

1.7 Practice - Variation

Write the formula that expresses the relationship described

1. c varies directly as a
2. x is jointly proportional to y and z
3. w varies inversely as x
4. r varies directly as the square of s
5. f varies jointly as x and y
6. j is inversely proportional to the cube of m
7. h is directly proportional to b
8. x is jointly proportional with the square of a and the square root of b
9. a is inversely proportional to b

Find the constant of variation and write the formula to express the relationship using that constant

10. a varies directly as b and $a = 15$ when $b = 5$
11. p is jointly proportional to q and r and $p = 12$ when $q = 8$ and $r = 3$
12. c varies inversely as d and $c = 7$ when $d = 4$
13. t varies directly as the square of u and $t = 6$ when $u = 3$
14. e varies jointly as f and g and $e = 24$ when $f = 3$ and $g = 2$
15. w is inversely proportional to the cube of x and w is 54 when $x = 3$
16. h is directly proportional to j and $h = 12$ when $j = 8$
17. a is jointly proportional with the square of x and the square root of y and $a = 25$ when $x = 5$ and $y = 9$
18. m is inversely proportional to n and $m = 1.8$ when $n = 2.1$

Solve each of the following variation problems by setting up a formula to express the relationship, finding the constant, and then answering the question.

19. The electrical current, in amperes, in a circuit varies directly as the voltage. When 15 volts are applied, the current is 5 amperes. What is the current when 18 volts are applied?
20. The current in an electrical conductor varies inversely as the resistance of the conductor. If the current is 12 ampere when the resistance is 240 ohms, what is the current when the resistance is 540 ohms?
21. Hooke's law states that the distance that a spring is stretched by hanging object varies directly as the mass of the object. If the distance is 20 cm when the mass is 3 kg, what is the distance when the mass is 5 kg?
22. The volume of a gas varies inversely as the pressure upon it. The volume of a gas is 200 cm^3 under a pressure of 32 kg/cm^2 . What will be its volume under a pressure of 40 kg/cm^2 ?
23. The number of aluminum cans used each year varies directly as the number of people using the cans. If 250 people use 60,000 cans in one year, how many cans are used each year in Dallas, which has a population of 1,008,000?
24. The time required to do a job varies inversely as the number of people working. It takes 5hr for 7 bricklayers to build a park well. How long will it take 10 bricklayers to complete the job?
25. According to Fidelity Investment Vision Magazine, the average weekly allowance of children varies directly as their grade level. In a recent year, the average allowance of a 9th-grade student was 9.66 dollars per week. What was the average weekly allowance of a 4th-grade student?
26. The wavelength of a radio wave varies inversely as its frequency. A wave with a frequency of 1200 kilohertz has a length of 300 meters. What is the length of a wave with a frequency of 800 kilohertz?
27. The number of kilograms of water in a human body varies directly as the mass of the body. A 96-kg person contains 64 kg of water. How many kilograms of water are in a 60-kg person?
28. The time required to drive a fixed distance varies inversely as the speed. It takes 5 hr at a speed of 80 km/h to drive a fixed distance. How long will it take to drive the same distance at a speed of 70 km/h?
29. The weight of an object on Mars varies directly as its weight on Earth. A person weighs 95lb on Earth weighs 38 lb on Mars. How much would a 100-lb person weigh on Mars?
30. At a constant temperature, the volume of a gas varies inversely as the pressure. If the pressure of a certain gas is 40 newtons per square meter when the volume is 600 cubic meters what will the pressure be when the volume is

reduced by 240 cubic meters?

31. The time required to empty a tank varies inversely as the rate of pumping. If a pump can empty a tank in 45 min 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?
32. The weight of an object varies inversely as the square of the distance from the center of the earth. At sea level (6400 km from the center of the earth), an astronaut weighs 100 lb. How far above the earth must the astronaut be in order to weigh 64 lb?
33. The stopping distance of a car after the brakes have been applied varies directly as the square of the speed r . If a car, traveling 60 mph can stop in 200 ft, how fast can a car go and still stop in 72 ft?
34. The drag force on a boat varies jointly as the wetted surface area and the square of the velocity of a boat. If a boat going 6.5 mph experiences a drag force of 86 N when the wetted surface area is 41.2 ft^2 , how fast must a boat with 28.5 ft^2 of wetted surface area go in order to experience a drag force of 94N?
35. The intensity of a light from a light bulb varies inversely as the square of the distance from the bulb. Suppose intensity is 90 W/m^2 (watts per square meter) when the distance is 5 m. How much further would it be to a point where the intensity is 40 W/m^2 ?
36. The volume of a cone varies jointly as its height, and the square of its radius. If a cone with a height of 8 centimeters and a radius of 2 centimeters has a volume of 33.5 cm^3 , what is the volume of a cone with a height of 6 centimeters and a radius of 4 centimeters?
37. The intensity of a television signal varies inversely as the square of the distance from the transmitter. If the intensity is 25 W/m^2 at a distance of 2 km, how far from the transmitter are you when the intensity is 2.56 W/m^2 ?
38. The intensity of illumination falling on a surface from a given source of light is inversely proportional to the square of the distance from the source of light. The unit for measuring the intensity of illumination is usually the foot-candle. If a given source of light gives an illumination of 1 foot-candle at a distance of 10 feet, what would the illumination be from the same source at a distance of 20 feet?



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Answers - Variation

1) $\frac{c}{a} = k$

2) $\frac{x}{yz} = k$

3) $wx = k$

4) $\frac{r}{s^2} = k$

5) $\frac{f}{xy} = k$

6) $jm^3 = k$

7) $\frac{h}{b} = k$

8) $\frac{x}{a\sqrt[3]{b}} = k$

9) $ab = k$

10) $\frac{a}{b} = 3$

11) $\frac{P}{rq} = 0.5$

12) $cd = 28$

13) $\frac{t}{u^2} = 0.67$

14) $\frac{e}{fg} = 4$

15) $wx^3 = 1458$

16) $\frac{h}{j} = 1.5$

17) $\frac{a}{x\sqrt[2]{y}} = 0.33$

18) $mn = 3.78$

19) 6 k

20) 5.3 k

21) 33.3 cm

22) 160 kg/cm³

23) 241,920,000 cans

24) 3.5 hours

25) 4.29 dollars

26) 450 m

27) 40 kg

28) 5.7 hr

29) 40 lb

30) 100 N

31) 27 min

32) 1600 km

33) $r = 36$

34) 8.2 mph

35) 2.5 m

36) $V = 100.5 \text{ cm}^3$

37) 6.25 km

38) $I = 0.25$



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