

**LESSON 2.4** Practice B  
**Factoring Polynomials**

Determine whether the given binomial is a factor of the polynomial  $P(x)$ .

- |  |  |
|--|--|
| 1. $(x-4)$ ; $P(x) = x^2 + 8x - 48$<br><u>Yes</u>    | 2. $(x+5)$ ; $P(x) = 2x^2 - 6x - 1$<br><u>No</u> |
| 3. $(x-6)$ ; $P(x) = -2x^2 + 15x - 18$<br><u>Yes</u> | 4. $(x+3)$ ; $P(x) = 2x^2 - x + 7$<br><u>No</u>  |

Factor each expression.

- |   |   |
|---|---|
| 5. $2x^4 + 2x^3 - x^2 - x$<br><u><math>(x)(2x^2-1)(x+1)</math></u>      | 6. $4x^3 + x^2 - 8x - 2$<br><u><math>(x^2-2)(4x+1)</math></u> |
| 7. $5x^6 - 5x^4 + x^2 - x$<br><u><math>(x)(5x^3+1)(x+1)(x-1)</math></u> | 8. $2x^4 + 54x$<br><u><math>(2x)(x+3)(x^2-3x+9)</math></u>    |
| 9. $64x^3 - 1$<br><u><math>(4x-1)(16x^2+4x+1)</math></u>                | 10. $3x^4 + 24x$<br><u><math>(3x)(x+2)(x^2+2x+4)</math></u>   |

Solve.

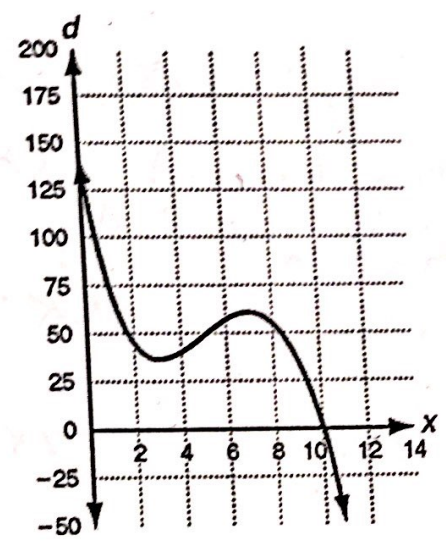
11. Since 2006, the water level in a certain pond has been modeled by the polynomial  $d(x) = -x^3 + 16x^2 - 74x + 140$ , where the depth  $d$ , is measured in feet over  $x$  years. Identify the year that the pond will dry up. Use the graph to factor  $d(x)$ .

$d(x) = (x-10)(-x^2 + 6x - 14)$

Since  $d(10) = 0$ ,  $(x-10)$  is a factor of  $d(x)$ .

$$\begin{array}{r|rrrr} 10 & -1 & 16 & -74 & 140 \\ & \downarrow & -10 & 60 & -140 \\ \hline & -1 & 6 & -14 & 0 \end{array}$$

$(x-10)(-x^2 + 6x - 14)$



$$\textcircled{1} \begin{array}{r|rrr} 4 & 1 & 8 & -48 \\ & \downarrow & & \\ & & 4 & 48 \\ \hline & 1 & 12 & 0 \end{array}$$

$P(4) = 0$  so  $(x-4)$  is a factor of  $P(x)$

$$\textcircled{3} \begin{array}{r|rrr} 6 & -2 & 15 & -18 \\ & \downarrow & & \\ & & -12 & 18 \\ \hline & -2 & 3 & 0 \end{array}$$

$P(6) = 0$  so  $(x-6)$  is a factor

$$\begin{aligned} \textcircled{5} & (2x^4 + 2x^3)(-x^2 - x) \\ & 2x^3(x+1) - x(x+1) \\ & (2x^3 - x)(x+1) \\ & x(2x^2 - 1)(x+1) \end{aligned}$$

$$\begin{aligned} \textcircled{7} & (5x^6 - 5x^4)(x^3 - x) \\ & 5x^4(x^2 - 1) + x(x^2 - 1) \\ & (5x^4 + x)(x^2 - 1) \\ & x(5x^3 + 1)(x+1)(x-1) \end{aligned}$$

$$\textcircled{9} (4x-1)(16x^2+4x+1)$$

$$\textcircled{2} \begin{array}{r|rrr} -5 & 2 & -6 & 1 \\ & \downarrow & & \\ & & -10 & 80 \\ \hline & 2 & -16 & 81 \end{array}$$

$P(-5) \neq 0$  so  $(x+5)$  is not a factor of  $P(x)$

$$\textcircled{4} \begin{array}{r|rrr} -3 & 2 & -1 & 7 \\ & \downarrow & & \\ & & -6 & 21 \\ \hline & 2 & -7 & 28 \end{array}$$

$P(-3) \neq 0$  so  $(x+3)$  is not a factor

$$\begin{aligned} \textcircled{6} & (4x^3 + x^2)(8x - 2) \\ & x^2(4x+1) - 2(4x+1) \\ & (x^2 - 2)(4x+1) \end{aligned}$$

$$\begin{aligned} \textcircled{8} & 2x(x^3 + 27) \\ & 2x(x+3)(x^2 - 3x + 9) \end{aligned}$$

$$\begin{aligned} \textcircled{10} & 3x(x^3 + 8) \\ & 3x(x+2)(x^2 - 2x + 4) \end{aligned}$$