

15E

$$1) F = \frac{5}{9}C + 32$$

$$F - 32 = 9/5 C \Rightarrow C = 5/9(F - 32)$$

$$2) W_1 = \frac{L_2 W_2}{L_1} \Rightarrow W_2 = \frac{L_1 W_1}{L_2}$$

$$3) \frac{A}{2\pi r} = \frac{2\pi r}{2\pi r} (H + r)$$

$$\frac{A}{2\pi r} = H + r \Rightarrow \frac{A}{2\pi r} - r = H$$

$$4) \frac{1}{F} + \frac{1}{B} = \frac{1}{A} \Rightarrow A \left(\frac{1}{F} + \frac{1}{B} \right) = 1$$

$$A = \frac{1 \times \frac{BF}{B+F}}{\frac{B+F}{BF} \times \frac{BF}{B+F}} \Rightarrow A = \frac{BF}{B+F}$$

$$5) \frac{D_2 F}{M_2 K} = \frac{M_1 M_2 \cdot D_2}{D_2 \cdot M_2 K}$$

$$M_1 = \frac{D_2 F}{M_2 K}$$

$$6) \frac{A}{2\pi r h} = 2\pi r h \Rightarrow \pi = \frac{A}{2rh}$$

$$7) W_p \times G_p = \text{Wins}$$

$$W_p \times 81 = 56$$

$$W_p = \frac{56}{81} = 69\%$$

$$8) W_p \times G = \text{Losses}$$

$$W_p \times 81 = 25$$

$$W_p = \frac{25}{81} = 31\%$$

$$9) 105 - 56 = 49 \text{ games}$$

$$10) \frac{49}{81} = 60\%$$

$$11) H = 1, N = 14$$

$$NH_3 = 14 + 1 + 1 + 1 = 17$$

$$\frac{N}{NH_3} = \frac{14}{17} = 82\%$$

$$12) \frac{H_3}{NH_3} = \frac{3}{17} = 18\%$$

$$13) (-7)^2 - (4)(3)(2) = 49 - 24 = 25$$

real, rational, unequal

$$14) (3X - 1)(X - 2) \quad X = 1/3, 2$$

$$15) 5X^2 - 45 = 0$$

$$(0)^2 - 4(5)(-45) = 900$$

real, rational, unequal

$$16) 5(X^2 - 9) = 0$$

$$5(X - 3)(X + 3) = 0 \quad X = 3, -3$$

$$17) 3X^2 + 2X = 0$$

$$\frac{-2 \pm \sqrt{2^2 - 4(3)(0)}}{2(3)} = \frac{-2 \pm 2}{6} =$$

$$\left(\frac{0}{6}, \frac{-4}{6} \right) = \left(0, \frac{-2}{3} \right)$$

$$18) 4X^2 - 12X + 3 = 0$$

$$\frac{-(-12) \pm \sqrt{(-12)^2 - 4(4)(3)}}{2(4)} = \frac{12 \pm 4\sqrt{6}}{8} =$$

$$\frac{3 \pm \sqrt{6}}{2}$$

$$19) \text{multiply all terms by 20}$$

$$8X + 4 - 20X = 20 - 15X - 40$$

$$-12X + 4 = -15X - 20$$

$$3X = -24$$

$$X = -8$$

$$20) \text{multiply all terms by 36}$$

$$16X - 36 = -15X + 36X$$

$$-36 = 5X$$

$$X = -36/5$$

16A

$$1) \frac{A}{Or} = \frac{6}{5}, \frac{A}{T} = \frac{6}{11}, \frac{Or}{T} = \frac{5}{11}$$

$$\frac{6}{5} = \frac{12}{Or} \quad Or = \frac{5 \times 12}{6} = 10 \text{ oranges}$$

$$2) \frac{C}{S} = \frac{1}{2}, \frac{C}{T} = \frac{1}{3}, \frac{S}{T} = \frac{2}{3}$$

$$\frac{1}{3} = \frac{C}{30} \quad C = \frac{1 \times 30}{3} = 10 \text{ cloudy}$$

$$30 - 10 = 20 \text{ sunny}$$

$$3) \frac{A}{B} = \frac{2}{5}, \frac{A}{T} = \frac{2}{7}, \frac{B}{T} = \frac{5}{7}$$

$$\frac{B}{490,000} = \frac{5}{7} \quad B = \frac{5 \times 490,000}{7} = 350,000 \text{ votes}$$

$$4) \frac{S}{R} = \frac{8}{7}, \frac{S}{T} = \frac{8}{15}, \frac{R}{T} = \frac{7}{15}$$

$$\frac{S}{56} = \frac{8}{7} \quad S = \frac{8 \times 56}{7} = 64 \text{ squirrels}$$

$$5) \frac{R}{M} = \frac{3}{5}, \frac{R}{T} = \frac{3}{8}, \frac{M}{T} = \frac{5}{8}$$

$$\frac{M}{24} = \frac{5}{8} \quad M = \frac{5 \times 24}{8} = 15 \text{ students like math}$$

$$6) \frac{Na}{NaCl} = \frac{23}{58}$$

$$\frac{Na}{406} = \frac{23}{58} \quad Na = \frac{23(406)}{58} = 161 \text{ g}$$

$$7) \frac{Cl}{NaCl} = \frac{35}{58}$$

$$\frac{Cl}{406} = \frac{35}{58} \quad Cl = \frac{35(406)}{58} = 245 \text{ g}$$

$$8) \frac{H_2}{H_2CO} = \frac{2}{46}$$

$$\frac{H_2}{352} = \frac{2}{46} \quad H_2 = \frac{2(352)}{46} = 15.30 \text{ g}$$

$$9) \frac{C}{352} = \frac{12}{46} \quad C = \frac{12(352)}{46} = 91.83 \text{ g}$$

$$10) \frac{O_2}{352} = \frac{32}{46} \quad O_2 = \frac{32(352)}{46} = 244.87 \text{ g}$$

16B

$$1) \frac{N}{I} = \frac{5}{10}, \frac{N}{T} = \frac{5}{15}, \frac{I}{T} = \frac{10}{15}$$

$$\frac{N}{135} = \frac{5}{15} \quad N = \frac{5 \times 135}{15} = 45 \text{ lbs.}$$

$$2) \frac{S_1}{S_2} = \frac{3}{7}, \frac{S_1}{T} = \frac{3}{10}, \frac{S_2}{T} = \frac{7}{10}$$

$$\frac{90}{T} = \frac{3}{10} \quad T = \frac{90 \times 10}{3} = 300 \text{ students}$$

S_1 = home schoolers

S_2 = all others

$$3) \frac{Sp}{SW} = \frac{2}{3}, \frac{Sp}{T} = \frac{2}{5}, \frac{SW}{T} = \frac{3}{5}$$

$$\frac{4}{SW} = \frac{2}{3} \quad SW = \frac{4 \times 3}{2} = 6 \text{ hrs.}$$

4) 8 gal. = 32 qts.

$$\frac{F}{A} = \frac{3}{1}, \frac{F}{T} = \frac{3}{4}, \frac{A}{T} = \frac{1}{4}$$

$$\frac{A}{32} = \frac{1}{4} \quad A = \frac{32 \times 1}{4} = 8 \text{ qts. ant. ivory}$$

$32 - 8 = 24$ qts. forest green

$$5) \frac{T_1}{T_2} = \frac{4}{5}, \frac{T_1}{T} = \frac{4}{9}, \frac{T_2}{T} = \frac{5}{9}$$

$$\frac{22}{T_2} = \frac{4}{5} \quad T_2 = \frac{5 \times 22}{4} = 27.5 \text{ in.}$$

$$6) \frac{C}{CF_2Cl_2} = \frac{12}{120}$$

$$\frac{C}{480} = \frac{12}{120} \quad C = \frac{12(480)}{120} = 48 \text{ g}$$

$$7) \frac{F_2}{480} = \frac{38}{120} \quad F_2 = \frac{38(480)}{120} = 152 \text{ g}$$

$$8) \frac{Cl_2}{480} = \frac{70}{120} \quad Cl_2 = \frac{70(480)}{120} = 280 \text{ g}$$

$$9) \frac{K_2}{K_2S} = \frac{78}{110}$$

$$\frac{K_2}{550} = \frac{78}{110} \quad K_2 = \frac{78(550)}{110} = 390 \text{ g}$$

$$10) \frac{S}{550} = \frac{32}{110} \quad S = \frac{32(550)}{110} = 160 \text{ g}$$

16C

$$1) \frac{b}{g} = \frac{4}{3}, \frac{b}{t} = \frac{4}{7}, \frac{g}{t} = \frac{3}{7}$$

$$2) \frac{b}{t} = \frac{4}{7} \quad \text{We need to know boys and we are given total.}$$

$$3) \frac{b}{t} = \frac{4}{7} \Rightarrow \frac{Bp}{21} = \frac{4}{7}$$

$$Bp = \frac{21(4)}{7} \Rightarrow Bp = 12$$

Boys present equals 12.

$$4) \frac{C_2}{C_2H_2} = \frac{24}{26}, \frac{H_2}{C_2H_2} = \frac{2}{26},$$

$$\frac{H_2}{C_2} = \frac{2}{24}$$

$$5) \frac{C_2}{C_2H_2} = \frac{24}{26} = \frac{M_C}{234}$$

$$\frac{234 \cdot 24}{26} = 216 \quad M_C = 216 \text{ g}$$

$$6) \frac{H_2}{C_2H_2} = \frac{2}{26} = \frac{M_H}{234}$$

$$\frac{234 \cdot 2}{26} = 18 \quad M_H = 18 \text{ g} \quad M_C + M_H = 234 \text{ g}$$

$$7) \frac{Fe}{FeCl_3} = \frac{56}{161}, \frac{Cl_3}{FeCl_3} = \frac{105}{161},$$

$$\frac{Fe}{Cl_3} = \frac{56}{105}$$

$$8) \frac{Fe}{FeCl_3} = \frac{56}{161} = \frac{M_{Fe}}{805}$$

$$\frac{805 \times 56}{161} = M_{Fe} = 280 \text{ g}$$

$$9) \frac{Cl_3}{FeCl_3} = \frac{105}{161} = \frac{M_{Cl}}{805}$$

$$\frac{805 \times 105}{161} = M_{Cl} = 525 \text{ g}$$

$$10) Y = ZX \quad \frac{Y}{X} = Z$$

$$11) \frac{RQW}{S} = T$$

$$12) 13/18 = .72 = 72\%$$

$$13) 5/18 = .28 = 28\%$$

$$14) \frac{C}{CF_2Cl_2} = \frac{12}{12 + 38 + 70} = \frac{38}{120} = 10\%$$

$$15) \frac{F_2}{CF_2Cl_2} = \frac{38}{120} = 31.66\%$$

$$16) \frac{Cl_2}{CF_2Cl_2} = \frac{70}{120} = 58.3\%$$

$$17) 2X^2 + X + 1/2 = 0 \quad a=2, b=1, c=1/2$$

$$b^2 - 4ac \Rightarrow 1 - 4(2)(1/2) = 1 - 4 = -3$$

imaginary

$$18) \frac{-1 \pm \sqrt{1^2 - 4(2)(1/2)}}{2(2)} = \frac{-1 \pm i\sqrt{3}}{4} =$$

$$\left(\frac{-1 + i\sqrt{3}}{4}, \frac{-1 - i\sqrt{3}}{4} \right)$$

$$19) X^2 + 7/4X + 49/64 = 1/2 + 49/64$$

$$(X + 7/8)^2 = 81/64$$

$$X = -7/8 \pm 9/8 = (1/4, -2)$$

$$20) (1/4)^2 + 7/4(1/4) = 1/2$$

$$1/16 + 7/16 = 1/2$$

$$1/2 = 1/2$$

$$(-2)^2 + 7/4(-2) = 1/2$$

$$4 - 7/2 = 1/2$$

$$1/2 = 1/2$$

16D

$$1) \frac{O}{C} = \frac{4}{3}, \frac{O}{T} = \frac{4}{7}, \frac{C}{T} = \frac{3}{7}$$

$$2) \frac{C}{T} = \frac{3}{7} \quad \text{We need to know total, and we are given cranberry.}$$

$$3) \frac{C}{T} = \frac{3}{7} \Rightarrow \frac{165}{T} = \frac{3}{7}$$

$$3T = 7 \cdot 165 \Rightarrow T = 385$$

$$4) \frac{K_2}{K_2O} = \frac{78}{94}, \frac{O}{K_2O} = \frac{16}{94}$$

$$\frac{K_2}{O} = \frac{78}{16}$$

$$5) \frac{K_2}{K_2O} = \frac{78}{94} = \frac{M_K}{752}$$

$$\frac{752 \cdot 78}{94} = 624 \quad M_K = 624 \text{ g}$$

$$6) \frac{O}{K_2O} = \frac{16}{94} = \frac{M_O}{752}$$

$$\frac{752 \cdot 16}{94} = 128 \quad M_O = 128 \text{ g}$$

$$7) \frac{C}{CHF_3} = \frac{12}{70}, \frac{H}{CHF_3} = \frac{1}{70}$$

$$\frac{F_3}{CHF_3} = \frac{57}{70}$$

$$8) \frac{C}{CHF_3} = \frac{12}{70} = \frac{M_C}{840}$$

$$\frac{840 \times 12}{70} = M_C = 144 \text{ g}$$

$$9) \frac{F_3}{CHF_3} = \frac{57}{70} = \frac{M_F}{840}$$

$$\frac{840 \times 57}{70} = M_F = 684 \text{ g}$$

$$10) r = 1/3 \pi r^2 H$$

$$\frac{r}{1/3 \pi r^2} = H \quad H = \frac{3}{\pi r}$$

$$11) S \left(\frac{T}{A+L} \right) = N$$

$$N = \frac{ST}{A+L}$$

$$12) \frac{932}{1650} = 56.5\%$$

$$13) \frac{718}{1650} = 43.5\%$$

$$14) \frac{C}{H_2CO} = \frac{12}{30} = 40\%$$

$$15) \frac{H_2}{H_2CO} = \frac{2}{30} = 6.66\%$$

$$16) \frac{O}{H_2CO} = \frac{16}{30} = 53.3\%$$

$$17) X^2 + 8X + 16 = 0 \quad a = 1, b = 8, c = 16$$

$$b^2 - 4ac \Rightarrow 8^2 - 4(1)(16) = 64 - 64 = 0$$

real, rational, equal, double root

$$18) X^2 + 8X + 16 = 0$$

$$(X + 4)^2 = 0$$

$$X = -4$$

$$19) \text{ multiply all terms by 24}$$

$$4(8X - 3) + 24 = 8(X - 5) - 3(2 - 3X)$$

$$32X - 12 + 24 = 8X - 40 - 6 + 9X$$

$$32X + 12 = 17X - 46$$

$$15X = -58$$

$$X = -3 \frac{13}{15}$$

$$20) \text{ multiply all terms by 21}$$

$$9X - 21X = 35X - 42$$

$$-12X = 35X - 42$$

$$-47X = -42$$

$$X = 42/47$$

16E

$$1) \frac{F}{S} = \frac{3}{1}, \frac{F}{T} = \frac{3}{4}, \frac{S}{T} = \frac{1}{4}$$

$$2) \frac{S}{T} = \frac{1}{4} \quad \text{We need to know total fans and we are given soccer.}$$

$$3) \frac{S}{T} = \frac{1}{4} \Rightarrow \frac{11,300}{T} = \frac{1}{4}$$

$$T = 11,300 \times 4 = 45,200 \text{ fans}$$

$$4) \frac{H_2}{H_2S} = \frac{2}{34}, \frac{S}{H_2S} = \frac{32}{34}$$

$$\frac{H_2}{S} = \frac{2}{32}$$

$$5) \frac{S}{H_2S} = \frac{32}{34} = \frac{M_S}{442}$$

$$\frac{32 \cdot 442}{34} = 416 \quad M_S = 416 \text{ g}$$

$$6) \frac{H_2}{H_2S} = \frac{2}{34} = \frac{M_H}{442}$$

$$\frac{2 \cdot 442}{34} = 26 \quad M_H = 26 \text{ g}$$

$$7) \frac{Fe_2}{NFe_2} = \frac{112}{126}, \frac{N}{NFe_2} = \frac{14}{126}$$

$$\frac{N}{Fe_2} = \frac{14}{112}$$

$$8) \frac{Fe_2}{NFe_2} = \frac{112}{126} = \frac{M_{Fe}}{882}$$

$$\frac{882 \times 112}{126} = M_{Fe} = 784 \text{ g}$$

$$9) \frac{N}{NFe_2} = \frac{14}{126} = \frac{M_N}{882}$$

$$\frac{882 \times 14}{126} = M_N = 98 \text{ g}$$

$$10) AB \left[\frac{1}{F} = \frac{1}{A} + \frac{1}{B} \right]$$

$$\frac{AB}{F} = B + A \Rightarrow AB = F(A + B)$$

$$\frac{AB}{A+B} = F$$

$$11) \frac{CD}{E} = -\frac{AB}{XY} \Rightarrow CD = E \left(-\frac{AB}{XY} \right)$$

$$-\frac{XYCD}{AB} = E$$

$$12) (.45)(5,435,960) = 2,446,182$$

$$13) \frac{55}{45} = \frac{11}{9}$$

$$14) \frac{Na}{NaOH} = \frac{23}{23 + 16 + 1} = \frac{23}{40} = 57.5\%$$

$$15) \frac{O}{NaOH} = \frac{16}{40} = 40\%$$

$$16) \frac{H}{NaOH} = \frac{1}{40} = 2.5\%$$

$$17) 3X^2 - 2X - 4 = 0 \quad a = 3, b = -2, c = -4$$

$$b^2 - 4ac \Rightarrow (-2)^2 - 4(3)(-4) = 4 + 48 = 52$$

real, irrational, unequal

$$18) \frac{-(-2) \pm \sqrt{52}}{6} = \frac{2 \pm 2\sqrt{13}}{6} = \frac{1 \pm \sqrt{13}}{3}$$

$$\left(\frac{1 + \sqrt{13}}{3}, \frac{1 - \sqrt{13}}{3} \right)$$

$$19) [9 - X = 1.25X - 8.4]100 \Rightarrow$$

$$900 - 100X = 125X - 840$$

$$1740 = 225X$$

$$X = 116/15$$

$$20) \text{ multiply all terms by 6}$$

$$3X + 90 = 2X + 6X$$

$$90 = 5X$$

$$18 = X$$