13 A uniform, horizontal flagpole is connected by a hinge to a wall at position O.
An aluminium wire connects the pole to the wall at A, as shown.

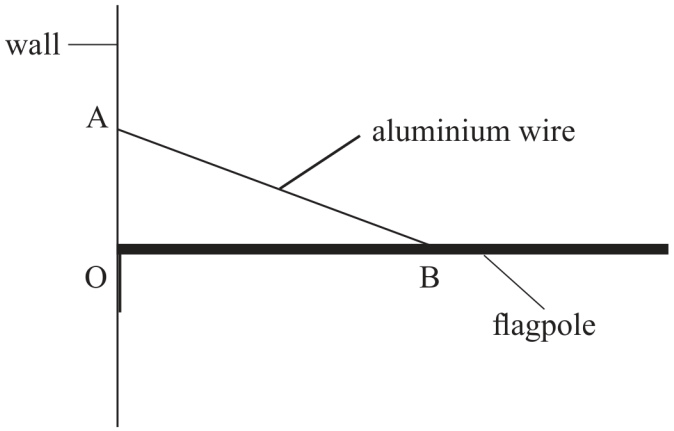
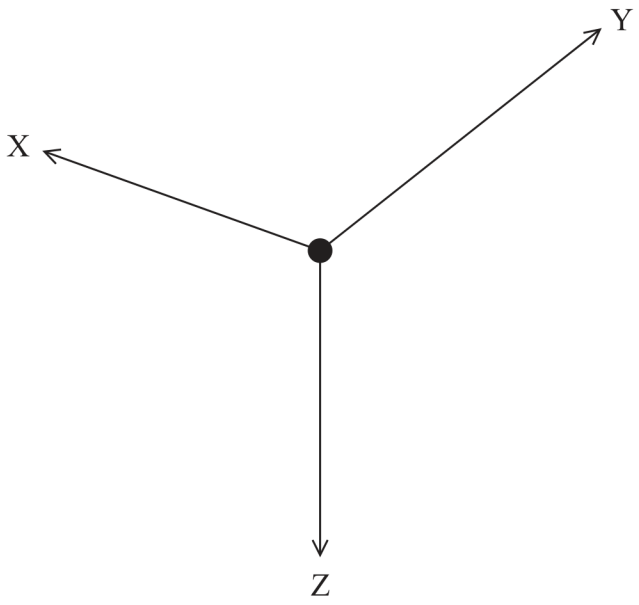


Diagram not to scale

(a) A free-body force diagram for the flagpole is shown below.

Identify the forces X, Y and Z.

(3)



X .....

Y .....

Z .....

(b) The aluminium wire will break if the tension in the wire exceeds 350 N.

The wire is attached to the flagpole at B, 0.8 m from the wall.

The wire is at an angle of 20° to the flagpole.

Assess whether the wire will break. You should use the principle of moments, taking moments about O.

length of flagpole = 1.2 m

mass of flagpole and flag = 15 kg

(3)

(Total for Question 13 = 6 marks)