

Complete solutions to Intro(k)

1. (a) What do 10 and 100 have in common?

A common factor of 10. Divide both by 10:

$$100 \div 10 = 10$$

$$10 \div 10 = 1$$

We have $100:10 = 10:1$.

(b) 23 is a common factor of 69 and 23. Divide both by 23.

$$69 \div 23 = 3$$

$$23 \div 23 = 1$$

Hence $69:23 = 3:1$.

(c) What is a common factor of 5, 25 and 45?

Obviously 5, dividing all three numbers by 5:

$$5 \div 5 = 1, 25 \div 5 = 5 \text{ and } 45 \div 5 = 9$$

Hence $5:25:45 = 1:5:9$.

(d) What do 6, 42, 54 and 72 have in common?

A factor of 6. Dividing each by 6:

$$6 \div 6 = 1, 42 \div 6 = 7, 54 \div 6 = 9 \text{ and } 72 \div 6 = 12$$

Hence $6:42:54:72 = 1:7:9:12$.

(e) It is easier to use whole numbers rather than fractions. What is the lowest common multiple of 3 and 6?

6, multiply both fractions by 6:

$$\frac{2}{3} \times 6 = 4, \quad \frac{5}{6} \times 6 = 5$$

Hence $\frac{2}{3}:\frac{5}{6} = 4:5$.

2. (a) We can write ratio as a division. We have

$$1\frac{1}{5}:2\frac{1}{4} = 1\frac{1}{5} \div 2\frac{1}{4}$$

$1\frac{1}{5} \div 2\frac{1}{4}$ on a calculator gives $\frac{8}{15}$, hence

$$1\frac{1}{5}:2\frac{1}{4} = 8:15$$

(b) Similarly evaluating $3\frac{1}{2} \div 2\frac{5}{12}$ on a calculator gives $1\frac{13}{29}$ which we can write as a top-heavy fraction:

$$1\frac{13}{29} = \frac{(1 \times 29) + 13}{29} = \frac{42}{29}$$

Hence $3\frac{1}{2}:2\frac{5}{12} = 42:29$.

3. (a) Multiplying 0.4 and 0.5 by 10:

$$0.4 \times 10 = 4 \text{ and } 0.5 \times 10 = 5$$

$0.4:0.5 = 4:5$.

(b) How do we convert 0.52 and 0.72 into whole numbers?

Multiply by 100:

$$0.52 \times 100 = 52$$

$$0.72 \times 100 = 72$$

Thus $0.52:0.72 = 52:72$. What do 52 and 72 have in common?

A factor of 4, dividing by 4:

$$52 \div 4 = 13 \text{ and } 72 \div 4 = 18$$

We have $52:72 = 13:18$ so

$$0.52:0.72 = 13:18$$

(c) We need to write $\sqrt{8}$ in terms of $\sqrt{2}$, if possible?

$$\sqrt{8} = \sqrt{4 \times 2} = \sqrt{4} \sqrt{2} = 2\sqrt{2}$$

We have $\sqrt{2}:\sqrt{8} = \sqrt{2}:2\sqrt{2}$. That is $\sqrt{2}$ and $\sqrt{8}$ have a common factor of $\sqrt{2}$, so dividing both by $\sqrt{2}$:

$$\sqrt{2} \div \sqrt{2} = 1$$

$$\sqrt{8} \div \sqrt{2} = 2\sqrt{2} \div \sqrt{2} = \frac{2\sqrt{2}}{\sqrt{2}} = 2$$

Therefore $\sqrt{2}:\sqrt{8} = 1:2$.

4. What is the total number of parts?

$$2 + 3 + 5 = 10$$

We divide length $0.64m$ into 10 equal parts:

$$0.64 \div 10 = 0.064m$$

Since the ratio is 2:3:5 we multiply $0.064m$ by 2, 3 and 5 to give the length of each piece:

$$2 \times 0.064m = 0.128m$$

$$3 \times 0.064m = 0.192m$$

$$5 \times 0.064m = 0.32m$$

5. The total number of parts is $8 + 3 = 11$, so the mass of each part is

$$66kg \div 11 = 6kg$$

Since copper is 8 parts, we multiply $6kg$ by 8:

$$\text{copper mass} = 6kg \times 8 = 48kg$$

Zinc is 3 parts, so

$$\text{zinc mass} = 6kg \times 3 = 18kg$$

6. What is the total number of parts?

$$3 + 4 + 6 = 13$$

We divide $45.5kg$ into 13 equal parts:

$$45.5 \div 13 = 3.5$$

There is $3.5kg$ in each part, so

$$\text{copper mass } 3 \times 3.5kg = 10.5kg$$

$$\text{zinc mass } 4 \times 3.5kg = 14kg$$

$$\text{nickel mass } 6 \times 3.5kg = 21kg$$

7. The total number of parts is $2 + 3 + 5 + 4 = 14$.

The number of students in each part is evaluated by dividing 1260 by 14:

$$1260 \div 14 = 90$$

There are 90 students in each part.

$$\text{Number of students in manufacturing} = 2 \times 90 = 180$$

$$\text{Number of students in building services} = 3 \times 90 = 270$$

$$\text{Number of students in vehicle} = 5 \times 90 = 450$$

$$\text{Number of students in control} = 4 \times 90 = 360$$