SENIOR 2 PHYSICS REVISION QUESTIONS

EXERCISE A

1. The unit of force in S.I. units is:
(a) Kilogram
(b) Newton
(c) Watt
(d) Dyne
(e) Joule.
2. A force acting on a body may
(a) Introduce internal stresses
(b) Balance the other forces acting on it
(c) Retard its motion
(d) Change its motion
(e) All of the above.
3. Effect of a force on a body depends upon
(a) Magnitude
(b) Direction
(c) Position or line of action
(d) All of the above
(e) None of the above.
4. A force is completely defined when we specify
(a) Magnitude
(b) Direction
(c) Point of application
(d) All of the above
(e) None of the above.
5. The weight of a body is due to
(a) Centripetal force of earth
(b) Gravitational pull exerted by the earth
(c) Forces experienced by body in atmosphere
(d) Force of attraction experienced by particles
(e) Gravitational force of attraction towards the center of the earth.
6. What name is given to

a) A driving force produced by aircraft's propulsion system or engine: ……..
b) A force of attraction between molecules of different substances:…….
c) A radial force required to keep an object moving in a circular path, by acting towards the centre:…….
d) Upward force exerted by the liquid on an object immersed in that liquid:……
e) Force resisting the motion of a body in air:……..

7. Give 5 differences between mass and weight

Mass	Weight

9. Label the forces represented on the diagram by using; Normal action, Normal reaction, Weight, Frictional force and Tension, given that the body tends to move up the slope.

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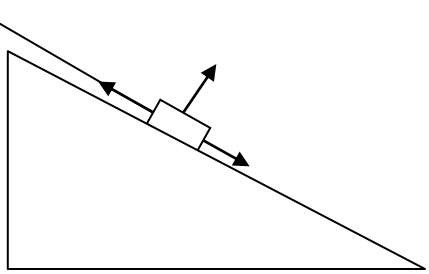


10. a) What is the acceleration produced when a net force of magnitude $420N$ is acting on a body of mass 30kg.

b) What is the weight of that body?

11. a) State Newton's law of universal gravitation and express it as a formula.

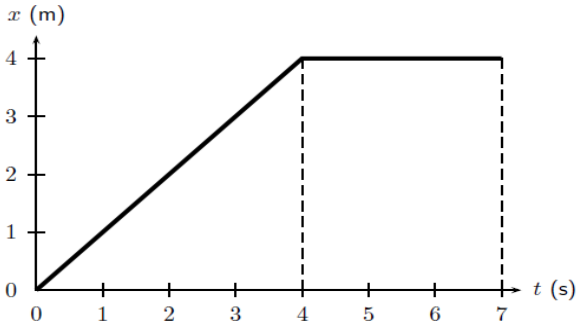
b) Two wardrobes of masses $1.6\times10^{2}kg$ and $2.3\times10^{2}kg$ exert an attractive force of $3.4\times10^{-6}N$ between them. What is the distance separating them?

EXERCISE B

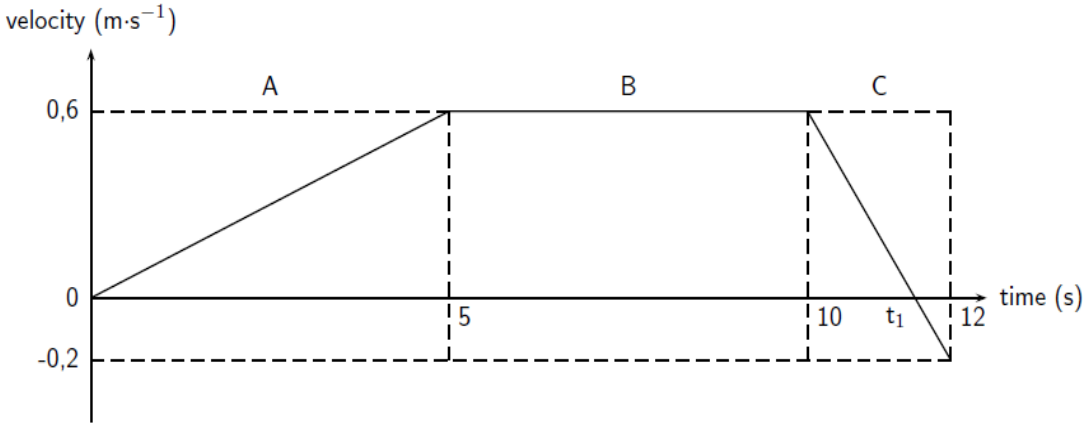
1. Use the method of dimensional analysis to check the validity of the following equations
   - **(a)** $E = mc^2$, where E is the energy obtainable from mass m and c is the velocity of light.
   - **(b)** Energy stored in a wire = $\frac{1}{2}EAe^2/L$ where E is the Young modulus, A the cross-sectional area and L the original length
   - **(c)** Escape velocity from a planet = $2Rg_o$ where R is the radius of the planet and g_o the gravitational intensity at its surface
2. What are the dimensions for the following quantities: (a) work (b) energy (c) power (d) momentum (e) impulse (f) force (g) density.

EXERCISE C

1. Is it possible for a moving body to have non-zero average speed but zero average velocity during any given interval of time? If so, explain.
2. A lady drove to the market at a speed of 8 km/h. Finding market closed, she came back home at a speed of 10 km/h. If the market is 2km away from her home, calculate the average velocity and average speed.
3. The position versus time graph below describes the motion of an athlete.
   What is the velocity of the athlete during the first 4 seconds?
   What is the velocity of the athlete from t = 4 s to t = 7 s?



4. A stone is dropped from a window. It takes the stone 1.5 seconds to reach the ground. How high above the ground is the window?
5. An apple falls from a tree from a height of 1,8 m. What is the velocity of the apple when it reaches the ground?
6. A car initially at rest accelerates at 4 m/s^2 while covering a distance of 100 m. Then the car continues at constant velocity for 500 m. Finally it slows to a stop with a deceleration of 3 m/s^2. Determine the total time of this displacement.
7. A motorcycle, travelling east, starts from rest, moves in a straight line with a constant acceleration and covers a distance of 64 m in 4 s. Calculate
   (a)its acceleration
   (b)its final velocity
   (c) at what time the motorcycle had covered half the total distance
   (d) What distance the motorcycle had covered in half the total time.
8. Indicate whether the following statements are TRUE or FALSE.
   (a) A scalar is the displacement of an object over a time interval.
   (b) The position of an object is where it is located.
   (c) The sign of the velocity of an object tells us in which direction it is travelling.
   (d) The acceleration of an object is the change of its displacement over a period in time.
9. A velocity-time graph for a ball rolling along a track is shown below. The graph has been divided up into 3 sections, A, B and C for easy reference. (Disregard any effects of friction.)



   a. Use the graph to determine the following
      i. the speed 5 s after the start
      ii. the distance travelled in Section A
      iii. the acceleration in Section C
   b. At time t_1 the velocity-time graph intersects the time axis. Use an appropriate equation of motion to calculate the value of time t_1 (in s).

EXERCISE D

1. A 2.50 kg block is resting on a horizontal surface. The coefficient of static friction between the surfaces in contact is 0.350. Calculate the maximum magnitude of force of static friction between the surfaces in contact
2. An object of mass 2kg is sliding on an inclined plane with the coefficient of kinetic friction 0.2. Find the kinetic friction force of contact
3. State 4 uses of friction forces (=advantages) and 4 Disadvantages of the same forces
4. Suggest 4 Ways of minimizing (=reducing friction forces)

EXERCISE E

1. A cube of copper has a mass of 240 g. Each side of the cube is 3.0 cm long. Calculate the density of copper in g cm^{-3} and in kg m^{-3}.
2. Calculate the relative density of a solid block of density of 78kgm^{-3}.

(Assume the density of water $\rho_W = 1000 kgm^{-3}$)

3. In an experiment to determine the relative density of a liquid, the following measurements were taken:

-mass of the empty bottle 50g

-mass of the beaker full of liquid 250g

-mass of beaker full of water 400g

(a) Calculate the R.D of the liquid

(b) Calculate the density of the liquid.

4. A cube of copper has a mass of 240 g. Each side of the cube is 3.0 cm long. Calculate the density of copper in g cm^{-3} and in kg m^{-3}.
5. The density of steel is 7850 kg/m^3. Calculate the mass of a steel sphere of radius 0.15 m.
6. A water bed is 2.00 m on a side and 30.0 cm deep. (a)Find its weight.
   (b)Find the pressure that the water bed exerts on the floor. Assume that the entire lower surface of the bed makes contact with the floor.
7. The four tires of an automobile are inflated to a gauge pressure of 2.0 x10^5 Pa. Each tire has an area of 0.024 m^2 in contact with the ground. Determine the weight of the automobile.
8. A container is filled to a depth of 20.0 cm with water. On top of the water floats a 30.0cm-thick layer of oil with specific gravity 0.700. What is the absolute pressure at the bottom of the container?

EXERCISE F

1. (a)Give four examples of practical application of surface tension.
   (b)How do insects run on the surface of water?
   (c)Explain the following statements in terms of pressure:
   (i)It is difficult to cut a wooden rod using a blunt edged knife.
   (ii)Racing cars are fitted with tyres of large area.
   (iii)People use straws to drink soda, water or juice.
2. find the pressure due to the fluid at depth of 76cm in still a) water ($\rho_w = 1.00 g/cm^3$) and b) mercury ($\rho = 13.6 g/cm^3$)

3. How high would water rise in the pipes of a building if the water pressure gauge shows the pressure at the ground floor to be 270kPa.
4. A reservoir dam holds an $8km^2$ lake behind it. Just behind the dam, the lake is 12.0m deep. What is the water pressure a) at the base of the dam and b) at a point 3.0m down from the lake's surface?

EXERCISE G

1. Define the term energy.
2. State and explain the six form of energy
3. Differentiate between:
    i. Potential energy and kinetic energy.
    ii. Gravitation and elastic potential energy
4. A brick of mass 0.5 kg is lifted through a distance of 100 m to the top of building. Calculate the potential energy attained by the brick.
5. A 50 kg diver is standing on top of a 10 m platform. How much gravitational potential energy does he have?
6. A 3,000 kg hot air balloon is hovering at a height of 100 m above Earth's surface. How much gravitational potential energy does it have?
7. A child holds a 1.5 kg rock at the edge of a cliff. What must the height of the cliff be, if the rock has a GPE of 1176 J?
8. A 0.15 kg baseball is thrown straight up into the air. When it reaches its maximum height, it has a GPE of 29.4 J. How high did the ball go before falling back to the ground?
9. A ball is at a height of 30 m. It is then moved to a height of 60m. By what factor does the GPE change?
10. What is the mass of an object which has 2400 J of KE when traveling at 6.0 m/s?
11. A 10 kg snowball is rolling down a hill. Just before reaching the bottom, its velocity is measured to be 10 m/s. What is the kinetic energy of the ball at this position?
12. A 100 kg running back in football is running with a velocity of 2 m/s. What is his kinetic energy?
13. What is the kinetic energy of a 20 kg object with a velocity of 5 m/s?
14. A 3 kg object has 45 J of kinetic energy. What is its velocity?
15. A 2000 kg car with a velocity of 20 m/s slows down and stops at a red light. What is the change in kinetic energy?
16. Draw a diagram of a single-string pulley system in which the velocity ratio is 2.
17. Using efficiency of a system of pulley is 80%. What load can be raised by effort of 600N given that the velocity ratio of the system is 3?
18. A machine with a velocity ratio of 6 requires 800j of work to raise a load of 600N through a vertical distance of 1m. Find the efficiency and mechanical advantage of the machine.
19. Draw a clear, labelled diagram of an inclined plane used to lift a heavy load 8m with a velocity ratio of 4. How long is the plane.

    A load of 30N is raised 2m when an effort of 10N moves through 8m. Calculate the mechanical advantages, velocity ratio and efficiency of the machine.

EXERCISE H

1. Explain why the density of gas is much less than that of solid or liquid.
2. Draw diagram to show one air molecule moves in a closed container.
3. Explain why it is easier to compress a gas than a liquid or a solid?
4. Describe the difference between solids, liquids and gases in terms of the arrangement of the molecules throughout the bulk of the material.
5. State and explain two applications of physical properties of solids, liquids and gases and show how they have improved our lives.
6. What is the height of a tree if it is viewed through a pinhole camera from 50.0m? The camera is 25cm long and the image formed is 2.0cm high.
7. State the three characteristics of an image formed by a pinhole camera.
8. What is the actual size of an object if the magnification is 0.20 and the image is 3.5cm high?
9. The distance from the pinhole to the screen in a pinhole camera is 19.5 cm. The height of the object is 3.75m. If the magnification is 0.175, calculate the distance to the object, and the height of the image.