

Practice 9-1

Inverse Variation

Each ordered pair is from an inverse variation. Find the constant of variation.

$$K = x \cdot y$$

1. $(3, \frac{1}{3})$ $K = 3 \cdot \frac{1}{3} = 1$ $K=1$
2. $(0.2, 6)$ $K = (0.2)(6) = 1.2$ $K=1.2$
3. $(10, 5)$ $K = 50$ $K=50$
4. $(\frac{5}{7}, \frac{2}{5})$ $K = \frac{5}{7} \cdot \frac{2}{5} = \frac{2}{7}$ $K = \frac{2}{7}$
5. $(3.5, 1.2)$ $K = 4.2$ $K=4.2$

Suppose that x and y vary inversely. Write a function that models each inverse variation.

6. $x = 7$ when $y = 2$
 1st: Find $K = x \cdot y$
 $K = 7 \cdot 2 = 14$
 2nd: Plug K into $y = \frac{K}{x}$
 $y = \frac{14}{x}$
7. $x = 4$ when $y = 9$
8. $x = -3$ when $y = 8$
9. $x = 5$ when $y = -6$
 $K = 5(-6) = -30$
 $y = \frac{-30}{x}$
10. $x = 1$ when $y = 0.8$
 $y = \frac{0.8}{x}$
11. $x = -4$ when $y = -2$
 $y = \frac{8}{x}$
12. $x = \frac{3}{5}$ when $y = 5$
 $K = \frac{3}{5} \cdot 5 = 3$
 $y = \frac{3}{x}$
13. $x = 3$ when $y = 2.1$
 $y = \frac{6.3}{x}$
14. $x = -\frac{1}{3}$ when $y = \frac{9}{10}$
 $y = \frac{-0.3}{x}$

Describe the combined variation that is modeled by each formula.

15. $I = \frac{120}{R}$
 I varies inversely with R .
16. $A = \frac{1}{2}bh$
 A varies jointly with b and h .
17. $h = \frac{3V}{B}$
 h varies directly with V and inversely with B .
18. $V = \frac{4}{3}\pi r^3$
 V varies directly with the cube of r .

Each pair of values is from an inverse variation. Find the missing value.

$$x \cdot y = x \cdot y$$

19. $(2, 4)$ and $(6, y)$
 $2 \cdot 4 = 6 \cdot y$
 $8 = 6y$
 $\frac{8}{6} = \frac{6y}{6}$
 $\frac{4}{3} = y$
20. $(\frac{1}{3}, 6)$ and $(x, -\frac{1}{2})$
 $\frac{1}{3} \cdot 6 = x \cdot -\frac{1}{2}$
 $(-\frac{2}{1})2 = x \cdot -\frac{1}{2}(-\frac{2}{1})$
 $-4 = x$
21. $(1.2, 4.5)$ and $(2.7, y)$
 $y = 2$

Suppose that x and y vary inversely. Write a function that models each inverse variation, and find y when $x = 8$.

22. $x = 4$ when $y = 2$

$$K = 4(2) = 8$$

$$y = \frac{8}{x}$$

$$y = \frac{8}{8} = 1$$

23. $x = -3$ when $y = \frac{1}{3}$

$$K = -3\left(\frac{1}{3}\right) = -1$$

$$y = -\frac{1}{x}$$

$$y = -\frac{1}{8}$$

24. $x = 6$ when $y = 1.2$

Write the function that models each relationship. Find z when $x = 6$ and $y = 4$.

25. z varies jointly with x and y . When $x = 7$ and $y = 2$, $z = 28$.

$$z = Kxy$$

$$\frac{28}{14} = \frac{K \cdot 7 \cdot 2}{14} \quad K = 2$$

② plug the #s in and find K

3rd:

$$z = 2xy$$

$$z = 2 \cdot 6 \cdot 4$$

$$z = 48$$

26. z varies directly with x and inversely with the cube of y . When $x = 8$ and $y = 2$, $z = 3$.

$$z = \frac{Kx}{y^3}$$

Is the relationship between the values in each table a direct variation, an inverse variation, or neither? Write equations to model the direct and inverse variations.

27.

x	2	4	5	20
y	10	5	4	1

$$K = xy$$

$$2 \cdot 10 = 20$$

$$4 \cdot 5 = 20$$

$$5 \cdot 4 = 20$$

$$20 \cdot 1 = 20$$

Inverse

$$y = \frac{K}{x}$$

$$y = \frac{20}{x}$$

28.

x	1	3	7	10
y	2	8	20	29

neither

$$\frac{y}{x} = k$$

Direct $y \div x$

29.

x	1	2	5	7
y	6	12	30	42

Divide Direct $K = 6$

$$6 \div 1 = 6$$

$$12 \div 2 = 6$$

$$30 \div 5 = 6$$

$$42 \div 7 = 6$$

Direct

$$y = Kx$$

$$y = 6x$$

30.

$y \div x$ Direct

x	0.2	0.5	2	3
y	25	62.5	150	375

$$y = 125x$$

$$25 \div 0.2 = 125$$

$$62.5 \div 0.5 = 125$$

$$150 \div 2 = 125$$

$$375 \div 3 = 125$$

31.

x	0.1	0.5	1.5	2
y	31	7	3	2.5

neither

32.

x	3	1.5	0.5	0.3
y	5	10	30	50

Inverse

$$K = 5 \cdot 3 = 15$$

$$K = 10(1.5) = 15$$

$$K = 30(0.5) = 15$$

$$K = 50(0.3) = 15$$

$$y = \frac{15}{x}$$

① write the eq.

Day 15

9.1 Inverse Variation

Ch. 2: Direct Variation

Constant \rightarrow $K = \frac{y}{x}$
OF variation

the ratio
is constant

Linear
Equation

$$y = Kx$$

Function that models
direct variation

Ch. 9 Inverse Variation

constant \rightarrow $K = xy$
OF variation

the product is
constant

Function

$$y = \frac{K}{x}$$

Joint & Other Variations

it's possible for 3 or more variables
to be related.

① $z = K \cdot xy$

"z varies jointly with
x & y."

② $z = \frac{Kxy}{w}$

z varies jointly with x & y
and inversely with w.

③ $z = \frac{Kx}{wy}$

z varies directly with x
and inversely with the
product of w & y.

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P.1. Linear Variations

Linear

Ch. 2 Direct Variations

Constant $\cdot x = y$
 $\frac{y}{x} = k$
 $y = kx$

of variation of the ratio
 is constant

Ch. 3 Inverse Variations

Constant $\cdot x = \frac{1}{y}$
 $\frac{1}{y} = \frac{k}{x}$
 $y = \frac{x}{k}$

The product is
 constant

Joint & Inverse Variations

It is possible for 3 or more variables
 to be related

(1) $y = kxz$
 Direct variation with x and z
 Inverse variation with y

(2) $y = \frac{kxz}{w}$
 Direct variation with x and z
 Inverse variation with y and w

(3) $y = \frac{kx}{z}$
 Direct variation with x
 Inverse variation with z
 Inverse variation with y