

5. 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 marks]
- (b) Write down your answer to (a) correct to the nearest integer. [1 mark]
- (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 marks]

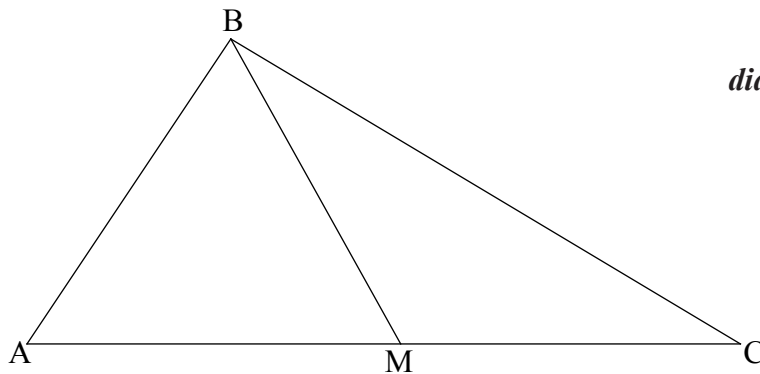
*Working:*

*Answers:*

- (a) \_\_\_\_\_
- (b) \_\_\_\_\_
- (c) \_\_\_\_\_



7. The diagram shows a triangle ABC in which  $AC = 17$  cm. M is the midpoint of AC. Triangle ABM is equilateral.



*diagram not to scale*

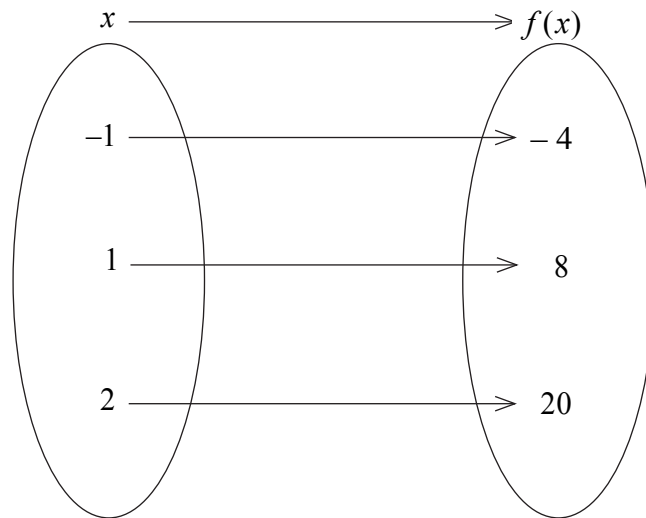
- (a) Write down
- (i) the length of BM in cm;
  - (ii) the size of angle BMC;
  - (iii) the size of angle MCB. [3 marks]
- (b) Calculate the length of BC in cm. [3 marks]

*Working:*

*Answers:*

- (a) (i) \_\_\_\_\_
- (ii) \_\_\_\_\_
- (iii) \_\_\_\_\_
- (b) \_\_\_\_\_

14. A quadratic function,  $f(x) = ax^2 + bx$ , is represented by the mapping diagram below.



- (a) Use the mapping diagram to write down **two** equations in terms of  $a$  and  $b$ . [2 marks]
- (b) Find the value of
- (i)  $a$  ;
- (ii)  $b$  . [2 marks]
- (c) Calculate the  $x$ -coordinate of the vertex of the graph of  $f(x)$ . [2 marks]

*Working:*

*Answers:*

- (a) \_\_\_\_\_  
 \_\_\_\_\_
- (b) (i) \_\_\_\_\_  
 (ii) \_\_\_\_\_
- (c) \_\_\_\_\_

15. The function  $f(x) = 5 - 3(2^{-x})$  is defined for  $x \geq 0$ .

(a) (i) On the axes below sketch the graph of  $f(x)$  and show the behaviour of the curve as  $x$  increases.

(ii) Write down the coordinates of any intercepts with the axes.

[4 marks]



(b) Draw the line  $y = 5$  on your sketch.

[1 mark]

(c) Write down the number of solutions to the equation  $f(x) = 5$ .

[1 mark]

*Working:*

*Answers:*

(a) (ii) \_\_\_\_\_

(c) \_\_\_\_\_