IGCSE Mathematics – Ratio and proportion - exercises

Exercise A

1. A ruler 30 cm long is broken into two parts in the ratio 8 : 7. How long are the two parts?

2. A recipe needs 400 g of flour to make 8 cakes. How much flour would be needed in order to make two dozen cakes?

3. To make 6 jam tarts, 120 g of jam is needed. How much jam is needed to make 10 tarts?

4. The scale of a map is 1 : 25 000.
   a) Two villages are 8 cm apart on the map. How far apart are they in real life? Give your answer in kilometres.
   b) The distance from a village to the edge of a lake is 12 km in real life. How far apart would they be on the map? Give your answer in centimetres.

5. A motorbike uses petrol and oil mixed in the ratio 13 : 2.
   a) How much of each is there in 30 litres of mixture?
   b) How much petrol would be mixed with 500 ml of oil?

6. a) A model car is a \( \frac{3}{8} \) scale model. Express this as a ratio.
   b) If the length of the real car is 5.5 m, what is the length of the model car?

7. An aunt gives a brother and sister £2000 to be divided in the ratio of their ages. If the girl is 13 years old and the boy 12 years old, how much will each get?

8. The angles of a triangle are in the ratio 2 : 5 : 8. Find the size of each of the angles.

9. A photocopying machine is capable of making 50 copies each minute.
   a) If four identical copiers are used simultaneously how long would it take to make a total of 50 copies?
   b) How many copiers would be needed to make 6000 copies in 15 minutes?

10. It takes 16 hours for three bricklayers to build a wall. Calculate how long it would take for eight bricklayers to build a similar wall.

Exercise B

1. A piece of wood is cut in the ratio 3 : 7.
   a) What fraction of the whole is the longer piece?
   b) If the wood is 1.5 m long, how long is the shorter piece?

2. A recipe for two people requires \( \frac{1}{4} \) kg of rice to 150 g of meat.
   a) How much meat would be needed for five people?
   b) How much rice would there be in 1 kg of the final dish?

3. The scale of a map is 1 : 10 000.
   a) Two rivers are 4.5 cm apart on the map, how far apart are they in real life? Give your answer in metres.
   b) Two towns are 8 km apart in real life. How far apart are they on the map? Give your answer in centimetres.

4. a) A model train is a \( \frac{1}{6} \) scale model. Express this as a ratio.
   b) If the length of the model engine is 7 cm, what is the true length of the engine?


6. The ratio of the angles of a quadrilateral is 2 : 3 : 3 : 4. Calculate the size of each of the angles.

7. The ratio of the interior angles of a pentagon is 2 : 3 : 4 : 4 : 5. Calculate the size of the largest angle.

8. A large swimming pool takes 36 hours to fill using three identical pumps.
   a) How long would it take to fill using eight identical pumps?
   b) If the pool needs to be filled in 9 hours, how many pumps will be needed?
Exercise C

1. Increase 100 by the following ratios:
   a) 8 : 5  
   b) 5 : 2  
   c) 7 : 4  
   d) 11 : 10 
   e) 9 : 4  
   f) 32 : 25

2. Increase 70 by the following ratios:
   a) 4 : 3  
   b) 5 : 3  
   c) 8 : 7  
   d) 9 : 4  
   e) 11 : 5 
   f) 17 : 14

3. Decrease 60 by the following ratios:
   a) 2 : 3  
   b) 5 : 6  
   c) 7 : 12 
   d) 3 : 5  
   e) 1 : 4  
   f) 13 : 15

4. Decrease 30 by the following ratios:
   a) 3 : 4  
   b) 2 : 9  
   c) 7 : 12 
   d) 3 : 16 
   e) 5 : 8  
   f) 9 : 20

5. Increase 40 by a ratio of 5 : 4.

6. Decrease 40 by a ratio of 4 : 5.

7. Increase 150 by a ratio of 7 : 5.


Exercise D

1. A photograph measuring 8 cm by 6 cm is enlarged by a ratio of 11 : 4. What are the dimensions of the new print?

2. A photocopier enlarges in the ratio 7 : 4. What would be the new size of a diagram measuring 16 cm by 12 cm?

3. A drawing measuring 10 cm by 16 cm needs to be enlarged. The dimensions of the enlargement need to be 25 cm by 40 cm. Calculate the enlargement needed and express it as a ratio.

4. A banner needs to be enlarged from its original format. The dimensions of the original are 4 cm tall by 25 cm wide. The enlarged banner needs to be at least 8 m wide but no more than 1.4 m tall. Calculate the minimum and maximum ratios of enlargement possible.

5. A rectangle measuring 7 cm by 4 cm is enlarged by a ratio of 2 : 1.
   a) What is the area of:
      i) the original rectangle?
      ii) the enlarged rectangle?
   b) By what ratio has the area been enlarged?

6. A square of side length 3 cm is enlarged by a ratio of 3 : 1.
   a) What is the area of:
      i) the original square?
      ii) the enlarged square?
   b) By what ratio has the area been enlarged?

7. A cuboid measuring 3 cm by 5 cm by 2 cm is enlarged by a ratio of 2 : 1.
   a) What is the volume of:
      i) the original cuboid?
      ii) the enlarged cuboid?
   b) By what ratio has the volume been increased?

8. A cube of side 4 cm is enlarged by a ratio of 3 : 1.
   a) What is the volume of:
      i) the original cube?
      ii) the enlarged cube?
   b) By what ratio has the volume been increased?

9. The triangle is to be reduced by a ratio of 1 : 2.

   a) Calculate the area of the original triangle.
   b) Calculate the area of the reduced triangle.
   c) Calculate the ratio by which the area of the triangle has been reduced.