

Question 20 (3 marks)

A student is investigating inertial and non-inertial frames of reference. The student carries out a series of activities on a boat floating on a large, calm lake. The boat remained level during these activities.

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Each activity and the student's observed results are recorded in the table.

<i>Activity</i>	<i>Observation</i>
Dropped a ball from a set height	Ball fell vertically with increasing velocity
Rolled a ball from one side of the boat to the other	Ball rolled across the floor with a constant velocity
Rolled a ball from the back of the boat towards the front of the boat	Ball rolled across the floor with a constant velocity

Justify the student's conclusion that: 'The boat can be regarded as an inertial frame of reference'.

When the ball was dropped, it fell vertically therefore there were no forces pulling it forward or pushing it back. Therefore the boat is not accelerating. Since the ball rolled across the floor with constant velocity, the boat is not accelerating in either direction - forward or back.

Since an inertial frame is a frame at constant velocity or at rest - that is, not accelerating, the boat can be considered to be an inertial frame of reference.