

GCSE Foundation Mathematics

Practice Test 2: 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) $8 : 12$
- (b) $15 : 20$
- (c) $28 : 42$
- (d) $21 : 35 : 49$

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

- (a) $3 : 18$
- (b) $5 : 25$
- (c) $4 : 28$
- (d) $6 : 30$

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

- (a) $14 : 2$
- (b) $21 : 3$
- (c) $32 : 4$
- (d) $45 : 5$

4. Express these as ratios:

- (a) 45p to £1.35
- (b) 60cm to 1.5m
- (c) 25 minutes to 1.5 hours
- (d) 400g to 2.4kg

5. A box contains green and yellow counters in the ratio $4 : 7$. If there are 28 green counters, how many yellow counters are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:
 - (a) £72 in the ratio 4 : 5
 - (b) £150 in the ratio 2 : 4 : 9
 - (c) £280 in the ratio 3 : 7
 - (d) £420 in the ratio 2 : 5 : 7
7. Sarah and Michael share £96 in the ratio 3 : 5. How much does each person get?
8. Four friends share the cost of a taxi fare totalling £36. David pays £8, Emma pays £12, Finn pays £6, and Grace pays the rest. What is the ratio of their payments?
9. A paint mixture uses red, blue, and white paint in the ratio 3 : 1 : 2. If 180ml of red paint is used, find the amounts of blue and white paint needed.
10. The sides of a triangle are in the ratio 5 : 7 : 8. If the perimeter is 60cm, find the length of each side.
11. A garden soil mix uses compost, sand, and clay in the ratio 3 : 2 : 1. How much of each material is needed to make 240kg of soil mix?

Section C: Direct Proportion

12. If 7 oranges cost £2.10, how much do 12 oranges cost?
13. 4 metres of ribbon cost £6. Find the cost of:
 - (a) 7 metres of ribbon
 - (b) 2.5 metres of ribbon
 - (c) 9.5 metres of ribbon
14. A motorbike travels 320 miles on 16 litres of fuel. How far can it travel on:
 - (a) 12 litres of fuel
 - (b) 25 litres of fuel
 - (c) 10 litres of fuel
15. 8 builders can complete a project in 6 days. How long would it take:
 - (a) 4 builders to complete the project
 - (b) 16 builders to complete the project
 - (c) 12 builders to complete the project
16. m is directly proportional to n . When $n = 6$, $m = 24$. Find:
 - (a) The value of m when $n = 9$
 - (b) The value of n when $m = 60$
 - (c) The constant of proportionality
17. The cost of gas is directly proportional to the number of units used. If 180 units cost £32.40, find the cost of 250 units.

Section D: Inverse Proportion

18. It takes 6 people 8 hours to harvest a field. How long would it take:
- (a) 4 people to harvest the field
 - (b) 12 people to harvest the field
 - (c) 16 people to harvest the field
19. s is inversely proportional to t . When $t = 8$, $s = 15$. Find:
- (a) The value of s when $t = 12$
 - (b) The value of t when $s = 20$
 - (c) The constant of proportionality
20. The time taken for a journey is inversely proportional to the speed. At 45 mph, a journey takes 4 hours. How long would the journey take at:
- (a) 60 mph
 - (b) 36 mph
 - (c) 30 mph
21. A swimming pool can be emptied by 4 pumps in 3 hours. How long would it take to empty the pool using:
- (a) 6 pumps
 - (b) 2 pumps
 - (c) 12 pumps

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 40000. Find the real distance if the map distance is:
- (a) 6 cm
 - (b) 9.5 cm
 - (c) 15 cm
 - (d) 3.5 cm
23. A model train is built to a scale of 1 : 87. If the real train is 26.1m long, how long is the model?
24. On a map with scale 1 : 20000, two villages are 12cm apart. What is the actual distance between the villages in:
- (a) metres
 - (b) kilometres
25. A drawing is reduced by a scale factor of 0.8. If the original drawing is 25cm by 20cm, find the dimensions of the reduction.
26. A square is enlarged by scale factor 4. If the original square has an area of 9 cm^2 , what is the area of the enlargement?
27. A rectangle has sides of 8cm and 12cm. It is enlarged by scale factor 1.5. Find:
- (a) The lengths of the sides of the enlargement
 - (b) The perimeter of the enlargement
 - (c) The area of the original rectangle
 - (d) The area of the enlargement

Section F: Speed, Distance, and Time

28. Calculate the missing values:

- (a) Speed = 45 mph, Time = 3.5 hours, Distance = ?
- (b) Distance = 350 km, Time = 4 hours, Speed = ?
- (c) Distance = 540 miles, Speed = 60 mph, Time = ?
- (d) Speed = 12 m/s, Time = 15 seconds, Distance = ?

29. A bus travels 240 miles in 3 hours 45 minutes. Calculate its average speed.

30. A runner travels at an average speed of 8 mph. How far does the runner travel in:

- (a) 1 hour 30 minutes
- (b) 45 minutes
- (c) 2 hours 15 minutes

31. A delivery van journey of 420 miles takes 7 hours. The first 240 miles are completed in 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) 54 km/h to m/s
- (b) 20 m/s to km/h
- (c) 50 mph to km/h (use 1 mile = 1.6 km)
- (d) 120 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 = 240g, Volume = 30 cm³, Density = ?
- (b) Density = 1.8 g/cm³, Volume = 50 cm³, Mass = ?
- (c) Mass = 210g, Density = 3.5 g/cm³, Volume = ?
- (d) Density = 7.2 g/cm³, Mass = 288g, Volume = ?

34. A metal block has a volume of 80 cm³ and a mass of 216g. Calculate its density.

35. Silver has a density of 10.5 g/cm³. What is the mass of a silver ring with volume 8 cm³?

36. Calculate these rates:

- (a) A hose fills a 60-litre tank in 4 minutes. Find the rate in litres per minute.
- (b) A printer produces 240 sheets in 4 minutes. Find the rate in sheets per minute.
- (c) A bakery makes 1800 loaves in 6 hours. Find the rate in loaves per hour.

37. Oil flows from a tank at a rate of 12 litres per minute. How long will it take to empty:

- (a) A 144-litre tank
- (b) A 300-litre tank

- (c) A 72-litre tank
38. The population of a city decreases at a rate of 180 people per year. If the current population is 28,500, what will the population be in:
- (a) 4 years
 - (b) 8 years
 - (c) 15 years

Section H: Problem Solving

39. A recipe for 8 people uses 320g flour, 160g butter, and 80g sugar. Adapt the recipe for:
- (a) 12 people
 - (b) 6 people
 - (c) 20 people
40. The ratio of cats to dogs in a shelter is 5 : 8. If there are 320 dogs, find:
- (a) The number of cats
 - (b) The total number of animals
41. A van uses 12 litres of diesel to travel 150 km. How much diesel is needed to travel 400 km?
42. Two quantities a and b are such that b is inversely proportional to the square of a . When $a = 3$, $b = 16$. Find the value of b when $a = 4$.
43. A model ship is built to a scale of 1 : 200. If the length of the real ship is 140m, find the length of the model in centimetres.
44. Three investors share profits in the ratio 4 : 5 : 6. If the total profit is £75,000, how much does each investor receive?
45. A fruit punch contains apple juice and cranberry juice in the ratio 5 : 2. If there are 400ml of apple juice, find:
- (a) The amount of cranberry juice
 - (b) The total volume of the punch
46. A coach travels from Manchester to London, a distance of 200 miles, in 4 hours. On the return journey, it takes 5 hours due to traffic. Find:
- (a) The average speed from Manchester to London
 - (b) The average speed from London to Manchester
 - (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