C6

Ratio and proportion

CHAPTER ASSIGNMENT · 137 MARKS

Name _____ Class _____ No. _____ Date _____

Answer every question in the space given. You may use a calculator. For each proportion question, say whether it is direct or inverse, then show your unitary or ratio method.

Practice questions from *Cambridge IGCSE Mathematics Core and Extended* (4th edition), Chapter 6 (Ratio and proportion), for classroom use. The Check yourself and Chapter quiz questions are Guru Jazzy's own.

Exercise 6.1 · Direct proportion

6.1.1 A machine prints four books in 10 minutes. How many will it print in 2 hours? [2]

6.1.2 A farmer plants five apple trees in 25 minutes. At the same rate, how long will it take him to plant 200 trees? [2]

6.1.3 A television uses 3 units of electricity in 2 hours. How many units will it use in 7 hours, to the nearest unit? [2]

6.1.4 A bricklayer lays 1500 bricks in an 8-hour day. (a) How many does he lay in a five-day week? (b) How long, to the nearest hour, would 10 000 bricks take? [4]

6.1.5 A machine uses 250 litres of paint for each 8 km of road. (a) How much paint is needed for 200 km? (b) What length of road can be marked with 4000 litres? [4]

6.1.8 A car travels at 80 km/h for 6 hours. (a) How far does it go? (b) What speed covers the same distance in 5 hours? [3]

Exercise 6.2 · Ratios and dividing in a ratio

6.2.1 Sand and gravel are mixed 5 : 3. (a) How much gravel goes with 750 kg of sand? (b) How much sand goes with 750 kg of gravel? [3]

6.2.2 A recipe uses 150 g butter, 500 g flour, 50 g sugar and 100 g currants to make 18 cakes. (a) How much of each is needed for 72 cakes? (b) How many whole cakes could 1 kg of butter make? [4]

6.2.5 Orange and mango juice are mixed 9 : 2. (a) How much mango goes with 189 litres of orange? (b) How much of each is in 605 litres of juice? [4]

6.2.c1 Divide each quantity in the ratio given.

150 in 2 : 3	72 in 2 : 3 : 4	5 kg in 13 : 7	45 minutes in 2 : 3	1 hour in 1 : 5

6.2.c8 55% of the 800 students in a school are boys. (a) What is the ratio of boys to girls? (b) How many boys and how many girls are there? [3]

6.2.c11 A 7 km gas pipe has a valve that divides it in the ratio 4 : 3. How far is the valve from each end? [2]

6.2.c12 The angles of a quadrilateral are in the ratio 1 : 2 : 3 : 3. Find each angle. [3]

6.2.c15 A profit of $8000 is shared in the ratio of investments: Alex $20 000, Maria $35 000, Ahmet $25 000. How much does each get? [3]

Exercise 6.3 · Inverse proportion

6.3.1 Sweets shared among 8 students give 6 each. How many would each get with 12 students? [2]

6.3.2 Copy and complete the table for a train travelling between two stations.

Column	a	b	c	d	e	f	g
Speed (km/h)	60	120	90	50	10		
Time (h)	2					3	4

6.3.3 Six people dig a trench in 8 hours. (a) How long would 4, 12 and 1 people take? (b) How many people would dig it in 3, 16 and 1 hours? [6]

6.3.4 Chairs are in 35 rows of 18. (a) How many rows with 21 chairs per row? (b) How many chairs per row with 15 rows? [3]

6.3.5 A train at 100 km/h takes 4 hours. How long would a train at 60 km/h take? [2]

6.3.7 Two identical pumps fill a pool in 30 hours. How much quicker would five pumps be? [3]

Exercises 6.4 and 6.5 · Increase and decrease by a ratio

6.4 Work out each.

Increase 100 by 8 : 5	Increase 70 by 4 : 3	Decrease 60 by 2 : 3	Decrease 30 by 3 : 4
Increase 40 by 5 : 4	Decrease 40 by 4 : 5	Increase 150 by 7 : 5	Decrease 210 by 3 : 7

6.5.1 A photo measuring 8 cm by 6 cm is enlarged by a ratio of 11 : 4. What are the new dimensions? [2]

6.5.3 A 10 cm by 16 cm drawing is enlarged to 25 cm by 40 cm. Write the enlargement as a ratio. [2]

6.5.5 A 7 cm by 4 cm rectangle is enlarged by a ratio of 2 : 1. Find the original area, the new area, and the ratio by which the area grows. [3]

6.5.8 A cube of side 4 cm is enlarged by a ratio of 3 : 1. Find the original volume, the new volume, and the ratio by which the volume grows. [3]

6.5.10 From your answers, what happens to areas and volumes when a shape is enlarged by k : 1? [2]

Exercise 6.6 · Compound measures

6.6.1 Aluminium has a density of 2900 kg/m^3. Find the mass of 4 m^3 of aluminium. **[2]**

6.6.2 A marathon is 42 195 m. The 2016 record was 2 h 2 min 57 s. (a) How many seconds is that? (b) Find the average speed in m/s to 2 d.p. (c) What speed would finish in under two hours? **[5]**

6.6.3 Densities in g/cm^3: aluminium 2.9, brass 8.8, copper 9.3, steel 8.2. (a) A 5 cm cube has a mass of 1.1 kg. Which metal is it? (b) A steel cube has a mass of 4.0 kg. Find its side to 1 d.p. **[5]**

6.6.4 Singapore has a population of 5 535 000 and an area of 719 km^2. (a) Find its population density. (b) Explain why China, with the largest population, does not have the highest density. **[3]**

6.6.5 A field measures 600 m by 800 m. (a) Find its area in km². (b) Find the density of 40 sheep in sheep/km². (c) The maximum is 180 sheep/km². How many sheep may graze there? [4]

Student assessment 1

A1.1 A boat travels at 15 km/h for 1 hour. (a) How far does it go? (b) What speed covers the same distance in 2½ hours? [2]

A1.2 A 30 cm ruler breaks in the ratio 8 : 7. How long are the parts? [2]

A1.3 400 g of flour makes 8 cakes. How much flour makes 24 cakes? [1]

A1.5 A map scale is 1 : 25 000. (a) Two villages are 8 cm apart on the map. How far apart are they in km? (b) A lake is 12 km from a village. How far is that on the map in cm? [4]

A1.6 Petrol and oil are mixed 13 : 2. (a) How much of each is in 30 litres? (b) How much petrol goes with 500 ml of oil? [3]

A1.7 A model car is a 1/40 scale model. (a) Write this as a ratio. (b) The real car is 5.5 m long. How long is the model? [2]

A1.9 The angles of a triangle are in the ratio 2 : 5 : 8. Find each angle. [3]

A1.11 Three bricklayers build a wall in 16 hours. How long would eight take? [2]

Student assessment 2

A2.1 A cyclist travels at 20 km/h for 1.5 hours. (a) How far does she go? (b) What speed covers the same distance in 1 hour? [2]

A2.2 A piece of wood is cut in the ratio 3 : 7. (a) What fraction is the longer piece? (b) If the wood is 1.5 m long, how long is the shorter piece? **[3]**

A2.4 A map scale is 1 : 10 000. (a) Two rivers are 4.5 cm apart on the map. How far apart are they in metres? (b) Two towns 8 km apart are how far apart on the map, in cm? **[4]**

A2.6 Divide 3 tonnes in the ratio 2 : 5 : 13. **[3]**

A2.7 The angles of a quadrilateral are in the ratio 2 : 3 : 3 : 4. Find each angle. **[3]**

A2.9 Three pumps fill a pool in 36 hours. (a) How long would eight pumps take? (b) How many pumps fill it in 9 hours? **[3]**

A2.11 A tap at 1.2 litres per minute fills a container in 4 minutes. (a) How long at 1 litre per minute, in minutes and seconds? (b) What rate fills it in 3 minutes? **[3]**

A2.12 A 60 cm by 25 cm map is reduced twice in the ratio 3 : 5. Find its final dimensions. [3]

Check yourself

1. Explain how you decide whether a problem is direct or inverse proportion. Give one example of each. [2]

2. Why must you add the parts of a ratio before you share a quantity? [2]

3. A student says 15 minutes is 0.15 hours. Explain the mistake and give the correct value. [2]

4. Lengths are doubled. Explain why the area is multiplied by 4, not 2. [2]

Chapter quiz

Q1 A machine fills 500 bottles in 15 minutes. How many does it fill in 90 minutes?

A	B	C	D
1500	2500	3000	7500

Q2 Tin and copper are mixed 8 : 3. How much tin goes with 36 g of copper?

A	B	C	D
13.5 g	44 g	96 g	288 g

Q3 Divide 20 m in the ratio 3 : 2.

A	B	C	D
6 m and 4 m	10 m and 10 m	12 m and 8 m	15 m and 5 m

Q4 Angles of a triangle are in the ratio 1 : 2 : 3. What is the largest angle?

A	B	C	D
60°	90°	120°	180°

Q5 8 people pick the apples in 6 days. How long do 12 people take?

A	B	C	D
4 days	9 days	10 days	16 days

Q6 A 12 cm by 8 cm photo is enlarged in the ratio 3 : 2. What is the new size?

A	B	C	D
8 cm by 5⅓ cm	15 cm by 11 cm	18 cm by 12 cm	36 cm by 16 cm

Q7 A train travels 140 km at 120 km/h. How long does the journey take?

A	B	C	D
1 h 10 min	1 h 16 min	1 h 20 min	1 h 40 min

Q8 A village of 540 people has an area of 8 km^2. What is its population density?

A	B	C	D
14.8 people/km^2	67.5 people/km^2	532 people/km^2	4320 people/km^2

End of assignment · Check your answers against the chapter at gurujazzy.com/subjects/o-level-mathematics/chapter-6-ratio-and-proportion/