

**5.2.D2 ~ Power Functions & Variation**

Write a power function representing the verbal statement. Use  $k$  for the constant of variation if one is not given.

1. If all men had identical body types, their weight,  $w$ , would vary directly as the cube of their height,  $h$ .
2. The average number of daily phone calls,  $C$ , between two cities varies jointly as the product of their populations,  $P_1$  and  $P_2$ , and inversely as the square of the distance,  $d$ , between them.
3. The area  $A$  of an equilateral triangle varies directly as the square of the length  $s$  of its sides.
4. A quantity  $W$  is inversely proportional to the square root of the quantity  $n$ .
5. The volume  $V$  of a circular cylinder with fixed height is directly proportional to the square of its radius  $r$ .

Write the initial equation, using  $k$  as the constant proportionality and then find the value of  $k$ . Write the new variation equation and use it to solve the problem.

6. The number of centimeters,  $W$ , of water produced from melting snow varies directly as  $S$ , the number of centimeters of snow. Meteorologists have found that 150 centimeters of snow will melt to 16.8 centimeters of water. How many centimeters of water will 200 centimeters of snow melt?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

7. The distance,  $s$ , that a body falls from rest varies directly as the square of the time,  $t$ , of the fall. If skydivers fall 64 feet in 2 seconds, how far will they fall in 4.5 seconds?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

8. The weight,  $w$ , of a great white shark varies directly as the cube of its length,  $l$ . A great white shark caught off Catalina Island, California, was 15 feet long and weighed 2025 pounds. What was the weight of the 25-foot-long shark in the novel *Jaws*?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

9. The length,  $l$ , of a violin string varies inversely as the frequency of its vibrations,  $f$ . A violin string 8 inches long vibrates at a frequency of 640 cycles per second. What is the frequency of a 10-inch string?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

10. The time  $t$  required to empty a tank varies inversely as the rate  $r$  of pumping. If a pump can empty a tank in 45 minutes at the rate of 600 kL/min, how long will it take the pump to empty the same tank at the rate of 1000 kL/min?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

11. Kinetic energy,  $E$ , varies jointly as the mass,  $m$ , and the square of the velocity,  $v$ . A mass of 8 grams and velocity of 3 centimeters per second has a kinetic energy of 36 ergs. Find the kinetic energy for a mass of 4 grams and velocity of 6 centimeters per second.

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION

12. The time,  $t$ , required to assemble computers varies directly as the number of computers assembled,  $c$ , and inversely as the number of workers,  $w$ . If 30 computers can be assembled by 6 workers in 10 hours, how long would it take 5 workers to assemble 40 computers?

INITIAL EQUATION

CONSTANT OF PROPORTIONALITY

NEW EQUATION

SOLUTION