

Name _____

Date _____

12.1 Understanding ratio — worked answers

Write and simplify ratios, find equivalent ratios, and connect a ratio to the fractions of the whole. · 53 questions

A · Fluency — Simplify, scale and convert to fractions.

- 1 Write the ratio **4 : 6** in its simplest form.

Answer: 2 : 3

The HCF of 4 and 6 is 2. Dividing both parts by it gives 2 : 3.

- 2 Write the ratio **10 : 15** in its simplest form.

Answer: 2 : 3

The HCF of 10 and 15 is 5. Dividing both parts by it gives 2 : 3.

- 3 Write the ratio **12 : 18** in its simplest form.

Answer: 2 : 3

The HCF of 12 and 18 is 6. Dividing both parts by it gives 2 : 3.

- 4 Write the ratio **8 : 20** in its simplest form.

Answer: 2 : 5

The HCF of 8 and 20 is 4. Dividing both parts by it gives 2 : 5.

- 5 Write the ratio **14 : 21** in its simplest form.

Answer: 2 : 3

The HCF of 14 and 21 is 7. Dividing both parts by it gives 2 : 3.

- 6 Write the ratio **9 : 24** in its simplest form.

Answer: 3 : 8

The HCF of 9 and 24 is 3. Dividing both parts by it gives 3 : 8.

- 7 Write the ratio **16 : 40** in its simplest form.

Answer: 2 : 5

The HCF of 16 and 40 is 8. Dividing both parts by it gives 2 : 5.

- 8 Write the ratio **25 : 35** in its simplest form.

Answer: 5 : 7

The HCF of 25 and 35 is 5. Dividing both parts by it gives 5 : 7.

- 9 Write the ratio **18 : 27** in its simplest form.

Answer: 2 : 3

The HCF of 18 and 27 is 9. Dividing both parts by it gives 2 : 3.

- 10 Write the ratio **30 : 45** in its simplest form.

Answer: 2 : 3

The HCF of 30 and 45 is 15. Dividing both parts by it gives 2 : 3.

- 11** Write the ratio **6 : 8** in its simplest form.

Answer: 3 : 4

The HCF of 6 and 8 is 2. Dividing both parts by it gives 3 : 4.

- 12** Write the ratio **20 : 50** in its simplest form.

Answer: 2 : 5

The HCF of 20 and 50 is 10. Dividing both parts by it gives 2 : 5.

- 13** Write the ratio **4 : 6 : 8** in its simplest form.

Answer: 2 : 3 : 4

The HCF of all three is 2, giving 2 : 3 : 4.

- 14** Write the ratio **10 : 15 : 25** in its simplest form.

Answer: 2 : 3 : 5

The HCF of all three is 5, giving 2 : 3 : 5.

- 15** Write the ratio **12 : 18 : 30** in its simplest form.

Answer: 2 : 3 : 5

The HCF of all three is 6, giving 2 : 3 : 5.

- 16** Write the ratio **9 : 6 : 15** in its simplest form.

Answer: 3 : 2 : 5

The HCF of all three is 3, giving 3 : 2 : 5.

- 17** Write the ratio **20 : 30 : 50** in its simplest form.

Answer: 2 : 3 : 5

The HCF of all three is 10, giving 2 : 3 : 5.

- 18** The ratio 2 : 3 is equivalent to 8 : ?. What is the missing number?

Answer: 12

The first part was multiplied by 4 ($2 \times 4 = 8$), so the second must be too: $3 \times 4 = 12$.

- 19** The ratio 3 : 5 is equivalent to 9 : ?. What is the missing number?

Answer: 15

The first part was multiplied by 3 ($3 \times 3 = 9$), so the second must be too: $5 \times 3 = 15$.

- 20** The ratio 1 : 4 is equivalent to 7 : ?. What is the missing number?

Answer: 28

The first part was multiplied by 7 ($1 \times 7 = 7$), so the second must be too: $4 \times 7 = 28$.

- 21** The ratio 5 : 2 is equivalent to 30 : ?. What is the missing number?

Answer: 12

The first part was multiplied by 6 ($5 \times 6 = 30$), so the second must be too: $2 \times 6 = 12$.

- 22** The ratio 3 : 7 is equivalent to 15 : ?. What is the missing number?

Answer: 35

The first part was multiplied by 5 ($3 \times 5 = 15$), so the second must be too: $7 \times 5 = 35$.

- 23** The ratio 4 : 9 is equivalent to 8 : ?. What is the missing number?

Answer: 18

The first part was multiplied by 2 ($4 \times 2 = 8$), so the second must be too: $9 \times 2 = 18$.

- 24** The ratio 7 : 3 is equivalent to 28 : ?. What is the missing number?

Answer: 12

The first part was multiplied by 4 ($7 \times 4 = 28$), so the second must be too: $3 \times 4 = 12$.

- 25** The ratio 2 : 5 is equivalent to 16 : ?. What is the missing number?

Answer: 40

The first part was multiplied by 8 ($2 \times 8 = 16$), so the second must be too: $5 \times 8 = 40$.

- 26** In the ratio **2 : 3**, what fraction of the whole is the first part?

Answer: 2/5

There are $2 + 3 = 5$ parts altogether, and the first share is 2 of them.

- 27** In the ratio **1 : 4**, what fraction of the whole is the first part?

Answer: 1/5

There are $1 + 4 = 5$ parts altogether, and the first share is 1 of them.

- 28** In the ratio **3 : 5**, what fraction of the whole is the first part?

Answer: 3/8

There are $3 + 5 = 8$ parts altogether, and the first share is 3 of them.

- 29** In the ratio **5 : 2**, what fraction of the whole is the first part?

Answer: 5/7

There are $5 + 2 = 7$ parts altogether, and the first share is 5 of them.

- 30** In the ratio **3 : 7**, what fraction of the whole is the first part?

Answer: 3/10

There are $3 + 7 = 10$ parts altogether, and the first share is 3 of them.

- 31** In the ratio **4 : 5**, what fraction of the whole is the first part?

Answer: 4/9

There are $4 + 5 = 9$ parts altogether, and the first share is 4 of them.

B · Reasoning — What a ratio does and does not say.

- 32** What does the ratio 3 : 2 mean?

- ☐ 3 more than 2
- ☐ For every 3 of the first there are 2 of the second
- ☐ 3 out of 2
- ☐ 3 divided by 2 parts

Answer: For every 3 of the first there are 2 of the second

A ratio compares two amounts, part with part.

- 33** How do you simplify a ratio?

- ☐ Subtract the smaller from the larger
- ☐ Divide every part by their highest common factor
- ☐ Add the parts
- ☐ Multiply the parts

Answer: Divide every part by their highest common factor

Exactly like simplifying a fraction, but with every part.

34 Does the order of a ratio matter?

- ☐ No
- ☐ Yes — $3 : 2$ is not the same as $2 : 3$
- ☐ Only for large numbers
- ☐ Only in word problems

Answer: Yes — $3 : 2$ is not the same as $2 : 3$

The first number always belongs to the first thing named.

35 In the ratio $2 : 3$, what fraction of the whole is the first part?

- ☐ $\frac{2}{3}$
- ☐ $\frac{2}{5}$
- ☐ $\frac{3}{5}$
- ☐ $\frac{1}{2}$

Answer: $\frac{2}{5}$

There are 5 parts in total, and 2 of them are the first share. Confusing $\frac{2}{3}$ with $\frac{2}{5}$ is the classic error.

36 What is the difference between a ratio and a fraction?

- ☐ Nothing
- ☐ A ratio compares part with part; a fraction compares part with whole
- ☐ A fraction is bigger
- ☐ A ratio uses a colon

Answer: A ratio compares part with part; a fraction compares part with whole

$2 : 3$ and $\frac{2}{3}$ describe different things.

37 Is $6 : 9$ the same ratio as $2 : 3$?

- ☐ Yes
- ☐ No

Answer: Yes

Divide both parts by 3.

38 Is $4 : 6$ the same ratio as $6 : 4$?

- ☐ Yes
- ☐ No

Answer: No

The order matters; $4 : 6$ simplifies to $2 : 3$ and $6 : 4$ to $3 : 2$.

39 Two lengths are in the ratio $1 : 4$. What can you say?

- ☐ They are equal
- ☐ The second is four times the first
- ☐ The second is 4 more
- ☐ The first is four times the second

Answer: The second is four times the first

One part against four equal parts.

C · Challenge — Units, three parts and missing values.

40 Simplify the ratio $45 : 60 : 75$.

Answer: $3 : 4 : 5$

The HCF of all three is 15.

- 41** A ratio 3 : 5 is equivalent to 21 : n. What is n?

Answer: 35

$3 \times 7 = 21$, so $n = 5 \times 7 = 35$.

- 42** A ratio a : 8 simplifies to 3 : 4. What is a?

Answer: 6

$8 \div 4 = 2$, so $a = 3 \times 2 = 6$.

- 43** Write 40 cm : 1 m as a ratio in its simplest form.

Answer: 2 : 5

Use the same units first: 40 cm : 100 cm, which simplifies to 2 : 5.

- 44** Write 30 minutes : 2 hours as a ratio in its simplest form.

Answer: 1 : 4

Same units: 30 min : 120 min = 1 : 4.

- 45** In the ratio 3 : 7, what fraction of the whole is the second part?

Answer: 7/10

There are 10 parts and 7 are the second share.

D · Word problems — Recipes, mixtures and maps.

- 46** A recipe uses 200 g of flour and 300 g of sugar. Write the ratio in its simplest form.

Answer: 2 : 3

200 : 300 divides by 100.

- 47** A class has 12 boys and 18 girls. Write the ratio of boys to girls in its simplest form.

Answer: 2 : 3

The HCF of 12 and 18 is 6.

- 48** A drink mixes 50 ml of syrup with 250 ml of water. Write the ratio in its simplest form.

Answer: 1 : 5

50 : 250 divides by 50.

- 49** Concrete mixes cement and sand in the ratio 1 : 4. For 3 kg of cement, how much sand is needed, in kg?

Answer: 12

$4 \times 3 = 12$ kg.

- 50** Paint mixes red and white in the ratio 2 : 5. For 6 litres of red, how much white, in litres?

Answer: 15

$6 \div 2 = 3$, and $5 \times 3 = 15$ litres.

- 51** A map scale is 1 : 50 000. How many cm on the ground is 1 cm on the map?

Answer: 50000

The scale says 50 000 cm.

- 52** A class has boys and girls in the ratio 3 : 4. If there are 9 boys, how many girls?

Answer: 12

$9 \div 3 = 3$, and $4 \times 3 = 12$.

- 53** A shop sells apples and pears in the ratio 5 : 2. If 40 apples are sold, how many pears?

Answer: 16

$40 \div 5 = 8$, and $2 \times 8 = 16$.