

GCSE Foundation Mathematics

Practice Test 1: 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) $6 : 9$
- (b) $12 : 16$
- (c) $25 : 35$
- (d) $18 : 24 : 30$

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

- (a) $4 : 12$
- (b) $3 : 15$
- (c) $5 : 20$
- (d) $2 : 14$

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

- (a) $8 : 2$
- (b) $15 : 3$
- (c) $20 : 4$
- (d) $12 : 3$

4. Express these as ratios:

- (a) 30p to £1.20
- (b) 40cm to 2m
- (c) 15 minutes to 2 hours
- (d) 250g to 1.5kg

5. A bag contains red and blue marbles in the ratio $3 : 5$. If there are 15 red marbles, how many blue marbles are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:
- (a) £48 in the ratio 3 : 5
 - (b) £120 in the ratio 2 : 3 : 7
 - (c) £200 in the ratio 4 : 6
 - (d) £350 in the ratio 3 : 4 : 7
7. Tom and Jerry share £84 in the ratio 5 : 7. How much does each person get?
8. Three friends share the cost of a meal totalling £45. Anna pays £12, Ben pays £18, and Claire pays the rest. What is the ratio of their payments?
9. A recipe uses flour, sugar, and butter in the ratio 4 : 2 : 1. If 200g of flour is used, find the amounts of sugar and butter needed.
10. The angles in a triangle are in the ratio 2 : 3 : 4. Find the size of each angle.
11. A concrete mix uses cement, sand, and gravel in the ratio 1 : 2 : 4. How much of each material is needed to make 350kg of concrete?

Section C: Direct Proportion

12. If 5 apples cost £1.25, how much do 8 apples cost?
13. 3 metres of fabric cost £12. Find the cost of:
- (a) 5 metres of fabric
 - (b) 7.5 metres of fabric
 - (c) 2.5 metres of fabric
14. A car travels 280 miles on 35 litres of petrol. How far can it travel on:
- (a) 20 litres of petrol
 - (b) 42 litres of petrol
 - (c) 15 litres of petrol
15. 6 workers can complete a job in 8 hours. How long would it take:
- (a) 4 workers to complete the job
 - (b) 12 workers to complete the job
 - (c) 3 workers to complete the job
16. y is directly proportional to x . When $x = 4$, $y = 20$. Find:
- (a) The value of y when $x = 7$
 - (b) The value of x when $y = 45$
 - (c) The constant of proportionality
17. The cost of electricity is directly proportional to the number of units used. If 150 units cost £24, find the cost of 220 units.

Section D: Inverse Proportion

18. It takes 4 people 6 hours to paint a fence. How long would it take:
- (a) 3 people to paint the fence
 - (b) 8 people to paint the fence
 - (c) 12 people to paint the fence
19. p is inversely proportional to q . When $q = 5$, $p = 12$. Find:
- (a) The value of p when $q = 10$
 - (b) The value of q when $p = 15$
 - (c) The constant of proportionality
20. The time taken to complete a journey is inversely proportional to the speed. At 60 mph, a journey takes 2 hours. How long would the journey take at:
- (a) 40 mph
 - (b) 80 mph
 - (c) 30 mph
21. A water tank can be filled by 3 pumps in 4 hours. How long would it take to fill the tank using:
- (a) 2 pumps
 - (b) 6 pumps
 - (c) 1 pump

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 50000. Find the real distance if the map distance is:
- (a) 4 cm
 - (b) 7.5 cm
 - (c) 12 cm
 - (d) 2.5 cm
23. A model car is built to a scale of 1 : 24. If the real car is 4.8m long, how long is the model?
24. On a map with scale 1 : 25000, two towns are 8cm apart. What is the actual distance between the towns in:
- (a) metres
 - (b) kilometres
25. A photograph is enlarged by a scale factor of 1.5. If the original photograph is 15cm by 10cm, find the dimensions of the enlargement.
26. A rectangle is enlarged by scale factor 3. If the original rectangle has an area of 12 cm^2 , what is the area of the enlargement?
27. A triangle has sides of 6cm, 8cm, and 10cm. It is enlarged by scale factor 2.5. Find:
- (a) The lengths of the sides of the enlargement
 - (b) The perimeter of the enlargement
 - (c) The area of the original triangle
 - (d) The area of the enlargement

Section F: Speed, Distance, and Time

28. Calculate the missing values:

- (a) Speed = 60 mph, Time = 2.5 hours, Distance = ?
- (b) Distance = 240 km, Time = 3 hours, Speed = ?
- (c) Distance = 450 miles, Speed = 75 mph, Time = ?
- (d) Speed = 25 m/s, Time = 8 seconds, Distance = ?

29. A train travels 180 miles in 2 hours 15 minutes. Calculate its average speed.

30. A cyclist travels at an average speed of 15 mph. How far does the cyclist travel in:

- (a) 2 hours 30 minutes
- (b) 45 minutes
- (c) 1 hour 20 minutes

31. A car journey of 300 miles takes 5 hours. The first 180 miles are completed in 3 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) 72 km/h to m/s
- (b) 15 m/s to km/h
- (c) 45 mph to km/h (use 1 mile = 1.6 km)
- (d) 90 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 = 150g, Volume = 25 cm³, Density = ?
- (b) Density = 2.5 g/cm³, Volume = 40 cm³, Mass = ?
- (c) Mass = 180g, Density = 3 g/cm³, Volume = ?
- (d) Density = 8 g/cm³, Mass = 200g, Volume = ?

34. A block of wood has a volume of 150 cm³ and a mass of 120g. Calculate its density.

35. Gold has a density of 19.3 g/cm³. What is the mass of a gold bar with volume 25 cm³?

36. Calculate these rates:

- (a) A tap fills a 40-litre tank in 5 minutes. Find the rate in litres per minute.
- (b) A photocopier prints 180 pages in 3 minutes. Find the rate in pages per minute.
- (c) A factory produces 2400 items in 8 hours. Find the rate in items per hour.

37. Water flows from a pipe at a rate of 15 litres per minute. How long will it take to fill:

- (a) A 90-litre tank
- (b) A 200-litre tank
- (c) A 45-litre tank

38. The population of a town increases at a rate of 250 people per year. If the current population is 12,500, what will the population be in:
- (a) 3 years
 - (b) 5 years
 - (c) 10 years

Section H: Problem Solving

39. A recipe for 6 people uses 400g flour, 200g butter, and 100g sugar. Adapt the recipe for:
- (a) 9 people
 - (b) 4 people
 - (c) 15 people
40. The ratio of boys to girls in a school is 3 : 4. If there are 420 girls, find:
- (a) The number of boys
 - (b) The total number of students
41. A car uses 8 litres of petrol to travel 100 km. How much petrol is needed to travel 350 km?
42. Two quantities x and y are such that y is inversely proportional to the square of x . When $x = 2$, $y = 18$. Find the value of y when $x = 3$.
43. A model aeroplane is built to a scale of 1 : 72. If the wingspan of the real aeroplane is 36m, find the wingspan of the model in centimetres.
44. Three business partners invest in the ratio 2 : 3 : 5. If the total investment is £50,000, how much does each partner invest?
45. A mixture contains oil and vinegar in the ratio 2 : 3. If there are 150ml of oil, find:
- (a) The amount of vinegar
 - (b) The total volume of the mixture
46. A train travels from London to Edinburgh, a distance of 400 miles, in 4 hours. On the return journey, it takes 5 hours due to delays. Find:
- (a) The average speed from London to Edinburgh
 - (b) The average speed from Edinburgh to London
 - (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**