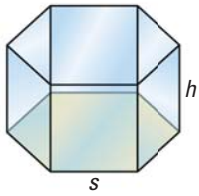
32. AQUARIUM DESIGN A manufacturer is designing an aquarium whose base is a regular hexagon. The aquarium should have a volume of 24 cubic feet and use the least amount of material possible. Let s be the length (in feet) of a side of the base, and let h be the height (in feet).



a. Write an equation that gives h in terms of s. (*Hint:* The volume of the aquarium is given by $V = \frac{3\sqrt{3}}{2}s^2h$.)

b. Find the dimensions s and h that minimize the amount of material used. (*Hint:* The surface area of the aquarium is given by $S = \frac{3\sqrt{3}}{2}s^2 + 6sh$.)

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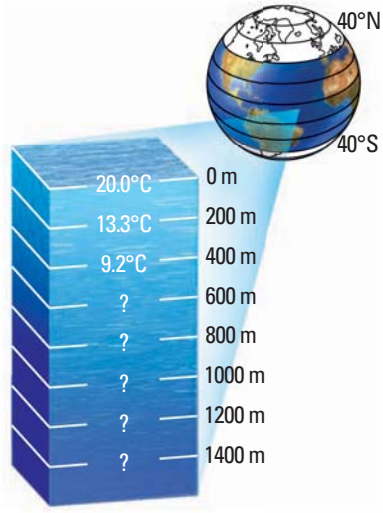
33. MULTIPLE REPRESENTATIONS The mean temperature T (in degrees Celsius) of the Atlantic Ocean between latitudes 40°N and 40°S can be modeled by

$$T = \frac{17{,}800d + 20{,}000}{3d^2 + 740d + 1000}$$

where d is the depth (in meters).



a. Making a Table Make a table of values showing the mean temperature for depths from 1000 meters to 1300 meters in 50 meter intervals.

b. Using a Graph Graph the model. Use your graph to estimate the depth at which the mean temperature is 4°C.

34. MULTI-STEP PROBLEM From 1993 to 2002, the number n (in billions) of shares of stock sold on the New York Stock Exchange can be modeled by

$$n = \frac{1054t + 6204}{-6.62t + 100}$$

where t is the number of years since 1993.

a. Graph the model.

b. *Describe* the general trends shown by the graph.

c. Estimate the year when the number of shares of stock sold was first greater than 100 billion.

35. TAKS REASONING The acceleration due to gravity g (in meters per second squared) changes as altitude changes and is given by the function

$$g = \frac{3.99 \times 10^{14}}{h^2 + (1.28 \times 10^7)h + (4.07 \times 10^{13})}$$

where h is the altitude (in meters) above sea level.

This spacecraft reached an altitude of 112 km in 2004.

a. Graph Graph the function.

b. Apply A mountaineer is climbing to a height of 8000 meters. What is the value of g at this altitude?

c. Apply A spacecraft reaches an altitude of 112 kilometers above Earth. What is the value of g at this altitude?

d. Explain *Describe* what happens to the value of g as altitude increases.

= WORKED-OUT SOLUTIONS on p. WS1 = TAKS PRACTICE AND REASONING = MULTIPLE REPRESENTATIONS