

**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.

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[3]

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

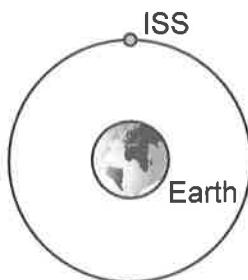


Fig. 1.1 (not to scale)

[1]

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

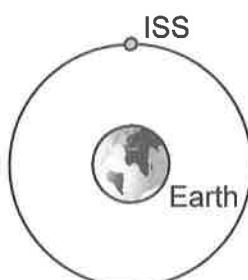


Fig. 1.2 (not to scale)

[1]

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

Calculate the magnitude of the acceleration of the ISS.

$$\text{acceleration} = \dots \text{ ms}^{-2}$$





- (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.

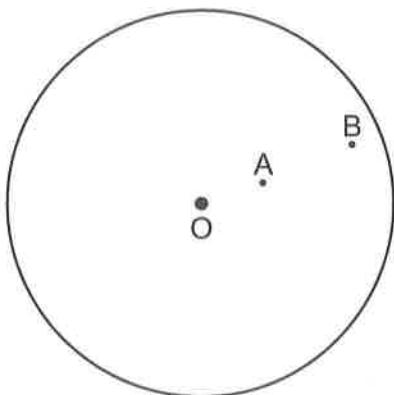


Fig. 1.3

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

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[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]

