

Quantities and Units MCQ

D¹ Which statement using prefixes of the base unit metre (m) is **not** correct?

- A** 1 pm = 10^{-12} m
- B** 1 nm = 10^{-9} m
- C** 1 Mm = 10^6 m
- D** 1 Gm = 10^{12} m

2 A cylindrical tube rolling down a slope of inclination θ moves a distance L in time T . The equation relating these quantities is

$$L \left(3 + \frac{a^2}{P} \right) = QT^2 \sin \theta$$

Where a is the internal radius of the tube and P and Q are constants.

Which line gives the correct units for P and Q ?

	P	Q
A	m^2	$m^2 s^{-2}$
B	m^2	ms^{-2}
C	m^2	$m^3 s^{-2}$
D	m^3	ms^{-2}

C³ Which quantity can be measured in electronvolts (eV)?

- A** electric charge
- B** electric potential
- C** energy
- D** power

B⁴ What is the ratio $\frac{10^{-3} \text{ THz}}{10^3 \text{ kHz}}$?

- A** 10^{-9}
- B** 10^{-6}
- C** 10^0
- D** 10^3

C⁵ What is the unit of weight in terms of SI base unit(s)?

- A** kg ms^{-1}
- B** kg ms^{-2}
- C** N
- D** J m^{-1}

- B** ⁶ Which quantity has the same base units as momentum?
- A density \times energy
 - B density \times volume \times velocity
 - C pressure \times area
 - D weight \div area

- B** ⁷ The units of all physical quantities can be expressed in terms of SI base units.
Which pair contains quantities with the same base units?
- A force and momentum \times
 - B pressure and Young modulus
 - C power and kinetic energy \times
 - D mass and weight \times

- A** ⁸ Three of these quantities have the same unit.
Which quantity has a different unit?
- A $\frac{\text{energy}}{\text{distance}}$
 - B force \times
 - C power \times time \times
 - D rate of change of momentum \times

- B** ⁹ Which row shows an SI base quantity with its correct unit?

	SI base quantity	unit	
A	charge	coulomb	\checkmark
B	current	ampere	\checkmark
C	potential difference	volt	\checkmark
D	temperature	degree Celsius	\times

- ¹⁰ The drag coefficient C_d is a number with no units. It is used to compare the drag on different cars at different speeds. It is given by the equation

$$C_d = \frac{2F}{\rho v^n A}$$

where F is the drag force on the car, ρ is the density of the air, A is the cross-sectional area of the car and v is the speed of the car.

What is the value of n ?

- A 1
- B 2
- C 3
- D 4

- 11 Which estimate is realistic?
- A The kinetic energy of a bus travelling on an expressway is 30 000 J.
 - B The power of a domestic light is 300 W.
 - C The temperature of a hot oven is 300 K.
 - D The volume of air in a car tyre is 0.03 m^3 .

- 12 Which unit is equivalent to the coulomb?

- A ampere per second
- B joule per volt
- C watt per ampere
- D watt per volt

- 13 The spring constant k of a coiled wire spring is given by the equation

$$k = \frac{Gr^4}{4nR^3}$$

where r is the radius of the wire, n is the number of turns of wire and R is the radius of each of the turns of wire. The quantity G depends on the material from which the wire is made.

What is a suitable unit for G ?

- A Nm^{-2}
- B Nm^{-1}
- C Nm
- D Nm^2

- 14 When the brakes are applied on a vehicle moving at speed v , the distance d moved by the vehicle in coming to rest is given by the expression

$$d = kv^2$$

where k is a constant.

What is the unit of k expressed in SI base units?

- A m^{-1}s^2
- B ms^{-2}
- C m^2s^{-2}
- D m^{-1}s

- 15 At temperatures close to 0 K, the specific heat capacity c of a particular solid is given by $c = bT^3$, where T is the thermodynamic temperature and b is a constant characteristic of the solid. The SI unit of specific heat capacity is $\text{J kg}^{-1} \text{K}^{-1}$.

What is the unit of constant b , expressed in SI base units?

- A $\text{m}^2\text{s}^{-2}\text{K}^{-3}$
- B $\text{m}^2\text{s}^{-2}\text{K}^{-4}$
- C $\text{kgm}^2\text{s}^{-2}\text{K}^{-3}$
- D $\text{kgm}^2\text{s}^{-2}\text{K}^{-4}$

- 16 Which list shows increasing lengths from beginning to end?

- A** 1 cm 1 nm 1 mm 1 μm
B 1 μm 1 mm 1 nm 1 cm
C 1 nm 1 μm 1 mm 1 cm
D 1 mm 1 cm 1 μm 1 nm

- 17 The time T taken for a satellite to orbit the Earth on a circular path is given by the equation

$$T^2 = \frac{kr^3}{M}$$

where r is the radius of the orbit, M is the mass of the Earth and k is a constant.

What are the SI base units of k ?

- A** $\text{kg}^{-1}\text{m}^{-3}\text{s}^2$ **B** $\text{kg}^{-1}\text{m}^3\text{s}^2$ **C** $\text{kg m}^{-3}\text{s}^2$ **D** $\text{kg m}^3\text{s}^2$

- 18 Which row gives reasonable estimates for the mass and the speed of an adult running?

	mass / kg	speed / m s^{-1}
A	6×10^0	5×10^1
B	6×10^1	5×10^0
C	6×10^1	5×10^1
D	6×10^2	5×10^0

- 19 The Reynolds number R is a constant used in the study of liquids flowing through pipes. R is a pure number with no unit.

$$R = \frac{\rho v D}{\mu}$$

where ρ is the density of the liquid, v is the speed of the liquid and D is the diameter of the pipe through which the liquid flows.

What are the SI base units of μ ?

- A** kg m s **B** $\text{kg m}^{-1}\text{s}$ **C** kg m s^{-1} **D** $\text{kg m}^{-1}\text{s}^{-1}$

- 20 The force F between two point charges q_1 and q_2 , a distance r apart, is given by the equation

$$F = \frac{kq_1q_2}{r^2}$$

where k is a constant.

What are the SI base units of k ?

- A** $\text{kg m}^3\text{s}^{-4}\text{A}^2$ **B** $\text{kg m}^3\text{s}^{-4}\text{A}^{-2}$ **C** $\text{kg m}^3\text{A}^2$ **D** $\text{kg m}^3\text{A}^{-2}$