

A level Physics B

H557/02 Scientific literacy in physics

Question Set 3

1

This question is about the force on a sail of a land yacht, a small vehicle that is powered by the wind.



Fig. 1.1

(a) Explain how air particles exert a pressure on a sail and why, when no wind is blowing, the sail experiences the same pressure on both sides. [3]

(b) A sail has an area 8.0 m^2 . A wind of velocity 18.0 ms^{-1} strikes the sail at 90° to the surface of the sail. It is assumed that the velocity of the wind falls to zero when it strikes the sail.

Calculate the force on the sail and suggest why the assumption may not be accurate.

$$\text{density of air} = 1.2 \text{ kg m}^{-3}$$

$$\text{force on sail} = \dots\dots\dots \text{N} \quad [4]$$

(c) A constant force of 300 N strikes the sail of a land yacht at an angle of 50° to the direction of motion of the vehicle as shown in Fig. 1.2. The mass of the yacht and rider is 135 kg .

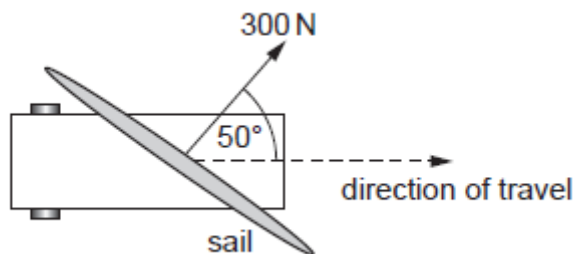


Fig. 1.2

Calculate the time for the land yacht to travel 50 m in the direction shown. The yacht starts from rest. Ignore resistive forces.

$$\text{time} = \dots\dots\dots \text{s} \quad [4]$$

Total Marks for Question Set 3: 11

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