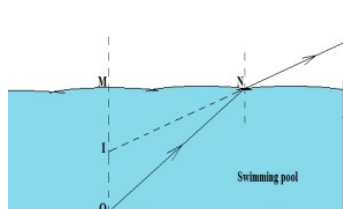


Marking GUIDE

1.

8. A skydiver falling through air under the influence of gravity. The two other forces acting on him are the upthrust and the viscus /drag force . The downward force of gravity remains constant regardless of the velocity at which the person is moving. However, as the person's velocity increases, until the magnitude of the sum of the upthrust and the viscus /drag force is equal to the gravitational force, thus producing a net force of zero. A zero net force means that there is no acceleration, as shown by Newton's second law. At this point, the person's velocity remains constant and we say that the person has reached his terminal velocity.

9. When you look at objects at the bottom of a swimming pool from the side, they appear closer to the surface than they actually are due to refraction. Refraction is the bending of light as it passes from one transparent medium (in this case, air) into another (water), and it occurs because light travels at different speeds in different materials.



In this scenario, A ray, ON, from the bottom of the pool is refracted away from the normal at N as it travels to the observer's eye because air is optically less dense than water.

- To the observer, the ray at N appears to come from I, the apparent position of the bottom of the pool.
- Therefore, to the observer, the depth of the pool is IM when in the actual sense the depth of the pool is OM. - The observer therefore sees the pool shallower than it actually is.

A real-life application of refraction in daily life can be seen in the use of eyeglasses and contact lenses. Eyeglasses are designed to correct vision problems, such as nearsightedness or farsightedness, by using lenses that manipulate the way light refracts as it enters the eye. By controlling the refraction of light, eyeglasses and contact lenses can help people see more clearly and focus on objects at the correct distance. Understanding refraction is essential in designing these optical aids to improve people's vision

OR any of

Cameras: Camera lenses use refraction to focus incoming light onto the camera's image sensor or film. This process creates sharp and detailed photographs. Adjusting the curvature and thickness of the lens elements can control how light refracts, allowing photographers to capture a wide range of subjects with clarity.

Telescopes: Telescopes, whether for astronomy or terrestrial observations, use lenses (or mirrors) to collect and magnify light from distant objects. Refraction helps bring the distant objects into focus, making them appear closer and more visible.

Microscopes: Microscopes rely on lenses to magnify tiny objects, allowing scientists and researchers to study the smallest of details. The careful design of microscope lenses and the precise control of refraction enable us to see and understand the microscopic world.

10. a) - Inner planets; Mercury, Venus, Earth and Mars

- Outer planets; Jupiter, Saturn, Neptune and Uranus

bi) - Planet Earth

ii) Time is explained on planet earth by its rotation about its axis and its revolution around the Sun.

- The rotation of the earth about its axis and its revolution about the Sun define time in terms of its different units.

- The seasons of the earth are explained in terms of the tilt of the earth.

- As the earth rotates about its axis, the tilt causes the overhead position of the Sun to move gradually from the tropic of capricorn to the tropic of cancer and vice versa.

- This movement of the overhead Sun results in the different seasons of the earth

c)- The Sun is a star, usually born out of a stellar nebula (a massive collection of dust particles in the universe).

- After acquiring a critical mass and sufficient gravity, it develops into a massive star by nuclear reactions of the constituent gasses.

- After many years of nuclear radiations and emissions, the massive star will explode into a super red giant when the gravitational force can no longer hold the particles together.

- The super red giant will undergo further explosion into a supernova, with a very bright central part.

- Finally, the supernova will end up into either a neutral star or a black hole, which will be the last stages in the life cycle of the Sun.