GCSE Foundation Mathematics
Practice Test 7: 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) $28 : 42$

   (b) $36 : 48$

   (c) $35 : 70$

   (d) $18 : 24 : 30$

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

   (a) $7 : 56$

   (b) $9 : 63$

   (c) $5 : 45$

   (d) $11 : 77$

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

   (a) $72 : 8$

   (b) $91 : 7$

   (c) $96 : 12$

   (d) $84 : 14$

4. Express these as ratios:

   (a) 75p to £3.25

   (b) 140cm to 4.2m

   (c) 55 minutes to 2.5 hours

   (d) 650g to 2.6kg

5. A jar contains red and blue marbles in the ratio $8 : 5$. If there are 56 red marbles, how many blue marbles are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:
   (a) £156 in the ratio 7 : 6
   (b) £420 in the ratio 3 : 9 : 12
   (c) £960 in the ratio 8 : 7
   (d) £750 in the ratio 5 : 7 : 8
7. Sarah and Jake share £240 in the ratio 4 : 8. How much does each person get?
8. Six athletes share training costs totalling £180. Amy pays £25, Ben pays £28, Chloe pays £32, Dan pays £30, Eva pays £27, and Felix pays the rest. What is the ratio of their payments?
9. A steel alloy uses iron, carbon, and nickel in the ratio 7 : 1 : 2. If 420g of iron is used, find the amounts of carbon and nickel needed.
10. The sides of a hexagon are in the ratio 5 : 6 : 7 : 8 : 9 : 10. If the perimeter is 135cm, find the length of each side.
11. A trail mix uses almonds, cashews, and raisins in the ratio 5 : 4 : 3. How much of each type is needed to make 360g of trail mix?

Section C: Direct Proportion

12. If 19 oranges cost £5.70, how much do 26 oranges cost?
13. 15 metres of fabric cost £24. Find the cost of:
    (a) 22 metres of fabric
    (b) 8.5 metres of fabric
    (c) 28.5 metres of fabric
14. A van travels 420 miles on 18 litres of fuel. How far can it travel on:
    (a) 12 litres of fuel
    (b) 27 litres of fuel
    (c) 15 litres of fuel
15. 18 electricians can wire a building in 9 days. How long would it take:
    (a) 15 electricians to wire the building
    (b) 27 electricians to wire the building
    (c) 12 electricians to wire the building
16. p is directly proportional to q. When $q = 16$, $p = 64$. Find:
    (a) The value of p when $q = 23$
    (b) The value of q when $p = 120$
    (c) The constant of proportionality
17. The cost of printing is directly proportional to the number of pages. If 360 pages cost £54, find the cost of 520 pages.

Section D: Inverse Proportion

18. It takes 15 painters 8 hours to paint a building. How long would it take:
    (a) 12 painters to paint the building
    (b) 20 painters to paint the building
    (c) 24 painters to paint the building

19. r is inversely proportional to s. When $s = 12$, $r = 28$. Find:
    (a) The value of r when $s = 16$
    (b) The value of s when $r = 42$
    (c) The constant of proportionality

20. The time for a journey is inversely proportional to the speed. At 48 mph, a journey takes 4 hours. How long would the journey take at:
    (a) 32 mph
    (b) 24 mph
    (c) 64 mph

21. A garden can be landscaped by 10 workers in 15 hours. How long would it take to landscape using:
    (a) 8 workers
    (b) 25 workers
    (c) 18 workers

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 80000. Find the real distance if the map distance is:
    (a) 8 cm
    (b) 12.5 cm
    (c) 18 cm
    (d) 7.2 cm

23. A model train is built to a scale of 1 : 48. If the real train is 72m long, how long is the model?

24. On a map with scale 1 : 150000, two cities are 8cm apart. What is the actual distance between the cities in:
    (a) metres
    (b) kilometres

25. A blueprint is enlarged by a scale factor of 2.5. If the original blueprint is 36cm by 24cm, find the dimensions of the enlargement.

26. A pentagon is enlarged by scale factor 6. If the original pentagon has an area of 18 cm^2, what is the area of the enlargement?

27. A rectangle has dimensions 20cm by 32cm. It is enlarged by scale factor 1.5. Find:
    (a) The dimensions of the enlargement
    (b) The area of the original rectangle
    (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 = 65 mph, Time = 3.6 hours, Distance = ?
    (b) Distance = 540 km, Time = 8 hours, Speed = ?
    (c) Distance = 720 miles, Speed = 80 mph, Time = ?
    (d) Speed = 28 m/s, Time = 25 seconds, Distance = ?
29. A ferry travels 84 miles in 3 hours 30 minutes. Calculate its average speed.
30. A runner runs at an average speed of 12 mph. How far does the runner travel in:
    (a) 2 hours 45 minutes
    (b) 75 minutes
    (c) 4 hours 20 minutes
31. A train journey of 480 miles takes 8 hours. The first 288 miles are completed in 4.8 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) 108 km/h to m/s
    (b) 35 m/s to km/h
    (c) 75 mph to km/h (use 1 mile = 1.6 km)
    (d) 144 km/h to mph

Section G: Density and Other Rates

33. Calculate the missing values using Density = $\frac{\text{Mass}}{\text{Volume}}$:
    (a) Mass = 360g, Volume = 45 cm^3, Density = ?
    (b) Density = 4.8 g/cm^3, Volume = 75 cm^3, Mass = ?
    (c) Mass = 504g, Density = 5.6 g/cm^3, Volume = ?
    (d) Density = 7.2 g/cm^3, Mass = 432g, Volume = ?
34. A bronze statue has a volume of 240 cm^3 and a mass of 2160g. Calculate its density.
35. Aluminum has a density of 2.7 g/cm^3. What is the mass of an aluminum block with volume 120 cm^3?
36. Calculate these rates:
    (a) A pump empties a 168-litre tank in 12 minutes. Find the rate in litres per minute.
    (b) A computer processes 720 calculations in 8 minutes. Find the rate in calculations per minute.
    (c) A factory produces 6300 items in 21 hours. Find the rate in items per hour.
37. Water flows from a tap at a rate of 9 litres per minute. How long will it take to fill:
    (a) 135 litres

(b) 243 litres

(c) 117 litres

38. The membership of a club increases at a rate of 420 members per year. If the current membership is 18,500, what will the membership be in:

(a) 5 years

(b) 8 years

(c) 12 years

Section H: Problem Solving

39. A recipe for 20 people uses 800g flour, 400g sugar, and 200g butter. Adapt the recipe for:

(a) 30 people

(b) 15 people

(c) 35 people

40. The ratio of fiction to non-fiction books in a library is $9 : 4$. If there are 252 fiction books, find:

(a) The number of non-fiction books

(b) The total number of books

41. A motorcycle uses 42 litres of fuel to travel 504 km. How much fuel is needed to travel 660 km?

42. Two quantities x and y are such that y is inversely proportional to the square of x. When $x = 3$, $y = 80$. Find the value of y when $x = 4$.

43. A model castle is built to a scale of $1 : 150$. If the height of the real castle is 45m, find the height of the model in centimetres.

44. Five partners divide business profits in the ratio $6 : 7 : 8 : 9 : 10$. If the total profit is £200,000, how much does each partner receive?

45. A concrete mixture contains cement and sand in the ratio $2 : 7$. If there are 560kg of sand, find:

(a) The amount of cement

(b) The total mass of the concrete

46. A cruise ship travels from Miami to Nassau, a distance of 1800 km, in 2.5 days. On the return journey, it takes 3 days due to rough seas. Find:

(a) The average speed from Miami to Nassau

(b) The average speed from Nassau to Miami

(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