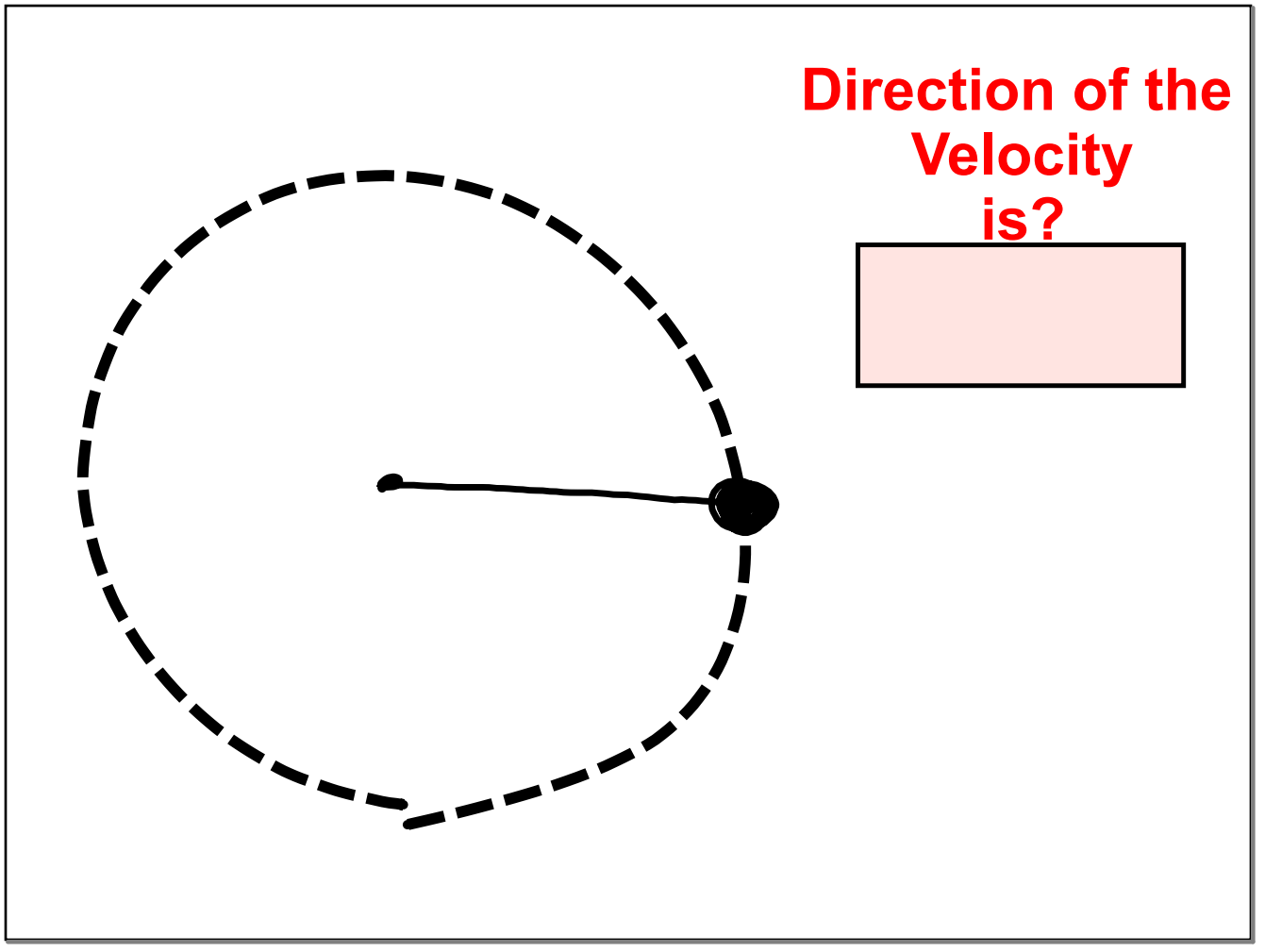
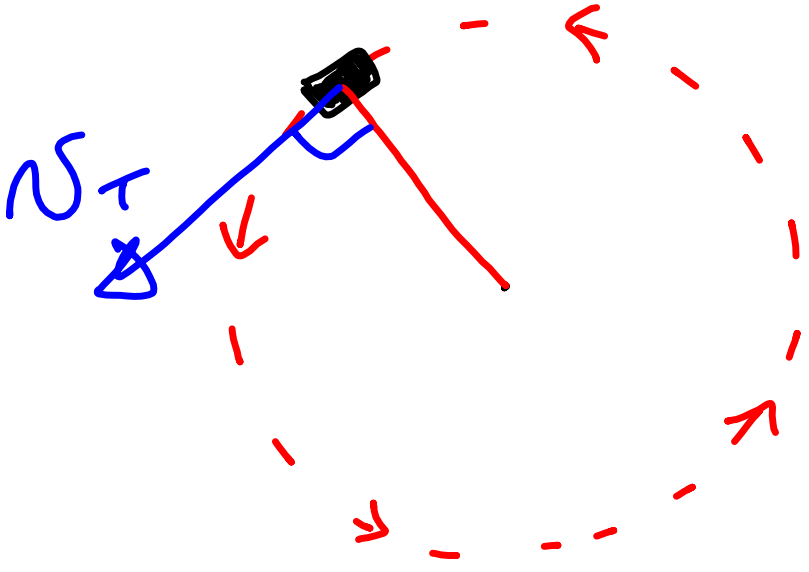
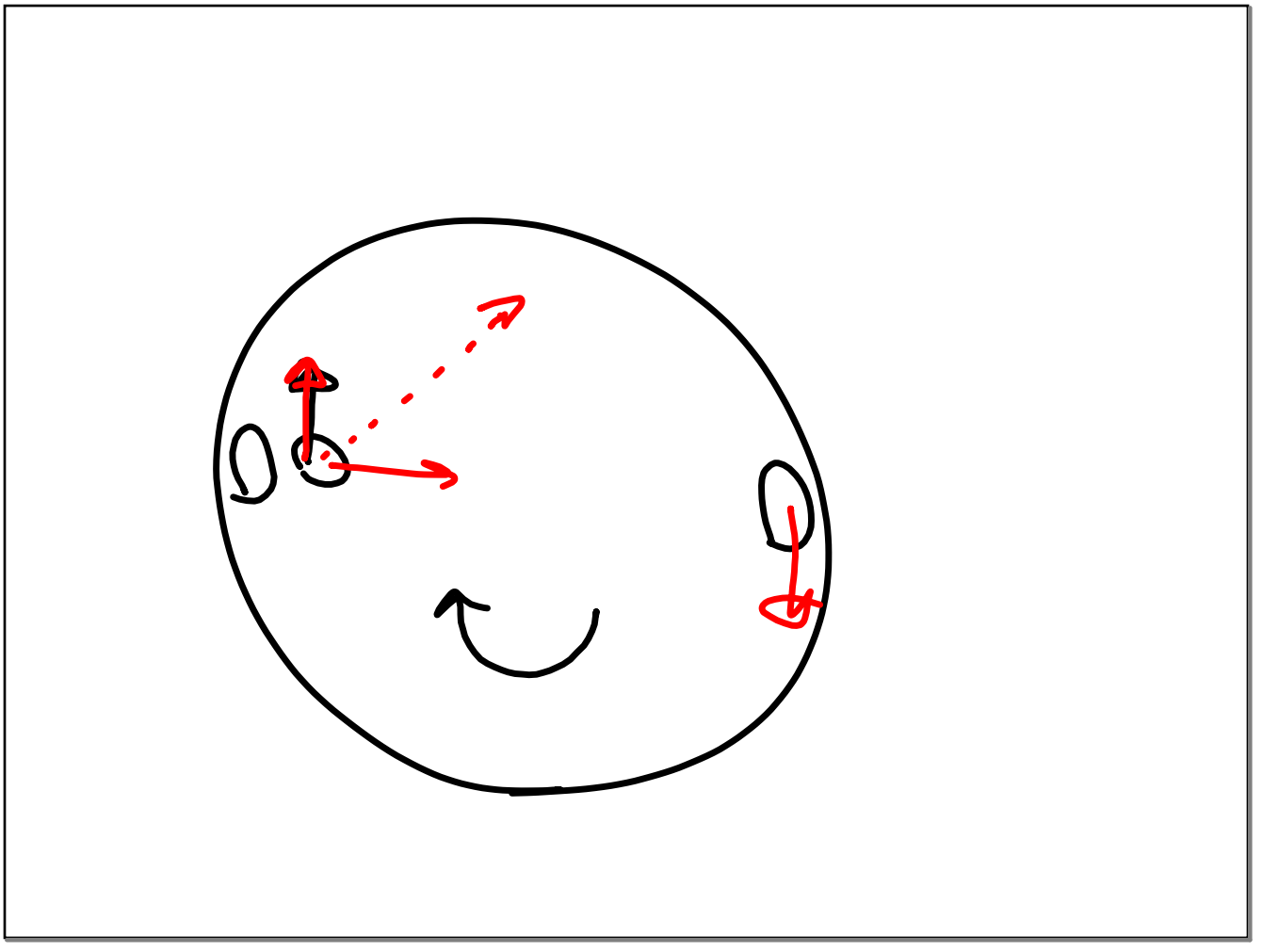

Direction of the Velocity is?

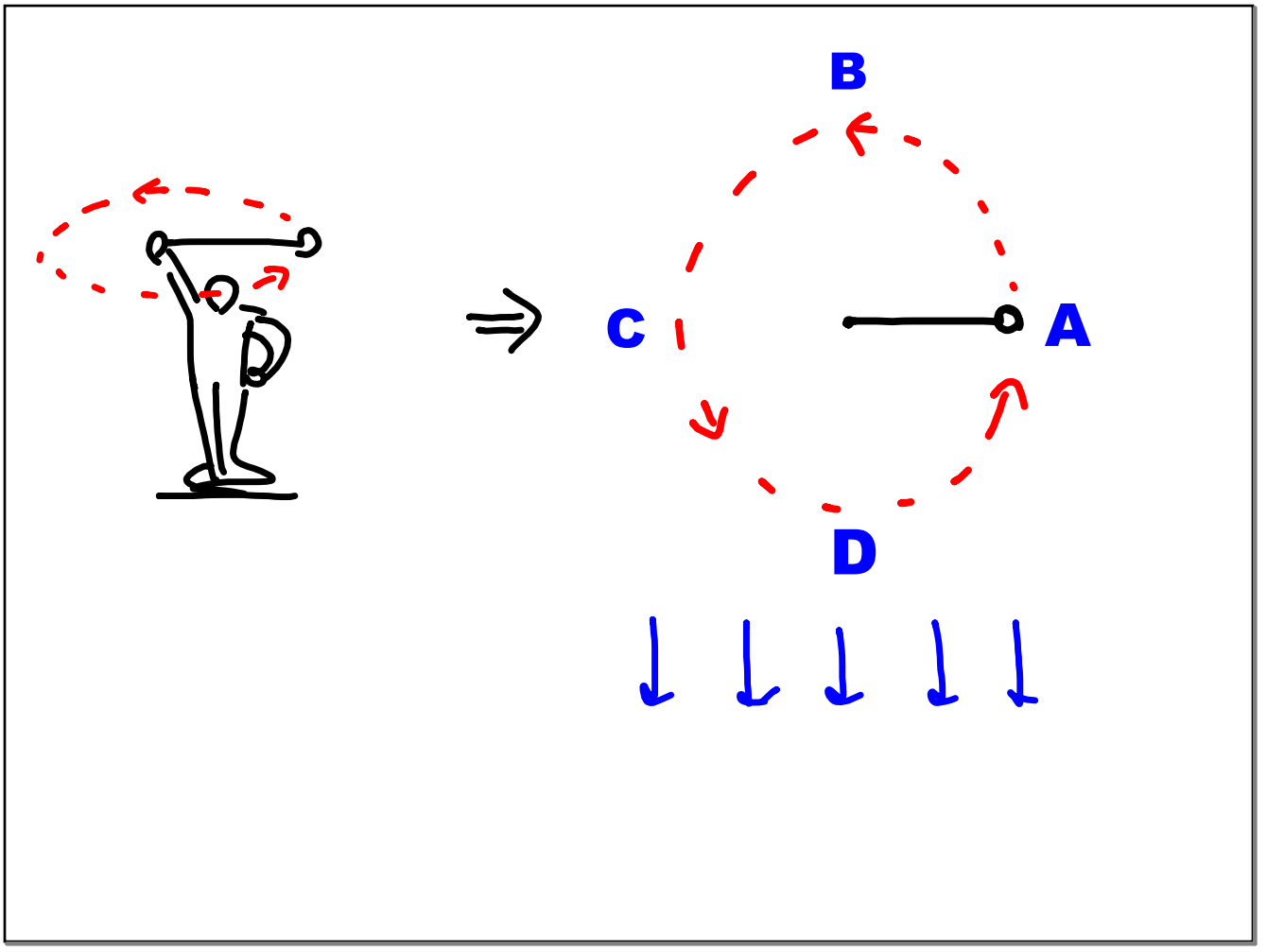
Which way does it go when released?

tangent

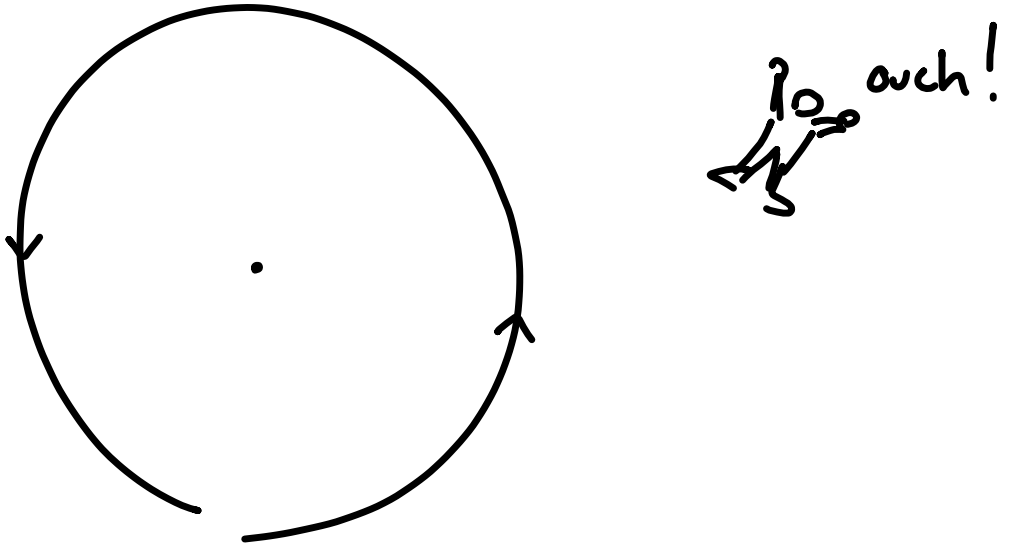


V_T = tangential velocity




B
C
A
D

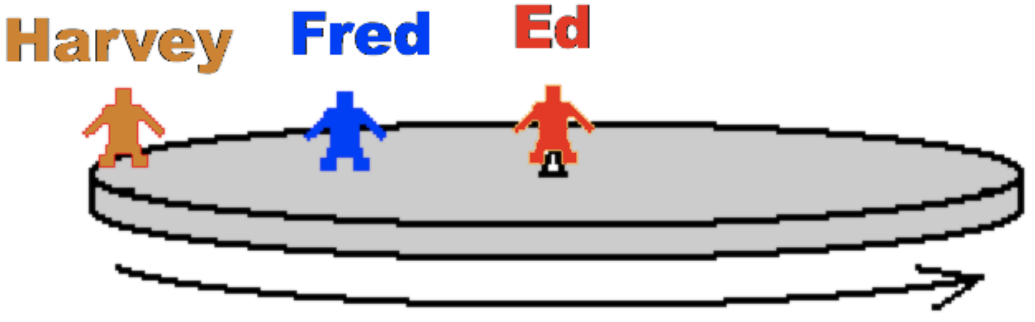
Where did he leave the circle?



Who has the largest angular velocity

Who has the largest actual velocity?

Who really has no actual velocity?



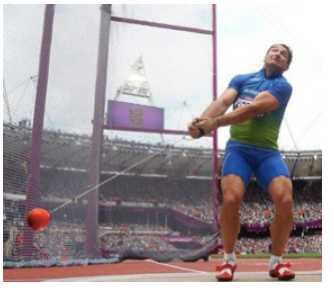
Which is which?

Hammer Throw World Record

86.74 m (284 ft 6 in)	Yuriy Sedykh	Soviet Union	Stuttgart, West Germany	August 30, 1986

Shot Put World Record

23.12 m	Randy Barnes (USA)	20 May 1990	Los Angeles, U.S.[1]

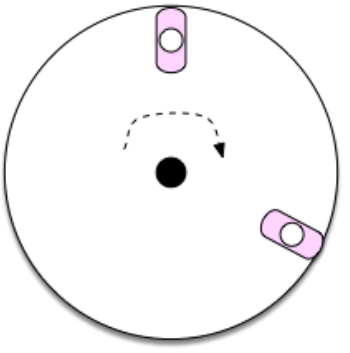


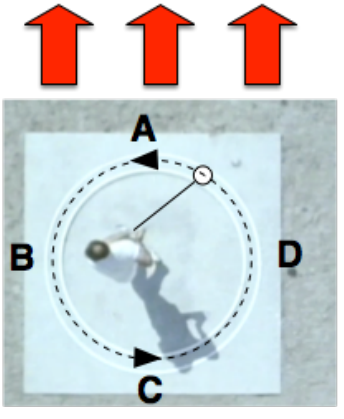
V_T depends on 2 things...

- Spin rate (angular velocity)
- How far out (radius)

1. Tangential Velocity - Direction

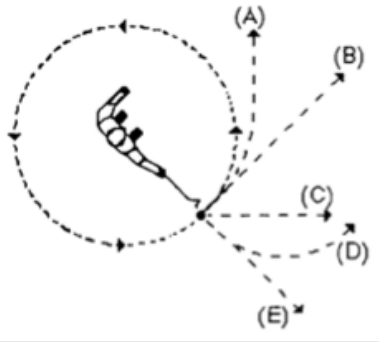
1. At right is the top view of a playground merry-go-round. if the person were to fall off at the moments shown, draw tangent arrows to show her path.

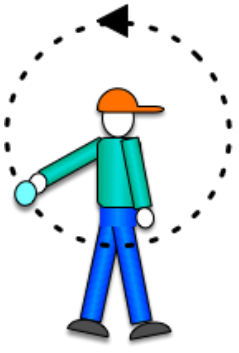




2. The red arrows show which way the hammer thrower is supposed to throw the hammer. At which point should he release it - when the ball gets to A, B, C or D?

3. A heavy ball is attached to a string and swung in a circular path as shown in the diagram. At the point shown, the string suddenly breaks. Which path is the one the ball will actually follow - A, B, C, D, or E?





4. (Tricky!) Softball pitchers move the ball around in a circular motion before releasing the ball. Draw an arrow to show the tangential velocity at the point should the pitcher release the ball to get maximum Range.

1. Tangential Velocity - Direction

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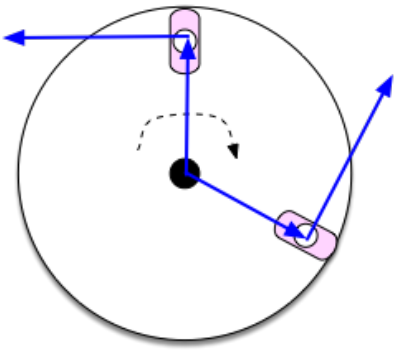
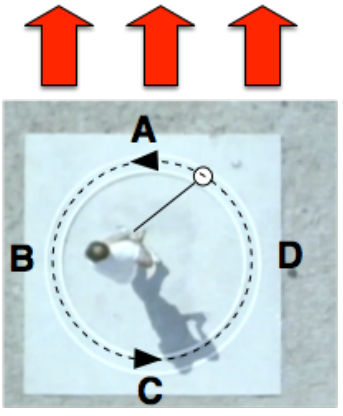


Draw a radius line. Tangential velocity is perpendicular.



2. The red arrows show which way the hammer thrower is supposed to throw the hammer. At which point should he release it - when the ball gets to A, B, C or D?

D

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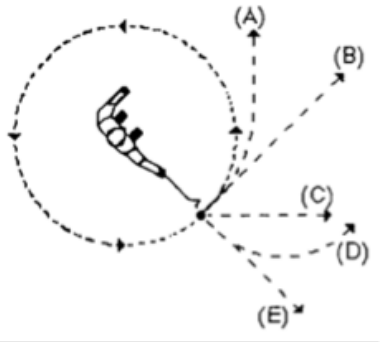
B



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45° gives the best range.

2. Angular vs Tangential Velocity

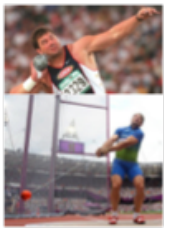
1. On the Swings, some riders are closer to the center of the circle than others.

a) Who has the greater angular velocity (rad/s)?

☐ Inner riders ☐ Outer riders ☐ It's the same.

b) Who has the tangential velocity (m/s)?

☐ Inner riders ☐ Outer riders ☐ It's the same.

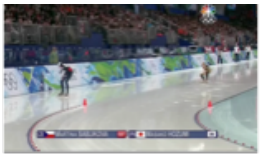


2. In the Shot Put (top) and the Hammer Throw (bottom), the projectiles have almost exactly the same mass.

Which sport has the farther throws?

☐ Shotput ☐ Hammer Throw ☐ It's the same.

WHY??



3. Why does the outer skater have a head start?

4. As the Earth spins…

a) Where is the greater **angular** velocity?
☐ At the Equator ☐ At the Poles ☐ It's the same

b) Where is the greater **tangential** velocity?
☐ At the Equator ☐ At the Poles ☐ It's the same

c) Where is there ZERO **tangential** velocity?
☐ At the Equator ☐ At the Poles ☐ It's the same

5. Wait! They are all moving differently? What would happen if someone with super strength at the North Pole threw a ball to someone at the equator. Would it get to them?? What would happen?

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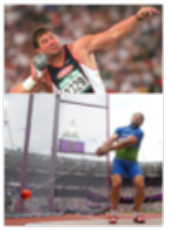

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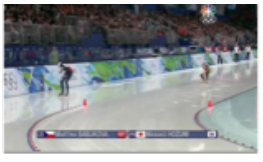
WHY??

Farther out is more - the hammer has a greater radius and therefore a greater tangential velocity



3. Why does the outer skater have a head start?

Farther out is more - the outer skater would travel a larger distance going around the same circle, so they'll need a head start.

4. As the Earth spins…

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☐ At the Equator ☐ At the Poles ☒ It's the same

b) Where is the greater **tangential** velocity?
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Tricky!