ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 1:

Suppose that you write on a piece of paper all integers from 1 through 100. How many times are you going to use the digit 1?

ANSWER: _____

* *

QUESTION 2:

Pete orders a 14" pizza and Jonathan orders a 10" pizza of the same thickness. Pete remarks, "I have 2 times as much pizza as you do!" To the nearest percent, what is his percent error?

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 3:

One can check that

$$2011 = 7^2 + 21^2 + 39^2 = 21^2 + 27^2 + 29^2 = 9^2 + 9^2 + 43^2.$$

There is another writing like these which can be encoded

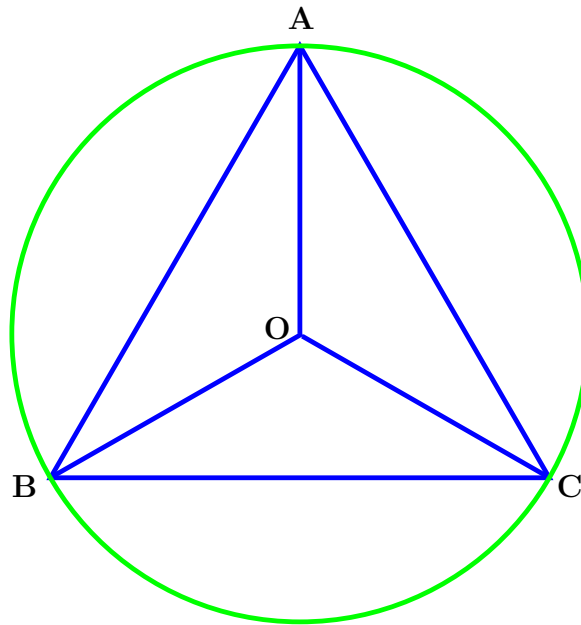$$2011 = (a - 10)^2 + (a + 10)^2 + 33^2.$$

Find the positive value of a.

ANSWER: _____

$* *$

QUESTION 4:

The equilateral triangle ΔABC is inscribed in a circle of radius **2** and center O. Find the area of ΔABC.

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 5:

Given that $\dfrac{3}{4} < \dfrac{a}{b} < \dfrac{4}{5}$ for positive integers a and b, what is the minimum possible value of b?

ANSWER: ——————————————

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QUESTION 6:

If $\sin x + \cos x = \dfrac{1}{2}$, what is the value of $\sin(2x)$?

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 7:

Find the smallest positive integer n such that $\dfrac{n}{2}$ is a perfect square and $\dfrac{n}{3}$ is a perfect cube.

CIPHERING ROUND 1

ANSWER: _____

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QUESTION 8:

What is the last digit of 3^{226}?

ANSWER: _____

* *

QUESTION 1:

Thomas read a 175-page book from Monday through Friday. Each day, beginning with Tuesday, he read 5 more pages than he read the previous day. How many pages did Thomas read on Monday?

CIPHERING ROUND 2

ANSWER: ―――――――――――――――

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QUESTION 2:

Solve the equation $3^{27^x} = 27^{3^x}$.

CIPHERING ROUND 2

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 3:

Let $x = 0.\underbrace{999....9}_{99 times}$. Find the number of 9's that are in the first **99** decimal places of the number $\sqrt{x}$.

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 4:

Find the digit in the 2011th decimal place of the number

$$\frac{2}{11} + \frac{11}{2}.$$

ANSWER: —————————————

✳✳

QUESTION 5:

The positive integers **13**, x, and y are the sides of a triangle. If $xy = 105$, then find the perimeter of the triangle.

ANSWER: ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

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QUESTION 6:

In a drawer there are 6 white hats and 4 blue hats. Two hats are selected at random (without replacement). Find the probability that the hats have the same color.

ANSWER: ⸻

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QUESTION 7:

Find the value of

$$\cos 1° + \cos 2° + \cos 3° + \cdots + \cos 177° + \cos 178° + \cos 179°.$$

CIPHERING ROUND 2

ANSWER: _____

* *

QUESTION 8:

Andy goes to the swimming pool every two days. Erica goes every five days. Dan goes every eight days. Today is Saturday and they are all at the swimming pool. Which day of the week will Andy, Erica, and Dan meet again at the swimming pool?