Do you know HOW?

Write each polynomial function in standard form. Then classify it by degree and by number of terms and describe its end behavior.

1. $y = 3x^2 - 7x^4 + 9 - x^4$

2. $y = 2x(x^2 - 3)(x^2 + 2)$

3. $y = (t - 2)(t + 1)(t + 1)$

Write a polynomial function for each set of zeros.

4. $x = 1, 2, \frac{3}{5}$

5. $x = \sqrt{2}, -i$

6. $x = 3 + i, -1 - \sqrt{5}$

Find the quotient and remainder.

7. $(x^2 + 3x - 4) \div (x - 1)$

8. $(x^3 + 7x^2 - 5x - 6) \div (x + 2)$

9. $(2x^3 + 9x^2 + 11x + 3) \div (2x + 3)$

For each equation, state the number of complex roots, the possible number of real roots, and the possible rational roots.

10. $3x^4 + 5x^3 - 2x^2 + x - 9 = 0$

11. $x^7 - 2x^5 - 4x^3 - 2x - 1 = 0$

For each equation, find all the roots.

12. $3x^4 - 11x^3 + 15x^2 - 9x + 2 = 0$

13. $x^3 - x^2 - x - 2 = 0$

14. One x-intercept of the graph of the cubic function $f(x) = x^3 - 2x^2 - 111x - 108$ is -9. What are the other zeros?

Use synthetic division and the Remainder Theorem to find $P(a)$.

15. $P(x) = 6x^4 + 19x^3 - 2x^2 - 44x - 24; a = -\frac{2}{3}$

16. $P(x) = x^4 + 3x^3 - 7x^2 - 9x + 12; a = 3$

17. $P(x) = x^3 + 3x^2 - 5x - 4; a = -1$

Expand each binomial.

18. $(x + z)^5$

19. $(1 - 2t)^2$

20. Graph and write the equation of the cubic function that is obtained from the parent function $y = x^3$ after this sequence of transformations: vertical stretch by a factor of 2, reflection across the x-axis, translation 3 units down and 4 units right.

Do you UNDERSTAND?

21. **Physics** You take measurements of the distance traveled by an object that is increasing its speed at a constant rate. The distance traveled as a function of time can be modeled by a quadratic function.
    a. Write a quadratic function that models distances of 10 ft at 1 sec, 30 ft at 2 sec, and 100 ft at 4 sec.
    b. Find the zeros of the function.
    c. **Reasoning** Describe what each zero represents for this real-world situation.

22. **Writing** For the polynomial $x^6 - 64$, could you apply the Difference of Cubes? Difference of Squares? Explain your answers.

23. The number of pairs of shoes Emily buys varies directly as the square of the area of the floor of her closet. If she can fit 12 pairs of shoes when her closet was 10 square feet, how many pairs of shoes will she fit when the area of her closet floor is 18 square feet?