

USING EQUATIONS TEST 1

Some of these answers require you use common sense.

(Take $g = 9.8 \text{ ms}^{-2}$).

1. Michael has a mass of 72kg. If Michael climbs 8m up a rock-climbing wall, calculate the gravitational potential energy he will have gained when he reaches the top of the wall.
2. Calculate the wavelength of sound being emitted at a frequency of 10 Hz. The speed of sound in air is 330 ms^{-1} .
3. A 5 kg mass extends a spring by 0.50 m. What is the spring constant of the spring?
4. A mass A of 6 kg moving with a velocity of 5 ms^{-1} collides with a mass B of 8 kg moving in the opposite direction at 3 ms^{-1} . Calculate the final velocity if the masses stick together on impact.
5. An object of mass 2.0 kg starts from rest and slides down a frictionless incline at an angle of 30° to the horizontal. If it slides 2.5 m down the plane, what will be its velocity?
6. What is the resistance of a 240 V, 100 W light bulb?
7. The time taken for a neutron to travel 6 m in a straight line is 0.3 m s. If a neutron has a mass of $5 \times 10^{-26} \text{ kg}$, calculate its kinetic energy.
8. A runner of mass 50 kg accidentally collides with a lamp-post. If he was traveling at 55 kmh^{-1} and took 0.6s to come to rest, what was the average force exerted by the lamp-post during the collision?
9. Emma decides to take her new jet-ski for a trial run. She moves in a circle around the lake taking 4 minutes to complete each circuit. The diameter of the circle is 510 m. Calculate the size of Emma's linear velocity.
10. Ryan jumps his jet-ski off waves leaving the water with a linear velocity of 12 ms^{-1} at an angle of 14 degrees relative to the surface of the water. What is the horizontal component of the jetski's velocity?
11. A cube of quartz is immersed in a container of alcohol. The absolute refractive indices are: quartz (1.54), alcohol (1.36). A ray of light is shone into the container of alcohol so that it strikes one face of the quartz cube at an angle of incidence of 33° . Calculate the angle of refraction of the ray as it passes into the quartz cube.
12. If light travels at $3.0 \times 10^8 \text{ ms}^{-1}$ in a vacuum, calculate the speed of light in alcohol. The absolute refractive index of alcohol is 1.36.