KEY

LO2 – Linear Unit Conversions

S.I. to S.I		Exact?
1 km	1000 m	✓
1 m	100 cm	✓
1 cm	10 mm	✓

Imperial to Imperial		Exact?
1 mi.	1760 yd.	✓
1 yd.	3 ft.	✓
1 ft.	12 in.	✓

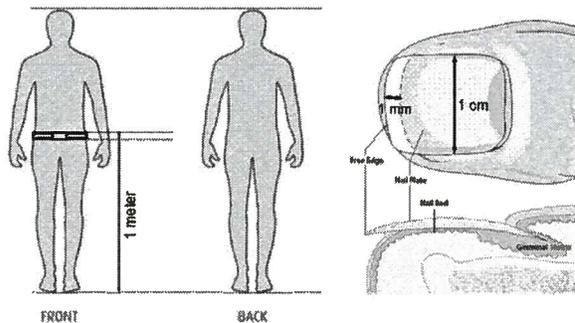| Imperial to S.I.		Exact?
1 mi.	1.609 km	✗
1 yd.	0.9144 m	✗
1 ft.	30.48 cm	✓
1 in.	2.54 cm	✓

Part 1 – Measurement Referents

A referent is a reference for a specific measurement. For example, the outside length of Mr. Bayer's Size 10 running shoe is approximately "1 foot" in length.

Mr. Bayer's Imperial Referents
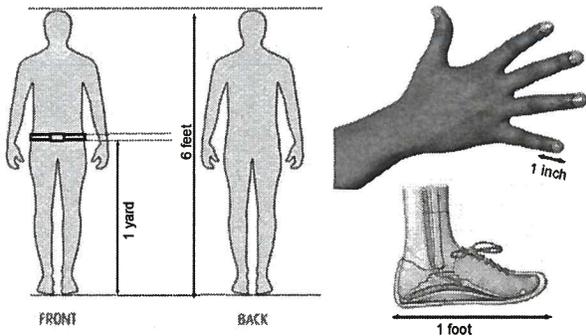
Mr. Bayer's S.I. Referents

Part 2 – S.I. to S.I. Conversions (Proportional Reasoning)

Step #1: Write down conversion.
Step #2: Line up given info above. Solve for x.

Q1: Convert 2.4km to meters.

$$\frac{2.4 \text{ km}}{1 \text{ km}} = \frac{x}{1000\text{m}}$$

$x = 2400\text{m}$

Q2: Convert 346cm to meters.

$$\frac{x}{1 \text{ m}} = \frac{346 \text{ cm}}{100 \text{ cm}}$$

$x = 3.46\text{m}$

Part 3 – S.I. to S.I. Conversions (Unit Analysis)

Q3: Convert 2.4km to meters.

$$\frac{2.4 \text{ km}}{1} \times \frac{1000 \text{ m}}{1 \text{ km}} = \frac{2400 \text{ m}}{1}$$

Conversion Factor

2400 m

Q4: Convert 346cm to meters.

$$\frac{346 \text{ cm}}{1} \times \frac{1 \text{ m}}{100 \text{ cm}} = \frac{3.46 \text{ m}}{1}$$

Conversion Factor

3.46m

Math 10C

S.I. to S.I		Exact?
1 km	1000 m	✓
1 m	100 cm	✓
1 cm	10 mm	✓

Imperial to Imperial		Exact?
1 mi.	1760 yd.	✓
1 yd.	3 ft.	✓
1 ft.	12 in.	✓

Imperial to S.I.		Exact?
1 mi.	1.609 km	✗
1 yd.	0.9144 m	✗
1 ft.	30.48 cm	✓
1 in.	2.54 cm	✓

Part 4 – Imperial to Imperial Conversions (Proportional Reasoning)

Q5: Convert 2000 yards to miles.

Step #1: Write down conversion
Step #2: Line up given info above. Solve for x.

$$\frac{x}{1\ mi} = \frac{2000\ yd}{1760\ yd}$$

$$\boxed{x \approx 1.136\ mi}$$

Q6: Convert 7.8 yards to feet.

$$\frac{7.8\ yd}{1\ yd} = \frac{x}{3\ ft}$$

$$\boxed{x = 23.4\ ft}$$

Part 5 – Imperial to Imperial Conversions (Unit Analysis)

Q7: Convert 2000 yards to miles.

$$\frac{2000\ yd}{1} \times \frac{1\ mi}{1760\ yd} = \frac{2000\ mi}{1760}$$

↑ Conversion Factor

$$\boxed{1.136\ mi}$$

Q8: Convert 7.8 yards to feet.

$$\frac{7.8\ yd}{1} \times \frac{3\ ft}{1\ yd} = \frac{23.4\ ft}{1}$$

↑ Conversion Factor

$$\boxed{23.4\ ft}$$

Part 6 – Imperial to S.I. Conversions (Proportional Reasoning)

Step #1: Write down conversion
Step #2: Line up given info above. Solve for x.

Q9: Convert 2.5 miles to kilometers.

$$\frac{2.5\ mi}{1\ mi} = \frac{x}{1.609\ km}$$

$$\boxed{x = 4.0225\ km}$$

Q10: Convert 1000 cm to inches.

$$\frac{x}{1\ in} = \frac{1000\ cm}{2.54\ cm}$$

$$\boxed{x = 393.7\ in}$$

Part 7 – Imperial to S.I. Conversions (Unit Analysis Reasoning)

Q11: Convert 2.5 miles to kilometers.

$$\frac{2.5\ mi}{1} \times \frac{1.609\ km}{1\ mi} = \frac{4.0225\ km}{1}$$

$$\boxed{4.0225\ Km}$$

Q12: Convert 1000 cm to inches.

$$\frac{1000\ cm}{1} \times \frac{1\ in}{2.54\ cm} = \frac{1000\ in}{2.54}$$

$$\boxed{393.7\ in}$$

Math 10C   **KEY**

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1 km	1000 m	✓
1 m	100 cm	✓
1 cm	10 mm	✓

Imperial to Imperial		Exact?
1 mi.	1760 yd.	✓
1 yd.	3 ft.	✓
1 ft.	12 in.	✓

Imperial to S.I.		Exact?
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1 yd.	0.9144 m	✗
1 ft.	30.48 cm	✓
1 in.	2.54 cm	✓

Part 8 – Multi-Step Conversions (Proportional Reasoning)

Q13: Convert 0.50 miles to meters.

Plan: miles → km → m

$$\frac{0.5\ mi}{1\ mi} = \frac{x}{1.609\ km}$$

$$x = 0.8045\ km$$

$$\frac{0.8045\ km}{1\ km} = \frac{x}{1000\ m}$$

$$x = 804.5\ m$$

Q14: Convert 10,000 inches to meters.

Plan: inches → cm → m

$$\frac{10,000\ in}{1\ in} = \frac{x}{2.54\ cm}$$

$$x = 25,400\ cm$$

$$\frac{x}{1\ m} = \frac{25,400\ cm}{100\ cm}$$

$$x = 254\ m$$

Part 9 – Multi-Step Conversions (Unit Analysis)

Q15: Convert 0.50 miles to meters.

Plan: miles → km → m

$$\frac{0.50\ mi}{1} \times \frac{1.609\ km}{1\ mi} \times \frac{1000\ m}{1\ km} = \frac{804.5\ m}{1}$$

$$804.5\ m$$

Q16: Convert 10,000 inches to meters.

Plan: inches → cm → m

$$\frac{10,000\ in}{1} \times \frac{2.54\ cm}{1\ in} \times \frac{1\ m}{100\ cm} = \frac{25,400\ m}{100}$$

$$254\ m$$

Math 10C

■ KEY ■

Q17: Convert 100 km/h to m/s.

$$\frac{100 \text{ km}}{\text{h}} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ h}}{3600 \text{ s}} = \frac{100,000 \text{ m}}{3600 \text{ s}} = \boxed{27.\overline{7} \text{ m/s}}$$

Q18: Convert 50 cm/s to km/h.

$$\frac{50 \text{ cm}}{\text{s}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} \times \frac{3600 \text{ s}}{1 \text{ h}} = \frac{180,000 \text{ km}}{100,000 \text{ h}} = \boxed{1.8 \text{ km/h}}$$