RATIOS

A DEFINITION

A.1 EXPRESSING RATIOS IN DIFFERENT FORMS

Ex 1: The ratio 3 to 2 is $\boxed{3}:\boxed{2}$.

Answer: The ratio 3 to 2 can be expressed as $3:2$ or $\frac{3}{2}$.

Ex 2: The ratio 5 to 4 is $\boxed{5}:\boxed{4}$.

Answer: The ratio 5 to 4 can be expressed as $5:4$ or $\frac{5}{4}$.

Ex 3: The ratio 7 to 3 is $\boxed{7}:\boxed{3}$.

Answer: The ratio 7 to 3 can be expressed as $7:3$ or $\frac{7}{3}$.

Ex 4: The ratio 8 to 5 is $\boxed{8}:\boxed{5}$.

Answer: The ratio 8 to 5 can be expressed as $8:5$ or $\frac{8}{5}$.

Ex 5: The ratio 10 to 6 is $\boxed{10}:\boxed{6}$.

Answer: The ratio 10 to 6 can be expressed as $10:6$ or $\frac{10}{6}$.

B PART-PART AND PART-WHOLE RATIOS

B.1 FINDING RATIOS IN PART-PART

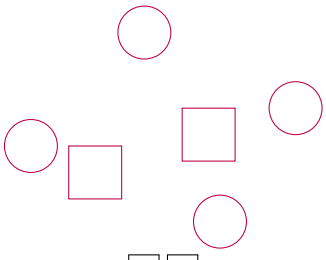
Ex 6: What is the ratio of girls to boys?

$\boxed{2}:\boxed{3}$

Answer:

- There are 2 girls.
- There are 3 boys.
- The ratio of girls to boys is $2:3$ or $\frac{2}{3}$.

Ex 7: What is the ratio of circles to rectangles?

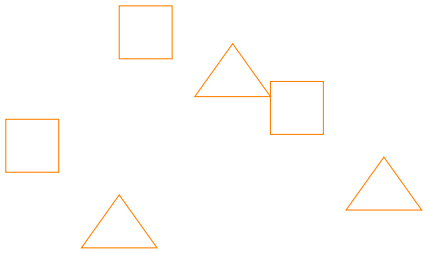


$\boxed{4}:\boxed{2}$

Answer:

- There are 4 circles.
- There are 2 rectangles.
- The ratio of circles to rectangles is $4:2$ or $\frac{4}{2}$.

Ex 8: What is the ratio of squares to triangles?



$\boxed{3}:\boxed{3}$

Answer:

- There are 3 squares.
- There are 3 triangles.
- The ratio of squares to triangles is $3:3$ or $\frac{3}{3}$.

Ex 9: What is the ratio of oranges to lemons?

$\frac{\boxed{4}}{\boxed{3}}$

Answer:

- There are 4 oranges.
- There are 3 lemons.
- The ratio of oranges to lemons is $\frac{4}{3}$, or $4:3$.

Ex 10: What is the ratio of girls to boys?

$\frac{\boxed{2}}{\boxed{4}}$

Answer:

- There are 2 girls.
- There are 4 boys.
- The ratio of girls to boys is $\frac{2}{4}$, or $2:4$.

B.2 FINDING RATIOS IN PART-WHOLE

Ex 11: What is the ratio of girls to kids?

$\boxed{2}:\boxed{5}$

Answer:

- There are 2 girls.
- There are 5 kids.
- The ratio of girls to kids is $2:5$ or $\frac{2}{5}$.

Ex 12: What is the ratio of boys to kids?

$\boxed{1}:\boxed{4}$

Answer:

- There is 1 boy.
- There are 4 kids.
- The ratio of boys to kids is $1:4$ or $\frac{1}{4}$.

Ex 13: Louis loves to play sports. In all, he has earned 5 swimming medals, 3 running medals, 6 cycling medals, and 2 triathlon medals.
What is the ratio of Louis's swimming medals to all of his medals?

$\boxed{5}:\boxed{16}$

Answer:

- Louis has earned 5 swimming medals.
- $$5+3+6+2=16$$
  Louis has earned 16 total medals.
- The ratio of swimming medals to all of his medals is $5:16$ or $\frac{5}{16}$.

Ex 14: Anna loves to read books. In all, she has read 12 mystery novels, 8 science fiction novels, 5 fantasy novels, and 3 historical novels.
What is the ratio of Anna's mystery novels to all of her books?

$\boxed{12}:\boxed{28}$

Answer:

- Anna has read 12 mystery novels.
- $$12+8+5+3=28$$
  Anna has read 28 books in total.
- The ratio of mystery novels to all of her books is $12:28$ or $\frac{12}{28}$.

Ex 15: The table shows the number of different types of birds that are swimming at a lake.

Bird	Number
Seagulls	1
Ducks	9
Geese	7
Swans	2

What is the ratio of swans to total birds?

$\boxed{2}:\boxed{19}$

Answer:

- There are 2 swans.
- There are $1+9+7+2=19$ birds.
- The ratio of swans to total birds is $2:19$ or $\frac{2}{19}$.

Ex 16: The table shows the number of different types of fruits in a basket.

Fruit	Number
Apples	3
Oranges	5
Bananas	4
Grapes	6

What is the ratio of apples to total fruits?

$\boxed{3}:\boxed{18}$

Answer:

- There are 3 apples.
- There are $3+5+4+6=18$ fruits.
- The ratio of apples to total fruits is $3:18$ or $\frac{3}{18}$.

Ex 17: The table shows the number of different types of vehicles in a parking lot.

Vehicle	Number
Cars	10
Bicycles	6
Motorcycles	4
Trucks	2

What is the ratio of trucks to total vehicles?

$\boxed{2}:\boxed{22}$

Answer:

- There are 2 trucks.
- There are $10+6+4+2=22$ vehicles.
- The ratio of trucks to total vehicles is $2:22$ or $\frac{2}{22}$.

C EQUAL RATIOS

C.1 MULTIPLYING THE RATIOS

Ex 18: Multiply the ratio by 2:

$$3 : 5 = \boxed{6} : \boxed{10}$$

Answer:

- $\frac{3}{5} \overset{\times 2}{=} \frac{6}{10}$ ($\times 2$ above and below)
- $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$
- $3 : 5 = 6 : 10$.

Ex 19: Multiply the ratio by 3:

$$4 : 7 = \boxed{12} : \boxed{21}$$

Answer:

- $\frac{4}{7} \overset{\times 3}{=} \frac{12}{21}$ ($\times 3$ above and below)
- $\frac{4}{7} = \frac{4 \times 3}{7 \times 3} = \frac{12}{21}$
- $4 : 7 = 12 : 21$.

Ex 20: Multiply the ratio by 4:

$$5 : 3 = \boxed{20} : \boxed{12}$$

Answer:

- $\frac{5}{3} \overset{\times 4}{=} \frac{20}{12}$ ($\times 4$ above and below)
- $\frac{5}{3} = \frac{5 \times 4}{3 \times 4} = \frac{20}{12}$
- $5 : 3 = 20 : 12$.

Ex 21: Multiply the ratio by 5:

$$2 : 5 = \boxed{10} : \boxed{25}$$

Answer:

- $\frac{2}{5} \overset{\times 5}{=} \frac{10}{25}$ ($\times 5$ above and below)
- $\frac{2}{5} = \frac{2 \times 5}{5 \times 5} = \frac{10}{25}$
- $2 : 5 = 10 : 25$.

C.2 FINDING THE MISSING VALUE

Ex 22:

$$1 : 2 = 2 : \boxed{4}$$

Answer:

- $\frac{1}{2} \overset{\times 2}{=} \frac{2}{4}$ ($\times 2$ above and below)
- $\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$
- $1 : 2 = 2 : 4$.

Ex 23:

$$2 : 3 = \boxed{4} : 6$$

Answer:

- $\frac{2}{3} \overset{\times 2}{=} \frac{4}{6}$ ($\times 2$ above and below)
- $\frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$
- $2 : 3 = 4 : 6$.

Ex 24:

$$3 : 5 = 9 : \boxed{15}$$

Answer:

- $\frac{3}{5} \overset{\times 3}{=} \frac{9}{15}$ ($\times 3$ above and below)
- $\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$

- $3:5=9:15$.

Ex 25:

$$4:7=\boxed{8}:14$$

Answer:

- $\frac{4}{7} \overset{\times 2}{=} \frac{8}{14}$
- $$\begin{aligned}\frac{4}{7} &= \frac{4\times 2}{7\times 2}\\ &= \frac{8}{14}\end{aligned}$$
- $4:7=8:14$.

Ex 26:

$$2:3=8:\boxed{12}$$

Answer:

- $\frac{2}{3} \overset{\times 4}{=} \frac{8}{12}$
- $$\begin{aligned}\frac{2}{3} &= \frac{2\times 4}{3\times 4}\\ &= \frac{8}{12}\end{aligned}$$
- $2:3=8:12$.

Ex 27:

$$3:2=\boxed{30}:20$$

Answer:

- $\frac{3}{2} \overset{\times 10}{=} \frac{30}{20}$
- $$\begin{aligned}\frac{3}{2} &= \frac{3\times 10}{2\times 10}\\ &= \frac{30}{20}\end{aligned}$$
- $3:2=30:20$.

D PROPORTION

D.1 IDENTIFYING THE PROPORTION

MCQ 28: Two vinaigrettes are being prepared:

- Vinaigrette A is made with 2 mL of oil and 1 mL of vinegar.
- Vinaigrette B is made with 4 mL of oil and 2 mL of vinegar.

Will these two vinaigrettes taste the same?

☒ Yes

☐ No

Answer:

- $\frac{2}{1} \overset{\times 2}{=} \frac{4}{2}$
- Since both ratios are equal, there is a proportion. So, the vinaigrettes will taste the same.

MCQ 29: On the cement package, it is indicated: 2 kilos of cement for 3 liters of water.
A worker prepares a mixture with 4 kilos of cement and 6 liters of water.
Did he follow the recommended proportions?

☒ Yes

☐ No

Answer:

- $\frac{2}{3} \overset{\times 2}{=} \frac{4}{6}$
- Since the two ratios are equal, the worker followed the recommended proportions.

MCQ 30: Two smoothie recipes are being prepared:

- Smoothie A is made with 3 cups of fruit and 2 cups of yogurt.
- Smoothie B is made with 6 cups of fruit and 4 cups of yogurt.

Will these two smoothies taste the same?

☒ Yes

☐ No

Answer:

- $\frac{3}{2} \overset{\times 2}{=} \frac{6}{4}$
- Since both ratios are equal, the proportions are the same. Therefore, the smoothies will taste the same.

MCQ 31: A gardener uses a fertilizer mix:

- The recommended mix is 5 grams of fertilizer per 2 liters of water.
- The gardener prepares a mixture with 10 grams of fertilizer and 4 liters of water.

Did the gardener follow the recommended proportions?

☐ Yes

☐ No

Answer:

- $\frac{5}{2} = \frac{10}{4}$ ($\times 2$ on both sides)
- Since both ratios are equals, the gardener followed the recommended proportions.