



9. A piece of wire of uniform cross section is bent in the shape shown above. What are the coordinates  $(\bar{x}, \bar{y})$  of the center of mass?

|     | $\bar{x}$ | $\bar{y}$ |
|-----|-----------|-----------|
| (A) | 15/14     | 6/7       |
| (B) | 6/7       | 6/7       |
| (C) | 15/14     | 8/7       |
| (D) | 1         | 1         |
| (E) | 1         | 6/7       |

10. A projectile is fired from the surface of the Earth with a speed of 200 meters per second at an angle of  $30^\circ$  above the horizontal. If the ground is level, what is the maximum height reached by the projectile?

- (A) 5 m  
 (B) 10 m  
 (C) 500 m  
 (D) 1,000 m  
 (E) 2,000 m

11. A particle moves along the  $x$ -axis with a non-constant acceleration described by  $a = 12t$ , where  $a$  is in meters per second squared and  $t$  is in seconds. If the particle starts from rest so that its speed  $v$  and position  $x$  are zero when  $t = 0$ , where is it located when  $t = 2$  seconds?

- (A)  $x = 12$  m  
 (B)  $x = 16$  m  
 (C)  $x = 24$  m  
 (D)  $x = 32$  m  
 (E)  $x = 48$  m

12. A figure skater is spinning on frictionless ice with her arms fully extended horizontally. She then drops her arms to her sides. Which of the following correctly describes her rotational kinetic energy and angular momentum as her arms fall?

|     | <u>Rotational Kinetic Energy</u> | <u>Angular Momentum</u> |
|-----|----------------------------------|-------------------------|
| (A) | Remains constant                 | Remains constant        |
| (B) | Decreases                        | Increases               |
| (C) | Decreases                        | Decreases               |
| (D) | Increases                        | Decreases               |
| (E) | Increases                        | Remains constant        |