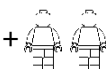


A correct answer to any of these questions will not give you points on the Interschool but instead will allow you to bring in additional students from your school. You have three attempts at each question, after which you cannot turn in an answer for that question again. *Good luck and have fun!*

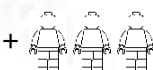
THETA

1. + 

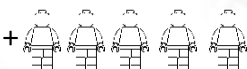
The repeating decimal $0.1\overline{26}$ can be expressed as a simplified fraction $\frac{A}{B}$, where A and B are positive integers. Find $A + B$.

2. + 

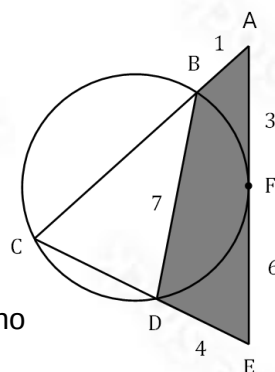
What is the only prime number that is the sum of four consecutive primes?

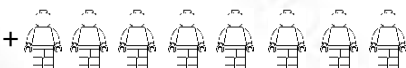
3. + 

Evaluate: $\sqrt{6 + 11\sqrt{6 + 11\sqrt{6 + 11\sqrt{\dots}}}}$

4. + 

In the figure (right), B, C, D, F are points on the circle, and $\overline{AE}$ is tangent to the circle at F . The area of the shaded quadrilateral $ABDE$ can be written in the form $\frac{x\sqrt{y}}{z}$, where x, y, z are positive integers, y is not divisible by the square of any prime, and x and z have no prime factors in common. What is $x + y + z$?



5. + 

$P(x)$ is a third degree monic polynomial which has a remainder of 5 when divided by $x - 1$ and a remainder of 7 when divided by $x + 1$. The graph of $P(x)$ intersects the y -axis at $y = 3$. Find the remainder when $P(x)$ is divided by $x - 3$.

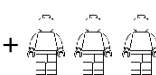
ALPHA

6. + 

What is the amplitude of the graph of $y = \sqrt{26} \sin(3x) + \sqrt{10} \cos(3x)$?

7. + 

The 2026 complex roots of the equation $x^{2026} - 4 = 0$ are plotted in the complex plane. Let A be the area of the convex polygon region that has these points as vertices. Find $[10A]$, where $[\cdot]$ is the greatest integer function.

8. + 

Given the following system of equations:

$$3x + 2y - z + 8w - 5p + 6q = 4$$

$$x + 3y + 10w - 4p + 2q = 5$$

$$2x + 4y - 2z + 3p + 6q = 0$$

$$5y + z - 2w - 2p + 2q = -1$$

$$5x + 6y + 3z + 14w + 6q = 7$$

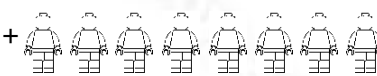
$$x + 7y + 5z + 2w - p + 2q = 1$$

What is w ?

9. + 

Let $x^3 - 20x^2 + 26x - 1 = 0$ have roots α , β , and γ . Evaluate:

$$\tan(\arctan(\alpha) + \arctan(\beta) + \arctan(\gamma))$$

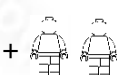
10. + 

An ellipse with eccentricity $e = \frac{2}{3}$ has a focus at the origin with corresponding directrix that has equation $y = -2x + 3$. If (a, b) are the coordinates of the vertex of the ellipse that is between this focus and directrix, find $a + b$.

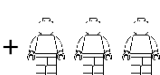
MU

11. + 

Find the value of $\sqrt[3]{26}$ when approximated from $\sqrt[3]{27}$ using differentials. Use the function $y = \sqrt[3]{x}$.

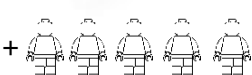
12. + 

Darsh has X linear feet of fencing and wants to enclose a rectangular area with a river along one side; hence, he does not need fencing along the river. The maximum area he is able to enclose is 200 square feet. Find X .

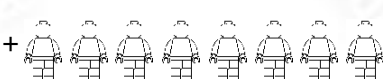
13. + 

Evaluate:

$$\int_0^1 \sqrt{1 - \sqrt{1 - x}} dx$$

14. + 

The functions $f(x) = x^2 + 1$ and $g(x) = -x^2$ share a common tangent line of positive slope. What is the equation of this tangent line in slope-intercept form?

15. + 

Evaluate:

$$\int_0^{2026} \frac{x - 2026}{\ln\left(\frac{x}{2026}\right)} dx$$

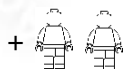
OPEN

16.



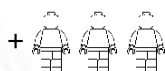
What is the smallest number n such that in a room of n people, the probability that at least two people have the same birthday is larger than 50%? Exclude February 29.

17.



In a 1900 speech to the International Congress of Mathematicians, David Hilbert set out a list of unsolved problems in mathematics. Let X be the number of problems on his list, and let Y be the number of problems from his list that have been completely solved as of October 2025. Find $X + Y$.

18.



Find the sum of the two missing numbers in the following movie quote:

The Man Upstairs: You know the rules, this isn't a toy!

Finn: Um... it kind of is.

The Man Upstairs: No, actually it's a highly sophisticated inter-locking brick system.

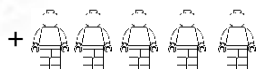
Finn: But we bought it at the toy store.

The Man Upstairs: We did, but the way I'm using it makes it an adult thing.

Finn: The box for this one said "Ages __ to __"!

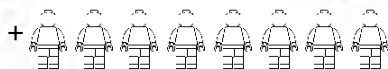
The Man Upstairs: That's a suggestion. They have to put that on there.

19.



Statistic $\hat{g}$ is an unbiased estimator of γ , a parameter in a certain population. It is known that the sampling distribution for $\hat{g}$ is $Uniform\left(\gamma - \frac{6}{\sqrt{n}}, \gamma + \frac{6}{\sqrt{n}}\right)$, where n is the sample size. If Ishika takes a sample of size 9 from the population and calculates a value of $\hat{g} = 10$, then find a 95% confidence interval for γ . Express your answer in interval notation.

20.



What is the first number in the sequence of integers of the form 3...3,331 (i.e. all digits 3 except a units digit of 1) that is composite?