Ch. 11 Book Review Key

Chapter 11 Test Review

Fill in the blank.

1. A parabola can be defined as the set of points in a plane that is equidistant from a given line called the directrix and a given point called the focus.
2. The graph of a quadratic function is called a(n) parabola
3. When a quadratic function is written in standard form and a is negative, the parabola opens down.
4. The value of the number under the radical sign in the quadratic formula is called the discriminant
5. Consider the graph of $x^2 = -12y$. Find the vertex, the focus, and the equation of the directrix for the parabola. (0,0) (0,-3) $y=3$

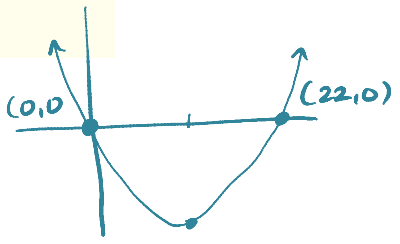
$4p=-12$
$p=-3$

6. How many real solutions does the equation $x^2 - 6x + 9 = 0$ have? $(x-3)(x-3)=0$ or use b^2-4ac $(-6)^2-4(1)(9)$ 0

   A. 0 **B. 1** C. 2 D. infinitely many

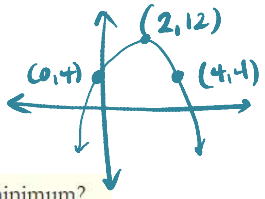
7. A parabola crosses the x-axis at (0, 0) and (22, 0), and it opens upward. Which of these points could be the vertex?

   A. (0, 22) **B. (11, −15)** C. (8, 11) D. (11, 18)



8. Sketch the graph of $y = -2x^2 + 8x + 4$.

y-int: (0,4)
A.O.S. $x=\frac{-b}{2a}=\frac{-8}{2(-2)}=2$
vertex: (2, 12)
$y=-2(2)^2+8(2)+4$
$y=-2(4)+16+4$
$y=12$



9. Find the vertex of $y = 4x^2 + 4x + 1$. Is this vertex a maximum or a minimum?

minimum
A.O.S. $x=\frac{-b}{2a}=\frac{-4}{2(4)}=-\frac{1}{2}$
vertex $(-\frac{1}{2}, 0)$
$y=4(-\frac{1}{2})^2+4(\frac{1}{2})+1$
$y=4(\frac{1}{4})-2+1=0$

10. Consider the graph of $y = -3x^2 + 6x - 5$. Without graphing the function, answer the following questions.

    a. Does the graph open upward or downward? Explain how you know. a is negative

    b. What are the coordinates of the vertex of the graph? Is it a maximum or a minimum? vertex (1,-2)

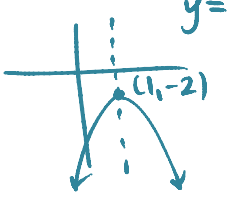
    c. What is the equation of the axis of symmetry of the graph?

    d. What is the domain of the function? What is the range?

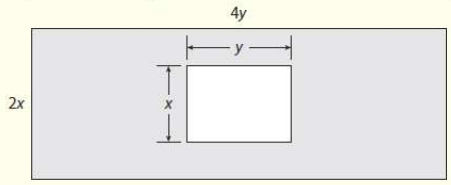
$x=\frac{-b}{2a}=\frac{-6}{2(-3)}=1$
$y=-3(1)^2+6(1)-5$
$y=-2$

c) A.O.S. $x=1$

d) Domain: $(-\infty, \infty)$
Range: $(-\infty, -2]$



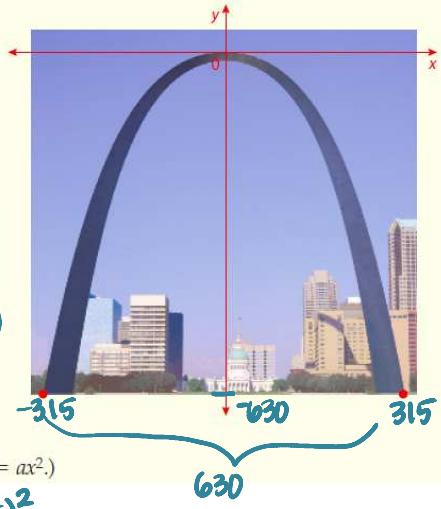
11. Write an expression to represent the area of the shaded region.



$8xy - xy$

$\boxed{7xy}$

12. The Gateway Arch in St. Louis, Missouri is 630 feet high. The distance between the legs of the arch at ground level is 630 feet. Its shape is actually a curve called a *catenary*, but it can be approximated by a parabola.



a. Assume the origin of a coordinate system is located at the top of the arch. What are the coordinates of the point at the lower-right edge of the right leg? $(315, -630)$

b. Find an equation for a parabola that approximates the arch. (Hint: Recall that a parabola with its vertex at the origin can be modeled with the function $y = ax^2$.)

$-630 = a(315)^2$

$-630 = a(99225)$

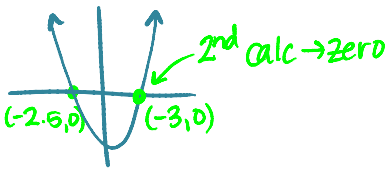
$\frac{-2}{315} = a \quad \therefore \boxed{y = -\frac{2}{315}x^2}$

13. Solve $2x^2 - x = 15$ by graphing.

$y = 2x^2 - x - 15$

$x = -2.5$

$x = 3$



14. Factor the polynomial.

a. $t^2 + 5t - 24$ **b.** $3m^2 - 27m + 60$

a) $\boxed{(t+8)(t-3)}$

b) $3(m^2 - 9m + 20)$

$\boxed{3(m-5)(m-4)}$

↑ yes! The GCF must be factored out to receive full credit for this problem ☺ it is not fully factored if you do not take it out...

15. Solve $x^2 - x = 30$ by factoring.

$x^2 - x - 30 = 0$

$(x-6)(x+5) = 0$

$x = 6 \quad x = -5$

16. A penny is dropped from the top of the Tower of the Americas in San Antonio, Texas. The function $h = -16t^2 + 750$ can be used to model the height of the penny (h) after t seconds. About how long will it take for the penny to reach the ground? → $h = 0$

$0 = -16t^2 + 750$

$-750 = -16t^2$

$\sqrt{\frac{750}{16}} = \sqrt{t^2} \quad t \approx \pm 6.85$

The penny will reach the ground after 6.85 sec.

17. Use the quadratic formula to solve $3x^2 - 2x = 8$.

$1^{st}\ 3x^2 - 2x - 8 = 0$

$2^{nd}\ b^2 - 4ac$

$(-2)^2 - 4(3)(-8)$

$4 + 96$

100

$3^{rd}\ x = \frac{2 \pm \sqrt{100}}{6}$

$\frac{2+10}{6} = 2$ $\quad \frac{2-10}{6} = \frac{-8}{6} = -\frac{4}{3}$

$x = 2$ or $x = -\frac{4}{3}$

$4+96$
100

$\frac{2+10}{6} = (2)$ $\quad \frac{2-10}{6} = \frac{-8}{6} = \left(-\frac{4}{3}\right)$

18. State the value of the discriminant of $5x^2 - 2x = 8$. How many real roots does the equation have?

$5x^2 - 2x - 8 = 0$ $\quad b^2 - 4ac$

$(-2)^2 - 4(5)(-8)$

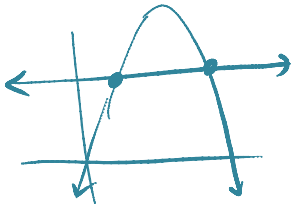
$4 + 160$

$164 \rightarrow$ 2 Real Roots

19. A toy rocket is fired in the middle of a field. The relationship between the height of the rocket and time can be modeled by the function $h = -16t^2 + 256t$, where h represents the height of the rocket in feet after t seconds. When is the rocket 540 feet above the ground?

$\underbrace{540}_{y_1} = \underbrace{-16t^2 + 256t}_{y_2}$

2nd calc → intersect



The rocket will reach 540 ft after 2.5 sec on the way up and 13.5 sec on the way down.