

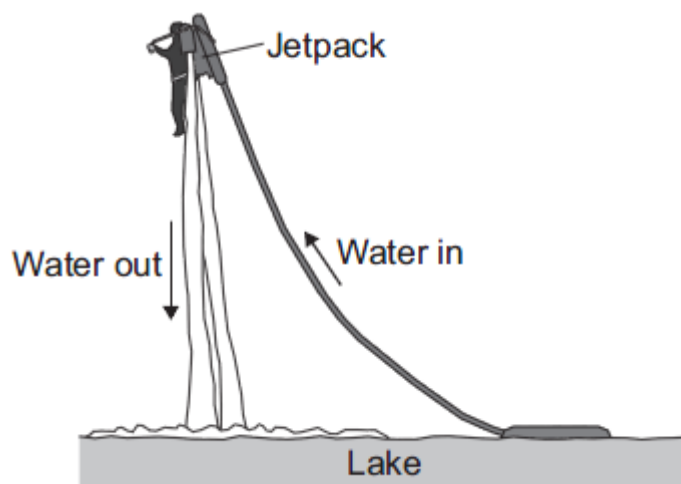
Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

The diagram below shows a person using a device called a jetpack. Water is forced downwards from the jetpack and produces an upward force on the person.



- (a) State the condition necessary for the person to be able to remain stationary in mid-air.

(1)

- (b) The person weighs 700 N and the jetpack weighs 140 N.

- (i) Calculate the combined mass of the person and the jetpack.

Gravitational field strength = 10 N/kg

Combined mass = _____ kg

(2)

- (ii) Increasing the upward force to 1850 N causes the person to accelerate upwards.

Calculate the acceleration of the person and the jetpack. Give the unit.

Acceleration = _____ Unit _____

(3)

(Total 6 marks)

Q2.

Quantities in physics are either scalars or vectors.

- (a) Use the correct answers from the box to complete the sentence.

acceleration	direction	distance	speed	time
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Velocity is _____ in a given _____.

(2)

- (b) Complete the table to show which quantities are scalars and which quantities are vectors.

Put **one** tick (✓) in each row.

The first row has been completed for you.

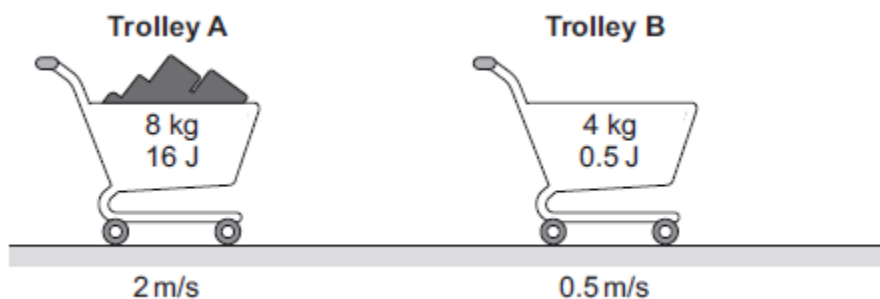
Quantity	Scalar	Vector
Momentum		✓
Acceleration		
Distance		
Force		
Time		

(3)

- (c) The diagram shows two supermarket trolleys moving in the same direction.

Trolley **A** is full of shopping, has a total mass of 8 kg and is moving at a velocity of 2 m / s with a kinetic energy of 16 J.

Trolley **B** is empty, has a mass of 4 kg and is moving at a velocity of 0.5 m / s with a kinetic energy of 0.5 J.



- (i) Calculate the momentum of both trolley **A** and trolley **B**.

Give the unit.

Momentum of trolley **A** = _____

Momentum of trolley **B** = _____

Unit _____

(4)

- (ii) The trolleys in the diagram collide and join together. They move off together.

Calculate the velocity with which they move off together.

Velocity = _____ m / s

(3)

- (iii) In a different situation, the trolleys in the diagram move at the same speeds as before but now move towards each other.

Calculate the total momentum and the total kinetic energy of the two trolleys before they collide.

Total momentum = _____

Total kinetic energy = _____ J

(2)

(Total 14 marks)