NOTICE

This document replaces any document with a version lower than

`1.0.0rc3`

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

$$10 \times 2$$

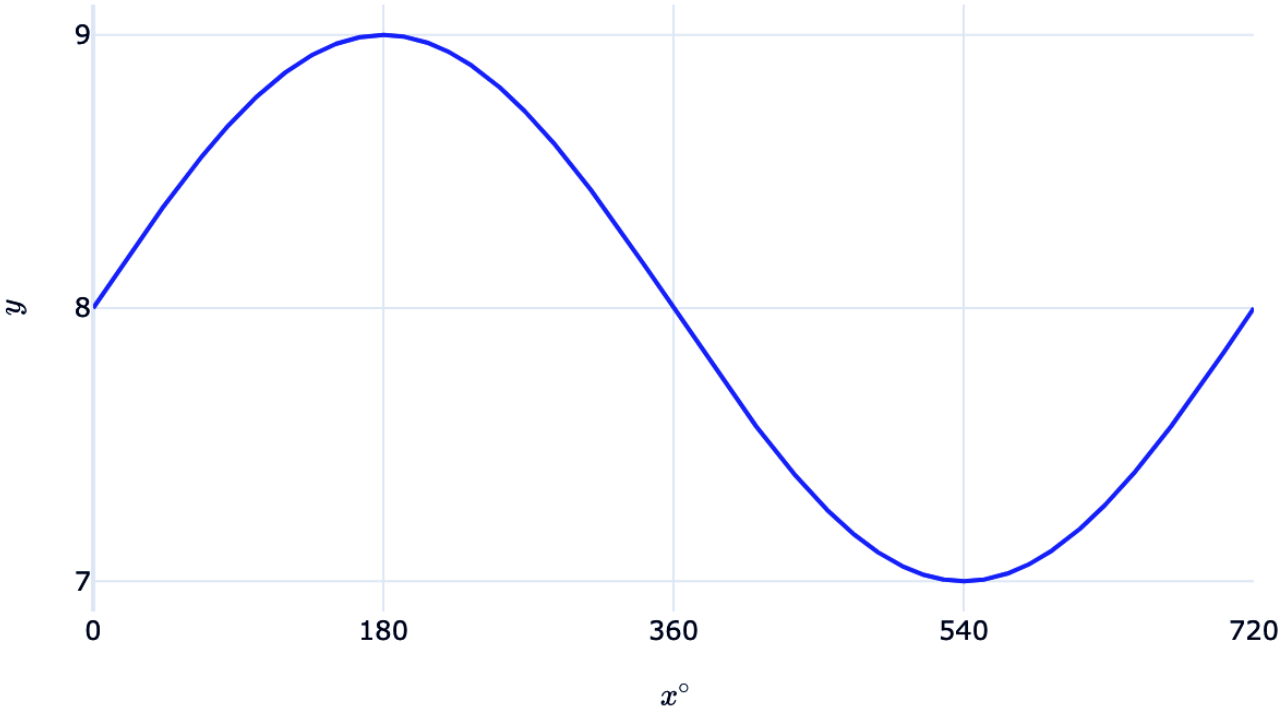
Question 2. State the value of

$$100 + 600 \div 200$$

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

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

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

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

$$\text{(A)} \quad \frac{x^2}{4} + 13x + 493 = 0$$
$$\text{(B)} \quad x^2 + 12x + 27 = 0$$
$$\text{(C)} \quad \frac{x^2}{4} + 5x + 425 = 0$$

Question 7. Determine the 4th 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.

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

Question 11. State the value of

$$\int_{-5}^{0} \left(8x^3 + 4x^2 + 4x\right)\ \mathrm{d}x$$

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

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

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

$$\text{(D)} \quad 5y = x + 46$$
$$\text{(E)} \quad \left(x + 5\right)^2 + \left(y - 16\right)^2 = 65$$

END OF PRACTICE QUESTIONS DOCUMENT

THE CHALLENGE
Practice Questions' Answers

NOTE THE FOLLOWING:

- Any answer that is *algebraically* and *reasonably* equivalent as the suggested answer **will be accepted by the system**.
  - 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* the same as each other.
- Any answer that is in the Times New Roman font are in **exact form**. Any answer that has been rounded off **will not be accepted by the system**.
- Any answer that is in the Arial font are **rounded off**. Any answer that is not **exactly as shown** in this answer key **will not be accepted by the system**.
  - However, if your answer contains a few more decimal places (e.g. "123.000" instead of the model answer of "123"), **your answer will be accepted**.

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

END OF ANSWERS DOCUMENT