# Polynomial Practice Problems

**Write each polynomial function in standard form. Then determine the end behavior of each.**

**1.** $n = 4m^2 - m + 7m^4$ 

**2.** $f(t) = 4t + 3t^3 + 2t - 7$ 

**3.** $f(r) = 5r + 7 + 2r^2$

**Divide using long division for #s 4 and 5:**

**4.** $\dfrac{x^4 - 23x^3 + 49x + 4}{x^2 + x - 2}$

**5.** $(2x^3 - 6x^2 + 4x + 1) \div (x^2 + 3)$

**Divide using synthetic division for #s 6 and 7:**

**6.** $(2x^3 - 3x^2 - 18x - 8) \div (x - 4)$

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

**Find all solutions of each equation.**

**8.** $x^4 + 14x^2 - 32 = 0$ 

**9.** $x^3 - 6x^2 + 8 = 0$ 

**10.** $6x^3 - 2x^2 + 4x = 0$

**11.** $x^4 - 5x^3 - 8x = -40$ 

**12.** $x^3 + 125 = 0$ 

**13.** $x^3 - 3x^2 + 4x - 12 = 0$

**14.** $3x^4 + 11x^3 + 14x^2 + 7x + 1 = 0$ 

**15.** $3x^4 - x^3 - 22x^2 + 24x = 0$ 

**16.** $45x^3 + 93x^2 - 12 = 0$

**17.** What is $P(-4)$ given that $P(x) = 2x^4 - 3x^3 + 5x^2 - 1$?

**18.** Write the equation of a polynomial function that has zeros at:

- $-3$ and $2 - i$.

- 3-i and 2

- 2i and 3 and a double root at 4

**19.** The remainder when dividing $x^3 + 2x^2 + 3x + k$ by (x+1) is 2. What is the remainder when dividing the same polynomial by (x-2)?

**20.** The volume of a box is $x^3 + 4x^2 + 4x$. What are the dimensions of the box?

**Use synthetic division and the given factor to completely factor the binomial function.**

**21.** $f(x) = x^3 + 2x^2 - 5x - 6; (x+1)$

**22.** $f(x) = x^3 + 9x^2 + 23x + 15; (x+5)$

**23.** Find the polynomial given the following

- Find a polynomial function whose graph passes through the points: (-3, -50), (-2, -4), (-1, 10), (0, 7), and (2, -23)

Cubic:

$r^2$

Quartic:

$r^2$

- Find a cubic and a quartic model for each set of values. Explain why one models the data better.

| - x | - -2 | - -1 | - 0 | - 1 | - 2 |
|---|---|---|---|---|---|
| - y | - -65 | - -14 | - -4 | - 2 | - 90 |

Cubic:

$r^2$

Quartic:

$r^2$

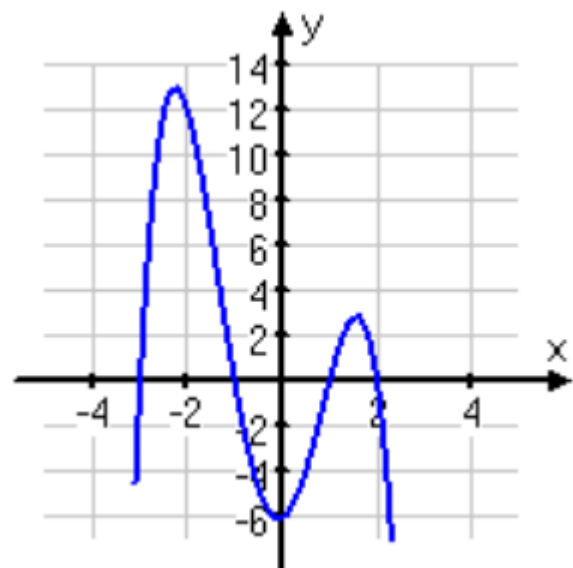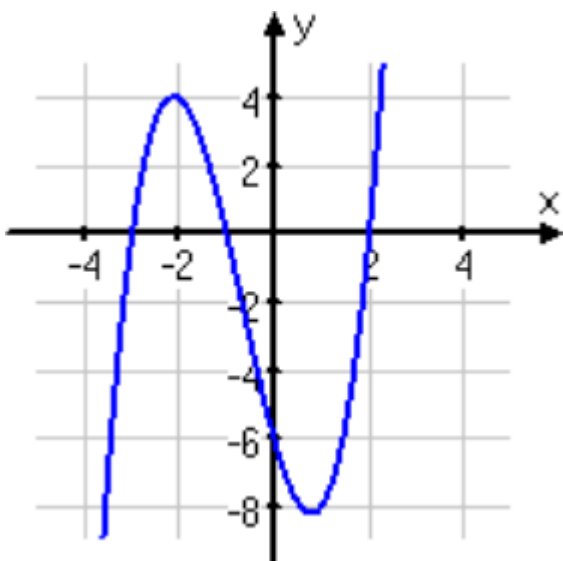**24.** Factor the following

$s^3 - 64$  $m^3 + 216$  $y^3 + 125$

$27x^3 - y^3$  $125x^3 + 8a^3$  $1000 + 27a^3$
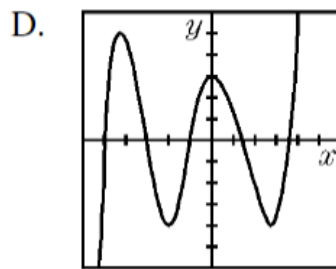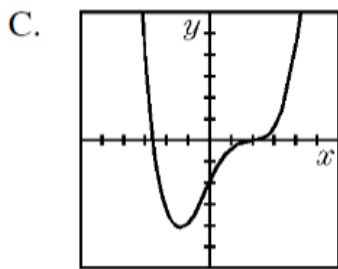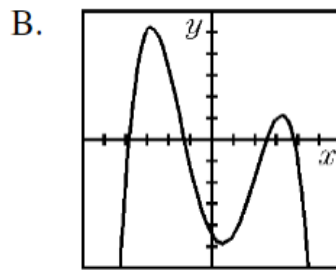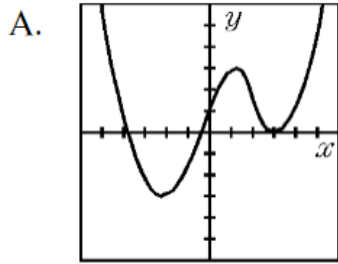
$3a^3 - 81x^3$  $r^3 + 8b^3$  $(2x + 3)^3 - y^3$

**25.** Write the equation given the following graphs:

**26.**

Which of the following graphs best illustrates the graph of $y = a(x - b)(x - c)(x - d)^2$ where $a > 0$ and $b \neq c \neq d$?

A.



B.



C.



D.



Which of the following graphs best illustrates the graph of $y = a(x - b)(x - c)(x - d)^2$ where $a < 0$ and $b \neq c \neq d$?

A.



B.



C.



D.