2-10) $\overline{AB}$ $m=5$ $A(-3,-1)$ $B(2,n)$

$m=5=\frac{n-(-1)}{2-(-3)}$

$\frac{5}{1}=\frac{n+1}{5}$ $25=n+1$ $\boxed{n=24}$

$-1 \quad -1$

$d=\sqrt{(24-(-1))^2+(2-(-3))^2}$

$d=\sqrt{(25)^2+(5)^2}$

$=\sqrt{625+25}$ $=\sqrt{650}=\sqrt{25\cdot 26}$

$=5\sqrt{26}$

Tue/Wed 10/28 & 10/29 (2.1.2) (2-16 → 2-29)

2-16) A careful graph is to scale done on graph paper and with key points clearly labeled

2-17) $p(x)=x^2+5x-6$

a) $p(0)=(0)^2+5(0)-6=-6$ $\boxed{(0,-6)}$

b) $0=x^2+5x-6$ $\boxed{(-6,0) \text{ and } (1,0)}$

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

$x=-6 \quad x=1$

c) $q(x)=x^2+5x$ $(0,0)$ y-int

y int ⇒ $(0)^2+5(0)=0$

x int $0=x^2+5x$ $(0,0)$ x-int.

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

$x=0$

$x=-5$

The graph of $p(x)$ is 6 units lower

d) $p(x)-q(x)=\cancel{x^2}+\cancel{5x}-6-(\cancel{x^2}+\cancel{5x})=-6$

2-18) a) $4^z = 8 \Rightarrow (2\cdot 2)^z = 2^{2z} = 2^3$

$\frac{2z}{2} = \frac{3}{2}$ $\boxed{z = \frac{3}{2}}$

Get the same base & set exp. equal to each other

b) $3^z = 81^2$

$3^z = (3\cdot 3\cdot 3\cdot 3)^2$

$3^z = 3^{(4\cdot 2)}$ $\boxed{z = 8}$

d) $5^{(z+1)/3} = 25^{1/2}$

$5^{(z+1)/3} = (5\cdot 5)^{1/2}$

$5^{(z+1)/3} = 5^{2/2}$

$\frac{(z+1)}{3} = \frac{2}{2}$

c) $4^{2z/3} = 8^{(z+2)}$ $(2\cdot 2)^{2z/3} = (2\cdot 2\cdot 2)^{z+2}$

$\frac{4z}{3} = \frac{3z+6}{1}$ $2^{2(2z/3)} = 2^{3(z+2)}$

$4z = 9z + 18$

$-9z \quad -9z$

$\frac{-5z}{-5} = \frac{18}{-5} \Rightarrow \boxed{z = -\frac{18}{5}}$

2-19) a) $\left(\frac{1}{81}\right)^{-1/4} = \left(\frac{81}{1}\right)^{1/4} = 3$

b) $x^{-2}y^{-4} = \frac{1}{x^2y^4}$

c) $(2x)^{-2}(16x^2y)^{1/2} = \frac{1}{4x^2}\cdot 4x\sqrt{y} = \boxed{\frac{\sqrt{y}}{x}}$

$z^2 + z = 6$

$z^2 + z - 6 = 0$

$(z+3)(z-2) = 0$

$\boxed{z = -3}$

$\boxed{z = 2}$

2-20) a) $3p + 3s = 22.50$

$3(8) + 3s + 1p = 37.50$

$24 + 3s + 1p = 37.50$

$-24 \qquad -24$

$3s + 1p = 13.50$

$-(3s + 3p = 22.50)$

$\frac{-2p}{2} = \frac{-9}{2}$ $p = \$4.50$ for Popcorn

$3(4.5) + 3s = 22.50$

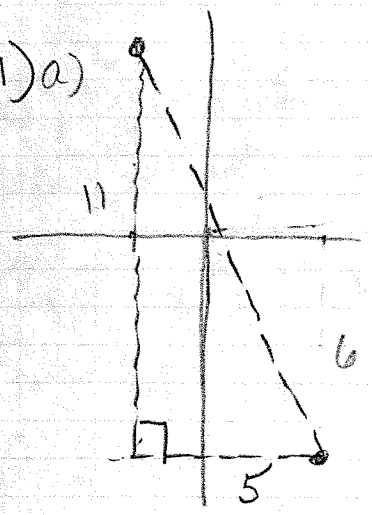
$13.5 + 3s = 22.50$

$-13.5 \qquad -13.50$ $s = \$3.00$ for soda

$\frac{3s}{3} = \frac{9}{3}$

b) ✓ used a system of equations

2-21) a)



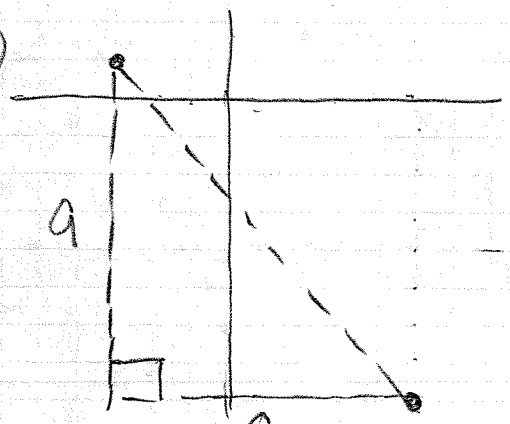
$x^2 = 11^2 + 5^2$

$x^2 = 121 + 25$

$\sqrt{x^2} = \sqrt{146}$

$\boxed{x = 12.1}$

b)



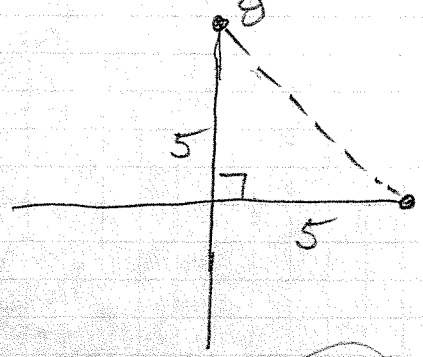
$x^2 = 9^2 + 8^2$

$x^2 = 81 + 64$

$\sqrt{x^2} = \sqrt{145}$

$\boxed{x = 12.0}$

c)



$x^2 = 5^2 + 5^2$

$x^2 = 25 + 25$

$\sqrt{x^2} = \sqrt{50}$

$\boxed{x = 7.1}$

d) $\sqrt{50} = \sqrt{2 \cdot 5 \cdot 5} = 5\sqrt{2}$

2 25

5 5

2-22) $P(n) = -n^2 + 10n$

Max Profit = \$25 million

when # textbooks sold = 5 million

Find the vertex

$\frac{-b}{2a} = \frac{-10}{2(-1)} = \frac{-10}{-2} = 5$

$P(n) = -(5)^2 + 10(5) = -25 + 50$

25

2-23) a) $y = 2(x+3)^2 - 8$ x^2 is pos. - opens up

vertex is $(-3, -8)$

Compared to $y = x^2$ it is shifted to the left and down and vertically stretched

b) To find the x-int $y = 0$

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

$0 = 2(x^2 + 6x + 9) - 8$

$0 = 2x^2 + 12x + 18 - 8 = 2x^2 + 12x + 10$

$0 = 2(x^2 + 6x + 5)$

$0 = 2(x+5)(x+1)$

$x = -5$ and $x = -1$ $\boxed{(-5, 0) \quad (-1, 0)}$

To find the y-int $x = 0$

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

$y = 2(9) - 8 = 18 - 8 = 10$

y-int $\boxed{(0, 10)}$

2-24) Table

$y = 3(x-1)^2 - 5$

x	y
-1	7
0	-2
1	-5
2	-2
3	7

Table

$3x^2 - 6x - 2$

x	y
-1	7
0	-2
1	5
2	-2
3	7

$\frac{-b}{2a} = \frac{6}{2(3)} = 1$

b) $y = 3(x-1)^2 - 5$

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

$y = 3x^2 - 6x + 3 - 5$

$y = 3x^2 - 6x - 2$ ✓

c) Because a is the coefficient of x^2 after the binomial is squared

2-25) a) $y = (x-h)^2 + k$

$y = (x-8)^2 - 5$

b) 10 = stretch = coefficient

$y = 10(x+6)^2$

c) $y = -0.6(x+7)^2 - 2$

2-26) $y = \frac{2}{3}x + b$

$-7 = \frac{2}{3}(3) + b$

$-7 = 2 + b$

$-9 = b$

$y = 2/3x - 9$

$x = 0$, $y = -9$, $(0, -9)$

$x = 6$, $y = -5$, $(6, -5)$

2-27) a) $\sqrt{50} = \sqrt{2 \cdot 5 \cdot 5} = \boxed{5\sqrt{2}}$

2 25

5 5

b) $\sqrt{72} = \sqrt{2 \cdot 6 \cdot 6} = \boxed{6\sqrt{2}}$

2 36

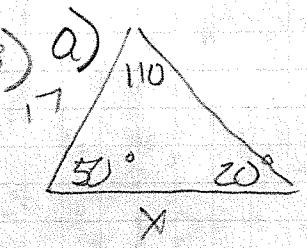
6 6

c) $\sqrt{45} = \sqrt{3 \cdot 3 \cdot 5} = \boxed{3\sqrt{5}}$

3 15

3 5

2-28) a) Law of Sines

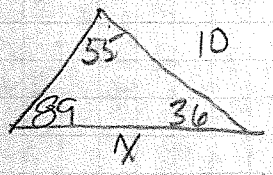


$\cancel{\frac{\sin 110}{x} = \frac{\sin 20}{17}}$

$\frac{17 \sin 110}{\sin 20} = \frac{x \sin 20}{\sin 20}$

$x = \frac{17 \sin 110}{\sin 20} = 46.71$

b)



$\cancel{\frac{\sin 89}{10} = \frac{\sin 55}{x}}$

$\frac{x \sin 89}{\sin 89} = \frac{10 \sin 55}{\sin 89}$

$x = \frac{10 \sin 55}{\sin 89} = 8.19$

2-29) a) $y = 300(1.04)^5 = \$365$

b) $y = 300(1.04)^x$

Monday 11/3 2.1.3 (2-35 → 2-41)

2-35) a) $y^2-6y=0$

$y(y-6)=0$

$\boxed{y=0}$ $y-6=0$

$+6 \quad +6$

$\boxed{y=6}$

b) $n^2+5n+7=7$

$-7 \quad -7$

$n^2+5n=0$

$n(n+5)=0$

$\boxed{n=0}$ $n+5=0$

$-5 \quad -5$

$\boxed{n=-5}$

c) $2t^2-14t+3=3$

$-3 \quad -3$

$2t^2-14t=0$

$2t(t-7)=0$

$\boxed{t=0}$ $t-7=0$

$+7 \quad +7$

$\boxed{t=7}$

d) $\frac{1}{3}x^2+3x-4=-4$

$+4 \quad +4$

$3\left(\frac{1}{3}x^2+3x=0\right)$

$x^2+9x=0$

$x(x+9)=0$

$\boxed{x=0}$ $\boxed{x=-9}$

2-36) a) $y=(x-3)(x-11)$

$x=3$

$x=11$

$\frac{3+11}{2}=\frac{14}{2}=7$

$y=(7-3)(7-11)$

$y=(4)(-4)=-16$

$v(7,-16)$

$\boxed{y=(x-7)^2-16}$

b) $y=(x+2)(x-6)$

$x=-2$

$x=6$

$\frac{-2+6}{2}=\frac{4}{2}=2$

$y=(2+2)(2-6)=4(-4)=-16$

$\boxed{y=(x-2)^2-16}$

c) $y=x^2-14x+40$

$y=(x-10)(x-4)$

$x=10$

$x=4$

$\frac{10+4}{2}=\frac{14}{2}=7$

$y=(7-10)(7-4)=(-3)(3)=-9$

$\boxed{y=(x-7)^2-9}$

d) $y=(x-2)^2-1$

$x=2$

$y=-1$

$\boxed{(2,-1)}$

2-37 a) No, the vertex is $x=2$ $y=-1$

$(2,-1)$

b) When $x=2$, $(x-2)^2$ will equal zero and $y=-1$, the smallest possible value for y in the equation. So the y-value of the vertex is the minimum value in the range of the function

2-38) in 1998 8 gigatons 1% increase

a) $y = 8 \cdot (1.01)^x$

$y = 8 \cdot (1.01)^{12} = 9.015$ gigatons

2 years after 1998 $\Rightarrow$ b) $C(x) = 8 \cdot (1.01)^{x+2}$ if x represents years since 2000 or

$C(x) = 8.16(1.01)^x$

2-39) a) $y = (x-2)(x-3)$ $\boxed{2}$ places $x=2$ and $x=3$

b) $y = (x+1)^2$ $y=0$ for vertex so one place $\boxed{1}$

c) $y = x^2 + 6x + 9$
$y = (x+3)(x+3)$ so $\boxed{1}$
$x = -3$

d) $y = x^2 + 7x + 10$ $\boxed{2}$
$y = (x+5)(x+2)$
$x = -5$ $x = -2$

e) $y = x^2 + 6x + 8$ $\boxed{2}$
$(x+4)(x+2)$
$x = -4$
$x = -2$

f) $y = -x^2 - 4x - 4$ $\boxed{1}$
$= -1(x^2 + 4x + 4)$
$y = -1(x+2)(x+2) = -1(x+2)^2$
$x = -2$

g) Check w/ Calculator

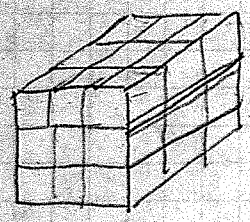
h) If the factored version includes a perfect square binomial factor, the parabola will touch @ one pt. only

2-40) a) $64^{1/3} = \sqrt[3]{64} = 4$

b) $(4x^2y^5)^{-2} = \dfrac{1}{16x^4y^{10}}$

c) $(2x^2 \cdot y^{-3}) \cdot (3x^{-1}y^5) = \dfrac{2x^{\cancel{2}\,1}}{y^3} \cdot \dfrac{3y^{\cancel{5}\,2}}{\cancel{x}} = \dfrac{6y^2}{x}$

2-41)



a) $P(3 \text{ sides}) = \frac{8}{27}$ the 8 corners

b) $P(2 \text{ sides}) \ \frac{12}{27}$

c) $P(\text{one side}) = \frac{6}{27}$

d) $\frac{1}{27}$ $P(\text{No sides})$

Tue/Wed 11/4 & 11/5 2.1.4 (2-50 $\longrightarrow$ 2-61)

ALG 2 CW

Completing the Square Practice Date: _____

Example 1

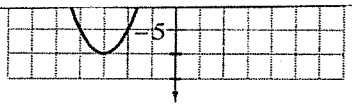
The function $f(x) = x^2 + 6x + 3$ is written in standard form. Complete the square to write it in graphing form. Then state the vertex of the parabola and sketch the graph.

The general equation of a parabola in graphing form is $f(x) = a(x-h)^2 + k$, where (h, k) is the vertex. The original equation needs to be changed into a set of parentheses squared, with a constant either added to or subtracted from it. To do this, we must know that $(x-h)^2 = x^2 - 2xh + h^2$. We will use this form of a perfect square to complete the square of the given equation or function.

KEY

Answers

1. $y = (x-4)^2 + 2$, vertex $(4, 2)$, up
2. $y = -(x+1)^2 - 6$, vertex $(-1, -6)$, down
3. $y = 3(x-4)^2 - 6$, vertex $(4, -6)$, up
4. $y = 2(x-0)^2 - 6$, vertex $(0, -6)$, up
5. $y = \frac{1}{2}(x-3)^2 - 4$, vertex $(3, -4)$, up
6. $y = (x+9)^2 + 16$, vertex $(-9, -16)$, up
7. Center: $(-2, -7)$, radius: 5
8. Center: $(9, -1)$, radius: 2
9. Center: $(-3, 0)$, radius: 10
10. Center: $(5, -7)$, radius: 4
11. Center: $(-25, 1)$, radius: $\sqrt{24} = 2\sqrt{6}$
12. Center: $(4, 8)$, radius: 24



Problems

Write each of the following equations in graphing form. Then state the vertex and the direction the parabola opens.

1. $y = x^2 - 8x + 18$
2. $y = -x^2 - 2x - 7$
3. $y = 3x^2 - 24x + 42$
4. $y = 2x^2 - 6$
5. $y = \frac{1}{2}x^2 - 3x + \frac{1}{2}$
6. $y = x^2 + 18x + 97$

Name KEY Period_____

What did the paper say to the scissors?

Solve by completing the square. Some answers appear more than once. ANSWER KEY

L. $x^2 + 16x - 36 = 0$ -18, 2	**I.** $x^2 + 6x - 7 = 0$ -7, 1	**R.** $x^2 + 6x - 2 = 0$ $-3 \pm \sqrt{11}$
A. $x^2 + 4x - 6 = 0$ $-2 \pm \sqrt{10}$	**Y.** $x^2 + 2x - 5 = 0$ $-1 \pm \sqrt{6}$	G. $x^2 + 6x + 2 = 0$ $-3 \pm \sqrt{7}$
U. $x^2 + 6x + 1 = 0$ $-3 \pm 2\sqrt{2}$	**E.** $x^2 + 10x - 24 = 0$ -12, 2	**S.** $x^2 + 2X - 7 = 0$ $-1 \pm 2\sqrt{2}$
N. $x^2 + 8x - 4 = 0$ $-4 \pm 2\sqrt{5}$	**K.** $x^2 - 4x - 8 = 0$ $2 \pm 2\sqrt{3}$	**O.** $x^2 - 2x - 35 = 0$ -5, 7
P. $x^2 - 2x - 2 = 0$ $1 \pm \sqrt{3}$	**O.** $x^2 + 5x - 50 = 0$ -10, 5	**H.** $x^2 - 4x - 12 = 0$ -2, 6

Y	O	U	R	E
$-1 \pm \sqrt{6}$	-5, 7	$-3 \pm 2\sqrt{2}$	$-3 \pm \sqrt{11}$	-12, 2

L	O	O	K	I	N	G
-18, 2	-10, 5	-5, 7	$2 \pm 2\sqrt{3}$	-7, 1	$-4 \pm 2\sqrt{5}$	$-3 \pm \sqrt{7}$

S	H	A	R	P
$-1 \pm 2\sqrt{2}$	-2, 6	$-2 \pm \sqrt{10}$	$-3 \pm \sqrt{11}$	$1 \pm \sqrt{3}$