# Homework: Inverse, Joint, and Combined Variation

1. y varies jointly as x and z. If y = 5 when x = 3 and z = 4, find y when x = 6 and z = 8.

$y = kxz \rightarrow 5 = k(3)(4) \quad k = 5/12 \quad y = (5/12)(6)(8)$

$y = 20$

2. y varies jointly as x and z. If y = 12 when x = 4 and z = 3, find y when x = 9 and z = 8.

$y = kxz \quad 12 = k \cdot 4 \cdot 3 \quad k = 1 \quad y = (1)(9)(8) = 72$

3. y varies directly as x and inversely as z. If y = 12 when x = 2 and z = 4, find y when x = 6 and z = 8.

$y = k\frac{x}{z} \quad 12 = k\frac{2}{4} \quad 24 = k \quad y = (24)\frac{6}{8}$

$y = 18$

4. A varies jointly as b and h. If A = 16 when b = 2 and h = 8, find A when b = 8 and h = 16.

$A = k \cdot b \cdot h \quad 16 = k \cdot 2 \cdot 8 \quad 1 = k \quad A = (1)(8)(16) = 128$

5. The volume V of gas varies inversely to the pressure P. The volume of a gas is 200 $cm^3$ under pressure of 32 $kg/cm^2$. What will be its volume under pressure of 40 $kg/cm^2$?

$V = k/p \quad 200 = k/32 \quad 6400 = k \quad V = 6400/40$

$V = 160$

6. The time it takes to fly from Los Angeles to New York varies inversely as the speed of the plane. If the trip takes 6 hours at 900 km/h, how long would it take at 800 km/h?

$\frac{6}{y} = \frac{900}{800} \quad \frac{6}{y} = \frac{800}{900} \quad y = 6.75$

would take 6.75 hrs.

7. x varies directly as $y^3$ and inversely as z. If x = 7 when y = 2 and z = 4, find x when y = 3 and z = 9.

$x = k\frac{y^3}{z} \rightarrow 7 = k\frac{2^3}{4} \quad k = 7/2 \quad x = (7/2)\left(\frac{3^3}{9}\right)$

10.5

8. The number of girls varied directly as the number of boys and inversely as the number of teachers. When there were 50 girls, there were 20 teachers and 10 boys. How many boys were there when there were 10 girls and 100 teachers?

$g = k\frac{b}{t} \rightarrow 50 = k\frac{10}{20} \rightarrow k = 100 \quad 10 = (100)\frac{b}{100}$

$b = 10$

9. Strawberries varied jointly as plums and tomatoes. If 500 strawberries went with 4 plums and 25 tomatoes, how many plums would go with 40 strawberries and 2 tomatoes?

4

weird it's the same, but ok. the other answers just worked in a way that this couldn't.

10. Cheers varied jointly as the number of fans and the square of the jubilation factor. When there were 100 fans and jubilation factor was 4 there were 1000 cheers. How many cheers were there when there were only 10 fans whose jubilation factor was 20?

$C = kf \cdot j^2 \quad 1{,}000 = k \cdot 100 \cdot 4^2 \quad k = .625$

squared!

$C = .625 \cdot 10 \cdot 20^2$

$= 2500$

11. Blues varied directly as greens and inversely as whites squared. If there were 3 greens when there were 4 blues and 2 whites, how many greens were required for 2 blues and 4 whites?

$B = k\frac{g}{w^2} \quad 4 = k\frac{3}{2^2} \quad 4 = \frac{3}{4}k \quad 5.33 = k$

$2 = (5.33)\frac{g}{4^2} \quad 32 = 5.33g \quad 6 = g$

6 greens

* Turn over for 4 more *

$y = kx$ $y = k/x$

**Homework**

**Determine whether x and y show direct variation, inverse variation or neither; then identify constant of variation**

**1.**

| x | y |
|---|---|
| 1.5 | 40 |
| 2.5 | 24 |
| 4 | 15 |
| 7.5 | 8 |
| 10 | 6 |

inverse $k = yx$ $= 60$

**2.**

| x | y |
|---|---|
| 12 | 132 |
| 18 | 198 |
| 23 | 253 |
| 29 | 319 |
| 34 | 374 |

direct $k = y/x$ $= 11$

**3.**

| x | y |
|---|---|
| 4 | 16 |
| 5 | 11 |
| 6.2 | 10 |
| 7 | 9 |
| 11 | 6 |

neither not constant b/c no constant variation $k \neq yx$ for all

**4.**

| x | y |
|---|---|
| 4 | 21 |
| 6 | 14 |
| 8 | 10.5 |
| 8.4 | 10 |
| 12 | 7 |

inverse $k = yx$ $= 84$