

### S.3 PHYSICS HOLIDAY WORK

Where necessary assume the acceleration due to gravity,  $g = 10ms^{-2}$ .

1.		7.		13.		19.		25.	
2.		8.		14.		20.		26.	
3.		9.		15.		21.		27.	
4.		10.		16.		22.		28.	
5.		11.		17.		23.		29.	
6.		12.		18.		24.		30.	

#### SECTION A

- The force which keeps the body moving in a circle is  
A. resultant      B. centrifugal      C. centripetal      D. rotational
- A block of wood measures  $5cm \times 3cm \times 10cm$  and has a mass of  $1.35 \times 10^{-1} kg$ . The density of the block in  $kgm^{-3}$  is  
A.  $1.5 \times 10^{-1}$       B.  $9.0 \times 10^{-1}$       C.  $3.0 \times 10^1$       D.  $9.0 \times 10^2$
- A mass of  $0.5kg$  causes a spring to extend by 4cm. The force that would cause an extension of 6cm is  
A.  $7.5N$       B.  $3.3N$       C.  $2.0N$       D.  $4.8N$
- When a crystal of potassium permanganate is carefully placed at the bottom of beaker containing water. It spreads uniformly in the water after some days due to.  
A. Diffusion      B. capillarity      C. surface tension      D. Brownian tension
- A box of mass  $0.6kg$  has dimensions  $50m$  by  $30m$  by  $200cm$ . The least and greatest pressure in  $Nm^{-2}$  respectively is  
A.  $0.004, 0.1$       B.  $0.004, 0.01$       C.  $0.001, 0.004$       D.  $0.1, 0.004$

6. As pendulum swings through the lowest point the energy content is
- A. Kinetic energy only
  - B. potential and sound
  - C. potential energy only.
  - D. kinetic and potential
7. Materials which break so immediately when tension forces are applied belong to a class of materials called
- A. Brittle
  - B. Ductile
  - C. Malleable
  - D. Plastic
8. Which of the following set contains only vectors?
- A. mass, velocity, force, speed, time
  - B. power, time, volume , work, displacement.
  - C. weight, displacement, acceleration, momentum
  - D. energy, momentum, displacement, velocity
9. The volume of an oil drop is  $1 \times 10^{-5} \text{ cm}^3$  it forms a patch of area  $10^2 \text{ cm}^2$  the size of one molecule in an oil drop is
- A.  $1 \times 10^{-3} \text{ cm}$
  - B.  $1 \times 10^{-7} \text{ cm}$
  - C.  $2 \times 10^{-7} \text{ cm}$
  - D.  $1 \times 10^7 \text{ cm}$
10. A rod of cross sectional area  $40 \text{ cm}^2$  needs a tensile force of  $2N$  to break, what is its breaking stress?
- A.  $0.005 \text{ Nm}^{-2}$
  - B.  $0.05 \text{ Nm}^{-2}$
  - C.  $5 \text{ Nm}^{-2}$
  - D.  $500 \text{ Nm}^{-2}$
11. Concrete is a material obtained by carefully proportionally mixture of
- A. cement, sisal, wood and water
  - B. sand, gravel, bamboo and water.
  - C. cement, sand, gravel and water.
  - D. gravel, sand, sisal and water
12. Pressure in liquids is independent of the

- A. density of liquid.
  - B. depth below the surface of the liquid.
  - C. pressure exerted on surface of the liquid.
  - D. cross - sectional area and the shape of the vessel of the liquid container.
13. A strut and a tie beam is under
- A. compression forces only
  - B. tension forces only.
  - C. tension and compression forces respectively.
  - D. compression and tension forces respectively.
14. A body of mass  $20\text{kg}$  falls freely from a height of  $5\text{m}$ . Find the velocity with which it hits the ground.
- A.  $3.2\text{ms}^{-1}$
  - B.  $4.5\text{ms}^{-1}$
  - C.  $7.1\text{ms}^{-1}$
  - D.  $10\text{ms}^{-1}$
15. Which of the following is not a set of derived quantities?
- A. Force, velocity, acceleration
  - B. momentum, speed , density
  - C. mass, length, temperature
  - D. weight, volume, area
16. The following are factors affecting diffusion in gases.
- A. volume and density
  - B. density and temperature
  - C. density and temperature
  - D. wind and area
17. The impulse of a force is defined as the product of;
- A. Force and its velocity
  - B. Force and time taken

- C. Momentum and time taken
- D. Mass and its velocity
18. Which of the following is not true about a body moving with a constant velocity?
- A. Its acceleration is zero
- B. Its kinetic energy is constant
- C. Its momentum is constant
- D. There is a resultant force on it
19. A body of mass  $30\text{kg}$  weighs  $60\text{N}$  on planet  $X$ . Which one of the following statement is true?
- A. The acceleration due to gravity on  $X$  is greater than that on earth.
- B. The mass of the body is greater than on  $X$  than it is on earth
- C. The acceleration due to gravity on  $X$  is less than that on the earth
- D. The mass of the body is less on  $X$  than it is on the earth.
20. A body moving on a horizontal surface experiences a frictional force of  $5\text{N}$ . If the normal reaction on the body is  $20\text{N}$ , find the mass of the body.
- A.  $0.5\text{kg}$
- B.  $1.5\text{kg}$
- C.  $2.0\text{kg}$
- D.  $2.5\text{kg}$
21. In an elastic collision
- A. bodies move with a common velocity
- B. kinetic energy is not conserved
- C. kinetic energy is conserved
- D. bodies stick together
22. A wheel barrow that is used to carry a load across a soft ground should have a
- A. Narrow wheel because it exerts greater pressure on the ground
- B. Narrow wheel because it exerts less pressure on the ground
- C. Wide wheel because it exerts greater pressure on the ground

- D. Wide wheel because it exerts less pressure on the ground
23. A strut as applied to beam is
- A. A girder under tension forces
  - B. A girder under shear forces
  - C. A girder under compression forces.
  - D. A girder which is neither in tension nor in compression.
24. The law of conservation of mechanical energy states that;
- A. Energy can be created or destroyed when changed from one form to another.
  - B. Energy is the ability to do work.
  - C. Energy is the product of force and distance moved in the direction of the force.
  - D. Energy is neither created nor destroyed but can be change from one form to another
25. The slope of a velocity-time graph gives
- A. Velocity
  - B. Acceleration
  - C. Displacement
  - D. Speed
26. A pulley system of velocity ratio 6 is used to lift a load of  $250N$  through a distance of  $3m$ . If the effort applied is  $50N$  how much energy is wasted?
- A.  $125J$
  - B.  $150J$
  - C.  $250J$
  - D.  $750J$
27. In a hydraulic press, the area of the piston on which the effort is applied is made smaller in order to
- A. facilitate the movement of the piston downward
  - B. transmit a force as large as possible to the load
  - C. transmit pressure equally throughout the liquid
  - D. obtain pressure as large as possible
28. The most suitable instrument for measuring the outer diameter of a test tube is
- A. vernier caliper
  - C. micrometer screw gauge



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32. a) A brick of mass  $1.6\text{kg}$  and of dimension  $0.8\text{m}$  by  $0.5\text{m}$  by  $0.4\text{m}$  . Calculate

i) minimum pressure exerted on the ground. (2marks)

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ii) Maximum pressure exerted on the ground. (2marks)

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33 a) Define the term uniform velocity (1 mark)

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b) A ticker tape timer has a vibrator of frequency  $40\text{Hz}$  and makes nine dots on a tape. The distance between the first and last dots is  $10\text{cm}$  . Calculate the velocity of the trolley driving the tape. (3 marks)

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34 a) State the principle of conservation of linear momentum (1 mark)

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b) How would you use the principle in (a) above to find the weight of a wooden rod? (3 marks)

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35 a) State Hooke's law of elasticity (1 mark)

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b) Draw a sketch graph of a force-extension graph for an elastic material and clearly indicate the regions where Hooke's law is and is not obeyed. (3 marks)

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### SECTION C

36. a) Distinguish between density and relative density and state their SI units. (4 marks)

b) Describe an experiment to measure the density of an irregular solid such as a glass stopper (4 marks)

c) (i) Define the moment of a force (1 mark)

A meter rule is found to balance at  $49\text{cm}$  mark. When a mass of  $100\text{g}$  is suspended at the  $10\text{cm}$  mark, it balances at the  $36\text{cm}$ . Calculate the weight of the rule (3 marks)

37 a) State Newton's laws of motion (3 marks)

b) A car accelerates uniformly from rest for  $30\text{s}$  with an acceleration of  $2\text{ms}^{-2}$ . It then travels at a constant speed for  $1.5\text{min}$  before being decelerated uniformly to rest in a further  $10\text{s}$ .

(i) Sketch a velocity time graph of the motion (2 marks)

(ii) Find the maximum speed of the car (2 marks)

(iii) Find the total distance travelled (3 marks)

(iv) the average speed for the whole journey (3 marks)

38. (a) List the differences between streamline flow and turbulent flow.

(b)(i) Define pressure.

(ii) Find the pressure at the bottom of a sea bed 100m deep if the density of seawater is  $2000 \text{ kg/m}^3$ .

33. (a) Define terminal velocity.

(b) With the aid of a labeled diagram, describe the motion of a steel ball, dropped centrally into a tall jar containing oil.

(c)(i) State Archimedes' principle.

(ii) An object weighs 62 N in air and 42 N when immersed in water of density  $1000 \text{ kg/m}^3$ .

If the same object weighs 46 N when completely immersed in a liquid, what is the density of the liquid?

(d) Explain why a ship is able to float on water in spite of being made of metal.

34. (a)(i) State the law of flotation.

(ii) Describe an experiment to verify the law of flotation.

(b) A rectangular wax of 0.6 m by 0.4 m by 0.1 m is held completely immersed in water a tight string tied to a lead ball at the bottom of the tank. If the relative density of the wax is 0.6, calculate the:

(i) Volume of the water displaced. (1 mark)

(ii) tension in the string. (2 marks)

(c) Explain how a rubber balloon for weather focusing can be made to rise up and float at a certain height. (4 marks)

(d) When floating in a liquid of relative density 0.8, a hydrometer displaces  $90 \text{ cm}^3$ . What volume will it displace when transferred to a liquid of relative density 1.2? (3 marks)

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