Metric and Standard Conversions

Grade 6 – 8 math · measurement

Name: Date: Score: / 26

Two systems, one awkward join

Converting within the metric system is moving a decimal point. Converting within the customary system means knowing twelve, sixteen and 5280. Converting **between** them is different again, because the factors are mostly untidy decimals.

One of them is not. **1 inch = 2.54 cm** exactly — that has been the definition since 1959, so it is not a measurement and carries no uncertainty. Everything else on this sheet is rounded.

That changes how an answer should be written. If the factor was rounded, the answer is approximate, and writing ≈ instead of = says so. It also means a rough sense of the sizes is worth having: a kilogram is about two pounds, a litre is a little over a quart, and a kilometre is roughly six tenths of a mile.

The factors

- **1 inch = 2.54 cm** exactly. It has been a definition since 1959, not a measurement.
- Most other cross-system factors are **rounded**, so answers from them are approximate.
- Write ≈ rather than = when the factor was rounded.
- Decide the **direction** first: more centimetres than inches, so inches → cm multiplies.
- A rough check: a **metre** is a long stride, a **kilogram** is about two pounds, a **litre** is a large bottle.
- A **kilometre** is about six tenths of a mile, so a 5 km run is a bit over 3 miles.

Part A — Convert round sensibly and use ≈ where the factor was rounded (8 marks)

10 inches → _____ **cm**	**50 cm →** _____ **inches**
5 miles → _____ **km**	**100 km →** _____ **miles**
3 pounds → _____ **g**	**5 kg →** _____ **pounds**
2 gallons → _____ **L**	**4 L →** _____ **quarts**

Part B — Estimate a rough answer is enough (8 marks)

1. A doorway is about 2 m high. Roughly how many feet is that?

2. A 5 km race. Roughly how many miles?

3. A 2 L bottle of soda. Roughly how many quarts?

4. A 70 kg person. Roughly how many pounds?

Part C — Think it through (10 marks)

1. Why is it reasonable to write 10 inches = 25.4 cm with an equals sign, but 5 miles ≈ 8.05 km with an approximately sign?

2. A recipe from Europe asks for 500 g of flour. A cook has a scale in ounces. Roughly how many ounces is that, and why does rounding matter less here than in a science lab?

Metric and Standard Conversions — Answer Key

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Part A — Convert

1. 10 inches → **25.4 cm**
2. 50 cm → **≈ 19.7 inches**
3. 5 miles → **≈ 8.05 km**
4. 100 km → **≈ 62.2 miles**
5. 3 pounds → **≈ 1360 g**
6. 5 kg → **≈ 11.0 pounds**
7. 2 gallons → **≈ 7.57 L**
8. 4 L → **≈ 4.23 quarts**

> Only the first is exact, because the inch is defined as exactly 2.54 cm.

Part B — Estimate

1. **about 6.6 feet**
   2 m = 200 cm, and 30.48 cm per foot gives 6.56 feet.
2. **a bit over 3 miles**
   5 ÷ 1.609 = 3.1.
3. **a bit over 2 quarts**
   2 × 1.057 = 2.1.
4. **about 154 pounds**
   70 × 2.20 = 154.

Part C — Think it through

1. **Because the inch factor is exact and the mile factor is not.**
   1 inch is defined as exactly 2.54 cm, so 10 inches is exactly 25.4 cm. The 1.609 km in a mile is itself rounded, so any answer built on it is approximate too.
2. **About 17.6 oz, or a little over a pound.**
   500 ÷ 454 = 1.10 lb, and 1.10 × 16 = 17.6 oz. A recipe tolerates a few per cent either way; a titration does not. How precise an answer needs to be depends on what it is for.