

Study Tips

- Get in a habit of checking your work. Don't look in the back of the book for the answer until after you have checked your work.
- You will not always have an answer section for your problems.

Reading and Writing After reading this section, write out the answers to these questions. Use complete sentences.

1. What does it mean to say that y varies directly as x ?
2. What is a variation constant?
3. What does it mean to say that y is inversely proportional to x ?
4. What does it mean to say that y varies jointly as x and z ?

1 Direct, Inverse, and Joint Variation

Write a formula that expresses the relationship described by each statement. Use k for the constant in each case. See Example 1.

5. T varies directly as h .
6. m varies directly as p .
7. y varies inversely as r .
8. u varies inversely as n .
9. R is jointly proportional to t and s .
10. W varies jointly as u and v .
11. i is directly proportional to b .
12. p is directly proportional to x .
13. A is jointly proportional to y and m .
14. t is inversely proportional to e .

2 Finding the Variation Constant

Find the variation constant, and write a formula that expresses the indicated variation. See Example 2.

15. y varies directly as x , and $y = 5$ when $x = 3$.
16. m varies directly as w , and $m = \frac{1}{2}$ when $w = \frac{1}{4}$.
17. A varies inversely as B , and $A = 3$ when $B = 2$.
18. c varies inversely as d , and $c = 5$ when $d = 2$.

19. m varies inversely as p , and $m = 22$ when $p = 9$.



20. s varies inversely as v , and $s = 3$ when $v = 4$.

21. A varies jointly as t and u , and $A = 24$ when $t = 6$ and $u = 2$.

22. N varies jointly as p and q , and $N = 720$ when $p = 3$ and $q = 2$.



23. T varies directly as u , and $T = 9$ when $u = 2$.

24. R varies directly as p , and $R = 30$ when $p = 6$.

3 Applications

Solve each variation problem. See Examples 3–5.

25. Y varies directly as x , and $Y = 100$ when $x = 20$. Find Y when $x = 5$.

26. n varies directly as q , and $n = 39$ when $q = 3$. Find n when $q = 8$.

27. a varies inversely as b , and $a = 3$ when $b = 4$. Find a when $b = 12$.

28. y varies inversely as w , and $y = 9$ when $w = 2$. Find y when $w = 6$.



29. P varies jointly as s and t , and $P = 56$ when $s = 2$ and $t = 4$. Find P when $s = 5$ and $t = 3$.

30. B varies jointly as u and v , and $B = 12$ when $u = 4$ and $v = 6$. Find B when $u = 5$ and $v = 8$.

31. **Aluminum flatboat.** The weight of an aluminum flatboat varies directly with the length of the boat. If a 12-foot boat weighs 86 pounds, then what is the weight of a 14-foot boat?

32. **Christmas tree.** The price of a Christmas tree varies directly with the height. If a 5-foot tree costs \$20, then what is the price of a 6-foot tree?

33. **Sharing the work.** The time it takes to erect the big circus tent varies inversely as the number of elephants working on the job. If it takes four elephants 75 minutes, then how long would it take six elephants?