

13E

$$1) (7)^2 - 4(3)(2) = 49 - 24 = 25$$

real, rational, unequal

$$2) (3X + 1)(X + 2) = 0 \quad X = -1/3, -2$$

$$3) (-5)^2 - 4(2)(4) = 25 - 32 = -7$$

imaginary

$$4) X = \frac{-(-5) \pm \sqrt{7}}{2(2)} = \frac{5 \pm i\sqrt{7}}{4}$$

$$5) (-2)^2 - 4(4)(9) = 4 - 144 = -140$$

imaginary

$$6) X = \frac{-(-2) \pm \sqrt{140}}{2(4)} = \frac{2 \pm 2i\sqrt{35}}{8} = \frac{1 \pm i\sqrt{35}}{4}$$

$$7) (-4)^2 - 4(2)(-7) = 16 + 56 = 72$$

real, irrational, unequal

$$8) X = \frac{-(-4) \pm \sqrt{72}}{2(2)} = \frac{4 \pm 6\sqrt{2}}{4} = \frac{2 \pm 3\sqrt{2}}{2}$$

$$9) 2X^2 + 6X - 3 = 0$$

$$\frac{-6 \pm \sqrt{6^2 - 4(2)(-3)}}{2(2)} = \frac{-6 \pm \sqrt{60}}{4} =$$

$$\frac{-6 \pm 2\sqrt{15}}{4} = \frac{-3 \pm \sqrt{15}}{2}$$

$$10) 5X^2 - 8X + 4 = 0$$

$$\frac{-(-8) \pm \sqrt{(-8)^2 - 4(5)(4)}}{2(5)} = \frac{8 \pm \sqrt{-16}}{10} =$$

$$\frac{8 \pm 4i}{10} = \frac{4 \pm 2i}{5}$$

$$11) [3X^2 + 8X - 3 = 0] \div 3$$

$$X^2 + 8/3 X + 16/9 = 1 + 16/9$$

$$\sqrt{X + 4/3}^2 = \sqrt{25/9}$$

$$X + 4/3 = \pm 5/3$$

$$X = -4/3 \pm 5/3 \quad X = -3, 1/3$$

$$12) 3(1/3)^2 + 8(1/3) - 3 = 0$$

$$1/3 + 8/3 - 9/3 = 0$$

$$3(-3)^2 + 8(-3) - 3 = 0$$

$$27 + (-24) - 3 = 0$$

$$13) X^5 + 5X^4(2A) + 10X^3(2A)^2 + 10X^2(2A)^3 + 5X(2A)^4 + (2A)^5 =$$

$$X^5 + 10X^4A + 40X^3A^2 + 80X^2A^3 + 80XA^4 + 32A^5$$

$$14) \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} X^1(-4)^5 = 6X(-1,024) = -6,144X$$

$$15) (2A)^3 + 3(2X)^2(-A) + 3(2X)(-A)^2 + (-A)^3 =$$

$$8X^3 - 12X^2A + 6XA^2 - A^3$$

$$16) (2X + 3Y)$$

$$17) \left(\frac{10 - \sqrt{AX}}{4} \right) \left(\frac{10 + \sqrt{AX}}{4} \right) =$$

$$\frac{100 - AX}{16}$$

$$18) \frac{\frac{2X^2(X^2)}{X^2} - \frac{1}{X^2}}{\frac{4}{X}} = \frac{\frac{2X^4 - 1}{X^2}}{\frac{4}{X}} =$$

$$\frac{2X^4 - 1}{4X}$$

$$19) \left[X + 3 - \frac{6X - 5}{2} = \frac{2X - 7}{6} \right] 6 =$$

$$6X + 18 - 18X + 15 = 2X - 7$$

$$-12X + 33 = 2X - 7$$

$$40 = 14X \quad X = 20/7$$

$$20) A^2 - B^2 = A^2 + B^2$$

14A

$$1) 45.00 - 33.75 = \$11.25 \text{ saved}$$

$$WP \times 45 = 11.25$$

$$WP = \frac{11.25}{45} = .25 \text{ or } 25\%$$

$$2) 25.00 - 15.00 = \$10.00 \text{ profit}$$

$$WP \times 15 = 10$$

$$WP = \frac{10}{15} = \frac{2}{3} = 67\%$$

$$3) 25.00 - 15.00 = \$10.00 \text{ profit}$$

$$WP \times 25 = 10$$

$$WP = \frac{10}{25} = \frac{2}{5} = 40\%$$

$$4) .28 \times 32 = 8.96$$

$$32.00 + 8.96 = \$40.96$$

$$5) 2,500 = P + 15\%(P)$$

$$2,500 = P(1 + .15)$$

$$\frac{2,500}{1.15} = \frac{P(1.15)}{(1.15)} = \$2174$$

$$6) .55 \times 195 = 107.25$$

$$195 - 107.25 = \$87.75$$

$$7) 32.45 = P + .06(P)$$

$$32.45 = P(1 + .06)$$

$$\frac{32.45}{1.06} = \frac{P(1.06)}{(1.06)} = \$30.61$$

$$8) .054 \times 45.50 = 2.46$$

$$.15 \times 45.50 = 6.83$$

$$45.50 + 2.46 + 6.83 = \$54.79$$

$$9) \text{Si} = 28, \text{O} = 16; \text{SiO}_2 = 28 + 2(16) = 60$$

$$\frac{\text{Si}}{\text{SiO}_2} = \frac{28}{60} = 47\%$$

$$10) \frac{\text{O}_2}{\text{SiO}_2} = \frac{32}{60} = 53\%$$

$$11) \text{Fe} = 56, \text{O} = 16; \text{Fe}_2\text{O}_3 = 2(56) + 3(16) = 160$$

$$\frac{\text{Fe}_2}{\text{Fe}_2\text{O}_3} = \frac{112}{160} = 70\%$$

$$12) \frac{\text{O}_3}{\text{Fe}_2\text{O}_3} = \frac{48}{160} = 30\%$$

14B

1) $.13 \times .59 = .08$

$.59 + .08 = \$.67$

2) $.153 \times 8,500 = \$1,300.50$

3) $14.04 - 13.50 = .54$

$WP \times 13.50 = .54$

$WP = \frac{.54}{13.50} = 4\%$

4) $.20 \times 13.50 = \$2.70$

5) $15.00 - 9.50 = 5.50$

$WP \times 15 = 5.5$

$WP = \frac{5.5}{15} = 37\%$

6) $.12 \times 1.38 = .17$

$1.38 + .17 = \$1.55$

7) $4.5 + 7 = 11.5\%$

$955 = P + 11.5\%(P)$

$955 = P(1 + .115)$

$\frac{955}{1.115} = \frac{P(1.115)}{(1.115)} = \$856.50 \text{ base price}$

$\$856.50 \times .045 = \38.54 sales tax

$\$856.50 \times .07 = \59.96 delivery

8) $.45 \times 75 = 33.75$ or $100\% - 45\% = 55\%$

$75 - 33.75 = \$41.25$ $.55 \times 75 = \$41.25$

9) $K = 39, Cr = 52, O = 16,$

$K_2Cr_2O_7 = 2(39) + 2(52) + 7(16) = 294$

$\frac{K_2}{K_2Cr_2O_7} = \frac{78}{294} = 27\%$

10) $\frac{Cr_2}{K_2Cr_2O_7} = \frac{104}{294} = 35\%$

11) $Na = 23, O = 16, H = 1; NaOH = 23+16+1=40$

$\frac{Na}{NaOH} = \frac{23}{40} = 58\%$

12) $\frac{H}{NaOH} = \frac{1}{40} = 3\%$

14C

$\text{Profit} = 9.50 - 4.00 = 5.50$

1) $WP \times W = \text{profit}$

$WP \times 4 = 5.50$

$WP = \frac{5.50}{4} = 1.38 = 138\%$

2) $WP \times 9.50 = 5.50 \Rightarrow WP = \frac{5.50}{9.50} = 58\%$

3) $.062 \times 23,600 = \$1,463.20$

4) $.0765 \times 23,600 = \$1,805.40$

5) $28.50 \times .15 = \$4.28$

6) $28.50 \times .0825 = \$2.35$

7) $C = 12, S = 32$

$CS_2 = 12 + 32 + 32 = 76$

$\frac{C}{CS_2} = \frac{12}{76} = 16\%$

8) $\frac{S_2}{CS_2} = \frac{64}{76} = 84\%$

9) $(8)^2 - 4(2)(8) = 0$
real, rational, equal

10) $2(X^2 + 4X + 4) = 0$
 $2(X + 2)(X + 2) = 0$
 $X = -2, -2$

11) $(-5)^2 - 4(1)(-7) = 25 + 28 = 53$
real, irrational, unequal

12) $X = \frac{-(-5) \pm \sqrt{53}}{2} = \frac{5 \pm \sqrt{53}}{2}$

13) $4^2 - 4(1)(6) = 16 - 24 = -8$
imaginary

14) $X = \frac{-4 \pm \sqrt{8}}{2} = \frac{-4 \pm 2i\sqrt{2}}{2} =$
 $-2 \pm i\sqrt{2}$

15) $2X^2 + 3X - 1 = 0$
 $\frac{-3 \pm \sqrt{3^2 - 4(-1)(2)}}{2 \cdot 2} = \frac{-3 \pm \sqrt{17}}{4}$

16) $\frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(5)}}{2} = \frac{5 \pm \sqrt{5}}{2}$

17) $X^2 + 4X - 32 = 0$
 $(X + 8)(X - 4) = 0$
 $X = -8, 4$

18) $(-8)^2 + 4(-8) - 32 = 0$
 $64 - 32 - 32 = 0$
 $(4)^2 + 4(4) - 32 = 0$
 $16 + 16 - 32 = 0$

19) $X^5 - 5X^4 + 10X^3 - 10X^2 + 5X - 1$

20) $\frac{4 \cdot 2 \cdot 2}{1 \cdot 2 \cdot 2} X^{13} = 108X$

14D

Profit = \$7.45

$$1) \text{ WP} \times \frac{12.50}{12.50} = \frac{7.45}{12.50} = 60\%$$

$$2) \text{ WP} \times \frac{19.95}{19.95} = \frac{7.45}{19.95} = 37\%$$

$$3) \text{ WP} \times \frac{19.95}{19.95} = \frac{12.50}{19.95} = 63\%$$

$$4) 78.10 \times .055 = \$4.30$$

$$5) 78.10 \times .15 = \$11.72$$

$$6) \text{ final cost} = 78.10 + 4.30 + 11.72 = \$94.12$$

$$\text{tax and tip} = 4.30 + 11.72 = \$16.02$$

$$\text{WP} \times 94.12 = 16.02 = 17\%$$

$$7) H = 1, S = 32$$

$$H_2S = 1 + 1 + 32 = 34$$

$$\frac{H_2}{H_2S} = \frac{2}{34} = 6\%$$

$$8) \frac{S}{H_2S} = \frac{32}{34} = 94\%$$

$$9) (8)^2 - 4(4)(20) = 64 - 320 = -256$$

imaginary

$$10) X = \frac{-8 \pm \sqrt{-256}}{2(4)} = \frac{-8 \pm 16i}{8} = -1 \pm 2i$$

$$11) 2X^2 - 7X + 4 = 0$$

$$(-7)^2 - 4(2)(4) = 49 - 32 = 17$$

real, irrational, unequal

$$12) \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(4)}}{2(2)} = \frac{7 \pm \sqrt{17}}{4}$$

$$13) 3X^2 - 7X - 4 = 0$$

$$(-7)^2 - 4(3)(-4) = 49 + 48 = 97$$

real, irrational, unequal

$$14) X = \frac{-(-7) \pm \sqrt{97}}{2(3)} = \frac{7 \pm \sqrt{97}}{6}$$

$$15) \frac{-(-5) \pm \sqrt{(-5)^2 - 4(6)(0)}}{2(6)} = \frac{5 \pm \sqrt{25}}{12}$$

$$\frac{5+5}{12}, \frac{5-5}{12} \quad X = (5/6, 0)$$

$$16) \frac{-0 \pm \sqrt{0 - 4(5)(-4)}}{2(5)} = \frac{\pm \sqrt{80}}{10} =$$

$$\frac{\pm 4\sqrt{5}}{10} = \frac{\pm 2\sqrt{5}}{5}$$

$$17) X(5X + 4) = 0$$

$$X = 0, -4/5$$

$$18) 5(0)^2 + 4(0) = 0$$

$$0 = 0$$

$$5(4/5)^2 + 4(4/5) = 0$$

$$16/5 - 16/5 = 0$$

$$19) X^5 + 5(X^4)(-2A) + 10(X^3)(-2A)^2 + 10X^2(-2A)^3 + 5X(-2A)^4 + (-2A)^5 =$$

$$X^5 - 10X^4A + 40X^3A^2 - 80X^2A^3 + 80XA^4 - 32A^5$$

$$20) \frac{2 \cdot 1 \cdot 3}{1 \cdot 7} X^2 3^2 = 54X^2$$

14E

Take 60% and subtract or take 40%. (100% - 60%)

$$1) 149.95 \times .60 = \$89.97 \text{ (discount)}$$

$$\begin{array}{r} 149.95 \\ - 89.97 \\ \hline \$59.98 \end{array}$$

$$2) 399 \times .60 = \$239.40 \text{ (discount)}$$

$$\begin{array}{r} 399.00 \\ - 239.40 \\ \hline \$159.60 \end{array}$$

$$3) 21.90 \times .60 = \$13.14 \text{ (discount)}$$

$$\begin{array}{r} 21.90 \\ - 13.14 \\ \hline \$8.76 \end{array}$$

$$4) 54.45 \times .0725 = \$3.95$$

$$5) 54.45 \times .16 = \$8.71$$

$$6) \text{ final cost} = 54.45 + 3.95 + 8.71 = \$67.11$$

$$\text{tax and tip} = 8.71 + 3.95 = \$12.66$$

$$\text{WP} \times 67.11 = 12.66 = 19\%$$

$$7) H = 1, C = 12$$

$$CH_4 = 12 + 1 + 1 + 1 + 1 = 16$$

$$\frac{C}{CH_4} = \frac{12}{16} = 75\%$$

$$8) \frac{H_4}{CH_4} = \frac{4}{16} = 25\%$$

$$9) (3)^2 - 4(1)(-5) = 9 + 20 = 29$$

real, irrational, unequal

$$10) X = \frac{-3 \pm \sqrt{29}}{2}$$

$$11) 3X^2 - X - 3 = 0$$

$$(-1)^2 - 4(-3)(3) = 1 + 36 = 37$$

real, irrational, unequal

$$12) X = \frac{1 \pm \sqrt{37}}{6}$$

$$13) 3X^2 - 5X + 2 = 0$$

$$(-5)^2 - 4(3)(2) = 25 - 24 = 1$$

real, rational, unequal

$$14) (3X - 2)(X - 1) = 0 \quad X = 2/3, 1$$

$$15) 4X^2 + 7X - 2 = 0$$

$$\frac{-7 \pm \sqrt{7^2 - 4(4)(-2)}}{2(4)} = \frac{-7 \pm \sqrt{49 + 32}}{8} =$$

$$\frac{-7 \pm \sqrt{81}}{8} = \frac{-7 \pm 9}{8} \quad X = (1/4, -2)$$

$$16) 3X^2 - 8X + 5 = 0$$

$$\frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(5)}}{2(3)} = \frac{8 \pm 2}{6}$$

$$X = 5/3, 1$$

$$17) X^2 - 8X + 16 = -9 + 16$$

$$\sqrt{(X - 4)^2} = \sqrt{7}$$

$$X - 4 = \pm \sqrt{7}$$

$$X = 4 \pm \sqrt{7}$$

$$18) (4 + \sqrt{7})^2 - 8(4 + \sqrt{7}) + 9 = 0$$

$$16 + 8\sqrt{7} + 7 - 32 - 8\sqrt{7} + 9 = 0$$

$$(4 - \sqrt{7})^2 - 8(4 - \sqrt{7}) + 9 = 0$$

$$16 - 8\sqrt{7} + 7 - 32 + 8\sqrt{7} + 9 = 0$$

$$19) (2X)^5 + 5(2X)^4(-1) + 10(2X)^3(-1)^2 + 10(2X)^2(-1)^3 + 5(2X)(-1)^4 + (-1)^5 =$$

$$32X^5 - 80X^4 + 80X^3 - 40X^2 + 10X - 1$$

$$20) \frac{5 \cdot 1 \cdot 8 \cdot 2 \cdot 1}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} (2X)^0(-3)^5 = -243$$