Combined Science G.10 (Physics)

Instructions: Study on P1making measurements and online resources then answer the worksheets.

Exercise P1.01 The SI system of units

a) Give the SI units (name and symbol) of the following quantities:

Length

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Volume

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b) Give the name in words and the symbol for the following:

One thousand metres

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One-thousandth of a metre

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c) How many

Centimetres are there in a metre? ……

Litres are there in a cubic metre? ……

d) List as many non-SI units of length as you can.

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e) Give a reason why it is important for scientists to have a system of units that is agreed between all countries.

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f) Name some more professions that make use of the SI system of units.

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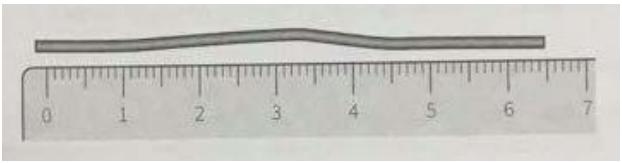
Exercise P1.02 Accurate measurements

a) The diagram shows how a student attempted to measure the length of a piece of wire.



From the diagram, estimate the length of the wire. ……

State **three** ways in which the student could have improved his technique for measuring the wire.

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b) Find a rectangular sheet of paper, at least as big as the pages of this book. A sheet of newspaper is ideal. Your task is to use a ruler to measure three lengths: the short side, the long side and the diagonal. For lengths that are longer than your ruler, you will need to devise a careful technique.

c) Describe the method you have used for measuring the length of the diagonal. It may help to include a diagram.

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d) Record your results (in centimetres) in Table 1.01.

Measurement	Length/cm	Length^2/cm^2
Short side		
Long side		
diagonal		

Table 1.01

e) Now you can use Pythagoras' theorem to test your result. In the third column of the table, calculate and write down the square of each length.

The calculate:

(short side)^2 + (long side)^2 = ……

This should be equal to (diagonal)^2.

f) Round off your values to the nearest cm^2. How close are your two answers? Write a comment below.

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Exercise P1.03 Density data

Some data about the density of various solids and liquids are shown in Table 1.02

Material	State / type	Density / kg/m^3	Density / g/cm^3
water	liquid / non-metal	1000	1.000
ethanol	liquid / non-metal	800	0.800
olive oil	liquid / non-metal	920	
mercury	liquid / metal	13 500	
ice	solid / non-metal	920	
diamond	solid / non-metal	3500	
cork	solid / non-metal	250	
chalk	solid / non-metal	2700	
iron	solid / metal	7900	
tungsten	solid / metal	19 300	
aluminium	solid / metal	2700	
gold	solid / metal	19 300	

Table 1.02

Two units are used for the densities, kg/m^3 and g/cm^3.

a) Complete the fourth column by converting each density in kg/m^3 to the equivalent value in g/cm^3. The first two have been done for you.

b) Ice floats on water because its density is less than that of water. Name another solid shown in the table which will float in water.

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c) A cook mixes equal volumes of water and olive oil in a jar. The two liquids separate. Complete the drawing of the jar to show how the liquids will appear. Label them.

d) A student wrote: “These data show that metals are denser than non-metals.” Do you agree? Explain your answer.

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e) Calculate the mass of a block of gold that measures 20 cm x 15 cm x 10 cm. Give your answer in kg.

f) A metalworker finds a block of silvery metal. He weighs it and he measures its volume. Here are his results:

mass of block = 0.270 kg

volume of block = 14.0 cm^3

Calculate the density of the block.

Suggest what metal this might be……..