

- 3 (a) State what is meant by *work done*.

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..... [1]

- (b) A skier is pulled along horizontal ground by a wire attached to a kite, as shown in Fig. 3.1.

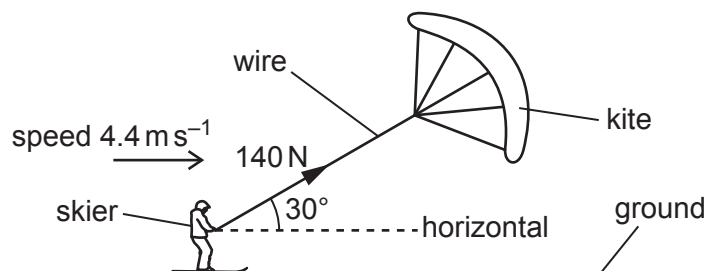


Fig. 3.1 (not to scale)

The skier moves in a straight line along the ground with a constant speed of 4.4 m s^{-1} . The wire is at an angle of 30° to the horizontal. The tension in the wire is 140 N .

- (i) Calculate the work done by the tension to move the skier for a time of 30 s .

work done = J [3]

- (ii) The weight of the skier is 860 N . The vertical component of the tension in the wire and the weight of the skier combine so that the skier exerts a downward pressure on the ground of 2400 Pa .

Determine the total area of the skis in contact with the ground.

area = m^2 [3]

- (iii) The wire attached to the kite is uniform. The stress in the wire is $9.6 \times 10^6 \text{ Pa}$.

Calculate the diameter of the wire.

diameter = m [2]

- (c) The variation with extension x of the tension F in the wire in (b) is shown in Fig. 3.2.

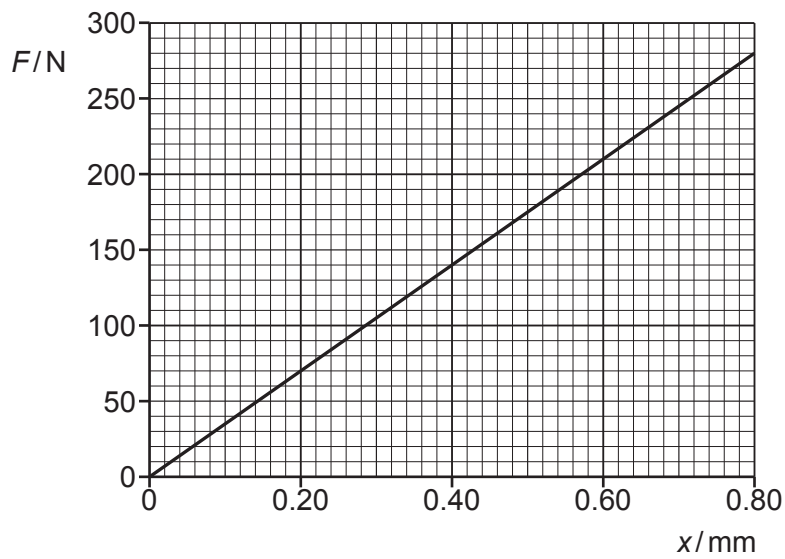


Fig. 3.2

A gust of wind increases the tension in the wire from 140 N to 210 N.

Calculate the change in the strain energy stored in the wire.

change in strain energy = J [3]

[Total: 12]