

Key

METRIC MEASUREMENTS A 1

Choose an appropriate standard metric unit to make the following measurements:

- 1. Mass of caffeine in one energy drink *mg or g*
- 2. Mass of a person *Kg*
- 3. Mass of a slice of cheese *g*
- 4. Volume of a sample of acid for a chemistry experiment *mL*
- 5. Volume of a bathtub *L*

Answer the following questions:

- 6. Identify the following data as quantitative or qualitative:
 - a. 25 m *quantitative*
 - b. blue color *qualitative*
 - c. 7.3 mL *quantitative*
 - d. cold *qualitative*
- 7. Which of the following would be a derived unit? *Can be more than one*
 - a. L
 - b. g/mL
 - c. cm
 - d. cm³
 - e. m/s²

8. A handbook gives the density of calcium as 1.54 g/cm³. Through lab calculations, a student calculates the density to be 1.25 g/cm³. Calculate the student's percent error.

$$\% \text{ Error} = \frac{|\text{accepted value} - \text{experimental value}|}{\text{accepted value}} \times 100 = \frac{|1.54 - 1.25|}{1.54} \times 100 = 18.83\% \approx 19\%$$

SCIENTIFIC NOTATION A 2

Convert numbers in ordinary (regular) notation to scientific notation.
Convert numbers in scientific notation to ordinary notation.

- 9. 985,000 *9.85 x 10⁵*
- 10. 8.99 x 10⁻² *0.0899*
- 11. 0.000087 *8.7 x 10⁻⁵*
- 12. 2.95 x 10³ *2950*
- 13. 8.845 *8.845 x 10⁰*
- 14. 5.443 x 10⁴ *54430*
- 15. 0.0232 *2.32 x 10⁻²*
- 16. 1.97 x 10⁻⁶ *0.00000197*

METRIC EQUALITIES A 3

Write an equality for the following metric unit pairs:

17. m and cm $1\text{ m} = 100\text{ cm}$
18. kL and L $1\text{ kL} = 1000\text{ L}$
19. s and ms $1\text{ s} = 1000\text{ ms}$
20. g and dag $10\text{ g} = 1\text{ dag}$
21. cm and mm $1\text{ cm} = 10\text{ mm}$
22. mg and g $1000\text{ mg} = 1\text{ g}$

PRECISION AND ACCURACY A 4 same as B 4

Answer the following questions:

23. The density of water is 1.00 g/mL at 25 °C. The following data was collected by two groups of students. Compare the following data on the density of water at 25°C and answer the following questions.

GROUP	DATA (g/mL)	AVERAGE (g/mL)
ONE	0.982 , 1.011, 0.976, 1.024	0.998
TWO	0.982, 0.980, 0.981, 0.983	0.982

- a. Which group is more accurate? **1**
- b. Which group is more precise? **2**
24. Four students used the same ruler to measure the length of the same pencil. The actual length of the pencil was 15.85 cm. **Write** four sets of data that would represent each of the following:
- a. data that is accurate and precise measurements
 15.85 cm 15.84 cm 15.86 cm 15.85 cm
- b. data that is inaccurate and imprecise measurements
 15.61 cm 15.95 cm 14.91 cm 16.10 cm
- c. data that is inaccurate and precise measurements
 14.13 cm 14.14 cm 14.14 cm 14.15 cm

METRIC EQUALITIES B 3

Write an equality for the following metric unit pairs:

17. L and cL $1\text{ L} = 100\text{ cL}$
18. mL and L $1000\text{ mL} = 1\text{ L}$
19. cm and m $100\text{ cm} = 1\text{ m}$
20. ms and s $1000\text{ ms} = 1\text{ s}$
21. cg and mg $1\text{ cg} = 10\text{ mg}$
22. hL and L $1\text{ hL} = 100\text{ L}$

PRECISION AND ACCURACY B 4 same as A 4

Answer the following questions:

← look at A4

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- a. data that is accurate and precise measurements
- b. data that is inaccurate and imprecise measurements
- c. data that is inaccurate and precise measurements

Challenge:

1. Write an equality for the following metric unit pairs:

- a. Gg and kg
- b. ng and cg
- c. μg and cg

$$1 \text{ Gg} = 1 \times 10^6 \text{ Kg}$$
$$1 \times 10^7 \text{ ng} = 1 \text{ cg}$$
$$10000 \mu\text{g} = 1 \text{ cg}$$

2. An object has a mass of 51.36 mg. How many Tg is this? Write your answer in scientific notation.

So, $51.36 \text{ mg} = 5.136 \times 10^{-14} \text{ Tg}$

$$1 \text{ Tg} = 1 \times 10^{12} \text{ g}$$
$$1 \text{ g} = 1000 \text{ mg}$$
$$51.36 \text{ mg} = 0.05136 \text{ g}$$
$$0.05136 \text{ g} = 5.136 \times 10^{-14} \text{ Tg}$$

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