Circle the correct or nearest item in each of the following: (10% each)

1. At the instant shown, the accelerations of the blocks $A$ and $B$ in the system are $a_A = 2 \text{ m/s}^2 \downarrow$ and $a_B = 3 \text{ m/s}^2 \uparrow$, respectively. The acceleration of the block $C$ is
   (a) $2 \text{ m/s}^2 \uparrow$. (b) $2 \text{ m/s}^2 \downarrow$. (c) $6 \text{ m/s}^2 \uparrow$. (d) $8 \text{ m/s}^2 \uparrow$. (e) $8 \text{ m/s}^2 \downarrow$. 

2. The velocity of a particle in rectilinear motion is shown. The total distance traveled by the particle during $0 \leq t \leq 13$ s is
   (a) 12 ft. (b) 16 ft. (c) 32 ft. (d) 36 ft. (e) 40 ft.

3. The velocity of a particle in rectilinear motion is shown. It is known that the initial position of the particle is $x_0 = 15$ ft. The time $t_1$ at which the particle passes through the origin is
   (a) 5.94 s. (b) 5.78 s. (c) 5.63 s. (d) 5.49 s. (e) 5.34 s.

4. A spacecraft revolves around the earth as shown. The period of orbit of the spacecraft is
   (a) 1.583 h. (b) 1.597 h. (c) 1.611 h. (d) 1.625 h. (e) 1.639 h.

5. A spacecraft revolves around the earth as shown. The minimum speed of the spacecraft in its orbit is
   (a) 4.45 mi/s. (b) 4.49 mi/s. (c) 4.52 mi/s. (d) 4.56 mi/s. (e) 4.60 mi/s.
Circle the correct or nearest item in each of the following: (10% each)

6. The 10-kg unbalanced wheel has a central radius of gyration \( k = 240 \text{ mm} \) about \( G \) and rolls without slipping with \( \omega_1 = 7.5 \text{ rad/s} \) in the position shown, where \( r = 480 \text{ mm} \) and \( b = 140 \text{ mm} \). When \( G \) is directly to the left of \( C \), the angular velocity \( \omega_2 \) of the wheel is
   
   (a) 4.77 rad/s   (b) 5.21 rad/s   (c) 5.63 rad/s   (d) 6.06 rad/s   (e) 6.47 rad/s.

![Fig. P6 & P7](image1)

![Fig. P8 & P9](image2)

![Fig. 10](image3)

7. Refer to Prob. 6. When \( G \) is directly to the left of \( C \), the angular acceleration \( \alpha \) of the unbalanced wheel is
   
   (a) 12.48 rad/s^2   (b) 11.40 rad/s^2   (c) 10.39 rad/s^2   (d) 9.43 rad/s^2   (e) 8.54 rad/s^2.

8. A section of pipe weighing 96.6 lb rolls without slipping with angular velocity \( \omega_1 \) just before falling into the 16-in. gap. Assume that the impact is perfectly plastic and the angular speed of the pipe after having crossed the gap is \( \omega_2 = 2.2 \text{ rad/s} \). The angular speed \( \omega' \) of the pipe just after impact is
   
   (a) 2.99 rad/s   (b) 2.90 rad/s   (c) 2.82 rad/s   (d) 2.74 rad/s   (e) 2.66 rad/s.

9. Refer to Prob. 8. the angular speed \( \omega \) of the pipe just before impact is
   
   (a) 3.52 rad/s   (b) 3.62 rad/s   (c) 3.73 rad/s   (d) 3.84 rad/s   (e) 3.95 rad/s.

10. If \( \alpha_{OA} = 1.2 \text{ rad/s}^2 \) just after the release from rest in the position shown, the length \( L \) of each slender rod of weight \( W \) is
    
    (a) 3.48 ft   (b) 3.73 ft   (c) 4.02 ft   (d) 4.35 ft   (e) 4.75 ft.