Chapter 6B Review Sheet

Complete the review sheet on separate paper, showing all work for each question including multiple choice. If work is not possible, then provide an explanation for your answer. Check all answers online and hand in on test day before your test for a +5 point bonus.

NOTE: UNSTAPLED/UNNAMED REVIEW SHEETS WILL NOT BE ACCEPTED OR COUNTED FOR CREDIT

1. The graph of the quadratic function \( y = ax^2 + bx + c \) is shown below. Which of the following must be true about the values of \( a \), \( b \), and \( c \)? (Be thoughtful about what you know: which way is the graph opening? Where is the y-intercept?)

   (1) \( a + c > 0 \)
   (2) \( a + b > 0 \)
   (3) \( a \cdot c < 0 \)
   (4) \( b \cdot c < 0 \)

2. The function \( y = -\frac{1}{2}(x-6)^2 + 17 \) is strictly decreasing over which of the following intervals

   (1) \( x > 6 \)
   (2) \( x > 3 \)
   (3) \( x < 6 \)
   (4) \( x < 17 \)

3. The height of an object can be modeled by the equation \( h(t) = -16t^2 + 48t \). Which of the following is not an equivalent way of expressing this function?

   (1) \( h(t) = -16(t^2 - 3t) \)
   (2) \( h(t) = 4t(-4t - 12) \)
   (3) \( h(t) = -t(16t - 48) \)
   (4) \( h(t) = 16t(3 - t) \)

4. The equation \( 5x(x-7)^2(3x+2) = 0 \) has a solution set of

   (1) \( \left\{-5, \frac{-2}{3}, \pm 7\right\} \)
   (2) \( \left\{-\frac{2}{3}, 0, 7\right\} \)
   (3) \( \{-5, -2, 7\} \)
   (4) \( \{-2, 0, 7\} \)

5. The quadratic function \( f(x) = 10x^2 + 11x - 6 \) has one zero at \( x = -\frac{3}{2} \). At which of the following \( x \)-values is its other zero?

   (1) \( x = 6 \)
   (2) \( x = \frac{1}{6} \)
   (3) \( x = \frac{2}{5} \)
   (4) \( x = -4 \)

6. Which of the following is the solution set to the inequality \( x^2 - 6x - 16 < 0 \)?

   (1) \(-2 < x < 8\)
   (2) \(-4 < x < 4\)
   (3) \(x > 8\)
   (4) \(x < -16\)

7. When 17 times a number is decreased by the square of the same number, the result is greater than 60. The number must be between

   (1) 6 and 10
   (2) 5 and 12
   (3) \(-5 \text{ and } 5\)
   (4) \(-20 \text{ and } -3\)

8. What is the \( x \)-coordinate of the turning point of the parabola \( y = 5x^2 + 27x - 3 \)?

   (1) \(-2.7\)
   (2) \(5.4\)
   (3) \(-1.8\)
   (4) \(7.2\)

9. A circle whose equation is \( x^2 + 4x + y^2 - 10y + 12 = 0 \) has a center at

   (1) \((-2, 5)\)
   (2) \((-4, 10)\)
   (3) \((3, -8)\)
   (4) \((2, 6)\)
10. The parabola \( y = 3x^2 - 24x + 55 \) can be written in the form

(1) \( y = 3(x-2)^2 + 2 \)   (3) \( y = 3(x+2)^2 - 11 \)
(2) \( y = 3(x-8)^2 + 55 \)   (4) \( y = 3(x-4)^2 + 7 \)

11. The height of an object in meters above the ground is given by \( h(t) = -4.9t^2 + 84t + 5 \), where \( t \) represents the time, in seconds. For which of the following intervals of \( t \) is the object above a height of 350 meters?

(1) \( 5.4 < t < 8.7 \)   (2) \( 6.8 < t < 10.3 \)   (3) \( 7.5 < t < 15.8 \)   (4) \( 7.2 < t < 12.1 \)

12. A circle whose center is at \((5, -3)\) and which passes through the point \((7, -8)\) has a radius equal to

(1) 5   (2) \( \sqrt{44} \)   (3) \( \sqrt{29} \)   (4) 8

13. A parabola has a focus at \((0, 10)\) and a directrix of the \( x \)-axis. Which of the following is the equation of the parabola?

(1) \( y = x^2 + 10 \)   (2) \( y = -\frac{1}{5}x^2 + 5 \)   (3) \( y = \frac{1}{10}x^2 + 5 \)   (4) \( y = \frac{1}{20}x^2 + 5 \)

14. Shana believes one of the two binomial factors of \( 12x^2 + 35x + 8 \) is \( 3x + 2 \). Is she correct? Explain your answer.

15. Given \( f(x) = 2x^2 - 13x + 36 \), algebraically find all values of \( x \) that solve the equation \( f(x) = 15 \).

16. Find the coordinate points where the line \( y = 3x - 2 \) intersects the circle \( x^2 + y^2 = 116 \). Only an algebraic solution is acceptable.

17. Solve the following equation for all values of \( x \) algebraically. \( 2(x^2 - 25) = 3x(25 - x^2) \)

18. Algebraically determine the solution to each inequality below. Express your answers in a solution set AND on a number line.

a) \( x^2 + 2x - 35 > 0 \)
b) \( x^2 - 4x - 5 > 0 \)
c) \( x^2 - 7 < 0 \)
d) \( x^2 - 6x + 9 \geq 0 \)
e) \( 0 < x^2 - 8x + 10 \)

19. Write the following functions in vertex form & identify the coordinates of its vertex. Describe the shifts of the graph.

a) \( y = 3x^2 - 12x + 23 \)
b) \( y = x^2 + 2x - 5 \)
c) \( y = x^2 + 12x + 20 \)
20. If \( f(x) = -x^2 + 5x + 24 \) and \( g(x) = 2x - 64 \)
   a) Algebraically solve for all values of \( x \) for which \( f(x) \geq g(x) \).
   b) Illustrate your solution graphically. Label your graph fully (equation for both graphs, and points of intersection).

21. The per unit cost, in dollars, of producing \( n \) items is given by \( c(n) = 0.125n^2 - 195n + 77325 \). Algebraically, determine the minimum per unit cost and the number of items that should be produced to obtain this minimum. Express your answer as a coordinate point AND in a sentence.

22. Determine the center and radius of the circle whose equation is \( x^2 + 6x + y^2 - 14y = 42 \).

23. A parabola has a focus at \((6, 8)\) and a directrix of \( y = 2 \).
   a) Create a rough sketch of the parabola. Label the focus and directrix.
   b) What are the coordinates of the vertex of the parabola? Explain how you found your answer.
   c) Determine the equation of the parabola using the locus definition of a parabola.

24. A parabola has a focus at \((4, -6)\) and a directrix of \( y = 0 \).
   a) Create a rough sketch of the parabola. Label the focus and directrix.
   b) What are the coordinates of the vertex of the parabola? Explain how you found your answer.
   c) Determine the equation of the parabola using the locus definition of a parabola.

25. Identify the vertex, focus, and directrix for each equation below. Create a rough sketch to verify each.
   a) \((x - 5)^2 = -12y\)
   b) \((x + 7)^2 = 16(y - 4)\)

26. For each below, the center of a circle is stated and a point on the circumference of the circle. State the radius & find the equation of the circle.
   a) Center \((2, -4)\)
      Point A \((-2, -7)\)
   b) Center \((-3, -6)\)
      Point A \((-6, -2)\)