



Name: _____

Period: _____

5.2 Parabolas as Conic Sections 2018-19**Identify each equation as a parabola, hyperbola, ellipse or circle.**

1. $(y-9) = 8(x-7)^2$
parabola

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

3. $9(y-7)^2 - 4(x-9)^2 = 36$
hyperbola

4. $\frac{x^2}{25} + \frac{(y-8)^2}{3} = 1$
ellipse

5. $x = 3y^2 + 15$
parabola

6. $x^2 + y^2 = 4$
circle

Determine the direction of opening, vertex, the focal width, focus, directrix, value of a and the axis of symmetry.

7. $(x-7)^2 = 12(y+1)$

Direction of opening upVertex (7, -1)Focal Width 12a = 3focus (7, 2)axis of symmetry x = 7directrix y = -4

8. $(y+4)^2 = 8(x-9)$

Direction of opening rightVertex (9, -4)Focal Width 8a = 2focus (11, -4)axis of symmetry y = -4directrix x = 7**Complete the square and write in factored form.**

9. $y^2 - 2y + 1$
 $(y-1)^2$

10. $y^2 + 10y + 25$
 $(y+5)^2$

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

12. $y^2 - \frac{5}{2}y + \frac{25}{16}$
 $(y - \frac{5}{4})^2$

Write the equations of the parabola, in standard form, by completing the square.

13. $y = x^2 + 6x + 9$
 $y + 9 = (x+3)^2$

14. $y = x^2 - 10x - 3$
 $y + 28 = (x-5)^2$

15. $x = y^2 - 7y + \frac{3}{4}$
 $x - \frac{3}{4} = y^2 - 7y + \frac{49}{4}$
 $x + \frac{46}{4} = (y - \frac{7}{2})^2$
 $x + 23\frac{1}{2} = (y - 7\frac{1}{2})^2$

Determine the direction of opening, vertex, focus, focal width, the value of a , and directrix, then graph the parabola.

16. $(x-2)^2 = 12(y+5)$

Direction of opening up

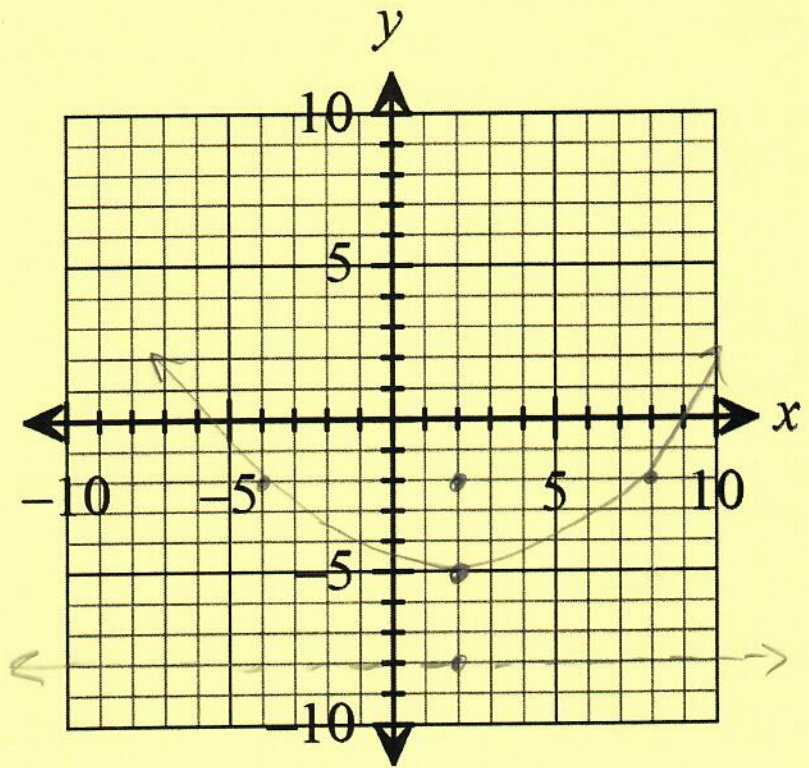
Vertex $(2, -5)$

Focal Width 12

$a =$ 3

Focus $(2, -2)$

Directrix $y = -8$



17. $(y-6)^2 = 16(x-4)$

Direction of opening right

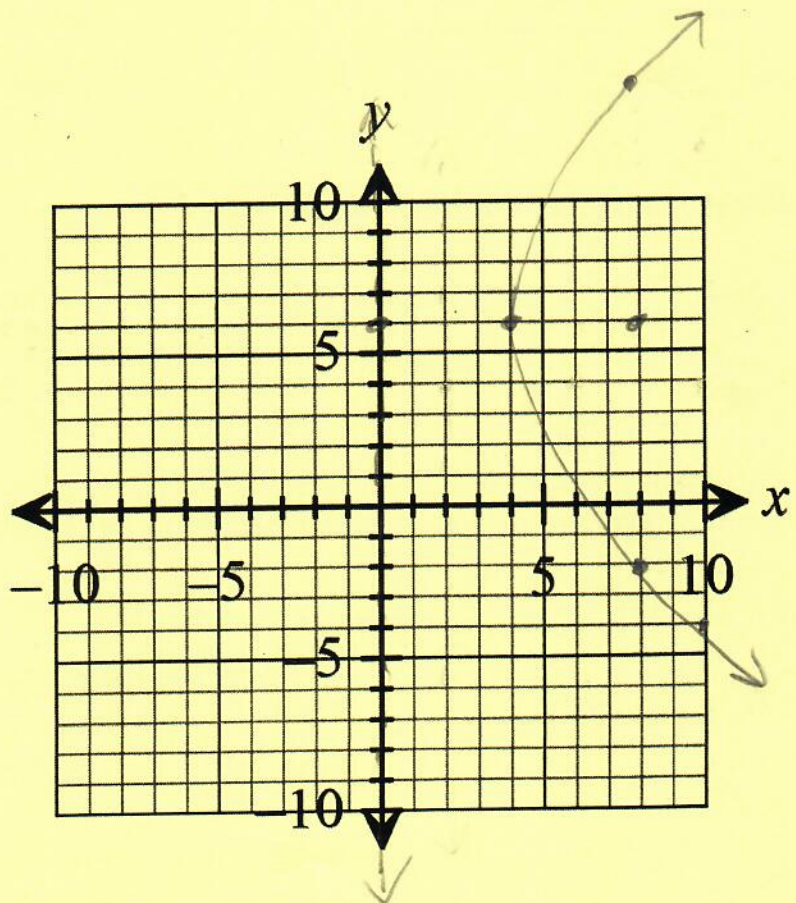
Vertex $(4, 6)$

Focal Width 16

$a =$ 4

Focus $(8, 6)$

Directrix $x = 0$



Complete the square and write the equation in standard form. Graph.

18. $x^2 + 8x = -6y - 10 + 16$ $(x+4)^2 = -6y + 6$
 $(x+4)^2 = -6(y-1)$

Direction of opening down

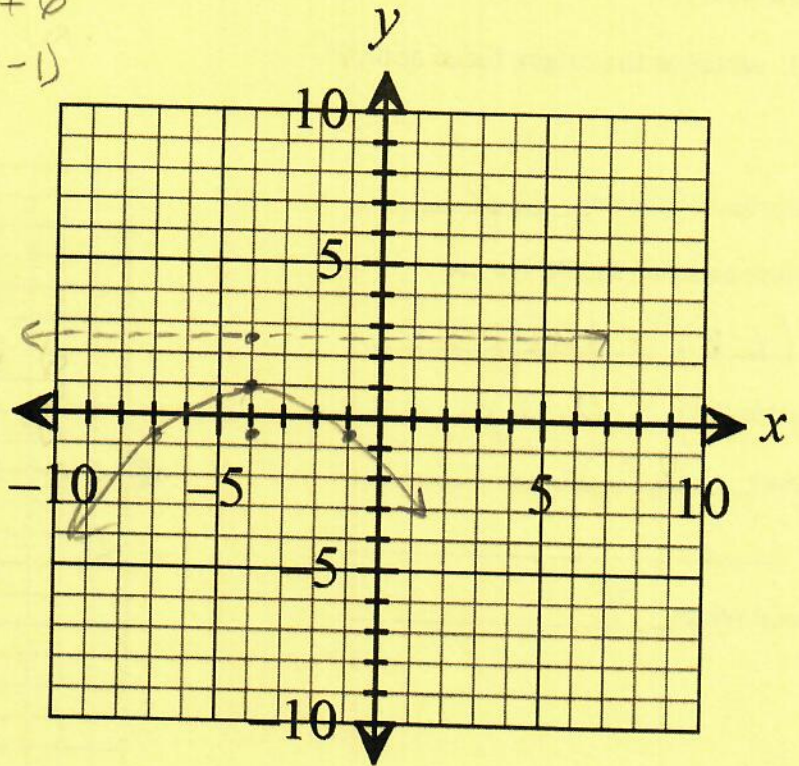
Vertex $(-4, 1)$

Focal Width 6

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

Focus $(-4, -\frac{1}{2})$

Directrix $y = 2.5$



19. $y^2 - 2y = -4x - 21$ $(y-1)^2 = -4x - 20$
 $(y-1)^2 = -4(x+5)$

Direction of opening left

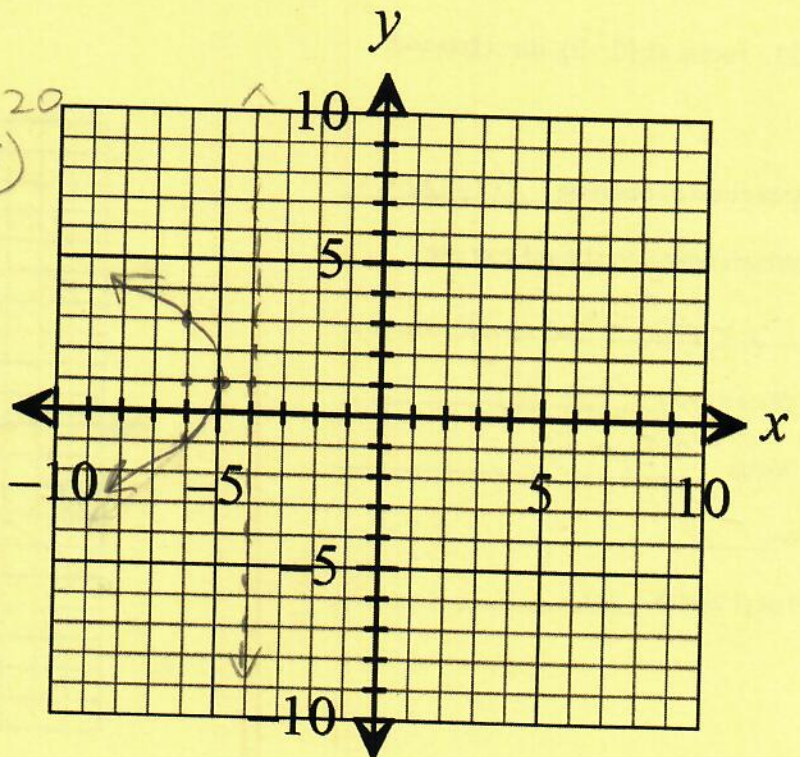
Vertex $(-5, 1)$

Focal Width 4

$a = -1$

Focus $(-6, 1)$

Directrix $x = -4$



Use the formulas from your notes to write an equation for each of the following parabolas (DRAW A GRAPH FOR HELP).

20. vertex at the origin, focus at (0, 2)

Direction of opening up

Which equation should you use

$(x-h)^2 = 4a(y-k)$

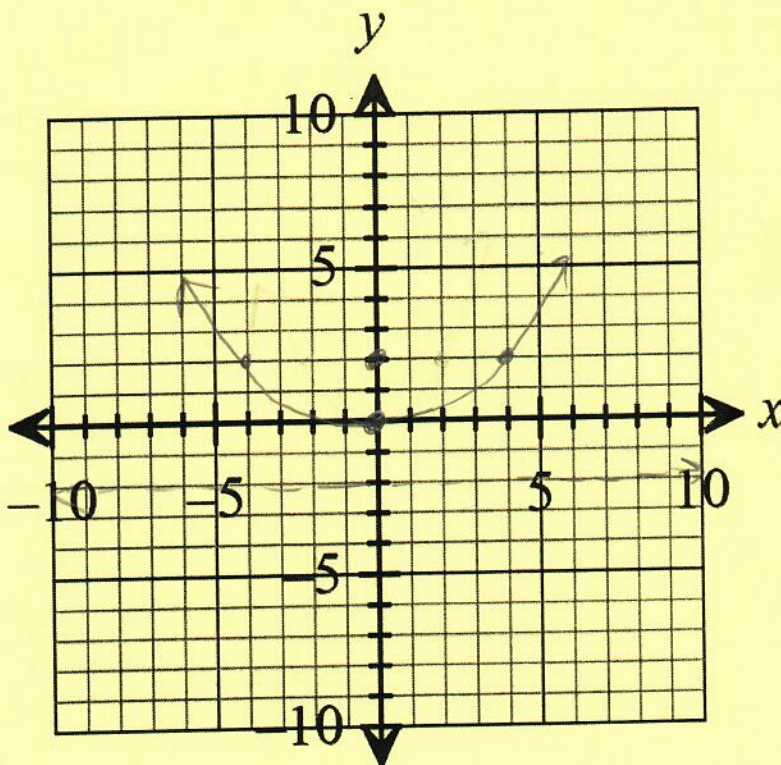
Vertex (h,k) (0,0)

Focus (0,2)

a= 2

Focal Width 8

Answer $(x-0)^2 = 8(y-0)$
 $x^2 = 8y$



21. focus at (0, -5), directrix y=5

Direction of opening down

Which equation should you use

$(x-h)^2 = 4a(y-k)$

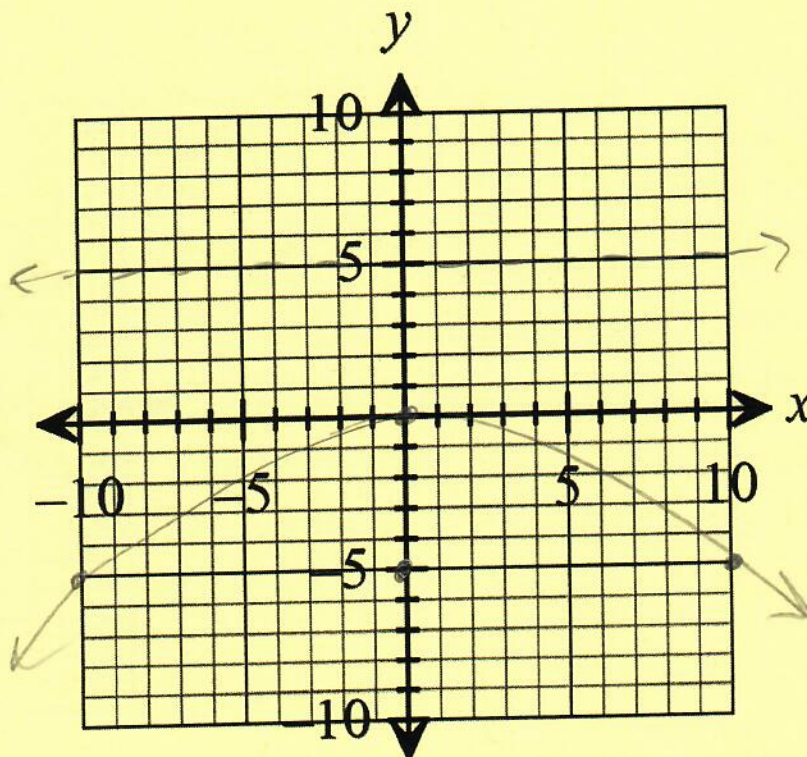
Vertex (h,k) (0,0)

Focus (0,-5)

a= -5

Focal Width 20

Answer $(x-0)^2 = -20(y-0)$
 $x^2 = -20y$



22. focus= $(-4, 0)$, directrix $x=2$

Direction of opening left

Which equation should you use

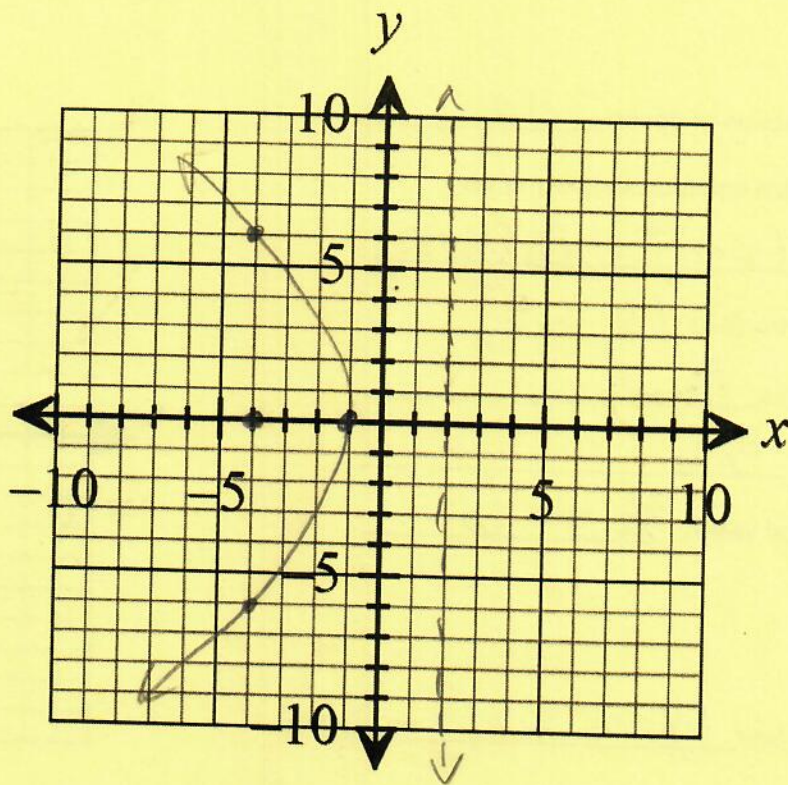
$(y-k)^2 = 4a(x-h)$

Vertex (h,k) $(-1, 0)$

Focus $(-4, 0)$

$a =$ -3

Focal Width 12



Answer $(y-0)^2 = -12(x+1)$
 $y^2 = -12(x+1)$

23. focus= $(2, -3)$, directrix $x=6$

Direction of opening left

Which equation should you use

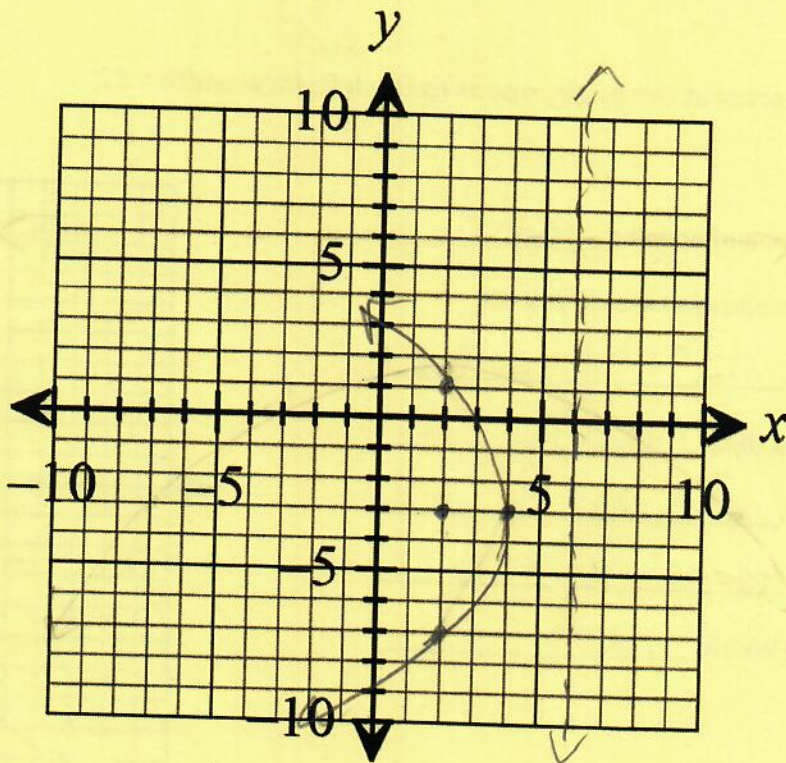
$(y-k)^2 = 4a(x-h)$

Vertex (h,k) $(4, -3)$

Focus $(2, -3)$

$a =$ -2

Focal Width 8



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

24. focus=(3, 4), directrix y=1

Direction of opening up

Which equation should you use

$(x-h)^2 = 4a(y-k)$

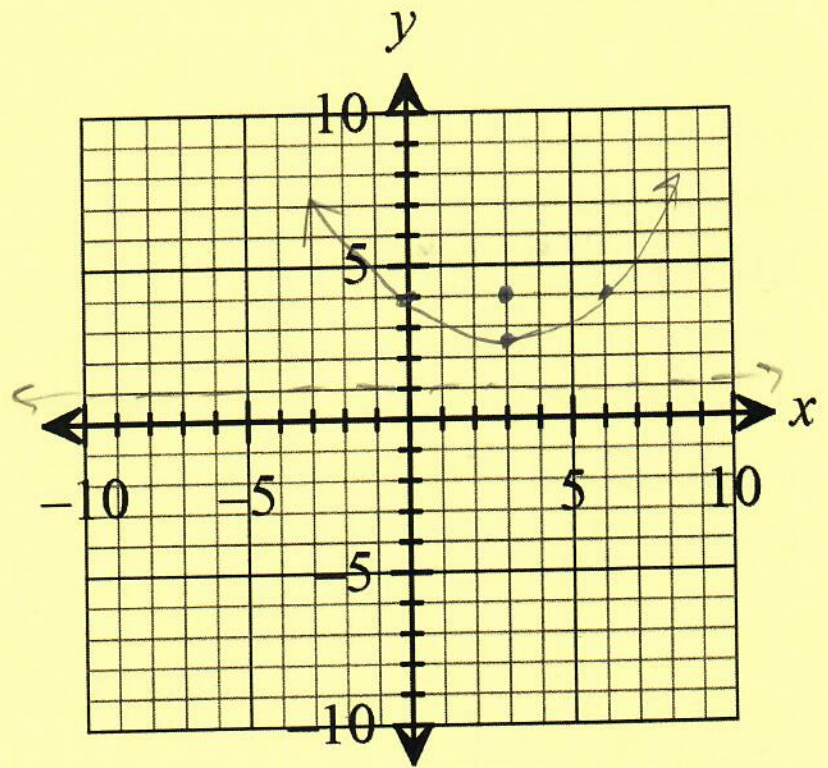
Vertex (h,k) (3, 2.5)

Focus (3, 4)

a= 3/2

Focal Width $3/2 \cdot 4 = 6$

Answer $(x-3)^2 = 6(y-2.5)$



25. vertex at the origin, opens to the left, focal width = 12

Direction of opening left

Which equation should you use

$(y-k)^2 = 4a(x-h)$

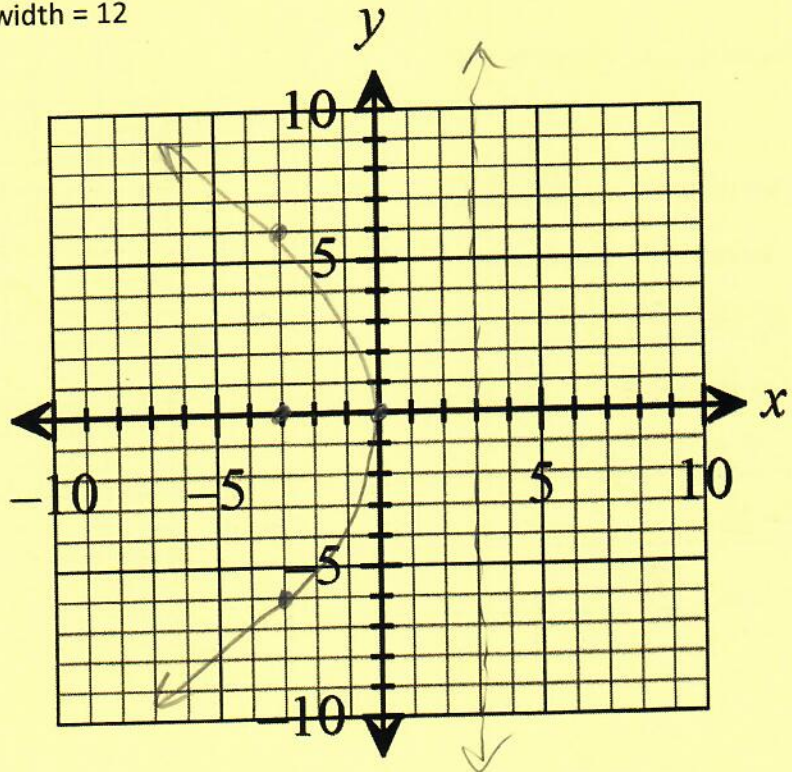
Vertex (h,k) (0, 0)

Focus (-3, 0)

a= $4a=12 \quad a=3$

Focal Width 12

Answer $(y-0)^2 = -12(x-0)$
 $y^2 = -12x$



26. Focus at $(-2, 4)$, vertex at $(-4, 4)$

Direction of opening right

Which equation should you use

$(y-k)^2 = 4a(x-h)$

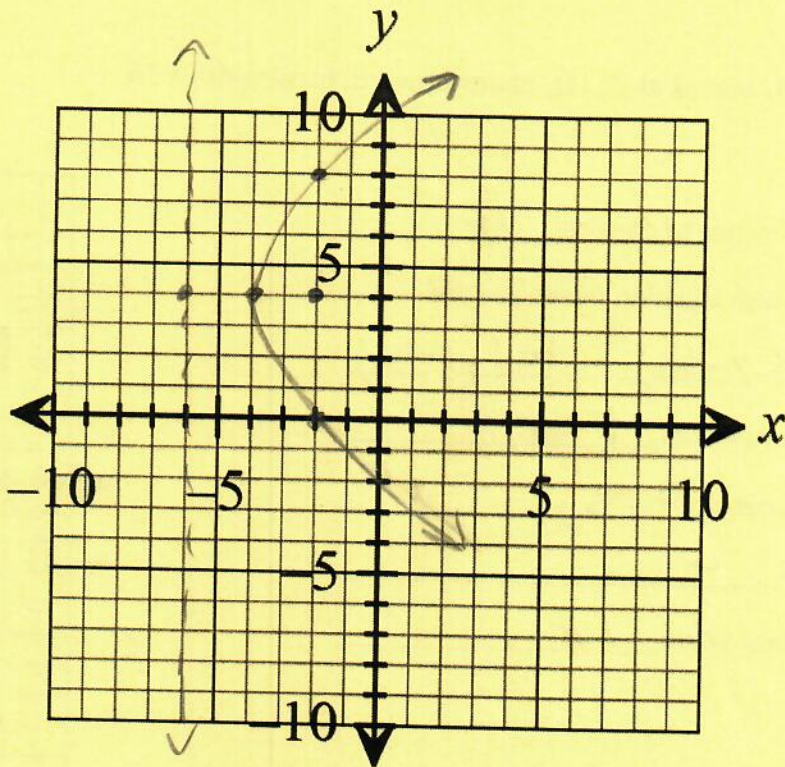
Vertex (h,k) $(-4, 4)$

Focus $(-2, 4)$

$a =$ 2

Focal Width 8

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



27. focus at $(2, -3)$, directrix $y = 5$

Direction of opening down

Which equation should you use

$(x-h)^2 = 4a(y-k)$

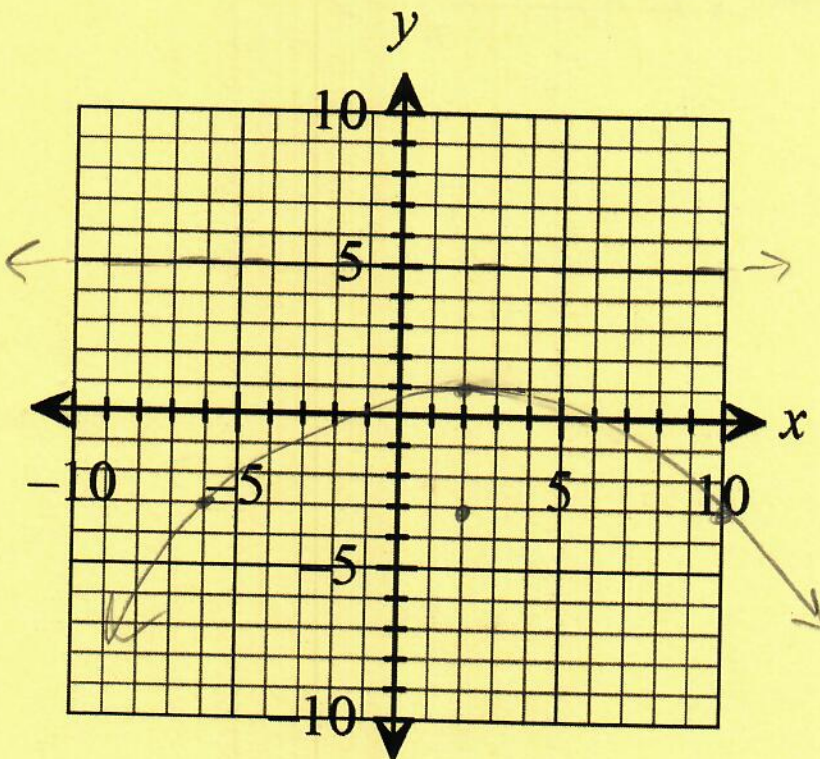
Vertex (h,k) $(2, 1)$

Focus $(2, -3)$

$a =$ -4

Focal Width 16

Answer $(x-2)^2 = -16(y-1)$



28. vertex at (2, -1), opens upward, focal width = 16

Direction of opening up

Which equation should you use

$(x-h)^2 = 4a(y-k)$

Vertex (h,k) (2, -1)

Focus (2, 3)

a = 4

Focal Width 16

Answer $(x-2)^2 = 16(y+1)$

