

# Measurement of Physical Quantities

## Exercise 1A

## Physical Quantities

- 1 Find and circle **four** base physical quantities and their SI units in the puzzle. Write them in the table, in the correct spaces to match the symbol for the unit.

M K I L O G R A M T  
 A M P E R E E K N U  
 S E J N X M F E I P  
 S T N G I Z R W U G  
 B R Y T H R H V J M  
 K E L H U T F C S L  
 Q S E C O N D R E M

Base quantity	SI unit	Symbol for SI unit
		m
		kg
		s
		A

- 2 Complete the sentences to give the measurements using the prefixes.

- (a) A cube has sides that measure 0.15 m. This is \_\_\_\_\_ cm.  
 (b) A current of 0.03 A is the same as a current of \_\_\_\_\_ mA.  
 (c) A mass of 0.15 kg is the same as a mass of \_\_\_\_\_ g.  
 (d) An athlete runs 100 m in a time of 9870 ms. This is the same as running a distance of \_\_\_\_\_ km in a time of \_\_\_\_\_ s.  
 (e) A wire has a diameter of 0.11 mm. This is the same as \_\_\_\_\_ cm.  
 (f) A power station generates 2 800 000 kW of power. This is \_\_\_\_\_ MW.

- 3 Write these values in standard form.

- (a) The speed of light = 300 000 000 m/s \_\_\_\_\_  
 (b) The density of lead = 11 300 kg/m<sup>3</sup> \_\_\_\_\_  
 (c) The thickness of a wire = 0.000 96 m \_\_\_\_\_  
 (d) The wavelength of a green light = 0.000 000 54 m \_\_\_\_\_

4 Draw one line to match each quantity to be measured to the measuring instrument required.

**Quantity**

Internal diameter of a glass tube

Length of a classroom

Time taken for a ball to roll down a ramp

Time from sunrise to sunset

Volume of liquid in a bottle

**Measuring instrument**

Digital clock

Measuring cylinder

Measuring tape

Stopwatch

Vernier calipers

**Exercise 1B**

**Measuring Quantities**

1 Complete the sentences using words from the word list. Use each word once, more than once or not at all.

accurate average bob calibration oscillation parallax period precision zero

The smallest unit an instrument can measure is called the \_\_\_\_\_ of the instrument. When your eye is not perpendicular to the scale of a measuring instrument, there will be a \_\_\_\_\_ error in the measurement.

There is an error when the jaws of a pair of vernier calipers are closed if the second division on the main scale coincides with the second division on the vernier scale. This is called a \_\_\_\_\_ error. Some instruments can be adjusted to remove this type of error. When instruments are adjusted to give an accurate reading, this is called \_\_\_\_\_.

When measuring the time for a ball to roll down a ramp, the error can be reduced by repeating the measurement several times and calculating the \_\_\_\_\_. A pendulum is a small weight called a \_\_\_\_\_ on the end of a string. When it makes a complete swing from one side to the other and back again, this is called one \_\_\_\_\_. The time this takes is called the \_\_\_\_\_.

The error in measuring this time can be reduced if the time for twenty oscillations is measured and the \_\_\_\_\_ is calculated.

## Exercise 1D

## Exam-style Questions

- 1 A student wants to know the maximum thickness of a five-cent coin. The student uses a pair of vernier calipers to measure the average thickness of a stack of 10 coins.

(a) Why does measuring the average thickness of a stack of 10 coins give a more accurate value for the maximum thickness?

[1]

Figures 1.8 and 1.9 show a close-up of the scales of the vernier calipers.

Scales when jaws are closed:

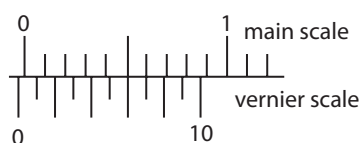


Figure 1.8

Scales when used to measure the thickness of a **stack of 10** coins:

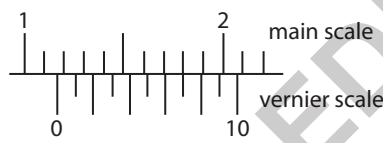


Figure 1.9

(b) What is the maximum thickness of **one** five-cent coin in mm?

Maximum thickness = \_\_\_\_\_ mm [3]

- 2 Here is a list of equipment used by students when doing experiments.

ammeter   beaker   electronic balance   measuring cylinder   metre rule   stopwatch  
measuring tape   thermometer   vernier calipers   voltmeter

Complete the table by inserting the most suitable piece of equipment for measuring each quantity listed.

[4]

Quantity to be measured	Most suitable piece of equipment
Diameter of a pencil	
Length of a building	
Time for a beaker to be filled with water from a tap	
Volume of water	

**Exercise 1E**

**Let's Reflect**

Reflect on your learning achievements for each section in Chapter 1. Look back at the concepts taught in the Student's Book. Check how you fare in answering the questions in the Student's Book and the Theory Workbook. Then complete the Chapter Journal.

- 1** Rate your confidence level for your understanding of this chapter.  
Draw a pointer on the confidence meter to show your confidence level.

→ If you are *not confident* or only *somewhat confident*, go back to the Student's Book and revise this chapter.



- 2** What questions do you still have about the concepts taught in this chapter? Write them, if any, in the space provided.

1.1 Physical Quantities	
1.2 Scalars and Vectors	

→ If you have written any questions, show them to someone such as your teacher who can help you.

- 3** What other thoughts do you have about learning this chapter?

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→ Reflect on your thoughts and share them with your teacher or classmates.