

Online Contest for Grade 7 and 8

THE DEEPER YOU GO, THE MORE YOU GROW!

I Instructions

1. The time duration for the contest is 120 minutes from 2:00 pm to 4:00 pm (IST)
2. Answers have to be submitted on the Google form:
3. You cannot submit the Google form more than once.
4. No other form of submission will be accepted.
5. Beyond 4:00 pm, the form will be deactivated.
There is no option to save your answers in a Google form
6. Hence it is suggested that you write your answers on a sheet of paper.
Submit it together in the Google form before 4:00 pm.
7. Important note for students who will be using Mobile – To open the Google form (to submit your answers), kindly download the PDF Question Paper then copy the Google form link and open it on Google Chrome.
8. Wherever there is a field/box to write the answer, write ONLY the INTEGER part of the answer.
E.g. If the answer is 134 hours or 134 sq cm, write (fill) the answer as: 134 only.
Do not use any full stop or any other explanation along with the answer.
Any such content will fetch you a wrong answer because the checking is automated and not manual.
9. For multiple choice questions, use the appropriate option.
10. The participant is not allowed to use any device for calculations or any sort of help from anyone else.
Any such act will disqualify the application.
11. Preserve your rough calculations. You may be asked to submit it.
If you are unable to submit it, you may be disqualified.
12. There is no negative marking for incorrect answers.
13. Ensure that you have filled respective fields about your personal details correctly in the Google form.

Hope you have read the instructions thoroughly !

See Problems from next page! ↓

II PROBLEMS

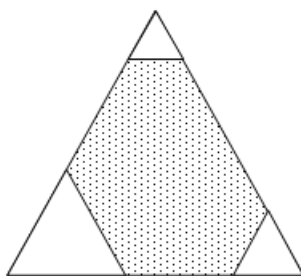
1. A sequence of different whole numbers is written in ascending order as follows:

$$2, 3, 5, 7, 23, 25, 27, 32, 35, 37, 52, 53, \dots, 7352, 7523, 7532.$$

Each digit of the number in the sequence is a prime number; no digit is repeated in a number.

The number of terms in the sequence is _____.

2. At every corner of a bigger equilateral triangle, a smaller equilateral triangle is cut thus giving an hexagon, as shown.



The perimeter of the hexagon is 12 *units* less than the perimeter of the bigger equilateral triangle (the one which is cut).

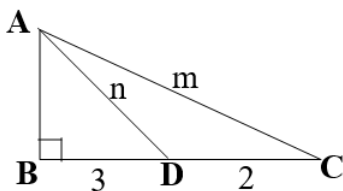
The sum of the perimeters of the three smaller equilateral triangles, is _____ *units*.

3. The LCM of three consecutive natural numbers is 350 more than the largest among the three.

The smallest natural number among the three is _____.

4. ABC is a right angled triangle where D is a point on BC , such that $AC = m$ *units*; $AD = n$ *units*;

$BD = 3$ *units* and $DC = 2$ *units*.

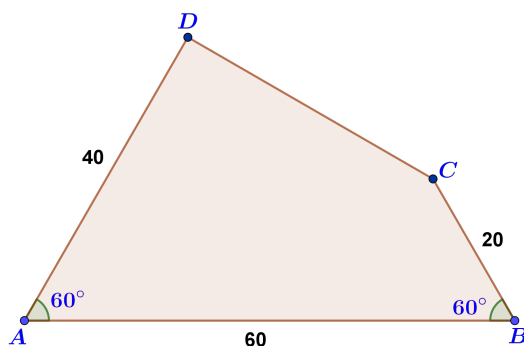


Note: Figure is not drawn to scale.

Which of the following is a possible value of $\frac{m}{n}$?

- A. 0.8 B. 1.6 C. 1.7 D. 2

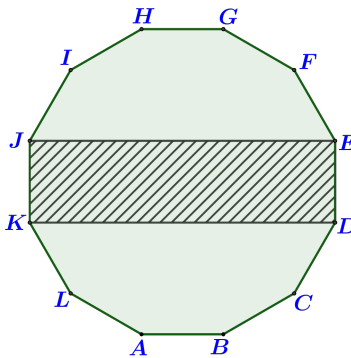
5. $ABCD$ is a convex quadrilateral where $AD = 40$ units; $BC = 20$ units;
 $AB = 60$ units and $\angle BAD = \angle ABC = 60^\circ$.



Note: Figure is not drawn to scale.

Then, the measure of $\angle BCD$ is

- A. 120° B. 150° C. 135° D. 140°
6. The number of integer values n , such that $n^2 + 8n + 61$ is a perfect square, is _____
- A. 0 B. 12 C. 4 D. 6
7. If $5^a \times 6^b \times 7^c = 9^x \times 10^{10} \times 14^6$ where a, b, c, x are positive integers, then $a + b + c + x =$ _____
- A. 36 B. 42 C. 40 D. 32
8. $ABCDEFGHIJKL$ is a regular dodecagon where its area is 540 *sq.units*.



Note: Figure is not drawn to scale.

Then, the area of the shaded region $DEJK$ is _____ *sq.units*.

9. If $(2x - 3y + 7)^2 + (8 - 2x + 3y)^2 = 245$, then the value of $(2x - 3y + 7) \times (8 - 2x + 3y) =$ _____.

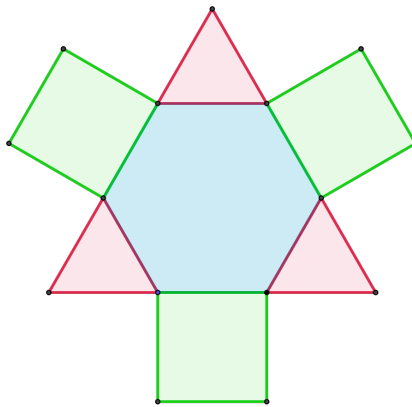
10. Let $x + 3xy + y = 13$ where x and y are integers. The number of solutions (x, y) for this equation is _____.

Note: If $(13,15)$ is a solution then $(15,13)$ is a different solution

11. In a list of 8 different natural numbers, the average of the smallest two numbers is 5 and the average of the largest two numbers is 30. What is the greatest possible average of all the 8 numbers? _____.

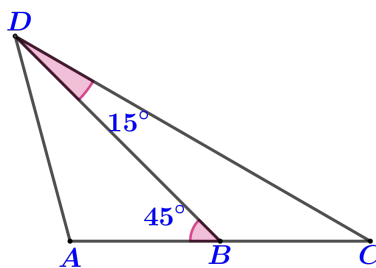
12. The number of 3-digit numbers which are divisible by the middle digit, is _____.

13. On alternate three sides of a regular hexagon three squares are constructed and on the remaining three sides, three equilateral triangles are constructed leading to the following 15-sided figure.



Then the ratio of the perimeter of the 15-sided figure to the sum of the perimeters of the 7 geometrical shapes in the figure is $\frac{p}{q}$ where p and q are relatively prime. Then $p + q$ is _____.

14. In $\triangle ACD$, DB is a median such that $\angle ABD = 45^\circ$ and $\angle BDC = 15^\circ$.



Then, $\angle ADB =$ _____ (in degrees).

15. Consider 13 tokens arranged in three straight lines such that each line has the same number of tokens. How many tokens does each line have? _____

16. A palindrome number is a number which reads the same when read from left to right and right to left.

For example, 383, 2332 are palindromes.

The number of 5-digit palindromes which are divisible by 12, is _____.

17. An Indian space station has picked up alien communication. After collecting some information, it has been observed that each alien from a distant planet speaks one word every morning. Their words can be one of the following:

- A low note L (**L**)
- A high note H followed by a low note L (**HL**)
- A low note L followed by a high note H (**LH**)

If the recording on Oct 1st 2023 showed

L H L L H H L L H L H L L H H L L L H H L H L L L H L

How many aliens spoke that morning?

18. Let A be the smallest multiple of 15 formed by using only the digits 0, 2 and 8 and there are as many 0's as 2's and 8's. What is the remainder when A is divided by 99? _____.

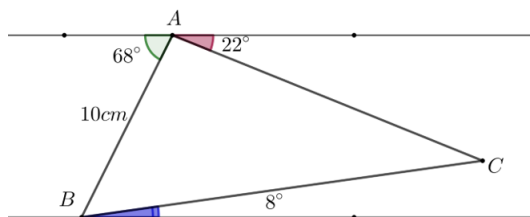
19. If the distance between any two adjacent dots in the same row and column is 1 unit, what is double the area of the following figure?



20. In the following figure, (not drawn to scale) the angles are as marked and the two lines through A and B are parallel to each other and $AB = 10$ cm.

Then, the length of $BC =$ _____ cm.

SEE NEXT PAGE!

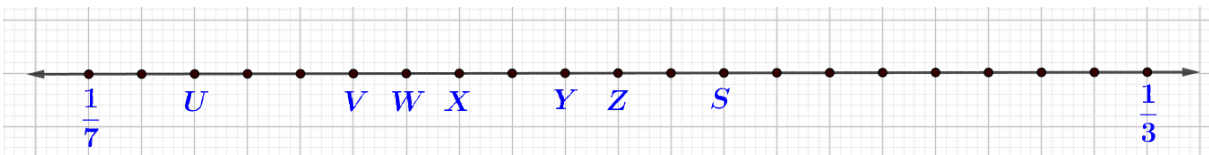


21. The Sierpinski triangle is a fractal that can be generated as shown below. The first four Sierpinski



triangles are shown. How many downward-pointing (white) triangles will be there in the 5th Sierpinski triangle?

22. In the following number line $\frac{1}{7}$ and $\frac{1}{3}$ are marked.



In between these two there are some named points. Which of these will represent $\frac{1}{5}$?

- A. V
- B. W
- C. X
- D. S

23. $(p, q, 3p + 4)$ is a pythagorean triplet each value < 100 and p being a prime.

The value of $(q - p)$ is _____.

24. When 134 is added to its reversal, 431, the sum is $134+431=565$. Find the greatest integer which when added to its reversal yields 1211.

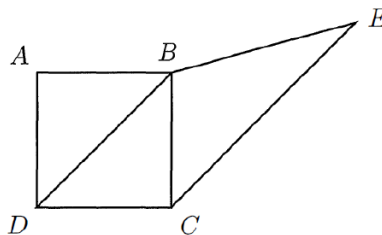
25. There are 8 boxes numbered (distinct and natural) from 1 to 8. We have 4 green balls and 4 blue balls.

In how many ways can you distribute the balls, one ball to each box so that the sum of the box numbers with blue balls is greater than the sum of the box numbers having green balls?

- A. 70
- B. 35
- C. 32
- D. 31

26. In the figure shown, $ABCD$ is a square, BEC is a triangle such that $BD \parallel CE$ and $BE = BD$.

SEE NEXT PAGE!



The measure of $\angle BEC$ is _____ (in degrees).

27. Let a, b, c, d be positive integers with $a < 2b, b < 3c, c < 4d$ and $d < 10$.

Then the largest value for a is _____.

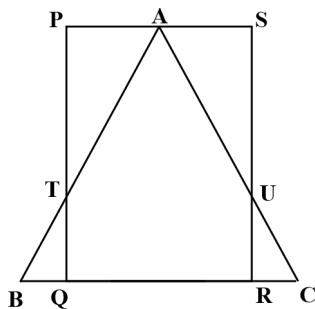
28. Given $a, b \geq \frac{1}{2}$ and $a, b \leq \frac{3}{2}$, the minimum value of the expression $\left(\frac{a+1}{b} + \frac{b+1}{a}\right)$ is

- A. $\frac{9}{4}$ B. 4 C. $\frac{10}{3}$ D. 6

29. $PQRS$ is a rectangle such that $PQ = 6$ cm; $PS = 2$ cm.

U, T are points on SR and PQ such that $SU = PT = \frac{2}{3}PQ$.

A is the midpoint of PS . AU and AT meet the extended QR at C, B respectively, as shown.



The area of $\triangle ABC$ is _____ cm^2 .

30. Let A be a set of 4 distinct positive integers whose *sum* is 1155.

The largest possible HCF of these 4 *positive integers* is _____.