GCSE Foundation Mathematics
Practice Test 6: 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) $22 : 33$

    (b) $24 : 32$

    (c) $45 : 75$

    (d) $15 : 20 : 25$

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

    (a) $8 : 72$

    (b) $6 : 48$

    (c) $4 : 36$

    (d) $12 : 84$

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

    (a) $63 : 9$

    (b) $72 : 8$

    (c) $81 : 9$

    (d) $84 : 12$

4. Express these as ratios:

    (a) 85p to £2.55

    (b) 120cm to 3.6m

    (c) 45 minutes to 3.5 hours

    (d) 750g to 3kg

5. A box contains copper and brass coins in the ratio $9 : 7$. If there are 63 copper coins, how many brass coins are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:

    (a) £117 in the ratio 8 : 5

    (b) £300 in the ratio 4 : 8 : 12

    (c) £700 in the ratio 9 : 5

    (d) £840 in the ratio 6 : 8 : 10

7. Marcus and Emma share £160 in the ratio 3 : 7. How much does each person get?

8. Eight teachers share conference expenses totalling £240. Anna pays £24, Ben pays £32, Carol pays £28, David pays £36, Eve pays £30, Frank pays £25, Grace pays £35, and Henry pays the rest. What is the ratio of their payments?

9. A bronze alloy uses copper, tin, and zinc in the ratio 9 : 2 : 1. If 360g of copper is used, find the amounts of tin and zinc needed.

10. The sides of a heptagon are in the ratio 6 : 7 : 8 : 9 : 10 : 11 : 12. If the perimeter is 189cm, find the length of each side.

11. A seed mix uses sunflower, pumpkin, and sesame seeds in the ratio 6 : 3 : 2. How much of each type is needed to make 440g of seed mix?

Section C: Direct Proportion

12. If 17 peaches cost £4.25, how much do 24 peaches cost?

13. 12 metres of chain cost £18. Find the cost of:

    (a) 20 metres of chain

    (b) 7.5 metres of chain

    (c) 26.5 metres of chain

14. A moped travels 300 miles on 15 litres of fuel. How far can it travel on:

    (a) 9 litres of fuel

    (b) 24 litres of fuel

    (c) 12 litres of fuel

15. 21 technicians can service equipment in 8 days. How long would it take:

    (a) 16 technicians to service the equipment

    (b) 24 technicians to service the equipment

    (c) 14 technicians to service the equipment

16. k is directly proportional to l. When $l = 18$, $k = 54$. Find:

    (a) The value of k when $l = 26$

    (b) The value of l when $k = 90$

    (c) The constant of proportionality

17. The cost of internet usage is directly proportional to the amount of data used. If 480GB costs £72, find the cost of 650GB.

Section D: Inverse Proportion

18. It takes 12 assemblers 6 hours to complete production. How long would it take:

    (a) 9 assemblers to complete production
    (b) 18 assemblers to complete production
    (c) 16 assemblers to complete production

19. j is inversely proportional to k. When $k = 14$, $j = 21$. Find:

    (a) The value of j when $k = 18$
    (b) The value of k when $j = 35$
    (c) The constant of proportionality

20. The time for a transport is inversely proportional to the speed. At 42 mph, transport takes 5 hours. How long would transport take at:

    (a) 35 mph
    (b) 30 mph
    (c) 70 mph

21. A field can be plowed by 8 tractors in 12 hours. How long would it take to plow using:

    (a) 6 tractors
    (b) 16 tractors
    (c) 24 tractors

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 90000. Find the real distance if the map distance is:

    (a) 9 cm
    (b) 13.5 cm
    (c) 20 cm
    (d) 6.4 cm

23. A model submarine is built to a scale of 1 : 64. If the real submarine is 96m long, how long is the model?

24. On a map with scale 1 : 120000, two ports are 7cm apart. What is the actual distance between the ports in:

    (a) metres
    (b) kilometres

25. A technical drawing is enlarged by a scale factor of 3.2. If the original drawing is 40cm by 30cm, find the dimensions of the enlargement.

26. An octagon is enlarged by scale factor 8. If the original octagon has an area of 25 cm^2, what is the area of the enlargement?

27. A trapezium has parallel sides of 16cm and 24cm with height 20cm. It is enlarged by scale factor 2.5. Find:

    (a) The lengths of the parallel sides of the enlargement
    (b) The height of the enlargement
    (c) The area of the original trapezium
    (d) The area of the enlargement

Section F: Speed, Distance, and Time

28. Calculate the missing values:

    (a) Speed = 70 mph, Time = 4.2 hours, Distance = ?
    (b) Distance = 630 km, Time = 9 hours, Speed = ?
    (c) Distance = 900 miles, Speed = 75 mph, Time = ?
    (d) Speed = 32 m/s, Time = 20 seconds, Distance = ?

29. A hovercraft travels 105 miles in 4 hours 15 minutes. Calculate its average speed.

30. A cyclist travels at an average speed of 16 mph. How far does the cyclist travel in:

    (a) 3 hours 45 minutes
    (b) 90 minutes
    (c) 5 hours 30 minutes

31. A lorry journey of 630 miles takes 10.5 hours. The first 378 miles are completed in 6.3 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) 126 km/h to m/s
    (b) 40 m/s to km/h
    (c) 95 mph to km/h (use 1 mile = 1.6 km)
    (d) 162 km/h to mph

Section G: Density and Other Rates

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

    (a) Mass = 420g, Volume = 60 cm^3, Density = ?
    (b) Density = 5.2 g/cm^3, Volume = 65 cm^3, Mass = ?
    (c) Mass = 396g, Density = 4.4 g/cm^3, Volume = ?
    (d) Density = 6.8 g/cm^3, Mass = 476g, Volume = ?

34. A marble sculpture has a volume of 180 cm^3 and a mass of 486g. Calculate its density.

35. Iron has a density of 7.9 g/cm^3. What is the mass of an iron rod with volume 85 cm^3?

36. Calculate these rates:

    (a) A valve drains a 154-litre tank in 11 minutes. Find the rate in litres per minute.
    (b) A processor handles 540 transactions in 9 minutes. Find the rate in transactions per minute.
    (c) A brewery produces 5400 bottles in 18 hours. Find the rate in bottles per hour.

37. Steam flows from a generator at a rate of 11 litres per minute. How long will it take to produce:

    (a) 165 litres of steam
    (b) 308 litres of steam

    (c) 132 litres of steam

38. The capacity of a stadium increases at a rate of 560 seats per year. If the current capacity is 28,000 seats, what will the capacity be in:

    (a) 6 years

    (b) 9 years

    (c) 15 years

Section H: Problem Solving

39. A recipe for 16 people uses 640g flour, 320g butter, and 160g sugar. Adapt the recipe for:

    (a) 24 people

    (b) 12 people

    (c) 40 people

40. The ratio of science to history books in a school library is $7 : 3$. If there are 210 science books, find:

    (a) The number of history books

    (b) The total number of books

41. A jet ski uses 36 litres of fuel to travel 240 km. How much fuel is needed to travel 350 km?

42. Two quantities m and n are such that n is inversely proportional to the fifth power of m. When $m = 2$, $n = 96$. Find the value of n when $m = 3$.

43. A model lighthouse is built to a scale of $1 : 120$. If the height of the real lighthouse is 36m, find the height of the model in centimetres.

44. Six friends divide vacation costs in the ratio $7 : 8 : 9 : 10 : 11 : 12$. If the total cost is £228,000, how much does each friend pay?

45. A paint mixture contains pigment and base in the ratio $3 : 8$. If there are 440ml of base, find:

    (a) The amount of pigment

    (b) The total volume of the paint

46. A cargo ship travels from Singapore to Hong Kong, a distance of 2700 km, in 3 days. On the return journey, it takes 3.5 days due to weather. Find:

    (a) The average speed from Singapore to Hong Kong

    (b) The average speed from Hong Kong to Singapore

    (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

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stepupmaths.co.uk