PHYSICS MCQ BOOKLET

Grade 11 · Chapter 1 · Physical Quantities and Measurements

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on qualitative and quantitative observations, estimation, base and derived units, dimensions, homogeneity, precision, accuracy, and uncertainty. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. Which observation is quantitative?

(A) The rod is 50 cm long.
(B) The liquid is blue.
(C) The gas has a smell.
(D) The surface feels rough.

Correct Answer: A

Explanation: A quantitative observation includes a number with a unit.

2. A student says, 'The iron ball is heavy.' This statement is mainly:

(A) a quantitative observation
(B) a qualitative observation
(C) a standard unit
(D) a measuring error

Correct Answer: B

Explanation: A student says, 'The iron ball is heavy.' This statement is mainly a qualitative observation.

3. Which pair contains one qualitative and one quantitative observation in that order?

(A) The beaker holds 100 mL; the water is cold.
(B) The box is 5 kg; the box is brown.
(C) The wire is thin; the wire is 2 m long.
(D) The air feels warm; the room is noisy.

Correct Answer: C

Explanation: Thin is qualitative, while 2 m long is quantitative.

4. The main purpose of measurement in physics is to:

(A) replace observation completely
(B) avoid using units
(C) guess values without checking
(D) describe quantities in a clear and comparable way

Correct Answer: D

Explanation: Measurement gives observations a clear numerical form that others can compare.

5. Which of the following is a physical quantity?

(A) Speed
(B) Honesty
(C) Beauty
(D) Friendliness

Correct Answer: A

Explanation: A physical quantity is something that can be measured, such as speed.

6. A physical quantity is best defined as something that can be:

(A) imagined only
(B) measured and expressed with a number and unit
(C) seen but not counted

(D) drawn without scale

Correct Answer: B

Explanation: Physical quantities need both a number and a unit for proper description.

7. Which option shows a physical quantity written correctly?

(A) long table
(B) high wall
(C) 12 kg mass
(D) small stone

Correct Answer: C

Explanation: A correct physical quantity statement includes a number, unit, and measurable property.

8. Which is the best example of measurement helping comparison?

(A) Saying one stick looks longer
(B) Saying one bag feels heavier
(C) Guessing which cup is larger
(D) Stating two ropes are 3.0 m and 2.4 m long

Correct Answer: D

Explanation: Stating two ropes are 3.0 m and 2.4 m long — this correctly answers the question.

9. Estimation is most useful when:

(A) a quick reasonable value is needed
(B) an exact value is never allowed
(C) units are not known
(D) all instruments are broken forever

Correct Answer: A

Explanation: Estimation gives a sensible approximate value when speed matters more than exact detail.

10. A good estimate should be:

(A) wild and random
(B) reasonable and based on experience
(C) much larger than expected
(D) always exactly correct

Correct Answer: B

Explanation: An estimate should be close enough to reality and based on known references.

11. Before measuring the height of a classroom by approximation, a useful first step is to:

(A) ignore known object sizes
(B) change the unit every time
(C) use a familiar reference such as door height
(D) measure the floor area first

Correct Answer: C

Explanation: Before measuring the height of a classroom by approximation, a useful first step is to use a familiar reference such as door height.

12. To estimate the length of a table without a ruler, a student could best use:

(A) the thickness of paper
(B) the width of a fingernail
(C) the mass of a book
(D) the span of a hand

Correct Answer: D

Explanation: A hand span is a practical body-based reference for estimating.

13. Which method is most suitable for estimating the thickness of a single notebook page?

(A) Measure 100 pages together and divide
(B) Compare it with room height

(C) Count the letters on the page
(D) Use the mass of the notebook

Correct Answer: A

Explanation: A single page is too thin, so measuring many pages together improves the estimate.

14. A student wants to estimate the area of a rectangular floor. The student should mainly estimate its:

(A) mass and density
(B) length and width
(C) height and thickness
(D) time and speed

Correct Answer: B

Explanation: A student wants to estimate the area of a rectangular floor. The student should mainly estimate its length and width.

15. To estimate the volume of a box-shaped carton, the needed dimensions are its:

(A) mass, weight, and size
(B) area, color, and shape
(C) length, width, and height
(D) height and time only

Correct Answer: C

Explanation: Volume of a box is found from length, width, and height.

16. Which everyday object is most suitable as a reference for estimating a small mass?

(A) A bus
(B) A mountain
(C) A road
(D) A textbook

Correct Answer: D

Explanation: A textbook has a manageable mass that helps judge other small objects.

17. A student estimates the time for morning assembly by comparing it with:

(A) a known clock interval
(B) the color of the sky
(C) the length of a pencil
(D) the mass of a bag

Correct Answer: A

Explanation: Time is best estimated by comparing it with familiar durations.

18. Which estimate is most reasonable for the height of a classroom door?

(A) 2 mm
(B) 2 m
(C) 20 cm
(D) 20 m

Correct Answer: B

Explanation: A classroom door is usually around a few meters tall, not centimeters or tens of meters.

19. Which estimate is most reasonable for the thickness of a coin?

(A) about 2 cm
(B) about 20 cm
(C) about 2 mm
(D) about 2 m

Correct Answer: C

Explanation: A coin is only a few millimeters thick.

20. Which estimate is most reasonable for the mass of a school bag with books?

(A) 5 mg

(B) 5 g
(C) 500 kg
(D) 5 kg

Correct Answer: D

Explanation: 5 kg — this correctly answers the question.

21. Which estimate is most reasonable for the time taken to blink once?

(A) a fraction of a second
(B) about 5 minutes
(C) about 1 hour
(D) about 1 day

Correct Answer: A

Explanation: A fraction of a second — this correctly answers the question.

22. Order of magnitude means the:

(A) exact value after careful measurement
(B) general size of a quantity in powers of ten
(C) color of a measured object
(D) difference between two units

Correct Answer: B

Explanation: Order of magnitude means the general size of a quantity in powers of ten.

23. Which value has the same order of magnitude as 300 m?

(A) 3 m
(B) 30 m
(C) 800 m
(D) 9000 m

Correct Answer: C

Explanation: Both 300 m and 800 m are in the hundreds range, so their scale is similar.

24. Which is the best order-of-magnitude estimate for the number of students in one classroom?

(A) 1
(B) 1000
(C) 100000
(D) 10

Correct Answer: D

Explanation: A classroom usually has tens of students, so 10 is the right scale.

25. Which of the following is a base quantity in SI?

(A) Mass
(B) Force
(C) Pressure
(D) Energy

Correct Answer: A

Explanation: Mass is a fundamental SI quantity, while force, pressure, and energy are derived quantities.

26. Which pair contains only SI base quantities?

(A) Speed and force
(B) Length and time
(C) Work and power
(D) Pressure and charge

Correct Answer: B

Explanation: Length and time are base quantities; the others are formed from base quantities.

27. Which of the following is a derived quantity?

(A) Electric current

(B) Temperature
(C) Velocity
(D) Amount of substance

Correct Answer: C

Explanation: Velocity is derived because it depends on length and time.

28. The SI unit of force is equal to:

(A) kg m^2 s^-2
(B) kg m^-1 s^-2
(C) A s
(D) kg m s^-2

Correct Answer: D

Explanation: From F = ma, force is mass times acceleration, so its base unit is kg m s^-2.

29. The SI base-unit form of work is:

(A) kg m^2 s^-2
(B) kg m s^-1
(C) kg m^-1 s^-2
(D) kg m^2 s^-1

Correct Answer: A

Explanation: Work equals force times distance, so its SI base unit is kg m^2 s^-2.

30. Power in SI base units is written as:

(A) kg m s^-2
(B) kg m^2 s^-3
(C) kg m^-1 s^-2
(D) kg m^2 s^-2

Correct Answer: B

Explanation: Power is work per second, so one more second in the denominator gives kg m^2 s^-3.

31. Pressure has SI base units of:

(A) kg m s^-2
(B) kg m^2 s^-3
(C) kg m^-1 s^-2
(D) kg m^2 s^-2

Correct Answer: C

Explanation: Pressure is force per area, so dividing by m^2 gives kg m^-1 s^-2.

32. Electric charge can be expressed in SI base units as:

(A) kg m s^-2
(B) kg m^2 s^-3
(C) A s^-1
(D) A s

Correct Answer: D

Explanation: Charge equals current multiplied by time, so its unit is ampere-second.

33. Which quantity has SI base units kg m^2 s^-3?

(A) Power
(B) Pressure
(C) Impulse
(D) Charge

Correct Answer: A

Explanation: Power is the rate of doing work, giving the base-unit form kg m^2 s^-3.

34. Which quantity has SI base units kg m^-1 s^-2?

(A) Energy

(B) Pressure
(C) Momentum
(D) Potential difference

Correct Answer: B

Explanation: Pressure is force divided by area, which simplifies to kg m^-1 s^-2.

35. The dimensions of velocity are:

(A) [L T^-2]
(B) [M L T^-1]
(C) [L T^-1]
(D) [M L^2 T^-2]

Correct Answer: C

Explanation: Velocity is distance per time, so its dimensions are length divided by time.

36. The dimensions of acceleration are:

(A) [L T^-1]
(B) [M L T^-2]
(C) [M L^2 T^-2]
(D) [L T^-2]

Correct Answer: D

Explanation: Acceleration is change of velocity per time, so it has dimensions [L T^-2].

37. The dimensional formula of force is:

(A) [M L T^-2]
(B) [M L^2 T^-2]
(C) [M L^-1 T^-2]
(D) [M L T^-1]

Correct Answer: A

Explanation: Force equals mass times acceleration, so its dimensions are [M L T^-2].

38. The dimensional formula of work is:

(A) [M L T^-2]
(B) [M L^2 T^-2]
(C) [M L^2 T^-3]
(D) [M L^-1 T^-2]

Correct Answer: B

Explanation: Work is force multiplied by distance, giving [M L^2 T^-2].

39. The dimensional formula of power is:

(A) [M L^2 T^-2]
(B) [M L T^-2]
(C) [M L^2 T^-3]
(D) [M L^-1 T^-2]

Correct Answer: C

Explanation: Power is work per time, so one extra time in the denominator gives [M L^2 T^-3].

40. The dimensions of pressure are:

(A) [M L T^-2]
(B) [M L^2 T^-2]
(C) [M T^-2]
(D) [M L^-1 T^-2]

Correct Answer: D

Explanation: Pressure is force per unit area, so its dimensions become [M L^-1 T^-2].

41. The dimensional formula of momentum is:

(A) [M L T^-1]

(B) [M L T^-2]
(C) [M L^2 T^-2]
(D) [M L^-1 T^-2]

Correct Answer: A

Explanation: Momentum equals mass times velocity, so its dimensions are [M L T^-1].

42. Which of the following is dimensionless?

(A) Density
(B) Strain
(C) Force
(D) Pressure

Correct Answer: B

Explanation: Strain is a ratio of two lengths, so all dimensions cancel out.

43. Which of the following is a dimensional constant?

(A) Pi
(B) Refractive index
(C) Gravitational constant G
(D) Coefficient of friction

Correct Answer: C

Explanation: Gravitational constant G — this correctly answers the question.

44. Which of the following is a dimensionless constant?

(A) Speed of light
(B) Planck constant
(C) Universal gas constant
(D) Pi

Correct Answer: D

Explanation: Pi is a pure number, so it has no dimensions.

45. Which one is a dimensional variable?

(A) Time
(B) Pi
(C) Angle in radian
(D) Relative density

Correct Answer: A

Explanation: Time can vary and it has dimensions, so it is a dimensional variable.

46. Which one is a dimensionless variable?

(A) Velocity
(B) Specific gravity
(C) Mass
(D) Force

Correct Answer: B

Explanation: Specific gravity is a ratio of densities, so it can change in value but has no dimensions.

47. According to the principle of homogeneity, in a correct physical equation:

(A) only numbers can be added
(B) units on the left must be larger
(C) dimensions on both sides must be the same
(D) all constants must be dimensionless

Correct Answer: C

Explanation: According to the principle of homogeneity, in a correct physical equation dimensions on both sides must be the same.

48. Which equation is dimensionally correct?

(A) v = u + at^2
(B) F = mv
(C) P = Ft
(D) s = ut + 1/2 at^2

Correct Answer: D

Explanation: Each term in s = ut + 1/2 at^2 has dimensions of length, so it satisfies homogeneity.

49. Which expression is not dimensionally correct?

(A) energy = force + distance
(B) distance = speed x time
(C) force = mass x acceleration
(D) pressure = force / area

Correct Answer: A

Explanation: Force and distance have different dimensions, so they cannot be added.

50. If force F depends on mass m and acceleration a, dimensional analysis gives:

(A) F proportional to m/a
(B) F proportional to ma
(C) F proportional to a/m
(D) F proportional to m + a

Correct Answer: B

Explanation: Matching dimensions shows that force must vary directly with mass and acceleration.

51. The time period T of a simple pendulum depends on length l and gravitational acceleration g. Dimensional analysis gives:

(A) T proportional to l/g
(B) T proportional to lg
(C) T proportional to sqrt(l/g)
(D) T proportional to g/l

Correct Answer: C

Explanation: The time period T of a simple pendulum depends on length l and gravitational acceleration g. Dimensional analysis gives T proportional to sqrt(l/g).

52. The speed v of a wave may depend on frequency f and wavelength lambda. Dimensional analysis gives:

(A) v proportional to f/lambda
(B) v proportional to lambda/f
(C) v proportional to f + lambda
(D) v proportional to f lambda

Correct Answer: D

Explanation: Frequency times wavelength has the dimensions of speed, so v is proportional to f lambda.

53. A measurement is called accurate when it is:

(A) very close to the true value
(B) repeated many times
(C) written with many digits
(D) taken with a large instrument

Correct Answer: A

Explanation: Accuracy tells how close a measured value is to the accepted or true value.

54. A set of readings is called precise when the readings are:

(A) close to the true value only
(B) close to one another
(C) always larger than the true value
(D) taken in kilograms

Correct Answer: B

Explanation: Precision means good agreement among repeated readings.

55. A student records 4.21 cm, 4.22 cm, 4.21 cm, and 4.22 cm, but the true value is 4.80 cm. These readings are:

(A) accurate but not precise
(B) both accurate and precise
(C) precise but not accurate
(D) neither accurate nor precise

Correct Answer: C

Explanation: The readings are tightly grouped, so they are precise, but they are far from the true value.

56. If repeated readings are scattered widely around the accepted value, the measurements are:

(A) accurate and precise
(B) accurate only if they are all equal
(C) precise only
(D) not very precise

Correct Answer: D

Explanation: Wide spread means poor precision even if some readings lie near the true value.

57. Which statement best compares accuracy and precision?

(A) Accuracy is closeness to true value, while precision is closeness of repeated readings
(B) Accuracy and precision always mean the same thing
(C) Precision depends only on unit conversion
(D) Accuracy is about number of decimal places only

Correct Answer: A

Explanation: Accuracy compares with the true value, while precision compares readings with each other.

58. The absolute uncertainty of a length measured as 12.4 cm with uncertainty 0.1 cm is:

(A) 12.5 cm
(B) 0.1 cm
(C) 0.8%
(D) 0.01 cm

Correct Answer: B

Explanation: Absolute uncertainty is the uncertainty written in the same unit as the measured quantity.

59. Fractional uncertainty is found by:

(A) adding all readings and dividing by two
(B) measured value divided by uncertainty
(C) absolute uncertainty divided by measured value
(D) multiplying uncertainty by 100 only

Correct Answer: C

Explanation: Fractional uncertainty is the ratio of uncertainty to the measured value.

60. Percentage uncertainty is equal to:

(A) absolute uncertainty plus measured value
(B) measured value divided by uncertainty
(C) half of the least count
(D) fractional uncertainty multiplied by 100

Correct Answer: D

Explanation: Percentage uncertainty is just the fractional uncertainty expressed in percent.

61. A mass is measured as 50.0 g with absolute uncertainty 0.5 g. Its fractional uncertainty is:

(A) 0.01
(B) 0.001
(C) 0.005

(D) 1

Correct Answer: A

Explanation: A mass is measured as 50.0 g with absolute uncertainty 0.5 g. Its fractional uncertainty is 0.01.

62. A voltage is measured as 12.0 V with uncertainty 0.3 V. The percentage uncertainty is:

(A) 0.25%
(B) 2.5%
(C) 3.6%
(D) 25%

Correct Answer: B

Explanation: A voltage is measured as 12.0 V with uncertainty 0.3 V. The percentage uncertainty is 2.5%.

63. The least count of an instrument is best described as:

(A) the largest value it can measure
(B) the average of many readings
(C) the smallest division it can reliably read
(D) the unit written on the scale

Correct Answer: C

Explanation: Least count is the smallest reading step shown or resolved by the instrument.

64. For a simple scale instrument, the measurement uncertainty is commonly taken as about:

(A) twice the least count
(B) ten times the least count
(C) zero if the instrument is new
(D) half the least count

Correct Answer: D

Explanation: For many scale readings, uncertainty is estimated as about half the least count.

65. A ruler has markings every 1 mm. A reasonable reading uncertainty is:

(A) 0.5 mm
(B) 1 mm
(C) 2 mm
(D) 0.1 mm

Correct Answer: A

Explanation: If the least count is 1 mm, the usual reading uncertainty is about plus or minus 0.5 mm.

66. An instrument with a smaller least count usually gives measurements that are:

(A) less certain
(B) more precise
(C) more uncertain in percentage only
(D) always accurate

Correct Answer: B

Explanation: Smaller least count allows finer reading, which improves precision.

67. If L = 12.3 +/- 0.1 cm and W = 5.4 +/- 0.1 cm, then L + W is:

(A) 17.7 +/- 0.1 cm
(B) 17.7 +/- 0.02 cm
(C) 17.7 +/- 0.2 cm
(D) 66.42 +/- 0.2 cm

Correct Answer: C

Explanation: For addition, absolute uncertainties add, so the result is 17.7 cm with 0.2 cm uncertainty.

68. If A = 8.0 +/- 0.2 m and B = 3.0 +/- 0.1 m, then A - B is:

(A) 5.0 +/- 0.1 m
(B) 11.0 +/- 0.3 m
(C) 5.0 +/- 0.02 m

(D) 5.0 +/- 0.3 m

Correct Answer: D

Explanation: For subtraction, the absolute uncertainties are added.

69. When two measured quantities are multiplied, the uncertainties are usually combined by adding their:

(A) fractional uncertainties
(B) absolute uncertainties
(C) units
(D) true values

Correct Answer: A

Explanation: In multiplication, fractional or percentage uncertainties are added.

70. If X = 4.0 +/- 5% and Y = 3.0 +/- 2%, then XY has percentage uncertainty:

(A) 3%
(B) 7%
(C) 5%
(D) 10%

Correct Answer: B

Explanation: If X = 4.0 +/- 5% and Y = 3.0 +/- 2%, then XY has percentage uncertainty 7%.

71. If P = 20.0 +/- 4% and Q = 5.0 +/- 1%, then P/Q has percentage uncertainty:

(A) 3%
(B) 4%
(C) 5%
(D) 20%

Correct Answer: C

Explanation: For division, percentage uncertainties also add: 4% + 1% = 5%.

72. If y = x^2, then the fractional uncertainty in y is approximately:

(A) the same as in x
(B) half that in x
(C) four times that in x
(D) twice that in x

Correct Answer: D

Explanation: For a power, the fractional uncertainty is multiplied by the power.

73. If z = x^3 and x has 2% uncertainty, the percentage uncertainty in z is:

(A) 6%
(B) 2%
(C) 3%
(D) 5%

Correct Answer: A

Explanation: A cube triples the percentage uncertainty, so 3 x 2% = 6%.

74. A side of a square is measured as 10.0 cm with 1% uncertainty. The area has uncertainty:

(A) 0.5%
(B) 2%
(C) 1%
(D) 10%

Correct Answer: B

Explanation: Area depends on the square of the side, so the percentage uncertainty doubles.

75. Four timings are 2.1 s, 2.3 s, 2.2 s, and 2.4 s. The average time is:

(A) 2.0 s
(B) 2.2 s

(C) 2.25 s
(D) 2.4 s

Correct Answer: C

Explanation: Average is found by adding all readings and dividing by the number of readings.

76. For repeated readings, a simple estimate of uncertainty can be taken from the range as:

(A) highest value plus lowest value
(B) average divided by number of readings
(C) lowest value only
(D) half of (highest value - lowest value)

Correct Answer: D

Explanation: For repeated readings, a simple estimate of uncertainty can be taken from the range as half of (highest value - lowest value).

77. The readings 15.2 cm, 15.4 cm, 15.3 cm, and 15.5 cm give an uncertainty from range of:

(A) +/- 0.15 cm
(B) +/- 0.1 cm
(C) +/- 0.2 cm
(D) +/- 0.3 cm

Correct Answer: A

Explanation: Range is 15.5 - 15.2 = 0.3 cm, so uncertainty is half of that, 0.15 cm.

78. Five readings of current are 1.8 A, 1.9 A, 2.0 A, 1.9 A, and 1.8 A. The best reported average is:

(A) 1.9 A
(B) 1.88 A
(C) 2.0 A
(D) 1.85 A

Correct Answer: B

Explanation: The arithmetic mean is (1.8 + 1.9 + 2.0 + 1.9 + 1.8) / 5 = 1.88 A.

79. A length is measured as 25.0 cm with uncertainty 0.5 cm. Its percentage uncertainty is:

(A) 0.5%
(B) 1%
(C) 2%
(D) 5%

Correct Answer: C

Explanation: A length is measured as 25.0 cm with uncertainty 0.5 cm. Its percentage uncertainty is 2%.

80. A student adds 6.2 +/- 0.1 N and 3.4 +/- 0.2 N. Which result is correct?

(A) 9.6 +/- 0.2 N
(B) 9.6 +/- 0.02 N
(C) 21.08 +/- 0.3 N
(D) 9.6 +/- 0.3 N

Correct Answer: D

Explanation: 9.6 +/- 0.3 N — this correctly answers the question.

B. Less Important / Secondary Topics

81. Which statement is qualitative?

(A) The powder is white.
(B) The water temperature is 25 deg C.
(C) The string is 1.5 m long.
(D) The box has a mass of 3 kg.

Correct Answer: A

Explanation: The powder is white. — this correctly answers the question.

82. Which statement is quantitative?

(A) The fruit smells sweet.
(B) The journey took 30 minutes.
(C) The room is bright.
(D) The water tastes salty.

Correct Answer: B

Explanation: Thirty minutes is a measured time with a unit.

83. A rough estimate of a person's height is most likely to be expressed in:

(A) liters
(B) seconds
(C) meters
(D) newtons

Correct Answer: C

Explanation: Height is a length, so meters are an appropriate unit.

84. Which everyday estimate is most reasonable?

(A) A car is about 15 mm long.
(B) A classroom is about 15 km wide.
(C) A coin is about 15 m thick.
(D) A pencil is about 15 cm long.

Correct Answer: D

Explanation: A pencil is about 15 cm long. — this correctly answers the question.

85. To estimate the thickness of a book, the most direct quantity to judge is:

(A) side-to-side page depth
(B) length from cover to cover side
(C) distance around the book
(D) time needed to read it

Correct Answer: A

Explanation: Thickness refers to the depth made by the stack of pages.

86. Which is the best estimate for the volume of a water bottle?

(A) about 500 m
(B) about 500 mL
(C) about 500 kg
(D) about 500 s

Correct Answer: B

Explanation: Bottle capacity is measured in volume units like milliliters.

87. A student says a wall is 'about 4 meters long.' This value is best described as:

(A) a useless guess
(B) a qualitative remark only
(C) an approximate measurement
(D) a unit without number

Correct Answer: C

Explanation: About 4 meters is a numerical estimate, so it is an approximate measurement.

88. Which estimate is most reasonable for the time taken to write one short sentence?

(A) about 10 hours
(B) about 10 days
(C) about 10 months
(D) about 10 seconds

Correct Answer: D

Explanation: About 10 seconds — this correctly answers the question.

89. Which quantity has the same dimensions as work?

(A) Torque
(B) Pressure
(C) Power
(D) Momentum

Correct Answer: A

Explanation: Torque — this correctly answers the question.

90. Which quantity has the same dimensions as impulse?

(A) Force
(B) Momentum
(C) Pressure
(D) Energy

Correct Answer: B

Explanation: Impulse equals change in momentum, so both share the same dimensions.

91. The dimensional formula of density is:

(A) [M L^-2]
(B) [M L^3]
(C) [M L^-3]
(D) [L^-3]

Correct Answer: C

Explanation: Density is mass per unit volume, so its dimensions are [M L^-3].

92. Which of the following cannot be tested by dimensional analysis alone?

(A) Whether both sides of an equation have same dimensions
(B) Whether a formula may be possible
(C) Whether terms being added are similar
(D) Whether a numerical constant is correct

Correct Answer: D

Explanation: Whether a numerical constant is correct — this correctly answers the question.

93. If kinetic energy E depends on mass m and speed v, the dimensional form is:

(A) E proportional to mv^2
(B) E proportional to mv
(C) E proportional to m/v
(D) E proportional to v/m

Correct Answer: A

Explanation: Energy has dimensions [M L^2 T^-2], which match mass times speed squared.

94. A quantity with dimensional formula [M^0 L^0 T^0] is:

(A) always zero
(B) dimensionless
(C) always a constant only
(D) a base quantity

Correct Answer: B

Explanation: When all powers are zero, the quantity has no dimensions.

95. Which equation is dimensionally correct?

(A) v = u + at
(B) W = Fs
(C) p = mv
(D) rho = m/V

Correct Answer: C

Explanation: Momentum equals mass times velocity, so p = mv is dimensionally correct.

96. Which equation is dimensionally wrong?

(A) v = u + at
(B) P = W/t
(C) rho = m/V
(D) s = ut + at

Correct Answer: D

Explanation: In s = ut + at, the first term is length but the second term is velocity, so the terms are not homogeneous.

97. If force F depends on density rho, speed v, and area A, then F is proportional to:

(A) rho v^2 A
(B) rho v A
(C) rho v^2 / A
(D) rho A / v^2

Correct Answer: A

Explanation: If force F depends on density rho, speed v, and area A, then F is proportional to rho v^2 A.

98. The area of a circle is written as A = pi r^2. Here pi is:

(A) a dimensional constant
(B) a dimensionless constant
(C) a dimensional variable
(D) a base quantity

Correct Answer: B

Explanation: Pi is just a pure number, so it has no dimensions.

99. If the true length is 10.0 cm and a reading is 9.9 cm, the measurement error is:

(A) 0.01 cm
(B) 1 cm
(C) 0.1 cm
(D) 9.9 cm

Correct Answer: C

Explanation: Error is the difference between measured and true value, which here is 0.1 cm.

100. Which instrument is likely to have the smallest least count?

(A) meter rule
(B) measuring tape
(C) wooden rod
(D) vernier calipers

Correct Answer: D

Explanation: Vernier calipers can read smaller intervals than an ordinary ruler or tape.

101. A measurement written as 7.50 +/- 0.05 cm shows that the uncertain part is mainly in the:

(A) second decimal place
(B) tens place
(C) ones place
(D) first decimal place

Correct Answer: A

Explanation: A measurement written as 7.50 +/- 0.05 cm shows that the uncertain part is mainly in the second decimal place.

102. If M = 40 +/- 2 g and N = 10 +/- 1 g, the percentage uncertainty in M/N is:

(A) 5%
(B) 15%
(C) 10%
(D) 20%

Correct Answer: B

Explanation: M has 5% uncertainty and N has 10%, so the quotient has 15% uncertainty.

103. Three distance readings are 12.0 m, 12.2 m, and 12.1 m. Their average is:

(A) 12.0 m
(B) 12.2 m
(C) 12.1 m
(D) 12.3 m

Correct Answer: C

Explanation: The mean is (12.0 + 12.2 + 12.1) / 3 = 12.1 m.

104. If x has a fractional uncertainty of 0.04, its percentage uncertainty is:

(A) 0.4%
(B) 40%
(C) 0.04%
(D) 4%

Correct Answer: D

Explanation: If x has a fractional uncertainty of 0.04, its percentage uncertainty is 4%.

105. A digital balance reads to 0.01 g. A common estimate for reading uncertainty is about:

(A) +/- 0.005 g
(B) +/- 0.5 g
(C) +/- 0.1 g
(D) +/- 0.01 g

Correct Answer: A

Explanation: A usual estimate is about half the least count, which is 0.005 g.

106. If y = x^4 and x has 3% uncertainty, then y has about:

(A) 3% uncertainty
(B) 12% uncertainty
(C) 6% uncertainty
(D) 81% uncertainty

Correct Answer: B

Explanation: If y = x^4 and x has 3% uncertainty, then y has about 12% uncertainty.

107. A result with low accuracy but high precision means the readings are:

(A) spread out and near the true value
(B) exactly equal to the true value
(C) close together but away from the true value
(D) random with no pattern

Correct Answer: C

Explanation: High precision means close to each other, while low accuracy means not close to the true value.

108. If a stopwatch has least count 0.2 s, a suitable absolute uncertainty for one reading is about:

(A) +/- 0.02 s
(B) +/- 0.2 s
(C) +/- 0.4 s
(D) +/- 0.1 s

Correct Answer: D

Explanation: If a stopwatch has least count 0.2 s, a suitable absolute uncertainty for one reading is about +/- 0.1 s.