GCSE Foundation Mathematics
Practice Test 8: 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) $26 : 39$

   (b) $30 : 45$

   (c) $56 : 84$

   (d) $21 : 28 : 35$

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

   (a) $6 : 54$

   (b) $8 : 64$

   (c) $9 : 72$

   (d) $12 : 96$

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

   (a) $56 : 7$

   (b) $90 : 10$

   (c) $88 : 11$

   (d) $78 : 13$

4. Express these as ratios:

   (a) 95p to £2.85

   (b) 160cm to 3.2m

   (c) 35 minutes to 4.5 hours

   (d) 850g to 3.4kg

5. A bag contains white and black counters in the ratio $7 : 4$. If there are 49 white counters, how many black counters are there?

Section B: Sharing in Ratios

6. Share these amounts in the given ratios:

    (a) £143 in the ratio 9 : 4
    (b) £480 in the ratio 4 : 8 : 12
    (c) £810 in the ratio 7 : 2
    (d) £630 in the ratio 6 : 7 : 8

7. Tom and Lucy share £192 in the ratio 5 : 7. How much does each person get?

8. Seven students share project expenses totalling £210. Anna pays £28, Ben pays £32, Chloe pays £26, Dan pays £35, Eva pays £29, Felix pays £31, and Grace pays the rest. What is the ratio of their payments?

9. A brass alloy uses copper, zinc, and tin in the ratio 8 : 3 : 1. If 480g of copper is used, find the amounts of zinc and tin needed.

10. The sides of an octagon are in the ratio 4 : 5 : 6 : 7 : 8 : 9 : 10 : 11. If the perimeter is 240cm, find the length of each side.

11. A granola mix uses oats, nuts, and dried fruit in the ratio 7 : 2 : 3. How much of each type is needed to make 480g of granola mix?

Section C: Direct Proportion

12. If 23 apples cost £6.90, how much do 32 apples cost?

13. 18 metres of rope cost £27. Find the cost of:

    (a) 25 metres of rope
    (b) 12.5 metres of rope
    (c) 31.5 metres of rope

14. A car travels 360 miles on 16 litres of fuel. How far can it travel on:

    (a) 11 litres of fuel
    (b) 24 litres of fuel
    (c) 18 litres of fuel

15. 24 plumbers can install pipes in 7 days. How long would it take:

    (a) 18 plumbers to install the pipes
    (b) 28 plumbers to install the pipes
    (c) 21 plumbers to install the pipes

16. m is directly proportional to n. When $n = 20$, $m = 75$. Find:

    (a) The value of m when $n = 28$
    (b) The value of n when $m = 135$
    (c) The constant of proportionality

17. The cost of catering is directly proportional to the number of guests. If 280 guests cost £420, find the cost for 380 guests.

Section D: Inverse Proportion

18. It takes 16 decorators 9 hours to redecorate a hall. How long would it take:

    (a) 12 decorators to redecorate the hall
    (b) 24 decorators to redecorate the hall
    (c) 18 decorators to redecorate the hall

19. t is inversely proportional to u. When $u = 15$, $t = 32$. Find:

    (a) The value of t when $u = 20$
    (b) The value of u when $t = 48$
    (c) The constant of proportionality

20. The time for a delivery is inversely proportional to the speed. At 54 mph, a delivery takes 3 hours. How long would the delivery take at:

    (a) 36 mph
    (b) 27 mph
    (c) 81 mph

21. A warehouse can be cleaned by 12 cleaners in 18 hours. How long would it take to clean using:

    (a) 9 cleaners
    (b) 27 cleaners
    (c) 15 cleaners

Section E: Scale Factors and Maps

22. A map has a scale of 1 : 75000. Find the real distance if the map distance is:

    (a) 12 cm
    (b) 16.5 cm
    (c) 22 cm
    (d) 8.4 cm

23. A model airplane is built to a scale of 1 : 36. If the real airplane is 54m long, how long is the model?

24. On a map with scale 1 : 125000, two towns are 9cm apart. What is the actual distance between the towns in:

    (a) metres
    (b) kilometres

25. An architectural plan is enlarged by a scale factor of 3.5. If the original plan is 32cm by 28cm, find the dimensions of the enlargement.

26. A triangle is enlarged by scale factor 7. If the original triangle has an area of 16 cm^2, what is the area of the enlargement?

27. A parallelogram has sides of 24cm and 18cm. It is enlarged by scale factor 2.5. Find:

    (a) The dimensions of the enlargement
    (b) The perimeter of the original parallelogram
    (c) The perimeter of the enlargement
    (d) The ratio of the perimeters

Section F: Speed, Distance, and Time

28. Calculate the missing values:

    (a) Speed = 55 mph, Time = 4.8 hours, Distance = ?

    (b) Distance = 672 km, Time = 12 hours, Speed = ?

    (c) Distance = 840 miles, Speed = 70 mph, Time = ?

    (d) Speed = 36 m/s, Time = 15 seconds, Distance = ?

29. A yacht travels 126 miles in 4 hours 45 minutes. Calculate its average speed.

30. A walker walks at an average speed of 4 mph. How far does the walker travel in:

    (a) 2 hours 15 minutes

    (b) 105 minutes

    (c) 3 hours 40 minutes

31. A bus journey of 560 miles takes 10 hours. The first 336 miles are completed in 6 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) 90 km/h to m/s

    (b) 42 m/s to km/h

    (c) 85 mph to km/h (use 1 mile = 1.6 km)

    (d) 128 km/h to mph

Section G: Density and Other Rates

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

    (a) Mass = 480g, Volume = 64 cm^3, Density = ?

    (b) Density = 6.4 g/cm^3, Volume = 85 cm^3, Mass = ?

    (c) Mass = 567g, Density = 6.3 g/cm^3, Volume = ?

    (d) Density = 8.5 g/cm^3, Mass = 544g, Volume = ?

34. A ceramic vase has a volume of 320 cm^3 and a mass of 768g. Calculate its density.

35. Copper has a density of 8.9 g/cm^3. What is the mass of a copper wire with volume 95 cm^3?

36. Calculate these rates:

    (a) A conveyor belt moves 192 items in 16 minutes. Find the rate in items per minute.

    (b) A printer produces 840 pages in 14 minutes. Find the rate in pages per minute.

    (c) A machine produces 7200 components in 24 hours. Find the rate in components per hour.

37. Oil flows from a pipeline at a rate of 13 litres per minute. How long will it take to collect:

    (a) 169 litres of oil

    (b) 273 litres of oil

    (c) 195 litres of oil

38. The population of a town increases at a rate of 640 people per year. If the current population is 32,500, what will the population be in:

    (a) 7 years
    (b) 9 years
    (c) 15 years

Section H: Problem Solving

39. A recipe for 24 people uses 960g flour, 480g butter, and 240g sugar. Adapt the recipe for:

    (a) 18 people
    (b) 32 people
    (c) 40 people

40. The ratio of mystery to romance novels in a bookshop is 5 : 8. If there are 160 mystery novels, find:

    (a) The number of romance novels
    (b) The total number of novels

41. A boat uses 48 litres of fuel to travel 384 km. How much fuel is needed to travel 528 km?

42. Two quantities a and b are such that b is inversely proportional to the cube of a. When $a = 2$, $b = 72$. Find the value of b when $a = 3$.

43. A model bridge is built to a scale of 1 : 180. If the height of the real bridge is 90m, find the height of the model in centimetres.

44. Four investors divide annual returns in the ratio 8 : 9 : 11 : 12. If the total return is £160,000, how much does each investor receive?

45. A mortar mixture contains cement and sand in the ratio 1 : 5. If there are 750kg of sand, find:

    (a) The amount of cement
    (b) The total mass of the mortar

46. An aircraft travels from London to New York, a distance of 5500 km, in 6.5 hours. On the return journey, it takes 7 hours due to headwinds. Find:

    (a) The average speed from London to New York
    (b) The average speed from New York 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

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stepupmaths.co.uk