

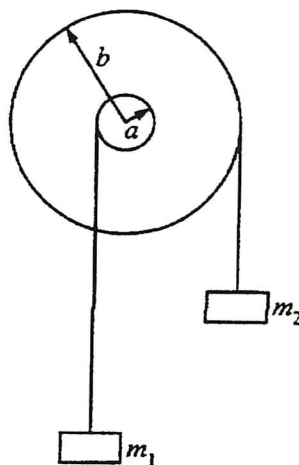
26. A target T lies flat on the ground 3 m from the side of a building that is 10 m tall, as shown above. A student rolls a ball off the horizontal roof of the building in the direction of the target. Air resistance is negligible. The horizontal speed with which the ball must leave the roof if it is to strike the target is most nearly
- (A) $\frac{3}{10}$ m/s
 (B) $\sqrt{2}$ m/s
 (C) $\frac{3}{\sqrt{2}}$ m/s
 (D) 3 m/s
 (E) $10\sqrt{\frac{5}{3}}$ m/s
27. To stretch a certain nonlinear spring by an amount x requires a force F given by $F = 40x - 6x^2$, where F is in newtons and x is in meters. What is the change in potential energy when the spring is stretched 2 meters from its equilibrium position?
- (A) 16 J
 (B) 28 J
 (C) 56 J
 (D) 64 J
 (E) 80 J
28. When a block slides a certain distance down an incline, the work done by gravity is 300 J. What is the work done by gravity if this block slides the same distance up the incline?
- (A) 300 J
 (B) Zero
 (C) -300 J
 (D) It cannot be determined without knowing the distance the block slides.
 (E) It cannot be determined without knowing the coefficient of friction.

29. A particle moves in the xy -plane with coordinates given by

$$x = A \cos \omega t \text{ and } y = A \sin \omega t,$$

where $A = 1.5$ meters and $\omega = 2.0$ radians per second. What is the magnitude of the particle's acceleration?

- (A) Zero
 (B) 1.3 m/s^2
 (C) 3.0 m/s^2
 (D) 4.5 m/s^2
 (E) 6.0 m/s^2



30. For the wheel-and-axle system shown above, which of the following expresses the condition required for the system to be in static equilibrium?
- (A) $m_1 = m_2$
 (B) $am_1 = bm_2$
 (C) $am_2 = bm_1$
 (D) $a^2m_1 = b^2m_2$
 (E) $b^2m_1 = a^2m_2$