Unit 9 · Distance

STUDY NOTES

Key terms

Length: how long a thing is.

Distance: how far apart two places are; measured in the same units as length.

Kilometer (km): 1 km = 1000 m; for roads and trips.

Meter (m): 1 m = 100 cm; for rooms, doors, cloth.

Centimeter (cm): 1 cm = 10 mm; for books, pencils.

Millimeter (mm): the smallest space on a ruler.

Units at a glance

Unit	Short form	How big	Measure with
kilometer	km	1 km = 1000 m	a vehicle's meter, a map
meter	m	1 m = 100 cm	a measuring tape
centimeter	cm	1 cm = 10 mm	a ruler
millimeter	mm	smallest on a ruler	a ruler

- 1 km = 1000 × 100 × 10 mm = **10,00,000 mm** (ten lakh)

Changing units

- **bigger → smaller unit: multiply**; smaller → bigger: divide
- a 1 m stick = 100 cm: the unit got smaller, so the number got bigger
- 3 km 250 m = 3000 + 250 = **3250 m**
- 2075 cm ÷ 100 = 20, 75 left → **20 m 75 cm**
- 4 m 6 cm = 400 + 6 = **406 cm**, not 46
- compare in one unit first: 3 km = 3000 m, more than 2900 m

Multiplying a length

1. multiply each unit by the number
2. move every **10 mm** into 1 cm (or **100 cm** into 1 m, or **1000 m** into 1 km)

- 22 cm 7 mm × 5: 110 cm 35 mm → **113 cm 5 mm** = 1 m 13 cm 5 mm
- 1 m 20 cm × 6: 6 m 120 cm → **7 m 20 cm**
- 3 km 145 m × 7: 21 km 1015 m → **22 km 15 m**
- 45 cm 23 mm = 47 cm 3 mm: carry like an ordinary sum
- multiplying = joining equal pieces end to end

Dividing a length

Way 1

1. share the **bigger unit first**
2. change what is left of it into the smaller unit, add
3. share that

- 58 cm 8 mm ÷ 3: 19 cm, 1 cm left = 10 mm; 18 mm ÷ 3 = 6 → **19 cm 6 mm**
- 7 km 200 m ÷ 6: 1 km, 1 km left = 1000 m; 1200 ÷ 6 = 200 → **1 km 200 m**
- 9 km 600 m ÷ 2 = **4 km 800 m**, not 4 km 300 m

Way 2: change it all into the smaller unit, divide, change back

- 2 m 80 cm = 280 cm; 280 ÷ 4 = **70 cm**
- 5 m 40 cm = 540 cm; 540 ÷ 6 = **90 cm**
- check by multiplying back: 19 cm 6 mm × 3 = 57 cm 18 mm = 58 cm 8 mm ✓
- dividing = cutting into equal parts; dividing undoes multiplying

Bus to Sauraha

- Kathmandu to Sauraha: **142 km 600 m**, 5 hours
- there and back: × 2 = **285 km 200 m**
- in one hour: ÷ 5 = **28 km 520 m** (an average)

Real lengths

- Sagarmatha: **8,848.86 m** (Nepal and China, 2020) = 8 km 848 m 86 cm
- marathon: **42.195 km** = 42 km 195 m (fixed in 1921)
- the meter: in 1791, one ten-millionth of equator to North Pole; today fixed by the speed of light

COMMON MISTAKES

✗ 2 km = 2 ÷ 1000 m
✓ to a smaller unit, multiply: 2000 m.

✗ 4 m 6 cm = 46 cm
✓ 400 + 6 = 406 cm.

✗ 4 km 80 m ÷ 4 = 1 km 2 m
✓ 80 ÷ 4 = 20: 1 km 20 m.

✗ the km left over forgotten when dividing
✓ change it into m and add it.

✗ 9 m 60 cm ÷ 3 = 3 m 2 cm
✓ 60 ÷ 3 = 20: 3 m 20 cm.