The CENTRE for EDUCATION
in MATHEMATICS and COMPUTING
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2026 Pascal Contest

(Grade 9)

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

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

Solutions

1. Since $8-7=6-5=4-3=2-1=1$, then $(8-7)+(6-5)+(4-3)+(2-1)=1+1+1+1=4$.

   Answer: (A)

2. The value of $\sqrt{36}$ is 6 and the value of $\sqrt{49}=7$. Since 37 is greater than 36 and less than 49, then $\sqrt{37}$ lies between 6 and 7. Since 37 is much closer to 36 than it is to 49, then of the given answers, the value of $\sqrt{37}$ is closest to 6.
   More precisely, $6.5^2=42.25$ and $37<42.25$, so $\sqrt{37}<6.5$.

   Answer: (B)

3. Evaluating the left side of the given equation, we get $2+2+2+2=8$. Since $2^3=8$, then $x=3$.

   Answer: (C)

4. Expressing the given fractions as decimals, we get $2\frac{3}{4}=2.75$, $2\frac{1}{4}=2.25$, and $2\frac{9}{10}=2.9$. Arranging from least to greatest, we get 2.25, 2.3, 2.45, 2.75, 2.9 or $2\frac{1}{4}$, 2.3, 2.45, $2\frac{3}{4}$, $2\frac{9}{10}$. The middle number is 2.45.

   Answer: (B)

5. Every cube has 12 edges, and so $12-9=3$ edges are not visible.

   Answer: (D)

6. In each of the figures 1, 2, 3, and 5, the path between A and B travels exactly 4 squares horizontally (left to right) and 4 squares vertically (bottom to top), and so each path has length $4+4=8$. In Figure 4, the path travels 2 squares horizontally, 2 squares vertically, and along the diagonal of a 2 by 2 square. The path along the diagonal of a 2 by 2 square is shorter than travelling along both a horizontal side and a vertical side of the 2 by 2 square. Thus the length of the path in Figure 4 is less than 8 and is the shortest of the given paths. (Using the Pythagorean theorem, we can confirm that $\sqrt{2^2+2^2}$ is indeed less than 4.)

   Answer: (D)

7. The combined length of the engine and the n freight cars is 140 m. The length of the engine is 20 m, and so the length of the n freight cars is 140 m $-$ 20 m $=$ 120 m. Each freight car has length 15 m, and so $n=\dfrac{120 \text{ m}}{15 \text{ m}}=8$.

   Answer: (B)

8. Since $9=3\times 3$, then 9 leaves remainder 0 when divided by 3. Since $9=2\times 4+1$, then 9 leaves remainder 1 when divided by 4. The remainders upon division by 3 and also division by 4 for each of the other given numbers are in the table that follows.

	9	11	10	13	8
remainder when divided by 3	0	2	1	1	2
remainder when divided by 4	1	3	2	1	0

   Of the given integers, 13 has the same remainder when it is divided by 3 as when it is divided by 4.

   Answer: (D)

9. Each angle in an equilateral triangle measures 60°, and so $\angle PQT = \angle QTP = 60^\circ$. Since $\angle STP = 120^\circ$, then $\angle STQ = 120^\circ - \angle QTP = 120^\circ - 60^\circ = 60^\circ$. The sum of the three angles in $\triangle QST$ is 180°, and so $\angle TQS = 180^\circ - 90^\circ - 60^\circ = 30^\circ$.

   In $\triangle QRS$, $QR = RS$ and so $\angle QSR = \angle SQR = \dfrac{180^\circ - 90^\circ}{2} = \dfrac{90^\circ}{2} = 45^\circ$.

   The measure of $\angle PQR$ is equal to $\angle PQT + \angle TQS + \angle SQR = 60^\circ + 30^\circ + 45^\circ = 135^\circ$.

   Answer: (E)

10. The top-left square is divided into 4 regions having equal area. Since 1 of these 4 regions is shaded, then 25% of the square is shaded.

    The top-middle square is divided into 8 regions having equal area. Since 2 of these 8 regions are shaded, then 25% of the square is shaded.

    The top-right square is divided into 2 larger regions having equal areas, and 2 smaller regions having equal areas. Since 1 of the larger regions is shaded, then more than 25% of the square is shaded. Alternatively, the shaded region consists of three complete 1×1 squares together with 6 half 1×1 squares, and thus the shaded area is 6. The entire 4×4 square has area 16, and $\frac{6}{16}$ is not equivalent to 25%.

    The bottom-left square is divided into 16 regions having equal area. Since 5 of these 16 regions are shaded, then more than 25% of the square is shaded.

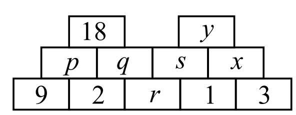
    The bottom-middle square is divided into 4 larger regions having equal areas, and 4 smaller regions having equal areas. Since 2 of the 4 larger regions are shaded, and 2 of the 4 smaller regions are shaded, then 50% of the square is shaded.

    In the bottom-right square, consider constructing a vertical line segment between the midpoint of the top side of the square and the midpoint of the bottom side of the square. The square would then be divided into 4 regions having equal areas. Since 1 of these regions is shaded, then 25% of the square is shaded.

    Thus, the top-left, top-middle, and bottom-right squares have exactly 25% of their area shaded and so there are 3 such squares.

    Answer: (C)

11. In the diagram, $p = 9 + 2 = 11$. Since $p + q = 18$, then $q = 18 - 11 = 7$. Also, $2 + r = q = 7$ and so $r = 7 - 2 = 5$. Since $s = r + 1 = 5 + 1 = 6$ and $x = 1 + 3 = 4$, then $y = s + x = 6 + 4 = 10$.



    Answer: (D)

12. When a point (x, y) is reflected in the x-axis, the resulting point has coordinates $(x, -y)$. Thus when $P(2, 3)$ is reflected in the x-axis, the resulting point has coordinates $(2, -3)$. When a point (x, y) is moved 3 units left, the resulting point has coordinates $(x - 3, y)$. Thus when $(2, -3)$ is moved 3 units left, the resulting point has coordinates $(-1, -3)$.

    Answer: (A)

13. In March, Max read $\frac{1}{3}$ of the b books, meaning that he had $1 - \dfrac{1}{3} = \dfrac{2}{3}$ of the b books, or $\dfrac{2}{3}b$ books, left to read. In April, he read 5 more books, thus leaving $\dfrac{2}{3}b - 5$ books left to read.

    Max then had 7 books left to read and so $\dfrac{2}{3}b - 5 = 7$.

    Solving, we get $\dfrac{2}{3}b = 12$ or $2b = 12 \times 3$ and so $b = \dfrac{36}{2} = 18$.

    Answer: (A)

14. In $\triangle WVZ$, the measure of $\angle ZWV$ is 90°. Using the Pythagorean theorem, we get $WV^2 = VZ^2 - WZ^2 = 17^2 - 15^2 = 289 - 225 = 64$ and so $WV = 8$ (since $WV > 0$). The area of trapezoid $VXYZ$ can be determined by subtracting the area of $\triangle WVZ$ from the area of square $WXYZ$. The area of square $WXYZ$ is $15^2 = 225$ and the area of $\triangle WVZ$ is $\frac{1}{2}(WV)(WZ) = \frac{1}{2}(8)(15) = 60$. The area of trapezoid $VXYZ$ is $225 - 60 = 165$.

ANSWER: (D)

15. Peter's car uses 10.2 L of fuel per 100 km, and thus uses 2×10.2 L $= 20.4$ L of fuel per 200 km. Fuel costs \$1.40/L and so Peter spends \$1.40/L $\times$ 20.4 L $=$ \$28.56 on fuel.
Mike's car uses 6.6 L of fuel per 100 km, and thus uses 2×6.6 L $= 13.2$ L of fuel per 200 km. Fuel costs \$1.40/L and so Mike spends \$1.40/L $\times$ 13.2 L $=$ \$18.48 on fuel.
Mike spends \$28.56 $-$ \$18.48 $=$ \$10.08 less than Peter on fuel.

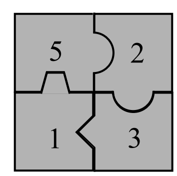
ANSWER: (E)

16. Suppose that $QR = x$. Since $PR = 8$, then $PQ = PR - QR = 8 - x$. Since $QS = 15$, then $RS = QS - QR = 15 - x$, and so $PS = PQ + QR + RS = (8 - x) + x + (15 - x) = 23 - x$.
The smallest possible integer length of $PS = 23 - x$ occurs when x is the largest integer possible. Since $PQ = 8 - x$, then $8 - x > 0$ and so $x < 8$. The largest integer value of x that is less than 8 is $x = 7$, and so the smallest possible integer length of PS is $23 - 7 = 16$.
(We confirm that when $x = 7$, $RS = 15 - x = 8$ and thus RS also has length greater than 0.)

ANSWER: (D)

17. In this solution, we call the part of the puzzle piece that sticks out, the *tab*. We call the recessed space, the *hole*. A tab in one piece is designed to fit into a corresponding hole in another piece. Piece 1 has a tab in the shape of a trapezoid. This is the only piece with a tab in this shape. Piece 4 and Piece 5 both have a hole in the shape of a trapezoid. Since there is only one trapezoid tab, either Piece 4 or Piece 5 will be the piece that does not get used to form a square.

Piece 4 has a tab in the shape of a triangle. Piece 1 is the only piece with a hole in the shape of a triangle. However, it is not possible to insert the Piece 4 tab into the Piece 1 hole while also inserting the Piece 1 tab into the Piece 4 hole. Thus, it is Piece 4 that does not get used to form the square. The completed puzzle is shown.



ANSWER: (D)

18. The number of integers in the first sum is $352 - 17 + 1 = 336$.
The number of integers in the second sum is also $355 - 20 + 1 = 336$.
Each term in the second sum is 3 more than the corresponding term in the first sum.
That is, $20 - 17 = 3$, $21 - 18 = 3$, $22 - 19 = 3$, and so on to $355 - 352 = 3$.
There are 336 terms in the second sum, and each is 3 greater than the corresponding term in the first sum, and so the second sum is $336 \times 3 = 1008$ greater than the first sum.
Thus, $x = 61\,992 + 1008 = 63\,000$.

ANSWER: (E)

19. We can systematically count the number of squares by considering the possible sizes of the squares.

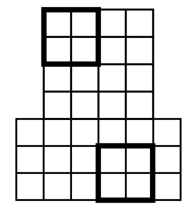
Case 1: Squares of size 1×1

There are 34 such squares.

Case 2: Squares of size 2×2

Begin with a 2×2 square in the top left corner of the diagram. Shifting this 2×2 square one column to the right gives a second 2×2 square. Shifting this second 2×2 square one column to the right again gives a third 2×2 square. Thus, there are 3 such 2×2 squares within the top two rows of the diagram.

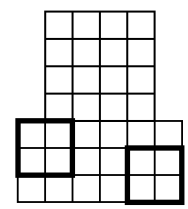
Each of these 3 squares can be shifted down one row to give 3 more 2×2 squares, each contained within the second and third rows of the diagram.



Continuing in this way, there are 3 such 2×2 squares within rows three and four, rows four and five, rows five and six, and rows six and seven. Thus, there are $3 \times 6 = 18$ such 2×2 squares. The first and the last of these 18 squares are shown in the diagram above.

There are 4 additional 2×2 squares. One of these occupies the leftmost two squares within rows five and six. This square can be shifted down one row, and each of these 2×2 squares can be shifted four columns to the right. The first and the last of these 4 squares are shown in the diagram to the right.

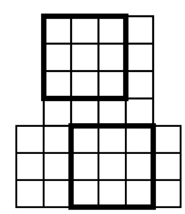
In total, there are $18 + 4 = 22$ squares of size 2×2.



Case 3: Squares of size 3×3

Beginning with a 3×3 square in the top left corner of the diagram and counting in a similar way, there are 2 such 3×3 squares within the top three rows of the diagram.

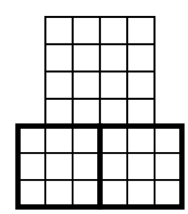
There are 2 such 3×3 squares within rows two through four, rows three through five, rows four through six, and finally rows five through seven. Thus, there are $2 \times 5 = 10$ such 3×3 squares. The first and the last of these 10 squares are shown in the diagram to the right.



There are 2 additional 3×3 squares. One of these occupies the leftmost three squares within rows five through seven. The second of these occupies the rightmost three squares within rows five through seven.

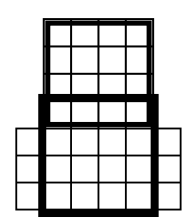
These 2 squares are shown in the diagram to the right.

In total, there are $10 + 2 = 12$ squares of size 3×3.



Case 4: Squares of size 4×4

There is a 4×4 square that occupies all four columns within rows one through four. This square can can be shifted downward one row to occupy rows two through five, shifted downward one row again to occupy rows three through six, and finally one more time to occupy rows four through seven. These are the only 4×4 squares and thus there are 4 in total. The first and the last of these 4 squares are shown in the diagram to the right.



There are no squares with dimensions greater than 4×4, and so there are $34 + 22 + 12 + 4 = 72$ squares of all sizes in the diagram.

Answer: (C)

20. *Solution 1*

We begin by naming the 2 quarters Q1 and Q2, the 2 dimes D1 and D2, and the 2 nickels N1 and N2.

There are 6 possible choices for the first coin, followed by 5 choices for the second coin. However, this double counts the number of possibilities since choosing for example Q1 first and D2 second is the same as choosing D2 first and Q1 second, and so there are a total of $\frac{6 \times 5}{2} = 15$ ways to choose the 2 coins.

Next, we count the number of ways to obtain a combined value of at least \$0.30.

These are: Q1 and Q2 (\$0.50), Q1 and D1 (\$0.35), Q1 and D2 (\$0.35), Q1 and N1 (\$0.30), Q1 and N2 (\$0.30), Q2 and D1 (\$0.35), Q2 and D2 (\$0.35), Q2 and N1 (\$0.30), and finally Q2 and N2 (\$0.30). This gives a total of 9 different ways.

The probability that the combined value of the two coins is \$0.30 or more is $\frac{9}{15} = \frac{3}{5}$.

Solution 2

The probability that the combined value of the two coins is at least \$0.30 is equal to the sum of the probabilities of the combined values being equal to \$0.30, \$0.35, and \$0.50.

The probability that the two coins have a combined value of \$0.30 is equal to the probability of choosing a quarter followed by a nickel, or choosing a nickel followed by a quarter. The probability that the first coin chosen is a quarter is $\frac{2}{6}$, and with 5 coins remaining, the probability that the second coin chosen is a nickel is $\frac{2}{5}$. Thus, the probability of choosing a quarter followed by a nickel is $\frac{2}{6} \times \frac{2}{5} = \frac{4}{30}$. The probability of choosing a nickel first followed by a quarter second is also equal to $\frac{4}{30}$, and so the probability that the combined value of the two coins is \$0.30 is $\frac{4}{30} + \frac{4}{30} = \frac{8}{30}$.

The probability that the two coins have a combined value of \$0.35 is equal to the probability of choosing a quarter followed by a dime, or choosing a dime followed by a quarter. As in the previous case, the probability that the combined value of the two coins is \$0.35 is also $\frac{4}{30} + \frac{4}{30} = \frac{8}{30}$.

The probability that the two coins have a combined value of \$0.50 is equal to the probability of choosing a quarter followed by a quarter. The probability of choosing a quarter followed by a quarter is $\frac{2}{6} \times \frac{1}{5} = \frac{2}{30}$.

Thus, the probability that the combined value of the two coins is at least \$0.30 is equal to $\frac{8}{30} + \frac{8}{30} + \frac{2}{30} = \frac{18}{30} = \frac{3}{5}$.

ANSWER: (B)

21. The third digit must be at least 3 since the smallest possible sum of two digits from 1 through 9 is $1 + 2 = 3$.

If the third digit is 3, then the combination must be 1 2 3 in that order.

If the third digit is 4, then the other two digits must be 1 and 3 since these are the only two distinct digits that have a sum of 4. Thus, the only possible combination with third digit 4 is 1 3 4. Note that 2 2 4 is not allowed since the digits must be distinct.

If the third digit is 5, then the first two must be either 1 and 4 or 2 and 3. Continuing in this way, we can list all possible combinations:

1 2 3			
1 3 4			
1 4 5	2 3 5		
1 5 6	2 4 6		
1 6 7	2 5 7	3 4 7	
1 7 8	2 6 8	3 5 8	
1 8 9	2 7 9	3 6 9	4 5 9

There are 16 possible combinations.

Answer: 16

22. The mean of the five integers is $\dfrac{16+x+8+17+11}{5}=\dfrac{52+x}{5}$.

The median must be smaller than two other integers in the list, so 17 cannot be the median since there are at least three integers in the list that are less than 17. Similarly, 8 cannot be the median since there are at least three integers in the list that are greater than 8.

The possible values for the median are x, 11, and 16.

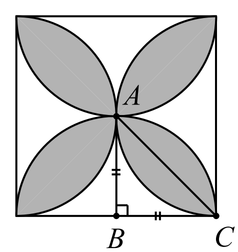
Since the median and mean are equal, we must have $x=\dfrac{52+x}{5}$, which implies $x=13$, or $11=\dfrac{52+x}{5}$ which implies $x=3$, or $16=\dfrac{52+x}{5}$ which implies $x=28$.

Therefore, the possibilities are $x=3$, $x=13$, and $x=28$. Their sum is $3+13+28=44$.

Answer: 44

23. Label the centre of the square A, the midpoint of the base B, and the bottom-right corner of the square C. Then $\triangle ABC$ has a right angle at B and $AB=CB$, as shown.

The flower is made up of four "petals", each of which is made up of two copies of the region formed by taking a sector of the circle of angle 90° and removing the right-isosceles triangle formed by the two radii.



The radius of each circle is $\dfrac{10}{2}=5$, so the area of each sector is $\dfrac{\pi(5)^2}{4}=\dfrac{25\pi}{4}$. The area of the triangle being removed is $\dfrac{1}{2}(5)^2=\dfrac{25}{2}$.

Therefore, the area of each petal is $2\times\left(\dfrac{25\pi}{4}-\dfrac{25}{2}\right)=\dfrac{25\pi-50}{2}$.

The area of the flower is 4 times the area of each petal, which is

$$\begin{aligned}4\times\left(\frac{25\pi-50}{2}\right)&=2\times(25\pi-50)\\&=50\pi-100\\&\approx 57.08\end{aligned}$$

The integer closest to the area of the flower is 57.

Answer: 57

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

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

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

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

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

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

Notice that $60^2 + 7(60) = 4020$ but $61^2 + 7(61) = 4148$, so we have that $c = 60$.

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

25. The area of an equilateral triangle with side length x is $\frac{1}{2}x^2 \times \frac{\sqrt{3}}{2} = \frac{\sqrt{3}x^2}{4}$. To see this, one can use the Pythagorean theorem to show that the height of an equilateral triangle with side length x is $\frac{\sqrt{3}}{2}x$.

If equilateral triangles with side lengths a, b, and c are removed from the corners, then the area of the resulting hexagon is

$$\frac{\sqrt{3} \cdot 6^2}{4} - \frac{\sqrt{3}a^2}{4} - \frac{\sqrt{3}b^2}{4} - \frac{\sqrt{3}c^2}{4} = \frac{\sqrt{3}}{4}(36 - a^2 - b^2 - c^2)$$

We are given that $0 < a \leq b \leq c$ and that each of $a + b$, $a + c$, and $b + c$ is less than 6. The table below contains all such triples (a, b, c) in the left column and the sum $a^2 + b^2 + c^2$ in the second column. The third column contains the integer $T = 36 - a^2 - b^2 - c^2$. Note that the area of the corresponding hexagon is $\frac{\sqrt{3}}{4}T$.

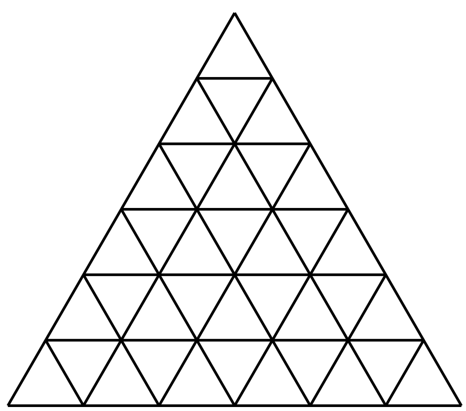
(a,b,c)	$a^2+b^2+c^2$	T
$(1,1,1)$	3	33
$(1,1,2)$	6	30
$(1,1,3)$	11	25
$(1,1,4)$	18	18
$(1,2,2)$	9	27
$(1,2,3)$	14	22
$(2,2,2)$	12	24
$(2,2,3)$	17	19

Suppose such a hexagon can be covered by equilateral triangles of side length k. Then the area of the hexagon must be an integer multiple of $\frac{\sqrt{3}}{4}k^2$. Thus, the quantity

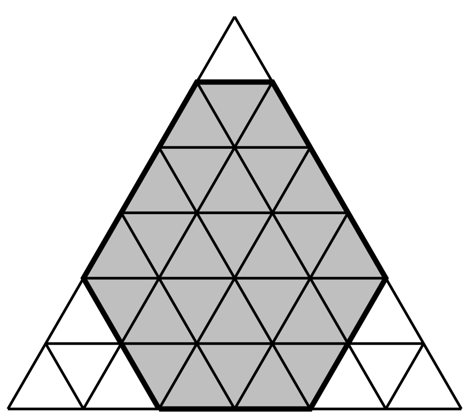
$$\frac{\frac{\sqrt{3}}{4}T}{\frac{\sqrt{3}}{4}k^2} = \frac{T}{k^2}$$

must be an integer. Note that this integer is the number of triangles used to cover the hexagon, and so $n = \frac{T}{k^2}$. Thus, to find possible values of n, we need to examine the perfect-square divisors of T for each value of T.

We first address the fact that $1 = 1^2$ is a divisor of each value of T.
Suppose the hexagon is covered by equilateral triangles of side length 1 (which we will call a *unit triangle*) as shown below.



If equilateral triangles of integer side length are removed from each corner, the resulting hexagon will already be tiled by unit triangles. For example, if triangles of side length 2, 2, and 1 are removed from the corners, we get the following



Therefore, it is possible to cover each possible hexagon by unit triangles, which means that we get n values of the form $\dfrac{T}{1^2} = T$ for each T. In other words, each T value is a possible n value.

The next-smallest perfect square is $2^2 = 4$, and the only T value that is a multiple of 4 is 24. $T = 24$ corresponds to $a = b = c = 2$. The remaining hexagon is a regular hexagon, which can indeed be covered by equilateral triangles of side length 2.
Therefore, $n = \dfrac{24}{2^2} = 6$ is a possible value of n.
(Note that the regular hexagon of side length x can always be covered by 6 equilateral triangles of side length x. This can be seen by connecting the centre of the hexagon to each of its 6 vertices.)

The next perfect square is $3^2 = 9$, which is a divisor of $T = 18$ and $T = 27$. These T values come from $(a, b, c) = (1, 1, 4)$ and $(a, b, c) = (1, 2, 2)$ respectively. Observe that the shortest side length of the hexagon with $T = 18$ is $6 - 4 - 1 = 1$ and the shortest side length of the other hexagon is $6 - 2 - 2 = 2$. We will now show that neither hexagon can be covered by equilateral triangles of side length 3.

For a hexagon to be covered exactly by triangles, each side of the hexagon must line up exactly with the side of at least one triangle. (Put differently, there must be triangles that have their sides directly along the sides of the hexagon.) None of the triangles are allowed to extend outside of the hexagon, so the side length of a triangle cannot exceed the side length of the hexagon along which it is placed. Therefore, if a hexagon is covered exactly by triangles of side length x, then every side of the hexagon must have length at least x.

Applying this, the hexagons with T values of 18 and 27 each have a side length less than 3 as observed earlier, so neither can be covered by equilateral triangles of side length 3.

The perfect square $4^2 = 16$ is not a divisor of any T value. The only other perfect square that divides a T value is $T = 25$, which has a divisor of 25. Of course, this would mean the hexagon with $T = 25$ is covered by exactly one equilateral triangle of side length 5, but this is not possible because the hexagon is not a triangle.

We now have that the n values are the T values along with 6. Their sum is

$$33 + 30 + 25 + 18 + 27 + 22 + 24 + 19 + 6 = 204$$

Answer: 04