# NOTICE

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

**`1.0.0rc5`**

**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

$$10 \times 2$$

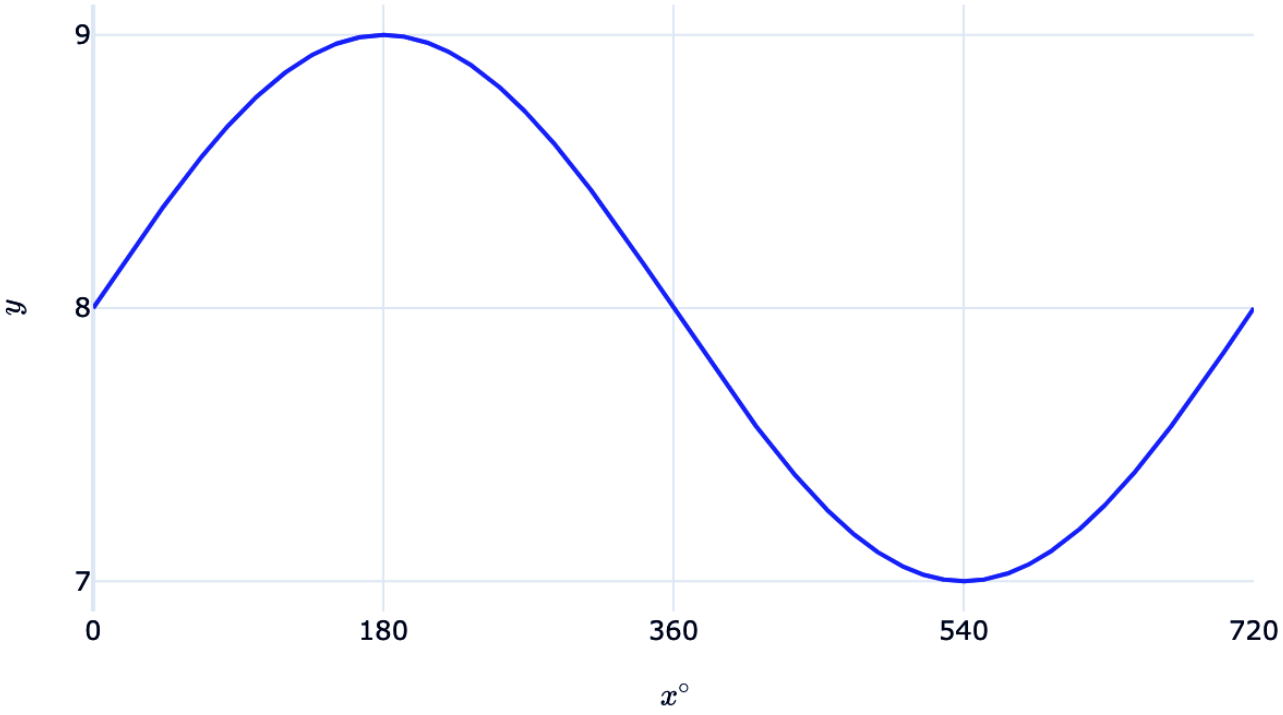
**Question 2.** State the value of

$$100 + 600 \div 200$$

**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:**

- 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 **no other acceptable answers**. |
| **5** | 0 | — |
| **6** | -9 and -3 | These are the roots of Equation (B). |
| **7** | $-\frac{20}{27}$ | There are **no other acceptable answers**. |
| **8** | 36.75 | This is the value of $x$. |
| **9** | 8 and 32768 | These are the solutions to the equation. |
| **10** | $-5\sin(5x+6)-5\cos(5x+6)-\frac{3}{2-3x}$ | The system will accept any **equivalent** 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 **equivalent** form of the answer. |
| **13** | -1 and -4 and -6 | Your answer must show **all three roots**. |
| **14** | -1 and -6 | These are the solutions to the simultaneous equations. |

**END OF ANSWERS DOCUMENT**