Unit 7 · Percentage

STUDY NOTES

Key terms

Percent: "out of a hundred" (Latin *per centum*, "for each hundred").

%: the percent sign; 47% is read "47 percent".

Percentage: a number out of 100: 47% = 47/100 = 0.47.

- the rest: 53/100 = 0.53 = 53%; together **100%**, the whole
- denominator 100 → the numerator is the percentage
- each small square of a hundred-square = 1%; "20% off": 20 rupees off every 100

Three ways to write one amount

Fraction	Decimal	Percentage
47/100	0.47	47%
4/10 = 40/100	0.4 = 0.40	40%
1/4 = 25/100	0.25	25%
3/5 = 60/100	0.6	60%
1 whole	1	100%

Fraction → percentage

Way 1: make the denominator 100 (top and bottom × the same number); the numerator is the percentage

- 3/5 = (3 × 20)/(5 × 20) = 60/100 = **60%**
- 7/20 = 35/100 = 35%; 1/4 = 25/100 = 25%

Way 2: × 100%; works even when the denominator can't be made 100 (3, 7, 8, 11)

$$\frac{3}{5} \times 100\% = \frac{300}{5}\% = 60\% \qquad \frac{3}{8} \times 100\% = \frac{300}{8}\% = 37\frac{4}{8}\%$$

- 300 ÷ 8 = 37, remainder 4; 4/8 = a half → 37 1/2%

Percentage → fraction

- take off %, divide by 100 (write it over 100)
  - 5% = 5/100
  - 64% = 64/100
  - 45% = 45/100
- mixed number first made improper: 14 1/2% = 29/2% = 29/(2 × 100) = **29/200**

Decimal ⇄ percentage

- decimal × 100%: the point moves **two places right**
  - 0.75 = 75%
  - 0.4 = 40%
  - 1.2 = 120%
- percentage ÷ 100: the point moves **two places left**: 75% = 0.75; 8% = 0.08
- 0.5 = 0.50 = **50%**; 5% = **0.05**

Percentage of a group

1. the part, as a fraction of the whole
2. × 100%

- 55 students, 33 girls: boys 55 − 33 = 22
- girls 33/55 × 100% = 3300/55% = **60%**; boys 2200/55% = **40%**
- 60% + 40% = **100%**: the parts of a whole add up to 100%
- the rest = 100% − the part: girls 3/4 = 75% → boys **25%**
- a percentage **of an amount**: 90% of 75 marks = 90/100 × 75 = 6750/100 = **67.5**
- Rs 60 and Rs 75 of Rs 300: 20% + 25% = 45%; left 55%
- a percentage is a **share**, not how many: 60% girls in a class of 55 is 33 girls

Comparing marks fairly

Subject	Marks	Out of 100
English	18/20	90/100 = 90%
Nepali	20/25	80/100 = 80%
Maths	40/50	80/100 = 80%
Science	35/50	70/100 = 70%
Local subject	70/100	70%

- best: English, though 18 is the smallest mark
- 45 out of 50 = 90/100 = **90%**; 80 out of 100 = **80%** → the first test is better

More than 100%?

- yes: more than one whole is more than 100% (3/2 = 150/100 = 150%)
- a share of one thing (the girls in a class) can't be more than 100%

COMMON MISTAKES

✗ 80 out of 100 beats 45 out of 50, as 80 > 45
✓ compare percentages: 90% beats 80%.

✗ 9/10 = 9%
✓ 9/10 = 90/100 = 90%.

✗ 0.5 = 5%
✓ 0.5 = 0.50 = 50%.

✗ 5% = 0.5
✓ 5% = 5/100 = 0.05.

✗ 60% girls in a class of 55 means 60 girls
✓ a percentage is a share: 33 girls.