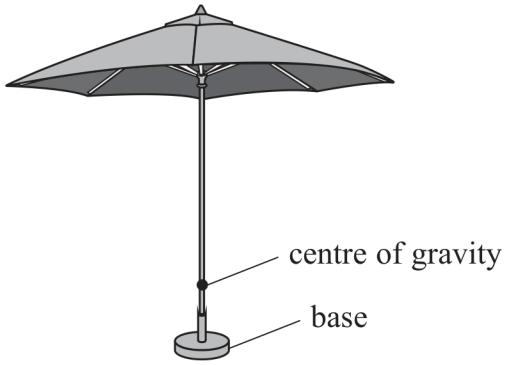
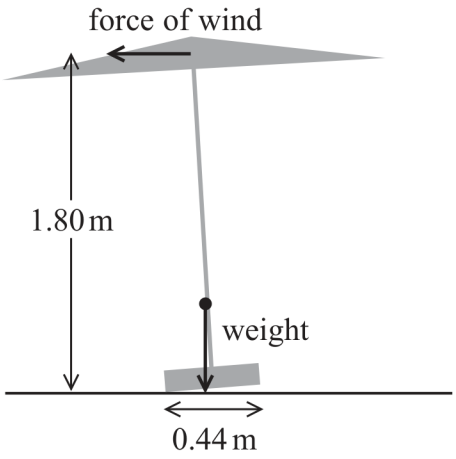
19 A large parasol has been set up on a windy day. The centre of gravity of the parasol is vertically above the centre of the base. The bottom of the parasol starts to lift from the ground as shown. The weight of the parasol is 110 N.



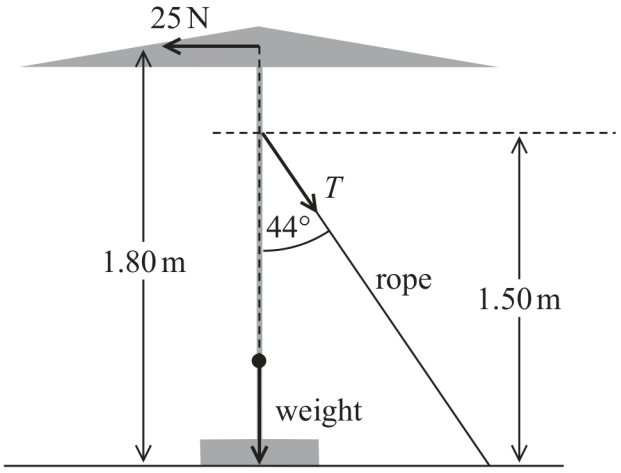
(a) The force of the wind is 14 N in a horizontal direction.



Explain why the parasol will topple. Your answer should include a calculation.

(4)

(b) To prevent the parasol from toppling, a rope is attached to the parasol at 1.50 m from the ground as shown. The rope makes an angle of 44° to the vertical.



The horizontal force from the wind is now 25 N.

Determine, by taking moments about the centre of the base, the vertical force that the base exerts on the ground.

Assume that the force which the ground exerts on the base acts through the midpoint of the base.

(5)

Force exerted on the ground = ...

(Total for Question 19 = 9 marks)