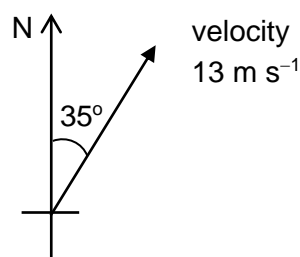


Answer **all** the questions in the space provided.

- 1 (a) State what is meant by a *random error*?

.....  
..... [1]

- (b) A ship at sea is travelling with a velocity of  $13 \text{ m s}^{-1}$  in a direction  $35^\circ$  east of north in still water, as shown in Fig. 1.1.



**Fig. 1.1**

- (i) Calculate the north component of the ship's velocity.

north component of velocity = .....  $\text{m s}^{-1}$  [1]

- (ii) The ship's velocity is measured with an uncertainty of  $\pm 10 \%$ . Its direction is measured with an uncertainty of  $\pm 1^\circ$ .

Determine the north component of the velocity with its associated uncertainty.

north component of velocity = .....  $\pm$  .....  $\text{m s}^{-1}$  [3]