1. What is meant by;

(i) Streamline flow (1 mk)

Type of flow where all particles at a point have the same velocity.

(ii) Turbulent flow (1 mk)

Type of flow where particles at a given point have different velocities and direction.

2. State Bernoulli's principle. (1 mk)

Provided the fluid is non-viscous, incompressible and its flow is streamline, an increase in its velocity produces a corresponding decrease in the pressure it exerts

3. State **one** assumption made in Bernoulli's fluid flow. (1mk)

fluid is incompressible.

4. Give three examples of Bernoulli's effect in air. (3 mk)

✓ When a ball is made to spin, it curves along the path.

✓ Lifting a light ball using a funnel

✓ Dynamic lift caused by aerofoil.

✓ Two light balls moving towards each other when air is blown between them.

5. State any three properties of an ideal fluid that obeys Bernoulli's principle (3mk)

✓ Non-viscous

✓ Incompressible

✓ Its flow is streamline.

6. An oil drop of volume **V m^3** introduced on the surface of water spreads to forma patch whose area is ***a*** **m^2**. Derive an expression for obtaining the diameter, **d** of a molecule of oil. (2mk)

Vol of patch = axd

vol of patch = vol of sphere

$$\frac{V}{a} = \frac{\pi d}{\pi}$$

$$d = V/a$$

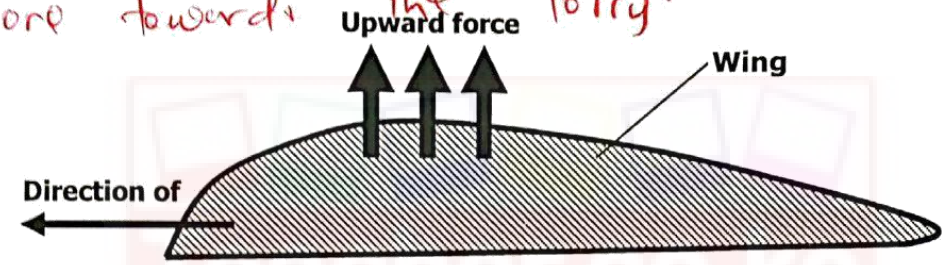
7. Two table Tennis balls are in the same level while suspended from threads a short distance apart. A stream of air is blown between the balls in a horizontal direction. Explain what happens to the balls (2mk)

The two balls moves towards each other since increase in velocity leads to a correspondingly decrease in pressure, atmospheric pressure therefore pushes the balls close to each other.

8. It is dangerous to stand close to a road when a fast moving lorry passes. Comment on this statement
(1mk)

High velocity of air caused by the lorry causes reduction of pressure, thus atmospheric pressure will push one towards the lorry.

9 . The diagram shows a cross-section of an aeroplane wing when the aero-plane is moving at constant height and constant speed, an upward force equal and opposite to its weight is exerted on its wing.



(a) **What** is the cause of the upward force?
(2mks)

Velocity above the wing is higher than velocity below, therefore, pressure above is low, atmospheric pressure thus lift it up.

(b) **Why** is the shape of the wing crucial in producing this upward force?
(2mk)

Air above the wing is made to cover long distance thus moves faster, than the air below.

10. A Girl stands some distance from a high wall and claps her hands

(i) What two measurements would need to be made in order to determine the speed of sound? (2mk)

✓ Distance from the wall
✓ Time taken for the girl to hear the echo.

(ii) **Describe** how you would make use of these measurements (3mks)

speed = $\frac{2d}{t}$ since for one to hear the echo, sound travels twice the distance.

11. The speed of sound in air determined on a warm day is 330m/s. Explain any difference you would expect in the results if the measurement is done on a cold day. (2 mks)

The speed will be slightly below this. Decrease in temperature reduces the speed of sound in air.

12. A range standing some distance from a wall blows a whistle and hears its echo 2.4 seconds later . How far is the wall from the ranger? (Speed of sound in air is 330 m/s). (3mk)

$s = \frac{2d}{t}$

$330 = \frac{2d}{2.4}$

$d = \frac{2.4 \times 330}{2}$

$= 396\text{m}$

13. A soldier standing between 2 cliffs fires a gun. He hears the first echo after 2s and the next after 5s. **Determine** the distance, between the two cliffs *(Take speed of sound as 340 m/s.)* (3mks)

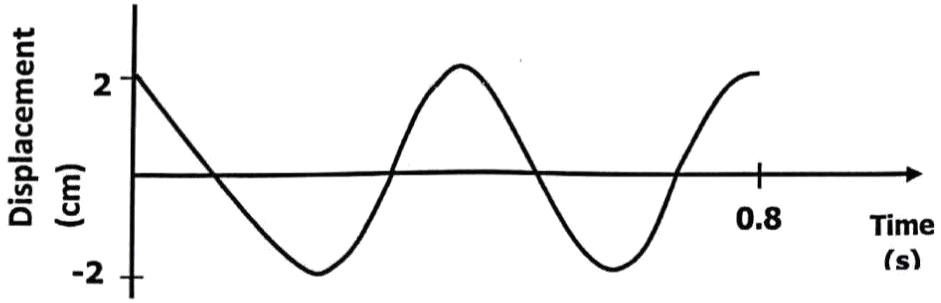
$s = \frac{2d}{t}$

$340 = \frac{2d}{7}$

$d = \frac{7 \times 340}{2}$

$d = 1190\text{m}$

14. The figure below show the displacement time graph of a wave traveling at 400cm/s.



Determine for the wave the:

(i) Amplitude (1mk)

2cm

(ii) Period (1mk)

$T = \frac{0.8}{2} = 0.45$

(iii) Frequency (2mk)

$f = \frac{1}{T} = \frac{1}{0.4} = 2.5\,Hz$

(iv) Wavelength (3mk)

$V = 400\,cm/s = 4\,m/s$

$V = f\lambda$

$\frac{4}{2.5} = \frac{2.5\lambda}{2.5}$

$\lambda = 1.6\,m$

15. Define the term moment of force.
(1mk)

Turning effect of force.

16. State the principle of moments.
(1mk)

At the point of equilibrium, sum of clockwise moments equals to sum of anticlockwise moments.

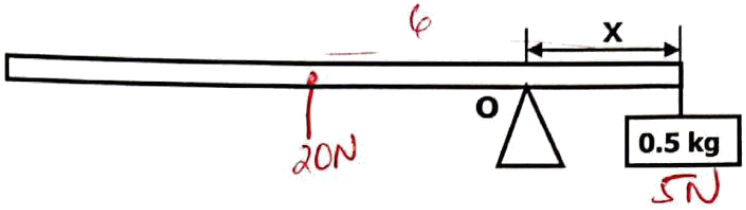
18. Name **three** activities which produce a turning effect.
(4mk)

- Opening/closing a tap
- Steering a wheel
- Bicycle Handle bars.

19. Why is it very difficult to open a door from a point too close to hinges?
(2mk)

Less moment of force is produced since it depends on the perpendicular distance from the pivot.

20. The figure below shows a uniform plank of weight **20N** and length **6m** balanced by a **0.5kg** mass at a distance **X** from the pivot point **O**.



Determine the value of **X** (3mk)

$F_1 d_1 = F_2 d_2$

$20(6-x) = 5x$

$120 - 20x = 5x$

$120 = 25x$

$x = 4.8\,m$