

Polynomials and Rational Functions: Mid-Unit Assessment

You may use a four-function or scientific calculator, but not a graphing calculator.

1. Which expression is equivalent to $2(3x + 4)(x - 1)(x - 3)$?

A. $6x^3 - 16x^2 - 14x + 24$

B. $6x^3 - 4x^2 - 34x - 24$

C. $3x^3 - 8x^2 - 7x + 12$

D. $6x^3 + 20x^2 - 2x - 24$

2. The polynomial p is a function of x . The graph of p has four zeros at -4 , $-\frac{2}{3}$, 0 , and 9 .

Select **all** the expressions that could represent p .

A. $3x(x - 4)\left(x + \frac{2}{3}\right)(x + 9)$

B. $-x(x + 4)\left(x + \frac{2}{3}\right)(x - 9)$

C. $-3x(x + 4)(3x + 2)(x - 9)$

D. $3x(x + 4)(2x - 3)(x - 9)$

E. $-3x(x + 4)(3x + 2)(x - 9)^2$

3. For the pair of polynomials given, select **all** the points of intersection of their graphs.

$$g(x) = (x + 7)(x - 5)$$

$$h(x) = x - 5$$

A. (-8, -13)

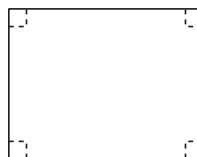
B. (-7, 0)

C. (-5, -10)

D. (-6, -11)

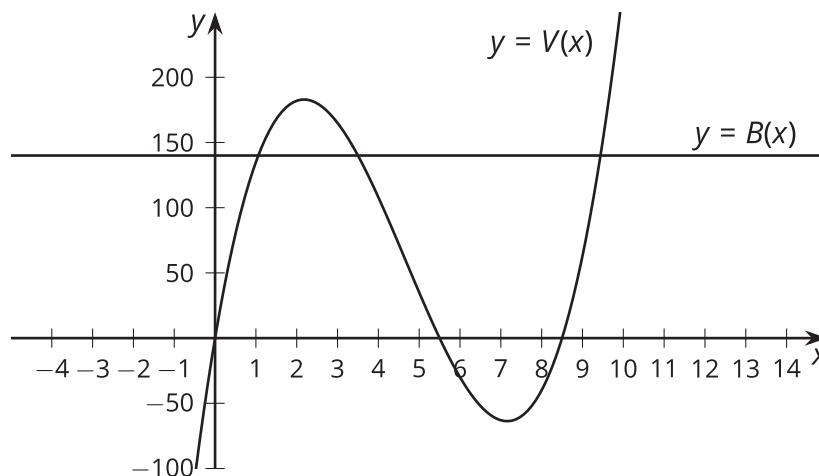
E. (5, 0)

4. Elena is making an open-top box by cutting squares out of the corners of a piece of paper that is 11 inches wide and 17 inches long, and then folding up the sides. If the side lengths of her square cutouts are x inches, then the volume of the box is given by



$$V(x) = x(11 - 2x)(17 - 2x).$$

Elena graphs the volume of the box along with the function $B(x) = 140$.

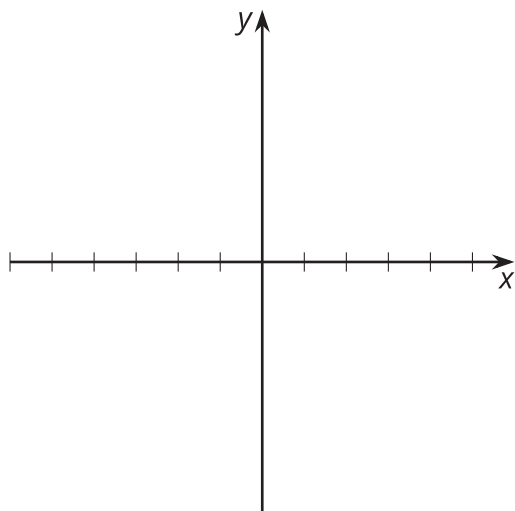


- What is a reasonable domain for $V(x)$?
- Approximately which value of x will give her a box with the greatest volume?
- For approximately which values of x is the volume of the box increasing?
- What do the points of intersection of these two graphs represent?

5. Let P be a polynomial function, and $P(x) = x^4 - dx^3 + 8x^2 - 14x + 16$. If $(x - 2)$ is a factor of the polynomial, what is the value of d ? Explain or show how you know.

6. Let g be a polynomial function of x where $g(x) = 2x^3 + 5x^2 - 28x - 15$. If $(x - 3)$ is a factor of g , write an equation for g as the product of linear factors.

7. Let $g(x) = -2(3x + 4)(x - 1)(x - 3)^2$ be a polynomial function.



a. Sketch a graph of the polynomial.

b. Name all horizontal and vertical intercepts of the graph.

c. State the end behavior of g .