The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
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2026 Fermat Contest

(Grade 11)

Wednesday, February 25, 2026
(in North America and South America)

Thursday, February 26, 2026
(outside of North America and South America)

Solutions

1. The cost to buy 2 F-MAT calculators is \$30, and so the cost to buy 4 F-MAT calculators is $2 \times \$30 = \$60$.

   Answer: (C)

2. *Solution 1*

   Factoring the numerator and simplifying, we get $\dfrac{101^2 - 101}{100} = \dfrac{101(101-1)}{100} = \dfrac{101(100)}{100} = 101$.

   Solution 2

   Evaluating, we get $\dfrac{101^2 - 101}{100} = \dfrac{10\,201 - 101}{100} = \dfrac{10\,100}{100} = 101$.

   Answer: (A)

3. Since 50% of 24 is 12, the membership increased by 12 members. Thus in the second year, there were $24 + 12 = 36$ members.

   Answer: (C)

4. If the number in the square immediately right of 16 is x, then $5 + 16 + x = 24$, and so $x = 24 - 21 = 3$. Notice that the 4th square must be filled with the number in the first square to give $3 + 5 + 16 = 5 + 16 + 3 = 24$. For the same reason, the 5th square must be filled with the number in the 2nd square (which is 5) to give $5 + 16 + 3 = 16 + 3 + 5 = 24$. Continuing in this way, the 6th square is filled with 16 and the number appearing in the square marked with a question mark is 3. The completed diagram is shown below.

3	5	16	3	5	16	3

   Answer: (A)

5. Evaluated, the left side of the equation is equal to $4^3 = 64$. Since $\dfrac{64}{4} = 16$, then the number of 4s in the sum on the right side of the equation is 16.

   Answer: (D)

6. The cost of each banana is half the cost of each apple, and so the cost to buy 8 bananas is the same as the cost to buy 4 apples. Therefore, the cost to buy 8 bananas and 4 apples is the same as the cost to buy $4 + 4 = 8$ apples. The total cost of the fruit is \$16.00, and so the cost of each apple is $\dfrac{\$16.00}{8} = \$2.00$.

   Answer: (E)

7. The bar graph shows that 6 times as many robins were observed as blue jays, and 3 times as many cardinals were observed as blue jays. Suppose that x blue jays were observed. Then $6x$ robins were oberved and $3x$ cardinals were observed. A total of 30 birds were observed, and so $x + 6x + 3x = 30$ or $10x = 30$, and so $x = 3$.

   On her walk, Leah observed $6x = 6(3) = 18$ robins.

   Answer: (D)

8. Since a, b, c, d are four consecutive positive integers, then $b = a + 1$, $c = a + 2$, and $d = a + 3$. Thus the value of $(a + d) - (b + c) = (a + a + 3) - (a + 1 + a + 2) = (2a + 3) - (2a + 3) = 0$.

   Answer: (B)

9. Suppose that the side length of the original square is x. Since the original square has area 10, then $x^2 = 10$. The new square has side length kx where k is a positive integer. The area of the new square is $(kx)^2 = k^2 \times x^2 = 10k^2$. Consider setting $10k^2$ equal to each of the five choices given and solving for k. Of these five choices, 90 is the only area for which k is a positive integer ($10k^2 = 90$ when $k = 3$).

Answer: (D)

10. *Solution 1*
Suppose that the the six-sided die is rolled first. The result of this roll is a positive integer from 1 to 6 inclusive. If the eight-sided die is rolled second, the probability that the number rolled is the same as the first number rolled is $\frac{1}{8}$.

Solution 2
Suppose that the eight-sided die is rolled first. The result of this roll is a positive integer from 1 to 8 inclusive. The probability that the first roll is a number from 1 to 6 inclusive is $\frac{6}{8}$. (If a 7 or 8 is rolled on the first die, the probability of rolling the same number on both dice is 0.) If the six-sided die is rolled second, the number rolled is the same as the first roll if the first roll is a number from 1 to 6 inclusive, which occurs with probability $\frac{6}{8}$, and the second roll matches the first, which occurs with probability $\frac{1}{6}$. Thus the probability that the same number is rolled on both dice is $\frac{6}{8} \times \frac{1}{6} = \frac{1}{8}$.

Solution 3
Consider the ordered pairs (a, b) for which a is the result of rolling the six-sided die and b is the result of rolling the eight-sided die.
There are 6 possible values of a and 8 possible values of b, and thus there are $6 \times 8 = 48$ ordered pairs representing the results of rolling the two dice.
Of these 48 ordered pairs, there are 6 for which the same number is rolled on both dice. These are $(1, 1)$, $(2, 2)$, $(3, 3)$, $(4, 4)$, $(5, 5)$, and $(6, 6)$, and so the probability that the same number is rolled on both dice is $\frac{6}{48} = \frac{1}{8}$.

Answer: (E)

11. Maria drove 500 km in 8 hours and thus had an average speed of $\frac{500 \text{ km}}{8 \text{ h}} = 62.5$ km/h.
Andrea's average speed was four times Maria's, or 4×62.5 km/h $= 250$ km/h.
Andrea's flight was 1500 km, and so her flight took $\frac{1500 \text{ km}}{250 \text{ km/h}} = 6$ hours.

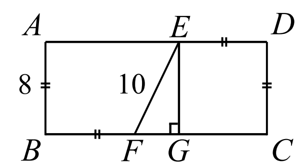
Answer: (D)

12. The smallest positive integer less than 100 that can be written as the sum of three consecutive integers is $1 + 2 + 3 = 6$.
The second smallest positive integer less than 100 that can be written as the sum of three consecutive integers is $2 + 3 + 4 = 9$, which is an increase of 3 from the previous sum.
In general, for positive integers a, the sum of three consecutive positive integers is
$a + (a + 1) + (a + 2) = 3a + 3$.
The next largest sum of three consecutive positive integers is $(a+1)+(a+2)+(a+3) = 3a+6$ which is $(3a + 6) - (3a + 3) = 3$ more than the previous sum.

That is, successive integers in the list of such sums will continue to increase by 3.
The largest positive integer less than 100 that can be written as the sum of three consecutive integers is $32 + 33 + 34 = 99$. (We note that $33 + 34 + 35 = 102 > 100$.)
Thus the positive integers less than 100 that can be written as the sum of three consecutive positive integers are of the form $3a + 3$ for positive integers $1 \leq a \leq 32$, and so there are 32 such numbers.

Answer: (D)

13. We begin by constructing line segment EG perpendicular to BC, as shown.
Then $EG = AB = 8$ and $\triangle EFG$ is right-angled at G.
By the Pythagorean theorem, $FG^2 = EF^2 - EG^2 = 10^2 - 8^2 = 36$, and so $FG = 6$ (since $FG > 0$).



Since $EGCD$ is a square, then $GC = ED = 8$. Thus, $BC = BF + FG + GC = 8 + 6 + 8 = 22$, and so the area of $ABCD$ is $AB \times BC = 8 \times 22 = 176$.

Answer: (B)

14. If a Sunday occurs on day n, then the next Sunday occurs on day $n + 7$ (7 days later).
Positive integers that differ by 7 have different *parity*, meaning that one is even and the other is odd.
Three of the pictures painted on Sundays have even numbers, and so the last of these pictures must have been painted $2 \times 7 = 14$ days after the first was painted. (Integers that differ by 14, or that differ by any even number, have the same parity.)
If the picture numbered 2 was the first picture painted on a Sunday, then the pictures numbered $2 + 14 = 16$ and $16 + 14 = 30$ were also painted on Sundays.
(You should confirm for yourself that this is the only possibility for which three of the pictures painted on Sundays have even numbers.)
The picture numbered 30 was painted on a Sunday, and so the picture numbered 25, painted 5 days earlier, was painted on a Tuesday.

Answer: (B)

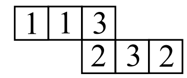
15. If $x : 4$ is equal to $9 : y$, then $\frac{x}{4} = \frac{9}{y}$ or $xy = 36$.
Since x and y are positive integers, then (x, y) is a positive divisor pair of 36.
The positive divisor pairs of 36 with $x < y$ are $(1, 36)$, $(2, 18)$, $(3, 12)$, and $(4, 9)$.
The reversals of these 4 ordered pairs (with $x > y$) are also positive divisor pairs.
In addition to these $4 \times 2 = 8$ ordered pairs, $(6, 6)$ is also a positive divisor pair of 36, and so there are 9 such ordered pairs.

Answer: (D)

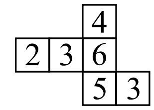
16. In equilateral $\triangle PXY$, the measure of $\angle PXY$ is 60° and $PX = XY$.
In square $WXYZ$, the measure of $\angle WXY$ is 90° and $WX = XY$.
Therefore, $\angle WXP = \angle WXY - \angle PXY = 90^\circ - 60^\circ = 30^\circ$ and $WX = PX$.
Thus $\triangle WXP$ is isosceles, and so $\angle PWX = \angle WPX = \dfrac{180^\circ - 30^\circ}{2} = 75^\circ$.
The measure of $\angle PWZ$ is $90^\circ - \angle PWX = 90^\circ - 75^\circ = 15^\circ$.
In a similar way, we can show that $\angle PZW = 15^\circ$, and so $\angle WPZ = 180^\circ - \angle PWZ - \angle PZW$ or $\angle WPZ = 180^\circ - 15^\circ - 15^\circ = 150^\circ$.

Answer: (A)

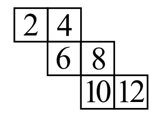
17. If the number on the top face is a 1, the cube is formed from the net shown to the right since it is the only net that contains the number 1. When this net is folded, the number on the face opposite either of the 1s is 3.



Of the remaining two nets, the net shown to the right is the only net that contains the number 3. Thus if the number on the top face is a 3, the cube is formed from this net. When this net is folded, the number on the face opposite either of the 3s is the other 3.



If the number on the top face is a 2, the cube is formed from the remaining net shown to the right. When this net is folded, the number on the face opposite the 2 is 8.



Therefore, the sum of the three numbers on the bottom faces is $3 + 3 + 8 = 14$.

Answer: (D)

18. The least possible value of $x - y$ is when x is minimized and y is maximized.
The least possible value of x is -4 and the greatest possible value of y is 17, in which case we get $x - y = -4 - 17 = -21$.
Attaining $x - y = -21$ rules out options **(A)** $-2 \le x - y \le 21$, **(B)** $6 \le x - y \le 13$, **(C)** $-13 \le x - y \le -6$, and **(D)** $5 \le x - y \le 28$ since -21 is *less* than -2, 6, -13, and 5.

Note that the greatest possible value of $x - y$ is when x is maximized and y is minimized. This happens when $x = 11$ and $y = 9$, giving $x - y = 11 - 9 = 2$, so indeed $x - y \le 2$ (as in (E)) is true for all such x and y.

Answer: (E)

19. No matter which ball is drawn first, there will be exactly 3 balls remaining with the same colour, and exactly 6 balls remaining with the same pattern. There is no overlap between these sets of 3 balls and 6 balls since there is only one ball with each possible colour and pattern combination.
There are $3 \times 6 = 18$ possible ways for the second ball to match the colour of the first ball and the third ball to match the pattern of the first ball.
There are $6 \times 3 = 18$ possible ways for the second ball to match the pattern of the first ball and the third ball to match the colour of the first ball.
Therefore, there are $2 \times 18 = 36$ possible ways that the remaining two balls can be drawn so that the condition is satisfied.
There are 28 balls in total, so there are 27 possibilities for the second ball, followed by 26 possibilities for the third ball once the second ball has been drawn. This gives a total of 27×26 ways that the last two balls can be drawn.

Putting things together, the probability that one of the last two balls will match the colour and the other will match the pattern is $\dfrac{36}{27 \times 26} = \dfrac{2}{39}$.

Answer: (B)

20. Suppose the common sum of the numbers in each row and in each column is S.
The total of all 12 integers in the grid is $3S$, since it is the sum of the 3 row sums. On the other hand, the total of all 12 integers in the grid is also $4S$ since it is the sum of all 4 column sums. Therefore, $3S = 4S$, which forces $S = 0$.

The second column is shown to contain a 7 and a -1, so the integer in the second row and second column must be -6 in order to make the column have a sum of $S = 0$.
Suppose the integer in the second row and fourth column is x. Then $4 + (-6) + c + x = 0$, or $x = 2 - c$.
The sum in the fourth column is $3 + (2 - c) + d = 5 + (d - c)$, but this sum must be $S = 0$, so $5 + (d - c) = 0$. Rearranging gives $5 = c - d$.

ANSWER: (C)

21. Suppose the midpoint of $P(a, b)$ and $Q(c, d)$ is $(0, 0)$. Then $\frac{a+c}{2} = 0$ and $\frac{b+d}{2} = 0$, which implies that $c = -a$ and $d = -b$.
Thus, the points $P(a, b)$ and $Q(-a, -b)$ are both on the given parabola. Substituting (a, b) and $(-a, -b)$ into the equation for the parabola gives the following two equations

$$b = -3a^2 + 4a + 27$$
$$-b = -3a^2 - 4a + 27$$

Subtracting these two equations gives $2b = 8a$ or $b = 4a$.

Substituting $b = 4a$ into the first equation gives $4a = -3a^2 + 4a + 27$, which can be simplified to $3a^2 = 27$ or $a^2 = 9$. Therefore, $a = \pm 3$, so $b = \pm 12$. Since $P(a, b)$ is above the x-axis, its y-coordinate, b, must be positive, so $b = 12$.

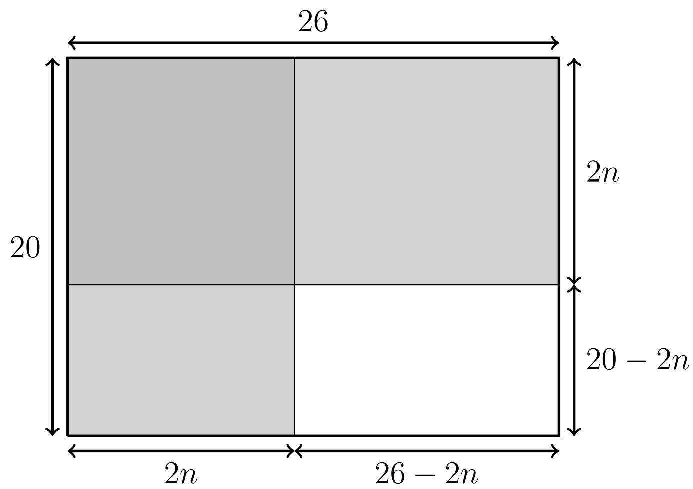
ANSWER: 12

22. *Solution 1*
The total area of the vertical strips is $n \times 2 \times 20 = 40n$ cm^2.
The total area of the horizontal strips is $n \times 2 \times 26 = 52n$ cm^2.
Each horizontal strip overlaps with each vertical strip in a rectangle. Each rectangle formed by an overlap has the same height as a horizontal strip and the same width as a vertical strip. Therefore, each overlapping rectangle has area $2 \times 2 = 4$ cm^2.

There are $n \times n = n^2$ overlaps in total, and each overlap is included in both the total area of the horizontal strips and the total area of the vertical strips.
Therefore, the total painted area is $(40n + 52n - 4n^2)$ cm^2. We are given that this is equal to $\frac{12}{13}$ of the total area of the rectangle, or $\frac{12}{13} \times 20 \times 26 = 480$ cm^2.
The integer n satisfies the equation $40n+52n-4n^2 = 480$, which is equivalent to $n^2-23n+120 = 0$.
Factoring gives $(n - 15)(n - 8) = 0$, so the possible values of n are $n = 8$ and $n = 15$. However, if $n = 15$, then the horizontal strips would cover a height of $2 \times 15 = 30$ cm. Since the rectangle has a height of 20 cm, and the horizontal strips do not overlap, this is impossible.
The only possible value of n is 8.

Solution 2
Shifting a horizontal strip up or down, will not change the total amount of the rectangle that is painted, as long as this shifting does not introduce overlap between horizontal strips. Similarly, shifting vertical strips to the left or right does not change the amount of the rectangle that is painted, as long as the shifting does not introduce overlap between vertical strips.

Because of this, we can assume *without loss of generality* that the horizontal strips are all at the top of the rectangle and exactly touching each other without overlap. We can also assume that the vertical strips are all at the left of the grid touching each other without overlap. This configuration is shown in the diagram.



The unpainted portion is a rectangle with width $26 - 2n$ and height $20 - 2n$. We are also given that the area of the painted portion is $\frac{12}{13}$ of the area of the 20×26 rectangle, so the area of the unpainted portion must be $\frac{1}{13}$ of 20×26.

Therefore, we have $(26 - 2n) \times (20 - 2n) = \frac{1}{13} \times 20 \times 26 = 40$. Expanding the left side gives $520 - 52n - 40n + 4n^2 = 40$, which can be rearranged to get $4n^2 - 92n + 480 = 0$.
Proceeding as in Solution 1, the only solution to this equation that makes sense given the context is $n = 8$.

ANSWER: 08

23. Suppose the number of *complete* strings of 1234 is k. We can compute the number of digits up to and including the rightmost 4 in the string. It is $4k$ (k occurrences of each of 1, 2, 3, and 4) plus the number of 5s, which is

$$4k + \Big(1 + 2 + 3 + 4 + \cdots + (k-2) + (k-1)\Big)$$

Note that the k 5s that follow the final 1234 are not included in this count. This sum is equal to

$$4k + \frac{(k-1)k}{2} = \frac{8k + k^2 - k}{2} = \frac{k^2 + 7k}{2}$$

so there are $\frac{k^2 + 7k}{2}$ digits up to and including the rightmost 4.

The total number of digits is 2026, so k must be the greatest integer satisfying $\frac{k^2 + 7k}{2} \leq 2026$, which is equivalent to $k^2 + 7k \leq 4052$.

Notice that $60^2 + 7(60) = 4020$ but $61^2 + 7(61) = 4148$, so we have that $k = 60$, meaning that there are 60 complete strings of 1234.

Thus, the number of digits up to and including the rightmost 4 is $\frac{60^2 + 7(60)}{2} = \frac{4020}{2} = 2010$. There would be 60 5s after the 60th 4, which is more than the $2026 - 2010 = 16$ digits needed to reach 2026 digits in total. This means there are no "partial" strings of 1234.

Therefore, among the first 2026 digits, there are 60 each of 1, 2, 3, 4 for a total of $4 \times 60 = 240$ digits, and the rest must be 5. Thus, $2026 - 240 = 1786$ of the digits are 5.

The sum of the first 2026 digits is

$$S = 1 \times 60 + 2 \times 60 + 3 \times 60 + 4 \times 60 + 5 \times 1786 = 9530$$

The sum of the digits of S is $9 + 5 + 3 + 0 = 17$.

ANSWER: 17

24. Let x be the number of rocks that are grey and not spotted, and let y be the number of rocks that are spotted and not grey. Then $n = x + y + 2m$, and we are given that $\frac{x+m}{y+m} = \frac{5}{2}$.

Rearranging the latter equation gives $2x+2m = 5y+5m$ or $3m = 2x-5y$. Scaling the equation $n = x + y + 2m$ by 3 gives $3n = 3x + 3y + 2(3m)$, into which we can substitute $3m = 2x - 5y$ to get $3n = 3x + 3y + 2(2x - 5y)$, which can be simplified to get $3n = 7(x - y)$.

Since x and y are integers, the above equation implies that n is a multiple of 7. Therefore, $n = 7k$ for some integer k. Substituting this into $3n = 7(x - y)$ leads to $3k = x - y$.

Since x, y, m and n are non-negative integers and $n = x + y + 2m$, the smallest possible value of m should correspond to the largest possible value of $x + y$, and the largest possible value of m should correspond to the smallest possible value of $x + y$. Since $x - y = 3k$ and x and y are non-negative, the smallest possible value of $x + y$ is when $x = 3k$ and $y = 0$, for a sum of $x + y = 3k$. In this case, $n = x + y + 2m$ is equivalent to $7k = 3k + 2m$, so $m = 2k$ is the largest possible value of m.

We have shown that (m, n) must take on the form $(j, 7k)$ where j is some integer with $0 \leq j \leq 2k$. Note that $100 < n < 300$ implies that $15 \leq k \leq 42$. We will show that all such pairs work, and then count the number of such pairs.

Given j and k so that $0 \leq j \leq 2k$, set $n = 7k$, $m = j$, $x = 5k - j$ and $y = 2k - j$. Note that since $0 \leq j \leq 2k$, both x and y are non-negative. Then we have

$$x + y + 2m = (5k - j) + (2k - j) + 2j = 7k = n$$

as well as

$$\frac{x+m}{y+m} = \frac{5k-j+j}{2k-j+j} = \frac{5}{2}$$

so both conditions are satisfied. Therefore, all such ordered pairs (m, n) work.

For each k from 15 through 42, there is one ordered pair for each value of j from $0 \leq j \leq 2k$. There are $2k + 1$ such values. Thus, the total number of ordered pairs is

$$\begin{aligned}[2(15)+1] + [2(16)+1] + [2(17)+1] + \cdots + [2(42)+1] &= 2(15 + 16 + 17 + \cdots + 42) + 28 \\ &= 2 \cdot \frac{28}{2}(15 + 42) + 28 \\ &= 28(15 + 42 + 1) \\ &= 28(58) \\ &= 1624\end{aligned}$$

ANSWER: 24

25. Since 1 is a divisor of all other digits, 1 must be the rightmost digit. Thus, we can count the number of lists of the integers 2 through 10 with the given property.

The integer 7 has no divisors or multiples other than itself among the integers from 2 through 10, which means it can be placed anywhere. There are 9 ways to place 7, which means we can count the number of orderings of the integers 2, 3, 4, 5, 6, 8, 9, and 10 that have the given condition, then multiply the result by 9 to get the desired total.

We will consider cases based on which of the integers can go to the right of 2. Note that 4, 6, 8, and 10 are all multiples of 2, and 2 has no remaining divisors other than itself, so each of 4, 6, 8, and 10 must go to the left of 2, while 3, 5, and 9 could go either to the right or left of 2.

Thus, the integers to the right of 2 are some subset of 3, 5, and 9. Note that if 9 is to the right of 2 and 3 is to the left of 2, then 3 will necessarily be to the left of 9, which violates the condition. Thus, the set of digits to the right of 2 is a subset of 3, 5, and 9 with the property that it does not contain 9 unless it contains 3. There are 6 such subsets, and they are

$$\{\,\}, \{3\}, \{5\}, \{3, 5\}, \{3, 9\}, \{3, 5, 9\}$$

where $\{\,\}$ represents the *empty set*.

Case 1: There are no integers to the right of 2

In this case, 10 and 5 can be placed independent of all other digits as long as 10 is to the left of 5. There are 7 available positions (since we are ignoring 1 and 7 and 2 has been placed). We can place 10 first in 7 ways, then place 5 in 6 ways. This gives a total of $7 \times 6 = 42$ ways to place 10 and 5. Exactly half of these will have 10 to the left of 5, so there are $\frac{42}{2} = 21$ ways to place 10 and 5.

There are now 5 positions remaining, into which the integers 3, 4, 6, 8, and 9 must be placed. The 4 and 8 can be placed anywhere, provided the 8 is to the left of the 4. By similar reasoning to that which was used to place the 10 and 5, there are $\frac{5 \times 4}{2} = 10$ ways to place 4 and 8. This gives a total of $21 \times 10 = 210$ ways to place 5, 10, 4, and 8.

There are now 3 remaining positions into which 3, 6, and 9 must be placed. 3 is a divisor of both 6 and 9, so 3 must go in the rightmost remaining position. The 6 and 9 can go in either order, so there are 2 ways to place 3, 6, and 9. Therefore, there are a total of $2 \times 210 = 420$ possible orders if there are no integers to the right of 2.

Case 2: 3 is the only digit to the right of 2

The only requirement of 9 is that it be placed to the left of 3, and so the 9 can be placed in any of the 6 remaining positions. The 6 needs only to be to the left of 2 and 3, so it can then be placed in any of the remaining 5 positions, so there are $6 \times 5 = 30$ ways to place 6 and 9. In the remaining 4 positions, 10 and 5 can be placed in $\frac{4 \times 3}{2} = 6$ ways (see the reasoning from earlier), and then 4 and 8 must be placed in the remaining two positions with 8 to the left of 4, so there is no choice. Therefore, there are $30 \times 6 = 180$ orders when 3 is the only digit to the right of 2.

Case 3: 5 is the only digit to the right of 2

In this case, 10 can go in any of the remaining 6 positions. 4 and 8 can then be placed in any of $\frac{5 \times 4}{2} = 10$ ways, for a total of $6 \times 10 = 60$ ways to place 10, 4, and 8. In the remaining 3 positions, we must place 3, 6, and 9. By reasoning used earlier, there are 2 ways to do this. Therefore, there are $60 \times 2 = 120$ orders when 5 is the only digit to the right of 2.

<u>Case 4: 3 and 5 are the only digits to the right of 2</u>
In this case, 6, 10, and 9 can be placed independently to the left of 2 in $5 \times 4 \times 3 = 60$ ways. There will be 2 remaining positions into which 4 and 8 must be placed with no choice since 8 must be to the left of 4. Also, the 3 and 5 can go in either order since neither is divisible by the other, so there are $2 \times 60 = 120$ orders in this case.

<u>Case 5: 3 and 9 are the only digits to the right of 2</u>
In this case, the 5, 6, and 10 can be placed anywhere to the left of 2 in $5 \times 4 \times 3 = 60$ ways, but exactly half of these placements will result in 10 to the right of 5. Thus, there are $\frac{60}{2} = 30$ ways to place 5, 6, and 10. Again, this forces the positions of 4 and 8, and since 9 must be to the left of 3 and both are in the two positions to the right of 2, there is no further choice. Therefore, there are 60 orders in this case.

<u>Case 6: 3, 5, and 9 are the only digits to the right of 2</u>
There are 3 possible positions for the 5, after which the 3 and 9 are forced. 6 and 10 can be placed in any of the four positions to the left of 2 in $4 \times 3 = 12$ ways. There is now no choice of where to place 4 and 8. Therefore, there are $3 \times 12 = 36$ orders in this case.

Taking the sum of the results from each case, we get

$$420 + 180 + 120 + 120 + 30 + 36 = 906$$

orders. As mentioned earlier, the total is this number multiplied by 9, for a total of $N = 9 \times 906 = 8154$. The rightmost two digits of N are 54.

ANSWER: 54