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3.5 Trimester Final Exam **A2.A.APR.6**

A2-APR.1 Perform operations with polynomials

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

2. 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) $(x - 6)(x + 1)$

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

$$A(x) = x^3 + 2x - 1$$
$$B(x) = x^2 + 7$$
$$C(x) = x^4 - 5x$$

5. 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) $0.18x^3 + 5.98x^2 + 99.4x + 180$

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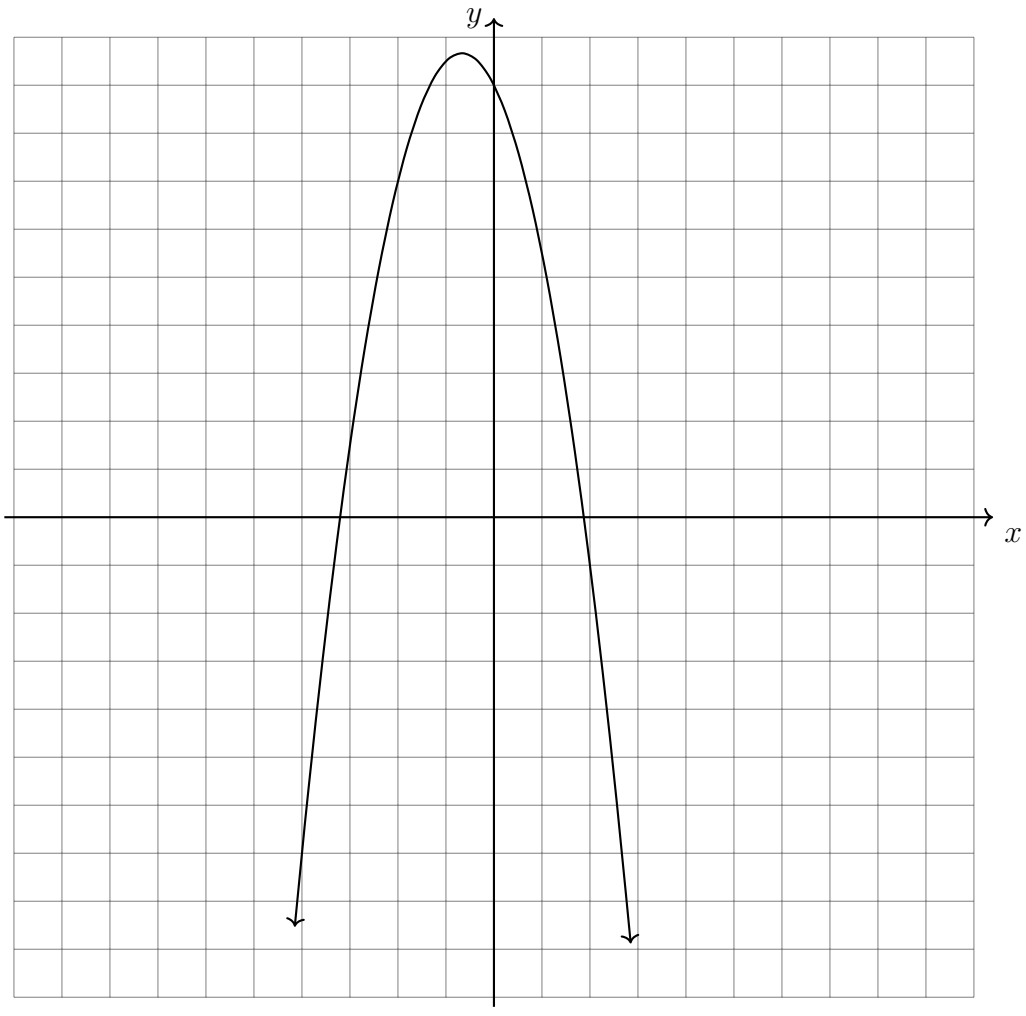
A2-F.IF.7a Graph linear and quadratic functions, show key features

6. One equation of a system is graphed. Graph the second equation, labeling the intersections as ordered pairs.

   $y = ax^2 - 2x + 9$ $2x + y = 3$

   Find the value of the leading coefficient a of the quadratic equation.



A2-A.APR.3 Identify zeros of polynomials given suitable factorizations

7. Write down the solutions to the equation $x(3x-1)(x+5)(x-1)=0$.

8. The polynomial p is a function of x. The graph of p has three zeros at 7, $\frac{2}{3}$, and -1. Select **all** the expressions that could represent p.

   (a) $(x-7)(x-\frac{2}{3})(x+1)$
   (b) $(x-7)(3x-2)(x-1)$
   (c) $3(x-7)(x-\frac{2}{3})(x+1)$
   (d) $3x(x+7)(x+\frac{2}{3})(x-1)^2$
   (e) $(x-7)(x+\frac{2}{3})(x-1)$
   (f) $(x-7)(3x-2)(x+1)$
   (g) $3(x-7)(x-\frac{2}{3})(x-1)$
   (h) $3x(x+7)(x-\frac{2}{3})(x+1)^2$

A2-A.APR.3 Rewrite rational expressions in different forms

9. Select the expression that is equivalent to $\dfrac{2x^2+11x-21}{x+3}$ for $x \neq -3$.

   (a) $2x+5-\dfrac{6}{x+3}$
   (b) $2x+17-\dfrac{20}{x+3}$
   (c) $2x+17-\dfrac{36}{x+3}$
   (d) $2x+5-\dfrac{36}{x+3}$

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A2-A.SSE.3c Use the properties of exponents

10. Identify the expressions that are equal to $\frac{2^2}{2^4}$

    (a) 2^6
    (b) $\frac{1}{2^2}$
    (c) 2^{-2}
    (d) $\frac{1}{4}$
    (e) 2^2
    (f) 0.5

11. Identify the expressions that are equal to 2^{-3}

    (a) 2.333...
    (b) $\sqrt{2}$
    (c) $\frac{1}{2^3}$
    (d) $\frac{1}{8}$
    (e) 6
    (f) 0.125

12. Identify the expressions that are equal to $9^{\frac{1}{2}}$

    (a) 9.5
    (b) $\sqrt{3}$
    (c) $\sqrt{9}$
    (d) 3
    (e) 81
    (f) 4.5

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

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

14. Write a recursive definition of the arithmetic sequence a.

n	a_n
1	5
2	-5
3	-15

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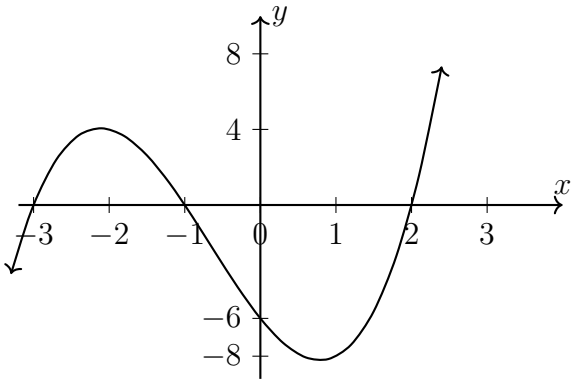
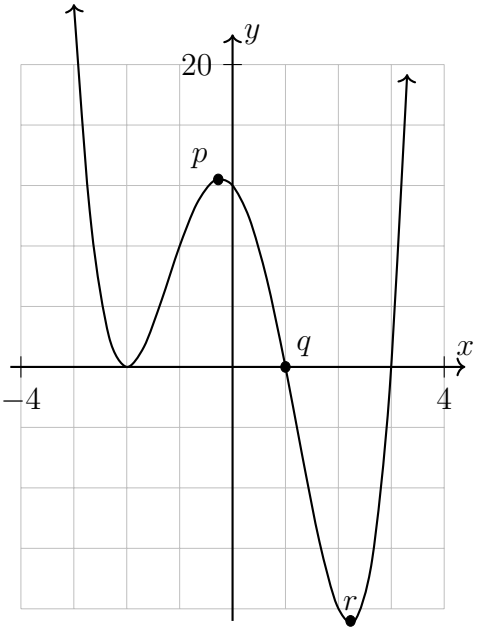
A2-F.IF.7c Graph polynomials, identify zeros, end behavior

15. Graphed is $f(x) = x^3 + 2x^2 - 5x - 6$. Write the function in factored form.



16. The graph of the polynomial $f(x) = x^4 - 9x^2 - 4x + 12$ is shown.



(a) What is the degree of the function?

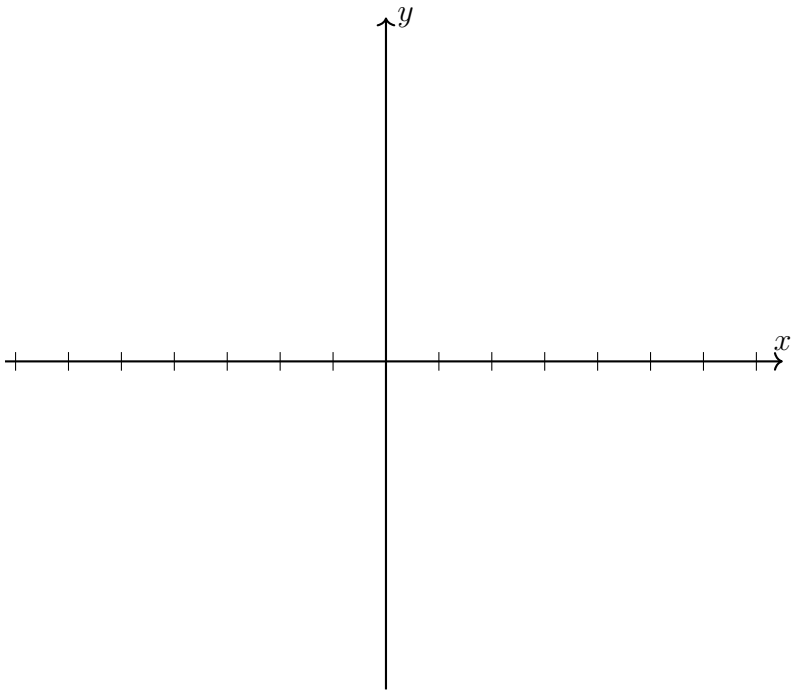
(b) What are the zeros of the function?

(c) Which factor has a multiplicity of 2?

(d) Write down the y-intercept as an ordered pair.

(e) Three points are marked on the graph, p, q, and r. Which one is a local minimum?

17. Let $j(x) = x(x+4)(x-3)^2$ be a polynomial function.



(a) Sketch a graph of the function. Label the x-intercepts.

(b) Find the value of the y-intercept and mark it on the graph.

(c) Identify the end behavior of the function.

i. As $x \to +\infty$, $y \to +\infty$;
as $x \to -\infty$, $y \to -\infty$

ii. As $x \to +\infty$, $y \to -\infty$;
as $x \to -\infty$, $y \to +\infty$

iii. As $x \to +\infty$, $y \to +\infty$;
as $x \to -\infty$, $y \to +\infty$

iv. As $x \to +\infty$, $y \to -\infty$;
as $x \to -\infty$, $y \to -\infty$

18. Given the rational function $r(x) = \dfrac{x+3}{x-2} - 3$.

(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.

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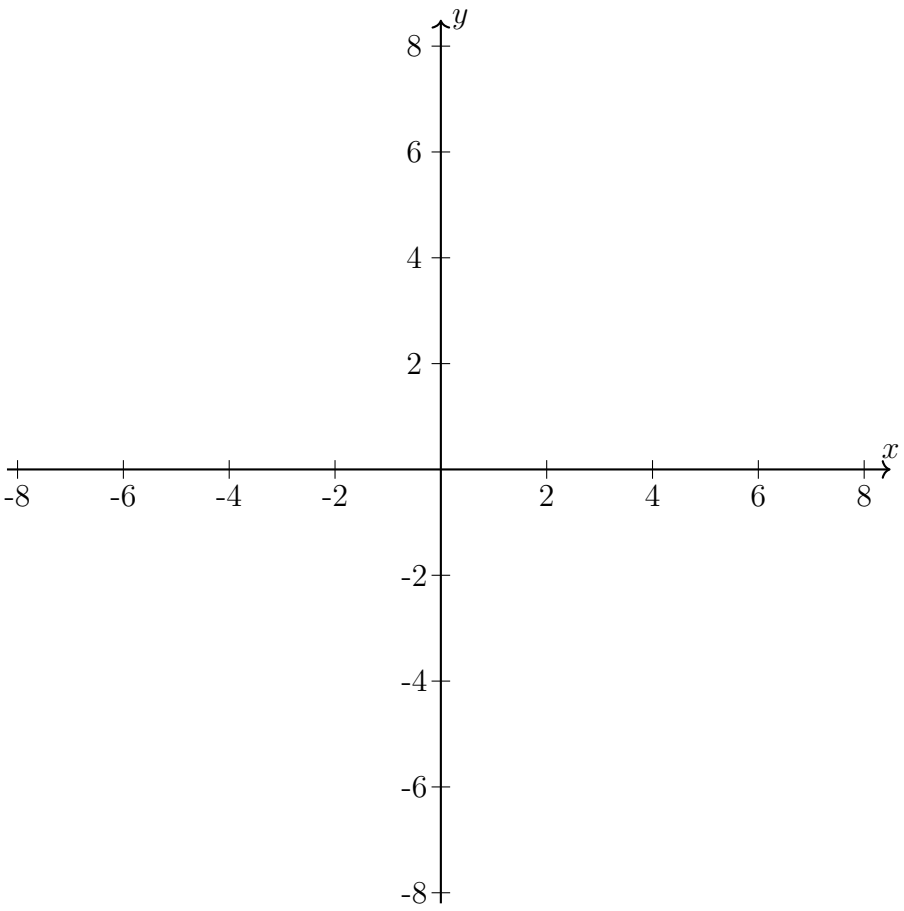

6.EE.b Reason about and solve one-variable equations and inequalities

19. Use the function $f(x) = \frac{1}{2}x + 11$ to answer the questions.

    (a) Find the value of $f(4)$.

    (b) Solve for x if $f(x) = 2$.

20. Solve each equation for x.

    (a) $x^2 + 5x + 6 = 0$

    (b) $x^3 - 7x^2 + 6x = 0$

21. Find all of the values of x that make the equation true.

$$\frac{3}{x-4} = \frac{x-5}{x}$$

22. Solve algebraically for x: $\dfrac{1}{x^2} + \dfrac{1}{2x} = \dfrac{6}{3x}$

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