Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 21

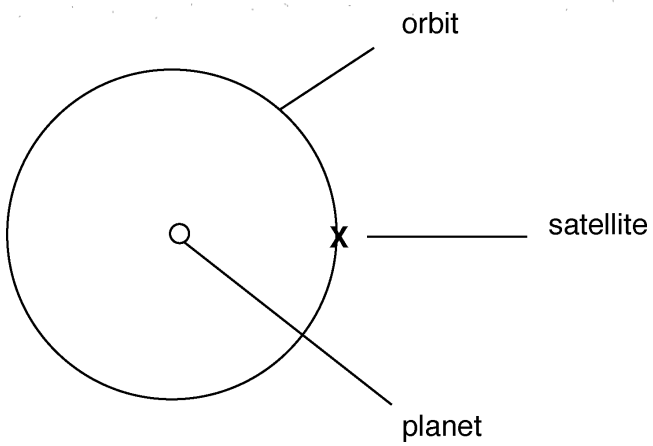
21 (a) State **two** features of a satellite in a **polar orbit**?

Suggest a use for a satellite in a polar orbit.

- Take the satellites over the Earth's poles
- The satellites travel very close to the Earth ∴ travel at very high speeds (≈ 8000 m/s)
- Used for monitoring the weather, spying and taking images of the Earth's surface

[3]

(b) An artificial satellite (**X**) is kept in a stable circular orbit around a planet by a centripetal force caused by gravity.



(i) Explain how the velocity of a satellite is constantly changing whilst its speed remains the same when it is in orbit.

The direction of the satellite is constantly changing
∴ the velocity of the satellite is constantly changing.
This is because velocity is a vector (magnitude AND direction)

[2]

(ii) The satellite is remotely controlled from Earth.

The scientists want the satellite to move slower. $\frac{GM}{r^2} = \frac{v^2}{r}$

What effect will this change in speed have on the height of its orbit?

Explain your answer.

The satellite would 'fall' to a lower orbit as gravitational attraction will be too strong and the satellite will fall towards the Earth.

[2]

Total Marks for Question Set 21: 7