1. The least count of a Vernier caliper is 0.01 cm. If the main scale reading is 3.0 cm and the 5th Vernier division coincides with the main scale, the measured length is:

A. 3.50 cm
B. 3.05 cm
C. 3.25 cm
D. 3.45 cm

Answer: B
Explanation:
Measured length = MSR + (Vernier scale division × LC)
= 3.0 + (5 × 0.01) = 3.05 cm

2. In a Vernier caliper, the least count is 0.02 cm. The zero error is +0.04 cm. If the observed reading is 4.26 cm, the correct length is:

A. 4.30 cm
B. 4.22 cm
C. 4.00 cm
D. 4.24 cm

Answer: B
Explanation:
Correct length = Observed reading − Zero error
= 4.26 − 0.04 = 4.22 cm

3. A Vernier caliper has 10 divisions on the Vernier scale equal to 9 divisions on the main scale. If 1 main scale division is 1 mm, the least count is:

A. 0.1 mm
B. 0.01 mm
C. 0.2 mm
D. 0.5 mm

Answer: A
Explanation:
LC = 1 MSD − 1 VSD
= 1 mm − (9 mm / 10) = 0.1 mm

Q4. A screw gauge has a pitch of 1 mm and 100 divisions on its circular scale. When the jaws are closed, the zero of the circular scale is 4 divisions below the reference line. If the reading shows 3 mm on the main scale and 36 divisions on the circular scale, what is the correct diameter of the wire?

A. 3.36 mm
B. 3.32 mm
C. 3.40 mm
D. 3.28 mm

Answer: B
Explanation:

Least count = 1 mm / 100 = 0.01 mm

Zero is 4 divisions below ⇒ positive zero error = +4 × 0.01 = +0.04 mm

Observed reading = 3 mm + (36 × 0.01) = 3.36 mm

Correct reading = 3.36 mm − 0.04 mm = 3.32 mm

Q5. A screw gauge has a least count of 0.01 mm. When the jaws are closed, the zero of the circular scale is 5 divisions above the reference line. What is the zero error and how is it corrected?

A. Zero error = +0.05 mm; correction = subtract
B. Zero error = −0.05 mm; correction = add
C. Zero error = +0.05 mm; correction = add
D. Zero error = −0.05 mm; correction = subtract

Answer: B
Explanation:

Zero is above reference line ⇒ negative zero error

Zero error = −(5 × 0.01) = −0.05 mm

To correct: add 0.05 mm to final reading

Q6. A screw gauge has a pitch of 1 mm and 100 divisions on the circular scale. What is its least count?

A. 0.01 mm
B. 0.1 mm
C. 1 mm
D. 0.001 mm

Answer: A
Explanation:
Least count = Pitch / Number of divisions
= 1 mm / 100 = 0.01 mm

Q7. The main scale of a screw gauge reads 3.5 mm and the 48th division of the circular scale coincides. If least count = 0.01 mm, what is the total reading?

A. 4.48 mm
B. 4.80 mm
C. 3.98 mm
D. 3.84 mm

Answer: C
Explanation:
Circular scale reading = 48 × 0.01 = 0.48 mm
Total reading = 3.5 mm + 0.48 mm = 3.98 mm

Q8. When the screw gauge is fully closed, the 4th division of the circular scale coincides with the reference line. What is the zero error?

A. +0.04 mm
B. −0.04 mm
C. +0.4 mm
D. −0.4 mm

Answer: A
Explanation:
Zero error = + (coinciding division × least count)
= 4 × 0.01 = +0.04 mm

Q9. A screw gauge shows a main scale reading of 5.0 mm and 30th circular scale division coinciding. If zero error is −0.02 mm, find the correct reading.

A. 5.28 mm
B. 5.30 mm
C. 5.32 mm
D. 5.50 mm

Answer: C
Explanation:
Observed reading = 5.0 mm + (30 × 0.01) = 5.30 mm
Zero error = −0.02 mm ⇒ correction = add
Final reading = 5.30 + 0.02 = 5.32 mm

Q10. A screw gauge with 0.01 mm least count has a zero error of +0.05 mm. If it reads 6.2 mm on main scale and 40th circular division, what is the actual thickness?

A. 6.60 mm
B. 6.65 mm
C. 6.55 mm
D. 6.45 mm

Answer: C
Explanation:
Circular reading = 40 × 0.01 = 0.40 mm
Observed reading = 6.2 + 0.40 = 6.60 mm
Zero error = +0.05 mm ⇒ correction = subtract
Final = 6.60 − 0.05 = 6.55 mm

Q11. The main scale of a Vernier caliper reads 4.0 cm, and the 6th division of the Vernier scale coincides. If 1 MSD = 1 mm and 10 VSD = 9 MSD, find the total reading.

A. 4.6 cm
B. 4.5 cm
C. 4.54 cm
D. 4.06 cm

Answer: D
Explanation:

Least Count = (1 MSD − 1 VSD) = 1 − (9/10) = 0.1 mm = 0.01 cm
Vernier reading = 6 × 0.01 = 0.06 cm
Total reading = 4.0 + 0.06 = 4.06 cm
Correct answer: D

Q12. The spherometer has pitch 1 mm and 100 circular divisions. The circular scale reads 47 when moved. What is the vertical height moved?

A. 0.47 mm
B. 1.47 mm
C. 0.047 mm
D. 4.7 mm

Answer: A
Explanation:
Least count = Pitch / No. of divisions = 1 mm / 100 = 0.01 mm
Height moved = 47 × 0.01 = 0.47 mm

Q13. A voltmeter shows a full-scale deflection at 5 V and has 100 divisions. What is its least count?

A. 0.05 V
B. 0.1 V
C. 0.01 V
D. 0.5 V

Answer: A
Explanation:
Least count = Total Voltage / No. of divisions = 5 / 100 = 0.05 V

Q14. A student connects a 10 Ω resistor to a 2 V battery and measures a current of 0.18 A. What is the error?

A. −0.02 A
B. 0.02 A
C. −0.02 V
D. +0.02 V

Answer: A
Explanation:

Expected current = V/R = 2/10 = 0.2 A
Measured = 0.18 A
Error = 0.18 − 0.2 = −0.02 A

Q15. A metre scale is used to measure the length of a rod but eye is not kept perpendicular to scale. What kind of error is this?

A. Systematic error
B. Random error
C. Instrumental error
D. Parallax error

Answer: D
Explanation:
When the observer's eye is not placed perpendicularly while reading scale, it causes parallax error.

Q16. Stopwatch shows 10 oscillations of a pendulum in 15.6 s. What is the time period?

A. 1.56 s
B. 0.78 s
C. 1.5 s
D. 2.0 s

Answer: A
Explanation:
Time period = Total time / Number of oscillations = 15.6 / 10 = 1.56 s

Q17. A pendulum has time period of 2 s. How many oscillations in 1 minute?

A. 30
B. 60
C. 120
D. 90

Answer: A
Explanation:
Oscillations = Total time / Time period = 60 / 2 = 30

Q18. In a simple pendulum experiment, increasing the length will:

A. Increase time period
B. Decrease time period
C. Not affect time period
D. Increase frequency

Answer: A
Explanation:
$T = 2\pi\sqrt{(L/g)}$ → Time period increases with length.

Q19. In a lens experiment, a student uses an object 25 cm from convex lens and finds image at 75 cm on the other side. What is focal length?

A. 20 cm
B. 25 cm
C. 30 cm
D. 15 cm

Answer: A
Explanation:
Using lens formula: $1/f = 1/v - 1/u$
$v = +75$ cm, $u = -25$ cm
$1/f = 1/75 - (-1/25) = (1 + 3)/75 = 4/75 \Rightarrow f = 18.75$ cm ≈ 20 cm

Q20. A concave mirror forms a real image of an object placed 30 cm in front of it at 60 cm from the mirror. Find focal length.

A. 20 cm
B. 30 cm
C. 40 cm
D. 45 cm

Answer: A
Explanation:
Using mirror formula: $1/f = 1/v + 1/u$
$v = -60$ cm, $u = -30$ cm
$1/f = -1/60 - 1/30 = -3/60 = -1/20$

f = −20 cm

Q21. A student uses a simple pendulum of length 100 cm and measures the time for 20 oscillations as 40 s. What is the value of acceleration due to gravity?

A. 9.87 m/s²
B. 10.1 m/s²
C. 9.8 m/s²
D. 9.6 m/s²

Answer: C
Explanation:
T = t/n = 40/20 = 2 s
$T = 2\pi\sqrt{(L/g)} \Rightarrow g = 4\pi^2L/T^2 = 4\times(3.14)^2\times1 / 4 = 9.8$ m/s²

Q22. If the angle between two vectors is 90°, then using parallelogram law, their resultant will be:

A. R = A + B
B. $R = \sqrt{(A^2 + B^2)}$
C. R = A − B
D. $R = A^2 + B^2$

Answer: B
Explanation:
When θ = 90°, $R = \sqrt{(A^2 + B^2)}$ as cos 90° = 0

Q23. A student measures a rod of actual length 98.5 cm using a metre scale having zero error of −0.5 cm. The measured length is 98 cm. What is the correct length?

A. 98.5 cm
B. 98.0 cm
C. 98.2 cm
D. 98.8 cm

Answer: A
Explanation:
Measured length = 98 cm
Zero error = −0.5 cm ⇒ True length = 98 + 0.5 = 98.5 cm

Q24. In an I-V characteristics graph for a forward-biased diode, the graph is:

A. A straight line through origin
B. Non-linear and starts after a threshold
C. Symmetric around origin
D. Constant current

Answer: B
Explanation:
Current remains low until threshold (~0.7 V), then rises rapidly ⇒ non-linear

Q25. In a prism experiment, the angle of minimum deviation occurs when:

A. The incident angle is 0°
B. The angle of incidence = angle of emergence
C. The angle of refraction is 0°
D. The prism is rotated

Answer: B
Explanation:
At minimum deviation: i = e, path of ray is symmetric.

Q26. A student plots a graph of V vs I using Ohm's Law setup and gets a straight line. The slope of the line gives:

A. Resistance
B. Current
C. Voltage
D. Power

Answer: A
Explanation:
V = IR ⇒ V vs I graph has slope = R

Q27. In u-v method with a convex lens, a student obtains u = 25 cm and v = 25 cm. What is the focal length?

A. 10 cm

B. 20 cm
C. 12.5 cm
D. 25 cm

Answer: C
Explanation:
Using lens formula: $1/f = 1/v - 1/u = 0$
But since u = v, object & image at 2f ⇒ f = 25/2 = 12.5 cm

Q28. A multimeter connected to a resistor reads 1.5 V and current 0.3 A. What is resistance?

A. 2.5 Ω
B. 5 Ω
C. 6 Ω
D. 0.5 Ω

Answer: B
Explanation:
$R = V/I = 1.5 / 0.3 = 5\ \Omega$

Q29. A resistor with color bands: red, violet, orange, gold. What is its resistance?

A. 27 kΩ ± 5%
B. 2.7 kΩ ± 10%
C. 27 Ω ± 10%
D. 270 kΩ ± 5%

Answer: A
Explanation:
Red = 2, Violet = 7, Orange = ×1000 ⇒ 27000 = 27 kΩ, Gold = ±5%

Q30. In a travelling microscope, main scale reading = 1.2 cm, circular scale division = 45 (LC = 0.001 cm). What is total reading?

A. 1.245 cm
B. 1.245 mm
C. 1.200 cm
D. 1.045 cm

Answer: A

Explanation:

Total = MSR + (CSD × LC) = 1.2 + (45 × 0.001) = 1.245 cm