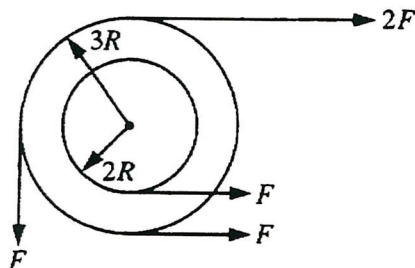


4. The position of a toy locomotive moving on a straight track along the  $x$ -axis is given by the equation  $x = t^3 - 6t^2 + 9t$ , where  $x$  is in meters and  $t$  is in seconds. The net force on the locomotive is equal to zero when  $t$  is equal to

- (A) zero  
 (B) 2 s  
 (C) 3 s  
 (D) 4 s  
 (E) 5 s



5. A system of two wheels fixed to each other is free to rotate about a frictionless axis through the common center of the wheels and perpendicular to the page. Four forces are exerted tangentially to the rims of the wheels, as shown above. The magnitude of the net torque on the system about the axis is

- (A) zero  
 (B)  $FR$   
 (C)  $2FR$   
 (D)  $5FR$   
 (E)  $14FR$

6. A wheel of mass  $M$  and radius  $R$  rolls on a level surface without slipping. If the angular velocity of the wheel is  $\omega$ , what is its linear momentum?

- (A)  $M\omega R$   
 (B)  $M\omega^2 R$   
 (C)  $M\omega R^2$   
 (D)  $\frac{M\omega^2 R^2}{2}$   
 (E) Zero