

MEASUREMENTS II

1. A

2. C

3. C

4. B

5. (a) reading on scale not zero when closed / no object B1 [1]

(b) 28 seen or implied C1

1.28 seen / 8 seen C1

0.16 cao unit not required (0.427 scores 2) A1 [3]

(c) easier to use (e.g. no vernier to read/automatic reading) / reduces operator error / quicker to use / more sf or dp or precise B1 [1]

uses a battery / cell / battery / cell may run out / expensive / too sensitive / readings fluctuate / (circuit) malfunction B1 [1]

[Total: 6]

6. (i) Least count of the Vernier

$$= \frac{\text{Value of one main scale division}}{\text{Number of divisions on vernier scale}} \quad [1\text{m}]$$

$$= \frac{1\text{mm}}{10}$$

$$= \frac{0.1\text{ cm}}{10}$$

$$= 0.01\text{ cm} \quad [1\text{m}]$$

(ii) Reading of the instrument = Main scale reading

+ (coinciding v.s. div x least count) [1m]

$$= 4.3 + (8 \times 0.01)$$

$$= 4.3 + 0.08$$

$$= 4.38\text{ cm} \quad [1\text{m}]$$

[Total 4m]

7. Zero error = $14 \times 0.01 = 0.14\text{mm}$ [1m]

Diagram 1 = $2.50 + 0.09 = 2.59\text{mm}$ [1m]

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Correct diameter = $2.59 - 0.14 = 2.45\text{mm}$ [1m]

8. (i) The wire whose thickness is to be determined is placed between the anvil and spindle end, [1m] the thimble is rotated till the wire is firmly held between the anvil and the spindle [1m]. The ratchet is provided to avoid excessive pressure on the wire [1m]. It prevents the spindle from further movement.

(ii) Least count of an instrument is the smallest reading [1m] that you can measure accurately [1m] with that instrument.

(iii) Reading = Linear scale reading + (Coinciding circular scale x Least count)

$$= 2.5 \text{ mm} + (46 \times 0.01) \text{ [1m]}$$

$$= (2.5 + 0.46) \text{ mm}$$

$$= 2.96 \text{ mm [1m]}$$

[Total 7m]