Solutions

Lesson 16 Practice Problems

1. There are many cylinders with a volume of 144π cubic inches. The height $h(r)$ in inches of one of these cylinders is a function of its radius r in inches where $h(r) = \frac{144}{r^2}$.

   a. What is the height of one of these cylinders if its radius is 2 inches?

   $h(2) = \frac{144}{2^2} = 36$ in.

   b. What is the height of one of these cylinders if its radius is 3 inches?

   $h(3) = \frac{144}{3^2} = 16$ in.

   c. What is the height of one of these cylinders if its radius is 6 inches?

   $h(6) = \frac{144}{6^2} = 4$ in.

2. The surface area $S(r)$ in square units of a cylinder with a volume of 18 cubic units is a function of its radius r in units where $S(r) = 2\pi r^2 + \frac{36}{r}$. What is the surface area of a cylinder with a volume of 18 cubic units and a radius of 3 units?

   $S(3) = 2\pi(3^2) + \frac{36}{3}$

   $= 18\pi + 12$

   ≈ 68.55 in^2

   optional

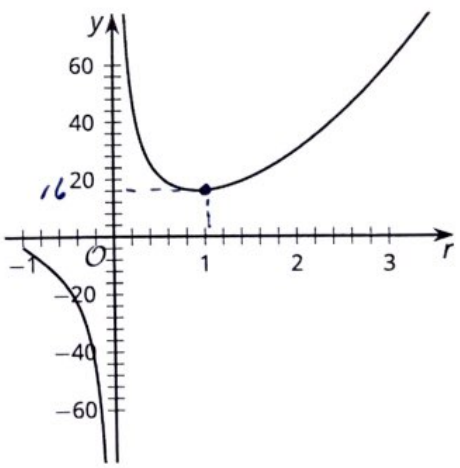
3. Han finds an expression for $S(r)$ that gives the surface area in square inches of any cylindrical can with a specific fixed volume, in terms of its radius r in inches. This is the graph Han gets if he allows r to take on any value between -1 and 5.

   a. What would be a more appropriate domain for Han to use instead?

   $r \geq 0$

   b. What is the approximate minimum surface area for the can?

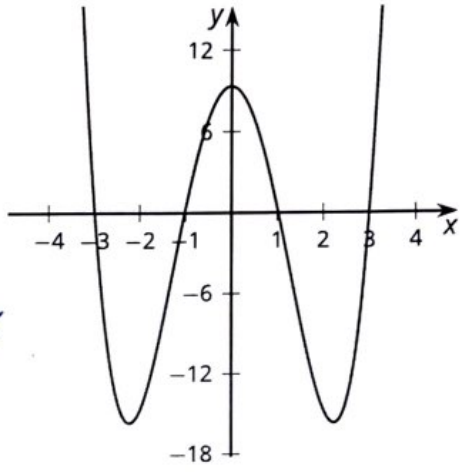
   16 in.^{3}



4. The graph of a polynomial function f is shown. Is the degree of the polynomial even or odd? Explain your reasoning.

Even.

End behavior is $y \to +\infty$ in both directions of x



(From Unit 2, Lesson 8.)

5. The polynomial function $p(x) = x^4 + 4x^3 - 7x^2 - 22x + 24$ has known factors of $(x+4)$ and $(x-1)$.

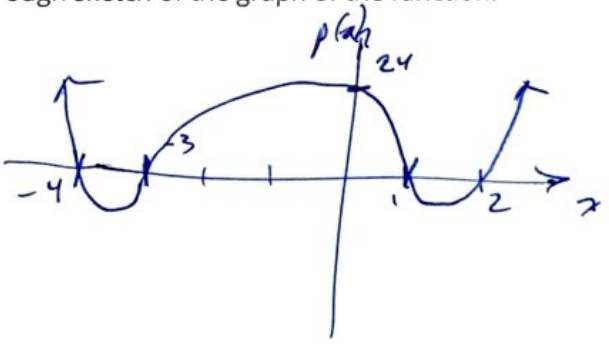
a. Rewrite $p(x)$ as the product of linear factors.

Use Calculator equation Solver

$x = 2, 1, -3, -4$

$p(x) = (x-2)(x-1)(x+3)(x+4)$

b. Draw a rough sketch of the graph of the function.



(From Unit 2, Lesson 12.)

6. Which polynomial has $(x + 1)$ as a factor?

$f(-1) = 0$

A. $x^3 + 2x^2 - 19x - 20$
$-1 \quad +2 \quad +19 \quad -20$ ✓

B. $x^3 - 21x + 20$
$-1 \quad +21 \quad +20$ ✗

C. $x^3 + 8x + 11x - 20$
$-1 \quad -8 \quad -11 \quad -20$ ✗

D. $x^3 - 3x^2 + 3x - 1$
$-1 \quad -3 \quad -3 \quad -1$ ✗

(From Unit 2, Lesson 15.)