Metric Units of Length, Mass, and Volume

Name: _____ **Class:** _____ **Date:** _____

Quick Review

The **metric system** is used in science to measure quantities such as length, mass, and volume.

Quantity	Common metric units	Measuring instrument
Length	millimetres (mm), centimetres (cm), metres (m), kilometres (km)	Ruler, measuring tape
Mass	milligrams (mg), grams (g), kilograms (kg)	Balance or scale
Volume	millilitres (mL), litres (L)	Graduated cylinder, measuring jug

Useful Conversions

- 1 km = 1,000 m
- 1 m = 100 cm = 1,000 mm
- 1 cm = 10 mm
- 1 kg = 1,000 g
- 1 g = 1,000 mg
- 1 L = 1,000 mL

Part A — Multiple Choice

Circle the correct answer.

1. Which unit is most appropriate for measuring the length of a pencil?

A. Kilometres
B. Centimetres
C. Kilograms
D. Litres

2. Which instrument is used to measure mass?

A. Thermometer
B. Graduated cylinder
C. Balance
D. Ruler

3. Which unit is most appropriate for measuring the amount of water in a drinking glass?

A. Millilitres
B. Kilometres
C. Kilograms
D. Metres

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4. How many centimetres are in one metre?

A. 10
B. 1,000
C. 50
D. 100

5. Which measurement represents the greatest mass?

A. 500 g
B. 1 kg
C. 750 g
D. 250 g

Part B — Matching

Match each item with the most appropriate metric unit.

Item	Answer	Units
1. Length of a football field	_____	A. Kilometres (km)
2. Mass of a paperclip	_____	B. Millimetres (mm)
3. Water in a swimming pool	_____	C. Litres (L)
4. Distance between two cities	_____	D. Metres (m)
5. Thickness of a coin	_____	E. Grams (g)

Part C — Metric Conversions

Complete the following conversions.

1. 3 m = _____ cm
2. 250 cm = _____ m
3. 5 kg = _____ g
4. 750 mL = _____ L
5. 2.5 L = _____ mL
6. 4,000 mm = _____ m
7. 1.5 km = _____ m
8. 350 g = _____ kg

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Part D — Estimating Measurements

Choose the most reasonable measurement for each item.

Item	Option A	Option B	Option C	Your answer
1. Height of a classroom door	2 mm	2 m	20 m	_____
2. Mass of a textbook	800 g	800 kg	8 mg	_____
3. Water in a small bottle	500 L	5 mL	500 mL	_____
4. Length of a school bus	10 m	10 mm	10 km	_____
5. Mass of an apple	150 kg	150 g	150 mg	_____

6. Why is it important to choose an appropriate unit when measuring something?

Part E — Practical Measurement Activity

Equipment: Ruler, balance or scale, graduated cylinder or measuring jug, water, and small classroom objects.

Measure the following items and record your results.

Object or quantity	Estimate	Actual measurement	Unit
Length of your pencil	_____	_____	cm
Width of your textbook	_____	_____	cm
Mass of your pencil case	_____	_____	g
Mass of an eraser	_____	_____	g
Volume of water provided	_____	_____	mL

1. Which of your estimates was closest to the actual measurement?

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2. Which estimate was furthest from the actual measurement?

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3. Explain how you correctly read the volume of water in a graduated cylinder.

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4. Why should you check that a balance reads zero before measuring an object's mass?

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Part F — Comparing Measurements

Use metric conversions to determine which measurement is greater.

1. Which is longer: 1.5 m or 140 cm? Answer: _____

2. Which is heavier: 0.75 kg or 800 g? Answer: _____

3. Which is a greater volume: 1.2 L or 950 mL? Answer: _____

4. Which is shorter: 2,500 mm or 2.4 m? Answer: _____

5. Put these lengths in order from shortest to longest: 75 cm, 1.2 m, 900 mm, 0.5 m

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Exit Ticket

1. Name two metric units used to measure length.

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2. What is the difference between mass and volume?

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3. Convert 2.5 kg into grams.

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4. Which instrument would you use to measure 50 mL of water?

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5. Why is the metric system useful in science?

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Metric Units of Length, Mass, and Volume — Answer Key

Part A — Multiple Choice

1. B — Centimetres. Appropriate for measuring the length of a pencil.
2. C — Balance. A balance is used to measure mass.
3. A — Millilitres. Appropriate for measuring the volume of water in a glass.
4. D — 100. There are 100 centimetres in one metre.
5. B — 1 kg. One kilogram equals 1,000 grams.

Part B — Matching

Item	Answer	Unit
1. Length of a football field	D	Metres (m)
2. Mass of a paperclip	E	Grams (g)
3. Water in a swimming pool	C	Litres (L)
4. Distance between two cities	A	Kilometres (km)
5. Thickness of a coin	B	Millimetres (mm)

Part C — Metric Conversions

Question	Answer
1. 3 m = ___ cm	300 cm
2. 250 cm = ___ m	2.5 m
3. 5 kg = ___ g	5,000 g
4. 750 mL = ___ L	0.75 L
5. 2.5 L = ___ mL	2,500 mL
6. 4,000 mm = ___ m	4 m
7. 1.5 km = ___ m	1,500 m
8. 350 g = ___ kg	0.35 kg

Conversion reminder: Multiply when converting from a larger unit to a smaller unit, and divide when converting from a smaller unit to a larger unit.

Part D — Estimating Measurements

Item	Answer	Reason
1. Height of a classroom door	B — 2 m	A typical door is approximately 2 metres tall.
2. Mass of a textbook	A — 800 g	A textbook may have a mass of several hundred grams.
3. Water in a small bottle	C — 500 mL	A common small water bottle holds approximately half a litre.
4. Length of a school bus	A — 10 m	A school bus is several metres long.
5. Mass of an apple	B — 150 g	A typical apple has a mass of approximately 150 grams.

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6. Why is it important to choose an appropriate unit when measuring something?

Choosing an appropriate unit makes measurements easier to understand, record, and compare. For example, centimetres are more convenient than kilometres for measuring a pencil.

Part E — Practical Measurement Activity

Answers will vary depending on the objects and equipment used.

Example measurements

Object or quantity	Example estimate	Example actual measurement	Unit
Length of pencil	15	16.2	cm
Width of textbook	20	21.0	cm
Mass of pencil case	200	185	g
Mass of eraser	20	18	g
Volume of water provided	100	95	mL

These are illustrative values only. Accept students' actual measurements when reasonable.

1. Which of your estimates was closest to the actual measurement?

Answers will vary.

Using the example table, the textbook width was closest, with a difference of 1.0 cm.

2. Which estimate was furthest from the actual measurement?

Answers will vary.

Students should compare the difference between their estimates and measurements. Since the items use different units, comparisons are most meaningful when expressed as percentage errors.

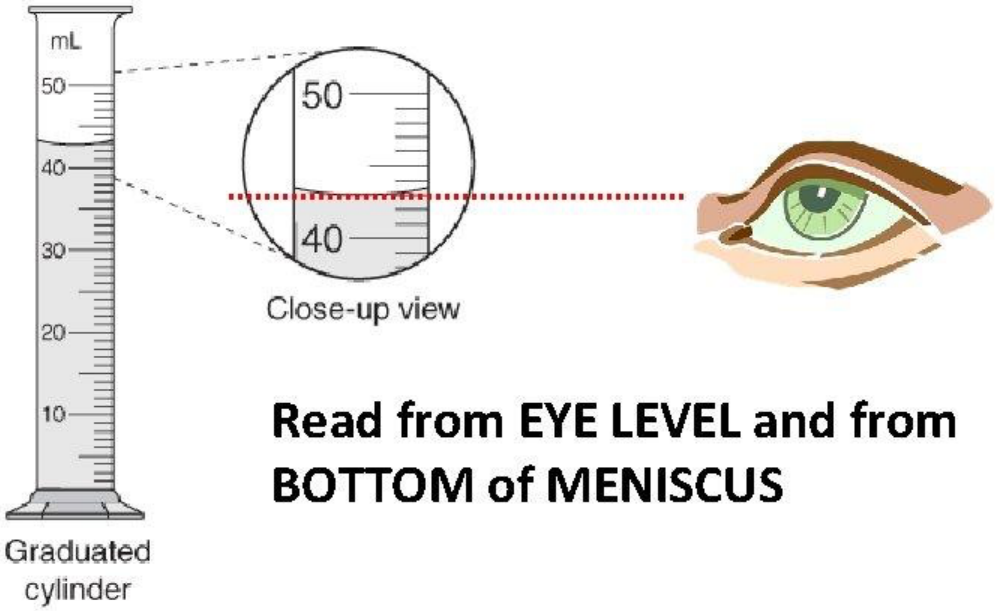
3. Explain how you correctly read the volume of water in a graduated cylinder.

Place the graduated cylinder on a flat surface and position your eyes level with the liquid surface. For water, read the measurement at the bottom of the meniscus (the curved liquid surface).

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Using a graduated cylinder



4. Why should you check that a balance reads zero before measuring an object's mass?

Checking that the balance reads zero helps prevent a zero error, which could make every measurement too high or too low.

Part F — Comparing Measurements

1. Which is longer: 1.5 m or 140 cm?

1.5 m = 150 cm

150 cm is greater than 140 cm.

Answer: 1.5 m

2. Which is heavier: 0.75 kg or 800 g?

0.75 kg = 750 g

800 g is greater than 750 g.

Answer: 800 g

3. Which is a greater volume: 1.2 L or 950 mL?

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1.2 L = 1,200 mL

1,200 mL is greater than 950 mL.

Answer: 1.2 L

4. Which is shorter: 2,500 mm or 2.4 m?

2,500 mm = 2.5 m

2.4 m is less than 2.5 m.

Answer: 2.4 m

5. Put these lengths in order from shortest to longest:

Given: 75 cm, 1.2 m, 900 mm, 0.5 m

Convert all measurements to centimetres:

- 75 cm = 75 cm
- 1.2 m = 120 cm
- 900 mm = 90 cm
- 0.5 m = 50 cm

Correct order:

0.5 m, 75 cm, 900 mm, 1.2 m

Exit Ticket

1. Name two metric units used to measure length.

Accept any two:

- Millimetres (mm)
- Centimetres (cm)
- Metres (m)
- Kilometres (km)

2. What is the difference between mass and volume?

Mass measures the amount of matter in an object, while volume measures the amount of space an object or substance occupies.

3. Convert 2.5 kg into grams.

2.5 × 1,000 = 2,500 g

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4. Which instrument would you use to measure 50 mL of water?

A graduated cylinder (measuring cylinder).

5. Why is the metric system useful in science?

The metric system provides standard units that scientists can use to measure, communicate, and compare results. Its decimal structure also makes conversions between units straightforward.

Teacher Notes

- Part E: Allow reasonable variation in student measurements. Focus on correct instrument use, appropriate units, and sensible estimates.
- Part C: Watch for students multiplying instead of dividing when converting to larger units.
- Part F: Encourage students to convert both measurements into the same unit before comparing them.
- Extension: Ask students to explain why 1 mL = 1 cm^3, or estimate the mass and volume of different classroom objects before measuring them.

Assessment focus: Students should be able to identify suitable units, make reasonable estimates, use measuring equipment correctly, convert between metric units, and compare quantities accurately.

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