -20$$

$$\left(\frac{1}{4}\right)(4x) = \left(\frac{1}{4}\right)(-20)$$

$$x = -5$$

$$\textcircled{3} \begin{array}{l} -10 \\ -8 \end{array} \begin{array}{l} x \\ x+2 \end{array}$$

$$(x) + (x+2) = -18$$

$$2x + 2 = -18$$

$$2x = -20$$

$$x = -10$$

$$\textcircled{4} \begin{array}{l} -2 \\ 0 \\ 2 \end{array} \begin{array}{l} x \\ x+2 \\ x+4 \end{array}$$

$$(x) + (x+2) + (x+4) = 0$$

$$3x + 6 = 0$$

$$3x = -6$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(-6)$$

$$x = -2$$

$$\textcircled{5} \begin{array}{l} 9 \\ 11 \\ 13 \end{array} \begin{array}{l} x \\ x+2 \\ x+4 \end{array}$$

$$(x) + (x+2) + (x+4) = 33$$

$$3x + 6 = 33$$

$$3x = 27$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(27)$$

$$x = 9$$

$$\textcircled{6} \begin{array}{l} -7 \\ -5 \end{array} \begin{array}{l} x \\ x+2 \end{array}$$

$$(x) + (x+2) = -12$$

$$2x + 2 = -12$$

$$2x = -14$$

$$\left(\frac{1}{2}\right)(2x) = \left(\frac{1}{2}\right)(-14)$$

$$x = -7$$

$$\textcircled{7} \begin{array}{l} 3 \\ 5 \\ 7 \end{array} \begin{array}{l} x \\ x+2 \\ x+4 \end{array} \quad \begin{array}{l} \text{not even} \\ \boxed{\text{NO SOLUTIONS}} \end{array}$$

$$(x) + (x+2) + (x+4) = 15$$

$$3x + 6 = 15$$

$$3x = 9$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(9)$$

$$x = 3$$



$$\textcircled{8} \begin{array}{l} \frac{15}{2} x \\ \frac{19}{2} x+2 \end{array} \begin{array}{l} \text{not integers} \\ \boxed{\text{NO SOLUTIONS}} \end{array}$$

$$(x) + (x+2) = 17$$

$$2x + 2 = 17 - 2$$

$$2x = 15$$

$$\left(\frac{1}{2}\right)(2x) = \left(\frac{1}{2}\right)(15)$$

$$x = 15/2$$

$$\textcircled{9} \begin{array}{l} 6 x \\ \boxed{7} x+1 \\ 8 x+2 \end{array}$$

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

$$2x = x + 6$$

$$x = 6$$

$$\textcircled{10} \begin{array}{l} -6 x \\ -5 x+1 \\ \boxed{-4} x+2 \end{array}$$

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

$$3x + 3 = 2x - 3$$

$$x + 3 = -3$$

$$x = -6$$

$$\textcircled{11} \begin{array}{l} -8 x \\ -6 x+2 \\ \boxed{-4} x+4 \end{array}$$

$$3(x+2) = 4(x+4) - 2$$

$$3x + 6 = 4x + 16 - 2$$

$$-x + 6 = 14 - 2$$

$$-x = 8 \quad x = -8$$

$$\textcircled{12} \begin{array}{l} 1 x \\ \boxed{3} x+2 \\ 5 x+4 \end{array}$$

$$2(x+4) = 4(x+2) - 2$$

$$2x + 8 = 4x + 8 - 2$$

$$-2x + 8 = 6 - 8$$

$$-2x = -2$$

$$\left(-\frac{1}{2}\right)(-2x) = \left(-\frac{1}{2}\right)(-2)$$

$$x = 1$$

$$\textcircled{13} \begin{array}{l} \frac{8}{3} x \\ \frac{14}{3} x+2 \\ \frac{20}{3} x+4 \end{array} \begin{array}{l} \text{not int.} \\ \boxed{\text{NO SOLUTIONS}} \end{array}$$

$$2x + (x+2) = 10$$

$$3x + 2 = 10 - 2$$

$$3x = 8$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(8)$$

$$x = 8/3$$

$$\textcircled{14} \begin{array}{l} 13 x \\ \boxed{15} x+2 \end{array}$$

$$3x + (x+2) = 54$$

$$4x + 2 = 54 - 2$$

$$4x = 52$$

$$\left(\frac{1}{4}\right)(4x) = \left(\frac{1}{4}\right)(52)$$

$$x = 13$$

$$\textcircled{15} 2n + (n-2) = 16$$

$$3n - 2 = 16 - 2$$

$$3n = 18$$

$$\left(\frac{1}{3}\right)(3n) = \left(\frac{1}{3}\right)(18)$$

$$n = 6$$

$$\textcircled{16} 3n + (n+2) = 26$$

$$4n + 2 = 26 - 2$$

$$4n = 24$$

$$\left(\frac{1}{4}\right)(4n) = \left(\frac{1}{4}\right)(24)$$

$$n = 6$$

$$\textcircled{17} 4n - (2n+1) = 9$$

$$2n - 1 = 9 + 1$$

$$2n = 10$$

$$\left(\frac{1}{2}\right)(2n) = \left(\frac{1}{2}\right)(10)$$

$$n = 5$$

$$\textcircled{18} 2n - (n+3) = 9$$

$$n - 3 = 9 + 3$$

$$n = 12$$

$$\textcircled{19} 3n - (n+2) = -4$$

$$2n - 2 = -4 + 2$$

$$2n = -2$$

$$\left(\frac{1}{2}\right)(2n) = \left(\frac{1}{2}\right)(-2)$$

$$n = -1$$

$$\textcircled{20} n - (2n-4) = -4$$

$$-n + 4 = -4 - 4$$

$$-n = -8 \quad n = 8$$

$$\textcircled{21} (2n+2) - (n-3) = 10$$

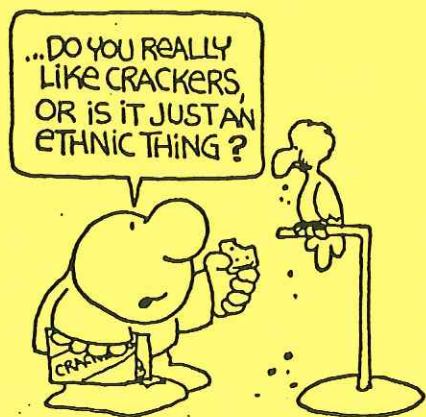
$$2n + 2 - n + 3 = 10$$

$$n + 5 = 10 - 5$$

$$n = 5$$

$$\begin{aligned} (22) \quad (n-3) - (2n+2) &= 0 \\ n-3-2n-2 &= 0 \\ -n-5 &= 0+5 \\ -n &= 5 \quad n = \boxed{-5} \end{aligned}$$

$$\begin{aligned} (23) \quad 2n - (n-5) &= (2n-4) \\ 2n-n+5 &= 2n-4-5 \\ n &= 2n-9 \\ -n &= -9 \quad n = \boxed{9} \end{aligned}$$



### 9. REVIEW

$$\begin{aligned} (1) \quad \frac{2n}{3} &= -4 \\ \left(\frac{3}{2}\right)\left(\frac{2n}{3}\right) &= \left(\frac{3}{2}\right)(-4) \\ n &= \boxed{-6} \end{aligned}$$

$$\begin{aligned} (2) \quad \frac{6}{8} &= \frac{-3n}{20} \\ \left(\frac{-20}{3}\right)\left(\frac{6}{8}\right) &= \left(\frac{-20}{3}\right)\left(\frac{-3n}{20}\right) \\ n &= \boxed{-5} \end{aligned}$$

$$\begin{aligned} (3) \quad 2(a+4) &= 3(2a-1)-1 \\ 2a+8 &= 6a-3-1 \\ 2a+8 &= 6a-4 \\ -4a &= -12 \\ \left(-\frac{1}{4}\right)(-4a) &= \left(-\frac{1}{4}\right)(-12) \\ a &= \boxed{3} \end{aligned}$$

$$\begin{aligned} (4) \quad 6(2x+1)+21 &= 3(4-x) \\ 12x+6+21 &= 12-3x \\ 12x+27 &= 12-3x \\ 15x &= -15 \\ \left(\frac{1}{15}\right)(15x) &= \left(\frac{1}{15}\right)(-15) \\ x &= \boxed{-1} \end{aligned}$$

$$\begin{aligned} (5) \quad 6n - \frac{2n}{3} - 12 &= 20 \\ 3\left[6n - \frac{2n}{3} - 12 = 20\right] \\ 18n - 2n - 36 &= 60 \\ 16n &= 96 \\ \left(\frac{1}{16}\right)(16n) &= \left(\frac{1}{16}\right)(96) \\ n &= \boxed{6} \end{aligned}$$

$$\begin{aligned} (6) \quad 8a - \frac{3a}{4} + 5 &= -14 \\ 4\left[8a - \frac{3a}{4} + 5 = -14\right] \\ 32a - 3a + 60 &= -56 \\ 29a &= -116 \\ \left(\frac{1}{29}\right)(29a) &= \left(\frac{1}{29}\right)(-116) \\ a &= \boxed{-4} \end{aligned}$$

$$\begin{aligned} (7) \quad -3x &> 15 \\ \left(-\frac{1}{3}\right)(-3x) &< \left(-\frac{1}{3}\right)(15) \\ x &< \boxed{-5} \end{aligned}$$

$$\begin{aligned} (8) \quad 14 &\leq -2n \\ \left(-\frac{1}{2}\right)(14) &\geq \left(-\frac{1}{2}\right)(-2n) \\ -7 &\geq n \quad n \leq \boxed{-7} \end{aligned}$$

$$\begin{aligned} (9) \quad \frac{-3n}{5} &> \frac{6}{5} \\ \left(-\frac{5}{3}\right)\left(\frac{-3n}{5}\right) &< \left(-\frac{5}{3}\right)\left(\frac{6}{5}\right) \\ n &< \boxed{-2} \end{aligned}$$

$$\begin{aligned} (10) \quad \frac{-8}{3} &\leq \frac{n}{6} \\ \left(\frac{6}{1}\right)\left(\frac{-8}{3}\right) &\leq \left(\frac{6}{1}\right)\left(\frac{n}{6}\right) \\ -16 &\leq n \\ n &\geq \boxed{-16} \end{aligned}$$

$$\begin{aligned} (11) \quad 6 - 2(n-3) &> 3n+2 \\ 6 - 2n + 6 &> 3n+2 \\ 12 - 2n &> 3n+2 \\ -5n &> -10 \\ \left(-\frac{1}{5}\right)(-5n) &< \left(-\frac{1}{5}\right)(-10) \\ n &< \boxed{2} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad & 10 - 3(4 - 2n) < 4n - 8 \\ & 10 - 12 + 6n < 4n - 8 \\ & -2 + 6n < 4n - 8 \end{aligned}$$

$$2n < -6$$

$$\left(\frac{1}{2}\right)(2n) < \left(\frac{1}{2}\right)(-6)$$

$$\boxed{n < -3}$$

$$\textcircled{13} \quad 4n - \frac{2n}{3} > 2(n-1) - 6$$

$$4n - \frac{2n}{3} > 2n - 2 - 6$$

$$3\left[4n - \frac{2n}{3} > 2n - 8\right]$$

$$12n - 2n > 6n - 24$$

$$-4n > -24$$

$$\left(\frac{1}{4}\right)(4n) > \left(\frac{1}{4}\right)(-24)$$

$$\boxed{n > -6}$$

$$\textcircled{14} \quad n + \frac{3n}{5} < -3(2-n) - 1$$

$$n + \frac{3n}{5} < -6 + 3n - 1$$

$$5\left[n + \frac{3n}{5} < -7 + 3n\right]$$

$$5n + 3n < -35 + 15n$$

$$-7n < -35$$

$$\left(\frac{1}{7}\right)(-7n) > \left(\frac{1}{7}\right)(-35)$$

$$\boxed{n > 5}$$

$$\textcircled{15} \quad \begin{array}{l} \boxed{-7} \quad x \\ \boxed{-6} \quad x+1 \\ \boxed{-5} \quad x+2 \end{array}$$

$$(x) + (x+1) + (x+2) = -18$$

$$3x + 3 = -18$$

$$3x = -21$$

$$\left(\frac{1}{3}\right)(3x) = \left(\frac{1}{3}\right)(-21) \quad x = -7$$

$$\textcircled{16} \quad \begin{array}{l} \boxed{-3} \quad x \\ \boxed{-2} \quad x+1 \\ \boxed{-1} \quad x+2 \\ \boxed{0} \quad x+3 \end{array}$$

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

$$4x + 6 = -6$$

$$4x = -12$$

$$\left(\frac{1}{4}\right)(4x) = \left(\frac{1}{4}\right)(-12)$$

$$x = -3$$

$$\textcircled{17} \quad \begin{array}{l} \boxed{6} \quad x \\ \boxed{8} \quad x+2 \\ \boxed{10} \quad x+4 \end{array}$$

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

$$2x = x + 6$$

$$x = 6$$

$$\textcircled{18} \quad \begin{array}{l} \boxed{8} \quad x \\ \boxed{10} \quad x+2 \\ \boxed{12} \quad x+4 \end{array}$$

$$3(x+2) = 4x - 2$$

$$3x + 6 = 4x - 2$$

$$-x + 6 = -2$$

$$-x = -8 \quad x = 8$$

$$\textcircled{19} \quad \begin{array}{l} \boxed{-5} \quad x \\ \boxed{-3} \quad x+2 \end{array}$$

$$3(x+2) + x = -14$$

$$3x + 6 + x = -14$$

$$4x = -20$$

$$\left(\frac{1}{4}\right)(4x) = \left(\frac{1}{4}\right)(-20)$$

$$x = -5$$

$$\textcircled{20} \quad \begin{array}{l} \boxed{3} \quad x \\ \boxed{5} \quad x+2 \\ \boxed{7} \quad x+4 \end{array}$$

$$3x + 2(x+4) = 23$$

$$3x + 2x + 8 = 23$$

$$5x = 15$$

$$\left(\frac{1}{5}\right)(5x) = \left(\frac{1}{5}\right)(15)$$

$$x = 3$$

$$\textcircled{21} \quad \begin{array}{l} 2n - (n+1) = 5 \\ 2n - n - 1 = 5 \\ n = \boxed{6} \end{array}$$

$$\textcircled{22} \quad \begin{array}{l} 3n - (2n-2) = 6 \\ 3n - 2n + 2 = 6 \\ n = \boxed{4} \end{array}$$

$$\textcircled{23} \quad \begin{array}{l} (2n+2) - (n-3) = (3n-1) \\ 2n+2-n+3 = 3n-1 \\ n+5 = 3n-1 \\ -2n+5 = -1 \\ -2n = -6 \\ \left(\frac{1}{2}\right)(-2n) = \left(\frac{1}{2}\right)(-6) \\ n = \boxed{3} \end{array}$$

$$\textcircled{24} \quad \begin{array}{l} (4n-3) - (2n+4) = (n+4) \\ 4n-3-2n-4 = n+4 \\ 2n-7 = n+4 \\ n-7 = 4 \\ n = \boxed{11} \end{array}$$

# Number Lines & Radicals

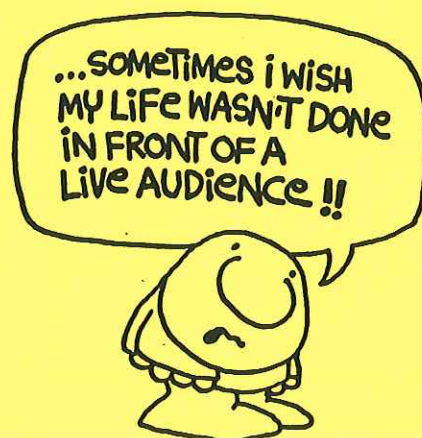
## 1. ABSOLUTE VALUE

- ① 7      ⑥  $-(-5) \times (-3)$       ⑩  $-|-5|$   
 ② 7      -15      -5  
 ③ 15      ⑦ -9  
 ④ 15      ⑧ -9  
 ⑤ -8      ⑨  $|-8| = 8$

## 2. NUMBER LINES

- ①  $g > e$        $g$  is to the right of  $e$   
 ②  $d < h$        $d$  is to the left of  $h$   
 ③  $f > -2$        $f$  is to the right of  $-2$   
 ④  $-1 < e$        $-1$  is to the left of  $e$   
 ⑤  $\frac{1}{2} \notin f$       Not enough information:  $f$  in range  $(0 < f < 1)$   
 ⑥  $c < -a$        $c$  is negative  
                           $-a$  is positive  
 ⑦  $g < -b$        $1 < g < 2, 2 < -b < 3$

- ⑧  $2f < 2$        $0 < 2f < 2$   
 ⑨  $3d > -6$        $-6 < 3d < -3$   
 ⑩  $3d < -1$        $-6 < 3d < -3$   
 ⑪  $f+g > 0$        $f$  and  $g$  are (+)  
                           $1 < f+g < 3$   
 ⑫  $e+c < 0$        $e$  and  $c$  are (-)  
                           $-4 < e+c < -2$   
 ⑬  $e+f \notin 0$        $-1 < e+f < 1$   
 ⑭  $f+h > 2$        $2 < f+h < 4$   
 ⑮  $h-f > 0$        $h$  to right of  $f$   
                          larger - smaller = (+)  
 ⑯  $g-k < 0$        $g$  to left of  $k$   
                          smaller - larger = (-)  
 ⑰  $b-d < 0$       smaller - larger = (-)



⑱  $f - e > 0$  larger - smaller = (+)

⑲  $d + f < 0$   $-2 < d + f < 0$

⑳  $f + g > 1$   $1 < f + g < 3$

㉑  $g - e > f - g$   $g - e$  is (+),  $f - g$  is (-)

㉒  $h - g < h - f$   $g > f$ ; therefore subtracting  $f$  gives the smaller result

㉓  $c - a > b - d$   $c - a$  is (+),  $b - d$  is (-)

### 3. NUMBER LINES

①  $g^2 < g^3$  values  $> 1$  get larger with higher exponents

②  $h^3 < h^4$  see above reason

③  $d^2 > d^3$   $d^2$  is (+): neg. to even power.  $d^3$  is (-): neg. to odd power

④  $c^3 < c^4$   $c^3$  is (-): neg. to odd power.  $c^4$  is (+): neg. to even power

⑤  $d > d^3$  values  $< -1$  get smaller with higher odd exponents

⑥  $c^3 > c^5$  see above reason

⑦  $g^2 < c^2$   $1 < g^2 < 4$ ,  $4 < c^2 < 9$

⑧  $h^2 > d^2$   $4 < h^2 < 9$ ,  $1 < d^2 < 4$

⑨  $g^2 \neq d^2$  both are between 1 and 4

⑩  $b^2 > c^2$  both are (+), since  $|b| > |c|$ ,  $b^2 > c^2$

⑪  $f > f^2$  fractions get closer to 0 with higher exponents

⑫  $f^2 > f^3$  see above reason

⑬  $e < e^2$   $e$  is (-),  $e^2$  is (+)

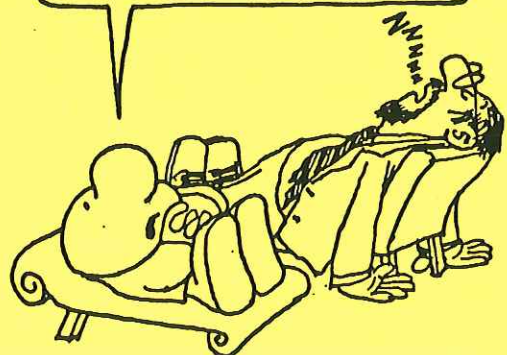
⑭  $e < e^3$  both are (-),  $e^3$  will be closer to 0 (and therefore larger)

⑮  $e^3 < e^5$  both are (-), frac. get closer to 0 with higher exponents

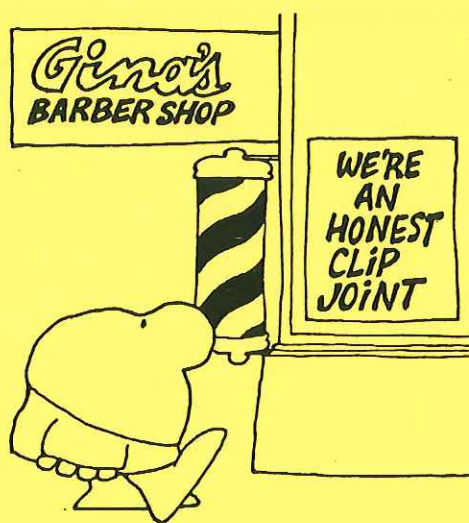
⑯  $f^4 < g$   $f^4$  will get closer to 0

⑰  $f^2 > -h$   $f^2$  is (+),  $-h$  is (-)

...AND SO DR. SCHRINK...  
THAT'S PRETTY MUCH THE  
STORY OF MY LIFE...



- ⑱  $e^2 \square -f$   $e^2$  is (+),  $-f$  is (-)
- ⑲  $e^3 \square d^3$  both are (-);  $e^3$  moves closer to 0,  $d^3$  moves left
- ⑳  $e^2 \square d^2$  both are (+);  $e^2$  is pos. fraction,  $1 < d^2 < 4$



#### 4. NUMBER LINES

- ①  $gh \square gd$   $gh$  is (+),  $gd$  is (-)
- ②  $fd \square bc$   $fd$  is (-),  $bc$  is (+)
- ③  $gh \square h^2$  both (+) and since  $h$  is larger:  $gh < hh$
- ④  $dc \square d^2$  both (+) and since  $|c|$  is larger:  $dc > dd$
- ⑤  $abc \square g^3$   $abc$  is (-),  $g^3$  is (+)
- ⑥  $2c \square bc$   $2c$  is (-),  $bc$  is (+)

- ⑦  $\frac{d}{g} \square \frac{g}{h}$   $\frac{d}{g}$  is (-),  $\frac{g}{h}$  is (+)
- ⑧  $\frac{g}{g^2} \square \frac{k}{c}$   $\frac{g}{g^2}$  is (+),  $\frac{k}{c}$  is (-)
- ⑨  $\frac{b}{c} \square e$   $\frac{b}{c}$  is (+),  $e$  is (-)
- ⑩  $d^2 \square \frac{a}{g}$   $d^2$  is (+),  $\frac{a}{g}$  is (-)
- ⑪  $\frac{a}{d} \square \frac{b}{g}$   $\frac{a}{d}$  is (+),  $\frac{b}{g}$  is (-)
- ⑫  $\frac{ab}{c} \square \frac{d}{c}$   $\frac{ab}{c}$  is (-),  $\frac{d}{c}$  is (+)
- ⑬  $\frac{g}{h} \square 1$   $\frac{g}{h}$  is (+) fraction, numerator < denominator
- ⑭  $\frac{c}{d} \square 1$   $\frac{c}{d}$  is (+) fraction, since  $|c| > |d|$  the fraction is  $> 1$
- ⑮  $\frac{f}{g} \square g$   $\frac{f}{g}$  is (+) fraction,  $f < g$  (num < denom)

Note about fractions:

(+) fraction  $> 1$  if numerator  $>$  denom.

(+) fraction  $< 1$  if numerator  $<$  denom.

#### 5. NUMBER LINES

- ①  $a(f+g) \square h(f+k)$   
 (-)(+) < (+)(+)
- ②  $g(h-g) \square h(g-h)$   
 (+)(+) > (+)(-)

③  $d(d-e) \begin{cases} \geq dg \\ (-)(-) > (-)(+) \end{cases}$

④  $d(g-f) \begin{cases} \leq bc \\ (-)(+) < (-)(-) \end{cases}$

⑤  $g+h \leq 5$  range:  $3 < g+h < 5$

⑥  $c+d \geq -5$  range:  $-5 < c+d < -3$

⑦  $h-f \geq 1$  range:  $1 < h-f < 3$

⑧  $d-f \leq -1$  range:  $-3 < d-f < -1$

⑨  $h-d \geq fh$  range:  $3 < h-d < 5$   
 $0 < fh < 3$

⑩  $g-d \begin{cases} \text{NE} \\ \geq 2g \end{cases}$  range:  $2 < g-d < 4$   
 $2 < 2g < 4$

⑪  $dg \leq -1$  range:  $-4 < dg < -1$

⑫  $eh \geq -3$  range:  $-3 < eh < 0$

⑬  $-d^2 \leq g^2$   $-d^2$  is (-),  $g^2$  is (+)

⑭  $-g^3 \leq -d^3$   $-g^3$  is (-),  $-d^3$  is (+)

⑮  $\frac{a}{b} \geq f$   $\frac{a}{b}$  is (+) fraction  $> 1$   
 $f$  is (+) fraction  $< 1$

⑯  $\frac{g}{h} \leq 1$   $\frac{g}{h}$  is (+) fraction  $< 1$

⑰  $a(h-f) \leq \frac{d}{h}$   $a(h-f)$  is  $< -3$   
 $\frac{d}{h}$  is a (-) fraction  $> -1$

⑱  $e(1-g) \leq \frac{h}{g}$   $e(1-g)$  is a (+) frac.  $< 1$   
 $\frac{h}{g}$  is a (+) fraction  $> 1$

⑲  $f+h \leq c^2$   $2 < f+h < 4$   
 $4 < c^2 < 9$

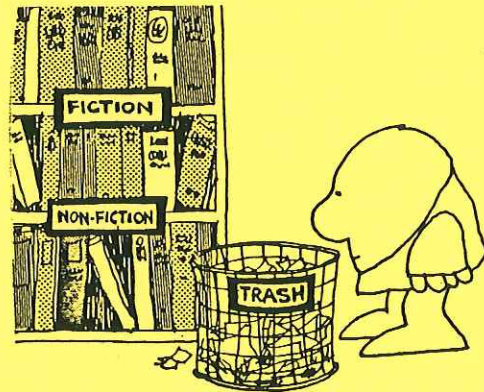
⑳  $g+h \leq -2a$   $3 < g+h < 5$   
 $6 < -2a < 8$

㉑  $e^2 \geq e^3$   $e^2$  is (+),  $e^3$  is (-)

㉒  $f^2 \geq f^3$  both are (+) frac.  
 $f^3$  is closer to 0

㉓  $abg \geq bcd$   $abg$  is (+),  $bcd$  is (-)

㉔  $d-e \geq c$   $-2 < d-e < 0$   
 $-3 < c < -2$



## 6. RADICALS & NUMBER LINES

①  $A=4$

②  $B=6$

③  $C=-7$

④  $D=-2$

⑤  $E=1$

⑥  $\sqrt{36} < \sqrt{40} < \sqrt{49}$

$6 < F < 7$

slightly closer to 6

⑦  $\sqrt{81} < \sqrt{90} < \sqrt{100}$

$9 < G < 10$

almost in the middle

## 7. SIMPLIFYING RADICALS

⑧  $\sqrt{25} < \sqrt{26} < \sqrt{36}$  closer to 5  
 $5 < H < 6$

⑨  $-\sqrt{36} < -\sqrt{30} < -\sqrt{25}$  in the middle  
 $-6 < I < -5$

⑩  $-\sqrt{100} < -\sqrt{99} < -\sqrt{81}$  much closer to -10  
 $-10 < J < -9$

⑪  $-\sqrt{16} < -\sqrt{10} < -\sqrt{9}$  much closer to -3  
 $-4 < K < -3$

⑫  $-\sqrt{81} < -\sqrt{70} < -\sqrt{64}$  closer to -8  
 $-9 < L < -8$

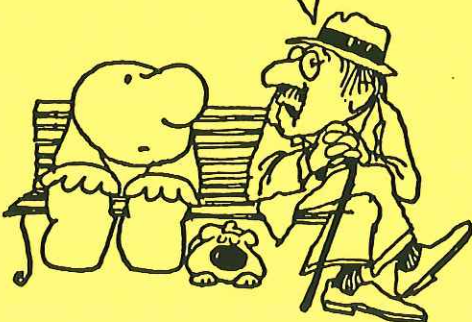
⑬  $m = 9$

⑭  $\sqrt{100} < \sqrt{120} < \sqrt{121}$  much closer to 11  
 $10 < N < 11$

⑮  $\sqrt{4} < \sqrt{6} < \sqrt{9}$  in the middle, slightly closer to 2  
 $2 < O < 3$

⑯  $\sqrt{49} < \sqrt{50} < \sqrt{64}$  much closer to 7  
 $7 < P < 8$

...AFTER YOU RETIRE, YOU FIND OUT THAT IT DOESN'T TAKE ALL THAT LONG TO DO ALL THE THINGS YOU WANTED TO DO AFTER YOU RETIRE !!



①  $\sqrt{49} = \boxed{7}$       ②  $\sqrt{64} = \boxed{8}$

③  $\sqrt{120} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 5} = \boxed{2\sqrt{30}}$

④  $\sqrt{72} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3} = \boxed{6\sqrt{2}}$

⑤  $\sqrt{50} = \sqrt{2 \cdot 5 \cdot 5} = \boxed{5\sqrt{2}}$

⑥  $\sqrt{112} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 7} = \boxed{4\sqrt{7}}$

⑦  $\sqrt{48} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} = \boxed{4\sqrt{3}}$

⑧  $\sqrt{80} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5} = \boxed{4\sqrt{5}}$

⑨  $\sqrt{90} = \sqrt{2 \cdot 3 \cdot 3 \cdot 5} = \boxed{3\sqrt{10}}$

⑩  $\sqrt{24} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3} = \boxed{2\sqrt{6}}$

⑪  $\sqrt{12} = \sqrt{2 \cdot 2 \cdot 3} = \boxed{2\sqrt{3}}$

⑫  $\sqrt{98} = \sqrt{2 \cdot 7 \cdot 7} = \boxed{7\sqrt{2}}$

⑬  $\sqrt{200} = \sqrt{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5} = \boxed{10\sqrt{2}}$

⑭  $\sqrt{240} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5} = \boxed{4\sqrt{15}}$

⑮  $\sqrt{14} = \sqrt{2 \cdot 7} = \boxed{\sqrt{14}}$

⑯  $\sqrt{6} = \sqrt{2 \cdot 3} = \boxed{\sqrt{6}}$

⑰  $\sqrt{\frac{49}{64}} = \frac{\sqrt{49}}{\sqrt{64}} = \boxed{\frac{7}{8}}$

⑱  $\sqrt{\frac{4}{9}} = \frac{\sqrt{4}}{\sqrt{9}} = \boxed{\frac{2}{3}}$

⑲  $\sqrt{\frac{25}{36}} = \frac{\sqrt{25}}{\sqrt{36}} = \boxed{\frac{5}{6}}$

⑳  $\sqrt{\frac{1}{81}} = \frac{\sqrt{1}}{\sqrt{81}} = \boxed{\frac{1}{9}}$



$$\textcircled{21} \frac{2\sqrt{27}}{3} = \frac{2\sqrt{3 \cdot 3 \cdot 3}}{3} = \frac{6\sqrt{3}}{3} = \boxed{2\sqrt{3}}$$

$$\textcircled{22} \frac{3\sqrt{32}}{8} = \frac{3\sqrt{2 \cdot 2 \cdot 2 \cdot 2}}{8} = \frac{12\sqrt{2}}{8} = \boxed{\frac{3\sqrt{2}}{2}}$$

## 8. ADDING & SUBTRACTING

$$\textcircled{1} \sqrt{3} + 2\sqrt{3} = \boxed{3\sqrt{3}}$$

$$\textcircled{5} \boxed{3\sqrt{3} + 2\sqrt{2}}$$

$$\textcircled{2} 3\sqrt{5} + 4\sqrt{5} = \boxed{7\sqrt{5}}$$

$$\textcircled{6} \boxed{\sqrt{6} + 2\sqrt{5}}$$

$$\textcircled{7} 3\sqrt{3} - 3\sqrt{3} = \boxed{0}$$

$$\textcircled{8} -4\sqrt{2} + 4\sqrt{2} = \boxed{0}$$

$$\textcircled{3} 2\sqrt{7} - \sqrt{7} = \boxed{\sqrt{7}}$$

$$\textcircled{9} 3\sqrt{2} + \sqrt{18} = 3\sqrt{2} + \sqrt{2 \cdot 3 \cdot 3} = 3\sqrt{2} + 3\sqrt{2} = \boxed{6\sqrt{2}}$$

$$\textcircled{4} 5\sqrt{2} - 4\sqrt{2} = \boxed{\sqrt{2}}$$

NOW, ZIGGY, TELL ME...  
 ..WHEN DID YOU FIRST GET THIS  
 UNCOMFORTABLE FEELING  
 YOU MIGHT NOT BE ABLE  
 TO PAY MY BILL?...



$$\textcircled{10} 4\sqrt{5} + \sqrt{20} = 4\sqrt{5} + \sqrt{2 \cdot 2 \cdot 5} = 4\sqrt{5} + 2\sqrt{5} = \boxed{6\sqrt{5}}$$

$$\textcircled{11} 2\sqrt{3} + 3\sqrt{2} - \sqrt{27} = 2\sqrt{3} + 3\sqrt{2} - 3\sqrt{3} = \boxed{\sqrt{3} + 3\sqrt{2}}$$

$$\textcircled{12} 4\sqrt{2} - 3\sqrt{6} - \sqrt{8} = 4\sqrt{2} - 3\sqrt{6} - 2\sqrt{2} = \boxed{2\sqrt{2} - 3\sqrt{6}}$$

$$\textcircled{13} \sqrt{32} - \sqrt{18} + \sqrt{50} = 4\sqrt{2} - 3\sqrt{2} + 5\sqrt{2} = \boxed{6\sqrt{2}}$$

$$\textcircled{14} 2\sqrt{27} + \sqrt{12} - 8\sqrt{3} = 6\sqrt{3} + 2\sqrt{3} - 8\sqrt{3} = \boxed{0}$$

$$\textcircled{15} 3\sqrt{5} - \sqrt{20} - \sqrt{5} = 3\sqrt{5} - 2\sqrt{5} - \sqrt{5} = \boxed{0}$$

$$\textcircled{16} 2\sqrt{8} - 3\sqrt{12} = \boxed{4\sqrt{2} - 6\sqrt{3}}$$

## 9. MULTIPLICATION

$$\textcircled{1} (\sqrt{3})(\sqrt{2}) = \boxed{\sqrt{6}}$$

$$\textcircled{2} (\sqrt{5})(\sqrt{7}) = \boxed{\sqrt{35}}$$

$$\textcircled{3} (\sqrt{6})(\sqrt{3}) = \sqrt{18} = \boxed{3\sqrt{2}}$$

$$\textcircled{4} (\sqrt{8})(\sqrt{6}) = \sqrt{48} = \boxed{4\sqrt{3}}$$

$$\textcircled{5} (\sqrt{12})(-\sqrt{3}) = -\sqrt{36} = \boxed{-6}$$

$$\textcircled{6} (\sqrt{20})(-\sqrt{5}) = -\sqrt{100} = \boxed{-10}$$

$$\textcircled{7} (\sqrt{7})(\sqrt{7}) = \boxed{7}$$

$$\textcircled{8} (\sqrt{3})(\sqrt{3}) = \boxed{3}$$

$$\textcircled{9} (\sqrt{6})^2 = \boxed{6}$$

$$\textcircled{10} (\sqrt{5})^2 = \boxed{5}$$

$$\textcircled{11} (2\sqrt{3})(3\sqrt{2}) = \boxed{6\sqrt{6}}$$

$$\textcircled{12} (4\sqrt{2})(2\sqrt{5}) = \boxed{8\sqrt{10}}$$

$$\textcircled{13} (3\sqrt{3})(2\sqrt{3}) = (6)(3) = \boxed{18}$$

$$\textcircled{14} (4\sqrt{6})(2\sqrt{6}) = (8)(6) = \boxed{48}$$

$$\begin{aligned} \textcircled{15} & 2(2\sqrt{6} + \sqrt{24}) \\ & 4\sqrt{6} + 2\sqrt{24} \\ & 4\sqrt{6} + 4\sqrt{6} = \boxed{8\sqrt{6}} \end{aligned}$$

$$\begin{aligned} \textcircled{16} & 3(\sqrt{8} + 2\sqrt{2}) \\ & 3\sqrt{8} + 6\sqrt{2} \\ & 6\sqrt{2} + 6\sqrt{2} = \boxed{12\sqrt{2}} \end{aligned}$$

$$\textcircled{17} 2\sqrt{2}(3 - 2\sqrt{3}) = \boxed{6\sqrt{2} - 4\sqrt{6}}$$

$$\textcircled{18} 3\sqrt{3}(4\sqrt{3} - 1) = \boxed{36 - 3\sqrt{3}}$$

$$\begin{aligned} \textcircled{19} & 4\sqrt{6}(2\sqrt{2} - \sqrt{6}) \\ & 8\sqrt{12} - 24 = \boxed{16\sqrt{3} - 24} \end{aligned}$$

$$\begin{aligned} \textcircled{20} & \sqrt{3}(3\sqrt{3} - \sqrt{6}) \\ & 9 - \sqrt{18} = \boxed{9 - 3\sqrt{2}} \end{aligned}$$

THE WASHINGTON POST MAY WIN A LOT OF PULITZERS, BUT YOU CAN'T BEAT THE SUNDAY NEW YORK TIMES FOR WARMTH AND COVERAGE!



## 10. REVIEW

$$\textcircled{1} \boxed{3}$$

$$\textcircled{3} \boxed{-2}$$

$$\textcircled{5} \boxed{13}$$

$$\textcircled{2} \boxed{7}$$

$$\textcircled{4} \boxed{-9}$$

$$\textcircled{6} \boxed{6}$$

$$\begin{aligned} \textcircled{7} & e-c \boxed{>} d-f \\ & e-c \text{ is } (+), d-f \text{ is } (-) \end{aligned}$$

$$\begin{aligned} \textcircled{8} & e-g \boxed{<} d-b \\ & e-g \text{ is } (-), d-b \text{ is } (+) \end{aligned}$$

$$\begin{aligned} \textcircled{9} & f \boxed{<} f^2 \\ & f > 1, f^2 \text{ gets larger} \end{aligned}$$

$$\begin{aligned} \textcircled{10} & g^3 \boxed{>} g^2 \\ & \text{values larger than 1 get} \\ & \text{larger with higher exponents} \end{aligned}$$

$$\begin{aligned} \textcircled{11} & c^2 \boxed{>} c \\ & c^2 \text{ is } (+), c \text{ is } (-) \end{aligned}$$

$$\begin{aligned} \textcircled{12} & b^2 \boxed{>} b^3 \\ & b^2 \text{ is } (+), b^3 \text{ is } (-) \end{aligned}$$

$$\begin{aligned} \textcircled{13} & e \boxed{>} e^2 \\ & e \text{ is a } (+) \text{ fraction, } e^2 \text{ will} \\ & \text{get closer to zero} \end{aligned}$$

$$\begin{aligned} \textcircled{14} & e^4 \boxed{<} e^3 \\ & \text{positive fractions get closer} \\ & \text{to zero with higher exponents} \end{aligned}$$

$$\begin{aligned} \textcircled{15} & abc \boxed{<} ab \\ & abc \text{ is } (-), ab \text{ is } (+) \end{aligned}$$

①⑥  $bg \leq cd$   
 $bg$  is (-),  $cd$  is (+)

①⑦  $f+g \leq 5$   
 range  $3 < f+g < 5$

①⑧  $h-e \geq 2$   
 range  $2 < h-e < 4$

①⑨  $2(d-b) \geq 1$   
 range  $2 < d-b < 6$

②⑩  $3(c+d) \leq -2$   
 range  $-3 < c+d < -1$

②①  $\frac{f}{g} \leq \frac{h}{g}$   
 $f/g < 1$ ,  $h/g > 1$

②②  $\frac{b}{c} \geq \frac{e}{g}$   
 $b/c > 1$ ,  $e/g < 1$

②③  $\frac{b}{f} \leq d$   
 $b/f < -1$ ,  $d > -1$

②④  $A = 8$

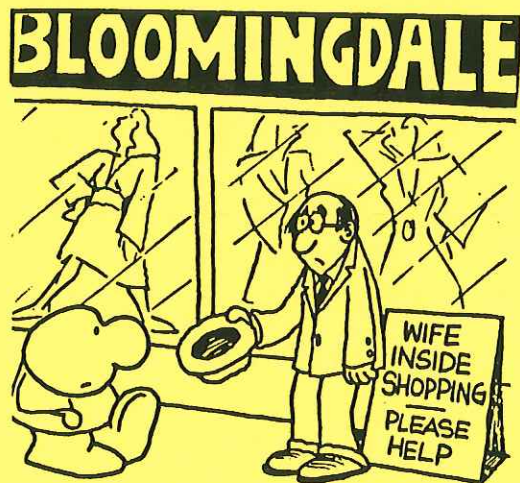
②⑤  $B = -7$

②⑥  $-\sqrt{25} < -\sqrt{24} < -\sqrt{16}$   
 $-5 < c < -4$   
 very close to -5

②⑦  $\sqrt{36} < \sqrt{38} < \sqrt{49}$   
 $6 < D < 7$   
 much closer to 6

②⑧  $\sqrt{9} < \sqrt{10} < \sqrt{16}$   
 $3 < E < 4$   
 much closer to 3

②⑨  $-\sqrt{36} < -\sqrt{33} < -\sqrt{25}$   
 $-6 < F < -5$   
 a little closer to -6



③⑩  $\sqrt{81} = 9$

③①  $\sqrt{169} = 13$

③②  $\sqrt{250} = \sqrt{2 \cdot 5 \cdot 5 \cdot 5} = 5\sqrt{10}$

③③  $\sqrt{60} = \sqrt{2 \cdot 2 \cdot 3 \cdot 5} = 2\sqrt{15}$

③④  $\sqrt{1000} = \sqrt{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5 \cdot 5} = 10\sqrt{10}$

③⑤  $\sqrt{96} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} = 4\sqrt{6}$

$$\textcircled{36} \sqrt{\frac{1}{25}} = \frac{\sqrt{1}}{\sqrt{25}} = \boxed{\frac{1}{5}}$$

$$\textcircled{37} \sqrt{\frac{4}{49}} = \frac{\sqrt{4}}{\sqrt{49}} = \boxed{\frac{2}{7}}$$

$$\textcircled{38} \frac{2\sqrt{27}}{9} = \frac{2\sqrt{3 \cdot 3 \cdot 3}}{9} = \frac{6\sqrt{3}}{9} = \boxed{\frac{2\sqrt{3}}{3}}$$

$$\textcircled{39} \frac{3\sqrt{8}}{2} = \frac{3\sqrt{2 \cdot 2 \cdot 2}}{2} = \frac{6\sqrt{2}}{2} = \boxed{3\sqrt{2}}$$

$$\textcircled{40} \frac{\sqrt{12}}{2} = \frac{\sqrt{2 \cdot 2 \cdot 3}}{2} = \frac{2\sqrt{3}}{2} = \boxed{\sqrt{3}}$$

$$\textcircled{41} 3\sqrt{5} + 2\sqrt{5} = \boxed{5\sqrt{5}}$$

$$\textcircled{42} 4\sqrt{2} + \sqrt{2} = \boxed{5\sqrt{2}}$$

$$\textcircled{43} 5\sqrt{7} - \sqrt{7} = \boxed{4\sqrt{7}}$$

$$\textcircled{44} 6\sqrt{3} - 8\sqrt{3} = \boxed{-2\sqrt{3}}$$

$$\textcircled{45} 2\sqrt{3} + \sqrt{27} = 2\sqrt{3} + 3\sqrt{3} = \boxed{5\sqrt{3}}$$

$$\textcircled{46} 3\sqrt{8} + 2\sqrt{2} = 6\sqrt{2} + 2\sqrt{2} = \boxed{8\sqrt{2}}$$

$$\textcircled{47} 4\sqrt{2} - 9\sqrt{3} = 8\sqrt{3} - 9\sqrt{3} = \boxed{-\sqrt{3}}$$

$$\textcircled{48} \begin{aligned} 3\sqrt{8} - 2\sqrt{3} + 3\sqrt{2} \\ 6\sqrt{2} - 2\sqrt{3} + 3\sqrt{2} = \end{aligned} \boxed{9\sqrt{2} - 2\sqrt{3}}$$

$$\textcircled{49} \begin{aligned} 4\sqrt{2} + 2\sqrt{6} - 2\sqrt{3} \\ 8\sqrt{3} + 2\sqrt{6} - 2\sqrt{3} = \end{aligned} \boxed{6\sqrt{3} + 2\sqrt{6}}$$

$$\textcircled{50} (2\sqrt{2})(3\sqrt{3}) = \boxed{6\sqrt{6}}$$

$$\textcircled{51} (\sqrt{5})(2\sqrt{2}) = \boxed{2\sqrt{10}}$$

$$\textcircled{52} (-\sqrt{6})(2\sqrt{12}) = -2\sqrt{72} = \boxed{-12\sqrt{2}}$$

$$\textcircled{53} (-3\sqrt{2})(-2\sqrt{6}) = 6\sqrt{12} = \boxed{12\sqrt{3}}$$

$$\textcircled{54} (\sqrt{3})^2 = \boxed{3}$$

$$\textcircled{55} (-\sqrt{5})^2 = \boxed{5}$$

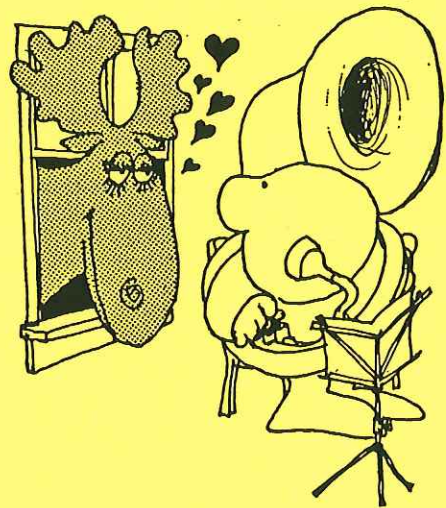
$$\textcircled{56} 3(2\sqrt{3} - 3\sqrt{2}) = \boxed{6\sqrt{3} - 9\sqrt{2}}$$

$$\textcircled{57} 2(6 - 2\sqrt{5}) = \boxed{12 - 4\sqrt{5}}$$

$$\textcircled{58} \begin{aligned} \sqrt{3}(2\sqrt{6} - \sqrt{3}) \\ 2\sqrt{18} - 3 = \end{aligned} \boxed{6\sqrt{2} - 3}$$

$$\textcircled{59} \begin{aligned} 2\sqrt{2}(\sqrt{8} + 3\sqrt{2}) \\ 2\sqrt{16} + 6\sqrt{4} \\ (2)(4) + (6)(2) = \end{aligned} \boxed{20}$$

$$\textcircled{60} \begin{aligned} 3\sqrt{3}(2\sqrt{3} + 2\sqrt{12}) \\ 6\sqrt{9} + 6\sqrt{36} \\ (6)(3) + (6)(6) = \end{aligned} \boxed{54}$$



# Angles & Triangles

## 1. ANGLE RELATIONSHIPS

①  $a + b + c = 180$

$75 + 50 + c = 180$

$125 + c = 180$

$c = 55$   $c = d$   $d = 55$

②  $2x + 3x + 90 = 180$

$5x + 90 = 180$

$5x = 90$

$x = 18$

$\angle ABC = 3x = 3(18)$   $\angle ABC = 54^\circ$

③  $8 \text{ sides} - 2 = 6$

$6(180) = 1080$   $1080^\circ$

④  $6 \text{ sides} - 2 = 4$

$4(180) = 720 \div 6 =$   $120^\circ$

⑤ Parallelogram has 4 sides

$4 \text{ sides} - 2 = 2(180) = 360^\circ$

$360 - 2(60) = 240 \div 2 =$   $120^\circ$

⑥  $x$  is supplementary to  $135^\circ$

$180 - x = 135$

$x = 45$   $y = 35$

$x + y + 100 = 180$

$45 + y + 100 = 180$

⑦  $\angle b$

⑧  $\angle b, \angle c, \angle f, \angle g$

⑨  $\angle c$

⑩  $\angle f$

⑪  $\angle e, \angle h$

⑫  $\angle c$  and  $\angle f$

$\angle d$  and  $\angle e$

⑬  $f = 135$

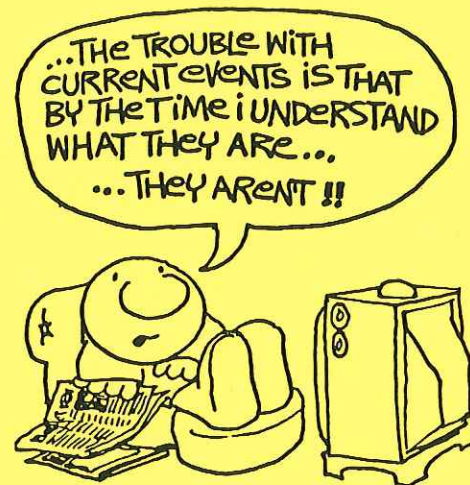
⑭  $g = 110$

⑮ false

⑯ true

⑰ true

⑱ transversal



⑲ The top triangle is  $45-45-90$   
(both legs are equal)

The vertical angles in the middle are both  $45^\circ$

$45 + 90 + x = 180$   $x = 45$

⑳ Bottom  $\angle$  is  $92^\circ$  (supplementary to  $88^\circ$ )  $9x + 13x + 92 = 180$

$22x + 92 = 180$

$22x = 88$

$x = 4$

②1 true  
 m and f are supplementary  
 c and d are supplementary  
 $m+f=180$   $c+d=180$

②2 true  
 $C=K$  corresponding angles  
 $K=P$  vertical angles  
 $C=P$  both angles = K

②3 false  
 $b=e$  and  $d=g$  vertical  $\angle$ 's  
 but  $b+e \neq d+g$

②4 false  
 $d=L$  corresponding angles  
 $L$  and  $P$  linear pair (supp)  
 therefore  $d$  supp to  $p$

②5 true  
 $e$  supp to  $f$  (linear pair)  
 $g=L$  (alt. interior  $\angle$ 's)  
 $L$  supp to  $k$  (linear pair)  
 therefore  $g$  supp to  $k$   
 $e+f=180$   $g+k=180$

②6 true  
 $d=g$  vertical angles  
 $g=O$  corresponding angles

②7 false  
 $f$  adjacent to  $e$  and  $b$   
 $g$  adjacent to  $c$  and  $h$

②8 true  
 $f=n$  corresponding angles  
 $n$  supp to  $j$  linear pair

## 2. SIMILAR TRIANGLES

$$\textcircled{1} \frac{3}{6} = \frac{8}{x} \quad 3x = 48$$

$$x = \boxed{16m}$$

$$\textcircled{2} \frac{10}{6} = \frac{25}{x} \quad 10x = 150$$

$$x = \boxed{15m}$$

$$\textcircled{3} \frac{x}{8} = \frac{1}{2} \quad 2x = 8$$

$$x = \boxed{4m}$$

$$\textcircled{4} \frac{4}{6} = \frac{2}{x} \quad 4x = 12$$

$$x = \boxed{3m}$$

$$\textcircled{5} \frac{6}{x} = \frac{4}{6} \quad 4x = 36$$

$$x = \boxed{9m}$$

$$\textcircled{6} \frac{6}{15} = \frac{x}{10} \quad 15x = 60$$

$$x = \boxed{4m}$$

$$\textcircled{7} \frac{4}{12} = \frac{x}{9} \quad 12x = 36$$

$$x = \boxed{3m}$$

$$\textcircled{8} \frac{8}{12} = \frac{x}{5} \quad 12x = 40$$

$$x = \boxed{3.3m}$$

$$\textcircled{9} \frac{3}{9} = \frac{4}{x} \quad 3x = 36$$

$$x = \boxed{12m}$$

$$\textcircled{10} \frac{5}{x} = \frac{10}{8} \quad 10x = 40$$

$$x = \boxed{4m}$$

### 3. PYTHAGOREAN THEOREM

$$\begin{aligned} \textcircled{1} \quad 5^2 + 9^2 &= c^2 \\ 25 + 81 &= c^2 \\ 106 &= c^2 \\ \sqrt{106} &= c \\ \boxed{\sqrt{106} \text{ ft}} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad 3^2 + 5^2 &= c^2 \\ 9 + 25 &= c^2 \\ 34 &= c^2 \\ \sqrt{34} &= c \\ \boxed{\sqrt{34} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad \text{Pyramid base} &= 100 \\ \frac{1}{2} \text{ of base} &= 50 \\ 50^2 + b^2 &= 80^2 \\ 2500 + b^2 &= 6400 \\ b^2 &= 3900 \\ b &= \sqrt{3900} = 10\sqrt{39} \\ \boxed{10\sqrt{39} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 15^2 + 36^2 &= c^2 \\ 225 + 1296 &= c^2 \\ 1521 &= c^2 \\ \sqrt{1521} &= c \\ 39 &= c \\ \boxed{39 \text{ ft}} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad \text{diameter} &= 6 \\ \text{radius} &= 3 \\ 3^2 + b^2 &= 8^2 \\ 9 + b^2 &= 64 \\ b^2 &= 55 \\ b &= \sqrt{55} \\ \boxed{\sqrt{55} \text{ in}} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad 5^2 + 8^2 &= c^2 \\ 25 + 64 &= c^2 \\ 89 &= c^2 \\ c &= \sqrt{89} \\ \boxed{\sqrt{89} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad 5^2 + 8^2 &= c^2 \\ 25 + 64 &= c^2 \\ 89 &= c^2 \\ \sqrt{89} &= c \\ \boxed{\sqrt{89} \text{ km}} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad 100^2 + a^2 &= 125^2 \\ 10,000 + a^2 &= 15,625 \\ a^2 &= 5,625 \\ a &= 75 \\ \boxed{75 \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad 8^2 + 12^2 &= c^2 \\ 64 + 144 &= c^2 \\ 208 &= c^2 \\ \sqrt{208} &= c \\ c &= 4\sqrt{13} \\ \boxed{4\sqrt{13} \text{ ft}} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad 9^2 + b^2 &= 24^2 \\ 81 + b^2 &= 576 \\ b^2 &= 495 \\ b &= \sqrt{495} \\ b &= 3\sqrt{55} \\ \boxed{3\sqrt{55} \text{ in}} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad 4^2 + b^2 &= 10^2 \\ 16 + b^2 &= 100 \\ b^2 &= 84 \\ b &= \sqrt{84} \\ b &= 2\sqrt{21} \\ \boxed{2\sqrt{21} \text{ ft}} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad \frac{1}{2} \text{ of } 24 \text{ ft} &= 12 \text{ ft} \\ 5^2 + 12^2 &= c^2 \\ 25 + 144 &= c^2 \\ 169 &= c^2 \\ \sqrt{169} &= c \\ 13 &= c \\ c &= 13 \\ \boxed{13 \text{ ft}} \end{aligned}$$

## 4. SPECIAL RIGHT TRIANGLES

$$\begin{aligned} \textcircled{1} \quad a &= 4 \text{ cm} \\ c &= 2a = 2(4) = \boxed{8 \text{ cm}} \\ b &= a\sqrt{3} = \boxed{4\sqrt{3} \text{ cm}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad c &= 12 \text{ cm} \\ a &= \frac{1}{2}c = \boxed{6 \text{ cm}} \\ b &= a\sqrt{3} = \boxed{6\sqrt{3} \text{ cm}} \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad b &= 7 \text{ m} \\ a &= \frac{b\sqrt{3}}{3} = \boxed{\frac{7\sqrt{3}}{3} \text{ m}} \\ c &= 2a = \boxed{\frac{14\sqrt{3}}{3} \text{ m}} \end{aligned}$$



$$\begin{aligned} \textcircled{4} \quad b &= 9\sqrt{6} \text{ m} \\ a &= \frac{b\sqrt{3}}{3} = \frac{(9\sqrt{6})(\sqrt{3})}{3} = \frac{9\sqrt{18}}{3} = \frac{27\sqrt{2}}{3} \\ c &= 2a = 2(9\sqrt{2}) = \boxed{18\sqrt{2} \text{ m}} \quad \boxed{9\sqrt{2} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{5} \quad c &= 8\sqrt{3} \text{ m} \\ a &= \frac{1}{2}c = \frac{1}{2}(8\sqrt{3}) = \boxed{4\sqrt{3} \text{ m}} \\ b &= a\sqrt{3} = (4\sqrt{3})(\sqrt{3}) = (4)(3) = \boxed{12 \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad b &= 6\sqrt{2} \text{ m} \\ a &= \frac{b\sqrt{3}}{3} = \frac{(6\sqrt{2})(\sqrt{3})}{3} = \frac{6\sqrt{6}}{3} = \boxed{2\sqrt{6} \text{ m}} \\ c &= 2a = 2(2\sqrt{6}) = \boxed{4\sqrt{6} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{7} \quad a &= 10 \text{ m} \\ b &= a = \boxed{10 \text{ m}} \\ c &= a\sqrt{2} = \boxed{10\sqrt{2} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad b &= 3\sqrt{2} \text{ cm} \\ a &= b = \boxed{3\sqrt{2} \text{ cm}} \\ c &= a\sqrt{2} = (3\sqrt{2})(\sqrt{2}) = (3)(2) = \boxed{6 \text{ cm}} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad c &= 12 \text{ m} \\ a &= \frac{c\sqrt{2}}{2} = \frac{12\sqrt{2}}{2} = \boxed{6\sqrt{2} \text{ m}} \\ b &= a = \boxed{6\sqrt{2} \text{ m}} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad c &= 4\sqrt{2} \text{ cm} \\ a &= \frac{c\sqrt{2}}{2} = \frac{(4\sqrt{2})(\sqrt{2})}{2} = \frac{(4)(2)}{2} = \boxed{4 \text{ cm}} \\ b &= a = \boxed{4 \text{ cm}} \end{aligned}$$

$$\begin{aligned} \textcircled{11} \quad c &= 6\sqrt{6} \text{ m} \\ a &= \frac{c\sqrt{2}}{2} = \frac{(6\sqrt{6})(\sqrt{2})}{2} = \frac{6\sqrt{12}}{2} = \boxed{6\sqrt{3} \text{ m}} \\ b &= a = \boxed{6\sqrt{3} \text{ m}} \end{aligned}$$



⑫  $a = 3\sqrt{3} \text{ cm}$   
 $b = a = \boxed{3\sqrt{3} \text{ cm}}$   
 $c = a\sqrt{2} = (3\sqrt{3})(\sqrt{2}) = \boxed{3\sqrt{6} \text{ cm}}$

⑬ 30-60-90 triangle  
 a) hypotenuse  
 $c = 2a = 2(5) = \boxed{10 \text{ m}}$

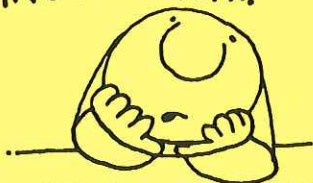
b) long leg  
 $b = a\sqrt{3} = \boxed{5\sqrt{3} \text{ m}}$

⑭ 30-60-90 triangle  
 a) short leg  
 $a = \frac{b\sqrt{3}}{3} = \frac{(8\sqrt{3})(\sqrt{3})}{3} = \frac{(8)(3)}{3} = \boxed{8 \text{ m}}$

b) hypotenuse  
 $c = 2a = (2)(8) = \boxed{16 \text{ m}}$

⑮ 45-45-90 triangle  
 $\text{leg} = a = \frac{c\sqrt{2}}{2} = \frac{(7\sqrt{2})(\sqrt{2})}{2} = \frac{(7)(2)}{2} = \boxed{7 \text{ cm}}$

ONE USEFUL THING ABOUT BEING A TOTAL INCOMPETENT...



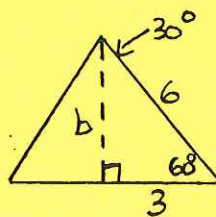
...IT GIVES OTHERS A STANDARD TO MEASURE THEMSELVES BY...

⑯ 30-60-90 triangle  
 a) short leg  
 $a = \frac{1}{2}c = \frac{1}{2}(10\sqrt{3}) = \boxed{5\sqrt{3} \text{ m}}$

b) long leg  
 $b = a\sqrt{3} = (5\sqrt{3})(\sqrt{3}) = \boxed{15 \text{ m}}$

⑰ 45-45-90 triangle  
 $\text{leg} = a = \frac{c\sqrt{2}}{2} = \frac{(9\sqrt{6})(\sqrt{2})}{2}$   
 $\frac{9\sqrt{12}}{2} = \frac{18\sqrt{3}}{2} = \boxed{9\sqrt{3} \text{ cm}}$

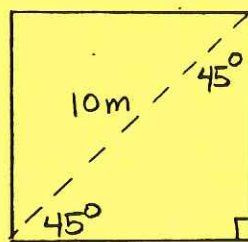
⑱ Drop an altitude to make a 30-60-90 triangle



hypot = 6  
 short leg = 3  
 long leg = b

$b = a\sqrt{3} = \boxed{3\sqrt{3} \text{ m}}$

⑲ The diagonal makes a 45-45-90 triangle

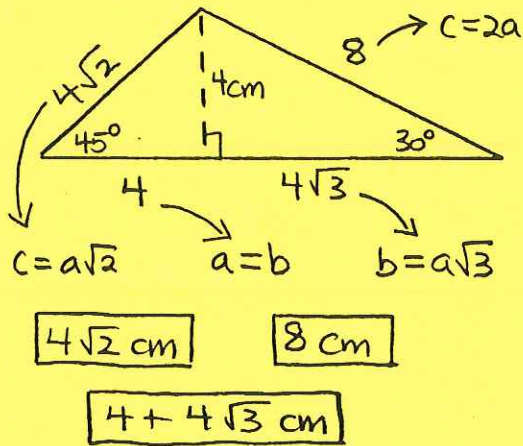


side of square is leg of triangle

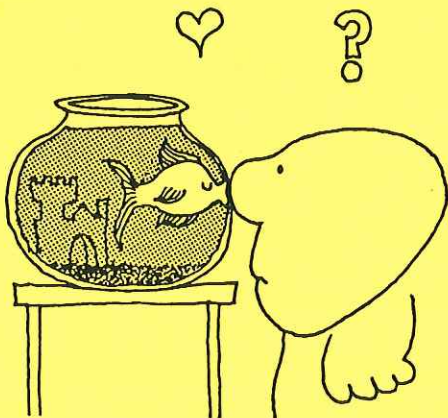
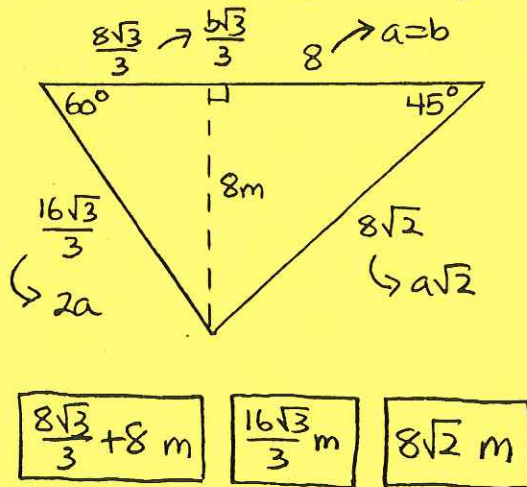
$a = \frac{c\sqrt{2}}{2} = \frac{10\sqrt{2}}{2} = \boxed{5\sqrt{2} \text{ m}}$

## 5. REVIEW

- ② Drop an altitude to divide the big triangle into a 45-45-90 and 30-60-90



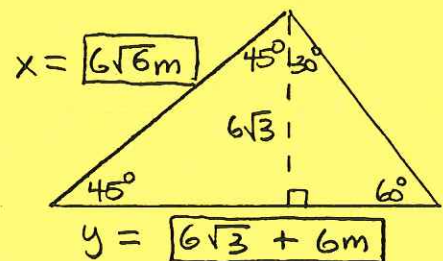
- ② Drop an altitude to divide the large triangle



- ① hypotenuse = 6m  
leg =  $a = \frac{c\sqrt{2}}{2} = \frac{6\sqrt{2}}{2} = \boxed{3\sqrt{2} \text{ m}}$
- ② short leg =  $4\sqrt{3} \text{ m}$   
a) long leg  
 $b = a\sqrt{3} = (4\sqrt{3})(\sqrt{3}) = \boxed{12 \text{ m}}$   
b) hypotenuse  
 $c = 2a = 2(4\sqrt{3}) = \boxed{8\sqrt{3} \text{ m}}$

- ③ Use the Pythagorean Theorem  
 $5^2 + b^2 = 13^2$   
 $25 + b^2 = 169$   
 $b^2 = 144$   
 $b = \sqrt{144}$   
 $b = \boxed{12 \text{ m}}$
- note: you can use the Pyth. triple 5-12-13

- ④ Drop an altitude



- 1) solve for short leg (6)
- 2) solve for height ( $6\sqrt{3}$ )
- 3) solve for leg ( $6\sqrt{3}$ )
- 4) solve for hypotenuse  
 $(6\sqrt{3})(\sqrt{2}) = (6\sqrt{6})$

⑤ Use the Pythagorean Theorem

$$8^2 + b^2 = 17^2$$

$$64 + b^2 = 289$$

$$b^2 = 225$$

$$b = \boxed{15 \text{ m}}$$

Pyth. triple  
8-15-17

⑩ transversal ⑬  $\angle a, \angle f, \angle c, \angle h$

⑪  $\angle d$

⑭ linear pair

⑫  $\angle a, \angle f$

⑮  $\angle b \neq \angle g, \angle f \neq \angle c$

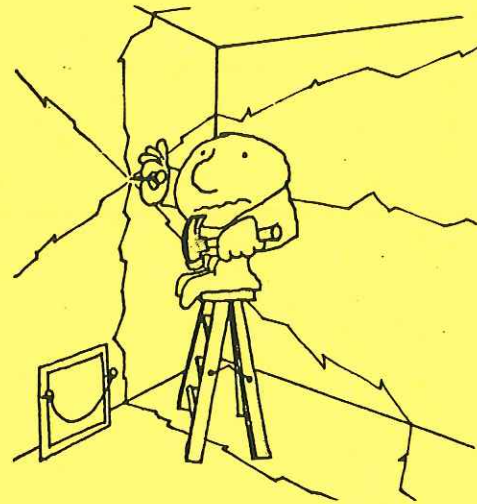
⑥ Use the Pythagorean Theorem

$$a^2 + 10^2 = 12^2$$

$$a^2 + 100 = 144$$

$$a^2 = 44$$

$$a = \sqrt{44} = \boxed{2\sqrt{11} \text{ m}}$$



⑦ Angle supplementary to  $120^\circ$  is  $\boxed{60^\circ}$

$$10x + 14x + 60 = 180$$

$$24x + 60 = 180$$

$$24x = 120$$

$$x = 5$$

$$10x = \boxed{50^\circ} \quad 14x = \boxed{70^\circ}$$

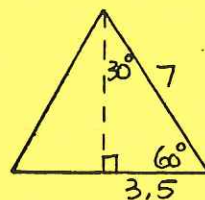
⑬  $\angle h$

⑰  $4e - f \quad 4(35) - (45) = \boxed{495}$

⑱  $3c - 2d \quad 3(65) - 2(115) = \boxed{-35}$

⑲  $\frac{10}{25} = \frac{8}{x} \quad 10x = 200$   
 $x = \boxed{20 \text{ m}}$

⑳



$$\boxed{3,5\sqrt{3}}$$

or  $\boxed{7/2\sqrt{3} \text{ m}}$

⑧  $b = 4a$  (vertical angles)

$$a + a + 4a = 180$$

$$6a = 180$$

$$a = 30$$

$$b = 4a = 4(30) = \boxed{120}$$

㉑ Bottom triangle:

$$30 + 40 + \square = 180$$

missing angle is  $110^\circ$

Top triangle:

$$25 + 110 + x = 180$$

$$x = \boxed{45}$$

⑨  $\frac{8}{6} = \frac{4}{x}$

$$8x = 24 \quad x = \boxed{3 \text{ m}}$$

22) true  
vertical angles are =

23) false  
vertical  $\angle$ 's are not supp.

24) true  
corresponding angles

25) true  
 $d=e$  alt. int.  $\angle$ 's  
 $e=a$  corresponding  $\angle$ 's

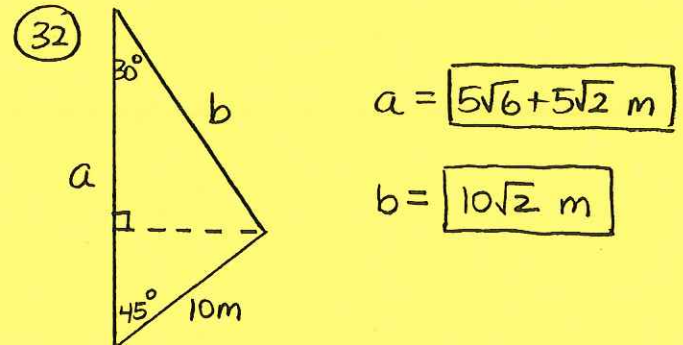
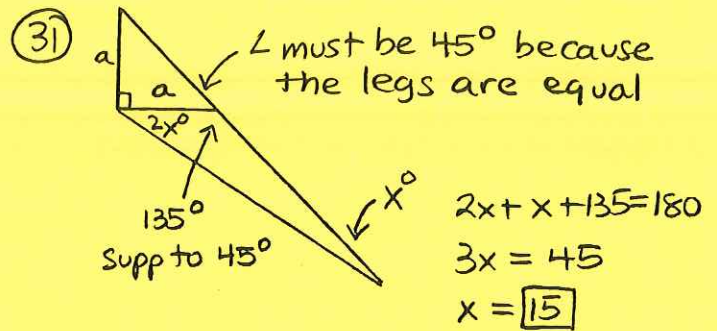
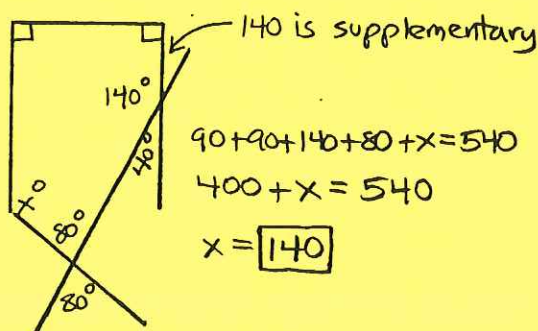
26) true  
 $h=d$  corresponding  $\angle$ 's  
 $d$  is supp. to  $c$  (linear pair)

27) false  
alternate but not interior

28) true  
opp. sides of rectangle are parallel by definition

29) Quadrilateral has  $360^\circ$   
 $x + 2x + x + 2x = 360$   
 $6x = 360$   $x = \boxed{60}$

30) Pentagon has  $540^\circ$   
 $5 - 2 = 3(180) = 540$



1) leg of bottom triangle

$$a = \frac{c\sqrt{2}}{2} = \frac{10\sqrt{2}}{2} = 5\sqrt{2}$$

2) altitude =  $5\sqrt{2}$

3) long leg;  $a\sqrt{3} = 5\sqrt{6}$

$$(5\sqrt{2})(\sqrt{3}) = 5\sqrt{6}$$

4) hypotenuse =  $2a = 10\sqrt{2}$

$$2(5\sqrt{2}) = 10\sqrt{2}$$

NO, I'M NOT A RECORDING !!!  
....ARE YOU ??



# Volume & Surface Area

## 1. PRISMS & CYLINDERS

$$\textcircled{1} V = (\text{base area})(\text{ht.})$$

$$\left(\frac{1}{2}\right)(12)(16)(14) = \boxed{1344 \text{ cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)\left(\frac{1}{2}\right)(12)(16) + (48)(14) = \boxed{864 \text{ cm}^2}$$

$$\textcircled{2} V = (\text{base area})(\text{ht})$$

$$(6)(6)(6) = \boxed{216 \text{ dm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)(6)(6) + (24)(6) = \boxed{216 \text{ dm}^2}$$

$$\textcircled{3} V = (\text{base area})(\text{ht})$$

$$V = (\pi r^2)(\text{ht})$$

$$(\pi)(1.5)^2(4.2) = \boxed{9.45\pi \text{ m}^3}$$

$$(3.14)(1.5)^2(4.2) = \boxed{29.673 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{cir})(\text{ht})$$

$$SA = (2)(\pi r^2) + (2\pi r)(\text{ht})$$

$$(2)(\pi)(1.5)^2 + (2)(\pi)(1.5)(4.2)$$

$$\boxed{17.1\pi \text{ m}^2}$$

$$(2)(3.14)(1.5)^2 + (2)(3.14)(1.5)(4.2)$$

$$\boxed{53.694 \text{ m}^2}$$

$$\textcircled{4} V = (\text{base area})(\text{ht})$$

$$(15)(11)(3) = \boxed{495 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)(15)(11) + (52)(3) = \boxed{486 \text{ m}^2}$$

$$\textcircled{5} V = (\text{base area})(\text{ht})$$

$$\left(\frac{1}{2}\right)(9)(12)(20) = \boxed{1080 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)\left(\frac{1}{2}\right)(9)(12) + (36)(20) = \boxed{828 \text{ m}^2}$$

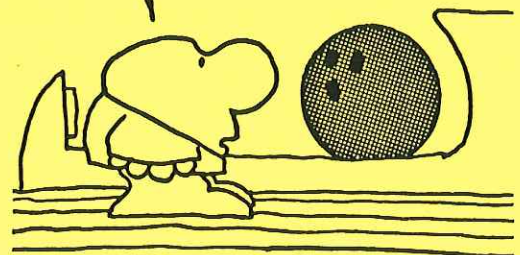
$$\textcircled{6} V = (\text{base area})(\text{ht})$$

$$(4)(10)(6) = \boxed{240 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)(4)(10) + (28)(6) = \boxed{248 \text{ m}^2}$$

DON'T LOOK AT ME LIKE THAT  
... I'M DOING THE BEST  
I CAN !!



$$\textcircled{7} V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$(\pi)(6)^2(10.5) = 378\pi \text{ dm}^3$$

$$(3.14)(6)^2(10.5) = 1186.92 \text{ dm}^3$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$(2)(\pi)(6)^2 + (2)(\pi)(6)(10.5) = 198\pi \text{ dm}^2$$

$$(2)(3.14)(6)^2 + (2)(3.14)(6)(10.5) = 621.72 \text{ dm}^2$$

$$\textcircled{8} V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$(\pi)(5)^2(30) = 750\pi \text{ dm}^3$$

$$(3.14)(5)^2(30) = 2355 \text{ dm}^3$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$(2)(\pi)(5)^2 + (2)(\pi)(5)(30) = 350\pi \text{ dm}^2$$

$$(2)(3.14)(5)^2 + (2)(3.14)(5)(30) = 1099 \text{ dm}^2$$

$$\textcircled{9} V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(10)(24)(40) = 4800 \text{ m}^3$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

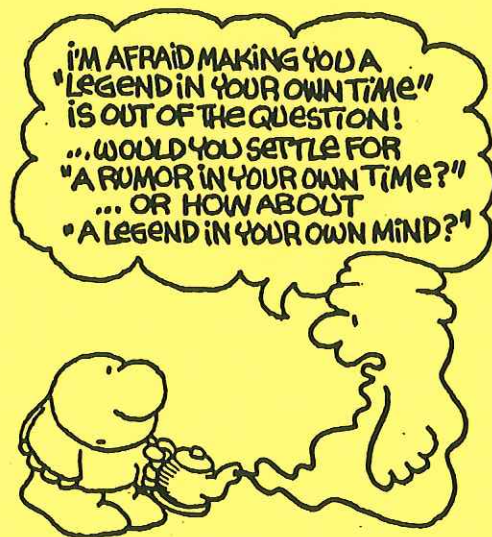
$$(2)\left(\frac{1}{2}\right)(10)(24) + (60)(40) = 2640 \text{ m}^2$$

$$\textcircled{10} V = (\text{base area})(ht)$$

$$(12)(7)(7) = 588 \text{ cm}^3$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)(12)(7) + (38)(7) = 434 \text{ cm}^2$$



$$\textcircled{11} V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$(\pi)(10)^2(6) = 600\pi \text{ cm}^3$$

$$(3.14)(10)^2(6) = 1884 \text{ cm}^3$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$(2)(\pi)(10)^2 + (2)(\pi)(10)(6) = 320\pi \text{ cm}^2$$

$$(2)(3.14)(10)^2 + (2)(3.14)(10)(6) = 1004.8 \text{ cm}^2$$

$$\textcircled{12} V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(3)(4)(9.4) = 56.4 \text{ cm}^3$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(3)(4) + (12)(9.4) = 124.8 \text{ cm}^2$$

$$\textcircled{13} V = (\text{base area})(ht)$$

$$(4)(5.1)(2.5) = 51 \text{ m}^3$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)(4)(5.1) + (18.2)(2.5) = 86.3 \text{ m}^2$$

$$\begin{aligned} \textcircled{14} \quad V &= (\text{base area})(ht) \\ V &= (\pi r^2)(ht) \\ (\pi)(21)^2(10) &= \boxed{4410\pi \text{ dm}^3} \\ (3.14)(21)^2(10) &= \boxed{13847.4 \text{ dm}^3} \end{aligned}$$

$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{cir})(ht) \\ SA &= (2)(\pi r^2) + (2\pi r)(ht) \\ (2)(\pi)(21)^2 + (2)(\pi)(21)(10) &= \boxed{1302\pi \text{ dm}^2} \\ (2)(3.14)(21)^2 + (2)(3.14)(21)(10) &= \boxed{4088.28 \text{ dm}^2} \end{aligned}$$

$$\begin{aligned} \textcircled{15} \quad V &= (\text{base area})(ht) \\ (\frac{1}{2})(16)(30)(50) &= \boxed{12,000 \text{ m}^3} \end{aligned}$$

$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{per})(ht) \\ (2)(\frac{1}{2})(16)(30) + (80)(50) &= \boxed{4480 \text{ m}^2} \end{aligned}$$

$$\begin{aligned} \textcircled{16} \quad V &= (\text{base area})(ht) \\ (3)(3)(3) &= \boxed{27 \text{ m}^3} \end{aligned}$$

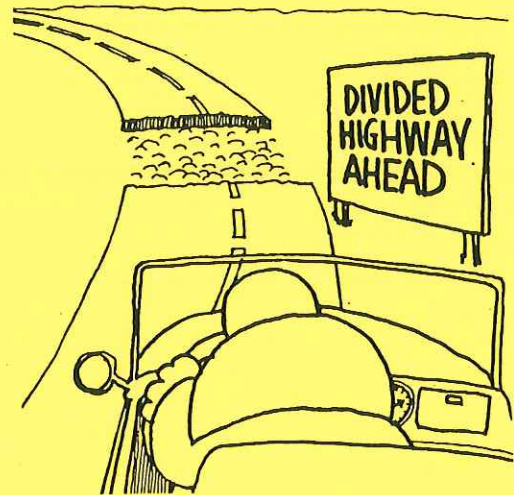
$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{per})(ht) \\ (2)(3)(3) + (12)(3) &= \boxed{54 \text{ m}^2} \end{aligned}$$

$$\begin{aligned} \textcircled{17} \quad V &= (\text{base area})(ht) \\ (\frac{1}{2})(3)(4)(2) &= \boxed{12 \text{ dm}^3} \end{aligned}$$

$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{per})(ht) \\ (2)(\frac{1}{2})(3)(4) + (12)(2) &= \boxed{36 \text{ dm}^2} \end{aligned}$$

$$\begin{aligned} \textcircled{18} \quad V &= (\text{base area})(ht) \\ V &= (\pi r^2)(ht) \\ (\pi)(9)^2(50) &= \boxed{4050\pi \text{ m}^3} \\ (3.14)(9)^2(50) &= \boxed{12,717 \text{ m}^3} \end{aligned}$$

$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{cir})(ht) \\ SA &= (2)(\pi r^2) + (2\pi r)(ht) \\ (2)(\pi)(9)^2 + (2)(\pi)(9)(50) &= \boxed{1062\pi \text{ m}^2} \\ (2)(3.14)(9)^2 + (2)(3.14)(9)(50) &= \boxed{3334.68 \text{ m}^2} \end{aligned}$$



## 2. RIGHT TRIANGULAR PRISMS

$$\begin{aligned} \textcircled{1} \quad 45-45-90 \quad \text{leg} &= 5 \text{ m} \\ \text{hypotenuse} &= 5\sqrt{2} \text{ m} \end{aligned}$$

$$\begin{aligned} V &= (\text{base area})(ht) \\ (\frac{1}{2})(5)(5)(8) &= \boxed{100 \text{ m}^3} \end{aligned}$$

$$\begin{aligned} SA &= (2)(\text{base area}) + (\text{per})(ht) \\ (2)(\frac{1}{2})(5)(5) + (10 + 5\sqrt{2})(8) \\ (25) + (80 + 40\sqrt{2}) &= \boxed{105 + 40\sqrt{2} \text{ m}^2} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 30-60-90 \quad \text{long leg} &= 9 \text{ m} \\ \text{short leg} &= 3\sqrt{3}, \quad \text{hyp} = 6\sqrt{3} \\ &(\text{continued}) \end{aligned}$$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(9)(3\sqrt{3})(14) = \boxed{189\sqrt{3} \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(9)(3\sqrt{3}) + (9+9\sqrt{3})(14)$$

$$(27\sqrt{3}) + (126 + 126\sqrt{3})$$

$$\boxed{126 + 153\sqrt{3} \text{ m}^2}$$

- ③ Use Pythagorean Theorem  
legs 3, 4  $\rightarrow$  hyp = 5

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(3)(4)(14) = \boxed{84 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(3)(4) + (12)(14) = \boxed{180 \text{ m}^2}$$

- ④ Use Pythagorean Theorem  
legs 4, 8  $\rightarrow$  hyp =  $4\sqrt{5}$   
 $4^2 + 8^2 = c^2$   
 $c^2 = 80$   $c = \sqrt{80} = 4\sqrt{5}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(4)(8)(9) = \boxed{144 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(4)(8) + (12 + 4\sqrt{5})(9)$$

$$(32) + (108 + 36\sqrt{5})$$

$$\boxed{140 + 36\sqrt{5} \text{ m}^2}$$

- ⑤ 45-45-90 hyp = 10  
legs =  $5\sqrt{2}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(5\sqrt{2})(5\sqrt{2})(10) = \boxed{250 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(5\sqrt{2})(5\sqrt{2}) + (10 + 10\sqrt{2})(10)$$

$$(50) + (100 + 100\sqrt{2}) = \boxed{150 + 100\sqrt{2} \text{ m}^2}$$

- ⑥ Use Pythagorean Theorem  
leg 8, hyp 12  $\rightarrow$  leg =  $4\sqrt{5}$   
 $8^2 + b^2 = 12^2$   
 $b^2 = 80$   $b = \sqrt{80} = 4\sqrt{5}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(8)(4\sqrt{5})(5) = \boxed{80\sqrt{5} \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(8)(4\sqrt{5}) + (20 + 4\sqrt{5})(5)$$

$$(32\sqrt{5}) + (100 + 20\sqrt{5}) = \boxed{100 + 52\sqrt{5} \text{ m}^2}$$

- ⑦ 45-45-90 leg = 6  
hypotenuse =  $6\sqrt{2}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(6)(6)(9) = \boxed{162 \text{ cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(6)(6) + (12 + 6\sqrt{2})(9)$$

$$(36) + (108 + 54\sqrt{2})$$

$$\boxed{144 + 54\sqrt{2} \text{ cm}^2}$$

- ⑧ 30-60-90 long leg = 6  
short leg =  $2\sqrt{3}$ , hyp =  $4\sqrt{3}$   
(continued)



$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(6)(2\sqrt{3})(8) = \boxed{48\sqrt{3}\text{cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(6)(2\sqrt{3}) + (6+6\sqrt{3})(8)$$

$$(12\sqrt{3}) + (48 + 48\sqrt{3})$$

$$\boxed{48 + 60\sqrt{3}\text{cm}^2}$$

⑨ 45-45-90 hyp 8  
legs =  $4\sqrt{2}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(4\sqrt{2})(4\sqrt{2})(5) = \boxed{80\text{cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(4\sqrt{2})(4\sqrt{2}) + (8 + 8\sqrt{2})(5)$$

$$(32) + (40 + 40\sqrt{2})$$

$$\boxed{72 + 40\sqrt{2}\text{cm}^2}$$

⑩ 30-60-90 long leg =  $12\sqrt{3}$   
short leg = 12, hyp = 24

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(12)(12\sqrt{3})(15) = \boxed{1080\sqrt{3}\text{m}^3}$$

AS MUCH AS I HATE GETTING  
NOTHING BUT BILLS  
... AT LEAST IT'S CONSOLING  
TO KNOW SOMEBODY CARES !!



$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(12)(12\sqrt{3}) + (36 + 12\sqrt{3})(15)$$

$$(144\sqrt{3}) + (540 + 180\sqrt{3})$$

$$\boxed{540 + 324\sqrt{3}\text{m}^2}$$

### 3. REVIEW

①  $V = (\text{base area})(ht)$   
 $V = (\pi r^2)(ht)$

$$(\pi)(2)^2(7) = \boxed{28\pi\text{m}^3}$$

$$(3.14)(2)^2(7) = \boxed{87.92\text{m}^3}$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$(2)(\pi)(2)^2 + (2)(\pi)(2)(7) = \boxed{36\pi\text{m}^2}$$

$$(2)(3.14)(2)^2 + (2)(3.14)(2)(7)$$

$$\boxed{113.04\text{m}^2}$$

②  $V = (\text{base area})(ht)$   
 $(10)(5)(8) = \boxed{400\text{cm}^3}$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)(10)(5) + (30)(8) = \boxed{340\text{cm}^2}$$

③  $V = (\text{base area})(ht)$   
 $(4)(4)(7) = \boxed{112\text{dm}^3}$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)(4)(4) + (16)(7) = \boxed{144\text{dm}^2}$$

④  $V = (\text{base area})(ht)$   
 $\left(\frac{1}{2}\right)(24)(18)(40) = \boxed{8640\text{cm}^3}$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(24)(18) + (72)(40)$$

$$\boxed{3312 \text{ cm}^2}$$

$$\textcircled{5} V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$(\pi)(1)^2(35) = \boxed{35\pi \text{ m}^3}$$

$$(3.14)(1)^2(35) = \boxed{109.9 \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$(2)(\pi)(1)^2 + (2)(\pi)(1)(35) = \boxed{72\pi \text{ m}^2}$$

$$(2)(3.14)(1)^2 + (2)(3.14)(1)(35) = \boxed{226.08 \text{ m}^2}$$

$$\textcircled{8} \text{ Use Pythagorean Theorem}$$

legs 4, 6  $\rightarrow$  hyp =  $2\sqrt{13}$

$$4^2 + 6^2 = c^2$$

$$c^2 = 52 \quad c = \sqrt{52} = 2\sqrt{13}$$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(4)(6)(9) = \boxed{108 \text{ cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(4)(6) + (10 + 2\sqrt{13})(9)$$

$$(24) + (90 + 18\sqrt{13})$$

$$\boxed{114 + 18\sqrt{13} \text{ cm}^2}$$

$$\textcircled{6} 30-60-90 \text{ hyp} = 20$$

short leg = 10, long leg =  $10\sqrt{3}$

$$V = (\text{base area})(ht)$$

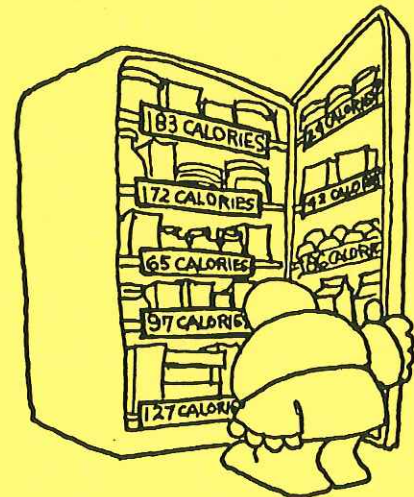
$$\left(\frac{1}{2}\right)(10)(10\sqrt{3})(12) = \boxed{600\sqrt{3} \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(10)(10\sqrt{3}) + (30 + 10\sqrt{3})(12)$$

$$(100\sqrt{3}) + (360 + 120\sqrt{3})$$

$$\boxed{360 + 220\sqrt{3} \text{ m}^2}$$



$$\textcircled{7} 45-45-90 \text{ hyp} = 12$$

legs =  $6\sqrt{2}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(6\sqrt{2})(6\sqrt{2})(6) = \boxed{216 \text{ cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$(2)\left(\frac{1}{2}\right)(6\sqrt{2})(6\sqrt{2}) + (12 + 12\sqrt{2})(6)$$

$$(72) + (72 + 72\sqrt{2}) = \boxed{144 + 72\sqrt{2} \text{ cm}^2}$$

$$\textcircled{9} 30-60-90 \text{ short leg} = 2$$

hyp = 4, long leg =  $2\sqrt{3}$

$$V = (\text{base area})(ht)$$

$$\left(\frac{1}{2}\right)(2)(2\sqrt{3})(9)$$

$$\boxed{18\sqrt{3} \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)\left(\frac{1}{2}\right)(2)(2\sqrt{3}) + (6+2\sqrt{3})(9)$$

$$(4\sqrt{3}) + (54 + 18\sqrt{3})$$

$$\boxed{54 + 22\sqrt{3} \text{ m}^2}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)\left(\frac{1}{2}\right)(9)(12) + (36)(20)$$

$$\boxed{828 \text{ cm}^2}$$

⑩ 45-45-90 legs = 3  
hypotenuse =  $3\sqrt{2}$

$$V = (\text{base area})(\text{ht})$$

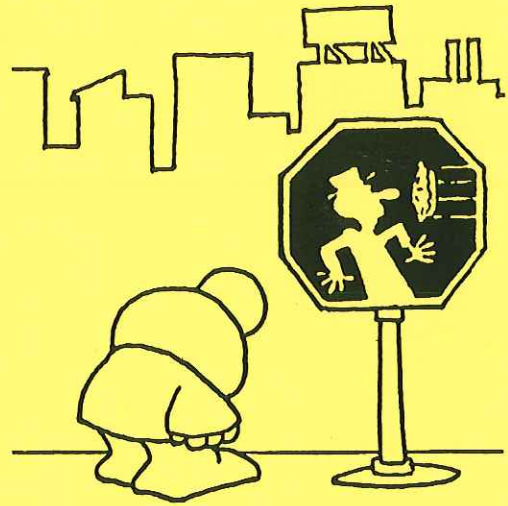
$$\left(\frac{1}{2}\right)(3)(3)(5) = \boxed{22.5 \text{ cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$(2)\left(\frac{1}{2}\right)(3)(3) + (6 + 3\sqrt{2})(5)$$

$$(9) + (30 + 15\sqrt{2})$$

$$\boxed{39 + 15\sqrt{2} \text{ cm}^2}$$



⑪ Use Pythagorean Theorem  
leg 9, hyp 15  $\rightarrow$  leg 12

$$9^2 + b^2 = 15^2$$

$$81 + b^2 = 225$$

$$b^2 = 144 \quad b = \sqrt{144} = 12$$

note: Pythagorean triple

$$(3-4-5) \times 3 = 9-12-15$$

$$V = (\text{base area})(\text{ht})$$

$$\left(\frac{1}{2}\right)(9)(12)(20) = \boxed{1080 \text{ cm}^3}$$

# Cumulative Review

**REVIEW #1**

- ① .003
- ② .03
- ③ 300
- ④ 600
- ⑤ 646.00
- ⑥ 646.0
- ⑦ 100,000
- ⑧ 125
- ⑨ 36
- ⑩  $(3 \times 10^2) + (2 \times \frac{1}{10})$   
 $+ (5 \times \frac{1}{10^2})$
- ⑪  $(2 \times 10^3) + (2 \times 10^0)$   
 $+ (2 \times \frac{1}{10^2})$
- ⑫  $(4 \times 10^3) + (4 \times 10^2)$   
 $+ (1 \times \frac{1}{10^2})$
- ⑬  $6 \div 5, \frac{6}{5}$
- ⑭  $5 \overline{)3}, 3 \div 5$
- ⑮  $3 \overline{)2}, \frac{2}{3}$
- ⑯ 2, 3, 5, 7, 11
- ⑰ 25, 26, 27, 28,  
30, 32
- ⑱ 37, 41, 43
- ⑲  $2^3 \times 5^2$

⑳  $2^5 \times 7$

㉑  $5^2 \times 13$

㉒ 6

㉓ 24

㉔ 15

㉕  $1\frac{1}{2}$

㉖  $3\frac{1}{7}$

㉗  $6\frac{1}{2}$

㉘  $\frac{3}{4} \square \frac{4}{5}$

$15 < 16$

㉙  $\frac{5}{3} \square \frac{8}{5}$

$25 > 24$

㉚  $\frac{12}{5} \square \frac{10}{4}$

$48 < 50$

㉛  $6\frac{3}{8} \times \frac{5}{5} = 5\frac{15}{40}$

$-5\frac{3}{5} \times \frac{8}{8} = 5\frac{24}{25}$

$\frac{31}{40}$

㉜  $6\frac{3}{4} \times \frac{7}{7} = 6\frac{21}{28}$

$+ 5\frac{3}{7} \times \frac{4}{4} = 5\frac{12}{28}$

$\frac{12\frac{5}{28}}{\leftarrow} \parallel \frac{33}{28}$

㉝  $4 = 3\frac{7}{7}$

$-2\frac{2}{7} = 2\frac{2}{7}$

$\frac{15}{7}$

㉞  $\frac{15}{24} \times \frac{8}{25}$

$\frac{3}{3} \times \frac{1}{5}$

$\frac{1}{1} \times \frac{1}{5} = \frac{1}{5}$

㉟  $2\frac{1}{5} \div 4$

$\frac{11}{5} \times \frac{1}{4} = \frac{11}{20}$

㊱  $2\frac{3}{5} \div \frac{39}{40}$

$\frac{13}{5} \times \frac{40}{39}$

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

㊲ .0364

㊳ 2520

㊴ .0253

㊵  $\frac{\text{part } n}{\text{whole } 35} = \frac{15}{100}$

$n = 5, 25$

$$\textcircled{41} \frac{\text{part}}{\text{whole}} = \frac{24}{n} = \frac{5}{100}$$

$$n = \boxed{480}$$

$$\textcircled{42} \frac{\text{part}}{\text{whole}} = \frac{9}{27} = \frac{n}{100}$$

$$n = 33.\bar{3} \quad \boxed{33.\bar{3}\%}$$

$$\textcircled{43} .\bar{6}, 66.\bar{6}\%$$

$$\textcircled{44} .015, \frac{3}{200}$$

$$\textcircled{45} 35\%, \frac{7}{20}$$

$$\textcircled{46} \text{kg}$$

$$\textcircled{47} \text{l}$$

$$\textcircled{48} \text{cm}$$

$$\textcircled{49} 3500\text{g}$$

$$\textcircled{50} .25 \text{ m}$$

$$\textcircled{51} 3, 2 \text{ l}$$

$$\textcircled{52} (20-32) \div 1.8$$

$$\boxed{-6.\bar{6}^{\circ}\text{C}}$$

$$\textcircled{53} 80 \times 1.8 + 32$$

$$\boxed{176^{\circ}\text{F}}$$

$$\textcircled{54} 212^{\circ}\text{F}, 100^{\circ}\text{C}$$

$$\textcircled{55} (+6)+(-7)-(-3)$$

$$(+6)+(-7)+(3) = \boxed{2}$$

$$\textcircled{56} (-4) \div (-1) \times (-2)$$

$$(4) \times (-2) = \boxed{-8}$$

$$\textcircled{57} (-3) - (-6) + (-2)$$

$$(-3) + (6) + (-2) = \boxed{1}$$

$$\textcircled{58} \text{mean } 6$$

$$\text{median } 6$$

$$\text{mode } 8$$

$$\text{range } 5$$

$$\textcircled{59} \text{mean } 5.\bar{3}$$

$$\text{median } 5.5$$

$$\text{mode } 2, 8$$

$$\text{range } 7$$

$$\textcircled{60} \text{mean } 4.\bar{3}$$

$$\text{median } 4$$

$$\text{mode } 4$$

$$\text{range } 2$$

$$\textcircled{61} A (-2, -4)$$

$$B (-1, 5)$$

$$\textcircled{62} \text{I, IV}$$

$$\textcircled{63} E (1, 2)$$

$$D (-3, 0)$$

$$\textcircled{64} a = \frac{1}{2}(5)(4)$$

$$a = \boxed{10 \text{ cm}^2}$$

$$p = 5 + 5 + 9$$

$$p = \boxed{19 \text{ cm}}$$

$$\textcircled{65} a = \frac{1}{2}(9)(3)$$

$$a = \boxed{13.5 \text{ m}^2}$$

$$p = \boxed{19.5 \text{ m}}$$



$$\textcircled{66} a = \frac{1}{2}(5)(3.3) = \boxed{8.25 \text{ m}^2}$$

$$p = 6 + 10.5 + 5 = \boxed{21.5 \text{ m}}$$

$$\textcircled{67} a = \frac{1}{2}(6+10)(4) = \boxed{32 \text{ cm}^2}$$

$$p = 4 + 6 + 5.5 + 10 = \boxed{25.5 \text{ cm}}$$

$$\textcircled{68} a = \frac{1}{2}(8+3)(8) = \boxed{44 \text{ m}^2}$$

$$p = 8 + 9 + 3 + 8.6 = \boxed{28.6 \text{ m}}$$

$$\textcircled{69} a = \frac{1}{2}(11+4)(5) = \boxed{37.5 \text{ cm}^2}$$

$$p = 7 + 11 + 5 + 4 = \boxed{27 \text{ cm}}$$

$$\textcircled{70} a = (8)(3) = \boxed{24 \text{ m}^2}$$

$$p = 2(3.5) + 2(8) = \boxed{23 \text{ m}}$$

$$\textcircled{71} a = (5.5)(5) = \boxed{27.5 \text{ cm}^2}$$

$$p = 4(5.5) = \boxed{22 \text{ cm}}$$

$$\textcircled{72} a = (6.5)(2) = \boxed{13 \text{ cm}^2}$$

$$p = 2(6.5) + 2(1.8)$$

$$\boxed{16.6 \text{ cm}}$$

$$\textcircled{73} \quad V = (\text{base area})(ht)$$

$$V = (4)(3)(7) = \boxed{84 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(ht)$$

$$SA = (2)(4)(3) + (14)(7) = \boxed{122 \text{ m}^2}$$

$$\textcircled{74} \quad V = (\text{base area})(ht)$$

$$V = (9)(2)(5.5) = \boxed{99 \text{ cm}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(ht)$$

$$SA = (2)(9)(2) + (22)(5.5) = \boxed{157 \text{ cm}^2}$$

$$\textcircled{75} \quad V = (\text{base area})(ht)$$

$$V = (3.5)(4.5)(6) = \boxed{94.5 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(ht)$$

$$SA = (2)(3.5)(4.5) + (16)(6) = \boxed{127.5 \text{ m}^2}$$

$$\textcircled{76} \quad V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$V = (\pi)(3)^2(9) = \boxed{81\pi \text{ cm}^3}$$

$$V = (3.14)(3)^2(9) = \boxed{254.34 \text{ cm}^3}$$

$$SA = 2(\text{base area}) + (\text{cir})(ht)$$

$$SA = 2(\pi r^2) + (2\pi r)(ht)$$

$$SA = (2)(\pi)(3)^2 + (2)(\pi)(3)(9) = \boxed{72\pi \text{ cm}^2}$$

$$SA = (2)(3.14)(3)^2 + (2)(3.14)(3)(9) = \boxed{226.08 \text{ cm}^2}$$

$$\textcircled{77} \quad V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$V = (\pi)(4)^2(11) = \boxed{176\pi \text{ m}^3}$$

$$V = (3.14)(4)^2(11) = \boxed{552.64 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{cir})(ht)$$

$$SA = 2(\pi r^2) + (2\pi r)(ht)$$

$$SA = (2)(\pi)(4)^2 + (2)(\pi)(4)(11)$$

$$SA = (2)(3.14)(4)^2 + (2)(3.14)(4)(11)$$

$$\boxed{120\pi \text{ m}^2}$$

$$\boxed{376.8 \text{ m}^2}$$

$$\textcircled{78} \quad \text{radius} = 2.5 \text{ m}$$

$$V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$V = (\pi)(2.5)^2(12) = \boxed{75\pi \text{ m}^3}$$

$$V = (3.14)(2.5)^2(12) = \boxed{235.5 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{cir})(ht)$$

$$SA = 2(\pi r^2) + (2\pi r)(ht)$$

$$SA = (2)(\pi)(2.5)^2 + (2)(\pi)(2.5)(12)$$

$$SA = (2)(3.14)(2.5)^2 + (2)(3.14)(2.5)(12)$$

$$\boxed{72.5\pi \text{ m}^2}$$

$$\boxed{227.65 \text{ m}^2}$$



$$\textcircled{79} 3, 9$$

$$\textcircled{80} 2, 5, 10, 3, 4, 6$$

$$\textcircled{81} 3$$

$$\textcircled{82} \frac{\left(\frac{1\frac{3}{4}}{2}\right)}{\left(\frac{3}{3}\right)} = \frac{\left(\frac{7}{8}\right)}{\left(\frac{3}{3}\right)} = \boxed{\frac{7}{24}}$$

$$1\frac{3}{4} \div 2 \quad \frac{7}{8} \div 3$$

$$\frac{7}{4} \times \frac{1}{2} = \frac{7}{8} \quad \frac{7}{8} \times \frac{1}{3} = \frac{7}{24}$$

$$\textcircled{83} \frac{\left(\frac{3}{5}\right)}{\left(\frac{1\frac{1}{2}}{2}\right)} = \frac{\left(\frac{3}{5}\right)}{\left(\frac{3}{4}\right)} = \boxed{\frac{4}{5}}$$

$$1\frac{1}{2} \div 2 \quad \frac{3}{5} \div \frac{3}{4}$$

$$\frac{3}{2} \times \frac{1}{2} = \frac{3}{4} \quad \frac{3}{5} \times \frac{4}{3} = \frac{4}{5}$$

$$\textcircled{84} \frac{\left(\frac{2}{\left(\frac{3}{5}\right)}\right)}{\left(\frac{1}{5}\right)} = \frac{\left(\frac{10}{3}\right)}{\left(\frac{1}{5}\right)} = \boxed{16\frac{2}{3}}$$

$$2 \div \frac{3}{5} \quad \frac{10}{3} \div \frac{1}{5}$$

$$2 \times \frac{5}{3} = \frac{10}{3} \quad \frac{10}{3} \times \frac{5}{1} = \frac{50}{3}$$

$$\textcircled{85} \left[(-2) - (-4)\right]^2 - \frac{(-3)^2}{4^0}$$

$$[2]^2 - \frac{9}{1}$$

$$(4) - (9) = \boxed{-5}$$

$$\textcircled{86} -3^2 - (-2)^2 \times (-3)$$

$$-9 - (4) \times (-3)$$

$$-9 - (-12) = \boxed{3}$$

$$\textcircled{87} (-4)^2 - 3^2 \times (-1)^0$$

$$(16) - 9 \times (1)$$

$$(16) - (9) = \boxed{7}$$

$$\textcircled{88} I, O$$

$$\textcircled{89} E, C, F$$

$$\textcircled{90} I, O$$

$$\textcircled{91} 6 - 3(2n - 1) = 2n$$

$$6 - 6n + 3 = 2n$$

$$9 - 6n = 2n$$

$$9 = 8n$$

$$\left(\frac{1}{8}\right)(9) = \left(\frac{1}{8}\right)(8n)$$

$$\frac{9}{8} = n \quad \boxed{n = 9/8}$$

$$\textcircled{92} \frac{3n}{2} - 3n = n - 6$$

$$2\left[\frac{3n}{2} - 3n = n - 6\right]$$

$$3n - 6n = 2n - 12$$

$$-3n = 2n - 12$$

$$-5n = -12$$

$$\left(-\frac{1}{5}\right)(-5n) = \left(-\frac{1}{5}\right)(-12)$$

$$\boxed{n = 12/5}$$

$$\textcircled{93} \frac{n}{3} - 2(n - 2) = 6$$

$$\frac{n}{3} - 2n + 4 = 6$$

$$3\left[\frac{n}{3} - 2n + 4 = 6\right]$$

$$n - 6n + 12 = 18$$

$$-5n = 6$$

$$\left(-\frac{1}{5}\right)(-5n) = \left(-\frac{1}{5}\right)(6)$$

$$\boxed{n = -6/5}$$

$$\textcircled{94} 3 - 2(n - 2) < -3$$

$$3 - 2n + 4 < -3$$

$$7 - 2n < -3$$

$$-2n < -10$$

$$\left(-\frac{1}{2}\right)(-2n) > \left(-\frac{1}{2}\right)(-10)$$

$$\boxed{n > 5}$$

$$\textcircled{95} \frac{2n}{3} - 3n \geq n - 1$$

$$3\left[\frac{2n}{3} - 3n \geq n - 1\right]$$

$$2n - 9n \geq 3n - 3$$

$$-7n \geq 3n - 3$$

$$-10n \geq -3$$

$$\left(-\frac{1}{10}\right)(-10n) \leq \left(-\frac{1}{10}\right)(-3)$$

$$\boxed{n \leq 3/10}$$

$$\textcircled{96} 4 - \frac{n}{2} < 3(n - 1)$$

$$2\left[4 - \frac{n}{2} < 3n - 3\right]$$

$$8 - n < 6n - 6$$

$$8 - 7n < -6$$

$$-7n < -14$$

$$\left(-\frac{1}{7}\right)(-7n) > \left(-\frac{1}{7}\right)(-14)$$

$$\boxed{n > 2}$$

$$\textcircled{97} a = \pi r^2$$

$$a = \pi(7)^2 = \boxed{49\pi\text{cm}^2}$$

$$a = (3.14)(7)^2 = \boxed{153.86\text{cm}^2}$$

$$C = 2\pi r$$

$$C = (2)(\pi)(7) = 14\pi \text{ cm}$$

$$C = (2)(3.14)(7) = 43.96 \text{ cm}$$

98) radius = 4.5 cm

$$A = \pi r^2$$

$$A = (\pi)(4.5)^2 = 20.25\pi \text{ cm}^2$$

$$A = (3.14)(4.5)^2 = 63.585 \text{ cm}^2$$

$$C = 2\pi r$$

$$C = (2)(\pi)(4.5) = 9\pi \text{ cm}$$

$$C = (2)(3.14)(4.5) = 28.26 \text{ cm}$$

99)  $A = \pi r^2$

$$A = (\pi)(2)^2 = 4\pi \text{ m}^2$$

$$A = (3.14)(2)^2 = 12.56 \text{ m}^2$$

$$C = 2\pi r$$

$$C = (2)(\pi)(2) = 4\pi \text{ m}$$

$$C = (2)(3.14)(2) = 12.56 \text{ m}$$

100) Central angle

$$360 - 2(110) = 140^\circ$$

$$A = \pi r^2 (\text{part})$$

$$A = \pi (3)^2 \left(\frac{140}{360}\right) = 3.5\pi \text{ cm}^2$$

$$A = (3.14)(3)^2 \left(\frac{140}{360}\right) = 10.99 \text{ cm}^2$$

$$C = 2\pi r (\text{part}) + 4r$$

$$C = 2(\pi)(3) \left(\frac{140}{360}\right) + (4)(3) = 2.3\pi + 12 \text{ cm}$$

$$C = 2(3.14)(3) \left(\frac{140}{360}\right) + (4)(3) = 19.326 \text{ cm}$$

101) Central angle =  $180^\circ$

$$A = \pi r^2 (\text{part})$$

$$A = (\pi)(5)^2 \left(\frac{180}{360}\right) = 12.5\pi \text{ m}^2$$

$$A = (3.14)(5)^2 \left(\frac{180}{360}\right) = 39.25 \text{ m}^2$$

$$C = 2\pi r (\text{part}) + 2r$$

$$C = 2(\pi)(5) \left(\frac{180}{360}\right) + (2)(5)$$

$$C = 2(3.14)(5) \left(\frac{180}{360}\right) + (2)(5)$$

$$5\pi + 10 \text{ m} \quad 25.7 \text{ m}$$

102) Central angle

$$180 - (30 + 50) = 100$$

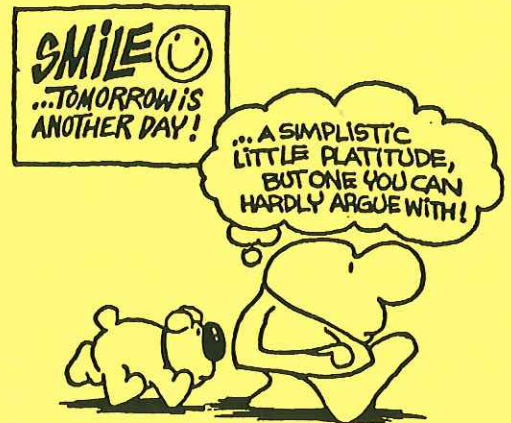
$$100^\circ \rightarrow 2 \text{ unlabeled sectors}$$

$$100 + 60 = 160^\circ$$

$$A = \pi r^2 (\text{part})$$

$$A = (\pi)(4)^2 \left(\frac{160}{360}\right) = 7.1\pi \text{ m}^2$$

$$A = (3.14)(4)^2 \left(\frac{160}{360}\right) = 22.328 \text{ m}^2$$



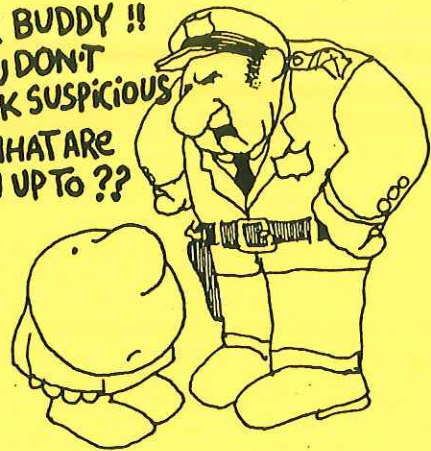


$$C = 2\pi r (\text{part}) + 6r$$

$$C = (2)(\pi)(4)\left(\frac{160}{360}\right) + (6)(4) = 3.5\pi + 24\text{m}$$

$$C = (2)(3.14)(4)\left(\frac{160}{360}\right) + (6)(4) = 35.167\text{m}$$

OK BUDDY !!  
YOU DON'T  
LOOK SUSPICIOUS  
...WHAT ARE  
YOU UP TO ??



$$(103) \quad 9 \div \frac{3}{4} \rightarrow 9 \times \frac{4}{3} = 12 \text{ lawns}$$

$$(104) \quad \frac{4}{5} \div 6 \rightarrow \frac{4}{5} \times \frac{1}{6} = \frac{2}{15} \text{ of house}$$

$$(105) \quad \frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$$

$$+ \frac{1}{6} \times \frac{1}{1} = \frac{1}{6}$$

$$\frac{5}{6}$$

→  $1 - \frac{5}{6} = \frac{1}{6}$

$\frac{1}{6}$  of the work left

$$(106) \quad \frac{\text{on sale}}{\text{total}} \quad \frac{35}{n} = \frac{10}{100}$$

$$10n = 3500$$

$$n = 350 \text{ total items}$$

$$350 - 35 = 315 \text{ not on sale}$$

$$(107) \quad \frac{\text{girls}}{\text{class}} \quad \frac{11}{25} = \frac{n}{100}$$

$$25n = 1100$$

$$n = 44\% \text{ girls}$$

$$100 - 44 = 56\% \text{ boys}$$

$$(108) \quad \frac{\text{1st \& 2nd yr.}}{\text{all players}} \quad \frac{n}{350} = \frac{34}{100}$$

$$100n = 11,900$$

$$n = 119 \text{ 1st \& 2nd yr.}$$

$$350 - 119 = 231 \text{ players}$$

$$(109) \quad \frac{\text{discount}}{\text{org. pr.}} \quad \frac{n}{120} = \frac{8}{100}$$

$$100n = 960$$

$$n = 9.6$$

$$\$120 - \$9.60 = \$110.40$$

$$(110) \quad \frac{\text{selling pr.}}{\text{org. pr.}} \quad \frac{2.40}{3.00} = \frac{n}{100}$$

$$3n = 240$$

$$n = 80$$

$$100 - 80 = 20 \quad 20\% \text{ discount}$$

$$(111) \quad \frac{\text{discount}}{\text{org. pr.}} \quad \frac{2.60}{n} = \frac{20}{100}$$

$$20n = 260$$

$$n = 13 \quad 13 - 2.60 = \$10.40$$

$$(112) \quad 4a - 2ab^2$$

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

$$4(-3) - 2(-3)(1)$$

$$(-12) - (-6) = -6$$

$$\begin{aligned} (113) \quad & 3b(2a-c) \\ & 3(-1)(2(-3)-(-2)) \\ & 3(-1)(-6+2) \\ & 3(-1)(-4) = \boxed{12} \end{aligned}$$

$$\begin{aligned} (114) \quad & -2b^3 - 2ac^2 \\ & -2(-1)^3 - 2(-3)(-2)^2 \\ & -2(-1) - 2(-3)(4) \\ & (2) - (-24) \\ & (2) + (24) = \boxed{26} \end{aligned}$$

$$\begin{aligned} (115) \quad & 2a(a-1) - 2(a+3a^2) \\ & 2a^2 - 2a - 2a - 6a^2 \\ & \boxed{-4a^2 - 4a} \end{aligned}$$

$$\begin{aligned} (116) \quad & 2ab - 3a(b-1) + 4 \\ & 2ab - 3ab + 3a + 4 \\ & \boxed{-ab + 3a + 4} \end{aligned}$$

$$\begin{aligned} (117) \quad & a^2 - 2a(a+b) - 3ab \\ & a^2 - 2a^2 - 2ab - 3ab \\ & \boxed{-a^2 - 5ab} \end{aligned}$$

$$\begin{aligned} (118) \quad & x = .\overline{23} \\ & 100x = 23.\overline{23} \\ & -x = \quad .\overline{23} \\ \hline & 99x = 23 \quad x = \boxed{\frac{23}{99}} \end{aligned}$$

$$\begin{aligned} (119) \quad & x = .\overline{15} \rightarrow 10x = 1.\overline{5} \\ & 100x = 15.\overline{5} \\ & 10x = \quad 1.\overline{5} \\ \hline & 90x = 14 \quad x = \boxed{\frac{14}{90}} \end{aligned}$$

$$\begin{aligned} (120) \quad & x = .\overline{021} \rightarrow 10x = .\overline{21} \\ & 1000x = 21.\overline{21} \\ & -10x = \quad .\overline{21} \\ \hline & 990x = 21 \\ & x = \frac{21}{990} = \boxed{\frac{7}{330}} \end{aligned}$$

$$(121) \quad \sqrt{180} = \sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 5} = \boxed{6\sqrt{5}}$$

$$(122) \quad \sqrt{96} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} = \boxed{4\sqrt{6}}$$

$$(123) \quad \sqrt{72} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3} = \boxed{6\sqrt{2}}$$

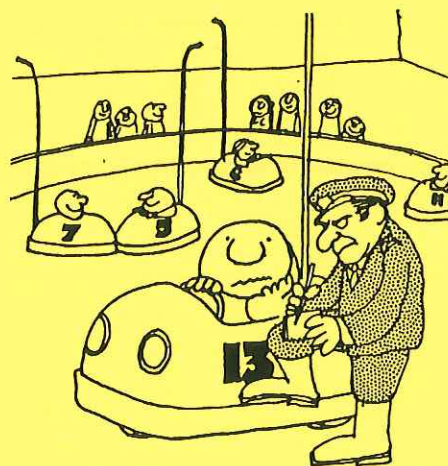
$$\begin{aligned} (124) \quad & 2\sqrt{6} + 3\sqrt{24} \\ & 2\sqrt{6} + 6\sqrt{6} \\ & \boxed{8\sqrt{6}} \end{aligned}$$

$$(125) \quad (3\sqrt{2})(2\sqrt{6}) = 6\sqrt{12} = \boxed{12\sqrt{3}}$$

$$\begin{aligned} (126) \quad & 3\sqrt{2}(\sqrt{10} + 2\sqrt{2}) \\ & 3\sqrt{20} + 6\sqrt{4} \\ & \boxed{6\sqrt{5} + 12} \end{aligned}$$

$$\begin{aligned} (127) \quad & 4^2 + 6^2 = n^2 \\ & 16 + 36 = n^2 \\ & 52 = n^2 \\ & n = \sqrt{52} = \boxed{2\sqrt{13} \text{ m}} \end{aligned}$$

$$\begin{aligned} (128) \quad & (\sqrt{2})^2 + n^2 = (3\sqrt{2})^2 \\ & 2 + n^2 = 18 \\ & n^2 = 16 \\ & n = \sqrt{16} = \boxed{4 \text{ m}} \end{aligned}$$



$$\begin{aligned} (129) \quad & n^2 + 6^2 = 8^2 \\ & n^2 + 36 = 64 \\ & n^2 = 28 \\ & n = \sqrt{28} = \boxed{2\sqrt{7} \text{ m}} \end{aligned}$$

$$(130) \quad \text{a) short leg} = \boxed{\frac{9}{2} \text{ m}}$$

$$\text{b) long leg} = \boxed{\frac{9}{2}\sqrt{3} \text{ m}}$$

$$(131) \quad \text{a) short leg} = \frac{(9\sqrt{6})(\sqrt{3})}{3} = \boxed{9\sqrt{2} \text{ m}}$$

$$\text{b) hypotenuse} = \boxed{18\sqrt{2} \text{ m}}$$

(132) a) short leg

$$\frac{(6)(\sqrt{3})}{3} = \boxed{2\sqrt{3} \text{ m}}$$

b) hypotenuse

$$(2\sqrt{3})(2) = \boxed{4\sqrt{3} \text{ m}}$$

(133) leg =  $\frac{(8)(\sqrt{2})}{(2)} = \boxed{4\sqrt{2} \text{ m}}$

(134) hyp =  $(2\sqrt{6})(\sqrt{2}) = 2\sqrt{12} = \boxed{4\sqrt{3} \text{ m}}$

(135) leg =  $\frac{(6\sqrt{6})(\sqrt{2})}{(2)} = 3\sqrt{12} = \boxed{6\sqrt{3} \text{ m}}$

(136) Triangle : long leg = 9  
short leg =  $3\sqrt{3}$ , hyp =  $6\sqrt{3}$

$$V = (\text{base area})(\text{ht})$$

$$V = \left(\frac{1}{2}\right)(9)(3\sqrt{3})(4) = \boxed{54\sqrt{3} \text{ cm}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(\text{ht})$$

$$SA = 2\left(\frac{1}{2}\right)(9)(3\sqrt{3}) + (9+9\sqrt{3})(4)$$

$$SA = (27\sqrt{3}) + (36+36\sqrt{3}) = \boxed{36+63\sqrt{3} \text{ cm}^2}$$

(137) Use Pythagorean Theorem

$$a^2 + 12^2 = 13^2 \quad \text{triple}$$

$$a^2 = 25 \quad 5-12-13$$

$$a = 5$$

$$V = (\text{base area})(\text{ht})$$

$$V = \left(\frac{1}{2}\right)(5)(12)(6) = \boxed{180 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(\text{ht})$$

$$SA = 2\left(\frac{1}{2}\right)(5)(12) + (30)(6)$$

$$SA = (60) + (180) = \boxed{240 \text{ m}^2}$$

(138) Triangle : hypotenuse = 8  
legs =  $8\sqrt{2}/2 = 4\sqrt{2}$

$$V = (\text{base area})(\text{ht})$$

$$V = \left(\frac{1}{2}\right)(4\sqrt{2})(4\sqrt{2})(10) = \boxed{160 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(\text{ht})$$

$$SA = 2\left(\frac{1}{2}\right)(4\sqrt{2})(4\sqrt{2}) + (8+8\sqrt{2})(10)$$

$$SA = (32) + (80+80\sqrt{2})$$

$$SA = \boxed{112 + 80\sqrt{2} \text{ m}^2}$$

IT'S SIMPLE COMMON SENSE  
...IF EVERYBODY WAS OUT TO  
GET YOU, THEY'D HAVE  
GOTTEN YOU BY NOW!



(139) Use Pythagorean Theorem

$$a^2 + 12^2 = 13^2 \quad \text{triple}$$

$$a^2 = 25 \quad 5-12-13$$

$$a = 5$$

$$V = (\text{base area})(\text{ht})$$

$$V = \left(\frac{1}{2}\right)(5)(12)(6) = \boxed{180 \text{ m}^3}$$

$$SA = 2(\text{base area}) + (\text{per})(\text{ht})$$

$$SA = 2\left(\frac{1}{2}\right)(5)(12) + (30)(6)$$

$$SA = (60) + (180) = \boxed{240 \text{ m}^2}$$

(139) e-g  $\square$  d-c

(-)  $\square$  (+)

(141)  $-2d \square d^2$

$-2d$  is (+) and  
farther from  
0,  $d^2$  is (+) and  
closer to 0.

(140)  $e^2 \square e^3$

a fraction gets  
closer to 0 as its  
exponent gets  
larger

$$\begin{array}{r} \textcircled{142} \\ \boxed{-3} \\ \boxed{-1} \\ +1 \end{array} \begin{array}{l} x \\ x+2 \\ x+4 \end{array} \quad \begin{array}{l} 2x = 3(x+4) - 9 \\ 2x = 3x + 12 - 9 \\ 2x = 3x + 3 \\ -x = 3 \\ x = -3 \end{array}$$

$$\begin{array}{l} \textcircled{143} \\ 3n - (2n - 2) = 16 \\ 3n - 2n + 2 = 16 \\ n + 2 = 16 \\ n = \boxed{14} \end{array}$$

$$\begin{array}{r} \textcircled{144} \\ 3 \\ 4 \\ \boxed{5} \end{array} \begin{array}{l} x \\ x+1 \\ x+2 \end{array} \quad \begin{array}{l} (x+2) - 2(x+1) = -3 \\ x+2 - 2x - 2 = -3 \\ -x = -3 \\ x = 3 \end{array}$$

$$\textcircled{145} \quad \frac{3}{6} = \frac{1}{x} \quad \begin{array}{l} 3x = 6 \\ x = \boxed{2m} \end{array}$$

$$\textcircled{146} \quad \frac{2}{5} = \frac{10}{x} \quad \begin{array}{l} 2x = 50 \\ x = \boxed{25m} \end{array}$$

$$\textcircled{147} \quad \frac{4}{6} = \frac{x}{21} \quad \begin{array}{l} 6x = 84 \\ x = \boxed{14m} \end{array}$$

$$\textcircled{148} \quad \boxed{x = 60} \quad \text{Supplementary to } 120^\circ$$

$$\boxed{n = 30} \quad \begin{array}{l} 2n = 60 \\ \text{Vertical angles} \end{array}$$

$$\boxed{y = 30} \quad \begin{array}{l} 4y = 120 \\ \text{vertical angles} \end{array}$$

$$\textcircled{149} \quad \boxed{a = 100} \quad \text{Supplementary to } 80^\circ$$

$$\boxed{b = 50} \quad 30 + 100 + b = 180$$

$$\begin{array}{l} \textcircled{150} \quad n = 30 \text{ because } n \text{ is Supp.} \\ \text{to } 150^\circ - \text{therefore:} \\ n = x - 10 \\ 30 = x - 10 \\ 40 = x \quad \longrightarrow \quad 2x = 80 \\ \quad \quad \quad \quad \quad \quad \quad \quad x = 40 \end{array}$$

Pentagon has  $540^\circ$

$$90 + 140 + 100 + 150 + a = 540$$

$\downarrow$                        $\downarrow$   
 supp of              supp of  
 $x = 40$                $2x = 80$

$$480 + a = 540$$

$$\boxed{a = 60}$$

- $\textcircled{151}$  a)  $\angle b, \angle c, \angle f, \angle g$   
 b)  $\angle f$



- 152 a)  $\angle f$   
b) alternate interior  $\angle$ 's

- 153 a)  $3a - 4c$   
 $3(40) - 4(140) = \boxed{-440}$   
b)  $\angle a$  and  $\angle d$

- 154 a)  $\$ .82/\ell$  b)  $.5\ell$  for  $\$.55$   
 $\$1.10/\ell$

- 155 a)  $\$4/\text{kg}$  b)  $.3 \text{ kg}$  for  $\$1.20$   
 $\boxed{=}$   $\$4/\text{kg}$

- 156 a)  $20 \text{ cm}$  for  $\$3.50$  b)  $\$.15/\text{cm}$   
 $\$.17\frac{1}{2}/\text{cm}$  or  $\$.18$



- 6 23, 29  
60, 62, 63, 64, 65, 66

- 7  $96 = 2^5 \times 3$   
 $162 = 2 \times 3^4$

- 8  $\frac{20}{3} > 4\frac{1}{2}$   $\frac{23}{5} > 2\frac{2}{5}$

- 9  $\frac{8}{3} < \frac{13}{5}$   $\frac{17}{4} < \frac{13}{3}$   
 $40 > 39$   $15 < 52$

- 10  $6\frac{2}{3} \times \frac{8}{8} = \frac{5\cancel{16}^{40}}{24}$   $9 = 8\frac{7}{7}$   
 $-2\frac{7}{8} \times \frac{3}{3} = 2\frac{21}{24}$   $-1\frac{4}{7} = 1\frac{4}{7}$   
 $\boxed{3\frac{19}{24}}$   $\boxed{7\frac{3}{7}}$

- 11  $3\frac{2}{3} \div 2\frac{4}{9}$   $\frac{15}{16} \div 1\frac{7}{8}$   
 $\frac{11}{3} \div \frac{22}{9}$   $\frac{15}{16} \div \frac{15}{8}$   
 $\frac{11}{3} \times \frac{9}{22} = \frac{3}{2} = \boxed{1\frac{1}{2}}$   $\frac{15}{16} \times \frac{8}{15} = \boxed{\frac{1}{2}}$

### REMEDICATION

- 1 .005, 500

- 2 a) 700 d) 700.0  
b) 699.98 e) 700  
c) 700 f) 1000

- 3 10,000,000 81

- 4  $(6 \times 10^4) + (3 \times 10^2) + (2 \times 1/10^3)$   
 $(4 \times 10^5) + (3 \times 1/10^2) + (5 \times 1/10^4)$

- 5  $7\sqrt{6}$   $6/7$   
 $5 \div 4$   $5/4$

$$\textcircled{12} .0346 \quad 230,000$$

$$\textcircled{13} \frac{\text{part}}{\text{whole}} \quad \frac{4.8}{n} = \frac{12}{100} \quad \begin{array}{l} 12n = 480 \\ n = \boxed{40} \end{array}$$

$$\frac{\text{part}}{\text{whole}} \quad \frac{12}{60} = \frac{n}{100} \quad \begin{array}{l} 60n = 1200 \\ n = 20 \\ \boxed{20\%} \end{array}$$

$$\textcircled{14} \frac{4}{5} = .8 = \boxed{80\%}$$

$$.6\% = .006 = \boxed{3/500}$$

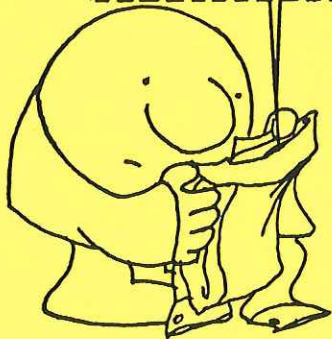
$$7/9 = \boxed{.7}$$

$$2.5\% = .025 = \boxed{1/40}$$

$$2\frac{1}{2} = 2.5 = \boxed{250\%}$$

TUMBLE WASH GENTLY  
IN LUKEWARM WATER  
WITH MILD DETERGENT

...if this doesn't work, use  
scrub brush, laundry soap and  
lots of elbow grease.



$$\textcircled{15} .015 \text{ km} = 1500 \text{ cm}$$

$$1.35 \text{ mm} = .00135 \text{ m}$$

$$45 \text{ kg} = .045 \text{ t}$$

$$\textcircled{16} \text{ kL, cm, g, mm}$$

$$\textcircled{17} (8-32) \div 1.8 = \boxed{-13.\bar{3}^{\circ}\text{C}}$$

$$-6 \times 1.8 + 32 = \boxed{21.2^{\circ}\text{F}}$$

$$\textcircled{18} (+6) - (-3) \times (-2)$$

$$(+6) - (+6)$$

$$(+6) + (-6) = \boxed{0}$$

$$(-2) \times (-1) - (+4)$$

$$(+2) - (+4)$$

$$(+2) + (-4) = \boxed{-2}$$

$\textcircled{19}$ mean	$7.8\bar{3}$	$5.8\bar{3}$
median	7.5	5.5
mode	6, 9	3
range	7	7

$$\textcircled{20} \text{ IV, II}$$

$$\textcircled{21} A = (\frac{1}{2})(9)(6) = \boxed{27 \text{ m}^2}$$

$$P = 9 + 10 + 18 = \boxed{37 \text{ m}}$$

$$A = (\frac{1}{2})(11)(12) = \boxed{66 \text{ cm}^2}$$

$$P = 11 + 13 + 12.3 = \boxed{36.3 \text{ cm}}$$

$$\textcircled{22} A = (\frac{1}{2})(6+2.5)(3.5)$$

$$\boxed{14.875 \text{ m}^2}$$

$$P = 6 + 3.5 + 2.5 + 4.1$$

$$\boxed{16.1 \text{ m}}$$

$$A = \left(\frac{1}{2}\right)(7+2.5)(8) = \boxed{38\text{cm}^2}$$

$$P = 7+8.6+2.5+8.1 = \boxed{26.2\text{cm}}$$

$$\textcircled{23} V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$V = (\pi)(4)^2(12) = \boxed{192\pi\text{m}^3}$$

$$V = (3.14)(4)^2(12) = \boxed{602.88\text{m}^3}$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$SA = (2)(\pi)(4)^2 + (2)(\pi)(4)(12)$$

$$SA = (2)(3.14)(4)^2 + (2)(3.14)(4)(12)$$

$$\boxed{128\pi\text{m}^2} \quad \boxed{401.92\text{m}^2}$$

$$V = (\text{base area})(ht)$$

$$V = (\pi r^2)(ht)$$

$$V = (\pi)(3)^2(7) = \boxed{63\pi\text{cm}^3}$$

$$V = (3.14)(3)^2(7) = \boxed{197.82\text{cm}^3}$$

$$SA = (2)(\text{base area}) + (\text{cir})(ht)$$

$$SA = (2)(\pi r^2) + (2\pi r)(ht)$$

$$SA = (2)(\pi)(3)^2 + (2)(\pi)(3)(7)$$

$$SA = (2)(3.14)(3)^2 + (2)(3.14)(3)(7)$$

$$\boxed{60\pi\text{cm}^2} \quad \boxed{188.4\text{cm}^2}$$

$$\textcircled{24} 3, 9 \quad 2, 5, 10, 3, 4, 6, 9$$

$$\textcircled{25} \frac{\left(\frac{2\frac{1}{2}}{3}\right)}{\left(\frac{3}{\frac{2}{3}}\right)} = \frac{\left(\frac{5}{6}\right)}{\left(\frac{9}{2}\right)} = \boxed{\frac{5}{27}}$$

$$\frac{\left(\frac{1\frac{1}{5}}{5}\right)}{\left(\frac{1\frac{1}{3}}{\frac{3}{4}}\right)} = \frac{\left(\frac{1\frac{1}{5}}{5}\right)}{\left(\frac{16}{9}\right)} = \frac{81}{80} = \boxed{1\frac{1}{80}}$$

$$\textcircled{26} -3^2 - (-3)^2 \times (-1)^4$$

$$-9 - (+9) \times (+1)$$

$$-9 - (+9)$$

$$-9 + (-9) = \boxed{-18}$$

$$(-5)^2 - (-2)^3 \times (-6)^0$$

$$(25) - (-8) \times (1)$$

$$(25) - (-8)$$

$$(25) + (8) = \boxed{33}$$

$$\textcircled{27} I, C, F \quad E, O$$

$$\textcircled{28} \frac{3n}{2} - 4(n-1) = -6$$

$$2\left[\frac{3n}{2} - 4n + 4 = -6\right]$$

$$3n - 8n + 8 = -12$$

$$-5n + 8 = -12$$

$$-5n = -20$$

$$\left(-\frac{1}{5}\right)(-5n) = \left(-\frac{1}{5}\right)(-20)$$

$$\boxed{n=4}$$

$$\frac{5n}{3} - 2(2n-2) = 18$$

$$3\left[\frac{5n}{3} - 4n + 4 = 18\right]$$

$$5n - 12n + 12 = 54$$

$$-7n = 6$$

$$\left(-\frac{1}{7}\right)(-7n) = \left(-\frac{1}{7}\right)(42) \quad \boxed{n=-6}$$

$$(29) \quad 2x - 3(4x - 2) < 10 - 8x$$

$$2x - 12x + 6 < 10 - 8x$$

$$-10x + 6 < 10 - 8x$$

$$-2x + 6 < 10$$

$$-2x < 4$$

$$\left(\frac{1}{2}\right)(-2x) > \left(\frac{1}{2}\right)(4) \quad \boxed{x > -2}$$

$$4x - 2(3x - 1) \geq 3x + 7$$

$$4x - 6x + 2 \geq 3x + 7$$

$$-2x + 2 \geq 3x + 7$$

$$-5x + 2 \geq 7$$

$$-5x \geq 5$$

$$\left(\frac{1}{5}\right)(-5x) \leq \left(\frac{1}{5}\right)(5) \quad \boxed{x \leq -1}$$



$$(30) \quad A = \pi r^2$$

$$A = \pi (9)^2 = \boxed{81\pi \text{ mm}^2}$$

$$A = (3.14)(9)^2 = \boxed{254.34 \text{ mm}^2}$$

$$C = 2\pi r$$

$$C = (2)(\pi)(9) = \boxed{18\pi \text{ mm}}$$

$$C = (2)(3.14)(9) = \boxed{56.52 \text{ mm}}$$

$$A = \pi r^2$$

$$A = (\pi)(7.5)^2 = \boxed{56.25\pi \text{ m}^2}$$

$$A = (3.14)(7.5)^2 = \boxed{176.625 \text{ m}^2}$$

$$C = 2\pi r$$

$$C = (2)(\pi)(7.5) = \boxed{15\pi \text{ m}}$$

$$C = (2)(3.14)(7.5) = \boxed{47.1 \text{ m}}$$

$$(31) \quad \text{Central angle } 100^\circ$$

$$A = \pi r^2 (\text{part})$$

$$A = (\pi)(4)^2 \left(\frac{100}{360}\right) = \boxed{4.4\pi \text{ m}^2}$$

$$A = (3.14)(4)^2 \left(\frac{100}{360}\right) = \boxed{13.95 \text{ m}^2}$$

$$C = 2\pi r (\text{part}) + 2r$$

$$C = (2)(\pi)(4) \left(\frac{100}{360}\right) + (2)(4) = \boxed{2.2\pi + 8 \text{ m}}$$

$$C = (2)(3.14)(4) \left(\frac{100}{360}\right) + (2)(4) = \boxed{14.97 \text{ m}}$$

$$\text{Central angle } 360 - 2(100) = 160^\circ$$

$$A = \pi r^2 (\text{part})$$

$$A = (\pi)(3)^2 \left(\frac{160}{360}\right) = \boxed{4\pi \text{ m}^2}$$

$$A = (3.14)(3)^2 \left(\frac{160}{360}\right) = \boxed{12.56 \text{ m}^2}$$

$$C = 2\pi r (\text{part}) + 4r$$

$$C = (2)(\pi)(3) \left(\frac{160}{360}\right) + (4)(3)$$

$$C = (2)(3.14)(3) \left(\frac{160}{360}\right) + (4)(3)$$

$$\boxed{2.6\pi + 12 \text{ m}}$$

$$\boxed{20.373 \text{ m}}$$

$$(32) \quad \frac{1}{4} + \frac{3}{7} = \frac{19}{28} \quad 1 - \frac{19}{28} = \boxed{\frac{9}{28} \text{ class left}}$$

$$\frac{2}{3} \times \frac{1}{5} = \boxed{\frac{2}{15} \text{ speeches}}$$



$$\textcircled{33} \quad \frac{\text{lost}}{\text{total}} = \frac{14}{100} = \frac{70}{100} \quad 70n = 1400$$

$$n = 20 \text{ total}$$

$$20 - 14 = \boxed{6 \text{ games won}}$$

$$\frac{\text{won}}{\text{total}} = \frac{3}{8} = \frac{n}{100} \quad 8 \text{ total games}$$

(3w, 5l)

$$8n = 300$$

$$n = 37.5 \quad \boxed{37.5\% \text{ won}}$$

$$\textcircled{34} \quad \frac{\text{discount}}{\text{org. pr.}} = \frac{3.50}{100} = \frac{5}{100}$$

$$5n = 350$$

$$n = \$70 \text{ org. price}$$

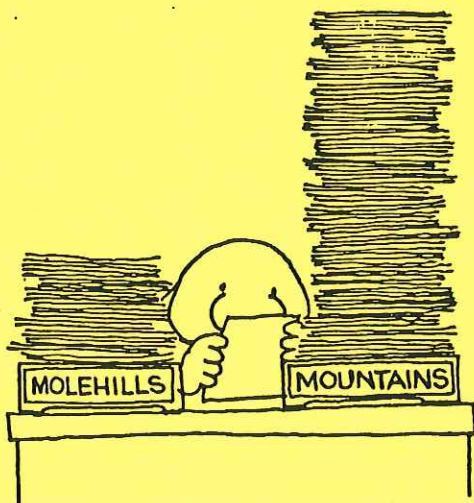
$$70 - 3.50 = \boxed{\$66.50}$$

$$\frac{\text{selling pr.}}{\text{org. pr.}} = \frac{7.40}{8.00} = \frac{n}{100}$$

$$8n = 740$$

$$n = 92.5\% \text{ selling price}$$

$$100 - 92.5 = \boxed{7.5\% \text{ discount}}$$



$$\textcircled{35} \quad 3x^2y - 2xy$$

$$3(-2)^2(-4) - 2(-2)(-4)$$

$$3(4)(-4) - 2(-2)(-4)$$

$$(-48) - (16)$$

$$(-48) + (-16) = \boxed{-64}$$

$$4x(y^2 - x^2)$$

$$4(-2)((-4)^2 - (-2)^2)$$

$$4(-2)(16 - 4)$$

$$4(-2)(12) = \boxed{-96}$$

$$\textcircled{36} \quad 2a(a-3b) - 2ab - a^2$$

$$2a^2 - 6ab - 2ab - a^2$$

$$\boxed{a^2 - 8ab}$$

$$4(a-1) - 2(2a+1)$$

$$4a - 4 - 4a - 2 = \boxed{-6}$$

$$\textcircled{37} \quad x = .\overline{14} \rightarrow 10x = 1.\overline{4}$$

$$100x = 14.\overline{4}$$

$$-10x = \quad 1.\overline{4}$$

$$\hline 90x = 13$$

$$x = \boxed{\frac{13}{90}}$$

$$x = .\overline{026} \rightarrow 10x = \overline{.26}$$

$$1000x = 26.\overline{26}$$

$$-10x = \quad \overline{.26}$$

$$\hline 990x = 26$$

$$x = \frac{26}{990} = \boxed{\frac{13}{495}}$$

$$\textcircled{38} \quad \sqrt{250} = \boxed{5\sqrt{10}}$$

$$\sqrt{120} = \boxed{2\sqrt{30}}$$

$$\textcircled{39} \quad \sqrt{3}(2\sqrt{6} - \sqrt{24})$$

$$2\sqrt{18} - \sqrt{72}$$

$$6\sqrt{2} - 6\sqrt{2} = \boxed{0}$$

$$2\sqrt{2}(3\sqrt{2} - \sqrt{8})$$

$$6\sqrt{4} - 2\sqrt{16}$$

$$(6)(2) - (2)(4)$$

$$12 - 8 = \boxed{4}$$

$$\textcircled{40} \quad (4\sqrt{2})^2 + b^2 = 10^2$$

$$32 + b^2 = 100$$

$$b^2 = 68$$

$$b = \sqrt{68} = \boxed{2\sqrt{17} \text{ m}}$$

$$(6)^2 + (3\sqrt{3})^2 = c^2$$

$$36 + 27 = c^2$$

$$c^2 = 63$$

$$c = \sqrt{63} = \boxed{3\sqrt{7} \text{ m}}$$

$$\textcircled{41} \quad \text{short leg} = 2\sqrt{3} \text{ m}$$

$$\text{hypotenuse} = (2)(2\sqrt{3}) = \boxed{4\sqrt{3} \text{ m}}$$

$$\text{long leg} = (2\sqrt{3})(\sqrt{3}) = \boxed{6 \text{ m}}$$

$$\text{long leg} = 12 \text{ cm}$$

$$\text{short leg} = \frac{(12)(\sqrt{3})}{(3)} = \boxed{4\sqrt{3} \text{ cm}}$$

$$\text{hypotenuse} = (2)(4\sqrt{3}) = \boxed{8\sqrt{3} \text{ cm}}$$

$$\textcircled{42} \quad \text{hypotenuse} = 16 \text{ m}$$

$$\text{leg} = (16)\left(\frac{\sqrt{2}}{2}\right)$$

$$\boxed{8\sqrt{2} \text{ m}}$$

$$\text{leg} = 3\sqrt{2} \text{ m}$$

$$\text{hyp} = (3\sqrt{2})(\sqrt{2})$$

$$\boxed{6 \text{ m}}$$

$$\textcircled{43} \quad \text{long leg} = 6 \text{ m}$$

$$\text{short leg} = (6)\left(\frac{\sqrt{3}}{3}\right)$$

$$\boxed{2\sqrt{3} \text{ m}}$$

$$\text{hyp} = (2)(2\sqrt{3})$$

$$\boxed{4\sqrt{3} \text{ m}}$$

$$V = (\text{base area})(ht)$$

$$V = \left(\frac{1}{2}\right)(2\sqrt{3})(6)(8) = \boxed{48\sqrt{3} \text{ m}^3}$$

$$SA = (2)(\text{base area}) + (\text{per})(ht)$$

$$SA = (2)\left(\frac{1}{2}\right)(2\sqrt{3})(6) + (6 + 6\sqrt{3})(8)$$

$$SA = (12\sqrt{3}) + (48 + 48\sqrt{3}) = \boxed{48 + 60\sqrt{3} \text{ m}^2}$$

$$\text{leg} = 2\sqrt{2}$$

$$\text{hypotenuse} = (2\sqrt{2})(\sqrt{2}) = 4 \text{ m}$$

$$V = (\text{base area})(ht)$$

$$V = \left(\frac{1}{2}\right)(2\sqrt{2})(2\sqrt{2})(5) = \boxed{20 \text{ m}^3}$$

continued

"OF COURSE I HAVE  
"PAST EXPERIENCE"  
... WHAT OTHER KIND  
IS THERE?"



$$SA = (2)(\text{base area}) + (\text{per})(\text{ht})$$

$$SA = (2)\left(\frac{1}{2}\right)(2\sqrt{2})(2\sqrt{2}) + (4+4\sqrt{2})(5)$$

$$SA = (8) + (20 + 20\sqrt{2})$$

$$\boxed{28 + 20\sqrt{2} \text{ m}^2}$$

44) a) .6 l for \$2.20 = \$3.67/l

b) \$3.50/l

a) \$4.07/m  $\boxed{=}$

b) 7m for \$28.50 = \$4.07/m

45) p-m  $\square$  r-t

(+)  $\square$  (-)

$p^2 \square p^4$

p is a negative fraction. Both  $p^2$  and  $p^4$  will be positive.  $p^4$  will be closer to zero (fraction to higher power).

$\frac{m}{n} \square \frac{s}{t}$

Both are positive fractions

$\frac{m}{n} > 1, \frac{s}{t} < 1$

$kmn \square npr$

(-) (+)

46) 9 x  $2(x+1) - (3x-4) = -3$

10 x+1  $2x+2 - 3x+4 = -3$

$\boxed{11}$  x+2  $-x+6 = -3$

x = 9

$3n - (5n+2) = -12$

$3n - 5n - 2 = -12$

$-2n = -10$

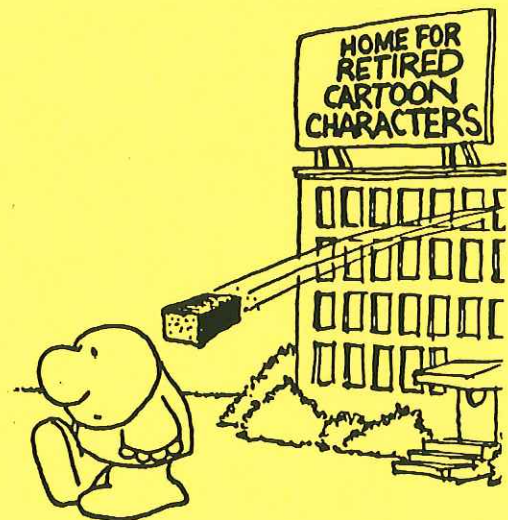
$\left(-\frac{1}{2}\right)(-2n) = \left(-\frac{1}{2}\right)(-10) \quad n = \boxed{5}$

47)  $\frac{5}{12} = \frac{3}{x} \quad 5x = 36 \quad \boxed{7\frac{1}{5} \text{ mm}}$

x = 36/5

$\frac{6}{9} = \frac{10}{x} \quad 6x = 90 \quad \boxed{15 \text{ cm}}$

x = 15



48)  $5x = 40$  vertical  $\angle$ 's

$\boxed{x = 8}$

$10n + 40 = 180$

(10n is supplementary to  $40^\circ$ )

$10n = 140$

$\boxed{n = 14}$

Continued

pentagon has  $540^\circ$

$$90 + 90 + 90 = 270$$

$270^\circ$  left for 2 angles

$$n + \boxed{a} = 180$$

$$2n + \boxed{b} = 180$$

↳ these 2 angles  
equal 270

$$3n + (270) = 360$$

$$3n = 90$$

$$\boxed{n = 30} \quad \boxed{x = 150}$$

x is supplementary to n



- 49) 1)  $\angle g$   
2)  $\angle b$  and  $\angle e$   
3)  $\angle c$  and  $\angle f$  -or-  $\angle b$  and  $\angle g$   
4)  $2h - 3e$   
 $2(25) - 3(155) = \boxed{-415}$

- 50) 1)  $\angle a$   
2) true  
3)  $\angle h, \angle c, \angle f, \angle a$   
4)  $\overleftrightarrow{K}$