

MATH · Y5-Y6

Bar Models — Fractions & Percentages

Solve fraction-of and percentage-of problems by drawing them

Why bar models work for fractions

A bar model makes a fraction visible. To find $\frac{3}{4}$ of 24, draw a bar of 24, split it into 4 equal parts (each is $24 \div 4 = 6$), then take 3 of those parts ($3 \times 6 = 18$). The bar shows you exactly what 'three quarters of' means. The same approach works for percentages — 25% of 80 means split 80 into 4 equal parts (since $25\% = \frac{1}{4}$), giving 20 in each part. Bar models are especially powerful for reverse problems — '15 is $\frac{3}{5}$ of what number?' is hard until you draw a bar of 5 parts where 3 of them = 15, then each part = 5, so the whole is 25.

Worked example: 'I had £36 and spent $\frac{2}{5}$ of it. How much is left?'

Draw a bar of £36. Split into 5 equal parts. Each part = $\text{£}36 \div 5 = \text{£}7.20$. 2 parts spent ($2 \times \text{£}7.20 = \text{£}14.40$). 3 parts left ($3 \times \text{£}7.20 = \text{£}21.60$). The bar shows the answer visually as well as numerically.

Set 1: Fraction of amount (draw the bar model)

1. Find $\frac{1}{4}$ of 28.
2. Find $\frac{3}{4}$ of 60.
3. Find $\frac{2}{3}$ of 24.
4. Find $\frac{5}{6}$ of 42.
5. Find $\frac{3}{8}$ of 56.
6. Find $\frac{2}{5}$ of £45.
7. Find $\frac{3}{10}$ of 80kg.



8. 8. Find $\frac{7}{10}$ of 200ml.

Set 2: Reverse problems (find the whole)

1. 1. 12 is $\frac{1}{4}$ of what number?
2. 2. 15 is $\frac{3}{5}$ of what number?
3. 3. 24 is $\frac{2}{3}$ of what number?
4. 4. £30 is $\frac{3}{4}$ of what amount?
5. 5. 18kg is $\frac{2}{5}$ of what mass?
6. 6. 42 is $\frac{6}{7}$ of what number?
7. 7. £8 is $\frac{1}{8}$ of what amount?
8. 8. 27cm is $\frac{3}{4}$ of what length?

Set 3: Percentage of amount

1. 1. Find 25% of 80.
2. 2. Find 50% of £42.
3. 3. Find 10% of 70.
4. 4. Find 20% of 60.
5. 5. Find 75% of 40.
6. 6. Find 30% of £80 (hint: 10% three times).
7. 7. Find 5% of 200 (hint: half of 10%).
8. 8. Find 15% of 60 (hint: 10% + 5%).

Set 4: Multi-step bar-model problems

1. 1. Sam had £40. He spent $\frac{1}{4}$ on a book and $\frac{1}{2}$ on lunch. How much is left?
2. 2. A school has 240 children. $\frac{5}{8}$ are boys. How many girls?
3. 3. A water tank holds 600 litres. It is $\frac{2}{3}$ full. How many more litres needed to fill it?
4. 4. A class has 30 children. 60% travelled by bus. How many did NOT travel by bus?



5. 5. After spending £24, James had $\frac{1}{3}$ of his money left. How much did he start with?

6. 6. Two numbers are in ratio 3:5. They add up to 64. What are the numbers?

Answer key

Set 1: 1. 7 2. 45 3. 16 4. 35 5. 21 6. £18 7. 24kg 8. 140ml

Set 2: 1. 48 2. 25 3. 36 4. £40 5. 45kg 6. 49 7. £64 8. 36cm

Set 3: 1. 20 2. £21 3. 7 4. 12 5. 30 6. £24 7. 10 8. 9

Set 4: 1. £10 (spent £30, left with £10) 2. 90 girls ($240 \div 8 = 30$, 3 parts = 90)

3. 200 litres ($\frac{1}{3}$ empty = 200) 4. 12 children (40% didn't take the bus)

5. £36 (£24 was $\frac{2}{3}$, so $\frac{1}{3} = £12$, total = £36) 6. 24 and 40 (8 parts of £8)

