# Sample test - Physics

1. A gram is:

   A. $10^{-6}$ kg
   B. $10^{-3}$ kg
   C. 1 kg
   D. $10^3$ kg
   E. $10^6$ kg

2. The average speed of a moving object during a given interval of time is always:

   A. the magnitude of its average velocity over the interval
   B. the distance covered during the time interval divided by the time interval
   C. one-half its speed at the end of the interval
   D. its acceleration multiplied by the time interval
   E. one-half its acceleration multiplied by the time interval.

3. A car travels 40 kilometres at an average speed of 80 km/h and then travels 40 kilometres at an average speed of 40 km/h. The average speed of the car for this 80-km trip is:

   A. 40 km/h
   B. 45 km/h
   C. 48 km/h
   D. 53 km/h
   E. 80 km/h

4. Which of the following quantities is NOT a vector?

   A. Mass
   B. Displacement
   C. Weight
   D. Acceleration
   E. Force

5. The standard 1-kg mass is attached to a compressed spring and the spring is released. If the mass initially has an acceleration of 5.6 m/s$^2$, the force of the spring has a magnitude of:

   A. 2.8 N
   B. 5.6 N
   C. 11.2 N
   D. 0 N
   E. cannot be calculated
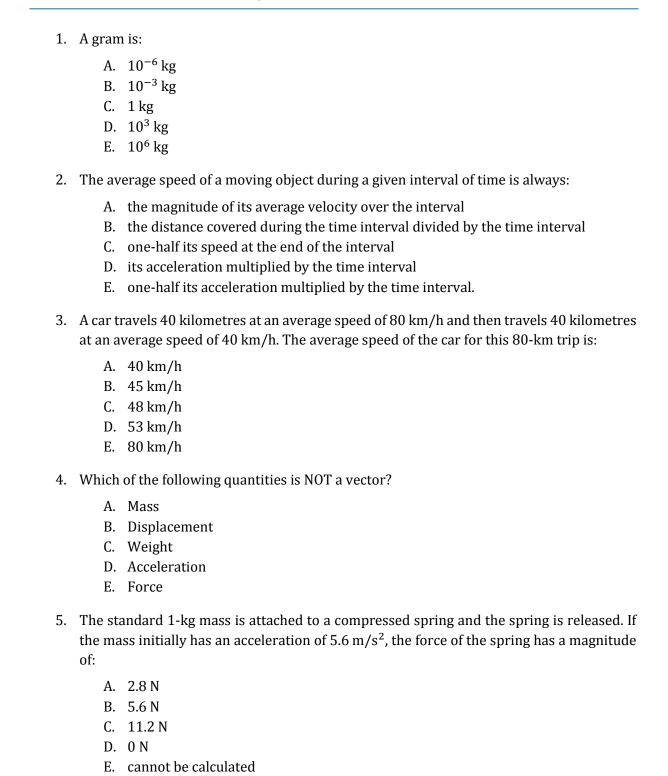
6. A 2-kg object is moving at 3 m/s. A 4-N force is applied in the direction of motion and then removed after the object has travelled an additional 5 m. The work done by this force is:

    A. 12 J
    B. 15 J
    C. 18 J
    D. 20 J
    E. 38 J

7. A 64-kg woman stands on frictionless level ice with a 0.1-kg stone at her feet. She kicks the stone with her foot so that she acquires a velocity of 0.0017 m/s in the forward direction. The velocity acquired by the stone is:

    A. 1.1 m/s forwards
    B. 1.1 m/s backwards
    C. 0.0017 m/s forwards
    D. 0.0017 m/s backwards
    E. none of these

8. An object moving in a circle at constant speed:

    A. must have only one force acting on it
    B. is not accelerating
    C. is held to its path by centrifugal force
    D. has an acceleration of constant magnitude
    E. has an acceleration that is tangent to the circle

9. In simple harmonic motion, the magnitude of the acceleration is:

    A. constant
    B. proportional to the displacement
    C. inversely proportional to the displacement
    D. greatest when the velocity is greatest
    E. never greater than $g$

10. A force of 5000 N is applied outwardly to each end of a 5-m long rod with a radius of 34 mm and a Young's modulus of $125 \cdot 10^8$ N/m$^2$. The elongation of the rod is:

    A. 0.002 mm
    B. 0.004 mm
    C. 0.14 mm
    D. 0.55 mm
    E. 1.42 mm

11. A rock, which weighs 1400 N in air, has an apparent weight of 900 N when submerged in fresh water (998 kg/m³). The volume of the rock is:

    A.  0.14 m³
    B.  0.6 m³
    C.  0.9 m³
    D.  $5.1 \cdot 10^{-2}$ m³
    E.  $9.2 \cdot 10^{-2}$ m³

12. Therby 300 g of an alloy as it cools through 50°C raises the temperature of 300 g of water from 30°C to 40° C. The specific heat of the alloy (in J/(g · °C)) is:

    A.  0.063
    B.  0.42
    C.  0.63
    D.  0.84
    E.  2.1

13. One mole of oxygen gas is at a pressure of $6.078 \cdot 10^5$ Pa and a temperature of 27°C. If the gas is heated at constant volume until the pressure triples, what is the final temperature?

    A.  9°C
    B.  81 K
    C.  81°C
    D.  900°C
    E.  900 K

14. Water waves in the sea are observed to have a wavelength of 300 m and a frequency of 0.07 Hz. The speed of these waves is:

    A.  0.00021 m/s
    B.  2.1 m/s
    C.  21 m/s
    D.  210 m/s
    E.  none of these

15. The standard reference sound level is about:

    A.  the threshold of human hearing at 1000 Hz
    B.  the threshold of pain for human hearing at 1000 Hz
    C.  the level of sound produced when the 1 kg standard mass is dropped 1 m onto a concrete floor
    D.  the level of normal conversation
    E.  the level of sound emitted by a standard 60 Hz tuning fork

16. A virtual image is one:

    A. towards which light rays converge but do not pass through
    B. from which light rays diverge but do not pass through
    C. from which light rays diverge as they pass through
    D. towards which light rays converge and pass through
    E. with a ray normal to a mirror passing through it

17. In a cinema, a picture 2.5 cm wide on the film is projected to an image 3 m wide on a screen that is 18 m away. The focal length of the lens is about:

    A. 7.5 cm
    B. 10 cm
    C. 12.5 cm
    D. 15 cm
    E. 20 cm

18. An electric field is most directly related to:

    A. the momentum of a test charge
    B. the kinetic energy of a test charge
    C. the potential energy of a test charge
    D. the force acting on a test charge
    E. the charge carried by a test charge

19. A 3-$\Omega$ and a 1.5-$\Omega$ resistor are wired in parallel and the combination is wired in series to a 4-$\Omega$ resistor and a 10-V emf device. The potential difference across the 3-$\Omega$ resistor is:

    A. 2 V
    B. 6 V
    C. 8 V
    D. 10 V
    E. 12 V

20. A car battery is rated at 80 A · h. An ampere-hour is a unit of:

    A. power
    B. energy
    C. current
    D. charge
    E. force