

## Standard form/Sig figs etc

52 min  
60 marks

1. 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)

2. 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)

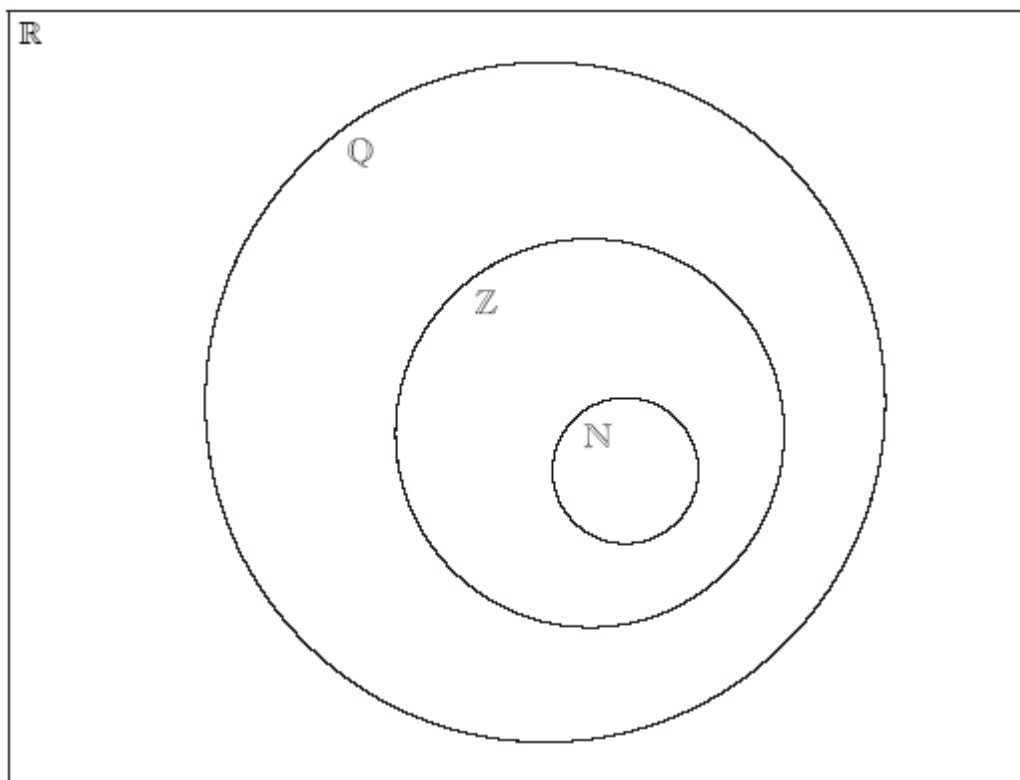
(c) Write down your answer to (b) in the form  $a \times 10^n$ , where  $1 \leq a < 10$  and  $n \in \mathbb{Z}$ .

(2)

(Total 6 marks)

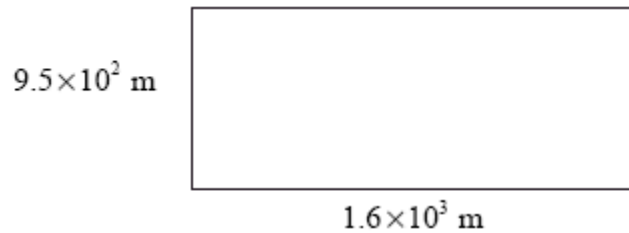
3. The Venn diagram shows the number sets  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$  and  $\mathbb{R}$ . Place each of the following numbers in the appropriate region of the Venn diagram.

$$\frac{1}{4}, -3, \pi, \cos 120^\circ, 2.7 \times 10^3, 3.4 \times 10^{-2}$$



(Total 6 marks)

4. 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)

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 field is 91.4 m long and 68.5 m wide.

- (a) Calculate the area of the field in  $\text{m}^2$ .
- (b) Calculate the area of the field in  $\text{cm}^2$ .
- (c) Express your answer to (b) in the form  $a \times 10^k$  where  $1 \leq a < 10$  and  $k \in \mathbb{Z}$ .

(Total 6 marks)

7. (a) Given  $x = 2.6 \times 10^4$  and  $y = 5.0 \times 10^{-8}$ , calculate the value of  $w = x \times y$ . Give your answer in the form  $a \times 10^k$  where  $1 \leq a < 10$  and  $k \in \mathbb{Z}$ .

(b) Which **two** of the following statements about the nature of  $x$ ,  $y$  and  $w$  above are **incorrect**?

- (i)  $x \in \mathbb{N}$
- (ii)  $y \in \mathbb{Z}$
- (iii)  $y \in \mathbb{Q}$
- (iv)  $w < y$
- (v)  $x + y \in \mathbb{R}$
- (vi)  $\frac{1}{w} < x$

(Total 8 marks)

8. 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)**

9. 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)**

10. 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)**