



Junior Cert Maths

Free Notes

Ratios



Ratios

A Ratio is a way of comparing the sizes of two or more quantities
A colon (:) is used to express Ratios

If you multiply/divide one side of a ratio you must multiply/divide the other side of the ratio by the same amount

$$\begin{array}{ll} 3 : 9 = 1 : 3 & 9 : 21 = 3 : 7 \\ 5 : 25 = 1 : 5 & 91 : 143 = 7 : 11 \\ 4 : 14 = 2 : 7 & 104 : 136 = 13 : 17 \end{array}$$

When dealing with Ratios add the separate parts of the ratio to get the total amount

$$\begin{array}{l} 1 : 9 \text{ Total amount } 1 + 9 = 10 \\ 2 : 3 \text{ Total amount } 2 + 3 = 5 \\ 3 : 8 \text{ Total amount } 3 + 8 = 11 \\ 5 : 14 \text{ Total amount } 5 + 14 = 19 \\ 1 : 3 : 5 \text{ Total amount } 1 + 3 + 5 = 9 \\ 2 : 5 : 7 \text{ Total amount } 2 + 5 + 7 = 14 \end{array}$$

Next split each part of the ratio into a fraction of the total amount.

$$\begin{array}{ll} 1 : 9 = \frac{1}{10} \text{ and } \frac{9}{10} & 2 : 3 = \frac{2}{5} \text{ and } \frac{3}{5} \\ 3 : 8 = \frac{3}{11} \text{ and } \frac{8}{11} & 5 : 14 = \frac{5}{19} \text{ and } \frac{14}{19} \\ 1 : 3 : 5 = \frac{1}{9} \frac{3}{9} \text{ and } \frac{5}{9} & 2 : 5 : 7 = \frac{2}{14} \frac{5}{14} \text{ and } \frac{7}{14} \end{array}$$

Adding the all of the fractions together should always equal 1

When calculating the ratio to be given out multiply by the fraction of the total amount

$$\begin{array}{ll} \begin{array}{l} 1 : 9 \text{ of } 100 \\ \frac{1}{10} \times 100 = 10 \quad \frac{9}{10} \times 100 = 90 \end{array} & \begin{array}{l} 2 : 3 \text{ of } 450 \\ \frac{2}{5} \times 450 = 180 \quad \frac{3}{5} \times 450 = 270 \end{array} \\ \begin{array}{l} 3 : 8 \text{ of } 13200 \\ \frac{3}{11} \times 13200 = 3600 \quad \frac{8}{11} \times 13200 = 9600 \\ 28000 \end{array} & \begin{array}{l} 5 : 14 \text{ of } 38000 \\ \frac{5}{19} \times 38000 = 10000 \quad \frac{14}{19} \times 38000 = \end{array} \end{array}$$

$$\frac{1}{9} \times 28800 = 3200 \quad 1 : 3 : 5 \text{ of } 28800 \quad \frac{3}{9} \times 28800 = 9600 \quad \frac{5}{9} \times 28800 = 16000$$

$$\frac{2}{14} \times 406000 = 58000 \quad 2 : 5 : 7 \text{ of } 406000 \quad \frac{5}{14} \times 406000 = 145000 \quad \frac{7}{14} \times 406000 = 203000$$

Adding all of the ratios together should always give the total amount

10.1

The lengths of two pieces of timber are in a ratio of 5 : 2.

The larger piece measures 250 mm.

Find the length of the shorter piece.

$$\frac{250}{5} = 50$$

$$50 \times 2 = 100\text{mm}$$

10.2

Peter and Anne share a lottery prize in the ratio 3.5: 2.5 Peter's share is €35000

What is the total prize fund?

$$\frac{35000}{3.5} = 10000$$

$$\begin{aligned} \text{Anne's share} &= 2.5 \times 10000 \\ &= 25000 \end{aligned}$$

$$25000 + 35000 = \text{€}60000$$

10.3

Two brands of blackcurrant squash drinks contain concentrated juice and sugar.

In brand A, the ratio of concentrated juice to sugar is 19:1.

In brand B, the ratio of concentrated juice to sugar is 9:1.

(i) " What is the volume of concentrated juice in

500 ml of brand A?

$$\text{Total amount} = 19+1 = 20$$

$$\text{Volume of Juice} = \frac{19}{20}$$

$$500 \times \frac{19}{20} = 475\text{ml}$$

(ii) What is the volume of sugar in 300 ml of brand B?

$$\text{Total amount} = 9+1 = 10$$

$$\text{Volume of sugar} = \frac{1}{10}$$

$$300 \times \frac{1}{10} = 30\text{ml}$$

500 ml of brand A is mixed with 300 ml of brand B.

(iii) " What is the ratio of the concentrated juice to the sugar in the mixture?

$$475 = \text{juice in brand A}$$

$$500 - 475 = 25\text{ml}$$

$$25\text{ml} = \text{Sugar in Brand A}$$

$$\text{Total amount of Sugar} = 25 + 30 = 55\text{ml}$$

$$\text{Total amount of blackcurrant} = 500+300 = 800\text{ml}$$

$$\text{Total amount of juice} = 800-55 = 745\text{ml}$$

$$\text{We get the ratio } 55:745$$

$$= 11:149$$

10.4

A soccer team has three strikers John, Paul and Michael. The number of minutes each had played by the end of a particular season is shown below. The team divided a bonus of €150 000 between its strikers in proportion to the time each had played.

Name	Minutes Played
John	2250
Paul	2600

Michael 150

(a) Calculate the amount each player received.

$$2250 + 2600 + 150 = 5000$$

$$\text{John receives } \frac{2250}{5000} \times 150000 = \text{€}67500$$

$$\text{Paul receives } \frac{2600}{5000} \times 150000 = \text{€}78000$$

$$\text{Michael receives } \frac{150}{5000} \times 150000 = \text{€}4500$$

At the end of the following season a larger total bonus was paid. At that time, John said: “The bonus should be paid according to the number of goals scored by the striker. Paul scored 50% more goals than Michael. I scored as many as both of them together. I would get €140 000 if the team used this method.” How much each would Paul and Michael get under John’s system?

Make a ratio Michael : Paul : John

Michael scored the least amount of goals so put him as 1 in the ratio

Paul scored 50% more goals than Michael

$$50\% = 0.5$$

$$0.5 \times 1 = 0.5$$

$$0.5 + 1 = 1.5$$

John scored twice as many as the two of them together

$$2(1 + 1.5) = 5$$

We get the ratio

$$1 : 1.5 : 5 \quad \text{Total number } 1 + 1.5 + 5 = 7.5$$

$$\frac{5}{7.5} = 140000$$

So then

$$\frac{1}{7.5} = 28000 \quad \text{and} \quad \frac{1.5}{7.5} = 42000$$

Michael gets €28000 and Paul gets €42000

Calculate the total bonus on offer?

$$140000 + 28000 + 42000 = €210000$$

10.5

Three business partners, Aideen, Brian and Caroline, invest €30000, €40000 and €70000 respectively. At the end of each year, 22.5% of the profit made is placed in reserve and the remainder is divided among the partners in proportion to their investments.

(i) " Given that in 2007, the profit amounted to €12880, calculate the amount placed in reserve.

$$22.5\% = 0.225$$

$$12880 \times 0.225 = €2898$$

(ii) " In 2008, Caroline's portion of the profit was €9331. Calculate how much Aideen and Brian each received in 2008.

Ratio Aideen : Brian : Caroline
 30000 : 40000 : 70000
 3 : 4 : 7

$$\text{Total number } 3 + 4 + 7 = 14$$

$$\frac{7}{14} = 9331$$

So

$$\frac{3}{14} = 3999$$

$$\frac{4}{14} = 5332$$

Aideen gets €3999 Brian gets €5332

(iii) " Calculate the amount placed in reserve in 2008.

$$3999 + 5332 + 9331 = €18662$$

$$100\% - 22.5\% = 77.5\%$$

$$77.5\% = 18662$$

1% = 240.80 22.5% = 5418 €5418 placed in the reserve

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