A-Level Physics - Newton's Laws of Motion

1. (a) State Newton's first law of motion.

(1 mark)

(b) Newton's third law suggests that forces always occur in pairs when two objects interact.

(i) State two ways in which the forces in such a pair are identical.

(2 marks)

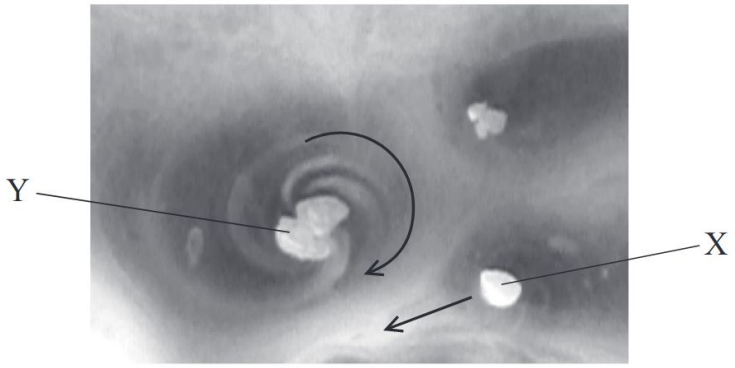
(ii) State two ways in which these forces are different.

(2 marks)

OCR A-Level Physics Paper 1, June 2016

2. Solid carbon dioxide changes state directly from solid to gas. This process is called sublimation. Solid carbon dioxide, when placed on water, will move rapidly across the surface due to jets of ejected gas.

The diagram below shows the direction of movement for two large pieces of solid carbon dioxide placed on water.



(a) When placed at rest on water, piece X begins to move rapidly in the direction shown. With reference to Newton's laws of motion, explain the motion of piece X.

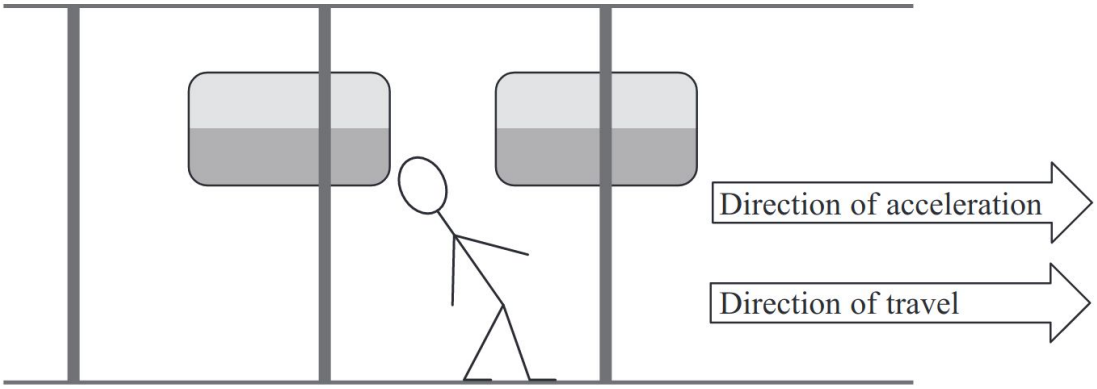
(5 marks)

(b) When placed at rest on water, piece Y remained in one position whilst spinning around.
Suggest why piece Y remains in one position.

(2 marks)

Edexcel A-Level Physics Paper 1, June 2014

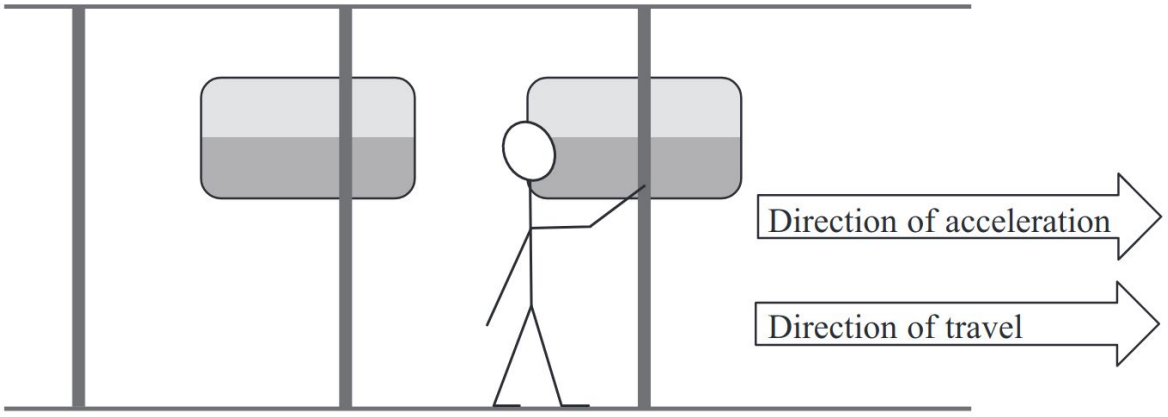
3. A passenger is standing in a train.
(a) The train accelerates and he falls backwards.



Use Newton's first law of motion to explain why he falls backwards.

(3 marks)

(b) As the train leaves the next station the passenger holds on to a vertical support as the train accelerates. This prevents the passenger falling backwards.



With reference to Newton's laws of motion, explain why holding on to a vertical support prevents the passenger falling backwards.

(5 marks)

Edexcel A-Level Physics Paper 1, June 2015

4. A student entering a physics classroom sees the following sentences on the board. These sentences are being used as examples in an explanation of Newton's third law.

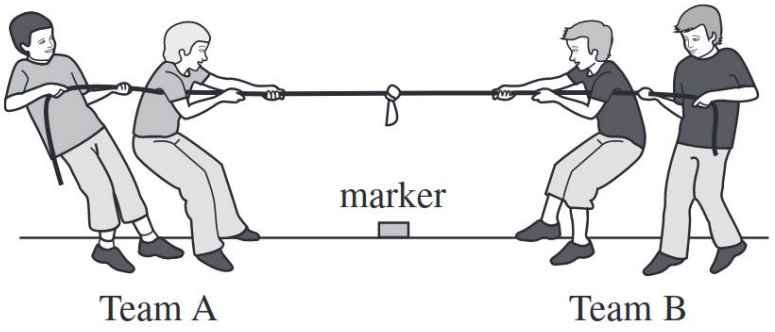
The car tyre exerts a frictional contact force of 300 N backwards on the road.
The road exerts a frictional contact force of 300 N forwards on the car tyre.

State Newton's third law.
Explain how the sentences provide a good example of a Newton's third law pair.

(5 marks)

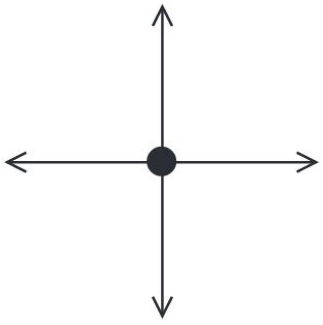
Edexcel A-Level Physics Paper 1, June 2012

5. In a game of tug-of-war two teams of children pull on opposite ends of a rope.
The team that pulls the other team over a marker wins the game.



(a) Initially Team A and Team B are stationary.

Add labels to the free-body force diagram for the child at the end of the rope for Team A at this instant.



(3 marks)

(b) Team B wins by pulling Team A over the marker.
By considering the forces on the children and on the rope explain, in terms of Newton's laws, the process by which Team A loses the game.

(6 marks)

Edexcel AS Physics Paper 1 June 2016