Unit 9 · Distance

STUDY NOTES

Key terms

Distance: the length of the straight line between two points.

Inch (in, ″): a twelfth of a foot (Latin *uncia*, "a twelfth").

Foot (ft, ′): 12 inches.

Converting: changing a length from one unit into another.

≈: "is about".

The units

Relation	Exact?
10 mm = 1 cm; 100 cm = 1 m; 1,000 m = 1 km	exact
1 in = 2.54 cm	exact (fixed in 1959)
1 ft = 12 in	exact
1 ft = 30.48 cm	exact (12 × 2.54)
1 m ≈ 39.37 in	rounded (39.370…)
1 m ≈ 3.28 ft	rounded (3.2808…)

- answers with 39.37 and 3.28 can differ in the last place: 500 m × 3.28 = 1,640 ft; 50,000 cm ÷ 30.48 = 1,640.42 ft; say "about"
- answers with 2.54 or 30.48 are exact
- a meter: a little more than 3 feet

Multiply or divide?

- **bigger unit → smaller**: **multiply** (ft → in × 12; in → cm × 2.54; ft → cm × 30.48)
- **smaller unit → bigger**: **divide** (in → ft ÷ 12; cm → in ÷ 2.54; cm → ft ÷ 30.48)
- a smaller unit fits more times: its number comes out bigger
- one length, four units: biggest number in cm, smallest in m (6 m room ≈ 600 cm, 236 in, 19.7 ft)

Conversions from the unit

- 10 in = 10 × 2.54 = 25.4 cm
- 5 m = 500 cm ≈ 196.85 in ≈ 16.4 ft
- 58 in
  - = 147.32 cm
  - 58/12 ≈ 4.83 ft (4 ft 10 in)
  - 58/39.37 ≈ 1.47 m
- 480 cm
  - ≈ 188.98 in
  - 480/30.48 ≈ 15.75 ft
  - 4.8 m
- 7 ft = 84 in = 213.36 cm
- longest of 1 m, 3 ft, 40 in, 99 cm: in cm 100, 91.44, **101.6**, 99 → 40 in

Feet and inches together

- inches → part of a foot: ÷ 12: 4 ft 6 in = 4 + 6/12 = **4.5 ft** = 54 in = 137.16 cm ≈ 1.37 m
- or all in inches first: 4 ft 9 in = 4 × 12 + 9 = 57 in = **144.78 cm**
- m and cm: 2 m 60 cm = 2.6 m; 2 m 10 cm = 2.1 m ≈ 6.89 ft
- **one unit before adding or subtracting**: board 2 m 60 cm ≈ 8.53 ft long, 4 ft 8 in ≈ 4.67 ft broad → about **3.86 ft** longer

Screens

- size = the **diagonal**, corner to corner, in inches
- 32 in TV = 81.28 cm diagonal (about 71 cm wide)
- 6.1 in phone ≈ 15.5 cm

Where it is used

- Nepal uses both
  - roads in km
  - school books in m
  - timber, house plans and heights in feet and inches
- health posts and hospitals record heights in cm
- 1 ropani = 5,476 sq ft, a square 74 ft on each side
- the exact 2.54 cm lets parts made in inches fit machines made in millimeters

COMMON MISTAKES

✗ 10 in = 10 ÷ 2.54 = 3.94 cm
✓ inch to cm, bigger to smaller: × 2.54 = 25.4 cm.

✗ 7 ft = 7 ÷ 12 in
✓ bigger to smaller: × 12 = 84 in.

✗ 4 ft 6 in = 4.6 ft
✓ 6 in = 6/12 ft = 0.5 ft: 4.5 ft.

✗ 2 m 60 cm − 4 ft 8 in subtracted as they are
✓ one unit first.

✗ a 32-inch TV is 32 in wide
✓ 32 in is the diagonal.

✗ 1 m = 3.28 ft exactly
✓ rounded; 1 ft = 30.48 cm is exact.