Unit 6 · Percentage

STUDY NOTES

Key terms

Percent: "out of a hundred" (Latin *per centum*); sign **%**: 23% = 23/100 = 0.23.

The whole: 1 = **100%**; half = 50%.

Formulas

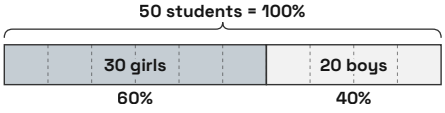
fraction or decimal × 100%	0.23 × 100% = 23% **Use:** → percentage
$p\% = \frac{p}{100}$	take away %, ÷ 100, lowest terms **Use:** → fraction or decimal
$p\%$ of $q = \frac{p}{100} \times q$	"of" means × **Use:** a percentage of an amount
$\frac{a}{b} \times 100\%$	the whole b at the bottom **Use:** what percentage a is of b

Changing between the three

- × 100% changes nothing: 100% is just 1
- 2/5 × 100% = 200/5 % = **40%**; or 2/5 = 40/100 (top and bottom × 20)
- make the denominator 100 when it goes easily into 100 (2, 4, 5, 10, 20, 25, 50); else × 100
  - 3/4 = 75/100 = 0.75 = 75%
  - 0.6 = 60/100 = 60%
  - 4/10 = 0.4 = 40%
- 8% = 8/100 = **2/25** (÷ HCF 4)
- a percentage can have a point: 0.075 = 7.5%; 2.5% = 0.025 = 25/1000 = **1/40**
- more than the whole → more than 100%: 1.8 = **180%**
- small percentage, small decimal: 0.5% = 0.005, not 0.5
- × or ÷ 100: the point moves **two** places

Percentage of a quantity

- 60% of 50 students = 60/100 × 50 = 0.6 × 50 = **30** girls; boys 20 = **40%**
- model drawing: a bar for the whole (100%), cut into 10 pieces of 10%, or quarters of 25%



Model drawing: 60% of 50 students are girls.

- **same unit first**: 15% of 2 km = 15/100 × 2000 m = 300 m
- 75% of Rs 120 = 3/4 × 120 = **Rs 90** (simplify before multiplying)
- 1% of anything = the whole ÷ 100; 10% = ÷ 10: 10% of 350 = 35
- 35% of 4000 units = 35 × 40 = 1400 units
- a% of b = b% of a: 50% of 40 = 40% of 50 = 20; 4% of 75 = 75% of 4 = 3

What percentage is it?

- 8 absent of 50: 8/50 × 100% = **16%**; present 42/50 × 100% = **84%**
- the parts of a whole add up to **100%**: 16% + 84% ✓
- the rest = 100% − the parts given: gold 20%, silver 30%, bronze 35% → no medal 15% (120 of 800)
- 500 m of a 2 km road: 500/2000 × 100% = **25%** (both in m)
- 45 units of 60: 45/60 × 100% = 3/4 × 100% = 75%
- ask first: percentage **of what**? That is the whole, at the bottom

Comparing marks

- maths 18/25 × 100% = **72%**; science 34/50 × 100% = **68%** → better in maths
- percentages put marks out of different totals on one scale, out of 100
- 72% of 50 = 36 marks: 2 more needed in science

Where it is used

- marks
- discounts ("20% off") and taxes
- interest at banks
- reports comparing places
- a phone's battery

COMMON MISTAKES

✗ 3/4 = 34%
✓ 3/4 = 75/100 = 75%.

✗ 0.5% = 0.5
✓ ÷ 100: 0.005.

✗ 8 out of 50 written 50/8
✓ the whole at the bottom: 8/50 × 100% = 16%.

✗ 34 out of 50 is better than 18 out of 25
✓ as percentages: 68% < 72%.

✗ a percentage can't be more than 100
✓ 1.8 = 180%.

✗ 8% left as 8/100
✓ lowest terms: 2/25.

Science Playground, Katunje, Bhaktapur
https://science-playground.com/learn/grade-6-math/percentage