

1. Given  $p = x - \frac{\sqrt{y}}{z}$ ,  $x = 1.775$ ,  $y = 1.44$  and  $z = 48$ ,

(a) calculate the value of  $p$ .

(2)

Barry **first** writes  $x$ ,  $y$  and  $z$  correct to one significant figure and **then** uses these values to estimate the value of  $p$ .

(b) (i) Write down  $x$ ,  $y$  and  $z$  each correct to one significant figure.

(ii) Write down Barry's estimate of the value of  $p$ .

(2)

(c) Calculate the percentage error in Barry's estimate of the value of  $p$ .

(2)

(Total 6 marks)

2. 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)

3. 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  $500 \text{ cm}^2$ .

(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)

4. (a) Calculate exactly  $\frac{(3 \times 2.1)^3}{7 \times 1.2}$ . (1)
- (b) Write the answer to part (a) correct to 2 significant figures. (1)
- (c) Calculate the percentage error when the answer to part (a) is written correct to 2 significant figures. (2)
- (d) Write 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)**

5. 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)**

6. A shipping container is a cuboid with dimensions 16 m,  $1\frac{3}{4}$  m and  $2\frac{2}{3}$  m.

(a) Calculate the **exact** volume of the container. Give your answer as a fraction.

(3)

Jim estimates the dimensions of the container as 15 m, 2 m and 3 m and uses these to estimate the volume of the container.

(b) Calculate the percentage error in Jim's estimated volume of the container.

(3)

**(Total 6 marks)**

7. In a television show there is a transparent box completely filled with identical cubes. Participants have to estimate the number of cubes in the box. The box is 50 cm wide, 100 cm long and 40 cm tall.

(a) Find the volume of the box.

(2)

Joaquin estimates the volume of one cube to be  $500\text{ cm}^3$ . He uses this value to estimate the number of cubes in the box.

(b) Find Joaquin's estimated number of cubes in the box.

(2)

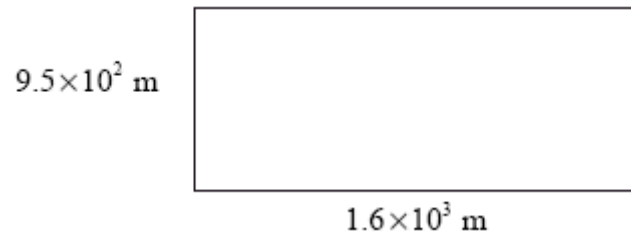
The actual number of cubes in the box is 350.

(c) Find the percentage error in Joaquin's estimated number of cubes in the box.

(2)

**(Total 6 marks)**

8. The following diagram shows a rectangle with sides of length  $9.5 \times 10^2$  m and  $1.6 \times 10^3$  m.



*diagram not to scale*

- (a) Write down the area of the rectangle in the form  $a \times 10^k$ , where  $1 \leq a < 10$ ,  $k \in \mathbb{Z}$ . (3)

Helen's estimate of the area of the rectangle is 1 600 000 m<sup>2</sup>.

- (b) Find the percentage error in Helen's estimate.

(3)  
(Total 6 marks)