

# Homework Packet 6 - Answer Key

## Multiplication Facts to 100 (F) Answers

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ /100

Calculate each product.

$\begin{array}{r} 3 \\ \times 9 \\ \hline 27 \end{array}$	$\begin{array}{r} 6 \\ \times 8 \\ \hline 48 \end{array}$	$\begin{array}{r} 7 \\ \times 2 \\ \hline 14 \end{array}$	$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$	$\begin{array}{r} 10 \\ \times 2 \\ \hline 20 \end{array}$	$\begin{array}{r} 6 \\ \times 7 \\ \hline 42 \end{array}$	$\begin{array}{r} 8 \\ \times 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 2 \\ \times 8 \\ \hline 16 \end{array}$	$\begin{array}{r} 3 \\ \times 4 \\ \hline 12 \end{array}$	$\begin{array}{r} 2 \\ \times 9 \\ \hline 18 \end{array}$
$\begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array}$	$\begin{array}{r} 10 \\ \times 3 \\ \hline 30 \end{array}$	$\begin{array}{r} 7 \\ \times 9 \\ \hline 63 \end{array}$	$\begin{array}{r} 3 \\ \times 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 2 \\ \times 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 8 \\ \times 7 \\ \hline 56 \end{array}$	$\begin{array}{r} 9 \\ \times 6 \\ \hline 54 \end{array}$	$\begin{array}{r} 5 \\ \times 6 \\ \hline 30 \end{array}$	$\begin{array}{r} 4 \\ \times 2 \\ \hline 8 \end{array}$	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$
$\begin{array}{r} 4 \\ \times 4 \\ \hline 16 \end{array}$	$\begin{array}{r} 7 \\ \times 5 \\ \hline 35 \end{array}$	$\begin{array}{r} 5 \\ \times 8 \\ \hline 40 \end{array}$	$\begin{array}{r} 4 \\ \times 7 \\ \hline 28 \end{array}$	$\begin{array}{r} 9 \\ \times 4 \\ \hline 36 \end{array}$	$\begin{array}{r} 6 \\ \times 6 \\ \hline 36 \end{array}$	$\begin{array}{r} 5 \\ \times 5 \\ \hline 25 \end{array}$	$\begin{array}{r} 10 \\ \times 5 \\ \hline 50 \end{array}$	$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array}$	$\begin{array}{r} 8 \\ \times 9 \\ \hline 72 \end{array}$
$\begin{array}{r} 7 \\ \times 10 \\ \hline 70 \end{array}$	$\begin{array}{r} 10 \\ \times 4 \\ \hline 40 \end{array}$	$\begin{array}{r} 2 \\ \times 2 \\ \hline 4 \end{array}$	$\begin{array}{r} 10 \\ \times 8 \\ \hline 80 \end{array}$	$\begin{array}{r} 10 \\ \times 9 \\ \hline 90 \end{array}$	$\begin{array}{r} 3 \\ \times 2 \\ \hline 6 \end{array}$	$\begin{array}{r} 3 \\ \times 8 \\ \hline 24 \end{array}$	$\begin{array}{r} 3 \\ \times 10 \\ \hline 30 \end{array}$	$\begin{array}{r} 9 \\ \times 9 \\ \hline 81 \end{array}$	$\begin{array}{r} 2 \\ \times 5 \\ \hline 10 \end{array}$
$\begin{array}{r} 4 \\ \times 6 \\ \hline 24 \end{array}$	$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$	$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 8 \\ \times 2 \\ \hline 16 \end{array}$	$\begin{array}{r} 3 \\ \times 7 \\ \hline 21 \end{array}$	$\begin{array}{r} 5 \\ \times 9 \\ \hline 45 \end{array}$	$\begin{array}{r} 7 \\ \times 8 \\ \hline 56 \end{array}$	$\begin{array}{r} 6 \\ \times 10 \\ \hline 60 \end{array}$	$\begin{array}{r} 9 \\ \times 2 \\ \hline 18 \end{array}$	$\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$
$\begin{array}{r} 9 \\ \times 10 \\ \hline 90 \end{array}$	$\begin{array}{r} 3 \\ \times 5 \\ \hline 15 \end{array}$	$\begin{array}{r} 8 \\ \times 8 \\ \hline 64 \end{array}$	$\begin{array}{r} 5 \\ \times 7 \\ \hline 35 \end{array}$	$\begin{array}{r} 4 \\ \times 9 \\ \hline 36 \end{array}$	$\begin{array}{r} 9 \\ \times 7 \\ \hline 63 \end{array}$	$\begin{array}{r} 6 \\ \times 2 \\ \hline 12 \end{array}$	$\begin{array}{r} 2 \\ \times 4 \\ \hline 8 \end{array}$	$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$	$\begin{array}{r} 2 \\ \times 6 \\ \hline 12 \end{array}$
$\begin{array}{r} 8 \\ \times 10 \\ \hline 80 \end{array}$	$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array}$	$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$	$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array}$	$\begin{array}{r} 2 \\ \times 10 \\ \hline 20 \end{array}$	$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 8 \\ \times 3 \\ \hline 24 \end{array}$	$\begin{array}{r} 9 \\ \times 8 \\ \hline 72 \end{array}$	$\begin{array}{r} 5 \\ \times 10 \\ \hline 50 \end{array}$	$\begin{array}{r} 5 \\ \times 4 \\ \hline 20 \end{array}$
$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$	$\begin{array}{r} 2 \\ \times 3 \\ \hline 6 \end{array}$	$\begin{array}{r} 4 \\ \times 5 \\ \hline 20 \end{array}$	$\begin{array}{r} 7 \\ \times 3 \\ \hline 21 \end{array}$	$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$	$\begin{array}{r} 4 \\ \times 10 \\ \hline 40 \end{array}$	$\begin{array}{r} 10 \\ \times 7 \\ \hline 70 \end{array}$	$\begin{array}{r} 8 \\ \times 5 \\ \hline 40 \end{array}$	$\begin{array}{r} 10 \\ \times 10 \\ \hline 100 \end{array}$	$\begin{array}{r} 10 \\ \times 6 \\ \hline 60 \end{array}$
$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$	$\begin{array}{r} 3 \\ \times 9 \\ \hline 27 \end{array}$	$\begin{array}{r} 10 \\ \times 6 \\ \hline 60 \end{array}$	$\begin{array}{r} 6 \\ \times 5 \\ \hline 30 \end{array}$	$\begin{array}{r} 6 \\ \times 10 \\ \hline 60 \end{array}$	$\begin{array}{r} 10 \\ \times 9 \\ \hline 90 \end{array}$	$\begin{array}{r} 6 \\ \times 9 \\ \hline 54 \end{array}$	$\begin{array}{r} 8 \\ \times 10 \\ \hline 80 \end{array}$	$\begin{array}{r} 9 \\ \times 8 \\ \hline 72 \end{array}$	$\begin{array}{r} 4 \\ \times 8 \\ \hline 32 \end{array}$
$\begin{array}{r} 3 \\ \times 2 \\ \hline 6 \end{array}$	$\begin{array}{r} 9 \\ \times 3 \\ \hline 27 \end{array}$	$\begin{array}{r} 3 \\ \times 5 \\ \hline 15 \end{array}$	$\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$	$\begin{array}{r} 5 \\ \times 9 \\ \hline 45 \end{array}$	$\begin{array}{r} 5 \\ \times 3 \\ \hline 15 \end{array}$	$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array}$	$\begin{array}{r} 9 \\ \times 5 \\ \hline 45 \end{array}$	$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$	$\begin{array}{r} 10 \\ \times 8 \\ \hline 80 \end{array}$

# Homework Packet 6 - Answer Key

## Unit 11

### Answer Key

#### Section 11-1

1. D      2. A      3.  $\frac{9}{16}$       4. 2      5.  $\frac{4}{3}$

#### Section 11-2

1. C      2. B      3. A      4. A      5. C  
6. D

#### Section 11-3

1. A      2. D      3. B      4. D      5. C  
6. B

#### Section 11-4

1. D      2. A      3. C      4. D      5. 11  
6.  $\frac{9}{16}$

#### Section 11-5

1. C      2. A      3. D      4. D      5. B  
6. C

#### Section 11-6

1. C      2. B      3. C      4. D

#### Chapter 11 Practice Test

1. B      2. C      3. A      4. A      5. D  
6. C      7. A      8. B      9. B

### Answers and Explanations

#### Section 11-1

1. D

Change the given equation into the vertex form  $y = a(x-h)^2 + k$ , in which  $(h, k)$  is the vertex of the parabola, by completing the square.

$$\begin{aligned} y &= x^2 - 6x + 5 \\ &= x^2 - 6x + \left(\frac{-6}{2}\right)^2 - \left(\frac{-6}{2}\right)^2 + 5 \\ &= (x^2 - 6x + 9) - 9 + 5 \\ &= (x-3)^2 - 4 \end{aligned}$$

The coordinate of the vertex can be read as  $(3, -4)$ .

2. A

Change the given equation into the factored form  $y = (x-a)(x-b)$ , in which  $x = a$  and  $x = b$  are the  $x$ -intercepts of the parabola. Find two numbers with a sum of  $-6$  and a product of  $5$ . The two numbers are  $-1$  and  $-5$ .

$y = x^2 - 6x + 5$  can be written in the factored form  $y = (x-1)(x-5)$ . The  $x$ -intercepts are  $1$  and  $5$ .

3.  $\frac{9}{16}$

$$\begin{aligned} y &= a(x-h)^2 \\ 0 &= a(4-h)^2 \quad x\text{-intercept at } (4, 0) \end{aligned}$$

Since  $a \neq 0$ ,  $4-h = 0$ , or  $h = 4$ .

The graph of the parabola passes through  $(0, 9)$ , since the  $y$ -intercept of the parabola is  $9$ .

$$9 = a(0-h)^2 \quad y\text{-intercept at } (0, 9)$$

$$9 = ah^2 \quad \text{Simplify.}$$

$$9 = a(4)^2 \quad \text{Substitute 4 for } h.$$

$$\frac{9}{16} = a$$

4. 2

$$\begin{aligned} y &= a(x+2)^2 - 15 \\ 3 &= a(1+2)^2 - 15 \quad x=1 \text{ and } y=3 \\ 3 &= 9a - 15 \\ 18 &= 9a \\ 2 &= a \end{aligned}$$

5.  $\frac{4}{3}$

The  $x$ -intercepts of the graph of the equation  $y = a(x-1)(x+5)$  are  $-5$  and  $1$ . The  $x$ -coordinate of the vertex is the average of the two  $x$ -intercepts.

Therefore,  $h = \frac{-5+1}{2} = -2$ . The value of  $k$  is  $-12$

because the minimum value of  $y$  is  $-12$ . So the coordinate of the vertex is  $(-2, -12)$ . Substitute  $x = -2$  and  $y = -12$  in the given equation.

$$-12 = a(-2-1)(-2+5)$$

$$-12 = -9a$$

$$\frac{12}{9} = a \text{ or } a = \frac{4}{3}$$

# Homework Packet 6 - Answer Key

## Section 11-2

1. C

$$x^2 - 2x - 24$$

Find two numbers with a sum of  $-2$  and a product of  $-24$ . The two numbers are  $-6$  and  $4$ .

$$\text{Therefore, } x^2 - 2x - 24 = (x - 6)(x + 4).$$

2. B

$$x^2 - 17x + 72$$

Find two numbers with a sum of  $-17$  and a product of  $72$ . The two numbers are  $-8$  and  $-9$ .

$$\text{Therefore, } x^2 - 17x + 72 = (x - 8)(x - 9).$$

3. A

$$-x^2 + 5x + 84 = -(x^2 - 5x - 84)$$

Find two numbers with a sum of  $-5$  and a product of  $-84$ . The two numbers are  $-12$  and  $7$ .

$$\begin{aligned} -x^2 + 5x + 84 &= -(x^2 - 5x - 84) \\ &= -(x - 12)(x + 7) = (12 - x)(x + 7) \end{aligned}$$

4. A

$$3x^2 + 7x - 6$$

Find two numbers with a sum of  $7$  and a product of  $3 \cdot -6$  or  $-18$ . The two numbers are  $-2$  and  $9$ .

$$\begin{aligned} 3x^2 + 7x - 6 &= 3x^2 - 2x + 9x - 6 && \text{Write } 7x \text{ as } -2x + 9x. \\ &= (3x^2 - 2x) + (9x - 6) && \text{Group terms.} \\ &= x(3x - 2) + 3(3x - 2) && \text{Factor out the GCF.} \\ &= (3x - 2)(x + 3) && \text{Distributive Property} \end{aligned}$$

5. C

$$2x^2 + x - 15$$

Find two numbers with a sum of  $1$  and a product of  $2 \cdot -15$  or  $-30$ . The two numbers are  $-5$  and  $6$ .

$$\begin{aligned} 2x^2 + x - 15 &= 2x^2 - 5x + 6x - 15 && \text{Write } x \text{ as } -5x + 6x. \\ &= (2x^2 - 5x) + (6x - 15) && \text{Group terms.} \\ &= x(2x - 5) + 3(2x - 5) && \text{Factor out the GCF.} \\ &= (2x - 5)(x + 3) && \text{Distributive Property} \end{aligned}$$

6. D

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

Find two numbers with a sum of  $-1$  and a product of  $6 \cdot -2$  or  $-12$ . The two numbers are  $-4$  and  $3$ .

$$\begin{aligned} -6x^2 + x + 2 &= -(6x^2 - x - 2) \\ &= -(6x^2 - 4x + 3x - 2) && \text{Write } -x \text{ as } -4x + 3x. \\ &= -[(6x^2 - 4x) + (3x - 2)] && \text{Group terms.} \\ &= -[2x(3x - 2) + (3x - 2)] && \text{Factor out the GCF.} \\ &= -(3x - 2)(2x + 1) && \text{Distributive Property} \end{aligned}$$

## Section 11-3

1. A

$$\begin{aligned} 3x^2 - 48 &= 3(x^2 - 16) && \text{Factor out the GCF.} \\ &= 3((x)^2 - (4)^2) && \text{Write in the form } a^2 - b^2. \\ &= 3(x - 4)(x + 4) && \text{Difference of Squares} \end{aligned}$$

2. D

$$\begin{aligned} x - 6\sqrt{x} - 16 & \text{ Let } y = \sqrt{x}, \text{ then } y^2 = x. \\ x - 6\sqrt{x} - 16 &= y^2 - 6y - 16 && y = \sqrt{x} \text{ and } y^2 = x \\ &= (y - 8)(y + 2) \\ &= (\sqrt{x} - 8)(\sqrt{x} + 2) && y = \sqrt{x} \text{ and } y^2 = x \end{aligned}$$

3. B

$$\begin{aligned} (x - y)^2 &= (x - y)(x - y) \\ &= x^2 - 2xy + y^2 \\ &= (x^2 + y^2) - 2xy \\ &= 10 - 2(-3) = 16 && x^2 + y^2 = 10 \text{ and } xy = -3 \end{aligned}$$

4. D

$$\begin{aligned} x^2 - y^2 &= (x + y)(x - y) \\ &= (10)(4) \\ &= 40 && x + y = 10 \text{ and } x - y = 4 \end{aligned}$$

# Homework Packet 6 - Answer Key

5. C

$$6x^2 + 7x - 24 = 0$$

$$(3x+8)(2x-3) = 0 \quad \text{Factor.}$$

$$3x+8=0 \text{ or } 2x-3=0 \quad \text{Zero Product Property}$$

$$x = -\frac{8}{3} \text{ or } x = \frac{3}{2} \quad \text{Solve each equation.}$$

$$\text{Since } \frac{3}{2} > -\frac{8}{3}, r = \frac{3}{2} \text{ and } s = -\frac{8}{3}.$$

$$r-s = \frac{3}{2} - \left(-\frac{8}{3}\right) = \frac{9}{6} + \frac{16}{6} = \frac{25}{6}$$

6. B

$$x^2 - 3x = 28$$

$$x^2 - 3x - 28 = 0 \quad \text{Make one side 0.}$$

$$(x-7)(x+4) = 0 \quad \text{Factor.}$$

$$x-7=0 \text{ or } x+4=0 \quad \text{Zero Product Property}$$

$$x=7 \text{ or } x=-4 \quad \text{Solve each equation.}$$

$$\text{Therefore, } r+s = 7+(-4) = 3.$$

## Section 11-4

1. D

$$x^2 - 10x = 75$$

$$\text{Add } \left(\frac{-10}{2}\right)^2 \text{ to each side.}$$

$$x^2 - 10x + \left(\frac{-10}{2}\right)^2 = 75 + \left(\frac{-10}{2}\right)^2$$

$$x^2 - 10x + 25 = 75 + 25 \quad \text{Simplify.}$$

$$(x-5)^2 = 100 \quad \text{Factor } x^2 - 10x + 25.$$

$$x-5 = \pm 10 \quad \text{Take the square root.}$$

$$x = 5 \pm 10 \quad \text{Add 5 to each side.}$$

$$x = 5+10 \text{ or } x = 5-10 \quad \text{Separate the solutions.}$$

$$x = 15 \text{ or } x = -5 \quad \text{Simplify.}$$

$$\text{If } x < 0, x = -5. \text{ Therefore, } x+5 = -5+5 = 0.$$

2. A

$$x^2 - kx = 20$$

$$\text{Add } \left(\frac{-k}{2}\right)^2 \text{ to each side.}$$

$$x^2 - kx + \left(\frac{-k}{2}\right)^2 = 20 + \left(\frac{-k}{2}\right)^2$$

$$x^2 - kx + \frac{k^2}{4} = 20 + \frac{k^2}{4} \quad \text{Simplify.}$$

$$\left(x - \frac{k}{2}\right)^2 = 20 + \frac{k^2}{4} \quad \text{Factor } x^2 - kx + \frac{k^2}{4}.$$

$$(6)^2 = 20 + \frac{k^2}{4} \quad \text{Substitute 6 for } x - \frac{k}{2}.$$

$$16 = \frac{k^2}{4}$$

$$\text{Solving for } k \text{ gives } k = \pm 8.$$

$$\text{Solving the given equation } x - \frac{k}{2} = 6 \text{ for } x$$

$$\text{gives } x = 6 + \frac{k}{2}.$$

$$\text{If } k = 8, x = 6 + \frac{8}{2} = 6 + 4 = 10.$$

$$\text{If } k = -8, x = 6 + \frac{-8}{2} = 6 - 4 = 2.$$

Of the answer choices, 2 is a possible value of  $x$ . Therefore, Choice A is correct.

3. C

$$x^2 - \frac{k}{3}x = 5$$

The equation could be solved by completing the square by adding  $\left(\frac{1}{2} \cdot \frac{k}{3}\right)^2$ , or  $\frac{k^2}{36}$ , to each side.

Choice C is correct.

4. D

$$x^2 - rx = \frac{k^2}{4}$$

$$\text{Add } \left(\frac{-r}{2}\right)^2, \text{ or } \frac{r^2}{4}, \text{ to each side.}$$

$$x^2 - rx + \frac{r^2}{4} = \frac{k^2}{4} + \frac{r^2}{4}$$

$$\left(x - \frac{r}{2}\right)^2 = \frac{k^2 + r^2}{4} \quad \text{Factor } x^2 - rx + \frac{r^2}{4}.$$

$$x - \frac{r}{2} = \pm \sqrt{\frac{k^2 + r^2}{4}} \quad \text{Take the square root.}$$

$$x - \frac{r}{2} = \pm \frac{\sqrt{k^2 + r^2}}{2} \quad \text{Simplify.}$$

$$x = \frac{r}{2} \pm \frac{\sqrt{k^2 + r^2}}{2} \quad \text{Add } \frac{r}{2} \text{ to each side.}$$

Choice D is correct.

5. 11

$$(x-7)(x-s) = x^2 - rx + 14$$

$$x^2 - (s+7)x + 7s = x^2 - rx + 14$$

Since the  $x$ -terms and constant terms have to be equal on both sides of the equation,

# Homework Packet 6 - Answer Key

$$r = s + 7 \text{ and } 7s = 14.$$

Solving for  $s$  gives  $s = 2$ .

$$r = s + 7 = 2 + 7 = 9$$

Therefore,  $r + s = 9 + 2 = 11$ .

6.  $\frac{9}{16}$

$$x^2 - \frac{3}{2}x + c = (x - k)^2 \Rightarrow$$

$$x^2 - \frac{3}{2}x + c = x^2 - 2kx + k^2$$

Since the  $x$ -terms and constant terms have to be equal on both sides of the equation,

$$2k = \frac{3}{2} \text{ and } c = k^2.$$

Solving for  $k$  gives  $k = \frac{3}{4}$ .

$$\text{Therefore, } c = k^2 = \left(\frac{3}{4}\right)^2 = \frac{9}{16}.$$

## Section 11-5

1. C

$$(p-1)x^2 - 2x - (p+1) = 0$$

Use the quadratic formula to find the solutions for  $x$ .

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-(-2) \pm \sqrt{(-2)^2 - 4(p-1)(-(p+1))}}{2(p-1)} \\ &= \frac{2 \pm \sqrt{4 + 4(p-1)(p+1)}}{2(p-1)} \\ &= \frac{2 \pm \sqrt{4 + 4p^2 - 4}}{2(p-1)} \\ &= \frac{2 \pm \sqrt{4p^2}}{2(p-1)} = \frac{2 \pm 2p}{2(p-1)} \\ &= \frac{2(1 \pm p)}{2(p-1)} = \frac{1 \pm p}{p-1} \end{aligned}$$

The solutions are  $\frac{1+p}{p-1}$  and  $\frac{1-p}{p-1}$ , or  $-1$ .

Choice C is correct.

2. A

Let  $r_1$  and  $r_2$  be the solutions of the quadratic

$$\text{equation } 3x^2 + 12x - 29 = 0.$$

Use the sum of roots formula.

$$r_1 + r_2 = -\frac{b}{a} = -\frac{12}{3} = -4.$$

3. D

$$kx^2 + 6x + 4 = 0$$

If the quadratic equation has exactly one solution, then  $b^2 - 4ac = 0$ .

$$b^2 - 4ac = 6^2 - 4(k)(4) = 0 \Rightarrow 36 - 16k = 0$$

$$\Rightarrow k = \frac{36}{16} = \frac{9}{4}$$

4. D

$$y = bx - 3 \text{ and } y = ax^2 - 7x$$

Substitute  $bx - 3$  for  $y$  in the quadratic equation.

$$bx - 3 = ax^2 - 7x$$

$$ax^2 + (-7 - b)x + 3 = 0 \quad \text{Make one side 0.}$$

The system of equations will have exactly two real solutions if the discriminant of the quadratic equation is positive.

$$(-7 - b)^2 - 4a(3) > 0, \text{ or } (7 + b)^2 - 12a > 0.$$

We need to check each answer choice to find out for which values of  $a$  and  $b$  the system of equations has exactly two real solutions.

A) If  $a = 3$  and  $b = -2$ ,  $(7 - 2)^2 - 12(3) < 0$ .

B) If  $a = 5$  and  $b = 0$ ,  $(7 + 0)^2 - 12(5) < 0$ .

C) If  $a = 7$  and  $b = 2$ ,  $(7 + 2)^2 - 12(7) < 0$ .

D) If  $a = 9$  and  $b = 4$ ,  $(7 + 4)^2 - 12(9) > 0$ .

Choice D is correct.

5. B

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

$$x^2 + 6x + 4 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$= \frac{-6 \pm \sqrt{20}}{2} = \frac{-6 \pm 2\sqrt{5}}{2}$$

$$= -3 \pm \sqrt{5}$$

# Homework Packet 6 - Answer Key

6. C

If the quadratic equation has no real solution, the discriminant,  $b^2 - 4ac$ , must be negative. Check each answer choice.

A)  $5x^2 - 10x = 6 \Rightarrow 5x^2 - 10x - 6 = 0$

$$b^2 - 4ac = (-10)^2 - 4(5)(-6) > 0$$

B)  $4x^2 + 8x + 4 = 0$

$$b^2 - 4ac = (8)^2 - 4(4)(4) = 0$$

C)  $3x^2 - 5x = -3 \Rightarrow 3x^2 - 5x + 3 = 0$

$$b^2 - 4ac = (-5)^2 - 4(3)(3) < 0$$

Choice C is correct.

## Section 11-6

1. C

Since the two  $x$ -intercepts are  $-4$  and  $2$ , the equation of the parabola can be written as  $y = a(x+4)(x-2)$ . Substitute  $x = 0$  and

$y = \frac{16}{3}$  in the equation, since the graph of the

parabola passes through  $(0, \frac{16}{3})$ .

$$\frac{16}{3} = a(0+4)(0-2)$$

Solving the equation for  $a$  gives  $a = -\frac{2}{3}$ .

Thus the equation of the parabola is

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

The  $x$ -coordinate of the vertex is the average of the two  $x$ -intercepts:  $\frac{-4+2}{2}$ , or  $-1$ .

The  $y$ -coordinate of the vertex can be found by substituting  $-1$  for  $x$  in the equation of the parabola:  $y = -\frac{2}{3}(-1+4)(-1-2) = 6$ .

The line passes through  $(2, 0)$  and  $(-1, 6)$ .

The slope of the line is  $\frac{6-0}{-1-2} = -2$ . The equation

of the line in point-slope form is  $y - 0 = -2(x - 2)$ .

To find the  $y$ -intercept of the line, substitute  $0$  for  $x$ .  $y = -2(0 - 2) = 4$

Choice C is correct.

2. B

$$y = x^2 + x \text{ and } y = ax - 1$$

Substitute  $ax - 1$  for  $y$  in the quadratic equation.

$$ax - 1 = x^2 + x$$

$$x^2 + (-a+1)x + 1 = 0 \quad \text{Make one side 0.}$$

If the system of equations has exactly one real solution, the discriminant  $b^2 - 4ac$  must be equal to 0.

$$(-a+1)^2 - 4(1)(1) = 0 \quad b^2 - 4ac = 0$$

$$a^2 - 2a + 1 - 4 = 0 \quad \text{Simplify.}$$

$$a^2 - 2a - 3 = 0 \quad \text{Simplify.}$$

$$(a-3)(a+1) = 0 \quad \text{Factor.}$$

$$a = 3 \text{ or } a = -1 \quad \text{Solutions}$$

Since  $a > 0$ ,  $a = 3$ .

3. C

One can find the intersection points of the two graphs by setting the two functions  $f(x)$  and  $g(x)$  equal to one another and then solving for  $x$ .

This yields  $2x^2 + 2 = -2x^2 + 18$ . Adding  $2x^2 - 2$  to each side of the equation gives  $4x^2 = 16$ . Solving for  $x$  gives  $x = \pm 2$ .

$$f(2) = 2(2)^2 + 2 = 10 \text{ and also } f(-2) = 10.$$

The two points of intersections are  $(2, 10)$  and  $(-2, 10)$ . Therefore, the value of  $b$  is 10.

4. D

$$x^2 + y^2 = 14 \quad \text{First equation}$$

$$x^2 - y = 2 \quad \text{Second equation}$$

$$x^2 = y + 2 \quad \text{Second equation solved for } x^2.$$

$$y + 2 + y^2 = 14 \quad \text{Substitute } y + 2 \text{ for } x^2 \text{ in first equation.}$$

$$y^2 + y - 12 = 0 \quad \text{Make one side 0.}$$

$$(y+4)(y-3) = 0 \quad \text{Factor.}$$

$$y = -4 \text{ or } y = 3 \quad \text{Solve for } y.$$

Substitute  $-4$  and  $3$  for  $y$  and solve for  $x^2$ .

$$x^2 = y + 2 = -4 + 2 = -2.$$

Since  $x^2$  cannot be negative,  $y = -4$  is not a solution.

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

The value of  $x^2$  is 5.

# Homework Packet 6 - Answer Key

## Chapter 11 Practice Test

1. B

The  $x$ -coordinate of the vertex is the average of the  $x$ -intercepts. Thus the  $x$ -coordinate of the

vertex is  $x = \frac{-2+6}{2} = 2$ . The vertex form of

the parabola can be written as  $y = a(x-2)^2 + k$ .

Choices A and D are incorrect because the  $x$ -coordinate of the vertex is not 2.

Also, the parabola passes through (0, 6).

Check choices B and C.

$$\text{B) } y = -\frac{1}{2}(x-2)^2 + 8$$

$$6 = -\frac{1}{2}(0-2)^2 + 8 \quad \text{Correct.}$$

$$\text{C) } y = -\frac{1}{2}(x-2)^2 + 9$$

$$6 = -\frac{1}{2}(0-2)^2 + 9 \quad \text{Not correct.}$$

Choice B is correct.

2. C

$$(x+y)^2 = 324 \Rightarrow x^2 + 2xy + y^2 = 324$$

$$x^2 + y^2 = 324 - 2xy$$

$$(x-y)^2 = 16 \Rightarrow x^2 - 2xy + y^2 = 16$$

$$\Rightarrow x^2 + y^2 = 16 + 2xy$$

Substituting  $16 + 2xy$  for  $x^2 + y^2$  in the equation

$$x^2 + y^2 = 324 - 2xy \text{ yields}$$

$$16 + 2xy = 324 - 2xy.$$

Solving this equation for  $xy$  yields  $xy = 77$ .

3. A

From the graph we read the length of  $AD$ , which is 9. Let the length of  $CD = w$ .

Perimeter of rectangle  $ABCD$  is 38.

$$2 \cdot 9 + 2w = 38 \Rightarrow 2w = 20 \Rightarrow w = 10$$

Therefore, the coordinates of  $B$  are  $(-1, 10)$

and the coordinates of  $C$  are  $(8, 10)$ .

The equation of the parabola can be written in vertex form as  $y = a(x-3)^2$ .

Now substitute 8 for  $x$  and 10 for  $y$  in the

equation.  $10 = a(8-3)^2$ . Solving for  $a$  gives

$$a = \frac{10}{25} = \frac{2}{5}. \text{ Choice A is correct.}$$

4. A

$$(ax+b)(2x-5) = 12x^2 + kx - 10$$

FOIL the left side of the equation.

$$2ax^2 + (-5a+2b)x - 5b = 12x^2 + kx - 10$$

By the definition of equal polynomials,  $2a = 12$ ,

$-5a + 2b = k$ , and  $5b = 10$ . Thus,  $a = 6$  and

$b = 2$ , and  $k = -5a + 2b = -5(6) + 2(2) = -26$ .

5. D

$$h = -\frac{1}{2}gt^2 + v_0t + h_0$$

In the equation,  $g = 9.8$ , initial height  $h_0 = 40$ ,

and initial speed  $v_0 = 35$ . Therefore, the equation

of the motion is  $h = -\frac{1}{2}(9.8)t^2 + 35t + 40$ .

Choice D is correct.

6. C

In the quadratic equation,  $y = ax^2 + bx + c$ , the  $x$ -coordinate of the maximum or minimum point

is at  $x = -\frac{b}{2a}$ .

Therefore, the object reaches its maximum height

when  $t = -\frac{35}{2(-4.9)} = \frac{25}{7}$ .

7. A

The object reaches to its maximum height when

$t = \frac{25}{7}$ . So substitute  $t = \frac{25}{7}$  in the equation.

$$h = -4.9\left(\frac{25}{7}\right)^2 + 35\left(\frac{25}{7}\right) + 40 = 102.5$$

To the nearest meter, the object reaches a maximum height of 103 meters.

8. B

Height of the object is zero when the object hits the ground.

$$0 = -4.9t^2 + 35t + 40$$

Use quadratic formula to solve for  $t$ .

$$\begin{aligned} t &= \frac{-35 \pm \sqrt{35^2 - 4(-4.9)(40)}}{2(-4.9)} \\ &= \frac{-35 \pm \sqrt{2009}}{-9.8} \approx \frac{-35 \pm 44.82}{-9.8} \end{aligned}$$

## Homework Packet 6 - Answer Key

Solving for  $t$  gives  $t \approx -1$  or  $t \approx 8.1$ .

Since time cannot be negative, the object hits the ground about 8 seconds after it was thrown.

9. B

When an object hits the ground,  $h = 0$ .

$h_0 = 150$  is given.

$$0 = -16t^2 + 150$$

Substitution

$$16t^2 = 150$$

Add  $16t^2$  to each side.

$$t^2 = \frac{150}{16}$$

Divide each side by 16.

$$t = \sqrt{\frac{150}{16}} \approx 3.06$$