

Page 35

(a) Match forces to letters:

- The weight of the buggy → D
 - The force pulling the buggy along → A
 - The friction between the skis and the snow → C
- 3 marks
-

Page 36

(b) Distance travelled in 10 days = $80 \text{ km/day} \times 10 \text{ days} = 800 \text{ km}$

1 mark

(c) At the start, the buggy had a greater total mass (295 kg), so it exerted a greater force on the snow, causing it to sink deeper. At the end, with less mass (130 kg), it exerted less force and did not sink as much.

1 mark

(d) Skis distribute the weight over a larger surface area compared to wheels, reducing pressure on the snow and preventing sinking.

1 mark

(e) A bigger sail captures more wind, providing a greater force to pull the buggy, increasing its speed.

1 mark

Page 37

Question 8: Planning an Investigation

1. Example investigation question:

"How does the angle of the ramp affect the speed of an object moving down the ramp?"

Page 38

(a) Independent variable:

The angle of the ramp (measured in degrees)

(b) Dependent variable:

The speed of the object (measured in m/s) using a stopwatch and ruler for distance

(c) Control variable:

The surface of the ramp to ensure fair testing.

Page 39

Question 1

(a)

(i) Arrow C (gravity acts downward).

(ii) Arrow B (force of the rope pulling Nicola forward).

(b) Calculation:

Speed = distance \div time

Distance = speed \times time = $2 \text{ m/s} \times 10 \text{ s} = 20 \text{ m}$

(c) One other force:

Friction (acting opposite to the motion of the roller blades).

Page 40

Question 8

(a) Direction of movement:

Arrow C (downward), as the force is unbalanced in that direction.

(b) Explanation:

The astronaut will move downward because the forces in other directions cancel out, leaving a resultant force of 1 N downward.

(c) Arrow Direction:

Arrow pointing downward (to show resultant movement direction).

Page 41

(b) Explanation:

The astronaut will move downward because the forces in the vertical direction are unbalanced. The 9 N downward force is greater than the upward 9 N, creating a net movement downward.

(c) Drawing:

Arrow pointing upward and to the right (resultant force direction from the combined horizontal and vertical forces).



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