9TH CLASS • PHYSICS

Chapter 1 Physical Quantities and Measurements

Complete Solved MCQs Collection

TOPICS COVERED

- Physical & Non-Physical Quantities
- Base & Derived Quantities
- SI Units & Prefixes
- Scientific Notation
- Length, Mass, Time & Volume Instruments
- Errors & Uncertainty
- Significant Figures
- Precision & Accuracy
- Rounding Off

94	100%	15
Solved MCQs	Answered & Explained	Topics Covered

Every question includes the correct answer highlighted in green with a tick mark, along with a detailed explanation.

Solved Multiple Choice Questions

Q1 **Which of the following is a physical quantity?**

- A Beauty
- B **Length** ✓
- C Love
- D Honesty

Correct Answer: **B) Length**

Explanation: A physical quantity can be measured directly or indirectly using an instrument and has a numerical value with a unit. Length can be measured with a ruler, so it is a physical quantity. Beauty, love and honesty cannot be measured with instruments — they are non-physical quantities.

Q2 **A non-physical quantity is best described as one that:**

- A Has a unit but no number
- B **Cannot be measured using instruments** ✓
- C Can always be measured with a ruler
- D Is always smaller than a physical quantity

Correct Answer: **B) Cannot be measured using instruments**

Explanation: Non-physical quantities such as fear, wisdom or beauty pertain to perception and cannot be measured with tools or instruments; they can only be described qualitatively or compared using surveys.

Q3 **Which of the following is NOT a physical quantity?**

- A Temperature
- B Density
- C **Wisdom** ✓
- D Mass

Correct Answer: **C) Wisdom**

Explanation: Wisdom cannot be measured with any instrument and has no fixed unit, so it is a non-physical quantity. Temperature, density and mass are all measurable physical quantities.

Q4 **Every measurement of a physical quantity consists of:**

- A A number only
- B A unit only
- C **A number and a unit** ✓
- D A symbol only

Correct Answer: **C) A number and a unit**

Explanation: A measurement is meaningless without both parts — the numerical magnitude and the unit that gives it meaning, e.g. '5 metres' needs both '5' and 'metres'.

Q5 **Which of these is a base physical quantity?**

- A Speed
- B Area
- C **Mass** ✓
- D Density

Correct Answer: **C) Mass**

Explanation: Mass is one of the seven fundamental (base) quantities selected arbitrarily by scientists. Speed, area and density are all derived from base quantities such as length, mass and time.

Q6 **Derived physical quantities are those which:**

- A Cannot be expressed in any unit
- B **Are expressed in terms of one or more base quantities** ✓
- C Only depend on time
- D Have no numerical value

Correct Answer: **B) Are expressed in terms of one or more base quantities**

Explanation: Derived quantities such as speed, area, volume, force and pressure are described in terms of one or more base quantities like length, mass and time.

Q7 **Which of the following is a derived quantity?**

- A Time
- B Electric current
- C **Force** ✓
- D Length

Correct Answer: **C) Force**

Explanation: Force is derived from mass, length and time (F = mass × acceleration), making it a derived quantity, whereas time, electric current and length are base quantities.

Q8 **Speed is a derived quantity because it depends on:**

- A Mass and time
- B **Distance and time** ✓
- C Force and area
- D Temperature and volume

Correct Answer: **B) Distance and time**

Explanation: Speed = Distance / Time, so it is derived from the two base quantities distance (length) and time.

Q9 **Density is derived from which two base quantities?**

- A Length and time
- B **Mass and volume(length)** ✓
- C Current and temperature
- D Time and amount of substance

Correct Answer: **B) Mass and volume(length)**

Explanation: Density = Mass / Volume, and since volume itself comes from length, density is ultimately derived from the base quantities mass and length.

Q10 **How many base units are there in the International System of Units (SI)?**

- A Five
- B Six
- C **Seven** ✓
- D Eight

Correct Answer: **C) Seven**

Explanation: The international committee recommended seven base units in 1961: metre, kilogram, second, ampere, kelvin, candela and mole.

Q11 **The SI unit of mass is the:**

- A Gram
- B Pound
- C **Kilogram** ✓
- D Newton

Correct Answer: **C) Kilogram**

Explanation: The kilogram (kg) is the SI base unit of mass. The gram and pound are not SI base units, and the newton is the unit of force, not mass.

Q12 **Which of the following is the correct SI symbol for time?**

- A Sec
- B S
- C **s** ✓
- D T

Correct Answer: **C) s**

Explanation: According to SI convention, the symbol for the second is a lowercase 's' (not 'sec' or 'S'), since SI symbols must be written exactly as defined.

Q13 **The SI unit of electric current is the:**

- A Volt
- B Watt
- C **Ampere** ✓
- D Ohm

Correct Answer: **C) Ampere**

Explanation: The ampere (A) is the SI base unit of electric current. Volt, watt and ohm are units of voltage, power and resistance respectively — all derived units.

Q14 **Which physical quantity has the SI unit 'candela'?**

- A Amount of substance
- B **Intensity of light** ✓
- C Temperature
- D Electric current

Correct Answer: **B) Intensity of light**

Explanation: The candela (cd) is the SI base unit for luminous intensity (intensity of light).

Q15 **The SI base unit for 'amount of substance' is the:**

A Litre

B Kilogram

C **Mole** ✓

D Candela

Correct Answer: **C) Mole**

Explanation: The mole (mol) is the SI base unit used to measure the amount of substance, based on the number of elementary entities present.

Q16 **Which base unit is the only SI unit that has a prefix attached to it by definition?**

A Metre

B Second

C **Kilogram** ✓

D Kelvin

Correct Answer: **C) Kilogram**

Explanation: The kilogram is unique among SI base units because it already carries the prefix 'kilo' as part of its official definition, unlike metre, second or kelvin.

Q17 **The SI unit of pressure is the:**

- A Newton
- B **Pascal** ✓
- C Joule
- D Watt

Correct Answer: **B) Pascal**

Explanation: Pressure is measured in pascals (Pa), a derived unit equal to one newton per square metre. Newton is the unit of force, not pressure.

Q18 **Which is the correct derived unit for electric charge?**

- A Ampere
- B Ohm
- C **Coulomb** ✓
- D Volt

Correct Answer: **C) Coulomb**

Explanation: Electric charge is measured in coulombs (C), a derived SI unit. The ampere measures current, not charge.

Q19 **The SI unit of area is:**

A Metre

B **Square metre** ✓

C Cubic metre

D Metre per second

Correct Answer: **B) Square metre**

Explanation: Area = length × breadth = metre × metre = square metre (m^2), which is a derived unit built from the base unit metre.

Q20 **The SI unit for speed, metre per second, is written with the symbol:**

A m/s

B ms^{-1}

C m·s

D **Both A and B are acceptable forms** ✓

Correct Answer: **D) Both A and B are acceptable forms**

Explanation: Speed's SI unit can correctly be written either as m/s or in exponential form as ms^{-1}; both represent metres divided by seconds.

Q21 **Which of the following quantities has the derived unit 'newton'?**

- A Pressure
- B **Force** ✓
- C Energy
- D Charge

Correct Answer: **B) Force**

Explanation: The newton (N) is the SI derived unit of force, defined in terms of the base units kilogram, metre and second.

Q22 **The prefix 'kilo' represents a power of ten equal to:**

- A **10^3** ✓
- B 10^{-3}
- C 10^6
- D 10^2

Correct Answer: **A) 10^3**

Explanation: 'Kilo' (symbol k) represents 10^3, meaning one kilometre equals 1000 metres.

Q23 **Which prefix represents 10^{-6}?**

A. Milli

B. **Micro** ✓

C. Nano

D. Pico

Correct Answer: **B) Micro**

Explanation: 'Micro' (symbol μ) represents 10^{-6}. For comparison, milli is 10^{-3}, nano is 10^{-9}, and pico is 10^{-12}.

Q24 **The symbol 'M' as an SI prefix stands for:**

A. Milli (10^{-3})

B. **Mega (10^{6})** ✓

C. Micro (10^{-6})

D. Mole

Correct Answer: **B) Mega (10^{6})**

Explanation: 'M' represents the prefix 'mega', equal to 10^{6}. It should not be confused with lowercase 'm' which stands for 'milli' (10^{-3}).

Q25 **5000 mm is equal to how many metres?**

- A 500 m
- B 50 m
- C **5 m** ✓
- D 0.5 m

Correct Answer: **C) 5 m**

Explanation: 5000 mm ÷ 1000 = 5 m, since one metre contains 1000 millimetres.

Q26 **3000 g is equal to:**

- A 0.3 kg
- B **3 kg** ✓
- C 30 kg
- D 300 kg

Correct Answer: **B) 3 kg**

Explanation: 3000 g ÷ 1000 = 3 kg, because one kilogram equals 1000 grams.

Q27 **2000 microseconds (μs) is equal to:**

- **A** **2×10^{-3} s** ✓
- **B** 2×10^{3} s
- **C** 2×10^{-6} s
- **D** 2×10^{6} s

Correct Answer: **A) 2×10^{-3} s**

Explanation: 2000 μs = 2000 × 10^{-6} s = 2 × 10^{-3} s = 2 milliseconds.

Q28 **Which prefix is used to represent 10^{12}?**

- **A** Giga
- **B** **Tera** ✓
- **C** Peta
- **D** Exa

Correct Answer: **B) Tera**

Explanation: 'Tera' (symbol T) represents 10^{12}. Giga is 10^{9}, peta is 10^{15}, and exa is 10^{18}.

Q29 **50000 cm is equal to how many metres?**

A. 5 m

B. 50 m

C. **500 m** ✓

D. 5000 m

Correct Answer: **C) 500 m**

Explanation: 50000 cm ÷ 100 = 500 m, since one metre equals 100 centimetres.

Q30 **The number 186,000 expressed correctly in scientific notation is:**

A. 18.6×10^4

B. **1.86×10^5** ✓

C. 186×10^3

D. 1.86×10^6

Correct Answer: **B) 1.86×10^5**

Explanation: In scientific notation, only one non-zero digit is kept before the decimal point. 186,000 = 1.86×10^5.

Q31 **The diameter of a hydrogen atom, 0.000000000052 m, is written in scientific notation as:**

- **A** **5.2×10^{-11} m** ✓
- **B** 5.2×10^{11} m
- **C** 52×10^{-12} m
- **D** 5.2×10^{-10} m

Correct Answer: **A) 5.2×10^{-11} m**

Explanation: Moving the decimal point 11 places to the right gives a negative exponent, so the value becomes 5.2×10^{-11} m.

Q32 **When adding numbers in scientific notation, the exponents of 10 must first be:**

- **A** Multiplied
- **B** **Made equal** ✓
- **C** Ignored
- **D** Subtracted

Correct Answer: **B) Made equal**

Explanation: Addition and subtraction in scientific notation are only possible when the powers of ten are equal; otherwise the decimal point must be shifted to make them the same before combining.

Q33 **Simplify: $(4 \times 10^3\ \text{kg})(6 \times 10^6\ \text{m}) =$**

- **A** **2.4×10^{10} kg·m** ✓
- **B** 2.4×10^9 kg·m
- **C** 24×10^9 kg·m
- **D** 1.5×10^{10} kg·m

Correct Answer: **A) 2.4×10^{10} kg·m**

Explanation: Multiply the coefficients ($4 \times 6 = 24$) and add the exponents ($10^{3+6} = 10^9$), giving $24 \times 10^9 = 2.4 \times 10^{10}$ kg·m.

Q34 **A number such as 1×10^{-2} has a value that is:**

- **A** Greater than one
- **B** Equal to one
- **C** **Less than one** ✓
- **D** Equal to zero

Correct Answer: **C) Less than one**

Explanation: Negative exponents represent values less than one; for example, 1×10^{-2} equals 0.01.

Q35 **The least count of an ordinary metre rule is:**

A 1 cm

B **1 mm** ✓

C 0.1 mm

D 0.01 mm

Correct Answer: **B) 1 mm**

Explanation: The smallest division marked on a metre rule is 1 mm, which is therefore its least count — the smallest measurement it can accurately record.

Q36 **Least count of an instrument is defined as:**

A The largest value it can measure

B **The smallest measurement that can be taken accurately with it** ✓

C The total length of its scale

D The number of divisions on its scale

Correct Answer: **B) The smallest measurement that can be taken accurately with it**

Explanation: Least count is the smallest measurement that an instrument can accurately measure, determined by the smallest division on its scale.

Q37 **Parallax error while reading a metre rule occurs due to:**

A. Using an old instrument

B. **Incorrect position of the eye while taking the reading** ✓

C. Reading the scale too quickly

D. Using the wrong units

Correct Answer: **B) Incorrect position of the eye while taking the reading**

Explanation: Parallax error arises when the eye is not placed directly perpendicular to the scale; viewing from an angle makes the object appear a different length than it actually is.

Q38 **A measuring tape has a least count of:**

A. 0.1 mm

B. **1 mm** ✓

C. 1 cm

D. 0.01 mm

Correct Answer: **B) 1 mm**

Explanation: A measuring tape, like a metre rule, has a least count of 1 mm and is typically used to measure longer distances up to several metres.

Q39 **Vernier Callipers can measure lengths accurately down to:**

A. 1 mm

B. **1/10th of a millimetre** ✓

C. 1/100th of a millimetre

D. 1 cm

Correct Answer: **B) 1/10th of a millimetre**

Explanation: Vernier Callipers are designed to measure small lengths down to 1/10th of a millimetre (0.1 mm), which is finer than an ordinary metre rule.

Q40 **The least count of Vernier Callipers is calculated as:**

A. 1 main scale division + 1 Vernier scale division

B. **1 main scale division − 1 Vernier scale division** ✓

C. 1 main scale division × 1 Vernier scale division

D. 10 × main scale division

Correct Answer: **B) 1 main scale division − 1 Vernier scale division**

Explanation: Least count of Vernier Callipers = 1 Main Scale division − 1 Vernier Scale division = 1 mm − 0.9 mm = 0.1 mm.

Q41 **On the Vernier scale of a Vernier Calliper, 9 mm length is divided into:**

- A 9 equal parts
- B **10 equal parts** ✓
- C 20 equal parts
- D 5 equal parts

Correct Answer: **B) 10 equal parts**

Explanation: The Vernier (sliding) scale has a total length of 9 mm which is divided into 10 equal parts, giving a least count of 0.1 mm.

Q42 **Which jaws of the Vernier Callipers are used to measure the internal dimensions of an object?**

- A Outside jaws A and B
- B **Inside jaws C and D** ✓
- C The tail
- D The main scale

Correct Answer: **B) Inside jaws C and D**

Explanation: Jaws C and D (the inside jaws) are used to measure internal dimensions, such as the internal diameter of a pipe, while outside jaws A and B measure external dimensions.

Q43 **The narrow strip that projects from behind the main scale of Vernier Callipers, used to measure the depth of a hollow object, is called the:**

A Vernier scale

B **Tail or depth gauge** ✓

C Main scale

D Thimble

Correct Answer: **B) Tail or depth gauge**

Explanation: This projecting strip is called the tail or depth gauge, and it is used specifically to measure the depth of hollow objects.

Q44 **Vernier Callipers were invented by:**

A Isaac Newton

B **Pierre Vernier** ✓

C Galileo Galilei

D James Watt

Correct Answer: **B) Pierre Vernier**

Explanation: Vernier Callipers were invented by the French scientist Pierre Vernier in 1631, which is why the sliding scale bears his name.

Q45 **If the main scale reading is 4.3 cm and the Vernier scale division in line with the main scale is 4 (least count 0.01 cm), the length of the object is:**

- A 4.30 cm
- B **4.34 cm** ✓
- C 4.40 cm
- D 4.04 cm

Correct Answer: **B) 4.34 cm**

Explanation: Length = Main scale reading + (Least count × Vernier scale reading) = 4.3 + (0.01 × 4) = 4.34 cm.

Q46 **If the zero of the Vernier scale lies to the right of the zero of the main scale, the instrument will show:**

- A **Slightly more than the actual length** ✓
- B Slightly less than the actual length
- C Exactly the actual length
- D No reading at all

Correct Answer: **A) Slightly more than the actual length**

Explanation: When the Vernier zero is to the right of the main scale zero, this positive zero error causes the instrument to read more than the true length, so the error must be subtracted from the observed reading.

Q47 **The Micrometer Screw Gauge is mainly used to measure:**

- A Long distances like a football field
- B **Very small lengths such as the diameter of a wire** ✓
- C Volume of liquids
- D Time intervals

Correct Answer: **B) Very small lengths such as the diameter of a wire**

Explanation: The screw gauge is designed for very small lengths, such as the diameter of a thin wire or the thickness of a metal sheet.

Q48 **The main scale on the sleeve of a Micrometer Screw Gauge has markings of:**

- A 0.1 mm each
- B **0.5 mm each** ✓
- C 1 mm each
- D 0.01 mm each

Correct Answer: **B) 0.5 mm each**

Explanation: The main scale on the sleeve of a standard screw gauge is marked in divisions of 0.5 mm each.

Q49 **The circular (thimble) scale of a typical Micrometer Screw Gauge is divided into how many divisions?**

- A 10
- B **50** ✓
- C 100
- D 20

Correct Answer: **B) 50**

Explanation: The thimble of a common screw gauge has 50 divisions on its circular scale, though some instruments may have 100 divisions with a 1 mm main scale.

Q50 **The least count of a Micrometer Screw Gauge with pitch 0.5 mm and 50 divisions on the circular scale is:**

- A 0.1 mm
- B 0.05 mm
- C **0.01 mm** ✓
- D 0.5 mm

Correct Answer: **C) 0.01 mm**

Explanation: Least count = Pitch ÷ Number of divisions on circular scale = 0.5 mm ÷ 50 = 0.01 mm.

Q51 **In a Micrometer Screw Gauge, the part that prevents over-tightening by making a clicking sound is called the:**

A Anvil

B Spindle

C **Ratchet** ✓

D Sleeve

Correct Answer: **C) Ratchet**

Explanation: The ratchet is designed to slip and produce a clicking sound once the object is gripped with just enough pressure, preventing damage from over-tightening.

Q52 **If a screw gauge shows a sleeve reading of 6.5 mm and a circular scale reading of 25 (least count 0.01 mm), the measured thickness is:**

A 6.50 mm

B **6.75 mm** ✓

C 6.25 mm

D 7.00 mm

Correct Answer: **B) 6.75 mm**

Explanation: Thickness = Main scale reading + (Circular scale reading × Least count) = 6.5 + (25 × 0.01) = 6.75 mm.

Q53 **Which instrument has the smallest least count among the following?**

- A Metre rule
- B Measuring tape
- C Vernier Callipers
- D **Micrometer Screw Gauge** ✓

Correct Answer: **D) Micrometer Screw Gauge**

Explanation: The Micrometer Screw Gauge has the smallest least count (0.01 mm), making it the most precise of the four instruments for measuring small lengths.

Q54 **If the zero of the circular scale of a screw gauge lies below the horizontal reference line (with no object between jaws), the zero error is:**

- A **Positive, and must be subtracted from the reading** ✓
- B Negative, and must be added to the reading
- C Zero, no correction needed
- D Undefined

Correct Answer: **A) Positive, and must be subtracted from the reading**

Explanation: When the circular scale zero is below the horizontal line, the instrument reads more than the actual thickness, giving a positive zero error that must be subtracted from the observed measurement.

Q55 **In physics, the difference between mass and weight is that:**

A. Mass and weight mean the same thing

B. **Mass is the quantity of matter in a body, weight is the force of gravity on it** ✓

C. Weight is measured in kilograms, mass in newtons

D. Mass changes with location, weight does not

Correct Answer: **B) Mass is the quantity of matter in a body, weight is the force of gravity on it**

Explanation: Mass is the quantity of matter in a body and stays constant, while weight is the gravitational force acting on that body and can vary with location.

Q56 **A spring balance is used to measure:**

A. Mass directly

B. **Weight** ✓

C. Volume

D. Time

Correct Answer: **B) Weight**

Explanation: A spring balance measures the force with which gravity pulls an object down, which is its weight, not its mass directly.

Q57 **In a physical (beam) balance, the mass of an object is found by:**

- A Reading a digital display
- B **Comparing it with known standard masses** ✓
- C Measuring its weight only
- D Timing its oscillations

Correct Answer: **B) Comparing it with known standard masses**

Explanation: A physical balance works on the principle of levers; the unknown mass is balanced against known standard masses placed in the other pan, and their total gives the object's mass.

Q58 **Which instrument can measure the mass of an object to an order of 0.1 mg?**

- A Spring balance
- B Physical balance
- C **Digital electronic balance** ✓
- D Metre rule

Correct Answer: **C) Digital electronic balance**

Explanation: The digital electronic balance is the most precise mass-measuring instrument mentioned, capable of measuring mass to the order of 0.1 mg.

Q59 **The least count of an ordinary mechanical (analogue) stopwatch is:**

A. 1 second

B. **1/10th of a second** ✓

C. 1/100th of a second

D. 1 minute

Correct Answer: **B) 1/10th of a second**

Explanation: An analogue stopwatch's dial is divided into small divisions each representing one tenth (1/10) of a second, which is its least count.

Q60 **Digital stopwatches can typically measure time to an accuracy of:**

A. 1 second

B. 1/10th of a second

C. **One hundredth of a second** ✓

D. One thousandth of a second

Correct Answer: **C) One hundredth of a second**

Explanation: Digital/electronic stopwatches can measure time intervals to an accuracy of one hundredth (1/100) of a second, finer than analogue stopwatches.

Q61 **An atomic clock is used to measure:**

A. Long geological time spans only

B. **Very short time intervals of about 10^{-10} seconds** ✓

C. Time in hours and minutes only

D. The age of fossils

Correct Answer: **B) Very short time intervals of about 10^{-10} seconds**

Explanation: The atomic clock is an extremely precise timing device capable of measuring very short time intervals, about 10^{-10} seconds.

Q62 **A radioactive decay clock is mainly used to measure:**

A. Short time intervals in a laboratory

B. **The age of remains that are thousands of years old** ✓

C. The period of a pendulum

D. Reaction times of students

Correct Answer: **B) The age of remains that are thousands of years old**

Explanation: Radioactive decay clocks measure the age of remains (in years) based on the decay of radioactive isotopes, useful over spans of thousands of years.

Q63 **A measuring cylinder is typically graduated in units of:**

A Metres

B **Cubic centimetres or millilitres** ✓

C Kilograms

D Seconds

Correct Answer: **B) Cubic centimetres or millilitres**

Explanation: A measuring cylinder has a scale marked in cubic centimetres (cm^3) or millilitres (mL), used to measure the volume of liquids and non-dissolvable solids.

Q64 **When reading the volume of water in a measuring cylinder, the reading should be taken at:**

A The top edge of the concave meniscus

B **The bottom of the concave meniscus, with the eye level with it** ✓

C Any point along the meniscus

D The very top of the liquid column

Correct Answer: **B) The bottom of the concave meniscus, with the eye level with it**

Explanation: For a liquid like water whose surface curves downward (concave meniscus), the reading is taken at the bottom edge, with the eye kept level with the meniscus to avoid parallax error.

Q65 **Mercury in a measuring cylinder has a surface that is:**

- A Concave, read at the bottom edge
- B **Convex, read at the top edge** ✓
- C Flat, read anywhere
- D Invisible, cannot be read

Correct Answer: **B) Convex, read at the top edge**

Explanation: Unlike water, mercury's surface curves upward (convex), so its reading is taken corresponding to the top edge of the curve.

Q66 **The displacement can (overflow can) method is used to find the volume of a solid when:**

- A The solid dissolves in water
- B **The solid does not fit into a measuring cylinder** ✓
- C The solid is a gas
- D The solid is magnetic

Correct Answer: **B) The solid does not fit into a measuring cylinder**

Explanation: When a solid body is too large to fit into a measuring cylinder, the displacement or overflow can is used: the water it displaces is collected and measured to determine the solid's volume.

Q67 **To find the volume of an irregular solid that does not dissolve using a measuring cylinder, one should:**

- A Weigh the solid before and after
- B **Note the difference between the liquid level before and after placing the solid in it** ✓
- C Measure only the height of the solid
- D Use a stopwatch

Correct Answer: **B) Note the difference between the liquid level before and after placing the solid in it**

Explanation: The solid is lowered into a liquid in which it does not dissolve; the rise in liquid level (difference between the two readings) equals the volume of the solid.

Q68 **Human errors in measurement occur due to:**

- A A fault in the instrument's manufacturing
- B **Personal performance, such as incorrect eye position while reading a scale** ✓
- C Environmental temperature changes only
- D Random unpredictable causes only

Correct Answer: **B) Personal performance, such as incorrect eye position while reading a scale**

Explanation: Human errors arise from personal limitations, such as the inability to precisely estimate a pointer's position or failing to line up the eye correctly with the scale.

Q69 **Systematic errors influence measurements by:**

A. Producing random, unpredictable variation each time

B. **Producing a consistent difference in every reading due to some definite cause** ✓

C. Occurring only once and never again

D. Cancelling out when averaged

Correct Answer: **B) Producing a consistent difference in every reading due to some definite cause**

Explanation: Systematic errors affect all measurements of a particular quantity equally and consistently, often caused by a zero error or poor calibration of the instrument.

Q70 **Zero error of an instrument is an example of which type of error?**

A. Random error

B. Human error

C. **Systematic error** ✓

D. None of these

Correct Answer: **C) Systematic error**

Explanation: Zero error occurs due to a definite, repeatable fault in the instrument's calibration, making it a systematic error that affects every reading in the same way.

Q71 **Random errors can best be reduced by:**

- A Buying a more expensive instrument
- **B Taking several readings and finding their average value** ✓
- C Ignoring the smallest readings
- D Recalibrating the instrument once

Correct Answer: **B) Taking several readings and finding their average value**

Explanation: Since random errors are caused by unpredictable fluctuations, taking multiple readings and averaging them reduces their overall effect on the final result.

Q72 **Which of the following is the best way to reduce human error while taking readings?**

- **A Use automated or digital instruments** ✓
- B Take the reading as quickly as possible
- C Avoid recording units
- D Round off all readings to whole numbers

Correct Answer: **A) Use automated or digital instruments**

Explanation: Using automated or digital instruments reduces the impact of human error, since it removes the dependency on a person's judgment when reading a scale.

Q73 **A balance that fluctuates due to sudden air currents in the room is displaying an example of:**

- A Systematic error
- B **Random error** ✓
- C Zero error
- D Parallax error

Correct Answer: **B) Random error**

Explanation: Random errors are caused by unpredictable environmental fluctuations, such as sudden air currents, which cause the balance readings to vary unpredictably between trials.

Q74 **The uncertainty in a measurement taken with an instrument is generally taken as:**

- A Equal to the least count of the instrument
- B **Half the least count of the instrument (± half)** ✓
- C Twice the least count
- D Always zero for digital instruments

Correct Answer: **B) Half the least count of the instrument (± half)**

Explanation: The maximum uncertainty in a reading is conventionally taken as plus-or-minus half the least count of the instrument used to take the measurement.

Q75 **If a length is measured with a metre rule of least count 0.1 cm, the maximum uncertainty in the reading is:**

A ± 0.1 cm

B **± 0.05 cm** ✓

C ± 0.2 cm

D ± 1 cm

Correct Answer: **B) ± 0.05 cm**

Explanation: The maximum uncertainty equals half the least count: ± 0.1 cm ÷ 2 = ± 0.05 cm.

Q76 **Uncertainty in short time intervals, such as the period of a pendulum, can be reduced by:**

A Measuring only one oscillation

B **Measuring the time for many oscillations and finding the average** ✓

C Using a shorter pendulum

D Ignoring the reaction time

Correct Answer: **B) Measuring the time for many oscillations and finding the average**

Explanation: Timing multiple oscillations (commonly thirty) and dividing by the number of oscillations reduces the relative effect of timing uncertainty on the calculated period.

Q77 **In digital measuring instruments, uncertainty is usually reflected in:**

A. The first digit of the reading

B. **The fluctuation of the last digit on the display** ✓

C. The colour of the display

D. The battery level

Correct Answer: **B) The fluctuation of the last digit on the display**

Explanation: Digital instruments usually estimate one digit beyond what is certain, so this uncertainty shows up as fluctuation in the last displayed digit.

Q78 **Significant figures in a measurement are defined as:**

A. All digits including trailing zeros

B. **The digits that are reliably known plus the first doubtful digit** ✓

C. Only the digits before the decimal point

D. Only even-numbered digits

Correct Answer: **B) The digits that are reliably known plus the first doubtful digit**

Explanation: Significant figures consist of all the accurately known digits in a measurement plus the first estimated (doubtful) digit.

Q79 **How many significant figures are there in the measurement 5.06 m?**

- A 2
- B **3** ✓
- C 4
- D 1

Correct Answer: **B) 3**

Explanation: A zero between two non-zero digits is always significant. In 5.06, the digits 5, 0, and 6 are all significant, giving 3 significant figures.

Q80 **How many significant figures are in the value 0.0034 m?**

- A 4
- B 5
- C **2** ✓
- D 3

Correct Answer: **C) 2**

Explanation: Zeros to the left of the first non-zero digit are never significant (they only locate the decimal point). Only '3' and '4' are significant, giving 2 significant figures.

Q81 **How many significant figures are there in 2.40 mm?**

A 2

B **3** ✓

C 4

D 1

Correct Answer: **B) 3**

Explanation: Zeros on the right side of a decimal point are considered significant, so 2, 4 and 0 are all significant, giving 3 significant figures.

Q82 **In the number 3.50 × 10^4 m written in scientific notation, the number of significant figures is:**

A 2

B **3** ✓

C 4

D 5

Correct Answer: **B) 3**

Explanation: When a number is written in scientific notation, all the digits before the exponent are significant. In 3.50, there are 3 significant figures (3, 5, and 0).

Q83 **How many significant figures does the value 1.25×10^2 have?**

- A 1
- B 2
- C **3** ✓
- D 4

Correct Answer: **C) 3**

Explanation: In scientific notation, all digits before the power of ten are significant: 1, 2 and 5 give a total of 3 significant figures.

Q84 **Precision of a measurement refers to:**

- A How close the measured value is to the true value
- B **How close together a group of repeated measurements are to each other** ✓
- C The unit used for measurement
- D The instrument's brand

Correct Answer: **B) How close together a group of repeated measurements are to each other**

Explanation: Precision describes the closeness of repeated measurements to one another, regardless of whether they are close to the true (accepted) value.

Q85 Accuracy of a measurement refers to:

- **A** **How close the measured value is to the accepted or true value** ✓
- **B** How many decimal places are recorded
- **C** How expensive the instrument is
- **D** How quickly the reading was taken

Correct Answer: **A) How close the measured value is to the accepted or true value**

Explanation: Accuracy reflects how close a measured value is to the actual or true value of the quantity being measured.

Q86 Arrows that land close together but far from the bullseye represent a measurement that is:

- **A** Accurate but not precise
- **B** **Precise but not accurate** ✓
- **C** Both accurate and precise
- **D** Neither accurate nor precise

Correct Answer: **B) Precise but not accurate**

Explanation: When repeated results cluster tightly together (precise) but are far from the true target (bullseye), the measurement is precise but not accurate.

Q87 **A measurement that is both accurate and precise is represented by arrows that:**

- A Are scattered all over the target
- B Land near each other but far from the bullseye
- C **Consistently hit near the centre of the bullseye** ✓
- D Miss the target completely

Correct Answer: **C) Consistently hit near the centre of the bullseye**

Explanation: Consistently hitting near the centre of the bullseye shows both precision (closeness to each other) and accuracy (closeness to the true value).

Q88 **The precision of a measurement is mainly determined by:**

- A The person taking the reading
- B **The least count of the instrument being used** ✓
- C The size of the object
- D The colour of the instrument

Correct Answer: **B) The least count of the instrument being used**

Explanation: Precision depends on the instrument used: the smaller the least count of the instrument, the more precise the measurement it can provide.

Q89 **The accuracy of a measurement is reflected by:**

- **A** **The number of significant figures** ✓
- **B** The colour of the display
- **C** The weight of the instrument
- **D** The brand name of the instrument

Correct Answer: **A) The number of significant figures**

Explanation: Accuracy depends on the fractional uncertainty in a measurement; the larger the number of significant figures, the higher the accuracy of the recorded measurement.

Q90 **Round off 2.512×10^3 m to 2 significant figures.**

- **A** **2.5×10^3 m** ✓
- **B** 2.6×10^3 m
- **C** 2.51×10^3 m
- **D** 3.0×10^3 m

Correct Answer: **A) 2.5×10^3 m**

Explanation: Rounding 2.512 to 2 significant figures: since the digit after '5' (which is 1) is less than 5, the digit is retained as is, giving 2.5×10^3 m.

Q91 **Round off 3.4567×10^4 kg to 3 significant figures.**

- A) 3.45×10^4 kg
- B) **3.46×10^4 kg** ✓
- C) 3.47×10^4 kg
- D) 3.5×10^4 kg

Correct Answer: **B) 3.46×10^4 kg**

Explanation: Rounding 3.4567 to 3 significant figures: the next digit (6) is greater than 5, so the retained digit is increased by one, giving 3.46×10^4 kg.

Q92 **When rounding off a number, if the last digit to be dropped is exactly 5 and the digit before it is even, the rule states that the retained digit should:**

- A) Always increase by one
- B) **Remain the same** ✓
- C) Always become zero
- D) Become the next even number

Correct Answer: **B) Remain the same**

Explanation: For the special case of the digit 5, if the preceding digit is even, it remains unchanged; if it is odd, one is added to it.

Q93 **Round off 4.452×10^2 m to 2 significant figures.**

- A) 4.4×10^2 m
- **B) 4.5×10^2 m** ✓
- C) 4.6×10^2 m
- D) 5.0×10^2 m

Correct Answer: **B) 4.5×10^2 m**

Explanation: Since 4.452×10^2 is closer to 4.5×10^2 than to 4.4×10^2, logic is applied to round it up to 4.5×10^2 m, even though a simple digit-based rule might initially suggest otherwise.

Q94 **Round off 4.45×10^2 m to 2 significant figures, given the digit before the dropped 5 is even.**

- **A) 4.4×10^2 m** ✓
- B) 4.5×10^2 m
- C) 4.6×10^2 m
- D) 4.0×10^2 m

Correct Answer: **A) 4.4×10^2 m**

Explanation: The digit before the 5 (which is 4) is even, so following the special rounding rule for 5, the digit remains unchanged, giving 4.4×10^2 m.