

Foundation GCSE: Inverse Proportion

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. If y is inversely proportional to x , and $y = 4$ when $x = 3$, find the constant of proportionality k .
2. Using Q1, find y when $x = 6$.
3. If p is inversely proportional to q and $p = 10$ when $q = 2$, write the equation linking p and q .
4. Find q when $p = 5$ using the equation in Q3.
5. It takes 4 workers 6 days to paint a wall. How many days will 3 workers take at the same rate?
6. If $y \propto \frac{1}{x^2}$ and $y = 2$ when $x = 3$, find y when $x = 2$.
7. Check if y and x are inversely proportional given pairs: $(2, 30)$, $(4, 15)$, $(5, 12)$. State yes/no and reason.
8. Speed s and travel time t are inversely proportional. A journey takes 3 hours at 60 km/h. How long at 90 km/h?
9. If $m \propto \frac{1}{\sqrt{n}}$ and $m = 3$ when $n = 4$, find m when $n = 9$.
10. If $y = \frac{24}{x}$, find the value of x when $y = 1.5$.
11. Describe the graphical shape of an inverse proportion relationship on a Cartesian plane.
12. 12 pipes can fill a tank in 4 hours. How many pipes are needed to fill the tank in 3 hours?
13. If a is inversely proportional to b , and $ab = 60$, find a when $b = 12$.
14. Gas pressure P is inversely proportional to volume V . If $P = 120$ when $V = 3$, find P when $V = 4$.
15. If $z \propto \frac{1}{w^3}$ and $z = 2$ when $w = 3$, find z when $w = 1$.
16. 8 machines take 15 hours to complete a run. How many hours would 6 machines take?
17. If y is inversely proportional to x , and $y = 8$ when $x = 0.5$, find the constant k .
18. Using Q17, find x when $y = 20$.
19. A gear with 20 teeth turns at 300 rpm, meshed with another gear turning at 400 rpm. How many teeth does it have?
20. If $y \times x^3 = 40$ and $x = 2$, find y .

Answers & Worked Solutions

1. $12 - k = xy = 4 \times 3 = 12$.
2. $2 - y = 12/6 = 2$.
3. $pq = 20$ (or $p = \frac{20}{q}$) – $10 \times 2 = 20$.
4. $4 - q = 20/5 = 4$.
5. 8 days – Total worker-days = $4 \times 6 = 24$; $24/3 = 8$.
6. $4.5 - k = 2 \times 9 = 18$; $18/4 = 4.5$.
7. Yes – Product xy is constant (60) for all pairs.
8. 2 hours – Distance = 180 km; $180/90 = 2$.
9. $2 - k = 3 \times \sqrt{4} = 6$; $6/\sqrt{9} = 2$.
10. $16 - x = 24/1.5 = 16$.
11. A hyperbola curve in the first quadrant approaching axes asymptotically.
12. 16 pipes – Total pipe-hours = 48; $48/3 = 16$.
13. $5 - a = 60/12 = 5$.
14. $90 - k = 360$; $360/4 = 90$.
15. $54 - k = 2 \times 27 = 54$; $54/1^3 = 54$.
16. 20 hours – Total machine-hours = 120; $120/6 = 20$.
17. $4 - k = 8 \times 0.5 = 4$.
18. $0.2 - x = 4/20 = 0.2$.
19. 15 teeth – $20 \times 300 = T_2 \times 400 \implies T_2 = 15$.
20. $5 - y(2^3) = 40 \implies 8y = 40 \implies y = 5$.