

**Name:**

# **Common Core Algebra II**

## **Unit 3**

### **Equations with Factoring and Complex Numbers**

**Mr. Schlansky**

**Lesson 1: I can solve quadratic equations by factoring.**

- 1) Bring everything to one side. Keep the leading coefficient positive.
- 2) Factor
- 3) Set each factor equal to zero

**Lesson 2: I can solve radical equations by squaring both sides.**

- 1) Isolate the radical
- 2) Square both sides
- 3) Solve equation
- 4) Check for extraneous solutions

**Lesson 3: I can solve fractional equations by multiplying by the LCD**

- 1) Multiply by the LCD!  
To find LCD:  
Integers: Find least common multiple (smallest integer every integer goes into)  
Variables: Put all factors in all denominators together
- 2) Solve equation
- 3) Check for extraneous solutions

**\*Factor the denominators if necessary**

**\*Extraneous solutions are the solutions that do not check!**

**Lesson 4: I can reduce negative radicals by separating into perfect squares and non perfect squares and using  $i = \sqrt{-1}$ .**

**Reducing Negative Radicals**

- 1) Separate radical into two radicals: perfect squares and non-perfect square
- 2) Take the square root of the perfect square

\* A negative inside a radical becomes an  $i$  and comes outside because  $i = \sqrt{-1}$ .

**Lesson 5: I can solve quadratic equations using the quadratic formula.**

**Quadratic Formula**

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

- 1)  $ax^2 + bx + c = 0$
- 2) List a, b, and c values
- 3) Substitute values into quadratic formula
- 4) Type discriminant into the calculator (what is underneath the radical)
- 5) REDUCE THE RADICAL off to the side (If possible)
- 6) Reduce from all three terms (If possible)

\*Separate into two fractions if there is an  $i$  involved.

**Lesson 6: I can solve practice solving quadratic equations using the quadratic formula.**  
Same notes as lesson 5

**Lesson 7: I can solve quadratic equations using Isolate/Square Root Method**

- 1) Isolate  $x^2$
  - 2) Take the square root of both sides
- \*Don't forget  $\pm$   
\*Reduce the radical if necessary

**Lesson 8: I can solve polynomial equations with imaginary/irrational solutions by factoring and using the quadratic formula and completing the square.**

**Polynomial Equations**

- 1) Bring everything to one side. Keep the leading coefficient positive.
- 2) Factor (Refer to above section)
- 3) Set each factor equal to zero

**Lesson 9: I can perform operations with complex numbers using  $i^2 = -1$  .**

**Operations with Polynomials**

Adding: Combine like terms

Subtracting: Keep, change, change

Keep the first polynomial

Change subtraction to addition

Change EVERY sign in the second polynomial

\*From comes first

Multiplying Binomials: Box Method

$$i^2 = -1, i^3 = -i$$

**Lesson 10: I can solve 2 X 2 systems using the elimination method**

**Elimination Method**

- 1) Choose a variable to cancel and multiply each equation by the other's coefficient
- \*multiply by negative if they are the same sign
- 2) Add equations together
  - 3) Solve equation for one variable
  - 4) Substitute answer in to either equation to find the second variable

### **Lesson 11: I can solve 3 X 3 systems using the elimination method**

#### **Elimination Method:**

- 1) Choose two pairs of equations and get the same variable to cancel. Use elimination method if necessary.
- 2) Use elimination method to solve the system with your two new equations.
- 3) Substitute those two answers into one of the original equations to find the third variable.

### **Lesson 12: I can solve 3 X 3 systems using PlySmlt2**

#### **Matrix Method**

Apps, PlySmlt2

### **Lesson 13: I can write the equation of a parabola given the focus and directrix using**

$$y = \frac{1}{4p}(x - v)^2 + t.$$

**Definition of a Parabola:** A parabola is the set of all points equidistant between a point (focus) and a line (directrix).

The vertex is directly in between the focus and the directrix. USE GRAPH PAPER AND COUNT!

$$y = \frac{1}{4p}(x - v)^2 + t$$

$(v, t) = \text{vertex}$

$p = \text{distance from vertex to focus / directrix}$

\*When given the equation, pull the vertex out.

### **Lesson 14: I can find the vertex, focus, and directrix given the equation of a parabola by pulling the vertex from the equation, using graph paper, and** $y = \frac{1}{4p}(x - v)^2 + t.$

1) Pull the vertex from the equation by negating what's in parenthesis for the x coordinate and negating what's in the parenthesis for the y or leaving the t value if y is by itself.

\*You can pull the p value from the equation by dividing the value by 4.

2) Plot the information you have on the graph and use that to find the third piece of information.

**The vertex is always in between the focus and the directrix!**

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## *Solving Quadratic Equations by Factoring*

1.  $y^2 - 5y - 6 = 0$

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

3.  $a^2 - 8a = 20$

4.  $3x^2 = 48$

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

6.  $3x^2 + 3x - 6 = 0$

7.  $n^2 = 3n + 18$

8.  $2x^2 + 3x = 5$

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## *Solving Radical Equations*

Solve the following radical equations and CHECK each solution

1.  $\sqrt{x-4} = 6$

2.  $5\sqrt{4x-8} + 2 = 12$

3.  $5 + \sqrt{x+5} = 7$

4.  $2\sqrt{2x-1} + 8 = 16$

5.  $4 + \sqrt{2x-5} = 1$

6.  $\sqrt{x^2 + x} = \sqrt{4x+10}$

$$7. x = \sqrt{7x-12}$$

$$8. x+4 = \sqrt{x+6}$$

$$9. x = 1 + \sqrt{x+5}$$

$$10. 3 = -x + \sqrt{x+5}$$

$$11. x = 2 + \sqrt{x+4}$$

$$12. \sqrt{4y+3} = 2y$$

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## *Fractional Equations*

Solve the following fractional equations and list the solutions as well as the extraneous solutions

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

2.  $\frac{1}{7} + \frac{2x}{3} = \frac{15x-3}{21}$

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

4.  $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

5.  $\frac{5}{x} = \frac{x+13}{6}$

6.  $\frac{1}{m+10} + \frac{1}{5} = \frac{3}{m+10}$





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

$$8. \frac{2}{x} - \frac{3x}{x+3} = \frac{x}{x+3}$$

$$9. \frac{-3}{x+3} + \frac{1}{2} = \frac{x}{6} - \frac{1}{2}$$

$$10. \frac{x+2}{x-2} = \frac{-3}{x}$$

$$11. \frac{3x+25}{x+7} - 5 = \frac{3}{x}$$

$$12. \frac{3p}{p-5} - \frac{2}{p+3} = \frac{p}{p+3}$$

$$13. \frac{1}{x-2} + \frac{4}{x+5} = \frac{7}{x^2+3x-10}$$

$$14. \frac{x}{x+2} + \frac{1}{x^2-4} = \frac{4}{x-2}$$

$$15. \frac{1}{b-3} - \frac{3}{2b+6} = \frac{b}{b^2-9}$$

$$16. \frac{a}{a-2} - \frac{8}{a+3} = \frac{10}{a^2+a-6}$$

$$17. \frac{1}{y} + \frac{6}{y^2+2y} = \frac{5}{y+2}$$

$$18. \frac{8}{x^2-121} = \frac{x}{x+11} - \frac{2}{x-11}$$

19. Which of the following is true based on the equation  $\frac{x}{x+3} + \frac{2}{x+1} = \frac{6}{x^2 + 4x + 3}$ ?
- 1) -3 is an extraneous solution
  - 2) -1 is an extraneous solution
  - 3) -3 and -1 are extraneous solutions
  - 4) -3 and 0 are extraneous solutions

20. To solve  $\frac{2x}{x-2} - \frac{11}{x} = \frac{8}{x^2 - 2x}$ , Ren multiplied both sides by the least common denominator.
- Which statement is true?
- 1) 2 is an extraneous solution.
  - 2)  $\frac{7}{2}$  is an extraneous solution.
  - 3) 0 and 2 are extraneous solutions.
  - 4) This equation does not contain any extraneous solutions.

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## *Reducing Negative Radicals*

**Reduce the following radicals**

1.  $\sqrt{12}$

2.  $\sqrt{50}$

3.  $\sqrt{162}$

4.  $\sqrt{40}$

5.  $\sqrt{45}$

6.  $\sqrt{108}$

7.  $\sqrt{63}$

8.  $\sqrt{125}$

9.  $\sqrt{-18}$

10.  $\sqrt{-50}$

11.  $\sqrt{-28}$

12.  $\sqrt{-75}$

13.  $\sqrt{-20}$

14.  $\sqrt{-54}$

15.  $\sqrt{-180}$

16.  $\sqrt{-32}$

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## *Solving Quadratic Equations Using the Quadratic Formula*

1.  $x^2 + x = 1$

2.  $2x^2 + 6x - 3 = 0$

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

4.  $x^2 - 6x = 9$

5.  $2x^2 - 6x = -5$

6.  $3x^2 = 4x - 2$

$$7. x^2 - 6x + 4 = 0$$

$$8. 4x^2 + 4x = 5$$

$$9. x^2 - 6x = -3$$

$$10. 4x^2 + 2x = -1$$

$$11. 4x^2 = 8x + 1$$

$$12. 2x^2 = 4x - 1$$

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## *Solving Quadratic Equations Regents Practice*

1. The solutions to the equation  $-\frac{1}{2}x^2 = -6x + 20$  are

- 1)  $-6 \pm 2i$
- 2)  $-6 \pm 2\sqrt{19}$
- 3)  $6 \pm 2i$
- 4)  $6 \pm 2\sqrt{19}$

2. A solution of the equation  $2x^2 + 3x + 2 = 0$  is

- 1)  $-\frac{3}{4} + \frac{1}{4}i\sqrt{7}$
- 2)  $-\frac{3}{4} + \frac{1}{4}i$
- 3)  $-\frac{3}{4} + \frac{1}{4}\sqrt{7}$
- 4)  $\frac{1}{2}$

3. The solution to the equation  $18x^2 - 24x + 87 = 0$  is

- 1)  $-\frac{2}{3} \pm 6i\sqrt{158}$
- 2)  $-\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$
- 3)  $\frac{2}{3} \pm 6i\sqrt{158}$
- 4)  $\frac{2}{3} \pm \frac{1}{6}i\sqrt{158}$



4. The solution to the equation  $4x^2 + 98 = 0$  is

- 1)  $\pm 7$
- 2)  $\pm 7i$
- 3)  $\pm \frac{7\sqrt{2}}{2}$
- 4)  $\pm \frac{7i\sqrt{2}}{2}$

5. Which equation has  $1 - i$  as a solution?

- 1)  $x^2 + 2x - 2 = 0$
- 2)  $x^2 + 2x + 2 = 0$
- 3)  $x^2 - 2x - 2 = 0$
- 4)  $x^2 - 2x + 2 = 0$

6. The roots of the equation  $x^2 + 2x + 5 = 0$  are

- 1)  $-3$  and  $1$
- 2)  $-1$ , only
- 3)  $-1 + 2i$  and  $-1 - 2i$
- 4)  $-1 + 4i$  and  $-1 - 4i$

7. Solve for  $x$  and express your answer in simplest  $a + bi$  form:  $x^2 - 6x + 25 = 0$

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## *Solving Quadratic Equations Using Isolate/Square Root Method*

**Solve for x and express your answers in simplest radical form or simplest  $a+bi$  form if necessary**

1.  $x^2 - 4 = 0$

2.  $x^2 + 4 = 0$

3.  $x^2 - 25 = 0$

4.  $x^2 + 49 = 0$

5.  $x^2 + 81 = 0$

6.  $x^2 - 100 = 0$

7.  $2x^2 - 20 = 12$

8.  $3x^2 + 21 = -54$

$$9. x^2 - 12 = 0$$

$$10. x^2 + 40 = 0$$

$$11. x^2 - 28 = 0$$

$$12. x^2 + 108 = 0$$

$$13. x^2 + 44 = 0$$

$$14. x^2 - 54 = 0$$

$$15. -3x^2 + 39 = -33$$

$$16. 2x^2 - 8 = -108$$

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## *Polynomial Equations with Irrational/Imaginary Solutions*

Solve each of the following equations and express irrational answers in simplest radical form or simplest  $a + bi$  form

1.  $x^4 + 8x^2 = 9$

2.  $x^4 + 4x^2 = 45$

3.  $x^3 + 3x^2 + 4x + 12 = 0$

4.  $x^3 - 3x^2 = -16x + 48$

5.  $x^4 - 6x^2 = -8$

6.  $x^3 + 4x^2 - 2x = 8$

$$7. x^4 - 4x^2 - 32 = 0$$

$$8. x^3 - 3x^2 - 5x + 15 = 0$$

$$9. 2x^3 - 3x^2 = -18x + 21$$

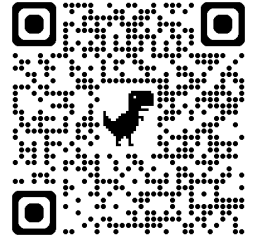
$$10. x^4 - 6x^2 - 27 = 0$$

$$11. x^4 + 4x^3 + 4x^2 = -16x$$

$$12. 3x^5 - 48x = 0$$

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## *Operations with Complex Numbers*

**Multiply the following pairs of complex numbers and express in a + bi form**

1.  $(-2 + 9i) + (6 + 8i)$

2.  $(-10 + 2i) + (7 + 6i)$

3.  $(5 - 2i) - (2 - 3i)$

4.  $(-2 + 2i) - (8 - i)$

5.  $(7 - 2i) \cdot (8 + 3i)$

6.  $(6 - i) \cdot (8 - 5i)$

7.  $(5 - 2i) \cdot (2 - 3i)$

8.  $(-2 + 2i) \cdot (8 - i)$

9.  $(-2 + 9i) \cdot (6 + 8i)$

10.  $(-7 + 2i) \cdot (7 + 6i)$

$$11. (2 - yi)^2$$

$$12. (3 - 7i)^2$$

$$13. (3k - 2i)^2$$

$$14. (4x - 3yi)^2$$

$$15. 3xi(3 - 2i)$$

$$16. 5i + 4i(2 + 3i)$$

$$17. 2xi(i - 4i^2)$$

$$18. 6xi^3(-4xi + 5)$$

$$19. 2i(\sqrt{-4} - 4)$$

$$20. -\frac{1}{2}i^3(\sqrt{-9} - 4) - 3i^2$$

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## *Solving Linear Systems in Two Variables*

Solve the following systems of equations algebraically for x and y

1. 
$$\begin{aligned} 2x + 4y &= -4 \\ 3x - 2y &= -14 \\ 5x - y &= -17 \\ 2x - 3y &= -12 \end{aligned}$$

2.

3. 
$$\begin{aligned} 4x + y &= 10 \\ -3x - 2y &= 0 \end{aligned}$$

4. 
$$\begin{aligned} 5x + 5y &= 15 \\ -2x + 3y &= -21 \end{aligned}$$

5. 
$$\begin{aligned} 7x + 2y &= -1 \\ x - y &= 5 \end{aligned}$$

6. 
$$\begin{aligned} -3x - 2y &= 12 \\ 5x + y &= -13 \end{aligned}$$



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## ***Solving Linear Systems with Three Variables Using Elimination Method***

1. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$x + 3y + 5z = 45$$

$$6x - 3y + 2z = -10$$

$$-2x + 3y + 8z = 72$$

2. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$x + 2y - 3z = -2$$

$$2x - 2y + z = 7$$

$$x + y + 2z = -4$$

3. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$-x + y + 2z = 7$$

$$2x + 3y + z = 1$$

$$-3x - 4y + z = 4$$

4. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$2x - y + z = 7$$

$$x + 2y - 5z = -1$$

$$x - y = 6$$

5. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$-2x + y + 3z = 20$$

$$-3x + 2y + z = 21$$

$$3x - 2y + 3z = -9$$

6. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$2x + 3y = 5 - z$$

$$x - 2z = 2y - 4$$

$$-3x - y + 3z = -7$$

7. Solve the following system of equations algebraically for all values of  $a$ ,  $b$ , and  $c$ .

$$a + 4b + 6c = 23$$

$$a + 2b + c = 2$$

$$6b + 2c = a + 14$$

8. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

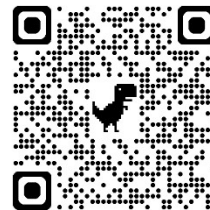
$$y = -2x + 14$$

$$3x - 4z = 2$$

$$3x - y = 16$$

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## ***Solving Linear Systems with Three Variables Using PlySmlt2***

1. Which value is contained in the solution of the system shown below?

$$2x + y - z = 1$$

$$x - 2y + z = 0$$

$$3x - y + 2z = 7$$

- 1) 0                    3) 2  
2) -1                  4) -3

2. Which value is *not* contained in the solution of the system shown below?

$$a + 5b - c = -20$$

$$4a - 5b + 4c = 19$$

$$-a - 5b - 5c = 2$$

- 1) -2  
2) 2  
3) 3  
4) -3

3. Which value is contained in the solution of the system shown below?

$$3x + y + z = -4$$

$$x - 2y + z = -5$$

$$2x + 3y - 2z = -9$$

- 3) -3                  3) -5  
4) -4                  4) -9

4. Which value is *not* contained in the solution of the system shown below?

$$4x - 5y + 2z = 130$$

$$3x + 2y - 7z = -99$$

$$10x - 6y - 4z = 112$$

- 1) -8                  3) 10  
2) -12                4) 15

5. What is the solution of the system shown below?

$$6x - 3y + 2z = 78$$

$$4x + 2y - 5z = -40$$

$$-3x - 4y - 3z = -41$$

1)  $x = 2, y = -4, z = 6$       3)  $x = 78, y = -40, z = -41$

2)  $x = 7, y = -4, z = 12$       4)  $x = 6, y = 2, z = -3$

6. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$x + 3y + 5z = 45$$

$$6x - 3y + 2z = -10$$

$$-2x + 3y + 8z = 72$$

7. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$x + 2y = 3z - 2$$

$$2x - 7 = 2y - z$$

$$x + y + 2z = -4$$

8. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$-x + y + 2z = 7$$

$$2x + 3y - 1 = -z$$

$$-4y + z = 4 + 3x$$

9. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$2x - y + z = 7$$

$$x + 2y - 5z = -1$$

$$x = y + 6$$

10. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$y + 3z = 2x + 20$$

$$-3x + 21 + 2y = -z$$

$$3x - 2y + 3z = -9$$

11. Solve the following system of equations for all values of  $x, y,$  and  $z$  using matrix method:

$$y = -2x + 14$$

$$3x - 4z = 2$$

$$3x - y = 16$$



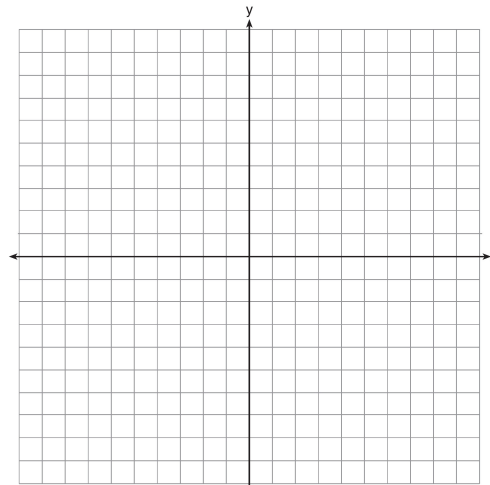
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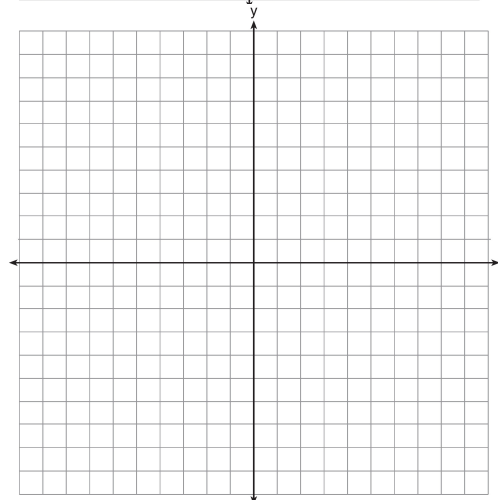
## *Writing the Equation of a Parabola*

For each of the following problems, state the coordinate of the focus and vertex, the equation of the directrix, the value of  $p$ , the equation of the parabola, and sketch the parabola.

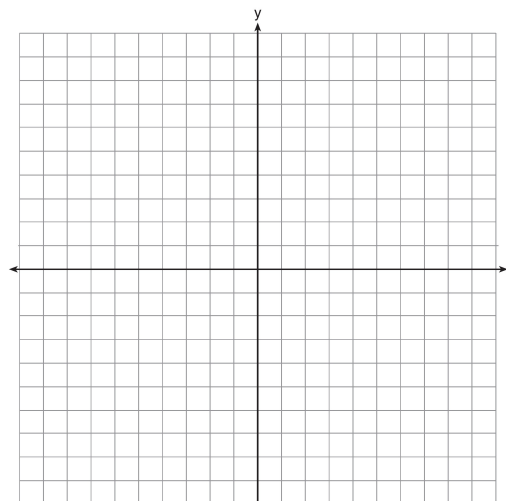
1. Focus:  $(-3, 2)$ , Directrix:  $y = 6$



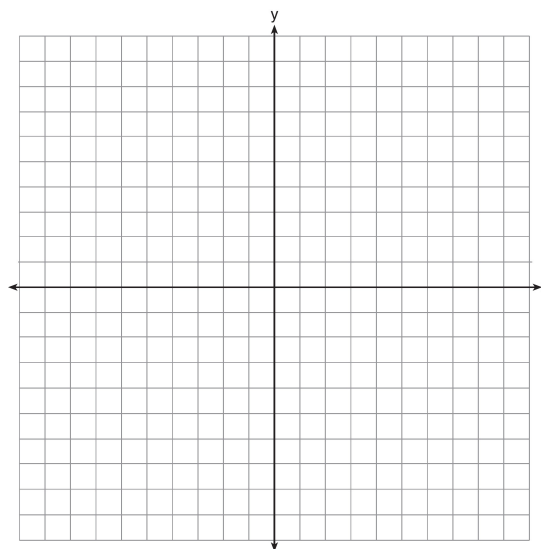
2. Focus:  $(6, -4)$ , Directrix:  $y = 2$



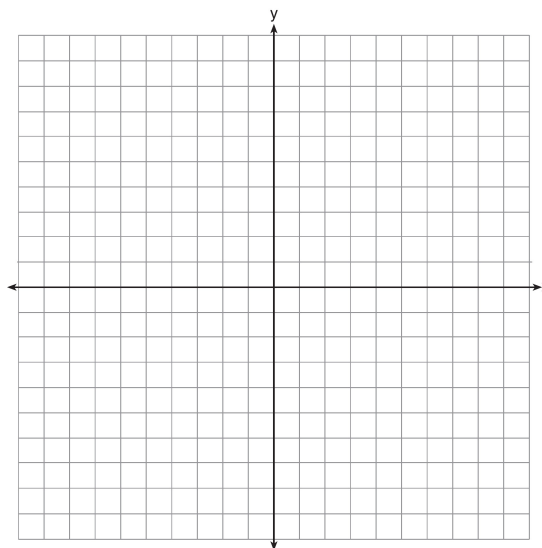
3. Focus:  $(2, -7)$ , Directrix:  $y = -1$



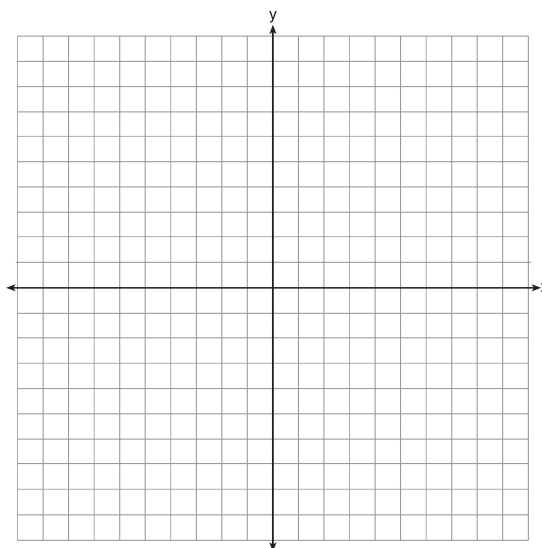
4. Focus:  $(1,-3)$ , Directrix:  $y = 9$



5. Focus:  $(-1,-2)$ , Directrix:  $y = 10$

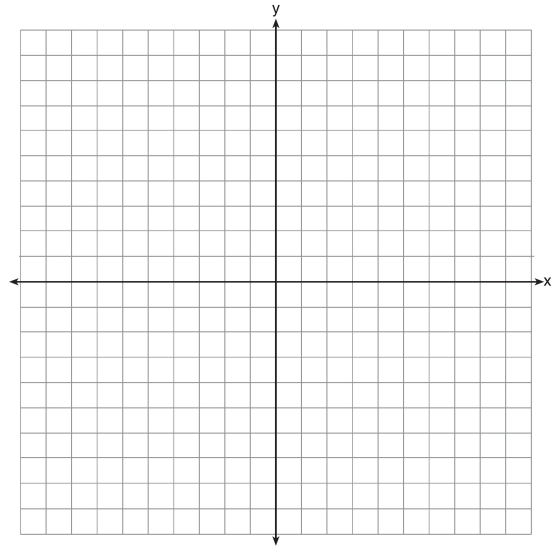


6. Directrix:  $y = 0$ , Focus:  $(-4,6)$

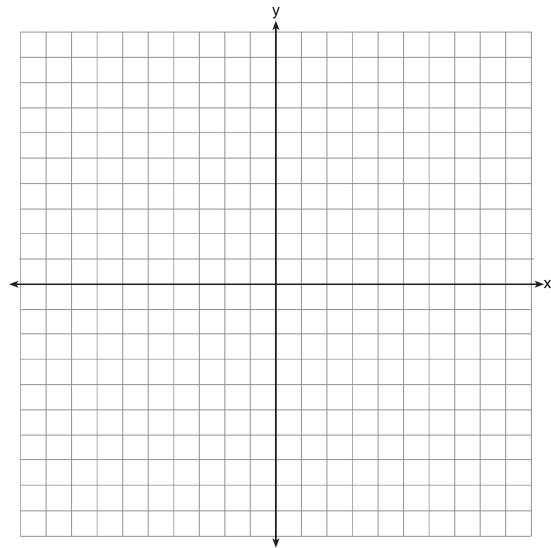




7. Directrix:  $y = -8$ , Focus:  $(-2, -2)$

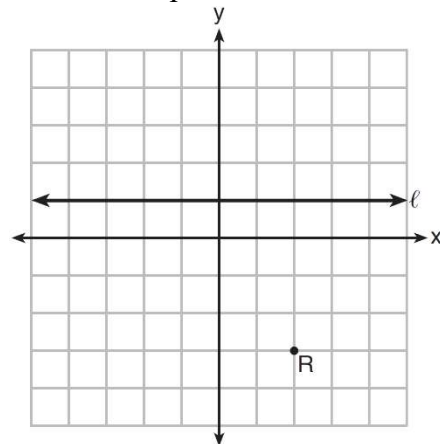


8. Focus:  $(-4, 1)$ , Directrix:  $y = -5$



9. Which equation represents the set of points equidistant from line  $\ell$  and point  $R$  shown on the graph below?

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



10. Which equation represents the equation of the parabola with focus  $(-3, 3)$  and directrix  $y = 7$ ?

- 1)  $y = \frac{1}{8}(x+3)^2 - 5$       3)  $y = -\frac{1}{8}(x+3)^2 + 5$   
2)  $y = \frac{1}{8}(x-3)^2 + 5$       4)  $y = -\frac{1}{8}(x-3)^2 + 5$

11. A parabola has its focus at  $(1, 2)$  and its directrix is  $y = -2$ . The equation of this parabola could be

- 1)  $y = 8(x+1)^2$       3)  $y = 8(x-1)^2$   
2)  $y = \frac{1}{8}(x+1)^2$       4)  $y = \frac{1}{8}(x-1)^2$

12. Which equation represents a parabola with a focus of  $(0, 4)$  and a directrix of  $y = 2$ ?

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

13. Which equation represents a parabola with a focus of  $(-2, 5)$  and a directrix of  $y = 9$ ?

- 1)  $(y-7)^2 = 8(x+2)$       3)  $(x+2)^2 = 8(y-7)$   
2)  $(y-7)^2 = -8(x+2)$       4)  $(x+2)^2 = -8(y-7)$

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## *Given Equation of a Parabola*

**Find the vertex and p value of the parabolas below**

1.  $y = \frac{1}{12}(x-5)^2 - 1$

2.  $y = \frac{1}{8}(x+3)^2 - 4$

3.  $y = -\frac{1}{16}(x+9)^2 - 8$

4.  $y = \frac{1}{4}(x+9)^2 - 3$

5.  $y = -\frac{1}{12}(x-7)^2 + 1$

6.  $y = \frac{1}{20}x^2 + 5$

7.  $12(y+2) = (x+3)^2$

8.  $-4(y+1) = (x-2)^2$

9.  $24(y+1) = (x-7)^2$

10.  $y = \frac{1}{2}(x-3)^2 + 4$

11.  $y = \frac{1}{4}(x+1)^2 + 2$

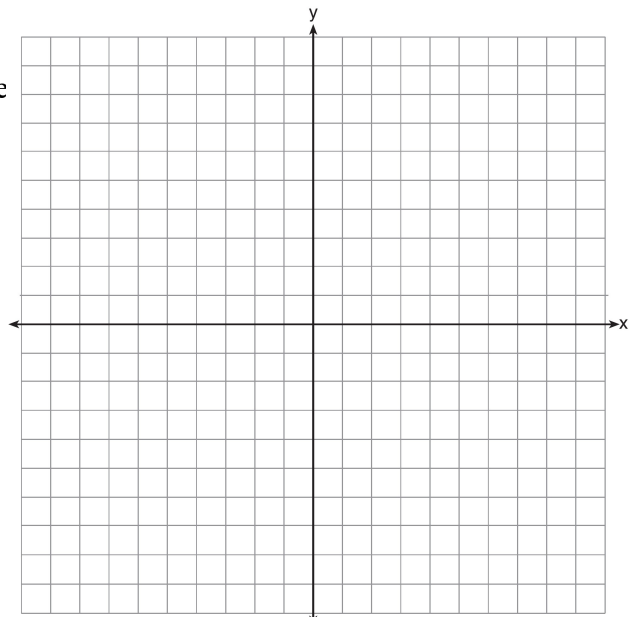
12.  $(x-2)^2 = 16(y-1)$

13.  $-6(y+1) = (x-7)^2$

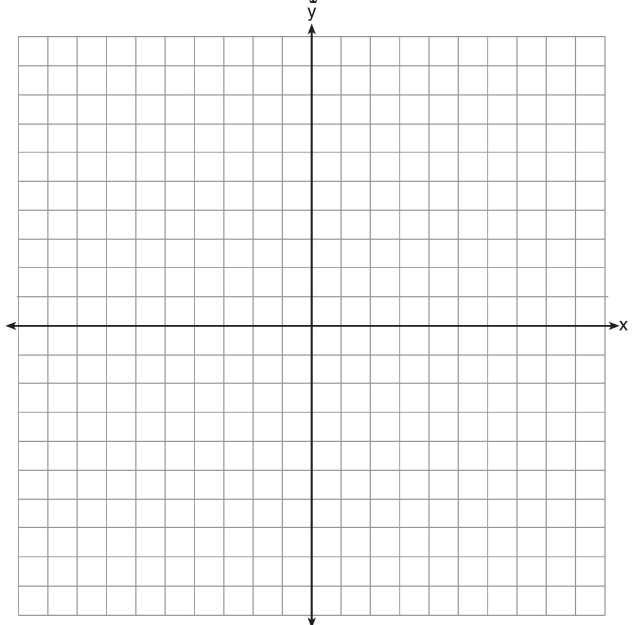
14.  $y = -\frac{1}{8}(x+9)^2 - 1$

15.  $y = -\frac{1}{16}(x+7)^2 - 2$

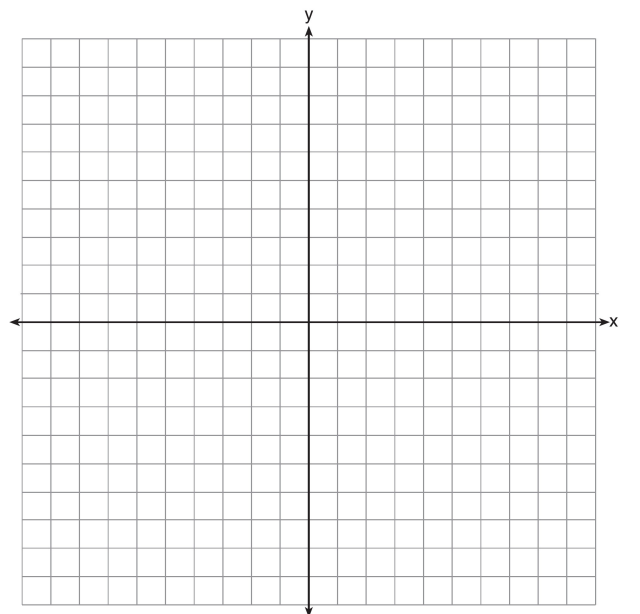
16. The equation of a parabola is  $y = -\frac{1}{16}(x+5)^2 + 1$ . If the focus is  $(-5, -3)$ , what is the equation of the directrix?



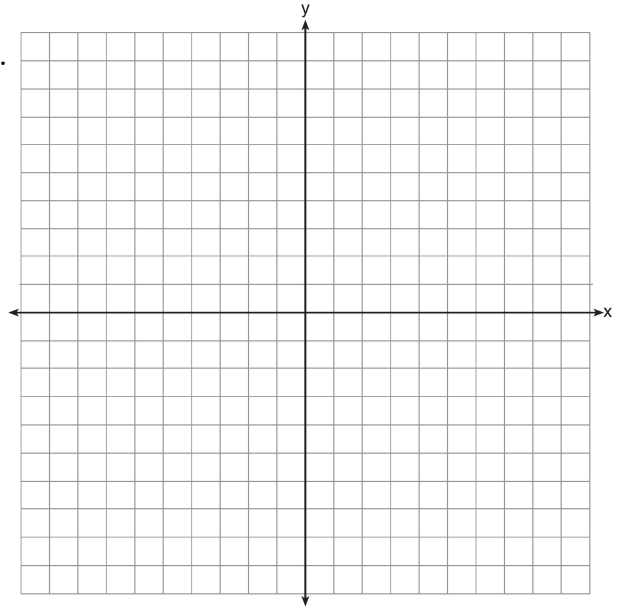
17. The parabola described by the equation  $y = \frac{1}{12}(x-2)^2 + 2$  has the directrix at  $y = -1$ . What is the focus?



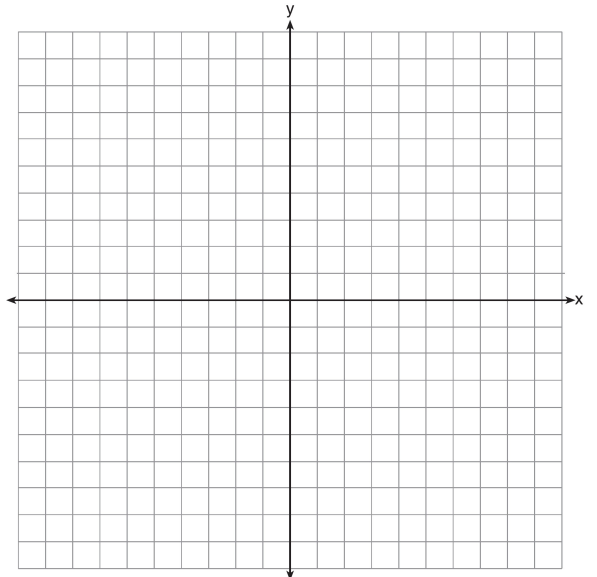
18. The directrix of the parabola  $12(y+3) = (x-4)^2$  has the equation  $y = -6$ . Find the coordinates of the focus of the parabola.



19. The parabola  $y = -\frac{1}{20}(x-3)^2 + 6$  has its focus at  $(3, 1)$ . Determine and state the equation of the directrix.

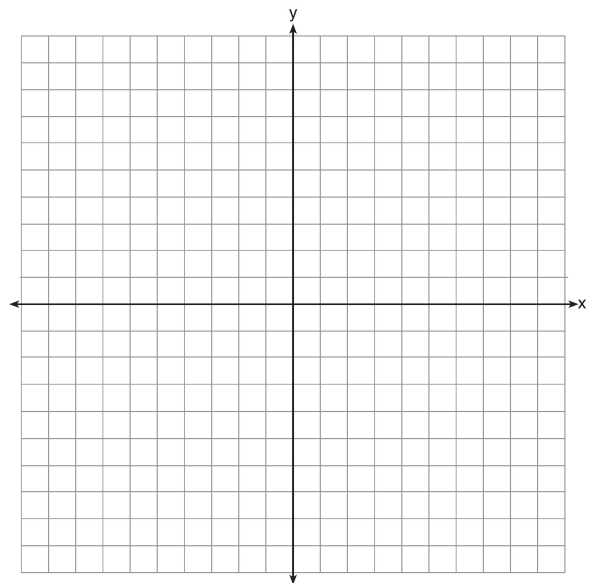


20. The parabola  $y = -\frac{1}{20}(x-4)^2 + 2$  has a directrix at  $y = 7$ . What is the focus?

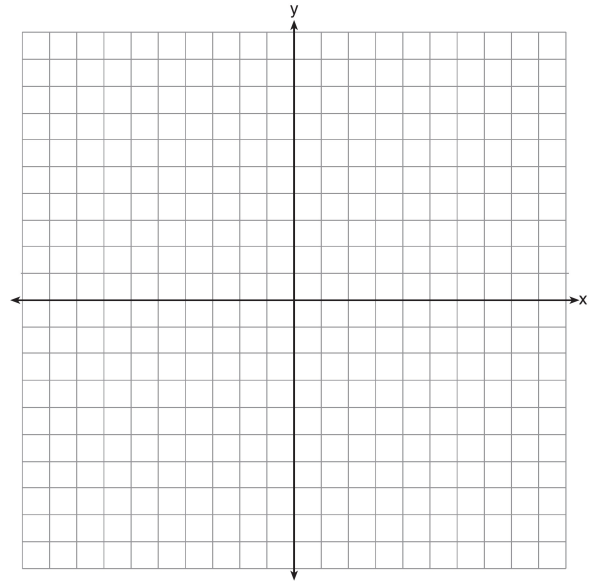


21. The parabola  $y = -\frac{1}{4}(x+3)^2 - 6$  has a directrix at  $y = -5$ . What is the focus?

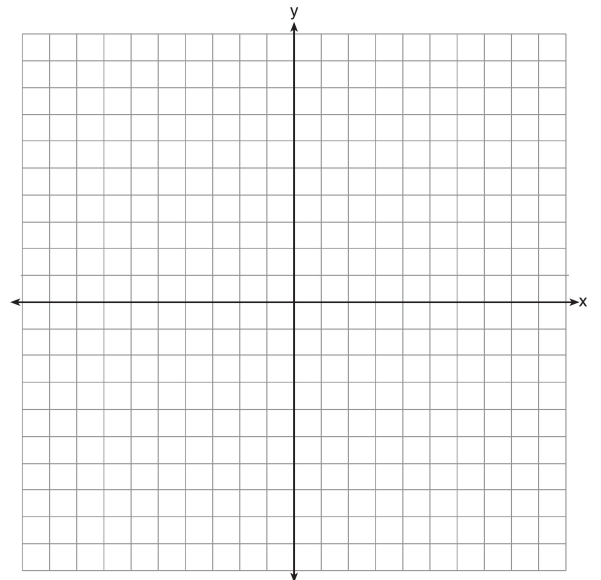
24.



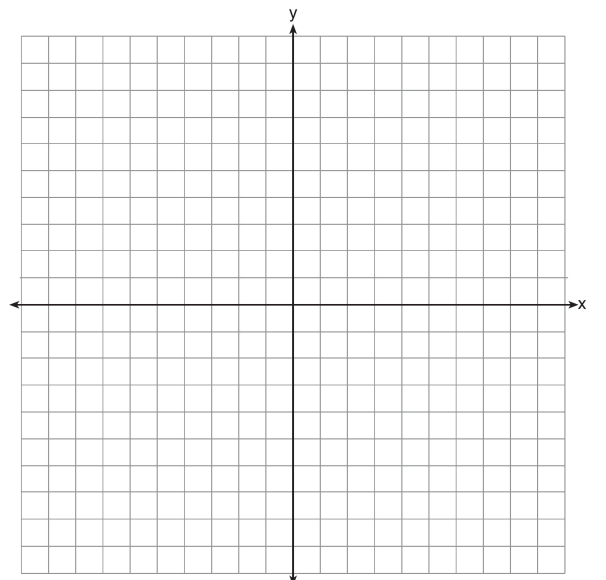
22. What is the focus and directrix of  $y = \frac{1}{12}(x-5)^2 + 2$ ?



23. What is the equation of the directrix for the parabola  $-8(y-3) = (x+4)^2$ ?



24. The parabola  $8(y-3) = (x-2)^2$  has a focus of (2,1). What is the equation of the directrix?



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## *Equations and Systems Review Sheet*

1. The solution set of the equation  $\sqrt{2x-4} = x-2$  is

- 1)  $\{-2, -4\}$
- 2)  $\{2, 4\}$
- 3)  $\{4\}$
- 4)  $\{ \}$

2. What is the solution set of the equation  $\frac{30}{x^2-9} + 1 = \frac{5}{x-3}$ ?

- 1)  $\{2, 3\}$
- 2)  $\{2\}$
- 3)  $\{3\}$
- 4)  $\{ \}$

**Solve the following equations**

3.  $3 = -x + \sqrt{x+5}$

4.  $x = 2 + \sqrt{x+4}$

5.  $\frac{x}{x-1} = \frac{2}{x} + \frac{1}{x-1}$

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

7. Solve the following system of equations algebraically for all values of  $x$ ,  $y$ , and  $z$ :

$$x + 2y - 3z = -2$$

$$2x - 2y + z = 7$$

$$x + y + 2z = -4$$

8. Which value is *not* contained in the solution of the system shown below?

$$4x + 2z = 5y + 130$$

$$3x + 2y = 7z - 99$$

$$10x - 6y - 4z = 112$$

3) -8                      3) 10

4) -12                     4) 15

9. Given  $i$  is the imaginary unit,  $(2 - yi)^2$  in simplest form is

1)  $y^2 - 4yi + 4$

2)  $-y^2 - 4yi + 4$

3)  $-y^2 + 4$

4)  $y^2 + 4$

10. The expression  $(3 - 7i)^2$  is equivalent to

1)  $-40 + 0i$

2)  $-40 - 42i$

3)  $58 + 0i$

4)  $58 - 42i$



11. Solve for  $x$  and express your answer in simplest radical form:  $x^2 - 6x = -12$

12. Solve for  $x$  and express your answer in simplest  $a+bi$  form:  $4x^2 + 2x = -1$

**Solve the following in simplest  $a+bi$  or radical form**

13.  $x^4 - 6x^2 = 27$

14.  $x^4 + 6x^2 = 40$

Express the following in simplest  $a+bi$  form

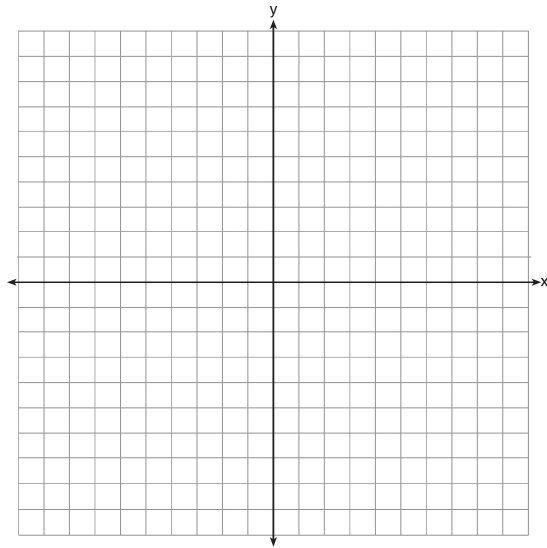
15.  $(3k - 2i)^2$

16.  $(4x - 3yi)^2$

17. Which equation represents a parabola with a focus of  $(-2, 5)$  and a directrix of  $y = 9$ ?

1)  $y = \frac{1}{8}(x+2)^2 + 7$       3)  $y = \frac{1}{8}(x-2)^2 - 7$

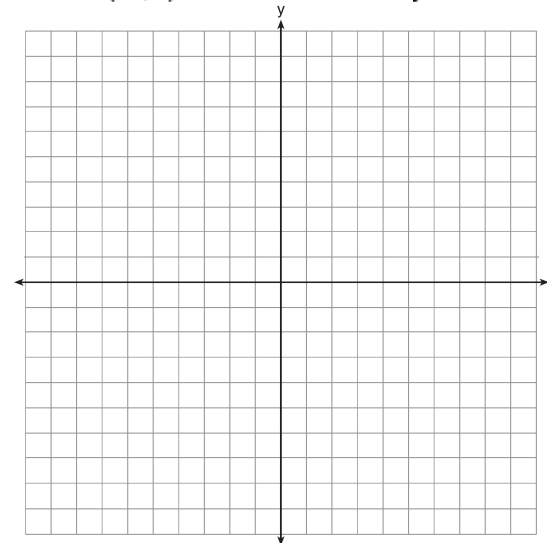
2)  $y = -\frac{1}{8}(x+2)^2 + 7$       4)  $y = -\frac{1}{8}(x-2)^2 - 7$



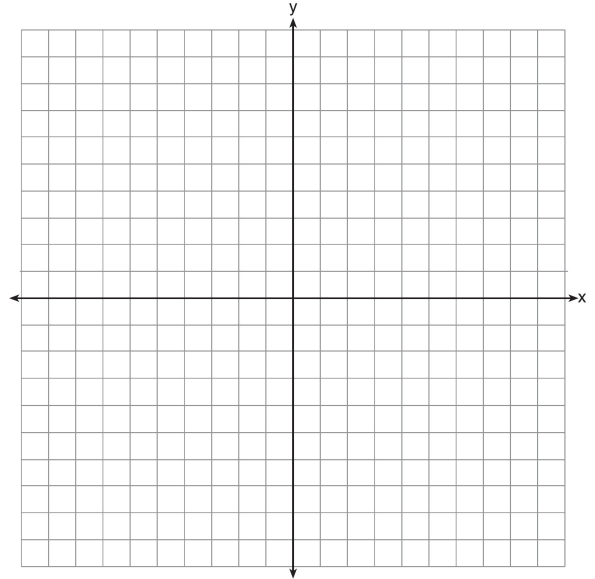
18. Which equation represents a parabola with a focus of  $(-2, 5)$  and a directrix of  $y = 9$ ?

1)  $(y-7)^2 = 8(x+2)$       3)  $(x+2)^2 = 8(y-7)$

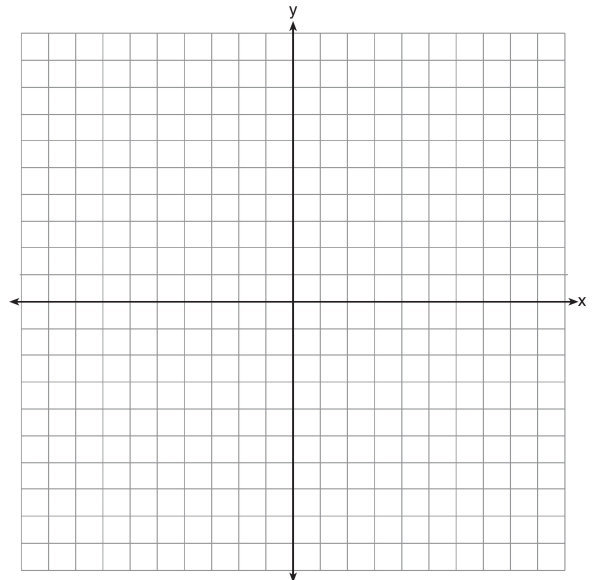
2)  $(y-7)^2 = -8(x+2)$       4)  $(x+2)^2 = -8(y-7)$



19. The parabola  $y = -\frac{1}{4}(x+3)^2 - 6$  has a directrix at  $y = -5$ . What is the focus?



20. The parabola  $y = \frac{1}{8}(x-2)^2 + 3$  has a focus of  $(2,1)$ . What is the equation of the directrix?



**Spiral Review**

**To determine if  $x - a$  is a factor:**

**Use remainder theorem and see if  $p(a) = 0$ .** If the remainder is 0, it is a factor. If the remainder is not 0, it is not a factor.

21. Which binomial is *not* a factor of the expression  $x^3 - 4x^2 - 25x + 28$ ?

- |          |          |
|----------|----------|
| 1) $x+6$ | 3) $x-1$ |
| 2) $x-7$ | 4) $x+4$ |

22. Which binomial is a factor of the expression  $x^4 + 4x^2 - 32$ ?

- |          |          |
|----------|----------|
| 1) $x+8$ | 3) $x-1$ |
| 2) $x-8$ | 4) $x+2$ |