3 **(a)** ce is a vector quantity. State three other vector quantities.

1. ....

2. ....

3. ....
[2]

(b) Three coplanar forces *X*, *Y* and *Z* act on an object, as shown in Fig. 3.1.
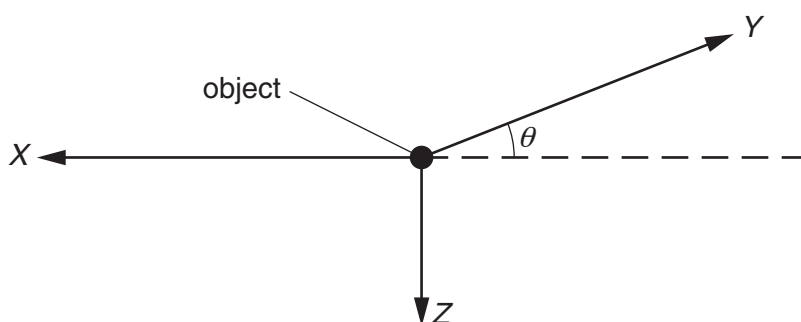

Fig. 3.1

The force *Z* is vertical and *X* is horizontal. The force *Y* is at an angle θ to the horizontal. The force *Z* is kept constant at 70 N.

In an experiment, the magnitude of force *X* is varied. The magnitude and direction of force *Y* are adjusted so that the object remains in equilibrium.

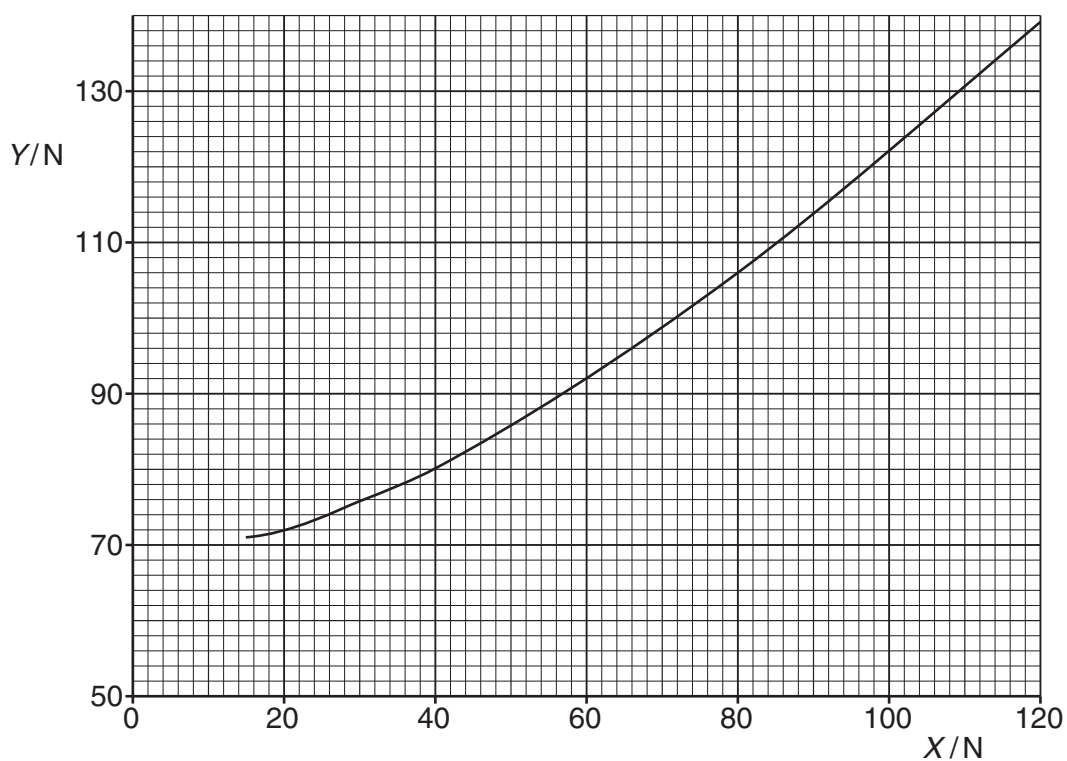Fig. 3.2 shows the variation of the magnitude of force *Y* with the magnitude of force *X*.

Fig. 3.2

(i) Fig. 3.2 to estimate the magnitude of Y for $X = 0$.

$Y =$ .... N [1]

(ii) State and explain the value of θ for $X = 0$.

....

....

....[2]

(iii) The magnitude of X is increased to 160 N.   resolution of forces to calculate the value of

1. angle θ,

$\theta =$ ....° [2]

2. the magnitude of force Y.

$Y =$ .... N [2]

(c) The angle θ decreases as X increases. Explain why the object cannot be in equilibrium for $\theta = 0$.

....

....

....[1]