Oxford Cambridge and RSA

GCSE Physics B (Twenty First Century Science)

J259/03 Depth in physics (Higher Tier)

Question Set 30

1 Planets outside our solar system have been discovered orbiting a star called Kepler-106.

Table 4.1 shows the properties of these planets. Assume that the planets move in **circular** orbits.

Planet	Radius of orbit (km)	Time to complete one orbit (s)	Speed (m / s)	Mass (kg)
1	9.87 × 106	5.36 × 105	116 000	2.73 × 1024
2	1.66 × 107	1.18 × 106	89 000	6.26 × 1025
3	3.59 × 107	3.80 × 106	59 000	3.87 × 1025

Table 4.1

(a) Calculate the momentum of planet **1**.

Momentum = ... kg m / s **[3]**

(b) Eve and Kai look at the information in **Table 4.1**.

Eve

Each planet has a constant speed but a changing velocity.

(i) Explain why Eve is correct.

[2]

Kai

As the radius of the orbit increases, the speed decreases.

(ii) Suggest why Kai is correct.

[2]

Total Marks for Question Set 30: 7