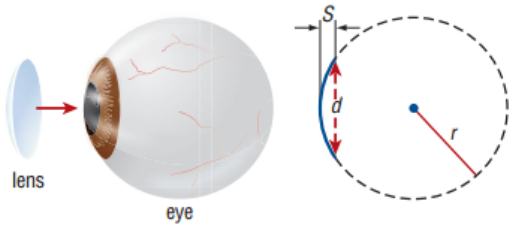
OPTICS A contact lens with the appropriate depth ensures proper fit and oxygen permeation. The depth of a lens can be calculated using the formula $S = r - \sqrt{r^2 - \left(\frac{d}{2}\right)^2}$, where S is the depth, r is the radius of curvature, and d is the diameter, with all units in millimeters.



1. If the depth of the contact lens is 1.15 millimeters and the radius of curvature is 7.50 millimeters, what is the diameter of the contact lens?
2. If the depth of the contact lens is increased by 0.1 millimeter and the diameter of the lens is 8.2 millimeters, what radius of curvature would be required?
3. If the radius of curvature remains constant, does the depth of the contact lens increase or decrease as the diameter increases?

WEATHER The wind chill temperature is the apparent temperature felt on exposed skin, taking into account the effect of the wind. The table shows the wind chill temperature produced at winds of various speeds when the actual temperature is 50°F. (Example 4)

Wind Speed (mph)	Wind Chill (°F)
5	48.22
10	46.04
15	44.64
20	43.60
25	42.76
30	42.04
35	41.43
40	40.88

4. Determine a power function to model the data.
5. Use the function to predict the wind chill, to the nearest tenth degree, when the wind speed is 65 miles per hour.

- $\sqrt[4]{(4x + 164)^3} + 36 = 100$
- $7 + \sqrt{(-36 - 5x)^5} = 250$
- $\sqrt{6x - 11} + 4 = \sqrt{12x + 1}$

Describe the end behavior of each function without making a table of values or graphing.

5. $f(x) = -2x^3 + 4x$ **6.** $f(x) = 5x^4 + 3$ **7.** $f(x) = -x^5 + 2x - 4$

8. $g(x) = 6x^6 - 2x^2 + 10x$ **9.** $g(x) = 3x - 4x^4$ **10.** $h(x) = 6x^2 - 3x^3 - 2x^6$

State the number of possible real zeros and turning points of each function. Then determine all of the real zeros by factoring. (Examples 3–5)

. $f(x) = x^6 - 8x^5 + 12x^4$

. $f(x) = x^4 - 4x^3 - 32x^2$

. $f(x) = 4x^8 + 16x^4 + 12$

. $f(x) = 6x^5 - 150x^3$

. $f(x) = 3x^5 + 11x^4 - 20x^3$

Determine the zeros and state the multiplicity of any repeated zeros:

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

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

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

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

. $f(x) = x^5 + 3x^4 - 10x^3$

SCULPTING Esteban will use a block of clay that is 3 feet by 4 feet by 5 feet to make a sculpture. He wants to reduce the volume of the clay by removing the same amount from the length, the width, and the height.

a. Write a polynomial function to model the situation.

b. He wants to reduce the volume of the clay to three fifths of the original volume. Write a polynomial function to model the situation.

c. How much should he take from each dimension?

Use the Factor Theorem to determine if the binomials given are factors of $f(x)$. Use the binomials that are factors to write a factored form of $f(x)$. (Lesson 2-3) **23–24. See margin.**

23. $f(x) = x^3 + 2x^2 - 25x - 50$; $(x + 5)$

24. $f(x) = x^4 - 6x^3 + 7x^2 + 6x - 8$; $(x - 1)$, $(x - 2)$

MULTIPLE CHOICE Find the remainder when $f(x) = x^3 - 4x + 5$ is divided by $x + 3$. (Les

F −10 **H** 20

G 8 **J** 26