1. Sketch the graph of: \( G(x) = (x - 2)^2 + 3 \)

2. Sketch the graph of: \( F(x) = |3x - 9| \)

3. Given the graph of: \( f(x) = g(x - 2) + 4 \), sketch the graph of \( g(x) \)

4. Given the graph of \( H(x) \), find:
   a) \( H(3) \)
   b) \( x \), such that \( H(x) = -2 \)

5. Graph: \( f(x) = \begin{cases} 
    x + 3, & \text{if } x < -2 \\
    4, & \text{if } -2 \leq x \leq 1 \\
    x^2 - 2x + 6, & \text{if } x > 1 
  \end{cases} \)

6. Given \( f(x) \), sketch the graph of \( y = -f(x + 3) \)

7. Given \( g(x) \), describe the graph of \( g(1 - x) + 1 \)

8. An open box is made from a 20cm x 25cm rectangular sheet of metal, by cutting squares from the corners. Express the volume as a function of \( x \), the side of the square.

9. A window is formed by placing a semicircle of radius \( r \) atop a rectangle that is twice as long as it is wide. Express the area as a function of \( r \).

10. An orange grove has 800 trees, each of which yields 750 oranges annually. It is determined that for each additional tree planted in the same grove, the annual yield for each tree drops by 30 oranges. Let \( n \) be the number of additional trees planted. Express the total yield of oranges as a function of \( n \).

11. The partition shown below is designed to enclose 300 sq ft.
   a) Express the perimeter of the partition as a function of \( x \).
   b) If the partition cost $25/linear ft, write an expression for the cost of the partition.

12. Express the distance \( D \), between the point \( (3, -2) \) and a point \( (x, y) \) on the parabola \( y = x^2 + 4 \) as a function of \( x \).

13. Sketch the graph of \( f(x) = -(x + 1)^2 - 3 \)

14. Sketch the graph of \( f(x) = -2x^2 + 6x - 4 \)

15. Find the max/min value of \( f(x) = 3x^2 - 18x + 27 \)

16. An object tossed from the top of a building travels according to the formula \( s(t) = -16t^2 + 64t + 120 \) where \( s(t) \) is the height in feet, and \( t \) is the number of seconds since the ball was tossed.
   a) What is the maximum height reached?
   b) What is the height of the building?
   c) After how many seconds, does the object hit the ground?

17. An infant’s growth rate \( g \), in pounds per month, can be approximated by the function \( g = kw(21 - w) \) where \( w \) is their present weight and \( k \) is a positive constant. At what weight is an infant’s rate of growth maximized?

18. Given: \( f(x) = \frac{x + 5}{x - 2}, g(x) = \sqrt{x - 3}, h(x) = x^2 \)
   a) \( (f - g)(4) \)
   b) \( (g \circ h)(4) \)
   c) \( (f \cdot g)(12) \)
   d) \( (f \circ h \circ g)(7) \)
   e) \( (g \circ h)(x) \)

**Answers:**
1. same shape as \( y = x^2 \) shifted right 2 and up 3
2. shape of \( y = |x| \) shifted right 3, and stretched by a factor of 3
3. shift left 2, and down 4
4a) find \( y \) value on graph for \( x = 3 \)
4b) find where \( y = -2 \), find corr. \( x \) value
8. $V = 4x^3 - 90x^2 + 500x$
9. $\frac{1}{2} \pi r^2 + 8r^2$
10. $T = -30n^2 - 23,250n + 600,000$
11a. $p = 5x + \frac{300}{x}$
11b. $C = 125x + \frac{7500}{x}$
12. $D = \sqrt{x^4 + 13x^2 - 6x + 45}$
13.
14.
15. 0
16a. 184 ft; b. 120 ft; c. 5.4 sec
17. 10.5 lbs.
18a. $\frac{7}{2}$; b. $\sqrt{13}$; c. 5.1; d. 4.5; e. $\sqrt{x^2 - 3}$