Section A

Answer **all** questions in this section.

1 **(a)** The International Space Station (ISS) travels at a constant speed as it orbits at a height of 400 km above the surface of Earth.

The orbital period is 90 minutes.

(i) Explain how the ISS moves at constant speed but is also accelerating.

.....

.....

.....

.....

..... [3]

(ii) On Fig. 1.1, draw an arrow to show the direction of the acceleration of the ISS.

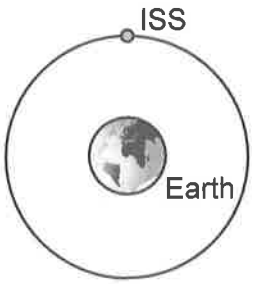

Fig. 1.1 (not to scale)

[1]

(iii) On Fig. 1.2, draw an arrow to show the direction of the resultant force on the ISS.

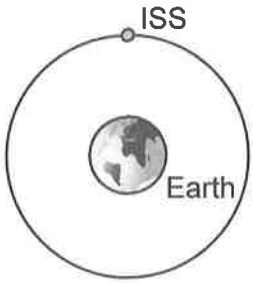

Fig. 1.2 (not to scale)

[1]

(iv) The radius of the Earth is 6400 km.

Calculate the magnitude of the acceleration of the ISS.

acceleration = ... $m\,s^{-2}$ [3]

(b) A disc is rotating at 25 revolutions per second. The diameter of the disc is 40 cm. The axis of rotation O intersects the centre of the disc and is perpendicular to the plane of the disc.

Fig. 1.3 shows a diagram of the disc with two points A and B marked.

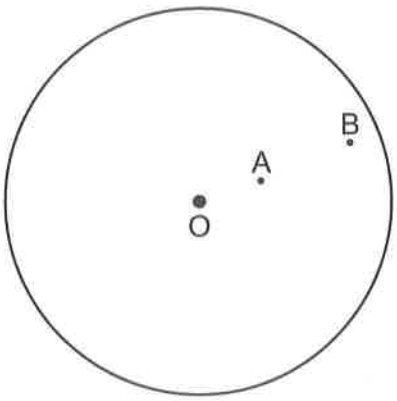

Fig. 1.3

(i) Compare the velocity v and angular velocity ω of the disc at the points A and B.

.....

.....

..... [2]

(ii) Calculate the angular velocity of a point on the rim of the disc.

Give the SI unit.

angular velocity = ... unit ..... [3]

[Total: 13]