

Definitions

1. Distinguish between scalar and vector quantities.

Vectors have a direction, scalars do not

2. Distinguish between speed and velocity, using the words vector and scalar.

Speed is a scalar, velocity is a vector; speed only has magnitude, velocity has magnitude and direction

3. Define acceleration.

Rate of change of velocity

4. State and explain which feature of a speed-time graph shows acceleration.

Gradient or slope

5. Explain what is meant by mass.

Amount of matter in an object at rest to the observer

6. State what is meant by the term weight.

Gravitational force due to force

7. Explain what is meant by gravitational field strength.

Gravitational force per unit mass

8. State some ways in which weight differs from mass.

weight has direction / mass does not; weight is a vector / mass is not; weight varies / mass does not; mass is amount of matter in an object at rest to the observer, weight is a force

9. State the equation linking the density of a substance with its mass and volume.

$$\rho = \frac{m}{V}; \quad \rho, m, \text{ and } V, \text{ are density, mass, and volume, respectively}$$

10. State three ways in which a force may change the motion of the object.

- Change speed(accelerates/decelerates)
- Change directions
- Causes rotations

11. State why force is a vector quantity.

Forces have magnitude AND direction

12. Explain what is meant by the term limit of proportionality of a spring.

Up to this limit, extension is proportional to the load applied to it.

13. State the name that is given to the turning effect of a force.

Moment

14. Define the moment of a force.

force \times perpendicular distance from a pivot; turning effect of the force about a point

15. State the two conditions required for any object to be in equilibrium.

(1) no resultant/net force

(2) no resultant/net moment

OR (sum of) clockwise moment(s) = (sum of) anticlockwise moment(s)

16. State the word equation that defines momentum.

momentum = mass \times velocity

17. State an expression for the kinetic energy of an object of mass m that is moving with a speed v .

$$E_k = \frac{1}{2}mv^2$$

18. State the word used to describe the energy stored in a stretched or compressed spring.

Elastic (potential) energy / strain energy

19. Explain what is meant by the term energy conservation.

(1) in any energy transfer

(2) the total amount of energy before and after the transfer is constant

20. State Hooke's Law

Up to limit of proportionality, extension of a spring is proportional to the load applied to it

21. State an example of a fuel in which chemical energy is stored.

(2013) food OR coal OR oil/diesel/petrol OR gas

22. Explain what is meant by renewable energy source.

(2013) continuously regenerated/not used up/everlasting supply

23. State what is meant by the efficiency of a power station.

(2008)[†] ratio of energy out to energy in

OR ratio of power out to power in

24. Define power.

(2015)[†] work (done) / time (taken)

OR energy (transferred) / time (taken) OR rate of doing work

OR rate of supplying energy

25. Define pressure.

(2013) force/area OR force per unit area

OR F/A , where F and A are force and area, respectively

26. Write an expression for change in (hydrostatic) pressure in a fluid in terms of change in depth.

(1) $\Delta p = \rho g \Delta d$

(2) p , g , ρ , and d are pressure, gravitational field strength, density, and depth, respectively

27. State what is meant by the term melting point.

(2011) (1) temperature at which

(2) change between solid and liquid (or vice-versa)

28. Describe the movement of particles composing a solid.

(2018)[†] (particles) vibrate

29. Describe the movement of particles composing a gas.

(2018)[†] random/haphazard/in all directions

30. In terms of particles, explain how a gas causes a pressure on the walls of its container.

(2022)[†] (1) particles/atoms moving/vibrating/have kinetic energy

(2) particles/atoms collide . . .

(3) . . . with container walls

(4) exert force/change of momentum/bounce off over an area

31. Explain, in terms of particles, why liquids expand more than solids when heated.

(2021)[†] (1) forces between liquid particles weak(er than in solids)

- (2) less energy / work done to separate molecules
- OR greater separation for same work done / same increase in energy

32. State what is meant by the specific heat capacity of a substance.

(2015) (1) energy/heat required to increase temperature

(2) of 1 kg/1 g/unit mass (of the substance)

(3) by 1°C/1 K/unit temperature

33. Explain, in terms of the behaviour of composing particles, evaporation.

(2013) (1) particles escape

(2) leave the liquid

(3) form gas or vapour

34. State some ways in which evaporation differs from boiling.

(2017) evaporation: at surface OR no bubbles form OR at any temperature OR no heat needed OR affected by draught / surface area

boiling: throughout liquid OR bubbles form at specific temperature OR heat needed OR not affected by draught / surface area

35. Explain, in terms of particles, why energy must be supplied for a solid to become a liquid.

(2016)[†] work done against forces

OR work done separating particles

OR energy to break bonds

OR potential energy of particles increases

36. State the name for the transfer of thermal energy through a metal.

(2022) conduction

37. State the process by which thermal energy is transferred from Sun to Earth.

(2006) radiation

38. State the conditions necessary for an object to remain at constant temperature.

(2023) (1) energy transfer energy rate away from the object

(2) should equal energy transfer energy rate towards the object

39. Explain why houses in hot countries are often painted white.

(2017) · the sun is a source of energy

- (thermal / heat / IR / electromagnetic) radiation
- white (or clearly implied) surfaces absorb less or don't absorb
- white (or clearly implied) surfaces reflect more
- to keep house cooler OR to reduce thermal energy / heat transferred to house

40. State how a longitudinal wave differs from a transverse wave.

(2020) (1) transverse: oscillation at right angles to the direction of propagation / travel / energy transfer (of the wave) OR longitudinal: oscillation parallel to / in the direction of propagation / travel / energy transfer (of the wave)

(2) longitudinal: has compressions AND rarefactions

41. State what is meant by frequency of a wave.

(2017)[†] number of wavefronts (generated/produced/passing a point) in 1 sec/per sec/in unit time

42. Distinguish between seismic P and S waves.

(2023) (1) both are waves caused by earthquakes

(2) P are fast moving longitudinal

(3) S are slow moving transverse

43. State what is meant by critical angle.

(2016) angle of incidence when angle of refraction = 90°

44. Explain what is meant by total internal reflection.

(2016) reflection in a more dense material where there is no refracted ray

OR all light in a more dense material is reflected

45. State what is meant by the focal length of a lens.

(2021) (1) distance between principal focus / focal point

(2) and optical centre / lens

46. Distinguish between converging and diverging lenses.

(2023) (1) lenses that cause rays of light initially parallel to the principle axis

(2) converging: to converge at the focus diverging: to diverge at the focus

47. State what is meant by real image.

(2011) image can be formed on a screen

OR is formed by rays of light meeting

OR is formed on the opposite side of the lens from the object

48. State what is meant by virtual image.

(1) the location at which light rays appear to come

(2) cannot be projected onto a screen

49. State what is meant by monochromatic light.

(2013) light of (only) one wavelength OR frequency OR colour

50. State the speed in a light in air.

(2019) $\approx 3.0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$

51. State some uses for microwave radiation.

(2023) · satellite television broadcasting · transmit mobile phone (cellphone) signals · WIFI communication
· cooking

52. State some uses for ultraviolet radiation.

(2023) · forensic science · security marking of valuable equipment and banknotes · sterilize water, medical instruments, food utensils

53. State some uses for visible electromagnetic radiation.

(2023) · eyesight · optical instruments such as cameras, telescopes and microscopes · photosynthesis

54. State some practical and scientific uses of γ -ray radiation.

(2023) · cancer tumour detection · kill/damage cancer cells · sterilize instrument

55. State how analogue and digital signals differ.

(2023) (1) analogue signals vary continuously

(2) digital signals vary discretely

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58. Explain why sound waves are described as longitudinal.

(2014) particles/molecules/atoms oscillate/vibrate

OR pressure variation/compressions/rarefactions/ displacements move

59. State what is meant by a compression in terms of sound.

(2020) compressing particles closer together than normal

60. State what is meant by a rarefaction in terms of sound.

(2020) compressing particles further apart than normal

61. Distinguish between permanent (steel) and temporary (soft iron) magnets.

(2023) permanent: · produce their own magnetic field · does not decay over time

temporary: · can be magnetized · can be easily demagnetized

62. Explain the mechanism of charging by friction.

(2023) (1) friction can cause one material to lose electrons

(2) transferring them to another material

(3) (both) materials thus become (oppositely) charged

63. State what is meant by electromotive force (EMF).

(2023) (1) electrical work done by a source

(2) in moving a charge around a complete circuit

64. Define one kilowatt-hour.

(2023) (1) a unit of energy

(2) equal to power in kilowatts multiplied by time in hours

65. List some electrical safety concerns.

(2023) · damaged insulation · excessive overheating

· overloaded (parallel) adaptors · moisture