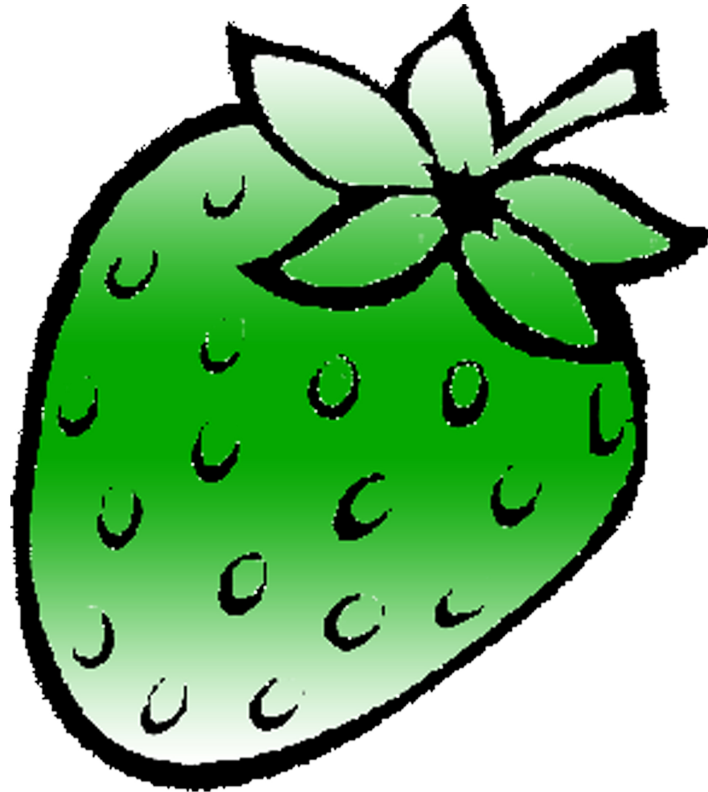


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SIMPLE HARMONIC MOTION

1. The piston of steam engine moves with simple harmonic motion. The crank rotate 3s at 120 rpm and the stroke length is 2 metres. Find the velocity and acceleration of the piston, when it is at a distance of 0.75 metre from the centre.
Ans: $a = 118.4 \text{ m/s}^2$
2. A body moving with simple harmonic motion, has an amplitude of 1 meter and the period of complete oscillation is 2 seconds. What will be the velocity and acceleration of the body after 0.4 second from the extreme position?
Ans: $a = 9.38 \text{ m/s}^2$
3. Find amplitude and time period of a particle moving with simple harmonic motion, which has a velocity of 9m/s at the distance of 2m and 3m respectively from the centre.
Ans: $t = 1.75 \text{ s}$
4. In s system the amplitude of the motion is 5 m and the time is 4 seconds. Find the time required by the particle in passing between points which are at distances of 4 m and 2 m from the centre of force and are on the same side of it.
Ans: $t = 0.33 \text{ s}$
5. A body performing simple harmonic motion has a velocity of 12 m/s when the displacement is 50 mm, and 3 m/s when the displacement is 100 mm, the displacement being measured from the mid-point. Calculate the frequency and amplitude of the motion. What is the acceleration when the displacement is 75 mm?
Ans: $a = 1332.6 \text{ m/s}^2$
6. A particle moving with simple harmonic motion has an acceleration of 6 m/s² at a distance of 1.5 m from the centre of oscillation. Find the time period of the oscillation.
Ans: $a = 1332.6 \text{ m/s}^2$
7. A body weighing 150 N moves with simple harmonic motion. The velocity and acceleration of the body when it is 200 mm from the centre of oscillation are 5 m/s and 20 m/s² respectively. Determine (a) amplitude of motion and, (b) no. of vibrations per minute.
Ans: 539mm, 95.5
8. A particle moves with simple harmonic motion. When the particle is 0.75 m from the mid-path, its velocity is 11 m/s and when 2 m from the mid-path its velocity is 3 m/s. Find the angular velocity, periodic time and its maximum acceleration.
Ans: $a = 1332.6 \text{ m/s}^2$
9. A particle moving with simple harmonic motion, has a velocity of 20 m/s at its central position. If the particle makes two oscillations per second, find (i) amplitude of motion and (ii) velocity at 1/4th distance of the amplitude.
Ans 1.59 m, 19.35 m/s