

# **NOTICE**

**This document replaces any document  
with a version lower than**

**1.0.0rc4**

**The questions in those documents no  
longer reflect the current types of  
questions that are asked in  
The Challenge.**

**DO NOT REFER TO THOSE DOCUMENTS  
FOR THE TYPES OF QUESTIONS ASKED.**

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# THE CHALLENGE

## Practice Questions

**Question 1.** State the value of

$$10 \times 2$$

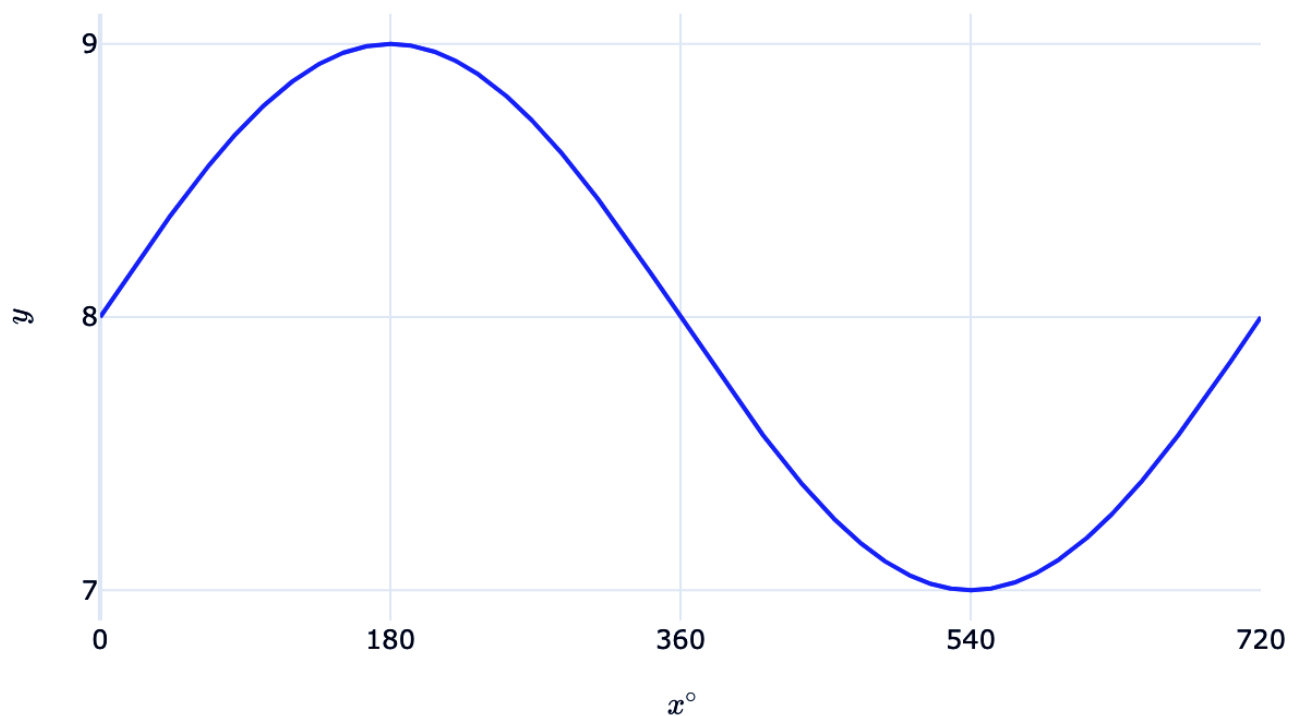
**Question 2.** State the value of

$$100 + 600 \div 200$$

**Question 3.** Solve for the value of  $x$  in the equation

$$12x - 345 = 678$$

**Question 4.**



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

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

given the graph of that function as shown above, where  $b > 0$ . Hence state the exact value of  $2^a \times 3^b \times 5^c$ .

**Question 5.** State the remainder when the polynomial

$$P(x) = 4x^7 + 12x^6 + 17x^5 + 22x^4 + 27x^3 + 32x^2 + 37x + 24$$

is divided by the linear function  $L(x) = 2x + 3$ .

**Question 6.** Solve the quadratic equation with real roots (Equation (A), Equation (B) or Equation (C)) for the **values** of  $x$ .

$$(A) \quad \frac{x^2}{4} + 13x + 493 = 0$$

$$(B) \quad x^2 + 12x + 27 = 0$$

$$(C) \quad \frac{x^2}{4} + 5x + 425 = 0$$

**Question 7.** Determine the 4<sup>th</sup> term in the binomial expansion of

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

**Question 8.** Solve for the value of  $x$  in the equation

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

**Question 9.** Solve for the **values** of  $x$  in the equation

$$3 \left| \frac{-1 \times \ln(2x)}{\ln(4)} + 5 \right| - 9 = 0$$

**Question 10.** Differentiate the following expression with respect to  $x$ .

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

**Question 11.** State the value of

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

**Question 12.** Integrate the following expression 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 13.** Solve for the **values** of  $x$  in the equation

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

**Question 14.** Solve for the **values** of  $x$  in the following simultaneous equations (Equation (D) and Equation (E)).

$$(D) \quad 5y = x + 46$$

$$(E) \quad (x + 5)^2 + (y - 16)^2 = 65$$

**END OF PRACTICE QUESTIONS DOCUMENT**

# THE CHALLENGE

## Practice Questions' Answers

### NOTE THE FOLLOWING:

- The system **will accept** any answer that is *algebraically* and *reasonably* equivalent to the suggested answer.
  - For example, both  $\tan x$  and  $\frac{\sin x}{\cos x}$  will be accepted as the anti-derivative of  $\sec^2 x$  as they are *algebraically* and *reasonably* equivalent to each other.
- Any answer that is in the Times New Roman font are in **exact form**. The system **will not accept** any answer that has been rounded off.
- Any answer that is in the Arial font are **rounded off**. The system **will not accept** any answer that is **not exactly as shown** in this answer key.
  - However, if your answer contains a few more decimal places (e.g. "123.000") than the suggested answer (e.g. "123"), **your answer will be accepted** by the system.

No.	Answer	Remarks
1	20	—
2	103	—
3	85.25	This is the value of $x$ .
4	7031250	There are <b>no other acceptable answers</b> .
5	0	—
6	-9 and -3	These are the roots of Equation (B).
7	$-\frac{20}{27}$	There are <b>no other acceptable answers</b> .
8	36.75	This is the value of $x$ .
9	8 and 32768	These are the solutions to the equation.
10	$-5 \sin(5x + 6) - 5 \cos(5x + 6) - \frac{3}{2 - 3x}$	The system will accept any <b>equivalent</b> form of the answer.
11	-1133.333	This needs to be rounded to 3 decimal places.
12	$3e^{x+7} + 2 \tan(x) + 9 \sin(x + 3)$	The system will accept any <b>equivalent</b> form of the answer.
13	-1 and -4 and -6	Your answer must show <b>all three roots</b> .
14	-1 and -6	These are the solutions to the simultaneous equations.

**END OF ANSWERS DOCUMENT**