

3 Express each of the following as a single logarithm:

(i)  $\log_a 2 + \log_a 3$ ,

(ii)  $2 \log_{10} x - 3 \log_{10} y$ .

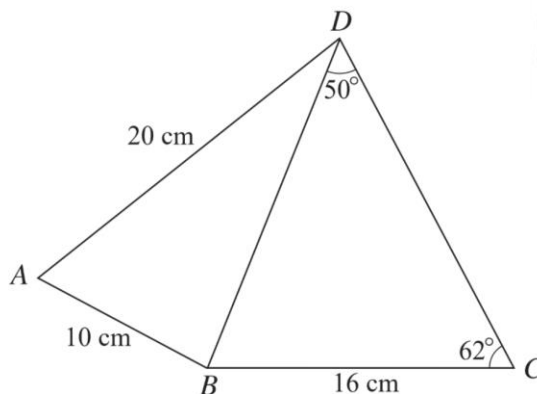


[1]

[3]

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4



In the diagram, angle  $BDC = 50^\circ$  and angle  $BCD = 62^\circ$ . It is given that  $AB = 10$  cm,  $AD = 20$  cm and  $BC = 16$  cm.

(i) Find the length of  $BD$ .

[2]

(ii) Find angle  $BAD$ .

[3]

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9 (i)

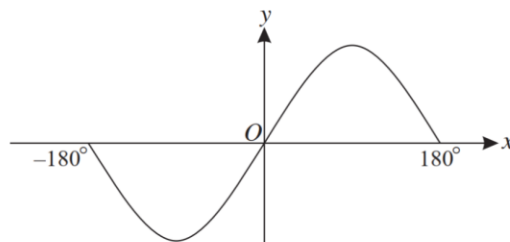


Fig. 1

Fig. 1 shows the curve  $y = 2 \sin x$  for values of  $x$  such that  $-180^\circ \leq x \leq 180^\circ$ . State the coordinates of the maximum and minimum points on this part of the curve.

[2]

(ii)

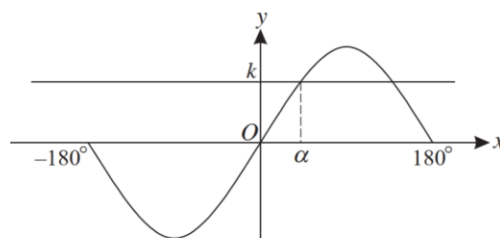


Fig. 2

Fig. 2 shows the curve  $y = 2 \sin x$  and the line  $y = k$ . The smallest positive solution of the equation  $2 \sin x = k$  is denoted by  $\alpha$ . State, in terms of  $\alpha$ , and in the range  $-180^\circ \leq x \leq 180^\circ$ ,

(a) another solution of the equation  $2 \sin x = k$ ,

[1]

(b) one solution of the equation  $2 \sin x = -k$ .

[1]

(iii) Find the  $x$ -coordinates of the points where the curve  $y = 2 \sin x$  intersects the curve  $y = 2 - 3 \cos^2 x$ , for values of  $x$  such that  $-180^\circ \leq x \leq 180^\circ$ .

[6]

**10 (i)** Find the binomial expansion of  $(2x + 5)^4$ , simplifying the terms. [4]

**(ii)** Hence show that  $(2x + 5)^4 - (2x - 5)^4$  can be written as

$$320x^3 + kx,$$

where the value of the constant  $k$  is to be stated.

**(iii)** Verify that  $x = 2$  is a root of the equation

$$(2x + 5)^4 - (2x - 5)^4 = 3680x - 800,$$

and find the other possible values of  $x$ . [6]

