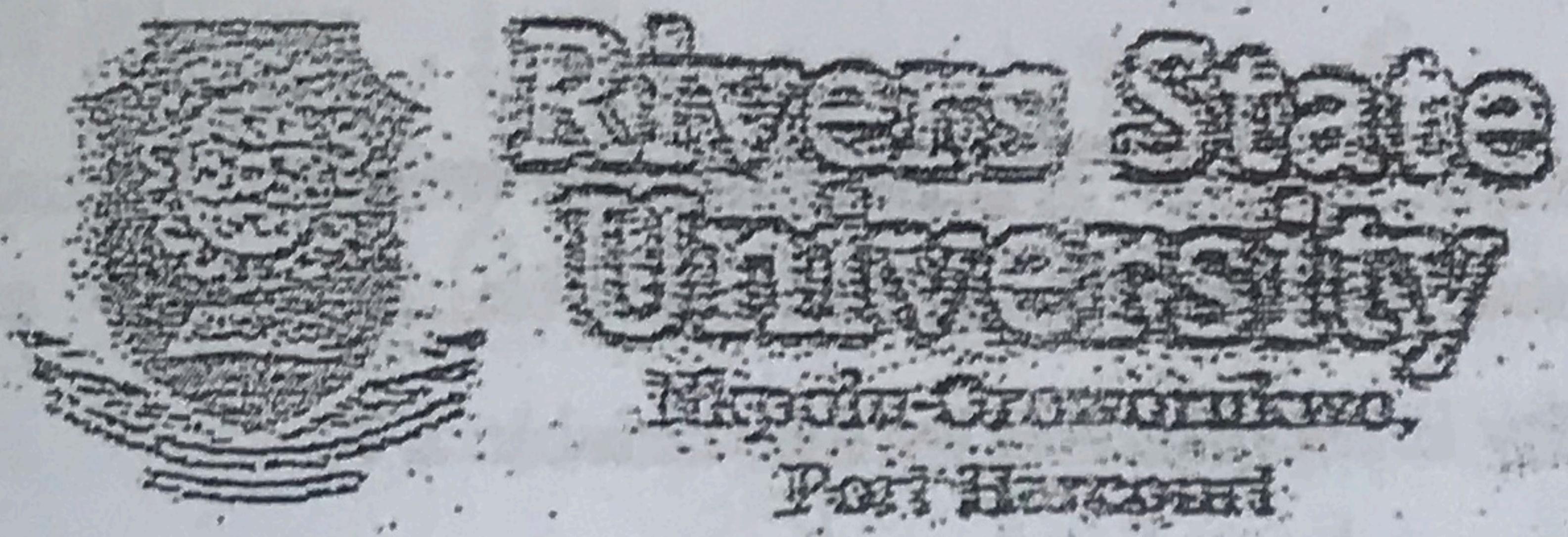


PHY 103

**IHEMEFOR PRINCE
(PRINCEGOLD)**



DEPARTMENT OF PHYSICS,

PHY 103: GENERAL LAB. I.

FIRST SEMESTER EXAMINATION,

2019/2020 ACADEMIC SESSION.

TIME ALLOWED: 1HR

INSTRUCTIONS: ANSWER ALL THE QUESTIONS

Name _____

Mat No _____ Dept _____

1. A measurement is said to be Accurate if it is close to the actual value.
2. What are the measurement accuracies of
i) meter rule 1mm ii) vernier caliper 0.1mm iii) stop watch 0.1sec

Four students each made a series of measurements of the acceleration of free fall, g , as shown in the table below. Use the information to answer questions 3 and 4.

student	results $g/m s^{-2}$			
A	9.81	9.79	9.84	9.83
B	9.81	10.12	9.88	9.94
C	9.45	9.21	9.28	9.76
D	9.45	8.46	8.50	8.41

3. Which of the results is precise but not accurate? (A, B, C or D)
4. Which of the results is precise and accurate? (A, B, C or D)
5. The notation ' μs ' is used as an abbreviation for a certain unit of time. What is the name and value of this unit? 10^{-6} seconds
6. Which product-pair of metric prefixes has the greatest magnitude?
A. pico x mega B. nano x kilo C. micro x giga D. milli x tera
7. Internal and external diameters can best be measured using Vernier Caliper
8. What measuring instrument works on the principle that, provided its elastic limit is not exceeded, its extension is proportional to an applied force? Spring Balance
9. In a simple pendulum experiment, if the time taken for 20 complete oscillation is 23 seconds, what is the frequency of the oscillation?

$$F = \frac{n}{T} = \frac{20}{23} = 0.87 \text{ Hz}$$

- variable should be plotted
11. Whenever possible, while plotting a graph, the _____ variable should be plotted on the y-axis
on the x-axis while the _____.

12. The diameter of a pendulum bob is measured several times and the results are found to be 2.20, 2.15, 2.20, 2.10, 2.05, 2.16, 2.18 cm. What is the mean value of the diameter?

$$M = y \left(\frac{bw^3 E}{4gl^3} \right) : \text{What is } M?$$

$M = \gamma \left(\frac{b w^3 E}{4 g l^3} \right)$. What physical quantity is represented by the term $\frac{b w^3 E}{4 g l^3}$?

Aug 19th

Aug 19th

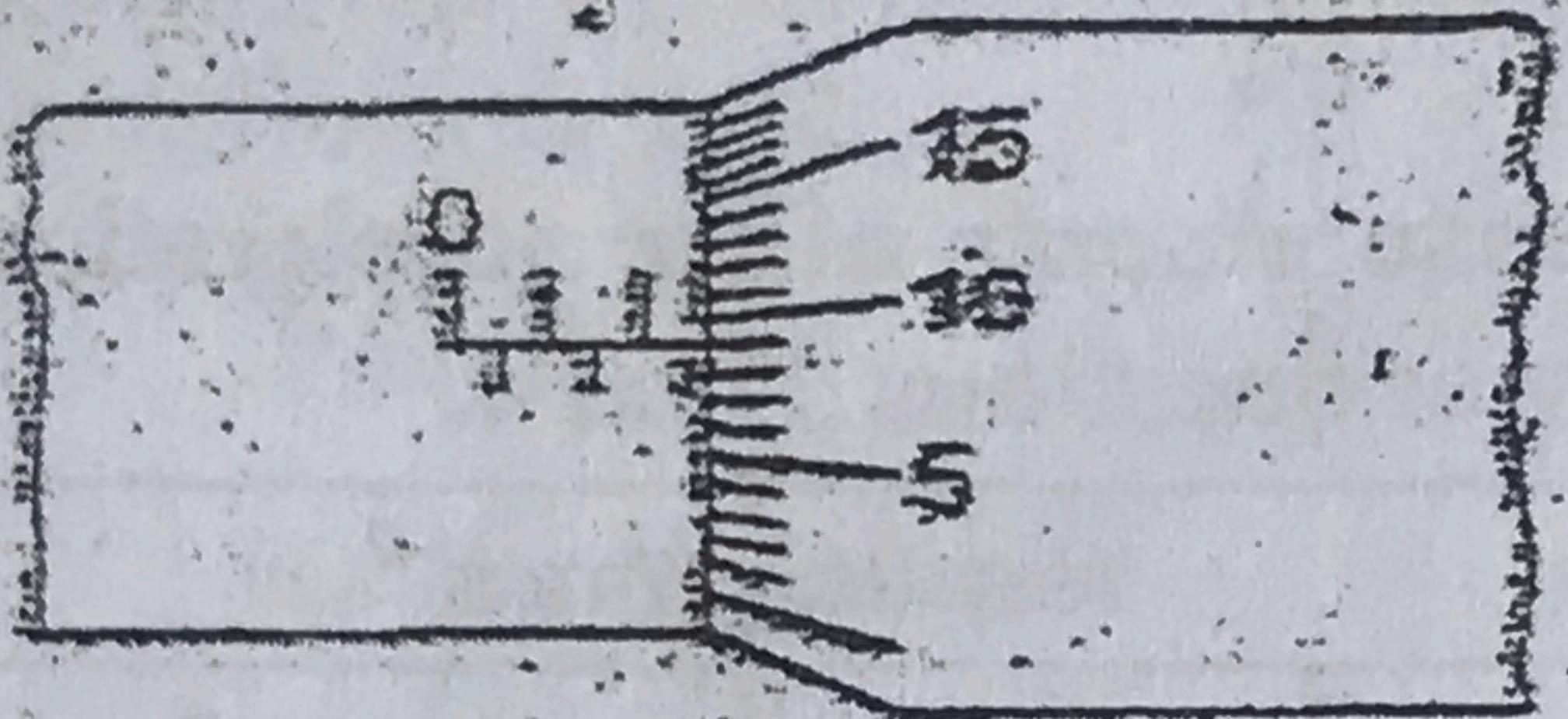
variable should be plotted
11. Whenever possible, while plotting a graph, the dependent variable should be plotted on the y-axis
on the x-axis while the independent.

12. The diameter of a pendulum bob is measured several times and the results are found to be 2.20, 2.15, 2.20, 2.10, 2.05, 2.16, 2.18 cm. What is the mean value of the diameter?

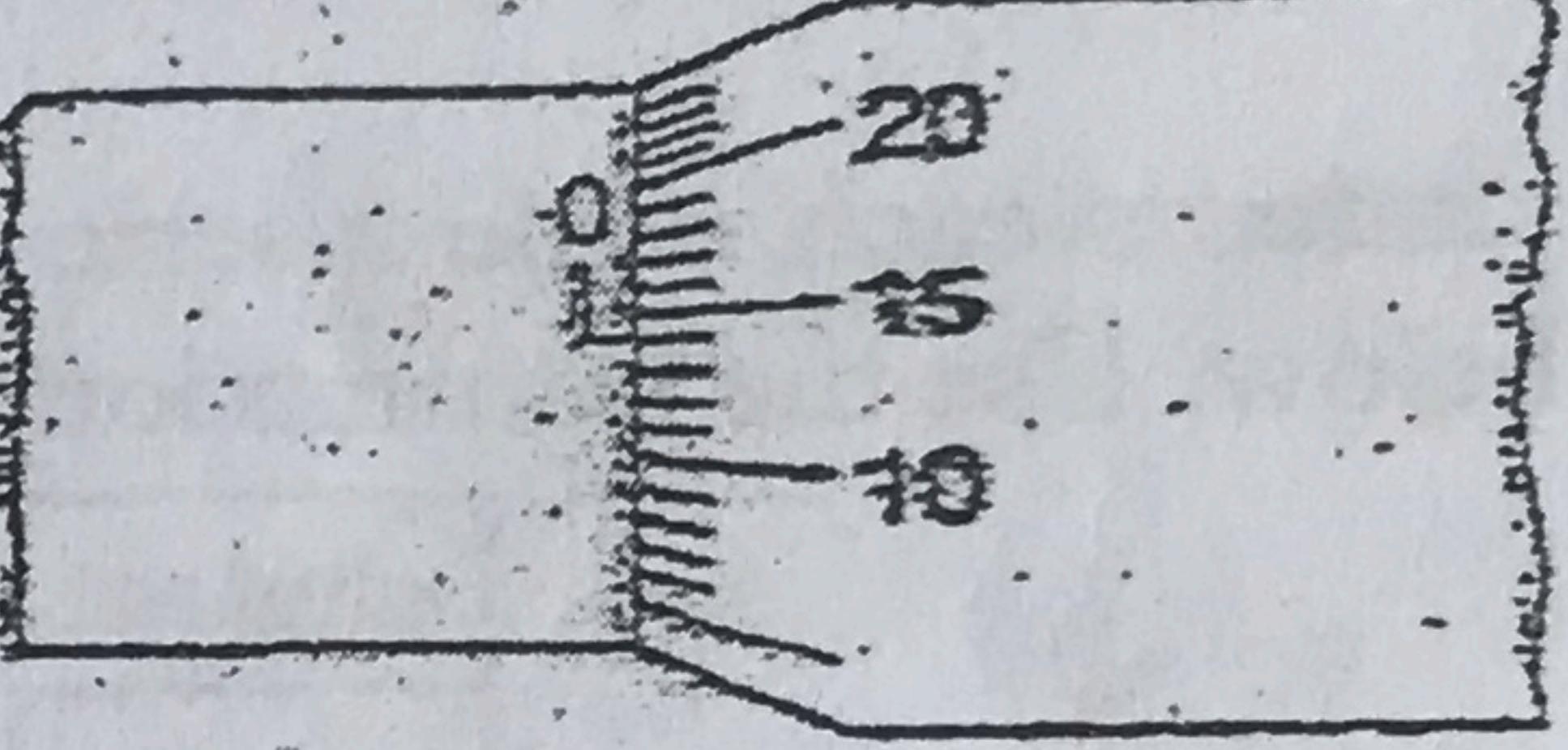
$$\text{Mean} = \frac{2.20 + 2.20 + 2.15 + 2.10 + 2.05}{5} = 2.12$$

z. 10. 24 z. 9. 16. 8

13. A micrometer screw gauge is used to measure the diameter of a copper wire. The reading with the wire in position is shown in diagram 1. The wire is removed and the jaws of the micrometer are closed. The new reading is shown in diagram 2. What is the diameter of the wire?



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14. The time taken to complete one oscillation in a simple pendulum is referred to as
Period.

15. A Graph is a pictorial representation of a relation between quantities that varies, it is a very important tool for analyzing experimental results.

16. The maximum displacement of a periodic motion is known as its ~~Amplitude~~.

17. Sets of energy values are recorded during a practical session; $5kJ$, $5mJ$, $5MJ$ and $5nJ$. Starting with smallest, what is the order of increasing magnitude of these energies?

$$5\text{K} \quad 5\text{mJ} \quad 5\text{K} \quad 5\text{N}$$

$$\times 10^{-3} \quad \times 10^{10} \quad \times 10^0$$

18. What is the period of the earth's rotation about its spin axis?

19. Systematic errors are classified into i) Cew and ii) Personal and iii) Instrumental.

20. The following readings were obtained in an experiment:

P (Volt)	1.50	2.50	3.30	3.90
R (Amp)	0.3	0.52	0.66	0.8

- a. Using a suitable scale, plot a graph of P against R .
b. Estimate the slope of the graph.
c. If P and R are related by the equation $P = \alpha^2 R$, determine the value of α from the graph.

PHY 103 SOLUTION
2019/2020 SESSION

1. Accurate

2. (i) 1mm (ii) 0.1mm
 (iii) 0.1 sec

5. MICRO-seconds \rightarrow
 10^{-6} second

6. (A) pico x mega
 $(10^{-12} \times 10^6 = 10^{-6})$

(B) nano x kilo
 $(10^{-9} \times 10^3 = 10^{-6})$

(C) micro x giga
 $(10^{-6} \times 10^9 = 10^3)$

Ans (D) milli x tera
 $10^{-3} \times 10^{12} = 10^9$ ✓

(7) Vernier calliper

(8) Spring balance

$$(9) F = \frac{n}{T} = \frac{20}{23} = 0.87 \text{ Hz}$$

(10) Young modulus of elasticity

(11) Independent, dependent

(12) Mean (\bar{x}) =

$$\frac{2.2 + 2.2 + 2.15 + 2.2 + 2.10 + 2.05 + 2.16 + 2.18}{8}$$

$$\frac{17.24}{8} = \underline{\underline{2.16 \text{ cm}}}$$

(13)

(13)

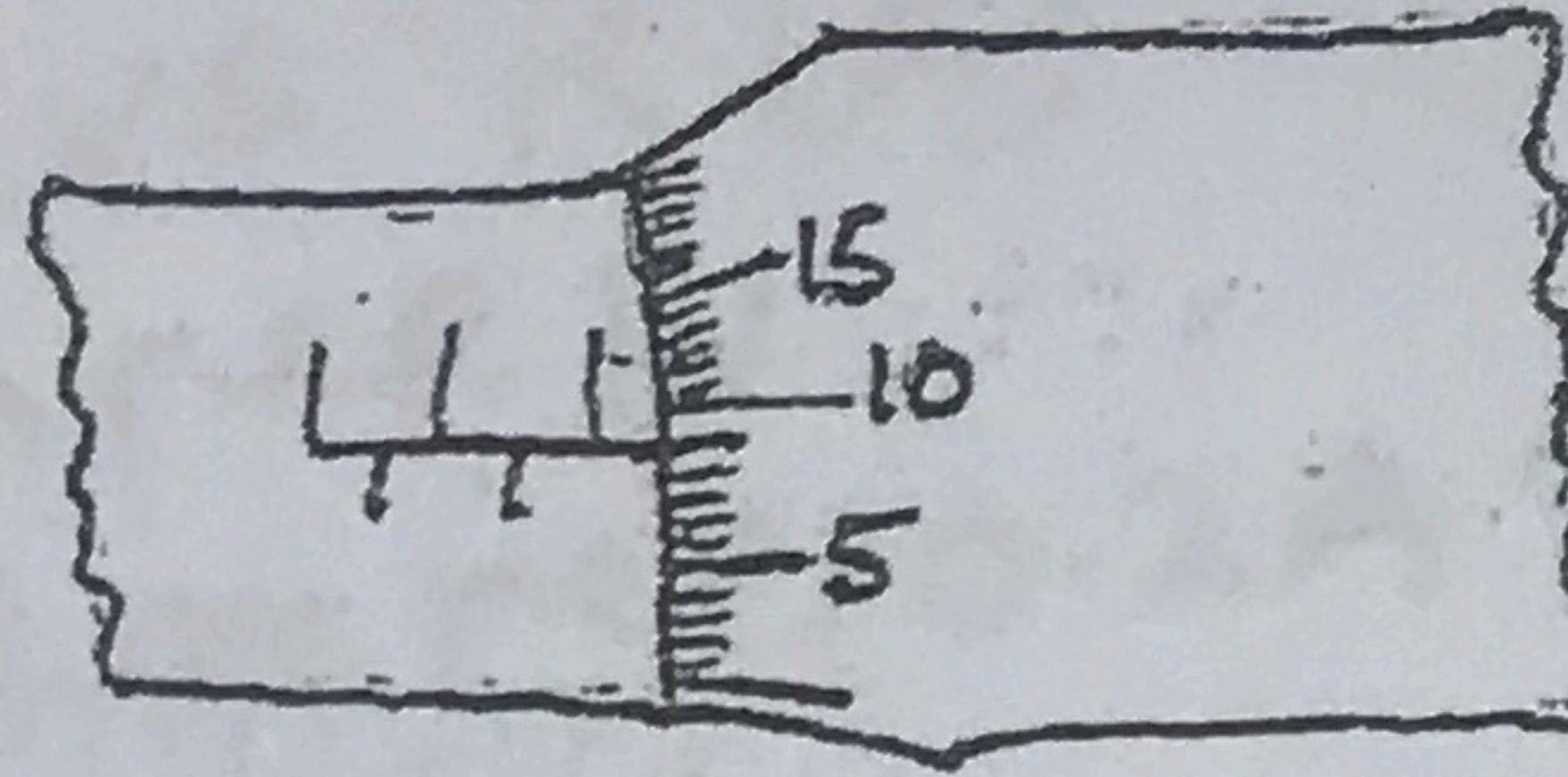


diagram 1

$$M.S = 2.5 \text{ mm}$$

$$C.S = \frac{9}{100} = 0.09 \text{ mm}$$

$$= 2.59 \text{ mm}$$

$$= 0.259 \text{ cm}$$

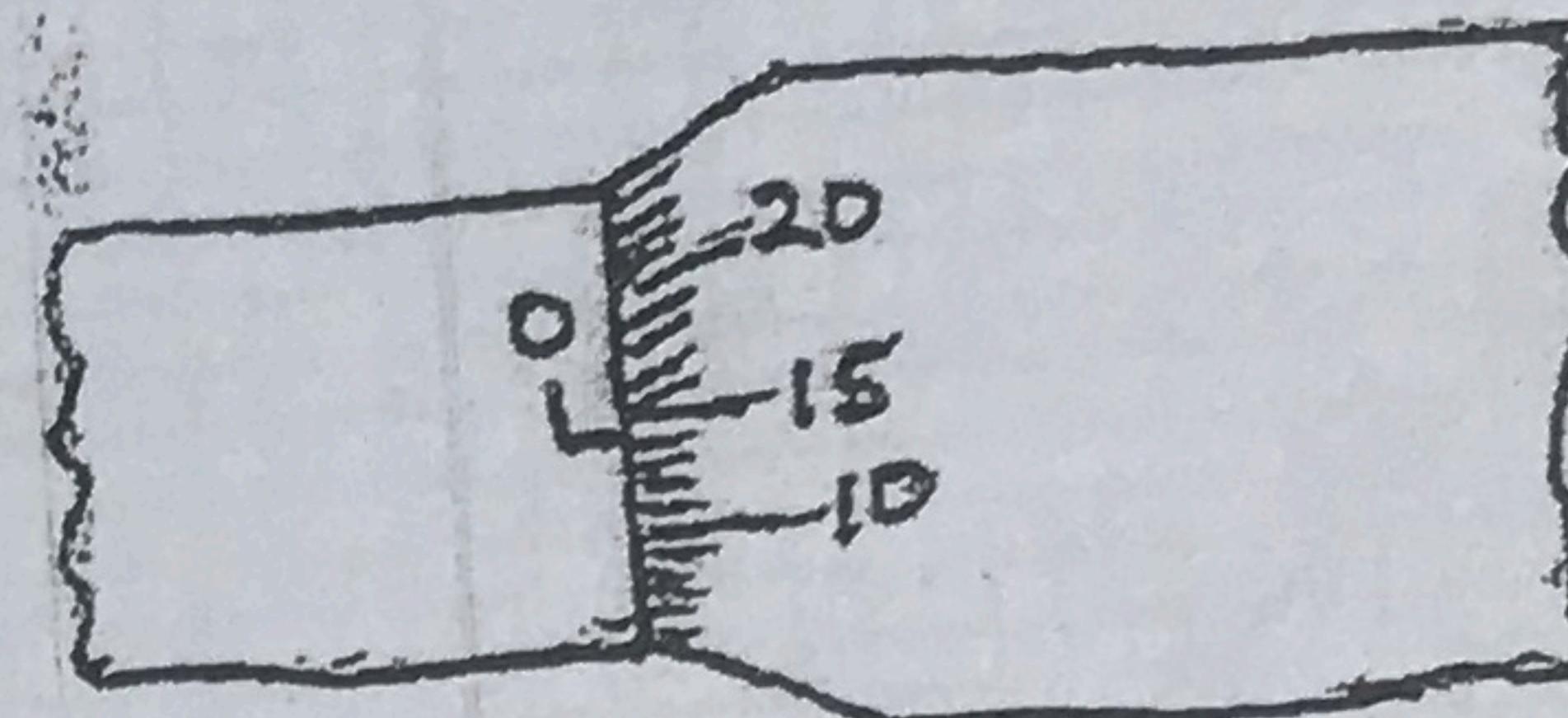


diagram 2

$$M.S = 0.5 \text{ mm}$$

$$C.S = \frac{14}{100} = 0.14 \text{ mm}$$

$$= 0.64 \text{ mm}$$

$$= 0.064 \text{ cm}$$

(14) Period

(15) Graph

(16) Amplitude

(17) 5nJ, 5mJ, 5kJ, 5MJ
 $\times 10^{-9}, \times 10^{-3}, \times 10^3, \times 10^6$

(19) (i) zero error

(ii) personal error

(iii) instrument error


(20) Refer to the graph in the next page

Title: A graph of $P(V)$ vs. $R(A)$

Scale: on P -axis: 2 cm rep. 1V

$P(V)$ on R -axis: 2 cm rep. 0.2A

T8



SOLUTION: 270 - QUESTION 20

$$\text{b) Slope} = \frac{\Delta P}{\Delta R} = \frac{P_2 - P_1}{R_2 - R_1} = \frac{4.6 - 1.5}{0.92 - 0.3} \text{ (V)} \\ = \frac{3.1}{0.62} \\ = 5 \text{ v}$$

c) Given that
 the governing
 equation of the
 plotted graph
 is $P = a^2 R$
 Comparing with the
 standard equation
 of a straight line
 $y = mx + c$

$$\text{where } c = 0$$

$$a^2 = \frac{P}{R}$$

$$a^2 = \text{slope}$$

$$a = (5)^{1/2} \text{ or } 2^{1/2}$$