

Question #1

a.) $(y+3)^2 = 64$
 $\sqrt{(y+3)^2} = \sqrt{64}$
 $y+3 = \pm 8$
 $y+3=8$ or $y+3=-8$
 $y=8-3$ $y=-8-3$
 $y=5$ or $y=-11$

b.) $(4x+3)^2 = 24$
 $\sqrt{(4x+3)^2} = \sqrt{24}$
 $4x+3 = \pm 2\sqrt{6}$
 $\frac{4x}{4} = \frac{-3 \pm 2\sqrt{6}}{4}$
 $x = -\frac{3}{4} \pm \frac{2\sqrt{6}}{4}$
 $x = -\frac{3}{4} \pm \frac{\sqrt{6}}{2}$

Question #2

a.) $x^2 = -12x + 13$
 Completing the Square
 $x^2 + 12x + 36 = 13 + 36$
 $\frac{12}{2} \rightarrow (6)^2$
 $(x+6)^2 = 49$
 $\sqrt{(x+6)^2} = \sqrt{49}$
 $x+6 = \pm 7$
 $x+6=7$ or $x+6=-7$
 $x=7-6$ $x=-7-6$
 $x=1$ or $x=-13$

quadratic formula
 $x^2 + 12x - 13 = 0$
 $a=1, b=12, c=-13$
 $x = \frac{-12 \pm \sqrt{(12)^2 - 4(1)(-13)}}{2(1)}$
 $= \frac{-12 \pm \sqrt{144 + 52}}{2} = \frac{-12 \pm \sqrt{196}}{2}$
 $= \frac{-12 \pm 14}{2} \rightarrow x = \frac{-12+14}{2} = \frac{2}{2} = 1$
 $x = \frac{-12-14}{2} = \frac{-26}{2} = -13$

b.) $x^2 - 4x + 4 = 0$
 Completing the Square
 $x^2 - 4x + 4 = -4 + 4$
 $\frac{-4}{2} \rightarrow (-2)^2$
 $(x-2)^2 = 0$
 $\sqrt{(x-2)^2} = \sqrt{0}$
 $x-2 = 0$
 $x = 2$

Quadratic Formula
 $x^2 - 4x + 4 = 0$
 $a=1, b=-4, c=4$
 $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(4)}}{2(1)}$
 $= \frac{4 \pm \sqrt{16-16}}{2} = \frac{4 \pm \sqrt{0}}{2}$
 $= \frac{4}{2} = 2$

c.) $2x^2 + 12x = -5$
 Completing the square
 $\frac{2x^2 + 12x}{2} = \frac{-5}{2}$
 $x^2 + 6x + 9 = \frac{-5}{2} + 9$
 $\frac{6}{2} \rightarrow (3)^2$
 $(x+3)^2 = \frac{13}{2}$
 $\sqrt{(x+3)^2} = \sqrt{\frac{13}{2}}$
 $x+3 = \pm \frac{\sqrt{13}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
 $x+3 = \pm \frac{\sqrt{26}}{2}$
 $x = -3 \pm \frac{\sqrt{26}}{2}$

quadratic formula

$2x^2 + 12x + 5 = 0$
 $a=2, b=12, c=5$
 $x = \frac{-(12) \pm \sqrt{(12)^2 - 4(2)(5)}}{2(2)}$
 $= \frac{-12 \pm \sqrt{144 - 40}}{4}$
 $= \frac{-12 \pm \sqrt{104}}{4}$
 $= \frac{-12 \pm 2\sqrt{26}}{4} = \frac{-12 \pm 2\sqrt{26}}{4}$
 $x = -3 \pm \frac{\sqrt{26}}{2}$

d.) $6x^2 + 6x = 0$
 completing the square

$\frac{6x^2 + 6x}{6} = \frac{0}{6}$
 $x^2 + x + \frac{1}{4} = 0 + \frac{1}{4}$
 $\frac{1}{2} \rightarrow (\frac{1}{2})^2$
 $(x+\frac{1}{2})^2 = \frac{1}{4}$
 $\sqrt{(x+\frac{1}{2})^2} = \sqrt{\frac{1}{4}}$
 $x+\frac{1}{2} = \pm \frac{1}{2}$
 $x+\frac{1}{2} = \frac{1}{2}$ or $x+\frac{1}{2} = -\frac{1}{2}$
 $x = \frac{1}{2} - \frac{1}{2}$ $x = -\frac{1}{2} - \frac{1}{2}$
 $x = 0$ or $x = -1$

quadratic formula

$6x^2 + 6x = 0$ $a=6, b=6, c=0$
 $x = \frac{-(6) \pm \sqrt{(6)^2 - 4(6)(0)}}{2(6)}$
 $= \frac{-6 \pm \sqrt{36}}{12} = \frac{-6 \pm 6}{12}$
 $x = \frac{-6+6}{12}$ or $x = \frac{-6-6}{12}$
 $x = \frac{0}{12}$ or $x = \frac{-12}{12}$
 $x = 0$ or $x = -1$

Question #2 continued

e.) $(x+3)(x+2) = 15$
 $x^2 + 5x + 6 = 15$
 $x^2 + 5x + 6 - 15 = 0$
 $x^2 + 5x - 9 = 0$

Completing the square

$$x^2 + 5x + \frac{25}{4} = 9 + \frac{25}{4}$$

$$\downarrow$$

$$\frac{5}{2} \rightarrow \left(\frac{5}{2}\right)^2$$

$$\left(x + \frac{5}{2}\right)^2 = \frac{61}{4}$$

$$\sqrt{\left(x + \frac{5}{2}\right)^2} = \sqrt{\frac{61}{4}}$$

$$x + \frac{5}{2} = \pm \frac{\sqrt{61}}{2}$$

$$\boxed{x = -\frac{5}{2} \pm \frac{\sqrt{61}}{2}}$$

Quadratic Formula

$$x^2 + 5x - 9 = 0$$

$$a=1, b=5, c=-9$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(-9)}}{2(1)}$$

$$= \frac{-5 \pm \sqrt{25+36}}{2}$$

$$= \frac{-5 \pm \sqrt{61}}{2}$$

$$\boxed{x = \frac{-5 \pm \sqrt{61}}{2}}$$

f.) $6y^2 + 2y - 1 = 0$

Completing the square

$$\frac{6y^2 + 2y - 1}{6} = \frac{0}{6}$$

$$y^2 + \frac{1}{3}y - \frac{1}{6} = 0$$

$$y^2 + \frac{1}{3}y + \frac{1}{36} = \frac{1}{6} + \frac{1}{36}$$

$$\downarrow \quad \uparrow$$

$$\frac{1}{3} \rightarrow \left(\frac{1}{6}\right)^2$$

$$\left(y + \frac{1}{6}\right)^2 = \frac{7}{36}$$

$$\sqrt{\left(y + \frac{1}{6}\right)^2} = \sqrt{\frac{7}{36}}$$

$$y + \frac{1}{6} = \pm \frac{\sqrt{7}}{6}$$

$$\boxed{y = -\frac{1}{6} \pm \frac{\sqrt{7}}{6}}$$

Quadratic Formula

$$6y^2 + 2y - 1 = 0$$

$$a=6, b=2, c=-1$$

$$y = \frac{-2 \pm \sqrt{2^2 - 4(6)(-1)}}{2(6)}$$

$$= \frac{-2 \pm \sqrt{4+24}}{12}$$

$$= \frac{-2 \pm \sqrt{28}}{12}$$

$$= \frac{-2 \pm 2\sqrt{7}}{12}$$

$$\boxed{y = -\frac{1}{6} \pm \frac{\sqrt{7}}{6}}$$

Question #3

a.) $5\sqrt{12} + 16\sqrt{27}$

$$5 \cdot 2\sqrt{3} + 16 \cdot 3\sqrt{3}$$

$$10\sqrt{3} + 48\sqrt{3} = \boxed{58\sqrt{3}}$$

b.) $\sqrt{5a} + 2\sqrt{45a^3}$

$$\sqrt{5a} + 2 \cdot 3a\sqrt{5a}$$

$$\sqrt{5a} + 6a\sqrt{5a}$$

$$\boxed{(1+6a)\sqrt{5a}}$$

c.) $\sqrt{10} \cdot \sqrt{5}$

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

d.) $\sqrt{5a^7} \cdot \sqrt{15a^3}$

$$\sqrt{75a^{10}} = \boxed{5a^5\sqrt{3}}$$

e.) $\frac{\sqrt{40xy^3}}{\sqrt{8x}} = \sqrt{\frac{40xy^3}{8x}} = \sqrt{5y^3} = \boxed{y\sqrt{5y}}$

f.) $(2\sqrt{5} - \sqrt{7})(3\sqrt{5} + 4\sqrt{7})$

$$6\sqrt{25} + 8\sqrt{35} - 3\sqrt{35} - 4\sqrt{49}$$

$$6 \cdot 5 + 5\sqrt{35} - 4 \cdot 7$$

$$30 + 5\sqrt{35} - 28$$

$$\boxed{2 + 5\sqrt{35}}$$

Question #4

a.) $\frac{12}{\sqrt{72}} = \frac{12}{6\sqrt{2}} = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \boxed{\sqrt{2}}$

b.) $\frac{\sqrt{12}}{(\sqrt{3}-1)(\sqrt{3}+1)} = \frac{\sqrt{36} + \sqrt{12}}{\sqrt{9} + \sqrt{3} - \sqrt{3} - 1}$

$$= \frac{6 + 2\sqrt{3}}{3-1} = \frac{6 + 2\sqrt{3}}{2} = \frac{6}{2} + \frac{2\sqrt{3}}{2} = \boxed{3 + \sqrt{3}}$$

c.) $\frac{5}{\sqrt[3]{9}} \cdot \frac{\sqrt[3]{3}}{\sqrt[3]{3}} = \boxed{\frac{5\sqrt[3]{3}}{3}}$

$(3 \cdot 3 \cdot 3)$

Question #4 continued

d) $\frac{7}{\sqrt{8}} \cdot \frac{\sqrt{4}}{\sqrt{4}} = \frac{7\sqrt{4}}{2}$
 2.2.2 2.2

e.) $\frac{4\sqrt{5}}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{10}}{3 \cdot 2}$
 $= \frac{4\sqrt{10}}{6} = \frac{2\sqrt{10}}{3}$

f.) $\frac{(3-\sqrt{2})(5-\sqrt{6})}{(5+\sqrt{6})(5-\sqrt{6})}$
 $= \frac{15-3\sqrt{6}-5\sqrt{2}+\sqrt{12}}{25-5\sqrt{6}+5\sqrt{6}-\sqrt{36}}$
 $= \frac{15-3\sqrt{6}-5\sqrt{2}+2\sqrt{3}}{25-6}$
 $= \frac{15-3\sqrt{6}-5\sqrt{2}+2\sqrt{3}}{19}$

Question #5

a.) $\sqrt{m} - 5 = 0$
 $\sqrt{m} = 5$
 $(\sqrt{m})^2 = (5)^2$
 $m = 25$

check:
 $\sqrt{25} - 5 = 0$
 $5 - 5 = 0$ $m=25$
 $0=0 \checkmark$

b.) $\sqrt{5m+4} = 3\sqrt{m}$
 $(\sqrt{5m+4})^2 = (3\sqrt{m})^2$
 $5m+4 = 9m$
 $4 = 9m - 5m$
 $4 = 4m$
 $m = 1$

check:
 $\sqrt{5(1)+4} = 3\sqrt{1}$
 $\sqrt{9} = 3\sqrt{1}$ $m=1$
 $3=3$

c.) $\sqrt{4y+1} = y-1$
 $(\sqrt{4y+1})^2 = (y-1)^2$
 $4y+1 = y^2 - 2y + 1$
 $0 = y^2 - 2y + 1 - 4y - 1$
 $0 = y^2 - 6y$
 $0 = y(y-6)$
 $y = 0$ OR $y-6 = 0$
 $y = 6$

check:
 $y=0: \sqrt{4(0)+1} = 0-1$
 $\sqrt{1} = -1$
 $1 \neq -1$
 $y=6: \sqrt{4(6)+1} = 6-1$
 $\sqrt{25} = 5$
 $5 = 5 \checkmark$

$y=6$

d.) $\sqrt[3]{x+5} = 2$
 $(\sqrt[3]{x+5})^3 = (2)^3$
 $x+5 = 8$
 $x = 8 - 5$
 $x = 3$
 check:
 $\sqrt[3]{3+5} = 2$ $x=3$
 $\sqrt[3]{8} = 2 \checkmark$
 $2=2$

e.) $\sqrt{5t+3} = 2$
 $(\sqrt{5t+3})^2 = (2)^2$
 $5t+3 = 4$
 $5t = 4-3$
 $5t = 1$
 $t = 1/5$

check:
 $\sqrt{5(\frac{1}{5})+3} = 2$
 $\sqrt{1+3} = 2$ $t=1/5$
 $\sqrt{4} = 2$
 $2=2 \checkmark$

f.) $x = 2\sqrt{x-1}$
 $(x)^2 = (2\sqrt{x-1})^2$
 $x^2 = 4(x-1)$
 $x^2 = 4x - 4$
 $x^2 - 4x + 4 = 0$
 $(x-2)(x-2) = 0$
 $x-2 = 0$
 $x = 2$

check:
 $2 = 2\sqrt{2-1}$
 $2 = 2\sqrt{1}$ $x=2$
 $2 = 2 \checkmark$

g.) $\sqrt{3-x+x^2} = x-2$
 $(\sqrt{3-x+x^2})^2 = (x-2)^2$
 $3-x+x^2 = x^2 - 4x + 4$
 $3-x+x^2 - x^2 + 4x - 4 = 0$
 $3x - 1 = 0$
 $3x = 1$
 $x = 1/3$

check:
 $\sqrt{3-\frac{1}{3}+(\frac{1}{3})^2} = \frac{1}{3} - 2$
 $\sqrt{3-\frac{1}{3}+\frac{1}{9}} = \frac{1}{3} - 2$
 $\sqrt{\frac{27-3+1}{9}} = -\frac{5}{3}$
 $\sqrt{\frac{25}{9}} = -\frac{5}{3}$ No solution
 $\frac{5}{3} = -\frac{5}{3} \quad X$

h.) $2 + \sqrt{12-2x} = x$
 $\sqrt{12-2x} = x-2$
 $(\sqrt{12-2x})^2 = (x-2)^2$
 $12-2x = x^2 - 4x + 4$
 $0 = x^2 - 4x + 4 + 2x - 12$
 $0 = x^2 - 2x - 8$
 $0 = (x-4)(x+2)$
 $x-4=0$ OR $x+2=0$
 $x=4$ $x=-2$
 $x=4$

check:
 $x=4:$
 $2 + \sqrt{12-2(4)} = 4$
 $2 + \sqrt{4} = 4$
 $2+2=4$
 $4=4 \checkmark$
 $x=-2:$
 $2 + \sqrt{12-2(-2)} = -2$
 $2 + \sqrt{16} = -2$
 $2+4 = -2$
 $6 \neq -2$

$x=4$

Question #6

a) $81^{1/2} = \sqrt{81} = \boxed{9}$

b) $-125^{1/3} = -\sqrt[3]{125} = \boxed{-5}$

c) $7^{2/3} \cdot 7^{7/3} = 7^{9/3} = 7^3 = \boxed{343}$

d) $\frac{x^{1/4} \cdot x^{5/4}}{x^{3/4}} = \frac{x^{6/4}}{x^{3/4}} = \boxed{x^{3/4}}$

e) $\sqrt[8]{49^8} = 49^{8/8} = 49^{1/2}$
 $= \sqrt{49} = \boxed{7}$

d) $3(x-4) - 4(x-3) = x+3 - (x-2)$ h) $2x - \frac{2x}{7} = \frac{x}{2} + \frac{17}{2}$
 $3x-12-4x+12 = x+3-x+2$

$-\frac{x}{7} = \frac{5}{2}$
 $\frac{-x}{-1} = \frac{5}{-1}$
 $\boxed{x = -5}$

LCD = 14
 $14(2x) - \frac{2}{7}(2x) = \frac{7}{2}(x) + \frac{7}{2}(17)$

$28x - 4x = 7x + 119$

$24x = 7x + 119$

$24x - 7x = 119$

$\frac{17x}{17} = \frac{119}{17}$

$\boxed{x = 7}$

e) $7(x+1) = 4[x - (3-x)]$

$7x+7 = 4(x-3+x)$

$7x+7 = 4(2x-3)$

$7x+7 = 8x-12$

$7 = 8x-12-7x$

$7 = x-12$

$7+12 = x$

$\boxed{x = 19}$

i) $\frac{x+1}{4} = \frac{1}{6} + \frac{2-x}{3}$

LCD = 12

$\frac{3}{12}(\frac{x+1}{4}) = \frac{2}{12}(\frac{1}{6}) + \frac{4}{12}(\frac{2-x}{3})$

$3(x+1) = 2 + 4(2-x)$

$3x+3 = 2+8-4x$

$3x+3 = 10-4x$

$3x+3+4x = 10$

$7x+3 = 10$

$7x = 10-3$

$\frac{7x}{7} = \frac{7}{7}$

$\boxed{x = 1}$

Question #7

a) $4x+6 = -(x-2)$

$4x+6 = -x+2$

$4x+6+x = 2$

$5x+6 = 2$

$5x = 2-6$

$\frac{5x}{5} = \frac{-4}{5}$

$\boxed{x = -4/5}$

f) $\frac{3}{5}x - \frac{1}{10}x = x - \frac{5}{2}$

LCD = 10

$\frac{2}{10}(\frac{3}{5}x) - \frac{1}{10}(\frac{1}{10}x) = 10(x) - \frac{5}{2}$

$6x - x = 10x - 25$

$5x = 10x - 25$

$5x - 10x = -25$

$\frac{-5x}{-5} = \frac{-25}{-5}$

$\boxed{x = 5}$

b) $10(2x-1) = 8(2x+1) + 14$

$20x-10 = 16x+8+14$

$20x-10 = 16x+22$

$20x-10-16x = 22$

$4x-10 = 22$

$4x = 22+10$

$\frac{4x}{4} = \frac{32}{4}$

$\boxed{x = 8}$

g) $\frac{x}{5} = \frac{x}{6} + 1$

LCD = 30

$\frac{30}{5}(\frac{x}{5}) = \frac{30}{6}(\frac{x}{6}) + 30(1)$

$6x = 5x + 30$

$6x - 5x = 30$

$\boxed{x = 30}$

Question #8

a) $(2x^2y^5)^5$

$(2)^5(x^2)^5(y^5)^5$

$\boxed{32x^{10}y^{25}}$

b) $(\frac{6x^3y^9}{2^5})^4$

$(6)^4(x^3)^4(y^9)^4$

$(2^5)^4$

$\boxed{\frac{1296x^{12}y^{36}}{2^{20}}}$

c) $3(x-2) + 7 = 2(x+5)$

$3x-6+7 = 2x+10$

$3x+1 = 2x+10$

$3x+1-2x = 10$

$x+1 = 10$

$x = 10-1$

$\boxed{x = 9}$

Question #8 continued

c) $\left(\frac{-2x^4y^{-2}z^{-3}}{3x^{-2}y^6z^{-4}}\right)^{-4}$

$\left(\frac{-2x^4x^2z^4}{3y^6y^2z^3}\right)^{-4}$

$\left(\frac{-2x^6z}{3y^8}\right)^{-4}$

$\frac{(-2)^{-4}(x^6)^{-4}(z)^{-4}}{(3)^{-4}(y^8)^{-4}}$

$\frac{(3)^4(y^8)^4}{(-2)^4(x^6)^4z^4}$

$\frac{81y^{32}}{16x^{24}z^4}$

d) $\frac{(6r^{-1})^2(2r^{-4})}{r^{-5}(r^2)^{-3}}$

$\frac{(6)^2(r^{-1})^2(2r^{-4})}{r^{-5}r^{-6}}$

$\frac{(36r^{-2})(2r^{-4})}{r^{-5}r^{-6}}$

$\frac{72r^{-6}}{r^{-11}}$

$\frac{72r^{-6}}{r^{-6}} = 72r^5$

e) $\frac{(a^{-2}b^{-3}c^{-4})^{-5}}{(a^2b^3c^4)^5}$

$\frac{(a^{-2})^{-5}(b^{-3})^{-5}(c^{-4})^{-5}}{(a^2)^5(b^3)^5(c^4)^5}$

$\frac{a^{10}b^{15}c^{20}}{a^{10}b^{15}c^{20}} = 1$

f) $\frac{(x^{-1}y^2z)^{-2}}{(x^{-3}y^3z)^{-1}}$

$\frac{(x^{-1})^{-2}(y^2)^{-2}(z)^{-2}}{(x^{-3})^{-1}(y^3)^{-1}(z)^{-1}}$

$\frac{x^2y^{-4}z^{-2}}{x^3y^{-3}z^{-1}}$

$\frac{x^2y^3z}{x^3y^4z^2}$

$\frac{1}{xy^2z}$

g) $\frac{(x+2y)^{-3}}{(x+2y)^{-5}}$

$\frac{(x+2y)^5}{(x+2y)^3}$

$(x+2y)^2$

Question #9

a) $(5x+3y)(6x-5y)$

$30x^2 - 25xy + 18xy - 15y^2$

$30x^2 - 7xy - 15y^2$

b) $(9y-2)(8y^2-6y+1)$

$72y^3 - 54y^2 + 9y - 16y^2 + 12y - 2$

$72y^3 - 70y^2 + 21y - 2$

c) $5t^4(2t-3)(6t+5)$

$5t^4(12t^2+10t-18t-15)$

$5t^4(12t^2-8t-15)$

$60t^6 - 40t^5 - 75t^4$

d) $(4x-3)^2$

$(4x-3)(4x-3)$

$16x^2 - 12x - 12x + 9$

$16x^2 - 24x + 9$

Question #10

a) $(t^2+2t-35) \div (t-5)$

$$\begin{array}{r} t+7 \\ t-5 \overline{) t^2+2t-35} \\ \underline{-(t^2-5t)} \\ 7t-35 \\ \underline{-(7t-35)} \\ 0 \end{array}$$

b) $(8t^8+24t^7-16t^5+12t^4) \div (8t^6)$

$\frac{8t^8}{8t^6} + \frac{24t^7}{8t^6} - \frac{16t^5}{8t^6} + \frac{12t^4}{8t^6}$

$t^2 + 3t - \frac{2}{t} + \frac{3}{2t^2}$

c) $(6r^4-11r^3-r^2+16r-8) \div (2r-3)$

$$\begin{array}{r} 3r^3 - r^2 - 2r + 5 \\ 2r-3 \overline{) 6r^4-11r^3-r^2+16r-8} \\ \underline{-(6r^4-9r^3)} \\ -2r^3-r^2 \\ \underline{-(-2r^3+3r^2)} \\ -4r^2+16r \\ \underline{-(-4r^2+6r)} \\ 10r-8 \\ \underline{-(10r-15)} \\ 7 \end{array}$$

$3r^3 - r^2 - 2r + 5 + \frac{7}{2r-3}$

Question #11

a) $s^2-6s-27$

$(s-9)(s+3)$

b) $m^2-12m+36$

$(m-6)(m-6)$

$(m-6)^2$

c) $15x^2-14x-8$

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

Question #11 continued

d.) $a^3 + a^2 - 4a - 4$
 $(a^3 + a^2) - (4a + 4)$
 $a^2(a+1) - 4(a+1)$
 $(a+1)(a^2 - 4)$
 $(a+1)(a+2)(a-2)$

e.) $x^3 - 27$
 $(x)^3 - (3)^3$
 $(x-3)(x^2 + 3x + 9)$

f.) $8w^3 + 125$
 $(2w)^3 + (5)^3$
 $(2w+5)(4w^2 - 10w + 25)$

g.) $12x^3 - 2x^2y - 24xy^2$
 $2x(6x^2 - xy - 12y^2)$
 $2x(3x + 4y)(2x - 3y)$

h.) $6x^3 - 6x$
 $6x(x^2 - 1)$
 $6x(x+1)(x-1)$

i.) $q^3 - q^2 + q - 1$
 $(q^3 - q^2) + (q - 1)$
 $q^2(q-1) + 1(q-1)$
 $(q-1)(q^2 + 1)$

j.) $x^2 + 100$
 Prime

k.) $27p^{10} - 45p^9 - 252p^8$
 $9p^8(3p^2 - 5p - 28)$
 $9p^8(3p + 7)(p - 4)$

l.) $x^2 - 17x + 66$
 $(x-11)(x-6)$

m.) $y^2 - 4yk - 12k^2$
 $(y-6k)(y+2k)$

n.) $4x^5 + 12x^4 - 40x^3$
 $4x^3(x^2 + 3x - 10)$
 $4x^3(x+5)(x-2)$

o.) $20x^2 + 22x + 6$
 $2(10x^2 + 11x + 3)$
 $2(5x+3)(2x+1)$

p.) $9p^2 - 18p + 8$
 $(3p-4)(3p-2)$

q.) $24x^2 - 42x + 9$
 $3(8x^2 - 14x + 3)$
 $3(4x-1)(2x-3)$

r.) $6x^2 - 5xy - y^2$
 $(3x-y)(2x-y)$

s.) $24x^4 + 10x^3 - 4x^2$
 $2x^2(12x^2 + 5x - 2)$
 $2x^2(4x-1)(3x+2)$

t.) $2w^3 - 2w^2 + 3w - 3$
 $(2w^3 - 2w^2) + (3w - 3)$
 $2w^2(w-1) + 3(w-1)$
 $(w-1)(2w^2 + 3)$

u.) $15x^2 - 14x - 8$
 $(5x+2)(3x-4)$

v.) $-3x^3 + 27x$
 $-3x(x^2 - 9)$
 $-3x(x+3)(x-3)$

w.) $9x^2 - 12xy + 4y^2$
 $(3x-2y)(3x-2y)$
 $(3x-2y)^2$

x.) $x^2 - 12x - 28$
 $(x-14)(x+2)$

y.) $24x^2 - 46x + 10$
 $2(12x^2 - 23x + 5)$
 $2(4x-1)(3x-5)$

z.) $27x^3 - 64y^3$
 $(3x)^3 - (4y)^3$
 $(3x-4y)(9x^2 + 12xy + 16y^2)$

aa.) $10x^2 + 19x + 6$
 $(5x+2)(2x+3)$

bb.) $6x^2 - 7xy - 5y^2$
 $(3x-5y)(2x+y)$

cc.) $64x^2 - 16y^2$
 $16(4x^2 - y^2)$
 $16(2x+y)(2x-y)$

dd.) $x^2 - 14x + 49$
 $(x-7)(x-7)$
 $(x-7)^2$

ee.) $9x^2 + 48xy + 64y^2$
 $(3x)^2 + 2(3x)(4y) + (4y)^2$
 $(3x+4y)^2$

ff.) $2x^3y - 32xy$
 $2xy(x^2 - 16)$
 $2xy(x+4)(x-4)$

Question #12

a.) $x^2 - x - 20 = 0$

$(x-5)(x+4) = 0$

$x-5 = 0$ OR $x+4 = 0$

$x = 5$ OR $x = -4$

b.) $x^2 - 4x = 12$

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

$(x-6)(x+2) = 0$

$x-6 = 0$ OR $x+2 = 0$

$x = 6$ OR $x = -2$

c.) $6x^2 - 7x + 2 = 0$

$(2x-1)(3x-2) = 0$

$2x-1 = 0$ OR $3x-2 = 0$

$\frac{2x}{2} = \frac{1}{2}$ $\frac{3x}{3} = \frac{2}{3}$

$x = \frac{1}{2}$ OR $x = \frac{2}{3}$

d.) $(x-6)(2x^2 - 5x - 3) = 0$

$(x-6)(2x+1)(x-3) = 0$

$x-6 = 0$ OR $2x+1 = 0$ OR $x-3 = 0$

$x = 6$ OR $x = -\frac{1}{2}$ OR $x = 3$

e.) $x^2 - 49 = 0$

$(x+7)(x-7) = 0$

$x+7 = 0$ OR $x-7 = 0$

$x = -7$ OR $x = 7$

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

$x^2 + 2x - 3x - 6 = 14$

$x^2 - x - 6 = 14$

$x^2 - x - 6 - 14 = 0$

$x^2 - x - 20 = 0$

$(x-5)(x+4) = 0$

$x-5 = 0$ OR $x+4 = 0$

$x = 5$ OR $x = -4$

Question #13

a.) $\frac{x^3 y^2}{x^2 y^4} \cdot \frac{y^6}{x^5}$

$\frac{x^3 y^8}{x^7 y^4}$

$\frac{y^4}{x^4}$

b.) $\frac{x+1}{3-x} + \frac{x^2}{x-3}$

$-\frac{x+1}{x-3} + \frac{x^2}{x-3}$

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

$\frac{x^2 - x - 1}{x-3}$

c.) $\frac{2}{x^2 - 4x} - \frac{3}{x^2 - 16}$

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

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

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

$\frac{2x+8}{x(x+4)(x-4)} - \frac{3x}{x(x+4)(x-4)}$

$\frac{2x+8-3x}{x(x+4)(x-4)}$

$\frac{-x+8}{x(x+4)(x-4)}$

d.) $\frac{3t^2 - t}{6t^2 + 15t} \div \frac{6t^2 + t - 1}{2t^2 - 5t - 25}$

$\frac{3t^2 - t}{6t^2 + 15t} \cdot \frac{2t^2 - 5t - 25}{6t^2 + t - 1}$

$\frac{t(3t-1)}{3t(2t+5)} \cdot \frac{(2t+5)(t-5)}{(2t+1)(3t-1)}$

$\frac{t-5}{3(2t+1)}$

e.) $\frac{\frac{1}{x^2} + \frac{1}{y^2}}{\frac{1}{x} - \frac{1}{y}}$

$\frac{\frac{1}{x^2} + \frac{1}{y^2}}{\frac{y-x}{xy}}$

$\frac{\frac{y^2+x^2}{x^2 y^2}}{\frac{y-x}{xy}}$

$\frac{y^2+x^2}{x^2 y^2}$

$\frac{y-x}{xy}$

$\frac{y^2+x^2}{x^2 y^2}$

$= \frac{y^2+x^2}{x^2 y^2} \div \frac{y-x}{xy}$

$\frac{y^2+x^2}{x^2 y^2} \cdot \frac{xy}{y-x}$

$\frac{y^2+x^2}{xy(y-x)}$

Question #14

a) $\frac{x+2}{3} = \frac{2x-1}{5}$

$5(x+2) = 3(2x-1)$

$5x+10 = 6x-3$

$10 = 6x-3-5x$

$10 = x-3$

$10+3 = x$

$x=13$

b.) $\frac{x}{x-2} + \frac{3}{x+2} = \frac{8}{x^2-4}$

$(x+2)(x-2)$

LCD = $(x+2)(x-2)$, R.V. $x \neq -2, 2$

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

$x(x+2) + 3(x-2) = 8$

$x^2 + 2x + 3x - 6 = 8$

$x^2 + 5x - 6 = 8$

$x^2 + 5x - 6 - 8 = 0$

$x^2 + 5x - 14 = 0$

$(x+7)(x-2) = 0$

$x+7=0$ or $x-2=0$

$x=-7$

$x=2$

X Restricted value

c.) $\frac{8}{x^2-9} + \frac{4}{x+3} = \frac{2}{x-3}$

$(x+3)(x-3)$

LCD = $(x+3)(x-3)$, R.V. $x \neq -3, 3$

$\left(\frac{8}{(x+3)(x-3)}\right)(x+3)(x-3) + \left(\frac{4}{x+3}\right)(x+3)(x-3) = \left(\frac{2}{x-3}\right)(x+3)(x-3)$

$8 + 4(x-3) = 2(x+3)$

$8 + 4x - 12 = 2x + 6$

$4x - 4 = 2x + 6$

$4x - 4 - 2x = 6$

$2x - 4 = 6$

$2x = 6 + 4$

$2x = 10$

$x=5$

d.) $\frac{1}{x-2} + \frac{1}{x+2} = \frac{4}{x^2-4}$

$(x+2)(x-2)$

LCD = $(x+2)(x-2)$, R.V. $x \neq -2, 2$

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

$1(x+2) + 1(x-2) = 4$

$x+2 + x-2 = 4$

$2x = 4$

$x=2$ ← Restricted Value

No solution

e.) $\frac{2x-1}{x^2+2x-8} + \frac{2}{x+4} = \frac{1}{x-2}$

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

LCD = $(x+4)(x-2)$ R.V. $x \neq -4, 2$

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

$2x-1 + 2(x-2) = 1(x+4)$

$2x-1 + 2x-4 = x+4$

$4x-5 = x+4$

$4x-5-x = 4$

$3x-5 = 4$

$3x = 4+5$

$3x = 9$

$x=3$

Question #15

a) $y = \frac{2}{3}x - \frac{3}{4}$

slope: $m = \frac{2}{3}$

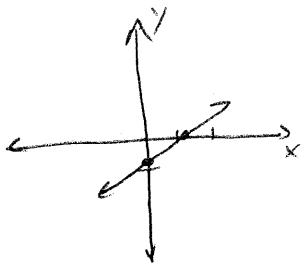
y-intercept $(0, -\frac{3}{4})$

x-intercept: $0 = \frac{2}{3}x - \frac{3}{4}$

$$\frac{3}{4} = \frac{2}{3}x$$

$$\frac{3}{4} \cdot \frac{3}{3} = \frac{2}{3}x \cdot \frac{3}{3}$$

$x = \frac{9}{8}$ $(\frac{9}{8}, 0)$



d) $x + 2y = 4$

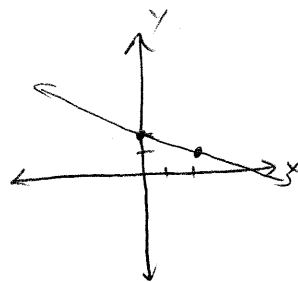
x-intercept $x + 2(0) = 4$
 $(4, 0)$ $x = 4$

y-intercept $0 + 2y = 4$
 $(0, 2)$ $2y = 4$
 $y = 2$

slope $\frac{dy}{dx} = -\frac{x+4}{2}$

$y = -\frac{1}{2}x + 2$

$m = -\frac{1}{2}$



b) $5x - 4y = 20$

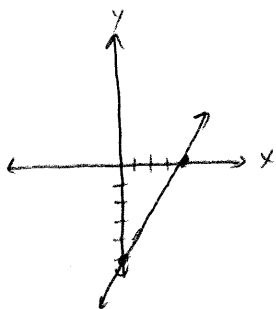
x-intercept $5x - 4(0) = 20$
 $(4, 0)$ $5x = 20$
 $x = 4$

y-intercept $5(0) - 4y = 20$
 $(0, -5)$ $-4y = 20$
 $y = -5$

slope: $\frac{-4y}{-4} = \frac{-5x + 20}{-4}$

$y = \frac{5}{4}x - 5$

$m = 5/4$



e) $3x + 2y = 6$

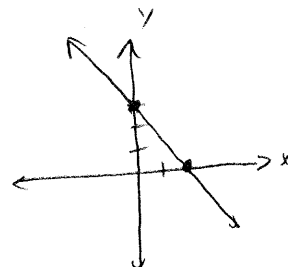
x-intercept $3x + 2(0) = 6$
 $(2, 0)$ $3x = 6$
 $x = 2$

y-intercept $3(0) + 2y = 6$
 $(0, 3)$ $2y = 6$
 $y = 3$

slope: $\frac{dy}{dx} = \frac{-3x + 6}{2}$

$y = -\frac{3}{2}x + 3$

$m = -3/2$



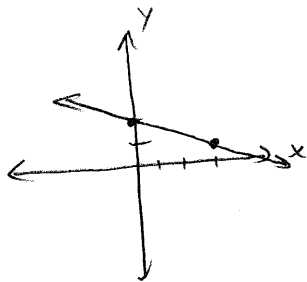
c) $\frac{1}{3}x + y = 2$

x-intercept $\frac{1}{3}x + 0 = 2$
 $(6, 0)$ $\frac{1}{3}x = 2$
 $\frac{1}{3} \cdot \frac{3}{3} = 2 \cdot \frac{3}{3}$
 $x = 6$

y-intercept $\frac{1}{3}(0) + y = 2$
 $(0, 2)$ $y = 2$

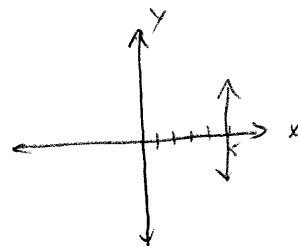
slope: $y = -\frac{1}{3}x + 2$

$m = -1/3$



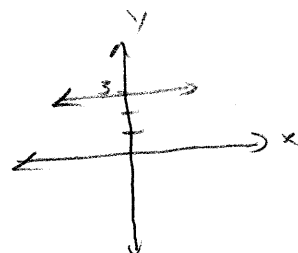
f) $x = 5$

x-intercept $(5, 0)$
y-intercept none
slope: undefined



g) $y = 3$

x-intercept none
y-intercept $(0, 3)$
Slope = 0



Question #16

a.) parallel to $x+2y=6$

$$\frac{2y}{2} = \frac{-x+6}{2}$$

$$y = -\frac{1}{2}x + 3$$

slope of parallel line = $-\frac{1}{2}$

$$y - y_1 = m(x - x_1)$$

$$y - 7 = -\frac{1}{2}(x - 3)$$

$$y - 7 = -\frac{1}{2}x + \frac{3}{2}$$

$$y = -\frac{1}{2}x + \frac{3}{2} + 7$$

$$y = -\frac{1}{2}x + \frac{3}{2} + \frac{14}{2}$$

$$y = -\frac{1}{2}x + \frac{17}{2}$$

b.) perpendicular to $3x+4y=5$

$$\frac{4y}{4} = \frac{-3x+5}{4}$$

$$y = -\frac{3}{4}x + \frac{5}{4}$$

slope of perpendicular line = $\frac{4}{3}$

$$y - (-2) = \frac{4}{3}(x - 3)$$

$$y + 2 = \frac{4}{3}x - 4$$

$$y = \frac{4}{3}x - 4 - 2$$

$$y = \frac{4}{3}x - 6$$

c.) $(3,4)$ $(6,2)$
 x_1, y_1 x_2, y_2

$$m = \frac{2-4}{6-3} = -\frac{2}{3}$$

$$y - 4 = -\frac{2}{3}(x - 3)$$

$$y - 4 = -\frac{2}{3}x + 2$$

$$y = -\frac{2}{3}x + 2 + 4$$

$$y = -\frac{2}{3}x + 6$$

d.) $m = \frac{2}{3}$ $(1,5)$

$$y - 5 = \frac{2}{3}(x - 1)$$

$$y - 5 = \frac{2}{3}x - \frac{2}{3}$$

$$y = \frac{2}{3}x - \frac{2}{3} + 5$$

$$y = \frac{2}{3}x - \frac{2}{3} + \frac{15}{3}$$

$$y = \frac{2}{3}x + \frac{13}{3}$$

e.) vertical line through $(3,2)$

$$x = 3$$

f.) horizontal line through $(-2,5)$

$$y = 5$$

b.) $\begin{cases} 3x - 5y = 11 \\ 2x - 6y = 2 \end{cases}$

$$6x - 10y = 22$$

$$-6x + 18y = -6$$

$$\frac{8y}{8} = \frac{16}{8}$$

$$y = 2$$

$$2x - 6(2) = 2$$

$$2x - 12 = 2$$

$$2x = 2 + 12$$

$$\frac{2x}{2} = \frac{14}{2}$$

$$x = 7$$

$$(7, 2)$$

Question #17

a.) $x - 2y = 16$

$$y + 3 = 3x$$

$$x = 2y + 16$$

$$y + 3 = 3(2y + 16)$$

$$y + 3 = 6y + 48$$

$$3 = 6y + 48 - y$$

$$3 = 5y + 48$$

$$3 - 48 = 5y$$

$$-45 = \frac{5y}{5}$$

$$y = -9$$

$$x - 2(-9) = 16$$

$$x + 18 = 16$$

$$x = 16 - 18$$

$$x = -2$$

$$(-2, -9)$$

c.) $-3(x - 3y) = -6$

$$3x - 9y = 9$$

$$-3x + 9y = 18$$

$$3x - 9y = 9$$

$$0 \neq 27$$

No solution

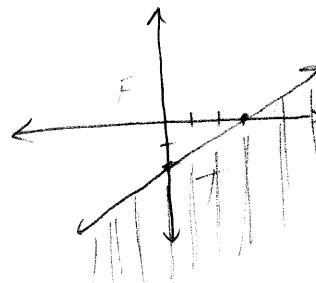
Question #18

a.) $2x - 3y \geq 6$

$$-3y \geq -2x + 6$$

$$\frac{-3y}{-3} \geq \frac{-2x + 6}{-3}$$

$$y \leq \frac{2}{3}x - 2$$

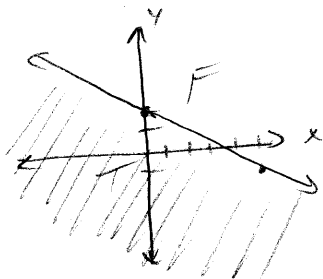


Test $(0,0)$: $2(0) - 3(0) \geq 6$
 $0 \geq 6$
 False

Question #18 continued

b.) $3x + 5y \leq 10$
 $\frac{5y \leq -3x + 10}{5} \quad \frac{-3x + 10}{5}$

$y \leq -\frac{3}{5}x + 2$

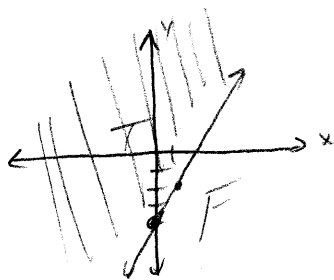


Test (0,0)

$3(0) + 5(0) \leq 10$
 $0 \leq 10$ True

c.) $2x - y \leq 4$

$\frac{-y \leq -2x + 4}{-1} \quad \frac{-2x + 4}{-1}$
 $y \geq 2x - 4$



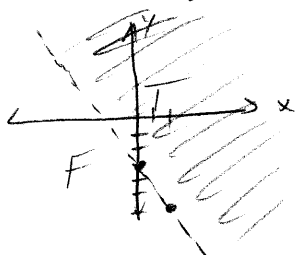
Test (0,0)

$2(0) - 0 \leq 4$
 $0 \leq 4$ True

d.) $3x + 2y > -6$

$\frac{2y > -3x - 6}{2} \quad \frac{-3x - 6}{2}$

$y > -\frac{3}{2}x - 3$



Test (0,0)

$3(0) + 2(0) > -6$
 $0 > -6$
 True

Question #19

a.) $f(2) = 3(2)^2 - 4(2) + 2$
 $= 3(4) - 4(2) + 2$
 $= 12 - 8 + 2 = \boxed{6}$

b.) $g(1) = \frac{5}{1-4} = \boxed{-\frac{5}{3}}$

c.) $f(x-3) = 3(x-3)^2 - 4(x-3) + 2$
 $= 3(x^2 - 6x + 9) - 4(x-3) + 2$
 $= 3x^2 - 18x + 27 - 4x + 12 + 2$
 $= \boxed{3x^2 - 22x + 41}$

d.) $h(-3) = -4(-3)^2 + 2(-3) + 8$
 $= -4(9) + 2(-3) + 8$
 $= -36 - 6 + 8 = \boxed{-34}$

Question #20

a.) $f(x) = \frac{3}{2x-5}$

$2x - 5 = 0$
 $2x = 5$
 $x = \frac{5}{2}$

All real numbers except $\frac{5}{2}$

b.) $f(x) = 2x + 1$

All real numbers

c.) $f(x) = \frac{7x}{5-x}$

$5 - x = 0$
 $5 = x$

All real numbers except 5

Question #21

a.) $\sqrt{56}$
 $\sqrt{4} \sqrt{14}$
 $\boxed{2\sqrt{14}}$

b.) $\sqrt{45}$
 $\sqrt{9} \sqrt{5}$
 $\boxed{3\sqrt{5}}$

c.) $\sqrt{80}$
 $\sqrt{16} \sqrt{5}$
 $\boxed{4\sqrt{5}}$

d.) $\sqrt{72x^5y^8z^2}$
 $\sqrt{36} \sqrt{2}$

$\boxed{6x^2y^4z\sqrt{2x}}$

Question #22

a.) $\frac{6(3^2-1)+8}{3 \cdot 2 - 2} = \frac{56}{4} = \boxed{14}$

$6(3^2-1)+8$	$3 \cdot 2 - 2$
$6(9-1)+8$	$6-2$
$6(8)+8$	4
$48+8$	
56	

b.) $3 + 2(4 - 8 \div 2) - (4 + 5[6 - 3]^2)$
 $3 + 2(4 - 4) - (4 + 5[6 - 3]^2)$
 $3 + 2 \cdot 0 - (4 + 5[6 - 3]^2)$
 $3 + 2 \cdot 0 - (4 + 5(3)^2)$
 $3 + 2 \cdot 0 - (4 + 5 \cdot 9)$
 $3 + 2 \cdot 0 - (4 + 45)$
 $3 + 2 \cdot 0 - 49$
 $3 + 0 - 49$
 $\boxed{-46}$

Question #22 continued

c.) $2 + 18 \div 3 \cdot 2 - 5$
 $2 + 6 \cdot 2 - 5$
 $2 + 12 - 5$
 $14 - 5$
 9

d.) $\frac{5}{3} + \frac{1}{6} - \frac{1}{2}$
 $\frac{10 + 1 - 3}{6} = \frac{8}{6} = \frac{4}{3}$

e.) $2|5 - (-3)| - 4(3 - 6)^2$
 $2|5 + 3| - 4(3 - 6)^2$
 $2|8| - 4(3 - 6)^2$
 $2 \cdot 8 - 4(3 - 6)^2$
 $2 \cdot 8 - 4(-3)^2$
 $2 \cdot 8 - 4 \cdot 9$
 $16 - 36$
 -20

Question #23

a.) $5x - 3y + 4z$
 $5(3) - 3(-2) + 4(5)$
 $15 - (-6) + 20$
 $15 + 6 + 20$
 41

b.) $4x^2 - 2y$
 $4(3)^2 - 2(-2)$
 $4(9) - 2(-2)$
 $36 - (-4)$
 40

a.) $2x^2 - 4y^2 - z^2$
 $2(3)^2 - 4(-2)^2 - (5)^2$
 $2 \cdot 9 - 4 \cdot 4 - 25$
 $18 - 16 - 25$
 -23

Question #24

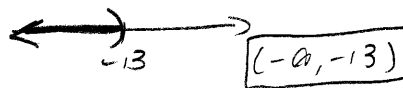
a.) $4x - (6x + 1) \leq 8x + 2(x - 3)$
 $4x - 6x - 1 \leq 8x + 2x - 6$
 $-2x - 1 \leq 10x - 6$
 $-2x - 1 - 10x \leq -6$
 $-12x - 1 \leq -6$
 $-12x \leq -6 + 1$
 $-12x \leq -5$
 $\frac{-12x}{-12} \leq \frac{-5}{-12}$
 $x \geq \frac{5}{12}$



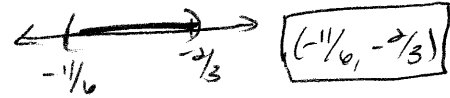
b.) $-w + 12 + 5w > w + 9 + w$
 $8w + 12 > 2w + 9$
 $8w + 12 - 2w > 9$
 $6w + 12 > 9$
 $6w > 9 - 12$
 $\frac{6w}{6} > \frac{-3}{6}$
 $w > -\frac{1}{2}$



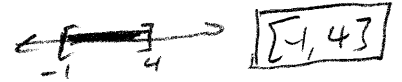
c.) $2(x - 5) + 3x < 4(x - 6) + 1$
 $2x - 10 + 3x < 4x - 24 + 1$
 $5x - 10 < 4x - 23$
 $5x - 10 - 4x < -23$
 $x - 10 < -23$
 $x < -23 + 10$
 $x < -13$



d.) $5 < 1 - 6m < 12$
 $5 - 1 < 1 - 6m - 1 < 12 - 1$
 $4 < -6m < 11$
 $\frac{4}{-6} > m > \frac{11}{-6}$
 $-\frac{2}{3} > m > -\frac{11}{6}$
 $-\frac{11}{6} < m < -\frac{2}{3}$

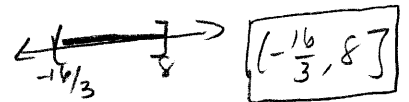


e.) $-7 \leq 3x - 4 \leq 8$
 $-7 + 4 \leq 3x - 4 + 4 \leq 8 + 4$
 $-3 \leq 3x \leq 12$
 $\frac{-3}{3} \leq \frac{3x}{3} \leq \frac{12}{3}$
 $-1 \leq x \leq 4$



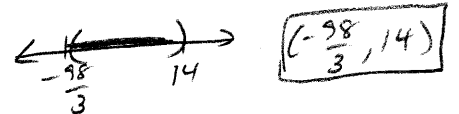
f.) $2 < 6 + \frac{3}{4}x \leq 12$
 $2 - 6 < 6 + \frac{3}{4}x - 6 \leq 12 - 6$

$-4 < \frac{3}{4}x \leq 6$
 $\frac{-4}{3/4} < \frac{3/4 x}{3/4} \leq \frac{6}{3/4}$
 $-\frac{16}{3} < x \leq 8$



g.) $-12 \leq \frac{3}{7}x + 2 < -4$
 $-12 - 2 \leq \frac{3}{7}x + 2 - 2 < -4 - 2$

$-14 \leq \frac{3}{7}x < -6$
 $\frac{-14}{3/7} \leq \frac{3/7 x}{3/7} < \frac{-6}{3/7}$
 $-\frac{98}{3} \leq x < 14$



Question #25

a.) $(-2b^6 + 3b^4 - b^2) + (b^6 + 2b^4 + 2b^2)$

$-b^6 + 5b^4 + b^2$

b.) $(5x^2y - 2xy + 9xy^2) - (8x^2y + 13xy + 12xy^2)$

$(5x^2y - 2xy + 9xy^2) + (-8x^2y - 13xy - 12xy^2)$

$-3x^2y - 15xy - 3xy^2$

c.) $[(6t^2 - 3t + 1) - (12t^2 + 2t - 6)] - [(4t^2 - 3t - 8) + (-6t^2 + 10t - 12)]$

$[(6t^2 - 3t + 1) + (-12t^2 - 2t + 6)] - [(4t^2 + 3t - 8) + (-6t^2 + 10t - 12)]$

$(-6t^2 - 5t + 7) - (-2t^2 + 13t - 20)$

$(-6t^2 - 5t + 7) + (2t^2 - 13t + 20)$

$-4t^2 - 18t + 27$

Question #26

1st: x

$x + x + 1 = 137$

2nd: $x + 1$

$2x + 1 = 137$

$2x = 137 - 1$

$2x = 136$

$x = 68$

$x + 1 = 69$

The integers are 68 and 69.

Question #27

Fed Ex = f

Airbourne Ex = a

UPS = u

$f + a + u = 13$

$f = 3a$

$u = a - 2$

$3a + a + a - 2 = 13$

$5a - 2 = 13$

$5a = 13 + 2$

$5a = 15$

$a = 3$

$f = 3(3) = 9$

$u = 3 - 2 = 1$

Akliah received 3 packages from Airbourne Express,
9 packages from Fed Ex and 1 package from UPS

Question #28

1st = x

2nd = $x + 2$

$x + 3(x + 2) = 46$

$x + 3x + 6 = 46$

$4x + 6 = 46$

$4x = 46 - 6$

$4x = 40$

$x = 10$

$x + 2 = 12$

The integers are 10 and 12.

Question #29

1st = x

2nd = $x + 2$

3rd = $x + 4$

$2(x + 4 - 6) = x + 2(x + 2) - 23$

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

$2x - 4 = 3x - 19$

$-4 = 3x - 19 - 2x$

$-4 = x - 19$

$-4 + 19 = x$

$x = 15$

$x + 2 = 17$

$x + 4 = 19$

The integers are 15, 17, 19.

Question #30

$$\begin{array}{rcl} \text{rate} \times \text{time} & = & \text{distance} \\ 25 & t & 25t \\ 18 & t & 18t \\ \hline & & 35 \end{array}$$

same direction:

$$\begin{aligned} 25t - 18t &= 35 \\ 7t &= 35 \\ \frac{7t}{7} &= \frac{35}{7} \\ t &= 5 \end{aligned}$$

It will take 5 hours.

Question #31

$$\begin{array}{rcl} \text{rate} \times \text{time} & = & \text{distance} \\ P \rightarrow S + L & 90 & t & 90t \\ S + L \rightarrow P & 116 & t & 116t \\ \hline & & & 2060 \end{array}$$

opposite direction:

$$\begin{aligned} 90t + 116t &= 2060 \\ 206t &= 2060 \\ \frac{206t}{206} &= \frac{2060}{206} \\ t &= 10 \end{aligned}$$

It will take 10 hours

Question #32

$$A = \pi r^2$$

$$A = \pi \left(\frac{13}{2}\right)^2$$

$$A = \frac{169}{4} \pi$$

The area is $\frac{169\pi}{4}$ ft²

Question #33

$$\begin{aligned} \frac{\$16 \text{ price}}{\$1.32 \text{ tax}} &= \frac{\$120 \text{ price}}{x} \\ \frac{16x}{16} &= \frac{158.4}{16} \\ x &= 9.9 \end{aligned}$$

The tax is \$9.90

Question #34

$$\begin{aligned} \frac{3300 \text{ miles}}{11 \text{ inches}} &= \frac{7700 \text{ miles}}{x} \\ 3300x &= 84700 \\ \frac{3300x}{3300} &= \frac{84700}{3300} \\ x &= 25\frac{2}{3} \end{aligned}$$

They are $25\frac{2}{3}$ inches apart

Question #35

$$\begin{aligned} \text{number} &= n \\ 3(n-2) &= 4+n \\ 3n-6 &= 4+n \\ 3n-6-n &= 4 \\ 2n-6 &= 4 \\ 2n &= 4+6 \\ \frac{2n}{2} &= \frac{10}{2} \\ n &= 5 \end{aligned}$$

The number is 5.

Question #36

$$\begin{array}{rcl} \text{value} \times \text{quantity} & = & \text{amount} \\ 0.50 & x & 0.50x \\ 0.20 & 80 & 16 \\ \hline 0.40 & y & 0.40y \end{array}$$

$$\begin{aligned} 0.5x + 16 &= 0.4y \\ x + 80 &= y \end{aligned}$$

$$\begin{aligned} 0.5x + 16 &= 0.4(x+80) \\ 0.5x + 16 &= 0.4x + 32 \\ 0.5x + 16 - 0.4x &= 32 \\ 0.1x + 16 &= 32 \\ 0.1x &= 32 - 16 \\ \frac{0.1x}{0.1} &= \frac{16}{0.1} \\ x &= 160 \end{aligned}$$

There are 160 gallons of 50% antifreeze

Question #37

$$\begin{aligned} 1^{\text{st}} &= x \\ 2^{\text{nd}} &= x+2 \\ x + 3(x+2) &= 46 \\ x + 3x + 6 &= 46 \\ 4x + 6 &= 46 \\ 4x &= 46 - 6 \\ \frac{4x}{4} &= \frac{40}{4} \\ x &= 10 \\ x+2 &= 12 \end{aligned}$$

The integers are 10 and 12

Question # 38

length = l
width = w
 $l = 3w$

Area:

$A = lw$
 $30 = (3w)(w+3)$
 $30 = 3w^2 + 9w$
 $0 = 3w^2 + 9w - 30$
 $0 = 3(w^2 + 3w - 10)$
 $0 = 3(w+5)(w-2)$

$3 = 0$ OR $w+5 = 0$ OR $w-2 = 0$
 $w = -5$ OR $w = 2$

width cannot be negative
 $l = 3(2) = 6$

The length is 6 m and the width is 2 m.

Question # 39

rate x time = job
(7hr) Doug $\frac{1}{7} \quad t \quad \frac{1}{7}t$
(12hr) Scott $\frac{1}{12} \quad t \quad \frac{1}{12}t$

$\frac{1}{7}t + \frac{1}{12}t = 1$

LCD = 84

$(\frac{1}{7}t)84 + (\frac{1}{12}t)84 = (1)84$

$12t + 7t = 84$

$19t = 84$
 $\frac{19}{19} \quad \frac{84}{19}$

$t = 4\frac{8}{19}$

It takes them $4\frac{8}{19}$ hours together.

Question #40

rate x time = job
(8hrs) Jorge $\frac{1}{8} \quad t \quad \frac{1}{8}t$
(6hrs) Caterina $\frac{1}{6} \quad t \quad \frac{1}{6}t$

$\frac{1}{8}t + \frac{1}{6}t = 1$

LCD = 24

$(\frac{1}{8}t)24 + (\frac{1}{6}t)24 = (1)24$

$3t + 4t = 24$

$\frac{7t}{7} = \frac{24}{7}$

$t = 3\frac{3}{7}$

It takes them $3\frac{3}{7}$ hours together.

Question # 41

rate x time = job
 x experienced $\frac{1}{x} \quad 2 \quad \frac{2}{x}$
 $2x$ new $\frac{1}{2x} \quad 2 \quad \frac{2}{2x}$

$\frac{2}{x} + \frac{1}{2x} = 1$

LCD = x

$(\frac{2}{x})x + (\frac{1}{2x})x = (1)x$

$2 + 1 = x$

$x = 3$

The experienced employee takes 3 hours working alone

Question #42

value x quantity = amount
0.25 \times 0.25x
0.10 \times 0.10y
0.19 \times 20 \times 3.8

$0.25x + 0.10y = 3.8$

$x + y = 20$

$y = 20 - x$

$0.25x + 0.10(20 - x) = 3.8$

$0.25x + 2 - 0.1x = 3.8$

$0.15x + 2 = 3.8$

$0.15x = 3.8 - 2$

$0.15x = 1.8$

$\frac{0.15x}{0.15} = \frac{1.8}{0.15}$

$x = 12$

$12 + y = 20$

$y = 20 - 12$

$y = 8$

12 lbs of the 25% mixture and 8 lbs of the 10% mixture are needed

Question #43

value x quantity = amount
5f \times f \times 5f
\$1 \times 5 \times 15
X \times 22 \times 50

$5f + 5 = 50$

$-1(f + 5 = 22)$

$5f + 5 = 50$

$-f - 5 = -22$

$\frac{4f}{4} = \frac{28}{4}$

$f = 7$

$7 + 5 = 22$

$5 = 22 - 7$

$5 = 15$

He has 7 \$bills and 15 \$1 bills

Question #44

	rate	x	time	=	distance
upstream	$b-6$		10		d
downstream	$b+6$		4		d

$$d = 10(b-6) \rightarrow d = 10b - 60$$

$$d = 4(b+6) \rightarrow d = 4b + 24$$

$$4b + 24 = 10b - 60$$

$$24 = 10b - 60 - 4b$$

$$24 = 6b - 60$$

$$24 + 60 = 6b$$

$$\frac{84}{6} = \frac{6b}{6}$$

$$b = 14$$

The speed of the canoe is 14 km/hr

Question #46

	rate	x	time	=	distance
upstream	$b-3$		t		4
downstream	$b+3$		t		10

$$(b-3)t = 4 \quad (b+3)t = 10$$

$$t = \frac{4}{b-3} \rightarrow t = \frac{10}{b+3}$$

$$\frac{4}{b-3} = \frac{10}{b+3}$$

$$4(b+3) = 10(b-3)$$

$$4b + 12 = 10b - 30$$

$$12 = 10b - 30 - 4b$$

$$12 = 6b - 30$$

$$12 + 30 = 6b$$

$$42 = 6b$$

$$\frac{42}{6} = \frac{6b}{6}$$

$$b = 7$$

The speed of the kayak is 7 mph

Question #45

	rate	x	time	=	distance
upstream	$8-c$		t		9
downstream	$8+c$		t		15

$$(8-c)t = 9 \quad (8+c)t = 15$$

$$t = \frac{9}{8-c} \rightarrow t = \frac{15}{8+c}$$

$$\frac{9}{8-c} = \frac{15}{8+c}$$

$$9(8+c) = 15(8-c)$$

$$72 + 9c = 120 - 15c$$

$$72 + 9c + 15c = 120$$

$$72 + 24c = 120$$

$$24c = 120 - 72$$

$$24c = 48$$

$$\frac{24c}{24} = \frac{48}{24}$$

$$c = 2$$

The current is 2 mph

Question #47

	rate	x	time	=	distance
upstream	$4-c$		t		8
downstream	$4+c$		t		24

$$(4-c)t = 8 \quad (4+c)t = 24$$

$$t = \frac{8}{4-c} \rightarrow t = \frac{24}{4+c}$$

$$\frac{8}{4-c} = \frac{24}{4+c}$$

$$8(4+c) = 24(4-c)$$

$$32 + 8c = 96 - 24c$$

$$32 + 8c + 24c = 96$$

$$32 + 32c = 96$$

$$32c = 96 - 32$$

$$32c = 64$$

$$\frac{32c}{32} = \frac{64}{32}$$

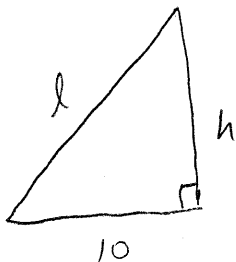
$$c = 2$$

The current is 2 mph

Question #48

Same as Question #44

Question #49



$$l = h + 2$$

$$10^2 + h^2 = l^2$$

$$10^2 + h^2 = (h + 2)^2$$

$$100 + h^2 = h^2 + 4h + 4$$

$$0 = h^2 + 4h + 4 - 100 - h^2$$

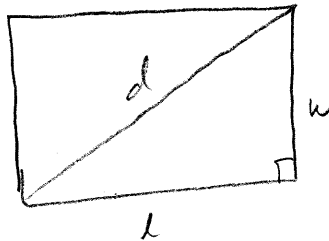
$$0 = 4h - 96$$

$$\frac{96}{4} = \frac{4h}{4}$$

$$h = 24$$

The ladder reaches 24 ft up the wall.

Question #50



$$l^2 + w^2 = d^2 \quad w = 7 \quad d = 25$$

$$l^2 + 7^2 = 25^2$$

$$l^2 + 49 = 625$$

$$l^2 = 625 - 49$$

$$l^2 = 576$$

$$\sqrt{l^2} = \sqrt{576}$$

$$l = \pm 24$$

The length of the rectangle is 24 cm