NEET Physics Crash Course
## Worksheet onNewton's Laws and Friction

Name:
Email id:

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1. A curved road is banked at an angle $\theta = 30^0$. The radius of curvature is 20 m. Assuming no friction, what is the speed of a vehicle that can safely negotiate the curve?

2. A spring is cut into three parts in the length ratio 1:2:3. When they are connected in series the spring constant is k'. When they are connected in parallel, the spring constant of the assembly is k''. The ratio k' / k'' is:

   a) 1: 1   b) 1: 3   c) 1:11   d) 1:12

3. A particle moves so that its position vector is given by **r** = cos ωt**i** + sin ωt**j** , where ω is a constant. Which of the following is true?

   a) velocity and acceleration are both parallel to **r**.
   b) Velocity is perpendicular to **r** and acceleration is directed toward the origin.
   c) Velocity is perpendicular to **r** and acceleration is directed away from the origin.
   d) velocity and acceleration are both perpendicular to **r**

4. Two blocks of masses 3m and m are connected by a massless string. They hang by a massless spring as shown.

   The magnitudes of the accelerations of A and B are respectively, immediately after the string is cut are

   a) g , g/3   b) g/3, g
   c) g, g   d) g/3, g/3

A   3m

B   m

5. A 5000 kg rocket is set for vertical firing. The exhaust speed is 800 m/s. To give an initial acceleration of 20 m/s^2, the amount of gases ejected per second should be

   a) 127.5 kg/s   b) 187.5 kg/s   c) 185.5 kg/s   d) 137.5 kg/s
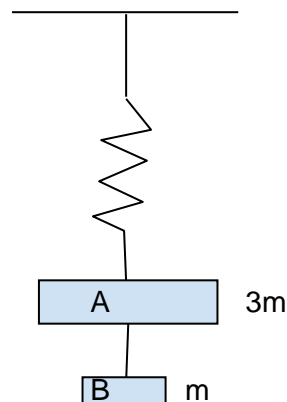
6. In the given figure, a = 15 m/s² is the total acceleration of a particle moving in the clockwise direction in a circle of radius R = 2.5 m at a given instant of time. The speed of the particle is
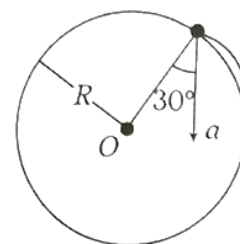
   a) 4.5 m/s   b) 5.0 m/s   c) 5.7 m/s   d) 6.2 m/s

7. The force on a rocket is 210 N. This thrust is generated by ejecting fuel from the rocket with a velocity of 300 m/s with respect to the rocket. The rate of consumption of fuel is

   a) 0.7 kg/s   b) 1.4 kg/s   c) 0.07 kg/s   d) 10.7 kg/s

8. What will be the maximum speed of a car on a road turn of radius R = 30m if the coefficient of friction between the tyres and the road is 0.4? [g = 9.8 m/s²]

   a) 10.84 m/s   b) 9.84 m/s   c) 8.84 m/s   d) 6.84 m/s

9. The dimensions of the Universal gravitational constant are:

   a) $[M^{-1} L^3 \ T^{-2}]$ b) $[M L^2 \ T^{-1}]$ c) $[M^{-2} L^3 \ T^{-2}]$ d) $[M^{-2} L^2 \ T^{-1}]$

10. A body under the action of the force **F** = 6**i** -8**j** + 10**k** acquires an acceleration of 1 m/s² . The mass of the body must be

   a) $2\sqrt{10} \ kg$ b) 10 kg   c) 20 kg   d) $10\sqrt{2} \ kg$