

GCSE Foundation Mathematics

Practice Test 9: Ratio, Proportion, and Rates of Change

Instructions:

Answer all questions. Show your working clearly.

Calculators may be used unless stated otherwise.

Time allowed: 90 minutes

Section A: Basic Ratios

1. Simplify these ratios:

(a) 32 : 48

(b) 27 : 54

(c) 42 : 63

(d) 16 : 24 : 32

2. Write these ratios in the form 1 : n :

(a) 5 : 40

(b) 7 : 49

(c) 8 : 56

(d) 9 : 81

3. Write these ratios in the form n : 1:

(a) 64 : 8

(b) 75 : 15

(c) 84 : 12

(d) 95 : 19

4. Express these as ratios:

(a) 65p to £3.90

(b) 125cm to 2.5m

(c) 42 minutes to 3.5 hours

(d) 750g to 4.5kg

5. A box contains green and yellow balls in the ratio 6 : 7. If there are 42 green balls, how many yellow balls are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:
- (a) £165 in the ratio 8 : 3
 - (b) £540 in the ratio 5 : 7 : 12
 - (c) £720 in the ratio 7 : 5
 - (d) £896 in the ratio 4 : 7 : 9 : 12
7. Kate and Mike share £168 in the ratio 3 : 4. How much does each person get?
8. Five friends share dinner costs totalling £150. Alex pays £28, Beth pays £32, Carl pays £26, Dana pays £35, and Emma pays the rest. What is the ratio of their payments?
9. A pewter alloy uses tin, antimony, and copper in the ratio 9 : 2 : 1. If 540g of tin is used, find the amounts of antimony and copper needed.
10. The sides of a nonagon are in the ratio 3 : 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11. If the perimeter is 189cm, find the length of each side.
11. A bird seed mix uses sunflower seeds, millet, and nyjer in the ratio 6 : 5 : 2. How much of each type is needed to make 520g of bird seed mix?

Section C: Direct Proportion

12. If 27 bananas cost £8.10, how much do 35 bananas cost?
13. 22 metres of wire cost £33. Find the cost of:
- (a) 28 metres of wire
 - (b) 15.5 metres of wire
 - (c) 34.5 metres of wire
14. A truck travels 450 miles on 20 litres of fuel. How far can it travel on:
- (a) 14 litres of fuel
 - (b) 28 litres of fuel
 - (c) 16 litres of fuel
15. 20 carpenters can build a deck in 12 days. How long would it take:
- (a) 16 carpenters to build the deck
 - (b) 30 carpenters to build the deck
 - (c) 24 carpenters to build the deck
16. v is directly proportional to w . When $w = 24$, $v = 96$. Find:
- (a) The value of v when $w = 32$
 - (b) The value of w when $v = 140$
 - (c) The constant of proportionality
17. The cost of shipping is directly proportional to the weight. If 340kg costs £85, find the cost of 460kg.

Section D: Inverse Proportion

18. It takes 14 gardeners 10 hours to plant a field. How long would it take:
- (a) 10 gardeners to plant the field
 - (b) 20 gardeners to plant the field
 - (c) 28 gardeners to plant the field
19. x is inversely proportional to y . When $y = 18$, $x = 24$. Find:
- (a) The value of x when $y = 24$
 - (b) The value of y when $x = 36$
 - (c) The constant of proportionality
20. The time for a race is inversely proportional to the speed. At 60 mph, a race takes 2 hours. How long would the race take at:
- (a) 40 mph
 - (b) 30 mph
 - (c) 80 mph
21. A construction site can be cleared by 15 bulldozers in 16 hours. How long would it take to clear using:
- (a) 12 bulldozers
 - (b) 20 bulldozers
 - (c) 24 bulldozers

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 85000. Find the real distance if the map distance is:
- (a) 11 cm
 - (b) 14.5 cm
 - (c) 19 cm
 - (d) 8.8 cm
23. A model ship is built to a scale of 1 : 56. If the real ship is 84m long, how long is the model?
24. On a map with scale 1 : 140000, two airports are 12cm apart. What is the actual distance between the airports in:
- (a) metres
 - (b) kilometres
25. A floor plan is enlarged by a scale factor of 4.5. If the original plan is 28cm by 32cm, find the dimensions of the enlargement.
26. A rhombus is enlarged by scale factor 9. If the original rhombus has an area of 14 cm^2 , what is the area of the enlargement?
27. A circle has a radius of 15cm. It is enlarged by scale factor 3.5. Find:
- (a) The radius of the enlargement
 - (b) The area of the original circle
 - (c) The area of the enlargement
 - (d) The ratio of the areas

Section F: Speed, Distance, and Time

28. Calculate the missing values:

- (a) Speed = 62 mph, Time = 5.5 hours, Distance = ?
- (b) Distance = 714 km, Time = 14 hours, Speed = ?
- (c) Distance = 945 miles, Speed = 63 mph, Time = ?
- (d) Speed = 42 m/s, Time = 18 seconds, Distance = ?

29. A submarine travels 168 miles in 5 hours 15 minutes. Calculate its average speed.

30. A cyclist cycles at an average speed of 18 mph. How far does the cyclist travel in:

- (a) 3 hours 20 minutes
- (b) 85 minutes
- (c) 4 hours 15 minutes

31. A car journey of 640 miles takes 11 hours. The first 384 miles are completed in 6.4 hours. Find:

- (a) The average speed for the whole journey
- (b) The average speed for the first part
- (c) The average speed for the second part

32. Convert these speeds:

- (a) 81 km/h to m/s
- (b) 38 m/s to km/h
- (c) 90 mph to km/h (use 1 mile = 1.6 km)
- (d) 176 km/h to mph

Section G: Density and Other Rates

33. Calculate the missing values using $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$:

- (a) Mass = 540g, Volume = 72 cm³, Density = ?
- (b) Density = 7.6 g/cm³, Volume = 95 cm³, Mass = ?
- (c) Mass = 608g, Density = 7.6 g/cm³, Volume = ?
- (d) Density = 9.2 g/cm³, Mass = 644g, Volume = ?

34. A glass sculpture has a volume of 280 cm³ and a mass of 714g. Calculate its density.

35. Lead has a density of 11.3 g/cm³. What is the mass of a lead pipe with volume 80 cm³?

36. Calculate these rates:

- (a) A bottling machine fills 228 bottles in 19 minutes. Find the rate in bottles per minute.
- (b) A scanner processes 672 documents in 12 minutes. Find the rate in documents per minute.
- (c) A bakery produces 5760 rolls in 18 hours. Find the rate in rolls per hour.

37. Gas flows from a tank at a rate of 17 litres per minute. How long will it take to release:

- (a) 221 litres of gas
- (b) 306 litres of gas
- (c) 187 litres of gas

38. The enrollment at a university increases at a rate of 750 students per year. If the current enrollment is 24,500, what will the enrollment be in:
- (a) 6 years
 - (b) 11 years
 - (c) 14 years

Section H: Problem Solving

39. A recipe for 28 people uses 1120g flour, 560g sugar, and 280g butter. Adapt the recipe for:
- (a) 21 people
 - (b) 36 people
 - (c) 45 people
40. The ratio of hardback to paperback books in a store is 3 : 11. If there are 99 hardback books, find:
- (a) The number of paperback books
 - (b) The total number of books
41. A helicopter uses 56 litres of fuel to travel 448 km. How much fuel is needed to travel 616 km?
42. Two quantities p and q are such that q is inversely proportional to the fourth power of p . When $p = 2$, $q = 120$. Find the value of q when $p = 3$.
43. A model tower is built to a scale of 1 : 240. If the height of the real tower is 120m, find the height of the model in centimetres.
44. Three business partners divide quarterly profits in the ratio 9 : 7 : 5. If the total profit is £126,000, how much does each partner receive?
45. A plaster mixture contains lime and sand in the ratio 3 : 11. If there are 880kg of sand, find:
- (a) The amount of lime
 - (b) The total mass of the plaster
46. A helicopter travels from the hospital to the accident site, a distance of 4200 km, in 4.5 hours. On the return journey, it takes 5.25 hours due to bad weather. Find:
- (a) The average speed from hospital to accident site
 - (b) The average speed from accident site to hospital
 - (c) The average speed for the whole round trip

Answer Space

Use this space for your working and answers.

END OF TEST

Total marks: 100

**For more resources and practice materials, visit:
stepupmaths.co.uk**