

# The Challenge: Sample Questions

## Question 1

Find the value of:

$$10 \times 2$$

## Question 2

Evaluate:

$$100 + 600 \div 200$$

## Question 3

Solve for  $x$ :

$$12x - 345 = 678$$

## Question 4

Factorise the following expression **completely**:

$$(w^3 + x^3)(4y^2 - 9z^2)$$

## Question 5

Determine the 4th term in the binomial expansion of:

$$\left(x^3 - \frac{1}{3x^3}\right)^6$$

## Question 6

Solve for  $x$ :

$$\sqrt{2\sqrt{3x+4}} - 5 = 0$$

### Question 7

Solve for the **values** of  $x$ :

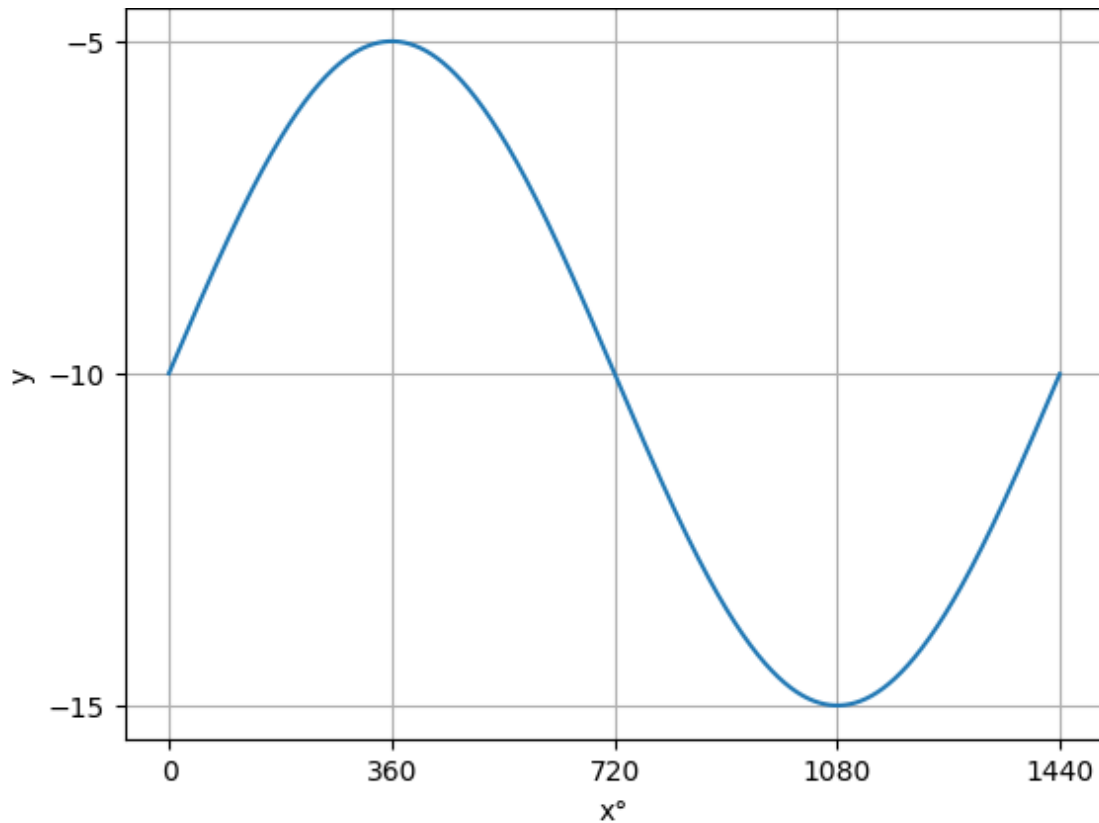
$$3 \left| \frac{-1 \times \ln(1 \times x)}{\ln(4)} + 5 \right| - 9 = 0.$$

### Question 8

Determine the values of  $a$ ,  $b$  and  $c$  in

$$y = a \sin \left( \frac{x}{b} \right) + c$$

given the graph of that equation as shown below.



### Question 9

Differentiate the following with respect to  $x$ :

$$\ln(2 - 3x) - \sin(5x + 6) + \cos(5x + 6)$$

### Question 10

Calculate:

$$\int_{-5}^0 (8x^3 + 4x^2 + 4x) \, dx.$$

### Question 11

Integrate the following with respect to  $x$ , leaving out the constant of integration ( $C$ ) in your answer:

$$3e^{x+7} + 9 \cos(x + 3) + 2 \sec^2(x)$$

### Question 12

Solve the quadratic equation with real root(s) for  $x$ :

A)  $\frac{265x^2}{4} + 11x + 1 = 0$

B)  $\frac{13x^2}{4} + 12x + 13 = 0$

C)  $\frac{19x^2}{2} + 19x + \frac{19}{2} = 0$

### Question 13

Solve for the **values** of  $x$ :

$$\frac{d}{dx} \left( \frac{x^4}{4} + \frac{11x^3}{3} + 17x^2 + 24x - 92 \right) = 0.$$

### Question 14

Solve for the **values** of  $x$  in the following simultaneous equations:

$$5y = x + 46,$$

$$(x + 5)^2 + (y - 16)^2 = 65.$$

**END OF SAMPLE QUESTIONS**

# **The Challenge: Sample Questions' ANSWERS**

## **Question 1**

20

## **Question 2**

103

## **Question 3**

$$x = 85.25$$

## **Question 4**

$$(w + x)(w^2 - wx + x^2)(2y + 3z)(2y - 3z)$$

## **Question 5**

$$-\frac{20}{27}$$

## **Question 6**

$$x = 36.75$$

## **Question 7**

$$x = 16 \text{ or } x = 65536$$

## **Question 8**

$$a = 5, b = 4 \text{ and } c = -10$$

**Question 9**

$$-5 \sin(5x + 6) - 5 \cos(5x + 6) - \frac{3}{2 - 3x}$$

**Question 10**

$$-1133.333$$

**Question 11**

$$3e^{x+7} + \frac{2 \sin(x)}{\cos(x)} + 9 \sin(x + 3) = 3e^{x+7} + 2 \tan(x) + 9 \sin(x + 3)$$

**Question 12**

$$x = -1$$

**Question 13**

$$x = -1 \text{ or } x = -6 \text{ or } x = -4$$

**Question 14**

$$x = -1 \text{ or } x = -6$$

**END OF ANSWERS DOCUMENT**