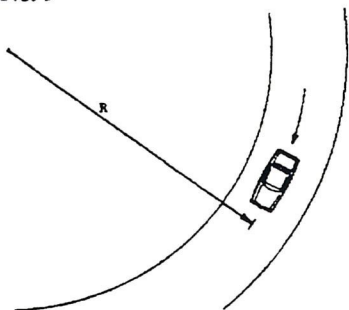


No. 8

A cart of mass 5.0 kg is moving horizontally in a straight line at 6.0 m/s. In order to change its speed to 10.0 meters per second, the work done on the cart must be

- (A) 40 joules (B) 90 joules (C) 160 joules  
(D) 400 joules (E) 550 joules

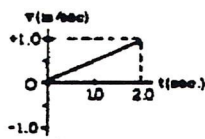
No. 9



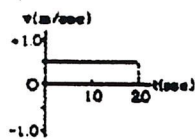
An automobile of mass  $m$  is proceeding around a highway curve of 20 meter radius. The surface of the roadway is horizontal, and the coefficient of friction between the tires and the roadway is 0.50. The maximum speed with which the car can round the curve without slipping is

- (A) 4 m/s (B) 6 m/s (C) 8 m/s  
(D) 10 m/s (E) 12 m/s

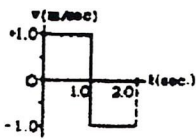
Questions 10 - 12 relate to five particles that start at  $x = 0$  at  $t = 0$  and move in one dimension independently of one another. Graphs of the velocity of each particle versus time are shown below.



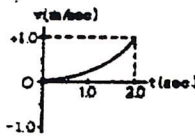
Particle A



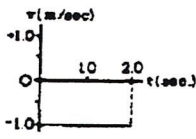
Particle B



Particle C



Particle D



Particle E

No. 10

Which particle is farthest from the origin at 2 seconds?

- (A) A (B) B (C) C (D) D (E) E

No. 11

Which particle moves with a constant nonzero acceleration?

- (A) A (B) B (C) C (D) D (E) E

No. 12

Which particle is in its initial position at  $t = 2$  seconds?

- (A) A (B) B (C) C (D) D (E) E

No. 13

A flywheel rotating at 12 revolutions per second can be brought to rest in 6.0 seconds. The average angular acceleration during this time interval is equal in magnitude to

- (A)  $\frac{1}{\pi} \text{ rad/s}^2$  (B)  $2 \text{ rad/s}^2$  (C)  $4 \text{ rad/s}^2$   
(D)  $4\pi \text{ rad/s}^2$  (E)  $72 \text{ rad/s}^2$

No. 14



A cart of mass  $2m$  has a velocity  $v_0$  before it strikes another cart of mass  $3m$  at rest. The two carts couple and move off together with a velocity

- (A)  $\frac{v_0}{5}$  (B)  $\frac{2v_0}{5}$  (C)  $\frac{3v_0}{5}$   
(D)  $\sqrt{\frac{2}{5}} v_0$  (E)  $\frac{2v_0}{3}$

No. 15

When a certain rubber band is stretched a distance  $x$ , it exerts a restoring force of magnitude  $F = ax + bx^2$ . The work done by an outside agent in changing the stretch from  $x = 0$  to  $x = d$  is

- (A)  $(ax + bx^2)d$  (B)  $a + 2bx$  (C)  $a + 2bd$   
(D)  $\frac{ax^2}{2} + \frac{bx^3}{3}$  (E)  $\frac{ad^2}{2} + \frac{bd^3}{3}$