



Ottawa Team Math Contest

Team Round Solutions

Part A: Each correct answer is worth 3.

1. What is the last digit of the product of the first 2025 odd prime numbers?

A) 1 B) 3 C) 5 D) 7 E) 9

5 is multiplied. Odd multiples of 5 always have last digit 5.

~Problem proposed by Rex

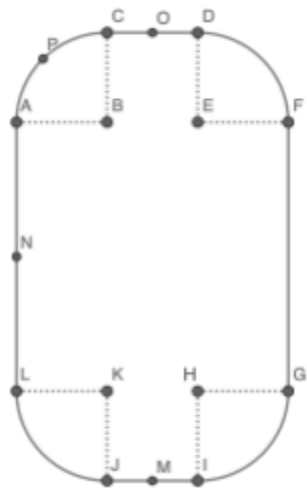
2. Suppose Eric adds up all the digits of the positive integer 3^{2025} , getting the positive integer n_1 . Then, he adds up all the digits of n_1 to get n_2 . He keeps repeating this process until he ends up with a one-digit number. What is that number?

A) 1 B) 3 C) 5 D) 6 E) 9

A number that is a multiple of 9 always has its sum of digits a multiple of 9.

~Problem proposed by Rex

3. A hockey rink (as shown) is defined by a 12-sided polygon ABCDEFGHIJKL where angles measures of B, E, H, K are 270° , $AL = FG = 3$, the remaining lengths are 1, and four quarter circles join the corners to complete the shape. Let a puck rebound off the perimeter of ACDFGIJL such that its incident angle is equivalent to its rebounded angle. Given the points M, N, O, P, find what point puck P just rebounded off of, given it started at point M in the direction of point N and has already rebounded 2025 times.



- A) M **B) N** C) O D) P E) None of the above

$2025 \equiv 1 \pmod{4} \rightarrow$ Puck moves once, M goes to N.

~Problem proposed by Karan

4. What is the remainder when $6^6 + 7^7 + 8^8$ is divided by 10?

- A) 5** B) 6 C) 7 D) 8 E) 9

Find Patterns of Last Digit:

Powers of 6 always have the last digit 6.

Powers of 7: 7, 9, 3, 1, 7, 9, 3

Powers of 8: 8, 4, 2, 6, 8, 4, 2, 6

$\rightarrow 6 + 3 + 6 = 15$

~Problem proposed by Karan



5. BattleCatsBoy is trying to build a deck of 8 cards, and each card in this game ranges from 1 to 9 elixirs, inclusive (For those who play Clash Royale, “The Mirror” is not considered as a card here). The application calculates the deck’s average elixir cost by summing up all individual card’s elixir costs and dividing it by 8 - rounding it to the nearest 1 decimal place. Given that there are exactly 6 one-elixir cards in the game, and unlimited number of other cards, what is the average elixir cost of the 13th lowest elixir deck one can build; in other words, what is the 13th lowest possible average elixir cost in the game?

A) 2.4 B) 2.5 C) 2.6 D) 2.7 **E) 2.8**

The lowest total elixir cost is $1+1+1+1+1+1+2+2 = 10$. (there are 6 one elixir cards so the optimal way is to use all 6 of them and fill in the rest with 2 elixir cards)

Each place lower would have the total elixir cost increased by 1 from the previous place (i.e. 2nd lowest would have total 11, 3rd would have 12 etc.), then the 13th has a total cost of 22.

$$22/8 = 2.75 \rightarrow 2.8$$

~Problem proposed by Rex

6. There are 5 lines in a plane, and 3 of these lines are concurrent to each other (i.e. they intersect at one point), and the rest are not. None of the lines are parallel to each other. How many points of intersections are there?

A) 6 **B) 8** C) 10 D) 12 E) 14

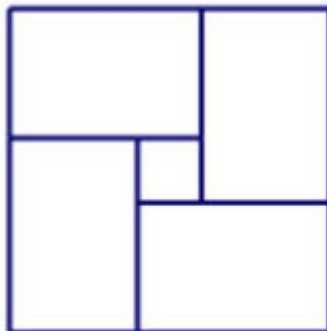
If no lines are concurrent, then they would have $C(5, 2) = 10$ intersections.

However, given that 3 lines are concurrent, which means they would’ve intersected at $C(3,2) = 3$ points but now only 1 point, the total is subtracted by 2: $10 - 2 = 8$

Note: The number of intersections of n lines given no lines are parallel or concurrent can be written as $C(n, 2)$ because every possible combination of 2 lines yields one intersection.

~Problem proposed by Rex

7. A large square is divided into 4 congruent rectangles and a smaller square as shown. Given that each rectangle has area 35 and the small square has area 4, find the positive difference between the length and the width of each rectangle.



- A) 1 **B) 2** C) 3 D) 4 E) 5

The total area is $35 \times 4 + 4 = 144$. Thus, the side length of the large square is 12. Label the long side of a congruent rectangle as x , and the short side as y . Therefore, $x+y = 12$ and $xy = 35$. Solving this equates $x = 7$ and $y = 5$. Thus, $x-y = 2$.

~Problem proposed by Rex - Inspired by 2016, the 27th Shanghai Yatai Tournament Mock Final (Grade 4) Problem #2

8. Three couples each send text messages on a fixed schedule between 8:00 AM and 9:00 AM—which we treat as minute 0 through minute 60:
- Karan & Vickie: First text at minute 0, then every 6 minutes (0,6,12...)
 - Matthew & Emily: First text at minute 1, then every 7 minutes
 - Eric & Juliann: First text at minute 3, then every 11 minutes

A text event is a minute in which at least one couple sends a text. How many total text events occur between minutes 0 and 60 (inclusive)?

- A) 21 B) 22 C) 23 **D) 24** E) 25

Karan & Vickie text 11 times in the hour. Matthew & Emily text 9 times in the hour. Eric & Juliann text 6 times in the hour. However, there are double instances, namely at 8:36, where all three couples text at the same time. Therefore, the answer is $11 + 9 + 6 - 2 = 24$

~ Problem proposed by Rex, the only single person in OTMaC 2025 Team at the time



9. $x + y + z = 15$, $xy + yz + xz = 74$. Compute $x^2 + y^2 + z^2$.

A) 57 B) 67 **C) 77** D) 87 E) 97

$$x^2 + y^2 + z^2 = (x+y+z)^2 - 2(xy + yz + xz) = 15^2 - 2(74) = 225 - 148 = 77$$

~ Problem proposed by Rex

10. Define a 45° or 30° measure angle as a “special angle”. How many unique **scalene** triangles are there such that all 3 of the angles have a measure of integer degree and have at least one special angle?

A) 138 B) 140 C) 141 D) 284 E) 285

Suppose a scalene triangle with one angle being 30° . The other two angles must sum to 150. Example combinations include 1 and 149, 2 and 148 74 and 76. Thus, it is evident that there are 73 unique scalene triangles with one angle being 30° (you must exclude the case of 30° - 30° - 120° and 30° - 75° - 75° since those aren't scalene). Similarly, there are 66 unique triangles that are scalene with an angle of 45° . However, we must eliminate the double case of a 30° , 45° , triangle which is included in both settings. Thus, the answer is $73 + 66 - 1 = 138$

~ Problem proposed by Karan

Part B: Each correct answer is worth 4.

11. The nine squares of a 3×3 grid are to be colored red, white, and blue, so that no row or column contains squares of the same color. How many different patterns can be made?

A) 4 B) 6 C) 9 **D) 12** E) 18

Name the 3 colours A, B, C. It is obvious that there are only 2 triples of combinations of A, B, C such that if we fill in the 3 rows with them (each row with a triple) by any order, no column contains squares of the same colour.

Triple 1:

ABC

BCA

CAB

Triple 2 (you may treat it as a horizontal reflection of triple 1):

CBA

ACB

BAC

Each of the above cases can be rearranged in $P(3,3) = 6$ possible permutations.

Therefore, total = $2 \times 6 = 12$

~Problem proposed by Rex - Taken from AMSP 2023 Counting Strategies Level 2 Course

12. Let S be the value of the following expression:

$$\left(1 + \frac{2}{1}\right)\left(1 + \frac{2}{2}\right)\left(1 + \frac{2}{3}\right)\left(1 + \frac{2}{4}\right) \cdots \left(1 + \frac{2}{2024}\right)\left(1 + \frac{2}{2025}\right)$$

What is the sum of all digits of S?

A) 19 B) 20 C) 21 D) 22 E) 23

Add the fractions inside the bracket and telescope yields:

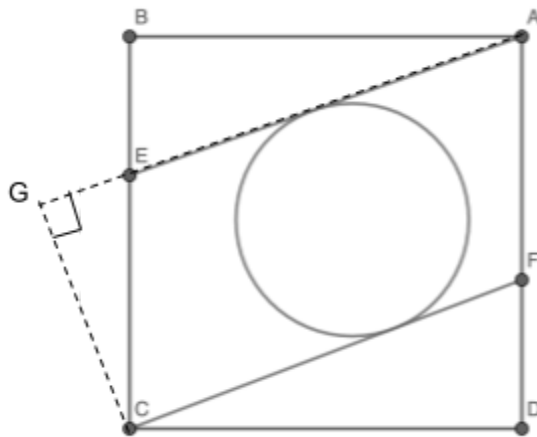
$$\frac{3}{1} \cdot \frac{4}{2} \cdot \frac{5}{3} \cdot \frac{6}{4} \cdots \frac{2026}{2024} \cdot \frac{2027}{2025} = \frac{2026 \times 2027}{1 \times 2}$$

From here, you can either brute force the multiplication or simply just realize that:

$2026 \equiv 1$ and $2027 \equiv 2 \pmod{9}$, which means answer $\equiv \frac{1 \times 2}{1 \times 2} \equiv 1 \pmod{9}$. Only 19 in the choices satisfies $1 \pmod{9}$ so the answer must be 19.

~Problem proposed by Rex - Inspired by 2016, the 27th Shanghai Yatai Tournament Mock Final (Grade 4) Problem #4

13. Let ABCD be a square with area 10. Point E is on line segment BC such that $CE = 2BE$; point F is on line segment AD such that $AF = 2DF$. A circle is drawn so that it is tangent to AE and CF, what is the area of that circle?



- A) $\frac{2}{3}\sqrt{10}\pi$ B) $\frac{3}{\sqrt{10}}\pi$ C) π D) $\frac{\sqrt{10}}{3}\pi$ E) $\frac{10}{9}\pi$

The square has side length of $\sqrt{10}$. Construct line segment CG such that CG is perpendicular to line AE at G, as shown. It is obvious that triangles ABE and CGE are similar, both having side length ratio $1-3-\sqrt{10}$. Since $CE = \frac{2}{3}BC = \frac{2\sqrt{10}}{3} \Rightarrow CG = 2$, The radius of the circle is just half of CG, which is 1. Thus, the area is π .

~Problem proposed by Rex

14. Some positive integers sum up to 11 and their maximum possible product is P; some other positive integers have a product of 80 and their minimum possible sum is S. What is $P - S$?

- A) 17 B) 32 C) 35 D) 41 E) 43

With some basic experimentation, $3 + 3 + 3 + 2 = 11$ gives the largest possible product of 54. Similarly, $4 + 4 + 5$ or $2 + 2 + 2 + 2 + 5 = 13$ gives the minimum possible sum while having a product of 80. Therefore, the solution is $54 - 13 = 41$

~Problem proposed by Rex

15. There are unique integers a_2, a_3, a_4, a_5 such that $\frac{4}{5} = \frac{a_2}{2!} + \frac{a_3}{3!} + \frac{a_4}{4!} + \frac{a_5}{5!}$ subject to $0 \leq a_i < i$ for $i = 2, 3, 4, 5$. Compute $a_2 + a_3 + a_4 + a_5$

A) 6 B) 7 C) 8 D) 9 E) 10

Make all the denominators $5! = 120$, then you would get $96 = 60a_2 + 20a_3 + 5a_4 + a_5$. With the constraints given, it is obvious that only $a_2, a_3, a_4, a_5 = 1, 1, 3, 1$ work

~Problem proposed by Rex - Inspired by 1999 AHSME Problem #25

16. Let ABCD be a trapezoid where $AB \parallel CD$ and $AB > CD$. Let the angle bisector of B intersect AD at E such that E lies on the circumcircle of $\triangle ABC$. Given that $\angle ABE = 15^\circ$, $\angle ADC = 90^\circ$, and $DC = 2$. The length of BE can be represented as $a(\sqrt{b} + \sqrt{c})$ for some positive integers a, b, and c, where b and c do not have any perfect square divisors other than 1.

What is $a + b + c$?

A) 8 B) 9 C) 10 D) 11 E) 12

$\angle ABE = 15^\circ$ and BE bisects $\angle B$ implies that $\angle ABC = 30^\circ$. Since E lies on the circumcircle of $\triangle ABC$ (aka. A, B, C, E cyclic), $\angle AEC = 180^\circ - \angle ABC = 150^\circ$. Then, $\angle CED = 30^\circ$, yielding $CE = 4$ as $\triangle CED$ is 30-60-90. It is also obvious that $\angle BCE = 90^\circ$ as $\angle BCD = 180^\circ - \angle ABC = 150^\circ$ ($AB \parallel CD$) and $\angle DCE = 60^\circ$. As it is found that $\triangle BCE$ is a 15-75-90 triangle with $CE = 4$, one may use the well known result that $\sin(15^\circ) = \frac{\sqrt{6}-\sqrt{2}}{4}$ from here to directly find $BE = 4(\sqrt{6} + \sqrt{2})$, or this will result in a few more extra steps. For example, it is easy to see that $\triangle ABE \cong \triangle CBE$ (AAS), yielding $AE = CE = 4$, then line segment CF may be constructed such that F is on AB and $AD \parallel CF$ (aka. CF is the translation of AD by 2 units to the right), so $CF = AD = AE + DE = 4 + 2\sqrt{3}$ (note that $DE = 2\sqrt{3}$ because of the earlier result that $\triangle CED$ is 30-60-90. Then knowing that

$\triangle BCF$ is also 30-60-90 yields $BC = 2CF = 8 + 4\sqrt{3}$, which also implies that $AB = 8 + 4\sqrt{3}$. Now, applying Pythagorean Theorem in $\triangle ABE$, using that $AE = 4$, $AB = 8 + 4\sqrt{3}$, is sufficient to find that $BE = 4(\sqrt{6} + \sqrt{2})$.

~Problem proposed by Karan - Approved by Professor Dragos Calitoiu

17. Rex wants to play PUBG with Karan, and they decided to meet at McDonald's this morning. Rex really wants to play PUBG but sleeps too much sometimes, so he can arrive any time at McDonald's between 9am and 11am and he can stay for at most 2 hours but he must leave no later than 12pm. Karan says he has to do robotics, so he will leave immediately if he doesn't see Rex at McDonald's the moment he arrives, and Karan can arrive any time between 9am and 12pm. If the probability of Rex successfully meeting Karan can be expressed as $\frac{m}{n}$ such that m and n are coprime, what is $m + n$?

A) 7 B) 9 C) 13 D) 17 **E) 19**

We may casework this problem by considering the time range Karan arrives.

Case 1: Karan arrives between 9am and 11am, the same time range as Rex ($P = \frac{2}{3}$)

In this case, as long as Rex arrives before Karan, they get to play together, and there is $\frac{1}{2}$ chance of that happening by intuition. So Case 1: $\frac{2}{3} \cdot \frac{1}{2} = \frac{1}{3}$

Case 2: Karan arrives between 11am and 12pm ($P = \frac{1}{3}$)

This case is a bit more complicated as caseworking Rex's arrival time is also required.

Case 2.1: Rex arrives between 10am and 11am ($P = \frac{1}{2}$)

If Rex arrives in this time range, which means he wouldn't leave until 12, then it is obvious that he can 100% meet Karan successfully. So Case 2.1: $\frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6}$

Case 2.2: Rex arrives between 9am and 10am ($P = \frac{1}{2}$)

Suppose Rex arrives x minutes past 9 and Karan arrives y minutes past 11 for $0 \leq x, y \leq 60$. Then by intuition, they can meet successfully if and only if

$x > y$, which there is a 50% chance. So Case 2.2: $\frac{1}{3} \cdot \frac{1}{2} \cdot 50\% = \frac{1}{12}$

Overall probability = $P(\text{Case 1}) + P(\text{Case 2.1}) + P(\text{Case 2.2}) = \frac{1}{3} + \frac{1}{6} + \frac{1}{12} = \frac{7}{12}$

Answer = $7 + 12 = 19$

~Problem proposed by Rex - Inspired by real world context



18. Let I be the intersection of two chords AB and CD , where $BI > DI$. Take D' on BI such that $DI = DD'$. Given $AI = 2$, $CI = 3$, $D'I = 2\sqrt{6} - 2\sqrt{2}$, and $\angle DD'I = 75^\circ$, Find BI .

A) 5 B) 6 C) 7 D) 8 E) 9

In triangle $DD'I$, we can use the cosine law using angle $D'DI$ ($180 - 2(75) = 30$) and $D'I$ (given). From this, we find that $DI = DD' = 4$. Now, we can apply the Power of a Point of I where $CI \times DI = AI \times BI$. From this, we conclude $BI = 6$.

~Problem proposed by Karan

19. If a Baby Dragon weighs 100kg, an Ice Golem weighs 85kg, a Hog weighs 70kg, and there are exactly X Baby Dragons, Y ice golems, and Z Hogs that weigh a total of 2025kg (X, Y, Z are nonnegative integers), how many possible triples of (X, Y, Z) are there?

A) 17 B) 18 C) 19 D) 20 E) 21

Since the total weight is odd, there must be an odd number of Ice Golems.

Thus, casework can be done with the cases categorized by the number of Ice Golems.

1 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (4, 22), (11, 12), (18, 2) \rightarrow 3 triples

3 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (3, 21), (10, 11), (17, 1) \rightarrow 3 triples

5 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (2, 20), (9, 10), (16, 0) \rightarrow 3 triples

7 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (1, 19), (8, 9) \rightarrow 2 triples

9 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (0, 18), (7, 8) \rightarrow 2 triples

11 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (6, 7) \rightarrow 1 triple

13 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (5, 6) \rightarrow 1 triple

15 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (4, 5) \rightarrow 1 triple

17 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (3, 4) \rightarrow 1 triple

19 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (2, 3) \rightarrow 1 triple

21 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (1, 2) \rightarrow 1 triple

23 Ice Golem \rightarrow (# of Baby Dragon, # of Hog) = (0, 1) \rightarrow 1 triple

Total = 20 triples

Note: Although this method seems very tedious, some patterns can be easily found as you casework things through if you have good number sense, so the method does not take as long as it seems. In particular, for cases with $11+$ Ice Golem, the pattern is obvious.

~Problem proposed by Rex



20. The only non-integer rational solution to the following polynomial $9x^6 + 12x^5 - 2x^4 - x^3 + 3x^2 - x$ can be represented as a/b , where a and b are coprime integers. What is $|100a - b|$?

A) 97

B) 197

C) 297

D) 397

E) 497

Using Polynomial Remainder and Factor Theorem, we know that possible roots of this polynomial are 1, -1, 1/3, -1/3, 1/9, -1/9. With some computation and intuition, the rational solution is 1/3. Thus, $|100a - b|$ is 97.

**Part C: Each correct answer is worth 6.**

21. Triangle ABC has a right angle at B and contains a point P such that $PA = 10$, $PB = 6$, and $\angle APB = \angle BPC = \angle CPA$. Find the length of line segment PC.

33

Let PC be x .

From $\angle APB = 120^\circ$ ($360^\circ/3$) with $PA = 10$ and $PB = 6$, the Law of Cosines gives:

$$AB^2 = 10^2 + 6^2 - 2 \cdot 10 \cdot 6 \cdot \cos(120^\circ) = 100 + 36 - 2 \cdot 10 \cdot 6 \cdot \left(-\frac{1}{2}\right) = 196$$

Using the same logic, $\angle BPC = 120^\circ$ ($360^\circ/3$) with $PB = 6$ and $PC = x$ gives

$$BC^2 = 36 + x^2 + 6x$$

Similarly, $\angle CPA = 120^\circ$ ($360^\circ/3$) with $PC = x$ and $PA = 10$ gives

$$AC^2 = 100 + x^2 + 10x$$

Since $\triangle ABC$ is right-angled at B, by Pythagorean Theorem, $AB^2 + BC^2 = AC^2$

Substituting the values yields $x = 33$.

~Problem proposed by Rex - Taken from AMSP 2023 Computational Geometry Course

22. If integers a, b, c, d form a geometric sequence such that $0 < a < b < c < d < 1000$, how many possible quadruples of (a, b, c, d) are there?

286

A sufficient way to count them is to observe that any four-term integer geometric sequence (a, b, c, d) with $0 < a < b < c < d < 1000$ must arise from choosing positive integers $p > q$ with $\gcd(p, q) = 1$ and a positive integer k , then setting:

$$a = q^3 k, b = q^2 p k, c = q p^2 k, d = p^3 k$$

Hence counting all valid quadruples reduces to:

1. Pick $p = 2, 3, \dots, 9$ (we need $p^3 < 1000$.)
2. Pick q with $1 \leq q < p$ and $\gcd(p, q) = 1$.
3. Pick k so that $q^3 k < 1000$.
4. Each such triple (p, q, k) gives a unique quadruple (a, b, c, d)

A quick tally:

- For $p = 2, p^3 = 8$. There is only $q = 1$, and $[999/8] = 124$ choices of k .
- For $p = 3, p^3 = 27$. Valid $q = 1, 2$ (both coprime to 3). Each allows $[999/37] = 37$ choices of k .
- For $p = 4, p^3 = 64$. Coprime $q \in \{1, 3\}$. Each has $[999/64] = 15$ choices of k .
- For $p = 5, p^3 = 125$. Coprime $q \in \{1, 2, 3, 4\}$. Each has $[999/125] = 7$ choices of k .
- For $p = 6, p^3 = 216$. Coprime $q \in \{1, 5\}$. Each has $[999/216] = 4$ choices of k .
- For $p = 7, p^3 = 343$. Coprime $q \in \{1, 2, 3, 4, 5, 6\}$. Each has $[999/343] = 2$ choices.
- For $p = 8, p^3 = 512$. Coprime $q \in \{1, 3, 5, 7\}$. Each has $[999/512] = 1$ choice.
- For $p = 9, p^3 = 729$. Coprime $q \in \{1, 2, 4, 5, 7, 8\}$. Each has $[999/729] = 1$ choice.

Summing all these contributions gives

$$p = 2: 124$$

$$p = 3: 2 \times 37 = 74$$

$$p = 4: 2 \times 15 = 30$$

$$p = 5: 4 \times 7 = 28$$

$$p = 6: 2 \times 4 = 8$$

$$p = 7: 6 \times 2 = 12$$

$$p = 8: 4 \times 1 = 4$$

$$p = 9: 6 \times 1 = 6$$

$$\Rightarrow \text{Total} = 124 + 74 + 30 + 28 + 8 + 12 + 4 + 6 = 286$$

~Problem proposed by Eric

23. A number set S contains 7 elements: $S = \{2, 3, 4, 6, 9, 12, 18\}$. If the product of a set is the product of all the elements in it, how many subsets of S (including S and empty set) has a product that is a multiple of 36?

101

Observing that every element in S is either a multiple of 2 or multiple of 3 or both, and 2 and 4 are the only two elements that is only a multiple of 2 AND 3 and 9 are the only two elements that is only a multiple of 3, we can conclude that if a subset of S has 4 elements or more, then its product must be a multiple of 36.

In total there are $2^7 = 128$ subsets of S , and there are $128/2 = 64$ subsets with 4 or more elements (subsets with 4 or more elements are symmetrical/opposite to 3 or less for a set of 7 elements). Subsets with 3 or less elements can be explored using casework.

Case 1: Length = 3

It can be observed that most subsets with length 3 work, so subtracting those that don't work from $C(7,3) = 35$ would yield the number of subsets with length 3 that is a multiple of 36.

*Subsets that **do not** work contain either both 2,4 or both 3,9:*

$\{2,3,4\}$, $\{2,4,6\}$, $\{2,4,12\}$, $\{2,3,9\}$, $\{3,6,9\}$, $\{3,9,18\}$

Therefore, there are $35 - 6 = 29$ subsets of length 3 that is a multiple of 36.

Case 2: Length = 2

Unlike Case 1, most subsets do not work here, so simply listing out the ones that work would be the strategy here. One way of doing this is to start with 18, the greatest number in S , then go lower.

$\{18, 2\}$, $\{18, 4\}$, $\{18, 6\}$, $\{18, 12\}$

$\{12, 3\}$, $\{12, 6\}$, $\{12, 9\}$

$\{9, 4\}$

Total = 8 subsets.

Therefore, combining all the subsets, there are a total of $64 + 29 + 8 = 101$ subsets that are multiples of 36.

~Problem proposed by Rex - Inspired by 2022 CIMC Problem A6



24. What is the sum of all positive divisors of 2025^2 that has a last digit of 1 OR 5?

7682623

25. In Clash Royale's Path of Legends, players gain 1 step for a win and lose 1 step for a loss, unless they are on a Golden Step, which cannot be lost. A Golden Step is earned after winning 3 games (not necessarily consecutively) since the last Golden Step. Once earned, it remains permanently. Rex starts at step 0 (a Golden Step) and needs to reach step 10 to enter Challenger III. Given that Rex has a 80% probability of winning each game, what is the probability that he reaches Challenger III within 12 games? Round to 2 significant digits.

Useful Fact: $0.8^{10} \approx 0.1074$

Example Scenario:

- Rex starts at step 0 (a Golden Step).
- He loses his first 10 games but stays at step 0 because step 0 is a golden step.
- He then wins 2 games (reaching step 2) but loses the next game (dropping to step 1).
- Winning another game moves him back to step 2, and since he has now won 3 games total since step 0, step 2 becomes a Golden Step.
- From here, he can never drop below step 2, no matter how many times he loses.
- The process repeats: every time Rex accumulates 3 wins after the previous Golden Step, he earns a new one.

0.34