

# Cambridge International AS & A Level

---

<https://babacambridgesolutions.com>

Mathematics

9709/12

Paper 1 Pure Mathematics 1

October/November 2024

Question No(1)

## We Offer:

Cambridge A Level Mathematics (9709) – **Online Tuition**

### Affordable Pricing

 **Pakistani Students: Rs. 200** – Get Complete One-Year Past Paper Solutions with Step-by-Step PDF & Video Explanations.

 **International Students: \$2** – Get Complete One-Year Past Paper Solutions with Step-by-Step PDF & Video Explanations.

### Payment Methods

 Jazz Cash: 03024344565

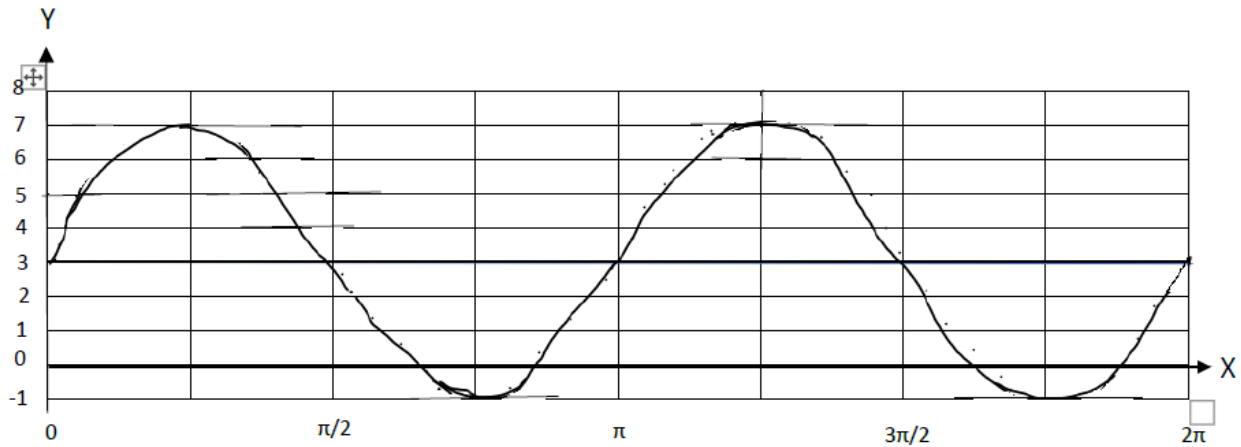
 EasyPaisa: 03454231525

### Contact for Details



**+92 345 4231525**

## Question No (1)



The diagram shows the curve with equation  $y = a \sin(bx) + c$  for  $0 \leq x \leq 2\pi$

where  $a$ ,  $b$  and  $c$  are positive constants.

- (a) State the values of  $a$ ,  $b$  and  $c$
- (b) For these values of  $a$ ,  $b$  and  $c$ , determine the number of solutions in the interval

$0 \leq x \leq 2\pi$  for each of the following equations:

- (i)  $a \sin(bx) + c = 7 - x$
- (ii)  $a \sin(bx) + c = 2\pi(x - 1)$

Solution:

① state the values of  $a$ ,  $b$  and  $c$

solution

$$y = a \sin(bx) + c$$

'a' indicates the amplitude of the curve which is the maximum or minimum range of the curve from the mean position.

From the graph

(2)

mean position is at 3.

maximum value from graph is 7.

$a$  = amplitude of the curve.

$\therefore$  From graph

$$a = 7 - 3$$

$$= 4$$

In the given equation

$$y = a \sin(bx) + c$$

' $b$ ' indicates the periodicity of the curve

As there are two cycles in the normal period of sine.

$$\therefore b = 2$$

' $c$ ' indicates the vertical shift in the graph from the horizontal axis.

' $c$ ' indicates vertical shift in the graph from the horizontal axis.

$$\therefore c = 3$$

DATE:-

③

② For these values of  $a$ ,  $b$  and  $c$ , determine the number of solutions in the interval  $0 \leq x \leq 2\pi$  for each of the following equations:

①  $a \sin(bx) + c = 7 - x$

Solution

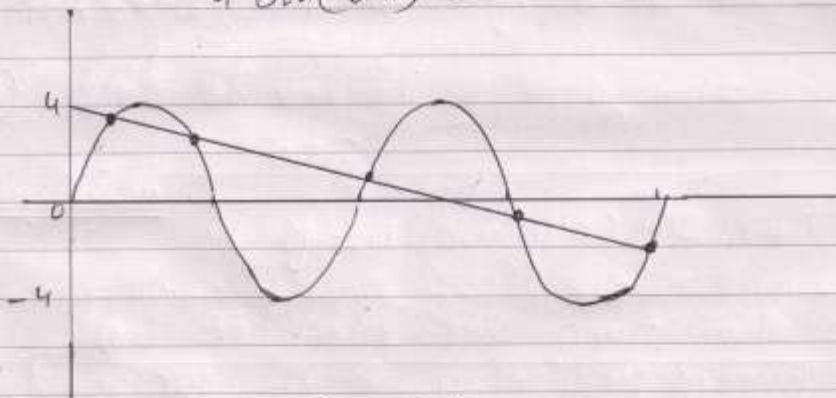
$$a \sin(bx) + c = 7 - x$$

$$\text{As } a = 4, b = 2, c = 3$$

$$\Rightarrow 4 \sin(2x) + 3 = 7 - x$$

$$4 \sin(2x) = 7 - x - 3$$

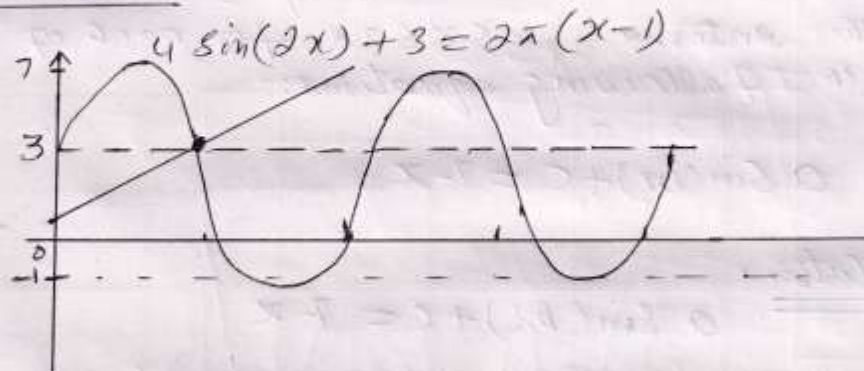
$$4 \sin(2x) = 4 - x$$



5 solutions

(ii)  $a \sin(bx) + c = 2\pi(x-1)$  (4)

Solution



There is one solution i.e. at  $x = \frac{\pi}{2}$ .