1 The Earth may be considered as a uniform sphere of radius 6.37×10^6 m.

Cambridge is at a point on the Earth's surface that has a latitude of 52.2° north of the Equator, as shown in Fig. 1.1.

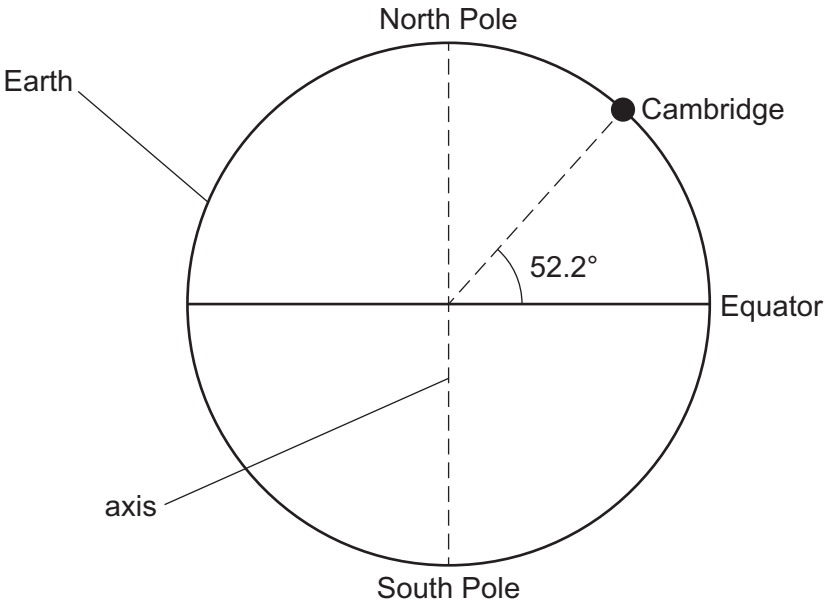

Fig. 1.1

As the Earth spins on its axis, Cambridge moves in a circle that is parallel to the Equator but with a smaller radius.

(a) (i) Show that the radius of the circle around which Cambridge moves is 3.90×10^6 m.

[1]

(ii) Calculate the speed at which Cambridge moves around the circle.

speed = ... $m\,s^{-1}$ [3]

(b) A student of mass 58.6 kg stands on horizontal ground in Cambridge.

(i) Determine the magnitude of the resultant force that acts to cause the circular motion of the student.

resultant force = ... N [2]

(ii) On Fig. 1.2, draw an arrow to show the direction of the resultant force that acts on the student.

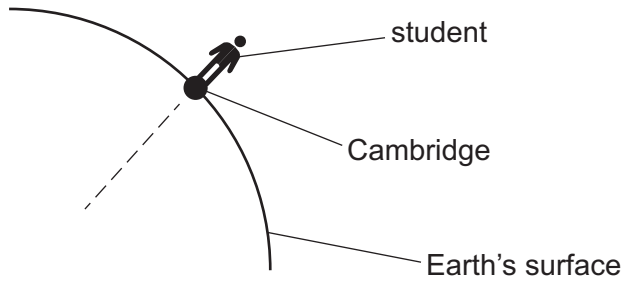

Fig. 1.2 (not to scale)

[1]

(iii) On Fig. 1.3, draw labelled arrows from the student to show the directions of the forces that act on the student to cause the resultant force in **(b)(ii)**.

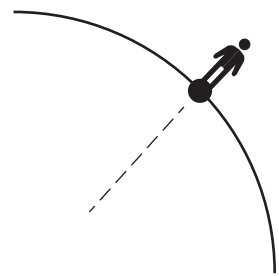

Fig. 1.3 (not to scale)

[2]

[Total: 9]