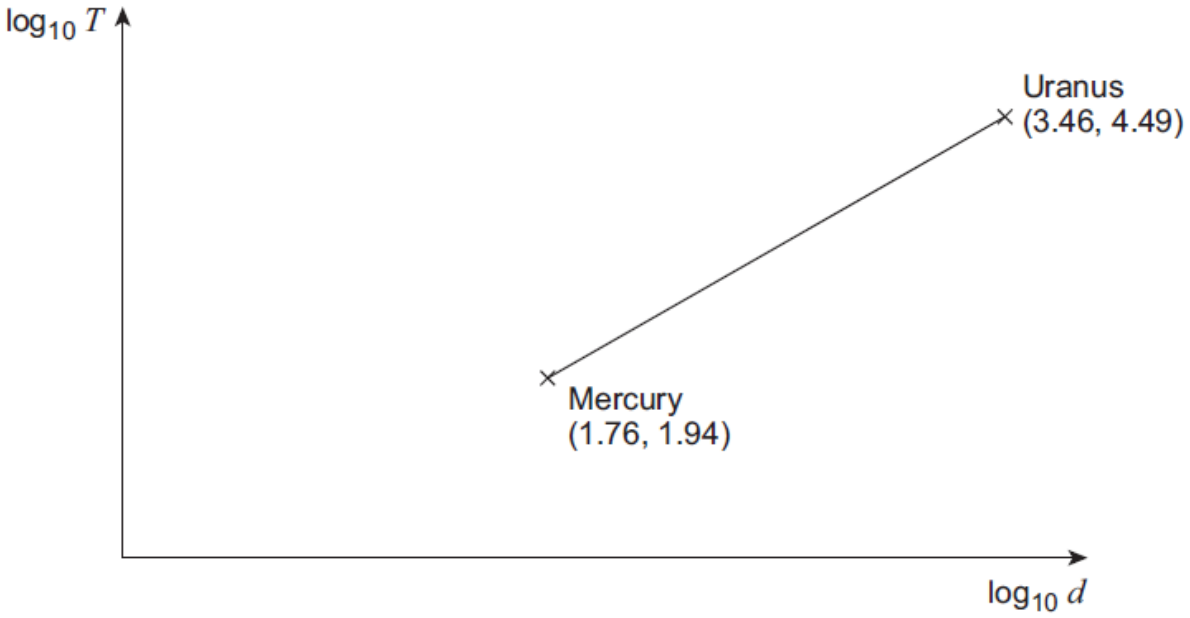
Exponentials and logarithms – A2 Mathematics P3

1. June/2022/Paper_7357/03/No.7

A planet takes T days to complete one orbit of the Sun.

T is known to be related to the planet's average distance d, in millions of kilometres, from the Sun.

A graph of $\log_{10} T$ against $\log_{10} d$ is shown with data for Mercury and Uranus labelled.



(a) (i) Find the equation of the straight line in the form

$$\log_{10} T = a + b \log_{10} d$$

where a and b are constants to be found.

[3 marks]

(a) (ii) Show that

$$T = \mathrm{K}d^{\mathrm{n}}$$

where K and n are constants to be found.

[2 marks

(b) Neptune takes approximately 60 000 days to complete one orbit of the Sun.

Use your answer to **7(a)(ii)** to find an estimate for the average distance of Neptune from the Sun.

[2 marks