# Physics Grade 11 Unit 8

## Bulk Matter (43 Questions)

19. Young's Modulus is the

(A) ratio of stress to strain.
(B) force per unit area.
(C) ratio of strain to stress.
(D) force per unit elongation.

20. Which of the following combinations of properties would be most desirable for a thermal insulator?

(A) high specific heat and low conductivity.
(B) low specific heat and high conductivity.
(C) high specific heat and high conductivity.
(D) low specific heat and low conductivity.

33. An open tank containing a liquid of density $\rho$ has a small hole in its side at a distance $y_1$ from the bottom. What is the speed at which the fluid leaves the hole when the liquid level is a distance h above the hole?

(A) $\sqrt{2gh}$ (B) $\sqrt{2gy_1}$ (C) $\sqrt{gh}$ (D) $\sqrt{gy_1}$

42. A garden hose has an inside diameter of 16mm. The hose can fill a 10 liter bucket in 20 seconds. If the diameter of the nozzle is reduced to 8 cm,

(A) water exits with a speed twice the speed inside the hose.
(B) a 10 litter bucket can be filled in 10 seconds.
(C) a 20 litter bucket can be filled in 40 seconds
(D) water exits with a speed half the speed inside the hose

43. When stretched beyond its elastic limit, a metal rod such as steel

(A) becomes elastic
(B) has no energy
(C) obeys Hook's law
(D) becomes plastic

24. Water flows through a horizontal pipe. At the wide end its speed is 4 m/s. The difference in pressure between the two ends is $4.5\times10^3$ Pa. The speed of the water at the narrow end is:

A) 2.6 m/s
B) 5 m/s
C) 3.4 m/s
D) 6 m/s

25. A4 m long steel beam supports a load of $6\times10^4$ N.Ifits cross-sectional area is $8\times10^{-3}$ $m^2$, what is its elongation? (Take $Y_{steal} = 2\times10^{11}$ Pa)

A) $4.5\times10^{-4}$ m
B) $3.5\times10^{-4}$ m
C) $2.5\times10^{-4}$ m
D) $1.5\times10^{-4}$ m

41. An immersion heater having a power of 4500 W is used to heat a 125 ℓit of water from 20°C to 50°C. How long will it take? (Take: $\rho_{water} = 1000$ kg/$m^3$, $c_{water} = 4200$ J/kg.$^0$C)

A) 35 sec
B) 3500 sec
C) 350 sec
D) 3.5 sec

14. What does the value of Reynolds number signify?

(A) It describes whether the flow is vertical or horizontal.
(B) It describes the magnitude of the viscosity of the liquid.
(C) It describes whether the flow is stream lined or turbulent.
(D) It describes the magnitude of the surface tension of the liquid.

28. The pressure at the bottom of a cylindrical tube filled with water was measured to be 5000 Pa. If the water in the tube were replaced with ethyl alcohol, what would be the new pressure at the bottom of the tube? (The density of ethyl alcohol is $0.8\ {}^{g}/_{cm^3}$).

(A) 4000 Pa (B) 4800 Pa (C) 5000 Pa (D) 6250 Pa

29. A table-tennis ball has a diameter of 3.80 cm and average density of $0.084\ {}^{g}/_{cm^3}$. What force is required to hold it completely submerged under water?

(A) 0.521 N (B) 0.258 N (C) 0.300 N (D) 0.510 N

46. Water flows through a fire hose of diameter 6.35 cm at a rate of $0.012\frac{m^3}{s}$. The fire hose ends in a nozzle of inner diameter 2.20 cm. What is the speed with which the water exits the nozzle?

(A) $23.4\frac{m}{s}$ (C) $63.2\frac{m}{s}$

(B) $31.6\frac{m}{s}$ (D) $46.8\frac{m}{s}$

21. The langth of an aluminum rod at a temperature of 20°C is 3 m. What will be the ratio of change in the length of the rod to its original length if its temperature is raised to 120°c? The coefficient of linear expansion of aluminum is $3.31 \times 10^{-5}$/K

A. 23% B. 3.2% C. 3% D. 0.23%

22. A very large open tank is full of oil whose density is 800 $kg/m$. If the absolute pressure at the bottom of the tank is $1.81 \times 10^5$ Pa, them what is the depth of the oil? (Note that atmospheric pressure is $1.01 \times 10^5$ Pa)

A. 100.0 m B. 75.0 m C. 10.0 m D. 9.5 m

34. A container resting on the floor of an elevator contains an incompressible fluid of density ρ. When the elevator has an upward acceleration of magnitude 'a' then what will be the pressure difference between two points in the fluid separated by a vertical distance Δh?

A. ρaΔh B. ρ(g+a)Δh C. ρgΔh D. ρgaΔh

48. Water flows through a fire hose of diameter 6.35 cm at a rate of 0.012 $m^3/s$. The fire hose ends in a nozzle of inner diameter 2.20 cm. What is the speed with which the water exits the nozzle?

A. 63.2 m/s B. 46.8 m/s C. 31.6 m/s D. 23.4 m/s

6. Which statement is correct about the pressure under a fluid in a container?

A. It depends on the volume of the fluid.
B. It depends on the density of the fluid.
C. It depends on the shape of the container.
D. It is independent of the depth of the fluid.

16. A garden hose has and inside diameter of 16cm. The hose can fill a 10 liter bucket in 20 seconds. If the diameter of the nozzle is reduced to 8 cm,
   A. Water exists with a speed twice the speed inside the hose.
   B. A 10 litter bucked can be filled in 10 seconds.
   C. A 20 litter bucket can be filled in 40 seconds.
   D. Water exists with a speed half the speed inside the hose.

21. When a load of 500kg is hanging from a steel wire of length 3m and cross sectional area $0.20cm^2$, the wire stretches beyond its no-load length. If the Young's modulus for the wire made of steel is $Y=2X\ 10^{11}$ Pa, what is the change in length of the wire beyond its no-load length?
   A. 3.75mm  B. 2.75mm  C. 1.75mm  D. 0.75

23. A table- tennis ball which is spherical in shape has a diameter of 6 cm and average density of 0.400 $g/cm^3$. What force is required to hold it completely submerged under water?
   A. 0.68 N downward
   B. 0.68 N upward
   C. 1.13 N downward
   D. 1.13 N upward

25. A horizontal pipe of 10 cm in diameter has a smooth reduction to a pipe of 5cm in diameter. If the pressure of the water in the larger pipe is 80kPa and the pressure in the smaller pipe is 6kPa, at what rate does the water flow through the smaller pipe?
   A. 1.63 m/s  B. 6.53m/s  C. 13.6m/s  D. 42.67m/s

46. A glass flask whose volume is exactly 1,000cm³ at 0°C is totally filled with 1000 cm³ of mercury at this temperature. when flask and mercury are heated to 100°C, 15.2cm³of mercury overflow. If the coefficient of volume expansion of mercury is $1.82 \times 10^{-4}$ per Celsius degree, what should be the coefficient of volume expansion of the glass?

A. $1.52 \times 10^{-4}/C^0$
B. $1.82 \times 10^{-4}/C^0$
C. $3.00 \times 10^{-4}/C^0$
D. $1.00 \times 10^{-5}/C^0$

22. Which one of the following laws best describes the behaviour of elastic materials?

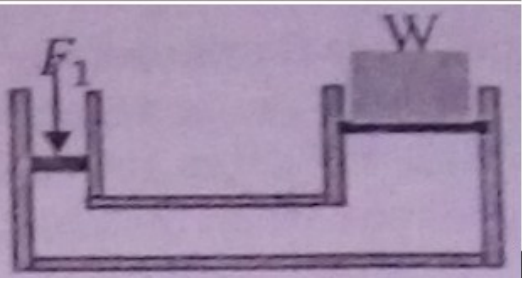
A. Gay Lussac's low
B. Hook's low
C. Newton's second low
D. Newton's low of gravitation

23. Two solid spheres made of gold and silver having equal masses are suspended by strings and fully submerged in a tank of water. Given that the density of gold is greater than that of silver, which one of the following statement is true?

A. The buoyant force on each sphere is the same.
B. The volume of water displaced by the gold sphere is larger than that of the silver sphere.
C. The tension in the string supporting each sphere is the same.
D. The buoyant force on the silver sphere is greater than that on the gold sphere.

24. The cross-section areas of the small and large pistons of a hydraulic lift shown in figure are 4.0 $cm^2$ and 0.02 $m^2$, respectively. What is the magnitude of the force $\vec{F}_1$ that must be applied to the small piston to lift a weight w = 15,000N placed on the larger piston?

A. $\times 10^2$N
B. $\times 10^4$ N
C. $\times 10^5$N
D. $3 \times 10^6$ N



25. An incompressible fluid flows through a horizontal pipe whose diameter varies along its length. The sum of the kinetic energy per unit volume and pressure of the fluid at different section of the pipe would _____

A. Depend on the length of the pipe.
B. Increase as the pipe diameter increases.
C. Increase as the pipe diameter decreases.
D. Remain the same as the pipe diameter changes.

26. The amount of heat required to raise the temperature of an object of mass m=1Kg by 1 Kelvin is known as_____.

A. Specific heat capacity
B. Heat capacity
C. Expansion coefficient
D. Internal energy

24. Pressure at the bottom of a liquid column is independent of:

(A) shape of the column.
(B) the density of the fluid.
(C) the depth of the point.
(D) the acceleration due to gravity.

25. The definition of Young's Modulus is given by:

(A) force per unit area.
(B) ratio of strain to stress.
(C) ratio of stress to strain.
(D) force per unit elongation.

26. A water pipe has a diameter of 5.0 cm in the inlet side and 1.5 cm in outlet side. Water flows at 0.50 $m^3$ per minute at the inlet point. What is the speed of the water at the outlet point?

(A) 26.67 m/s
(B) 13.33 m/s
(C) 74.1 m/s
(D) 148.1 m/s

27. A metal ball has a diameter that is slightly greater than the diameter of a hole that has been cut into a metal plate. The coefficient of linear expansion for the metal from which the ball is made is greater than that for the metal of the plate. Which one of the following procedures can be used to make the ball pass through the hole?

(A) Raise the temperatures of the ball and the plate by the same amount.
(B) Heat the ball and cool the plate.
(C) Lower the temperatures of the ball and the plate by the same amount.
(D) There is no way of passing the ball through the hole.

28. A billiard ball of radius 4 cm is falling through a liquid of viscosity 0.985 at a velocity of 2.5 m/s. The drag force on the ball is

(A) $0.591\pi$ N
(B) $0.118\,\pi$ N
(C) $1.182\pi$ N
(D) $0.059\,\pi$ N

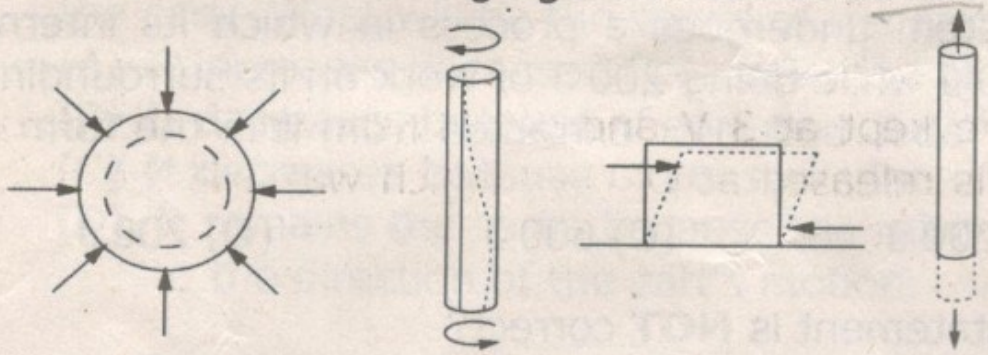
29. Which one of the following statements is correct?

(A) Elastic materials retain their shape after deformation.
(B) Plastic materials can recover the original size or shape after being distorted.
(C) Plastic materials change their shape by pressure.
(D) Elastic materials cannot recover the original size or shape after being distorted.

21. An electric immersion water heater is rated at 400 W. How long will it take to heat one kilogram of water from 10 °C to 30 °C? (The specific heat of water is 4.2 J/g K.)

(A) 15 min
(B) 1 min
(C) 3.5 min
(D) 45 min

27. Which of the following figure indicates tensile deformation?



(A) (B) (C) (D)

28. A beaker with water resting on a scale weighs 40 N. A block suspended on a hanging spring weighs 20 N. The spring scale reads 15 N when a block is fully submerged in the water. What is the reading of a scale on which the beaker with water rests, while the block is submerged in the water after detached from the hanging spring?

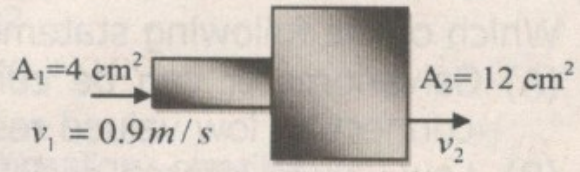
(A) 60 N (B) 45 N (C) 55 N (D) 25 N

29. An object with a mass of 150 kg and a volume of 0.75 $m^3$ is floating in a liquid of density 0.8 $g/cm^3$. What percentage of the object's volume will be submerged below the surface of the fluid?

(A) 75% (B) 50% (C) 25% (D) 100%

30. In the figure below, what is the speed of water as it leaves $A_2$?

(A) 0.3 m/s (C) 3.3 m/s
(B) 0.9 m/s (D) 3.6 m/s




22. **Which of the following statement is correct about elastic behavior of materials?**

**(A) For sufficiently small stress, stress is proportional to strain.**
**(B) In tensile stress the force is parallel to the cross-sectional area, where as in shear stress, the force is perpendicular to the area.**
**(C) All materials do not necessarily have elastic limit.**
**(D) With plastic materials, the body goes to original dimensions after removal of the force that caused deformation.**

23. A fluid of unknown density filled in a beaker of 250.0 $cm^3$. The pressure due to the fluid at the base of the beaker is 2.30 Pa. The base area of the beaker is 102 $cm^2$. What is the density of the fluid?

(A) 9.2 x $10^3$ $kg/m^3$
(B) 9.2 x $10^1$ $kg/m^3$
(C) 9.2 x $10^6$ $kg/m^3$
(D) 7.9 x $10^3$ $kg/m^3$

24. Which of the following statement is correct?

(A) Surface tension is proportional to the length along with the surface tension force acts.
(B) In a given tube, the capillary action is large for a liquid of larger density.
(C) The angle between the wall of a container and the liquid surface has no role on the capillary action
(D) Surface tension pulls the liquid column up until there is sufficient mass of liquid for weight to overcome the intermolecular forces.

25. Water flows at a rate of 0.4 litter per second through garden hose of inside diameter 4.0 cm. The nozzle of the hose is a circular opening of diameter 2.0 cm. What is the speed of the water when it emerges? **($\pi$ = 3.14)**

(A) 0.32 m/s (B) 1.27 m/s (C) 3.2 m/s (D) 12.7 m/s

26. How much heat would be absorbed by 2g of ice at 0°c dropped into water at 0°c, to melt it totally to water at 0°c? (Latent heat of melting, L = 340,000J/Kg )

(A) 680J (B) 840J (C) 340J (D) 420J