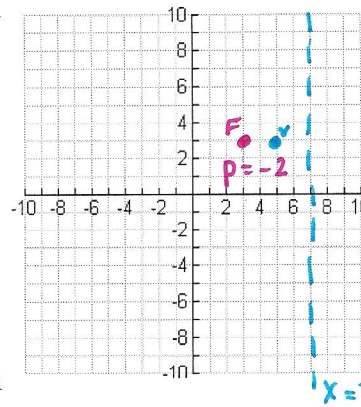


1. Write the equation for the parabola in vertex form with a vertex (5, 3) and directrix $x = 7$.

$$x-h = \frac{1}{4p} (y-k)^2$$

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

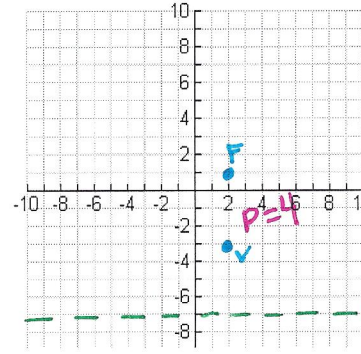


vertical directrix
 $x-h = \frac{1}{4p} (y-k)^2$

2. Write the equation for the parabola in vertex form with a vertex (2, -3) and focus (2, 1).

$$y-k = \frac{1}{4p} (x-h)^2$$

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

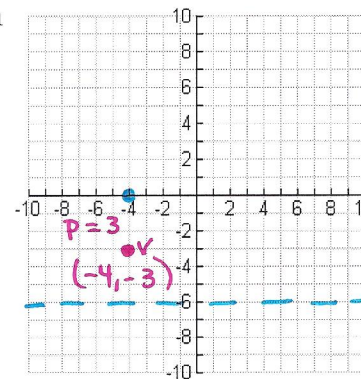


Horizontal directrix
 $y-k = \frac{1}{4p} (x-h)^2$

3. Write the equation for the parabola in vertex form with a focus at (-4, 0) and directrix $y = -6$.

$$y-k = \frac{1}{4p} (x-h)^2$$

$$y+3 = \frac{1}{12} (x+4)^2$$



Horizontal directrix
 $y-k = \frac{1}{4p} (x-h)^2$

Ben rolls a 1-6 number cube. Find each probability

4. Ben rolls a 3 or a 4. $P(\underline{3} \text{ or } \underline{4}) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

5. Ben rolls a number greater than 2 or an even number.

$$P(>2 \text{ or even}) = \frac{4}{6} + \frac{3}{6} - \frac{2}{6} = \frac{5}{6}$$

6. Ben rolls a prime number or an odd number (1 is not prime)

$$P(\underline{\text{prime}} \text{ or } \underline{\text{odd}}) = \frac{3}{6} + \frac{3}{6} - \frac{2}{6} = \frac{4}{6} = \frac{2}{3}$$

7. If you are given that a student plays an instrument, what is the probability that the student also plays a sport?

	Plays a Sport	
Plays an Instrument	Yes	No
	Yes	38
No	51	67

$$P(\text{sport} | \text{instrument}) = \frac{47}{85} = 0.55 \text{ or } 55\%$$

8. Solve by factoring: $2x^2 + 8x + 6 = 0$

$$2(x^2 + 4x + 3) = 0$$

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

$$x = -3 \quad x = -1$$

9. Solve by factoring: $x^2 - 5x + 6 = 0$

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

$$x = 3 \quad x = 2$$

10. Solve by factoring: $4x^2 - 16x + 16 = 0$

$$4(x^2 - 4x + 4) = 0$$

$$4(x - 2)^2 = 0$$

$$x = 2$$

11. Solve by completing the square: $x^2 + 18x - 15 = 0$

$$x^2 + 18x + 81 = 15 + 81$$

$$(x + 9)^2 = 96$$

$$x + 9 = \pm\sqrt{96}$$

$$x + 9 = \pm 4\sqrt{6}$$

$$x = -9 \pm 4\sqrt{6}$$

12. Solve by completing the square: $2x^2 + 8x + 6 = 0$

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

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

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

$$(x + 2)^2 = 1$$

$$x + 2 = \pm\sqrt{1}$$

$$x + 2 = \pm 1$$

$$x = -3, -1$$

13. Solve using the quadratic formula: $x^2 + 7x + 15 = 0$

$$x = \frac{-7 \pm \sqrt{49 - 4(1)(15)}}{2(1)}$$

$$\rightarrow x = \frac{-7 \pm \sqrt{-11}}{2}$$

$$\rightarrow x = \frac{-7 \pm i\sqrt{11}}{2}$$

14. Solve using the quadratic formula: $2x^2 - 5x + 3 = 0$

$$x = \frac{5 \pm \sqrt{25 - 4(2)(3)}}{2(2)}$$

$$\rightarrow x = \frac{5 \pm \sqrt{1}}{4}$$

$$\rightarrow x = \frac{5 \pm 1}{4}$$

$$\rightarrow x = 1.5, 1$$

15. Solve the system: $\begin{cases} y = x^2 - 3x - 1 \\ -2x + y = -5 \end{cases} \rightarrow y = 2x - 5$

$$2x - 5 = x^2 - 3x - 1$$

$$0 = x^2 - 5x + 4$$

$$0 = (x - 4)(x - 1) \rightarrow x = 4, 1$$

$$(4, 3)(1, -3)$$

16. Describe the transformations: $g(x) = -\frac{1}{2}(x+4) - 7$

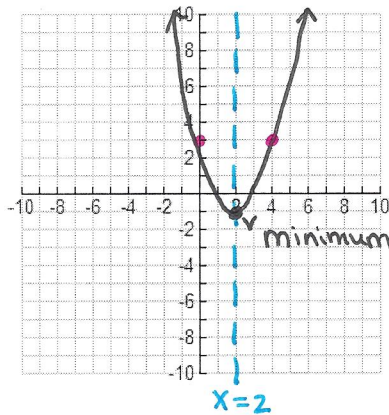
Reflection over x-axis
Vertical compression by $\frac{1}{2}$
Horizontal Translation left 4
Vertical Translation down 7

For each function, (a) determine whether the graph opens up or down, (b) find the axis of symmetry, (c) find the vertex, (d) find the y-intercept, (e) graph the function.

17. $f(x) = x^2 - 4x + 3$ opens up

AOS = $-\frac{b}{2a} = -\frac{(-4)}{2(1)} = 2$

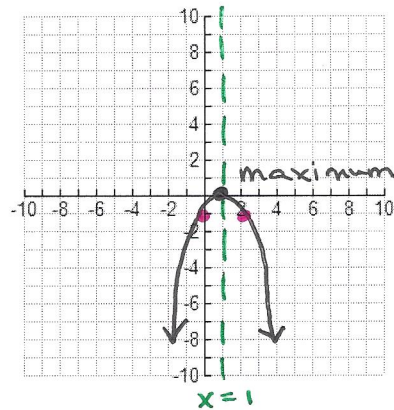
V(2, -1)
plug-in to get y-value
y-intercept = (0, 3)



18. $g(x) = -x^2 + 2x - 1$ opens down

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

V(1, 0)
plug-in to get y-value
y-intercept = (0, -1)



19. Factor $1 - 9y^4$ ← Difference of Two Squares
 $(1 - 3y^2)(1 + 3y^2)$

20. Factor $9x^2 - 12x + 4$ ← Perfect Square Trinomial
 $(3x - 2)^2$

21. Solve $3x^2 = -48 \rightarrow x^2 = -16$
 $x = \pm\sqrt{-16}$
 $x = \pm 4i$

22. Find the absolute value $|3 + 4i| = \sqrt{3^2 + 4^2} = \sqrt{25} = 5$

23. Simplify $(-6 + 4i) + (7 - 2i) = 1 + 2i$

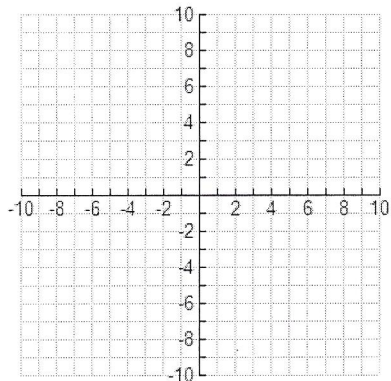
24. Simplify $(9 - 4i) - (3 + 2i) = 6 - 6i$

25. Simplify $(5 - 6i)^2 \rightarrow (5 - 6i)(5 - 6i)$
 $25 - 30i - 30i + 36i^2$
 $25 - 60i - 36 \rightarrow \boxed{-11 - 60i}$

26. Simplify $\frac{5 + 2i}{3 - 4i} \cdot \frac{3 + 4i}{3 + 4i} = \frac{15 + 20i + 6i + 8i^2}{9 + 12i - 12i - 16i^2} = \frac{7 + 26i}{25}$

27. $-5i^{21} \rightarrow -5 \cdot i^{20} \cdot i$
 \downarrow
 $-5 \cdot (i^2)^{10} \cdot i$
 \downarrow
 $-5 \cdot (-1)^{10} \cdot i \rightarrow -5 \cdot 1 \cdot i = \boxed{-5i}$

28. Write the equation of the circle $x^2 + 4y - 6x + y^2 = -9$. Identify the center and the radius and determine which quadrant(s) the circle would lie in when graphed.



$$x^2 - 6x + \frac{9}{9} + y^2 + 4y + \frac{4}{4} = -9 + \frac{9}{9} + \frac{4}{4}$$

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

center (3, -2)
 $r = 2$
 Quadrant 4