Applied Ratio Extension Problems

Recipe Questions Past

1. A muffin recipe makes 12 muffins with the following ingredients:

   - 300g flour
   - 200g sugar
   - 2 eggs (approx. 100g)
   - 250ml milk

   You want to increase the yield by 50%. Calculate the new quantities for all ingredients.

2. A sauce recipe serves 4 people:

   - 400ml tomato passata
   - 2 cloves garlic (20g)
   - 100ml olive oil
   - 50g fresh basil

   You only want to make 75% of the original recipe. Calculate the new quantities.

3. A cake recipe that serves 6 people requires:

   - 240g flour
   - 180g butter
   - 150g sugar
   - 3 eggs (150g)

   You need to serve 10 people. By what percentage must you increase the recipe? Calculate all new ingredient quantities.

4. After cooking, you have 560g of pasta from a recipe that was increased by 40% from its original size. What was the original mass of pasta the recipe made?

5. A bread recipe uses:

   - 1000g flour
   - 600ml water
   - 20g salt
   - 15g yeast

   The baker makes a new batch using 850g of flour after reducing the recipe.

   (a) By what percentage was the recipe reduced?

   (b) Calculate the new quantities for all other ingredients.

Recipe Questions Future

6. You are making a square brownie. The recipe for a 20cm × 20cm tray uses:

   - 200g chocolate
   - 150g butter
   - 3 eggs

   You are using a larger 25cm × 25cm tray. Calculate the new quantities for all ingredients.

7. You are baking a circular cake. The original recipe is for a cake tin with a diameter of 20cm and uses:

   - 250g flour
   - 200g sugar
   - 4 eggs

   You are using a tin with a diameter of 30cm. Calculate the new quantities.

8. You are making two rectangular pizzas. The large pizza has dimensions 35cm × 25cm. The small pizza has dimensions 20cm × 15cm. The small pizza recipe uses:

   - 200g cheese
   - 150g flour
   - 100ml tomato sauce

   (a) What is the area of each pizza?

   (b) How much of each ingredient does the large pizza need?

9. You are decorating the perimeter of a rectangular cake with sprinkles. The cake is 28cm long and 18cm wide. One gram of sprinkles covers 4cm of perimeter.

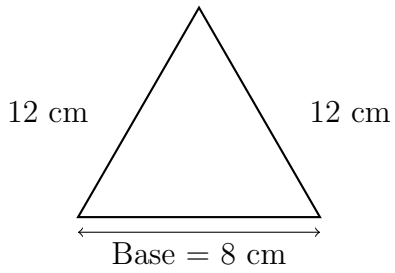
   - 300g cake base
   - 200g icing
   - 50g sprinkles (original amount)

   (a) What is the perimeter of your cake?

   (b) How many grams of sprinkles do you need?

   (c) If you make a cake with double the perimeter, by what factor should you multiply all ingredients?

10. A fancy triangular dessert has side lengths 12cm, 12cm, and 8cm. You create a similar dessert where all side lengths are increased by a scale factor of 1.5.



Original Dessert

The original recipe uses:

- 120g sugar (for the area)
- 80g cocoa powder (for the perimeter decoration)
- 3 eggs

(a) What is the perimeter of the original dessert?

(b) What is the perimeter of the new, larger dessert?

(c) How much sugar is needed for the larger dessert?

(d) How much cocoa powder is needed for the larger dessert?

(e) How many eggs are needed for the larger dessert?

Best Buys Past

11. A 500g box of cereal costs £4.50. A 750g box costs £6.30. Which is the better buy?

12. Store A sells 6 cans of soda for $4.80. Store B sells the same soda with a 15% discount on single cans that normally cost $0.95 each. Where should you buy if you need 6 cans?

13. A 2L bottle of juice costs €3.20. The 1.5L bottle is on sale for 20% off its regular price of €2.80. Which size offers better value per liter?

14. **Electronic World** is having a clearance sale:
    Headphones: Original £120, now 20% off
    Speakers: Original £85, now 30% off

    The store is also running a buy 3 items, get the cheapest free deal. You can sell electronics for 50% of non-discounted price to a local shop - what is the cheapest way you can buy both the headphones and speakers?

15. A furniture store offers two payment plans for a £1200 sofa:
    Plan A: 25% down payment, then 12 monthly payments of £80
    Plan B: No down payment, 18 monthly payments of £75
    Considering the total amount paid, which plan is better and by what percentage of the original price?

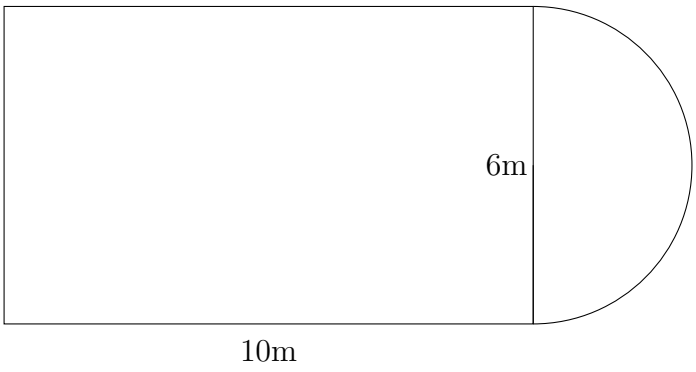
Best Buys Future

16. You need to fence a rectangular garden. Store A sells fencing for $12 per meter. Store B sells pre-cut 2m sections for $20 each. Which is cheaper for a 10m × 8m garden?

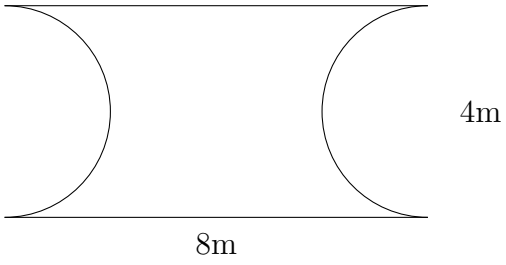
17. You want to tile a floor. Tile Type A costs £25 per square meter. Tile Type B costs £18 per square meter but requires 15% more tiles due to breakage. For a 4m × 5m room, what is the lowest price to tile the room?

18. Paint costs £35 per liter and covers 12m^2 per liter. Brand X offers 20% more coverage per liter for £42 per liter. For painting two walls of dimensions 4m × 3m and 5m × 3m, which paint is better value? Buying the cheapest, how much will the paint cost?

19. You need to buy grass seed for a lawn. The lawn consists of a rectangle (10m × 6m) with a semicircular extension (radius 3m) at one end. Seed A covers 15m^2 per kg at \$4.80 per kg. Seed B covers 25m^2 per kg at \$7.50 per kg. Which seed is more economical?



20. A swimming pool has the following shape: a central rectangle 8m × 4m, with semicircular ends of radius 2m. You need to buy a pool cover. Material X costs \$18 per m^2 and lasts 3 years. Material Y costs \$25 per m^2 and lasts 5 years. Considering cost per year, which material is more economical? How much will it cost per year to keep the pool covered for the least price?



Scaling Past

21. A drawing is scaled up by 150%. If the original length was 8 cm, what is the new length?

22. A map scale is 1:25,000. What percentage of the actual distance does 1 cm on the map represent?

23. A photo is reduced to 80% of its original size. If the reduced width is 12 cm, what was the original width?

24. Sarah is creating a scale drawing of her bedroom. She decides to use a scale which represents 2% of actual size. What ratio represents here scale? If her bed measures 2 meters long in reality, what length should she draw it in her scale drawing? Give your answer in centimetres.

25. A company is producing scale models of buildings. Model A is made at 2.5% of actual size, while Model B is made at 4% of actual size.

    (a) If a window is 1.2 meters wide in the actual building, how wide is it in each model?

    (b) If Model A's height is 45 cm, what is the actual building's height?

    (c) What percentage larger is Model B compared to Model A?

Scaling Future

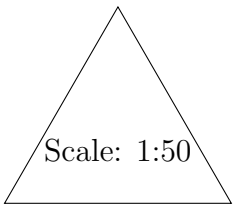
11. A square is enlarged using scale factor 3. If the original perimeter was 12 cm, what is the new perimeter?

12. A scale drawing of a rectangular field uses scale 1:200. If the drawing shows the field as 6 cm $\times$ 4 cm, what is the actual area of the field?

    The equilateral triangle below represents a park. If each side s is 2 cm in the drawing, find:

    (a) The actual perimeter of the park

    (b) The actual area of the park (area of equilateral triangle $= \frac{\sqrt{3}}{4}s^2$)



13. A blueprint shows a circular fountain with diameter 3 cm at scale 1:30.

    (a) What is the actual diameter of the fountain?

    (b) Calculate the actual area of the fountain's surface.

    (c) If the scale was changed to 1:45, what would be the drawn diameter?

14. An architect creates scale drawings of two similar rectangular rooms. Room A is drawn at scale 1:100 and measures 5 cm $\times$ 4 cm in the drawing. Room B is drawn at scale 1:80 and measures 6 cm $\times$? cm in the drawing.

    (a) Calculate the actual dimensions and area of each room.

    (b) Which room has the larger actual area and by what percentage?

    (c) If both drawings were converted to scale 1:50, what would be their new dimensions on paper?