1. A satellite travels around the Earth in a circular orbit 500 kilometres above the Earth's surface. The radius of the Earth is taken as 6400 kilometres.

(a) Write down the radius of the satellite's orbit.

(1)

(b) Calculate the distance travelled by the satellite in one orbit of the Earth. Give your answer correct to the nearest km.

(3)

(c) Write down your answer to (b) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

(2)

(Total 6 marks)

2. The planet Earth takes one year to revolve around the Sun. Assume that a year is 365 days and the path of the Earth around the Sun is the circumference of a circle of radius 150 000 000 km.

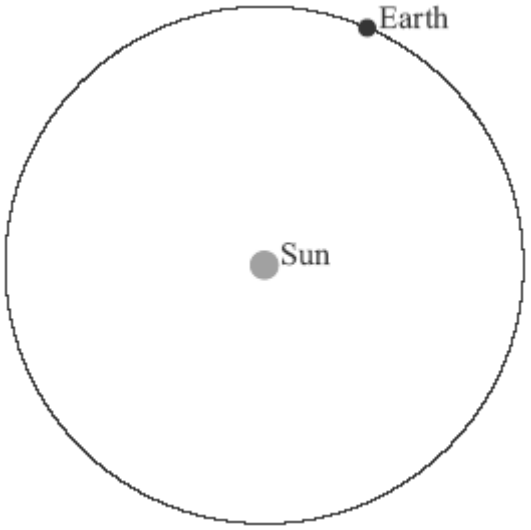

diagram not to scale

(a) Calculate the distance travelled by the Earth in **one day**.

(4)

(b) Give your answer to part (a) in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(2)

(Total 6 marks)

3. Calculate $3.7 \times 16.2^2 - 500$, writing your answer

(a) correct to two decimal places;

(b) (i) correct to three significant figures;

(ii) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

(Total 4 marks)

4. The volume of a sphere is $V = \sqrt{\frac{S^3}{36\pi}}$, where S is its surface area.

The surface area of a sphere is 500 cm^2.

(a) Calculate the volume of the sphere. Give your answer correct to **two decimal places**.

(3)

(b) Write down your answer to (a) correct to the nearest integer.

(1)

(c) Write down your answer to (b) in the form $a \times 10^n$, where $1 \leq a < 10$ and $n \in \mathbb{Z}$.

(2)

(Total 6 marks)

5. Consider the following four numbers.

$$p = 0.00314 \; ; \; q = 0.00314 \times 10^2 \; ; \; r = \frac{\pi}{1000} \; ; \; s = 3.14 \times 10^{-2}$$

(a) One of these numbers is written in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$. Write down this number.

(1)

(b) Write down the smallest of these numbers.

(2)

(c) Write down the value of $q + s$.

(1)

(d) Give your answer to part (c) in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(2)

(Total 6 marks)

6. Given that $h = \sqrt{l^2 - \frac{d^2}{4}}$,

(a) Calculate the **exact** value of h when $l = 0.03625$ and $d = 0.05$.

(2)

(b) Write down the answer to part (a) correct to three decimal places.

(1)

(c) Write down the answer to part (a) correct to three significant figures.

(1)

(d) Write down the answer to part (a) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

(2)

(Total 6 marks)

7. Let $A = 4.5 \times 10^{-3}$ and $B = 6.2 \times 10^{-4}$. Find

(a) AB;

(b) $2(A + B)$.

Give your answers in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(Total 4 marks)

8. Let $x = 7.94$.

(a) Calculate the value of $\frac{2x+1}{x^3}$.

(b) (i) Give your answer correct to **three** decimal places.

(ii) Write your answer to (b)(i) as a percentage.

(c) Give your answer to part (b)(i) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

(Total 6 marks)

9. Given the equation $p = r^2 + 2qr$.

(a) Calculate the exact value of p when $q = 3.6$ and $r = 24$.

(b) Write your answer correct to two significant figures.

(c) Express your answer to (b) in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(Total 8 marks)

10. The total weight of 256 identical pencils is 4.24 kg. Calculate the weight of one pencil, in kg.

(a) Give your answer exactly.

(b) Give your answer correct to three significant figures.

(c) Write your answer to part (b) in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(Total 8 marks)

11. Let $m = 6.0 \times 10^3$ and $n = 2.4 \times 10^{-5}$.

Express each of the following in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(a) mn;

(b) $\frac{m}{n}$.

(Total 4 marks)

12. Let $x = 6.4 \times 10^7$ and $y = 1.6 \times 10^8$.

Find

(a) $\frac{x}{y}$

(b) $y - 2x$,

giving your answers in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(Total 8 marks)

13. Using the formula $V = \pi r^2 (H - h)$, and your calculator value of π, calculate the value of V when $r = 4.26$, $H = 21.58$ and $h = 14.35$.

(a) Give the full calculator display.

(b) Give your answer to two decimal places.

(c) Give your answer to two significant figures.

(d) Write your answer to part (c) in the form $a \times 10^k$ where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(Total 8 marks)

14. If $x = 3.1 \times 10^4$ and $y = 2.4 \times 10^{-7}$, calculate the values of the following, expressing your answers in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(a) x^2

(b) $\frac{x}{y}$

(Total 4 marks)