1. A bowling ball was dropped from the same height and at the same time that a softball was thrown horizontally. Neglecting air resistance, which statement is true?

   A The bowling ball hit the ground first.

   B The softball hit the ground first.

   C The bowling ball and softball hit the ground at the same time.

   D The bowling ball fell faster than the softball.

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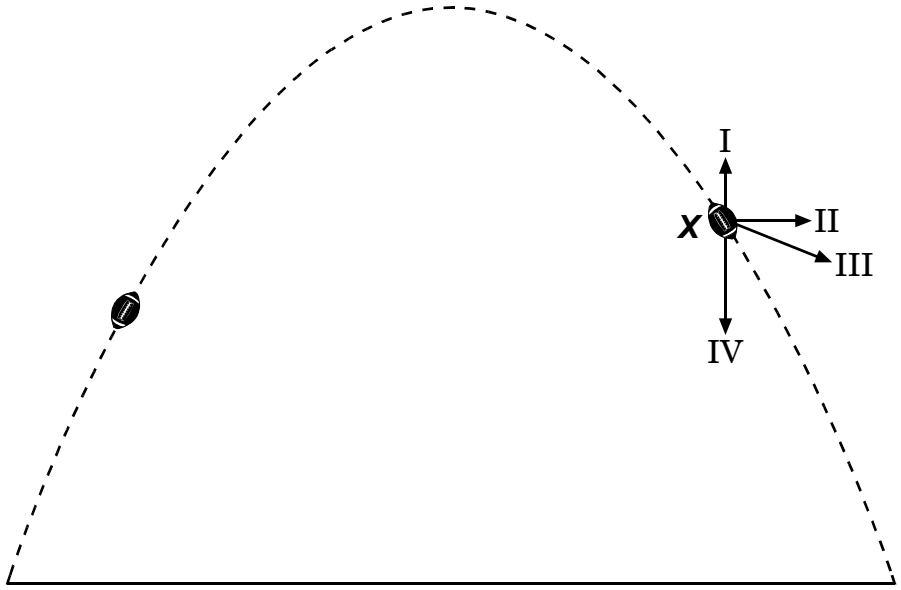
2. The path of a kicked football is shown in the diagram. The dashed line shows the path of the ball if the air resistance is neglected. Point ***X*** is a point along the path.



   Which arrow points in the direction of the acceleration?

   A I

   B II

   C III

   D IV

3. A baseball is thrown across a field. Neglecting air resistance, which ***best*** describes the horizontal components of the ball's velocity and acceleration while it is in the air?

   A Velocity is constant; acceleration is decreasing.

   B Velocity is constant; acceleration is constant.

   C Velocity is decreasing; acceleration is decreasing.

   D Velocity is increasing; acceleration is constant.

---

4. A 0.15-kg object is projected vertically into the air with a velocity of 30. m/s. How high above the ground is the object after 3.3 seconds?

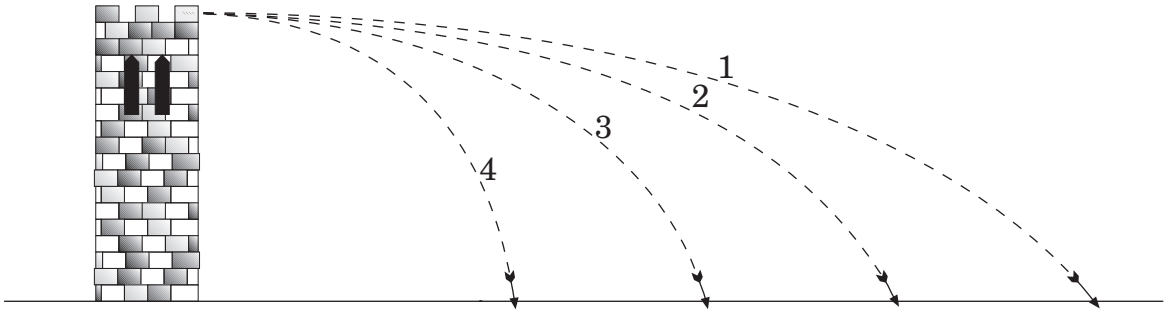
   A 46 m

   B 53 m

   C 110 m

   D 150 m

5. Four arrows are shot horizontally from the top of a tower, as shown below.



Which path represents the arrows with the ***greatest*** horizontal velocity?

A 1

B 2

C 3

D 4

---

6. A ball is thrown horizontally. Which factor will increase the flight time of the ball?

A increasing the vertical height from which the ball is thrown

B increasing the horizontal velocity of the ball

C decreasing the horizontal velocity of the ball

D decreasing the vertical height from which the ball is thrown

7. A ball is thrown with a velocity of 17.6 m/s at an angle of 40.0° to the horizontal. What horizontal distance measured along the ground does the ball travel before striking the ground?

   A 15.6 m

   B 20.3 m

   C 31.2 m

   D 40.6 m

8. A projectile was launched horizontally with a velocity of 468 m/s, 1.86 m above the ground. How long did it take the projectile to hit the ground?

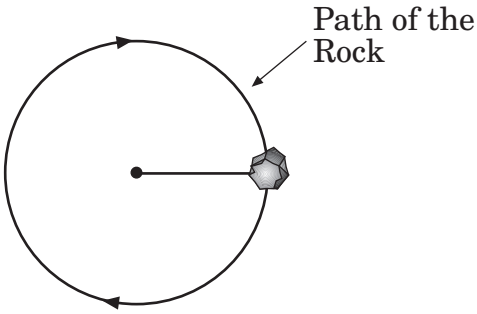
   A 0.308 s

   B 0.380 s

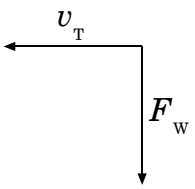
   C 0.616 s

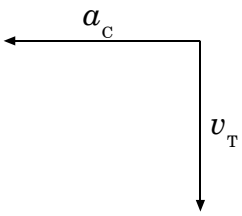
   D 1.32 s

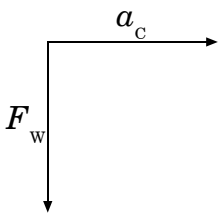
9. A rock is tied to a string and swung in a clockwise, vertical circle.

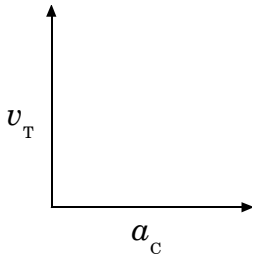


When the rock is at the position shown, which of the following indicates the direction of v_T (tangential velocity), a_C (centripetal acceleration), and/or F_W (weight)?

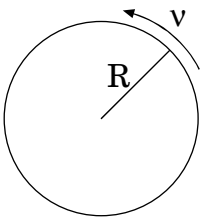
A


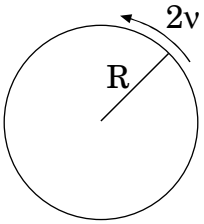
B


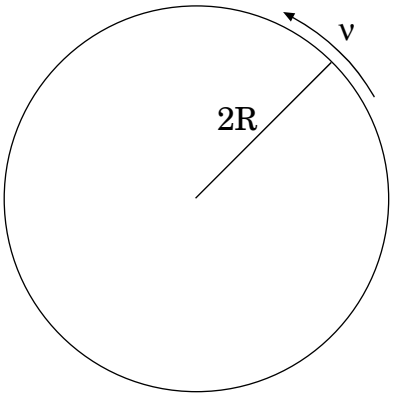
C


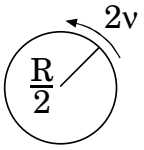
D


10. Which represents the ***greatest*** centripetal acceleration?

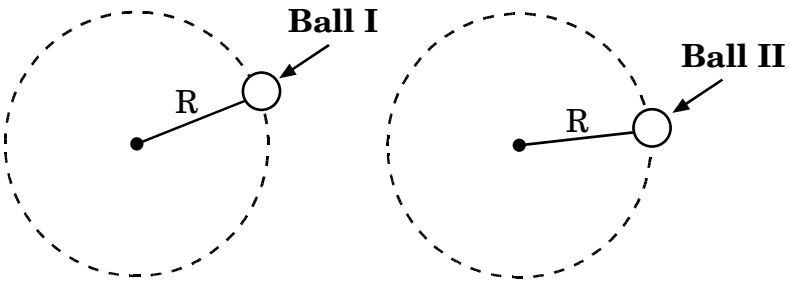
A


B


C


D


11. Ball II has twice the mass of Ball I, and both are moving in circles of equal radii at the same speed.



How do the net forces of Ball I and Ball II compare?

A $F_I = 4F_{II}$

B $F_I = 2F_{II}$

C $F_{II} = 4F_I$

D $F_{II} = 2F_I$

End of Goal 3 Sample Items

EOC Physics Goal 3
Sample Items Key Report

1 **Objective: 3.01**
Analyze and evaluate projectile motion in a defined frame of reference.
Thinking Skill: Integrating **Correct Answer:** C

2 **Objective: 3.01**
Analyze and evaluate projectile motion in a defined frame of reference.
Thinking Skill: Analyzing **Correct Answer:** D

3 **Objective: 3.02**
Design and conduct investigations of two-dimensional motion of objects.
Thinking Skill: Knowledge **Correct Answer:** B

4 **Objective: 3.02**
Design and conduct investigations of two-dimensional motion of objects.
Thinking Skill: Applying **Correct Answer:** A

5 **Objective: 3.02**
Design and conduct investigations of two-dimensional motion of objects.
Thinking Skill: Analyzing **Correct Answer:** A

6 **Objective: 3.02**
Design and conduct investigations of two-dimensional motion of objects.
Thinking Skill: Integrating **Correct Answer:** A

7 **Objective: 3.03**
Analyze and evaluate independence of the vector components of projectile motion.
Thinking Skill: Applying **Correct Answer:** C

8 **Objective: 3.03**
Analyze and evaluate independence of the vector components of projectile motion.
Thinking Skill: Applying **Correct Answer:** C

9 **Objective: 3.04**
Evaluate, measure, and analyze circular motion.
Thinking Skill: Analyzing **Correct Answer:** B

10 **Objective: 3.04**
Evaluate, measure, and analyze circular motion.
Thinking Skill: Analyzing **Correct Answer:** D

11 **Objective: 3.06a**
Investigate, evaluate and analyze the relationship among:
a. Centripetal force.
Thinking Skill: Analyzing **Correct Answer:** D