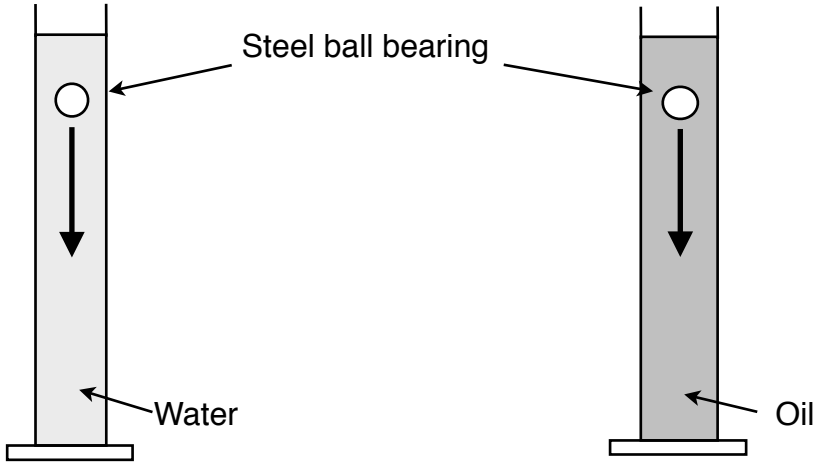
1 A student does an experiment to investigate a steel ball bearing falling through water and oil.

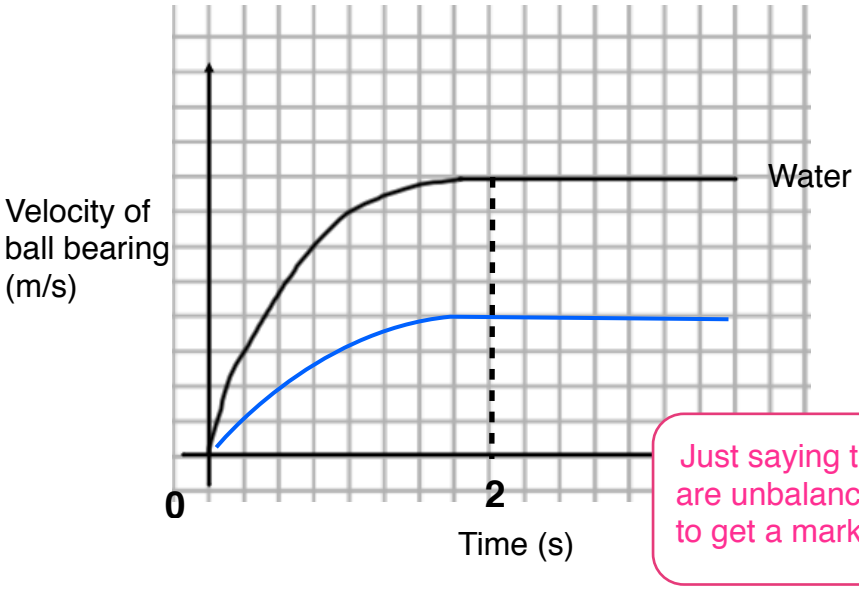


1 (a) What is the name of the downward force on each ball bearing?

Weight or gravity [1 mark]

(1 mark)

1 (b) The student obtained the following result for the motion of the ball bearing through the water, before it hit the bottom.



Just saying that the forces are unbalanced is not enough to get a mark for this question.

1 (b) (i) Explain the movement of the ball bearing between 0 and 2 seconds in terms of the forces acting on it.

Weight/gravitational force/downward force is bigger/larger [1 mark]

than the upthrust/upward force/resistance [1 mark]

(there is) a resultant force downward [1 mark]

(2 marks)

Do not write outside the box

1 (b) (ii) After 2 seconds, the ball bearing reaches terminal velocity. Describe and explain the motion of the ball bearing after it has reached terminal velocity, in terms of the forces acting on it.

Ball bearing is moving at constant/steady velocity or speed. [1 mark]

Forces are balanced. [1 mark]

Resultant force is zero OR upward force/upthrust/resistance/drag is the same as weight. [1 mark]

(3 marks)

Note that the question says 'Describe **and** explain…' that means you have to say what it is doing and why.

1 (c) Oil is a thicker liquid than water. *On the graph*, sketch a line to show the motion of the ball bearing when dropped into the oil.

Any line starting at zero and following the same pattern as the given line but below the line given (see example). [1 mark]

Your line must reach terminal velocity as shown by a flat (horizontal) part of the line.

(1 mark)

(Total 7 marks)

End of questions