

Use synthetic division and the Remainder Theorem to evaluate $f(c)$

1. $f(x) = x^2 - 8x + 6; f(-5)$

2. $f(x) = x^3 + 2x^2 - 3x + 1; f(3)$

3. $f(x) = 3x^4 + x^3 - 2x^2 + x + 12; f(4)$

4. $f(x) = 2x^3 - 8x^2 - 2x + 5; f(-3)$

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

6. $f(x) = x^5 + 8x^3 + 2x - 15; f(-2)$

Use the Factor Theorem to show that $x - c$ is a factor of $P(x)$ for the given value of c .

7. $P(x) = x^3 - 9x^2 + 27x - 27, c = 3$

8. $P(x) = x^3 - 2x^2 + 4x - 8, c = -2$

9. $P(x) = 2x^3 - 8x^2 + 5x - 20, c = 4$

10. $P(x) = 3x^3 - 4x^2 - 12x + 16, c = 2$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

11. $x^3 - x^2 - 5x - 3; x + 1$

12. $x^3 - x^2 - 10x - 8; x + 2$

13. $3x^3 + 8x^2 + 3x - 2; x + 1$

14. $2x^3 + 7x^2 - 53x - 28; x - 4$

15. $3x^3 + 10x^2 - x - 12; x + 3$

16. $x^3 - 6x^2 + 11x - 6; x - 2$

17. $x^3 + x^2 - 16x - 16; x + 1$

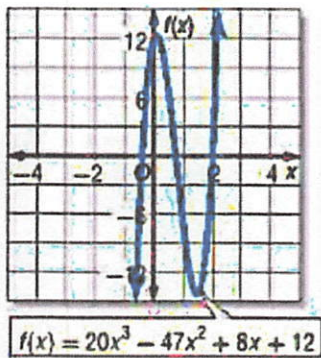
18. $6x^3 + 26x^2 + 16x - 24; x + 3$

19. $x^3 - 7x^2 + 7x + 15; x + 1$

20. $x^3 + 4x^2 - 16x - 64; x + 4$

Use the graph to find all of the factors for each polynomial function.

21



Use synthetic division and the Remainder Theorem to evaluate $f(c)$

1. $f(x) = x^2 - 8x + 6; f(-5)$

$$\begin{array}{r|rrrr} -5 & 1 & -8 & 6 & \\ & & -5 & 65 & \\ \hline & 1 & -13 & 71 & \end{array}$$

2. $f(x) = x^3 + 2x^2 - 3x + 1; f(3)$

$$\begin{array}{r|rrrrr} 3 & 1 & 2 & -3 & 1 & \\ & & 3 & 15 & 36 & \\ \hline & 1 & 5 & 12 & 37 & \end{array}$$

3. $f(x) = 3x^4 + x^3 - 2x^2 + x + 12; f(4)$

$$\begin{array}{r|rrrrrr} 4 & 3 & 1 & -2 & 1 & 12 & \\ & & 12 & 52 & 200 & 804 & \\ \hline & 3 & 13 & 50 & 201 & 816 & \end{array}$$

4. $f(x) = 2x^3 - 8x^2 - 2x + 5; f(-3)$

$$\begin{array}{r|rrrr} -3 & 2 & -8 & -2 & 5 & \\ & & -6 & 42 & -120 & \\ \hline & 2 & -14 & 40 & -115 & \end{array}$$

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

$$\begin{array}{r|rrrr} 6 & 1 & 0 & -5 & 2 & \\ & & 6 & 36 & 186 & \\ \hline & 1 & 6 & 31 & 188 & \end{array}$$

6. $f(x) = x^5 + 8x^3 + 2x - 15; f(-2)$

$$\begin{array}{r|rrrrrr} -2 & 1 & 0 & 8 & 0 & 2 & -15 & \\ & & -2 & 4 & -24 & 48 & -100 & \\ \hline & 1 & -2 & 12 & -24 & 50 & -115 & \end{array}$$

Use the Factor Theorem to show that $x - c$ is a factor of $P(x)$ for the given value of c .

7. $P(x) = x^3 - 9x^2 + 27x - 27, c = 3$

$$\begin{array}{r|rrrr} 3 & 1 & -9 & 27 & -27 & \\ & & 3 & -18 & 27 & \\ \hline & 1 & -6 & 9 & 0 & \end{array} \quad \text{yes}$$

8. $P(x) = x^3 - 2x^2 + 4x - 8, c = -2$

$$\begin{array}{r|rrrr} -2 & 1 & -2 & 4 & -8 & \\ & & -2 & 8 & -24 & \\ \hline & 1 & -4 & 12 & -32 & \end{array} \quad \text{NO}$$

9. $P(x) = 2x^3 - 8x^2 + 5x - 20, c = 4$

$$\begin{array}{r|rrrr} 4 & 2 & -8 & 5 & -20 & \\ & & 8 & 0 & 20 & \\ \hline & 2 & 0 & 5 & 0 & \end{array} \quad \text{yes}$$

10. $P(x) = 3x^3 - 4x^2 - 12x + 16, c = 2$

$$\begin{array}{r|rrrr} 2 & 3 & -4 & -12 & 16 & \\ & & 6 & 4 & -16 & \\ \hline & 3 & 2 & -8 & 0 & \end{array} \quad \text{yes}$$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

11. $x^3 - x^2 - 5x - 3; x + 1$

$$\begin{array}{r|rrrr} -1 & 1 & -1 & -5 & -3 & \\ & & -1 & 2 & 3 & \\ \hline & 1 & -2 & -3 & 0 & \end{array}$$

$$x^2 - 2x - 3 \quad (x-3)(x+1)$$

12. $x^3 - x^2 - 10x - 8; x + 2$

$$\begin{array}{r|rrrr} -2 & 1 & -1 & -10 & -8 & \\ & & -2 & 6 & 8 & \\ \hline & 1 & -3 & -4 & 0 & \end{array}$$

$$x^2 - 3x - 4 \quad (x-4)(x+1)$$

13. $3x^3 + 8x^2 + 3x - 2; x + 1$

$$\begin{array}{r} -1 \\ 3 8 3 -2 \\ -3 -5 2 \\ \hline 3 5 -2 0 \end{array}$$

$3x^2 + 5x - 2$ $(3x-1)(x+2)$

14. $2x^3 + 7x^2 - 53x - 28; x - 4$

$$\begin{array}{r} 4 \\ 2 7 -53 -28 \\ 8 60 28 \\ \hline 2 15 7 0 \end{array}$$

$2x^2 + 15x + 7$ $(2x+1)(x+7)$

15. $3x^3 + 10x^2 - x - 12; x + 3$

$$\begin{array}{r} -3 \\ 3 10 -1 -12 \\ -9 -3 12 \\ \hline 3 1 -4 0 \end{array}$$

$3x^2 + x - 4$ $(3x+4)(x-1)$

16. $x^3 - 6x^2 + 11x - 6; x - 2$

$$\begin{array}{r} 2 \\ 1 -6 11 -6 \\ 2 -8 6 \\ \hline 1 -4 3 0 \end{array}$$

$x^2 - 4x + 3$ $(x-3)(x-1)$

17. $x^3 + x^2 - 16x - 16; x + 1$

$$\begin{array}{r} -1 \\ 1 1 -16 -16 \\ -1 0 16 \\ \hline 1 0 -16 0 \end{array}$$

$x^2 - 16$ $(x-4)(x+4)$

18. $6x^3 + 26x^2 + 16x - 24; x + 3$

$$\begin{array}{r} -3 \\ 6 26 16 -24 \\ -18 -24 24 \\ \hline 6 8 -8 0 \end{array}$$

$6x^2 + 8x - 8$
 $2(3x^2 + 4x - 4) = 2(3x-2)(x+2)$

19. $x^3 - 7x^2 + 7x + 15; x + 1$

$$\begin{array}{r} -1 \\ 1 -7 7 15 \\ -1 8 -15 \\ \hline 1 -8 15 0 \end{array}$$

$x^2 - 8x + 15$ $(x-3)(x+5)$

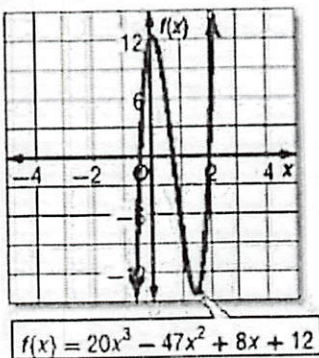
20. $x^3 + 4x^2 - 16x - 64; x + 4$

$$\begin{array}{r} -4 \\ 1 4 -16 -64 \\ -4 0 64 \\ \hline 1 0 -16 0 \end{array}$$

$x^2 - 16$ $(x-4)(x+4)$

Use the graph to find all of the factors for each polynomial function.

21



$$\begin{array}{r} 2 \\ 20 -47 8 12 \\ 40 -14 -12 \\ \hline 20 -7 -6 0 \end{array}$$

$20x^2 - 7x - 6$ $(4x-3)(5x+2)$

5x	4x - 3
20x ²	-15x
8x	-6