NAME _____   DATE _____

Scenario

A doughnut-shaped space station is built far away from the gravitational fields of Earth and other massive bodies. For the comfort and safety of the astronauts, the space station is rotated to create an artificial internal gravity. The rotation speed is such that the apparent acceleration due to gravity at the outer surface is 9.8 m/s^2. The space station rotates clockwise.
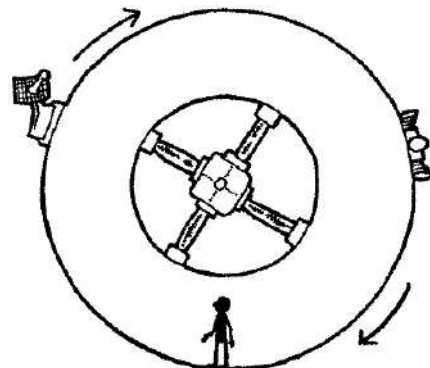
Using Representations

PART A: On the image at right, sketch and label vectors that represent the astronaut's velocity and acceleration.

PART B: The dot at right represents the astronaut standing in the space station. Draw a free-body diagram showing and labeling the forces (not components) exerted on the astronaut at the instant shown. Draw the relative lengths of all vectors to reflect the magnitudes of all the forces.

PART C: The astronaut drops a ball. On the following diagrams, sketch the velocity and acceleration vectors for the ball as seen by an observer outside the space station in an inertial frame of reference. These are NOT free-body diagrams.
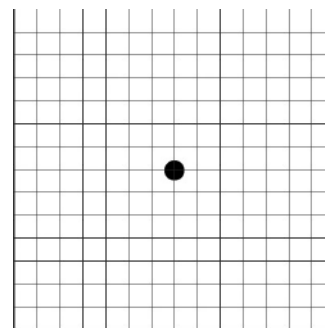
After the ball is released and before it hits the floor

After the ball hits the floor
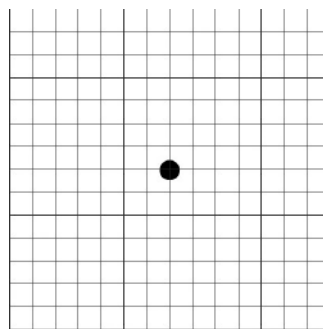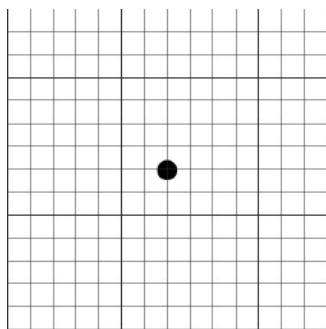
PART D: From the point of view of a person watching from outside the space station, what does the path of the ball look like?

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PART E: From the point of view of the astronaut inside the space station, what does the path of the ball look like?

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