

**PART A - CALCULATOR ACTIVE:****Maximum Time: 35 Minutes**

Fill in the blanks: Put answers in the space provided.

1. The value of  $k$  that makes  $x^2 + kx + \frac{25}{4}$  a perfect trinomial is \_\_\_\_\_.
2. If the discriminant is positive, then a parabola has \_\_\_\_\_  $x$ -intercepts.
3. If the discriminant is negative, then a parabola has \_\_\_\_\_  $x$ -intercepts.
4. If the discriminant is zero, then a parabola has \_\_\_\_\_  $x$ -intercepts.
5. If one  $x$ -intercept of a parabola is 5 and the axis of symmetry equation is  $x = -2$ , then what is the other  $x$ -intercept? \_\_\_\_\_
6. A quadratic can be factored if the discriminant is a \_\_\_\_\_.
7. If the two  $x$ -intercepts of a parabola are  $\frac{2}{3} - \sqrt{5}$  and  $\frac{2}{3} + \sqrt{5}$ , then the equation of the axis of symmetry is \_\_\_\_\_.
8. Determine the coordinates of the points of intersection of  $\begin{cases} y = 3x^2 - 2x - 7 \\ y = 2x - 5 \end{cases}$   
\_\_\_\_\_ and \_\_\_\_\_
9. Use quadratic regression to write the equation of the quadratic in function form that passes through the points  $(-1, -6)$ ,  $(2, -3)$  and  $(3, -10)$ . \_\_\_\_\_
10. Determine the vertex of  $f(x) = 2x^2 + 5x - 1$  \_\_\_\_\_ and state whether the vertex is a maximum or a minimum: \_\_\_\_\_.

For #11-14: The equation  $h(t) = 20t - 5t^2$  gives the height  $h$  (in meters) reached in time  $t$  (in seconds) of an object thrown straight into the air.

11. What is the height for  $t = 1$  second? \_\_\_\_\_
12. At what time(s) will the object hit the ground? \_\_\_\_\_
13. What is the maximum height of the object? \_\_\_\_\_
14. When will the object reach its maximum height? \_\_\_\_\_

**CALCULATOR ACTIVE: MULTIPLE CHOICE**

Write the CAPITAL LETTER for the correct response on the separate answer sheet.

15. The  $y$ -intercept of  $y + 1 = -\frac{1}{8}(x + 4)^2$  is

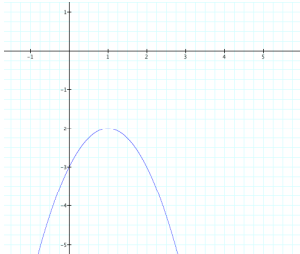
- A) -2                      B) 1                      C) -3                      D) -1

16. The equation of a parabola with vertex  $(-3, 5)$  is

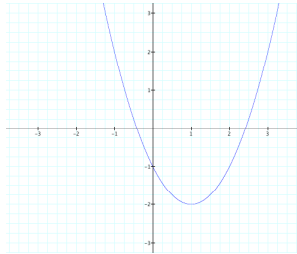
- A)
- $y + 3 = (x - 5)^2$
- B)
- $y - 5 = (x + 3)^2$
- C)
- $y - 3 = (x + 5)^2$
- D)
- $y + 5 = (x - 3)^2$

17. Which parabola is the graph of  $y = -(x - 1)^2 - 2$ ?

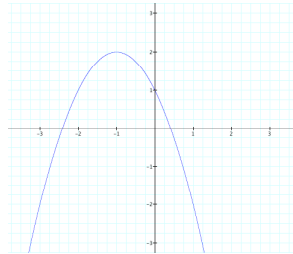
A)



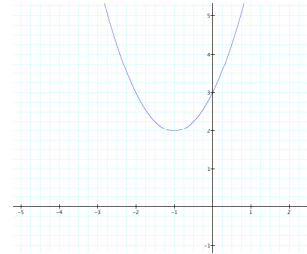
B)



C)



D)



18. What number would you add and subtract to complete the square on  $x^2 + 2x$ ?

- A) 1                      B) 4                      C)
- $\frac{1}{2}$
- D) 2

19. If the discriminant of  $y = x^2 + bx + c$  is zero, which of the following is NOT NECESSARILY TRUE?

- A)  $h = 0$                       C) there is one  $x$ -intercept  
 B)  $k = 0$                       D)  $y = x^2 + bx + c$  is a perfect trinomial

20. The ONLY quadratic equation in function form is

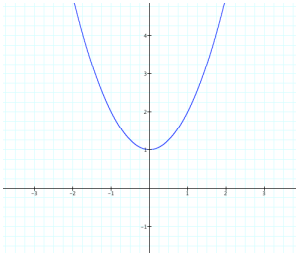
- A)  $3x^2 - 2y + 5 = 0$                       C)  $-3x^2 + x - 6y + 1 = 0$   
 B)  $y = 2x^2 + 3x - 4$                       D)  $3x^2 - 6x + 21y - 12 = 0$

21. The vertex of the parabola  $y = x^2 - 16x + 64$  is

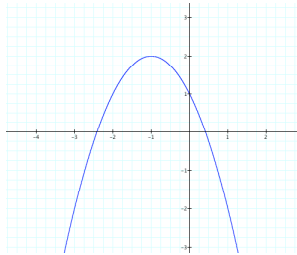
- A)
- $(-16, 64)$
- B)
- $(-8, 0)$
- C)
- $(8, 0)$
- D)
- $(0, 64)$

22. Which parabola has a quadratic equation with  $a > 0$  and the discriminant  $D = 0$ ?

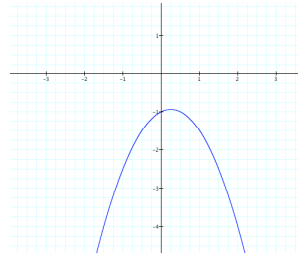
A)



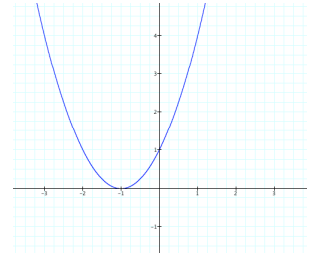
B)



C)



D)



23. The  $y$ -intercept from  $y = (x - 2)(x - 6)$  is

A) 2

B) 4

C) 6

D) 12

24. The value of  $h$  from the parabola  $y = (x - 2)(x - 6)$

A) 2

B) 4

C) 6

D) 12

25. What is the value of  $c$  if the point  $(-1, -2)$  lies on the parabola whose equation is

$$y = 2x^2 + cx?$$

A)  $c = \frac{1}{4}$ B)  $c = 4$ C)  $c = -4$ D)  $c = 2$ 

26. The value of  $a$  from the parabola  $3x^2 - 5x - 2y + 1 = 0$  is

A)  $\frac{2}{3}$ B)  $\frac{3}{2}$ C)  $\frac{5}{3}$ D)  $\frac{3}{5}$ 

27. The roots of  $(3x + 5)(4x - 1) = 0$  are

A)  $x = -5, 1$ B)  $x = 5, -1$ C)  $x = -\frac{1}{4}, \frac{5}{3}$ D)  $x = \frac{1}{4}, -\frac{5}{3}$

**PART C - CALCULATOR INACTIVE**

Answer the following questions on looseleaf OR graph paper. Draw the graph for #32 on the grid provided after the bonus question on the last page.

28. Determine the equation of the parabola given the following information. Leave your answer in the most appropriate form.

6 a)  $V(-3, 2)$  and passes through the point  $(-6, -7)$ .

b)  $a = -2$  and  $x$ -intercepts of  $(3, 0)$  and  $(-5, 0)$ ,

c)  $y$ -intercept of  $(0, 4)$ , axis of symmetry of  $x = -2$  and  $f(-1) = 7$ .

29. Complete the square to put  $y = 3x^2 - 24x - 2$  in vertex form and state

6 a) the coordinates of the vertex.

b) the equation of the axis of symmetry.

c) the value of the maximum or the minimum and indicate which it is.

30. Solve  $12x^2 + 5x - 2 = 0$  by BOTH factoring and the quadratic formula.

6

31. Determine the coordinates of the point(s) of intersection of the parabola

3  $y = x^2 - 5x + 3$  and the line  $y = 2x - 3$ .

32. For the parabola whose equation is  $y = -\frac{1}{2}(x + 1)^2 + 3$ ,

8 a) State the coordinates of the vertex

b) Determine the value of the  $y$ -intercept

c) Determine the value(s) of the  $x$ -intercept(s) (do not try to approximate)

d) Determine the coordinates of the point on the graph when  $x = 1$ .

e) Determine the coordinates of the point(s) on the graph when  $y = -5$ .

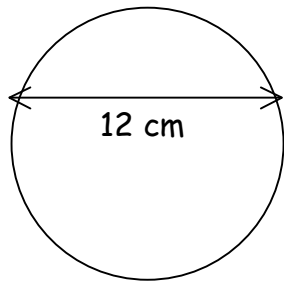
f) Graph the parabola and label all of the points stated in (a) - (e).

33. The sum of two numbers  $a$  and  $b$  is 14 and their product is -51. Determine the numbers  $a$  and  $b$ .

6

**BONUS:** The length of the rectangle show below is twice its width, and the areas of the rectangle and the circle below are equal. Write an equation in terms of  $x$  for this situation, and solve for  $x$ .

5



**Grid for #32:** Locate the  $x$  and  $y$  axis in a logical spot to be able to see the entire parabola.

