SUVA SANGAM COLLEGE

YEAR 13

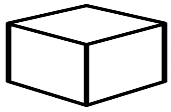
PHYSICS

WORKSHEET 1

Strand 1	Mechanics
Sub-Strand	Measurements
Content Learning Outcome	Apply the skills and methods of measurement in calculating quantities and perform dimensional to see it is dimensionally correct.
Reference from Text	Pg 2 to 8

Questions

No.	**CONCEPT IN BRIEF**: To calculate uncertainty in a series of readings, **the estimated value** of the reading will be given by taking the average of the readings and the **uncertainty** will be given by half of the range of measurements
1.	a) A group of Year 13 students took a measurement for the length of the microscope slide and obtained the following values: 8.52, 8.54, 8.53, 8.55, 8.53, 8.51 Evaluate the measurement with its appropriate uncertainty.
	b) Filipe measured the period of oscillation of a simple pendulum. The recorded readings were: 4.63, 4.56, 4.52, 4.70 and 4.61 seconds. (i) Find the mean of the five measurements (ii) Calculate the absolute error.
	CONCEPT IN BRIEF: When measurements are raised to a power multiply the % Uncertainty by the power. $(a + b\%)^n = a^n \pm (nb)\%$

<table>
<tr><td>2.</td><td>a) A glass cube is measured to be 3.2 ± 0.1 cm. Find its volume in cm^3 along with its absolute uncertainty. ($V = L^3$)</td></tr>
<tr><td></td><td>b) Tomasi made a paper cube and calculated the volume using the formula:
$V = L^3$
 
Calculate the length along with its absolute uncertainty if
$V = 12.4 \pm 0.2\ cm^3$.</td></tr>
<tr><td></td><td>CONCEPT IN BRIEF: Dimensional Analysis.
<table><tr><td>Quantity</td><td>Unit Name</td><td>Unit Symbol</td><td>Dimension</td></tr><tr><td>Length</td><td>Meter</td><td>m</td><td>L</td></tr><tr><td>Mass</td><td>Kilogram</td><td>kg</td><td>M</td></tr><tr><td>Time</td><td>Second</td><td>s</td><td>T</td></tr></table>Note: $L + L = L$ but $L \times L = L^2$</td></tr>
<tr><td>3.</td><td>a) The period of simple harmonic motion of pendulum is defined as $T = 2\pi\sqrt{\frac{L}{g}}$; where L is the length of pendulum and g is the acceleration due to gravity. Show that this equation is dimensionally consistent.</td></tr>
<tr><td></td><td>b) Show that the formula ${v_f}^2 = {v_i}^2 + 2ad$ is dimensionally consistent, where $v_f$and $v_i$are the final and initial velocities respectively, d is the distance and a is the acceleration.</td></tr>
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