Solutions

Lesson 17 Practice Problems

1. Jada is planning a kayak trip. She finds an expression for the time, $T(s)$, in hours it takes her to paddle 10 kilometers upstream in terms of s, the speed of the current in kilometers per hour. This is the graph Jada gets if she allows s to take on any value between 0 and 7.5.

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

   $0 \le S \le 5.5$

   b. What is the approximate speed of the current if her trip takes 6 hours?

   3.8 km/hr

   $y = T(s)$
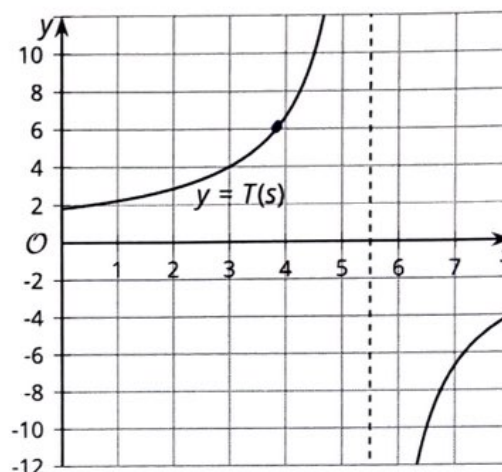
2. A cylindrical can needs to have a volume of 6 cubic inches. A label is to go around the side of the can. The function $S(r) = \frac{12}{r}$ gives the area of the label in square inches where r is the radius of the can in inches.

   a. As r gets closer and closer to 0, what does the behavior of the function tell you about the situation?

   $r \to 0$

   $S(r) = \frac{12}{r} \to +\infty$

   ∞

   the label's area increases without bound

   b. As r gets larger and larger, what does the end behavior of the function tell you about the situation?

3. What is the equation of the vertical asymptote for the graph of the rational function
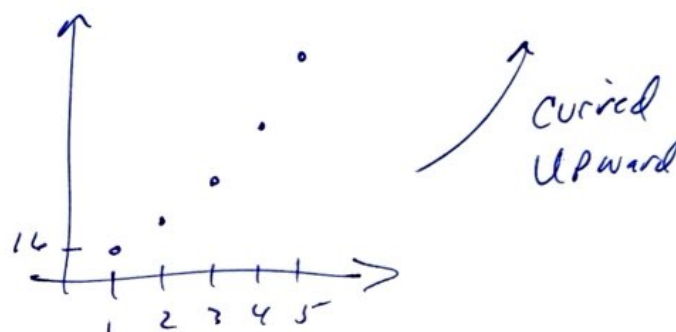
$g(x) = \frac{6}{x-1}$ $x = 1$

A. $x = 1$

B. $x = -1$

C. $x = 6$

D. $x = \frac{1}{6}$

4. A geometric sequence h starts at 16 and has a growth factor of 1.75. Sketch a graph of h showing the first 5 terms.
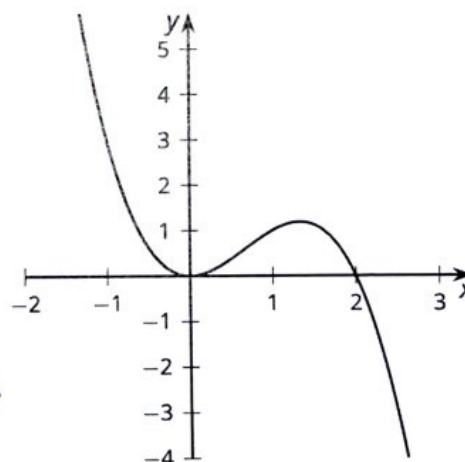
curved upward

(From Unit 1, Lesson 7.)

5. Is this the graph of $g(x) = -x^2(x-2)$ or $h(x) = x^2(x-2)$? Explain how you know.

negative leading coefficient because it is flipped

$x \to +\infty, y \to -\infty$
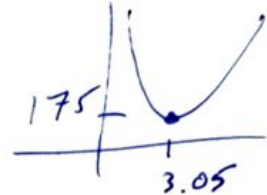
eg.

(From Unit 2, Lesson 10.)

$$V = \pi r^2 h \quad, \quad h = \frac{V}{\pi r^2}$$

$$SA = 2\pi r h + 2\pi r^2$$

$$= \frac{2V}{r} + 2\pi r^2$$

6. *Technology required.* A 6 oz cylindrical can of tomato paste needs to have a volume of 178 cm³. The current can design uses a radius of 2.75 cm and a height of 7.5 cm. Use graphing technology to find a cylindrical design that would have less surface area so each can uses less metal.

$$SA = \frac{2(178)}{r} + 2\pi r^2$$

$$r = 3.05 \text{ cm}$$

(From Unit 2, Lesson 16.)

$$h = \frac{178}{\pi (3.05)^2} = 6.09 \text{ cm}$$

7. The surface area $S(r)$ in square units of a cylinder with a volume of 20 cubic units is a function of its radius r in units where $S(r) = 2\pi r^2 + \frac{40}{r}$. What is the surface area of a cylinder with a volume of 20 cubic units and a radius of 4 units?

(From Unit 2, Lesson 16.)

$$S(r)$$

$$S(4) = 2\pi(4^2) + \frac{40}{4}$$

$$= 32\pi + 20$$

$$= 120.53096\ldots$$

$$\approx 120.5 \text{ units}^2$$