

**Test: Polynomial and rational expressions****A2.A.APR.6**

1. The expression  $\frac{x^4 - 5x^2 + 4x + 14}{x + 2}$  is equivalent to
- (a)  $x^3 - 2x^2 - x + 6 - \frac{2}{x + 2}$
  - (b)  $x^3 - 5x + 4 - \frac{14}{x + 2}$
  - (c)  $x^3 + 2x^2 - x + 2 + \frac{18}{x + 2}$
  - (d)  $x^3 + 2x^2 - 9x + 22 - \frac{30}{x + 2}$
2. What is the solution set of the equation  $\frac{x + 2}{x} + \frac{x}{3} = \frac{2x^2 + 6}{3x}$ ?
- (a)  $\{-3\}$
  - (b)  $\{-3, 0\}$
  - (c)  $\{3\}$
  - (d)  $\{0, 3\}$
3. Which equation represents a polynomial identity?
- (a)  $x^3 + y^3 = (x + y)^3$
  - (b)  $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$
  - (c)  $x^3 + y^3 = (x + y)(x^2 - xy - y^2)$
  - (d)  $x^3 + y^3 = (x - y)(x^2 + xy + y^2)$

4. Use polynomial long division

(A.APR.6 Rewrite rational expressions)

to find an expression of the form  $ax^2 + bx + c + \frac{d}{x+e}$  with  $a, b, c, d, e$  integers that is equivalent to  $\frac{x^3 + 9x^2 - 5x - 90}{x + 4}$  for  $x \neq -4$ .

5. Solve algebraically for  $n$ :  $\frac{2}{n^2} + \frac{3}{n} = \frac{4}{n^2}$

**A2-APR.1 Perform operations with polynomials**

6. Find the sum in standard form  $(4x^4 + 5x^3 + 3x^2 - 4) + (x^4 - 2x^3 - 2x^2 - x + 1)$ .

7. Which expression is equivalent to  $(x + 2)^2 - 5(x + 2) + 6$ ?

(a)  $x(x + 1)$

(b)  $(x - 3)(x + 2)$

(c)  $(x - 4)(x + 3)$

(d)  $(x - 6)(x + 1)$

8. Write the expression  $A(x) \cdot B(x) - 3C(x)$  as a polynomial in standard form.

$$A(x) = x^3 + 2x - 1$$

$$B(x) = x^2 + 7$$

$$C(x) = x^4 - 5x$$

9. Stone Manufacturing has developed a cost model,  $C(x) = 0.18x^3 + 0.02x^2 + 4x + 180$ , where  $x$  is the number of sprockets sold, in thousands. The sale price can be modeled by  $S(x) = 95.4 - 6x$  and the company's revenue by  $R(x) = x \cdot S(x)$ . The company profits,  $R(x) - C(x)$ , could be modeled by

(a)  $0.18x^3 + 6.02x^2 + 91.4x + 180$

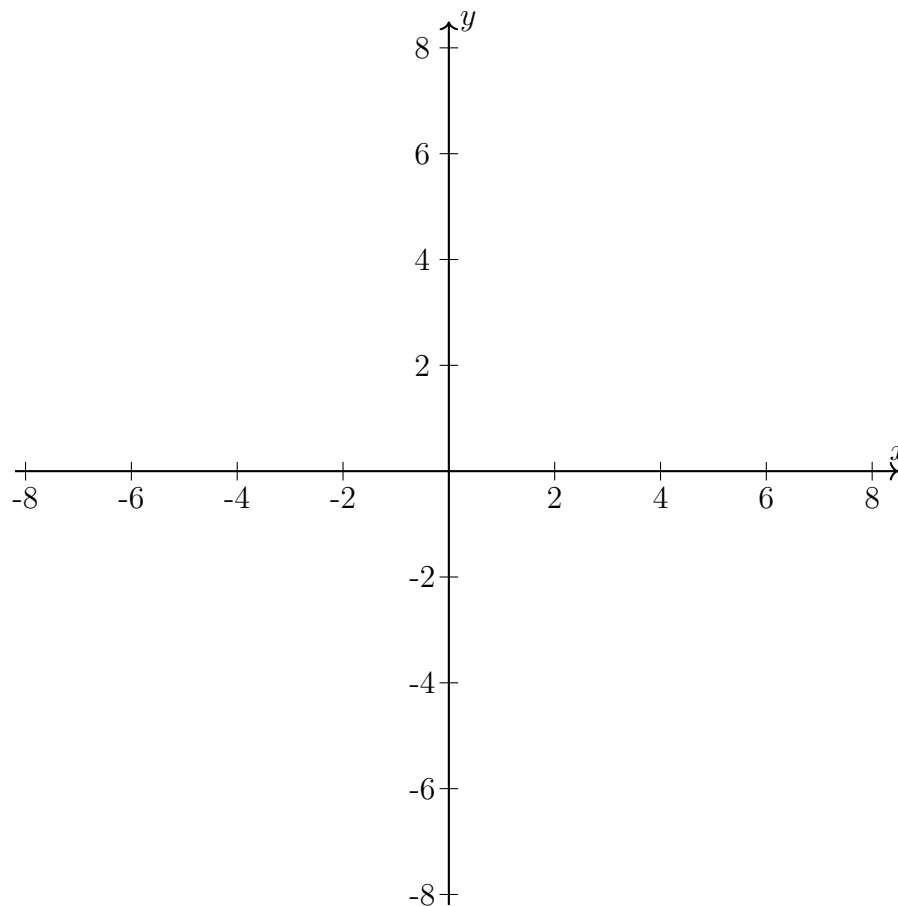
(b)  $0.18x^3 - 5.98x^2 - 91.4x + 180$

(c)  $-0.18x^3 - 6.02x^2 + 91.4x - 180$

(d)  $0.18x^3 + 5.98x^2 + 99.4x + 180$

10. Given the rational function  $r(x) = \frac{x+3}{x-2} - 3$ . (F.IF.7d Graph rational functions)

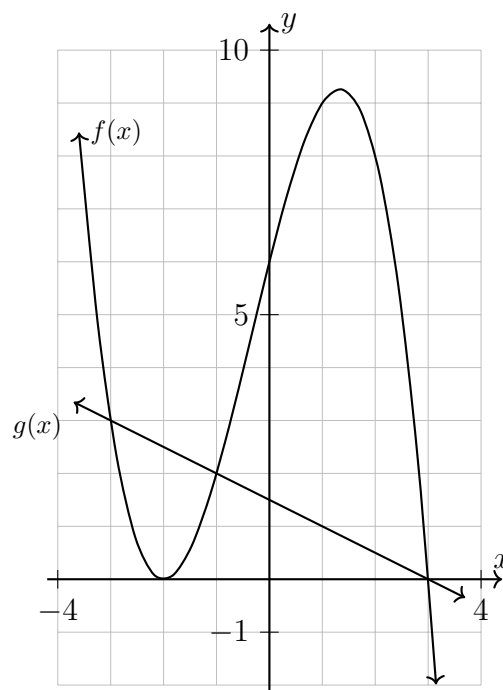
- (a) Sketch a graph of the function.
- (b) Mark the vertical asymptote as dotted line and label it with its equation.
- (c) Explain why the asymptote is located there.



**A2-F.IF.7c Graph polynomials, identify zeros, end behavior**

11. The polynomial  $f(x)$  and linear function  $g(x)$  are graphed below.

- (a) What is the degree of  $f(x)$ ?
- (b) Is the leading coefficient of  $f(x)$  positive, negative, or zero?
- (c) If the polynomial  $f(x)$  is written as the product of linear factors, what factor would be squared?
- (d) Write down the three solutions to  $f(x) = g(x)$  as ordered pairs.

**A2-F.BF.2 Write arithmetic and geometric sequences with recursive formulas**

12. Write a recursive definition of the sequence  $a_1 = 2$ ,  $a_2 = 6$ ,  $a_3 = 18$ ,  $a_4 = 54, \dots$