

Foundation GCSE: Direct 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 directly proportional to x , and $y = 12$ when $x = 3$, find the constant of proportionality k .
2. Using Q1, find y when $x = 7$.
3. If $m \propto n$ and $m = 30$ when $n = 5$, write the equation linking m and n .
4. Find n when $m = 54$ using the equation in Q3.
5. The cost of apples C is directly proportional to weight w . If 2 kg cost 6, find the cost of 5 kg.
6. If a is directly proportional to b^2 , and $a = 48$ when $b = 4$, find a when $b = 3$.
7. Check if y and x are in direct proportion given pairs: (2, 6), (4, 12), (5, 15). State yes/no and reason.
8. The extension of a spring e is directly proportional to load W . If 15 N produces 3 cm, find extension for 40 N.
9. If $p \propto \sqrt{q}$ and $p = 20$ when $q = 16$, find p when $q = 25$.
10. A recipe requires 250 g of flour for 6 cakes. How much flour is needed for 15 cakes?
11. If $y = kx$ passes through (6, 42), find k .
12. Using Q11, find the value of x when $y = 84$.
13. Describe the graphical appearance of a direct proportion relationship on a Cartesian plane.
14. The weight of a metal bar is directly proportional to length. A 20 cm bar weighs 800 g. Find weight of a 35 cm bar.
15. If $z \propto w^3$ and $z = 192$ when $w = 4$, find the constant of proportionality.
16. Using Q15, find z when $w = 3$.
17. If $A \propto r^2$, and $A = 78.5$ when $r = 5$, find A when $r = 10$ (using $\pi \approx 3.14$).
18. If 5 workers generate 300 units at a proportional rate, how many units do 8 workers generate?
19. Given $y \propto x$ with $y = 15$ at $x = 4$, find the percentage increase in y when x increases by 20%.
20. Solve for x given $y = kx$, where $y = 45$, $k = 3.5$, giving your answer to 2 decimal places.

Answers & Worked Solutions

1. $4 - k = y/x = 12/3 = 4$.
2. $28 - y = 4(7) = 28$.
3. $m = 6n - k = 30/5 = 6$.
4. $9 - n = 54/6 = 9$.
5. $15 - \text{Cost per kg} = 3; 5 \times 3 = 15$.
6. $27 - a = kb^2 \implies 48 = k(16) \implies k = 3;$
 $3(3^2) = 27$.
7. Yes – Ratio y/x is constant (3 in all cases).
8. $8 \text{ cm} - e = 0.2W \implies 0.2(40) = 8$.
9. $25 - p = 5\sqrt{q} \implies 5\sqrt{25} = 25$.
10. $625 \text{ g} - 250 \times (15/6) = 625$.
11. $7 - k = 42/6 = 7$.
12. $12 - 84 = 7x \implies x = 12$.
13. A straight line passing through the origin (0, 0) with positive gradient.
14. $1400 \text{ g (or 1.4 kg)} - 35 \times (800/20) = 1400$.
15. $3 - z = kw^3 \implies 192 = 64k \implies k = 3$.
16. $81 - z = 3(3^3) = 81$.
17. $314 - A = 3.14r^2 \implies 3.14(10^2) = 314$.
18. $480 \text{ units} - \text{Unit rate is } 60 \text{ units/worker}; 8 \times 60 = 480$.
19. 20% – Direct proportion preserves percentage changes.
20. $12.86 - x = 45/3.5 \approx 12.86$.