Section A

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

1   The Earth may be assumed to be a uniform sphere of radius 6400 km and mass 6.02 x 10^{24} kg.

(a)   A 50.0 kg boy is standing still on a flat ground located at latitude 35.6° north of the Equator, somewhere in Japan, as shown in Fig 1.1.
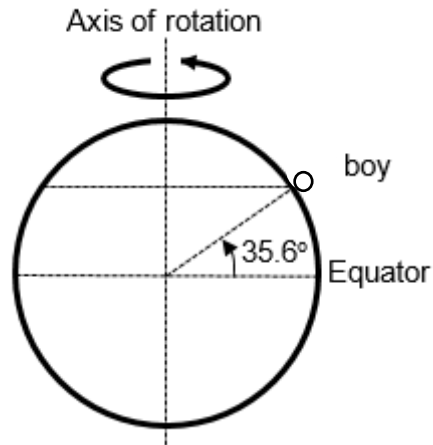

Fig. 1.1

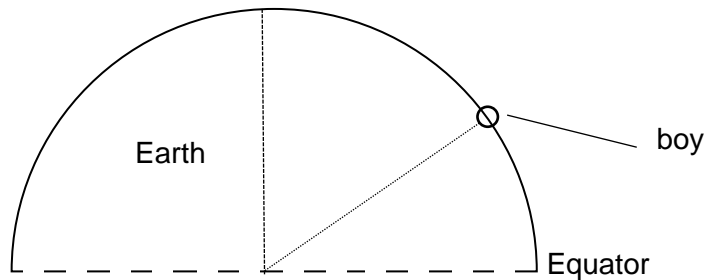**(i)**   Draw and label all the forces acting on the boy on Fig. 1.2.

Fig. 1.2

[2]

(ii)   The boy now puts a weighing scale under him to read his weight from the scale.

Explain whether there is a difference in the readings on the weighing scale if the boy stands on the same weighing scale at the North pole.

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.... [2]

[Turn over

(b) A satellite orbiting the Earth with a period of 24 hours and flew directly above the boy from west to east. The satellite is under the influence of gravitational force alone.

    (i) Determine the height of the satellite above the boy.

height = ... m   [3]

    (ii) Explain whether it is a geostationary satellite above the boy.

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....   [1]