Singapore & Asian Schools Math Olympiad

Secondary 1 (Grade 7) – GEP Practice

2019

Contest Problems with Full Solutions

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LIVEWORKSHEETS

Section A (Correct answer – 2 points| No answer – 0 points| Incorrect answer – minus 1 point)

Question 1

The number 2019 is the smallest positive integer that can be written in 6 ways as the sum of squares of 3 prime numbers. One such way is:

$$x^2 + x^2 + 41^2 = 2019$$

What is the value of x?

A. 19
B. 17
C. 13
D. 23
E. None of the above

Question 2

In physics, the kinetic energy (E) of a particle with mass (m) and momentum (p) is described by the relation:

$$E = \frac{p^2}{2m}$$

What will happen to the kinetic energy of a particle if its mass is reduced to half of the original and its momentum is doubled?

A. Unchanged
B. Double
C. Four times the original
D. Eight times the original
E. None of the above

LIVEWORKSHEETS

Question 3

Find the sum of the prime factors of $2^8 - 1$.

A. 25
B. 60
C. 17
D. 9
E. None of the above

Question 4

Consider all the integers from 1 to 100. Which of the following is NOT true about them?

A. The number of even numbers is the same as the number of odd numbers.
B. Writing all the digits, the digit "0" is the least occurring digit.
C. There are more even numbers than prime numbers.
D. The number of multiples of 8 is the same as the number of multiples of 9.
E. The average of the 100 numbers is not an integer.

Question 5

What is the smallest four-digit number that is divisible by 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10?

A. 1260
B. 2520
C. 840
D. 5040
E. None of the above

LIVEWORKSHEETS

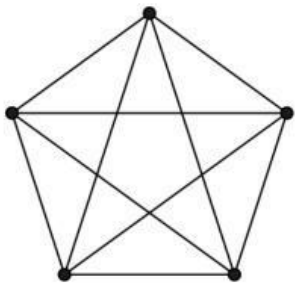
Question 6

The number of Instagram followers of Ariana rose 10% from September to October, then dropped 20% from October to November, then rose 50% from November to December. What was the percentage increase from September to December?

A. 80%
B. 62%
C. 56%
D. 32%
E. None of the above

Question 7

In network science, a "fully connected network" is represented by a graph in such a way that each pair of vertices (called nodes) is connected by exactly one line segment (called a connection). For instance, a fully connected network with 5 nodes is illustrated on the right. This network has 10 connections as shown. How many connections does a fully connected network with 10 nodes have?



A. 45
B. 55
C. 20
D. 66
E. None of the above

Question 8

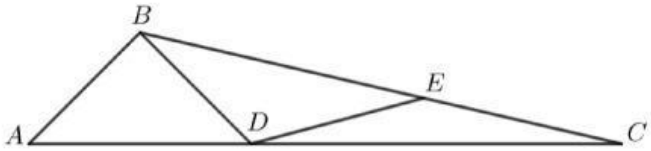
The product of 46 integers is 1. Which of the following cannot be the sum of these 46 integers?

A. 38
B. 6
C. 0
D. –14
E. –46

LIVEWORKSHEETS

Question 9

In the triangle below, $AB = BD = DE = EC$. Given $\angle ABE = 120°$, what is the measure of $\angle BDA$?



A. $65°$
B. $60°$
C. $45°$
D. $15°$
E. None of the above

Question 10

The operator $\otimes$ acts on two numbers to give the following outcomes:

$$2 \otimes 6 = 44$$

$$4 \otimes 10 = 87$$

$$8 \otimes 18 = 1613$$

$$16 \otimes 22 = 2019$$

What is the value of $32 \otimes 34$?

A. 3266
B. 6440
C. 3225
D. 3233
E. None of the above

Question 11

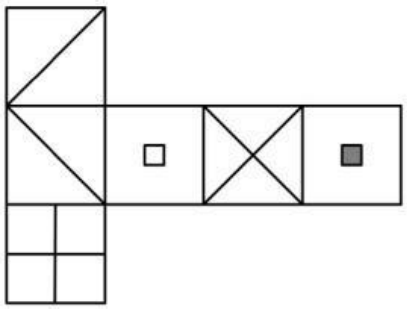
In a camp, each student played at least 2 games. The games were Scavenger Hunt, Animal Charades and Musical Chairs. Twelve students played all three games, 33 played the Scavenger Hunt, 29 played the Animal Charades and 36 played the Musical Chairs. How many students were there in the camp?

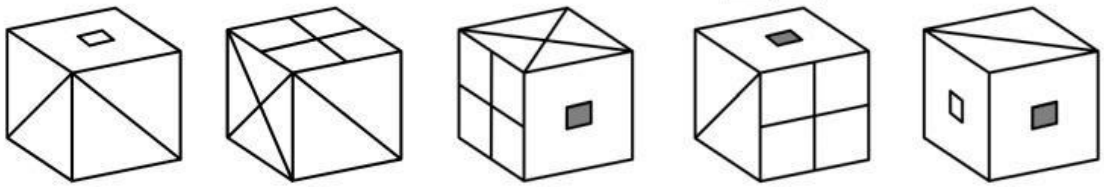
A. 62
B. 31
C. 43
D. 110
E. None of the above

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Question 12

Which cube below will be formed when the net on the right is folded?





A B C D E

Question 13

Find the numerator of the following sum in its simplest form.

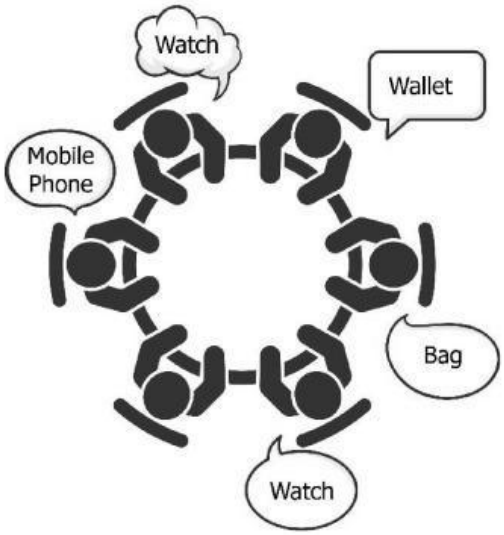
$$\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\cdots+\frac{511}{512}$$

A. 512
B. 522
C. 3586
D. 4097
E. None of the above

LIVEWORKSHEETS

Question 14

A leader asked his 6 followers what is inside the gift box he saw. These 6 followers are sitting around a table. Two of them are truth-tellers and they are sitting next to each other. Two followers are liars and they are sitting next to each other as well. Each of the remaining two followers is either a truth-teller or liar, and they are not sitting next to each other. The responses of the followers are shown in the picture below.



What is inside the gift box?

A. Mobile Phone
B. Watch
C. Wallet
D. Bag
E. Insufficient data

Question 15

Two calendars are the same if all their dates correspond to the same days. The calendar for the year 2019 is the same for the year ____.

(Years 2016, 2012, 2008 and 2004 are the leap years)

A. 2003
B. 2005
C. 2012
D. 2013
E. 2014

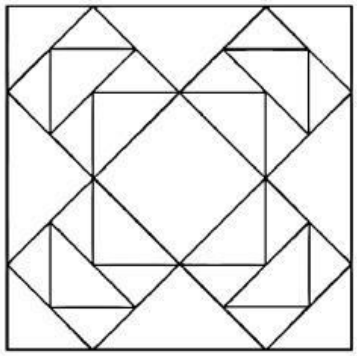
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Section B **(Correct answer – 4 points| Incorrect or No answer – 0 points)**

When an answer is a 1-digit number, shade "0" for the tens, hundreds and thousands place.
Example: if the answer is 7, then shade 0007
When an answer is a 2-digit number, shade "0" for the hundreds and thousands place.
Example: if the answer is 23, then shade 0023
When an answer is a 3-digit number, shade "0" for the thousands place.
Example: if the answer is 785, then shade 0785
When an answer is a 4-digit number, shade as it is.
Example: if the answer is 4196, then shade 4196

Question 16

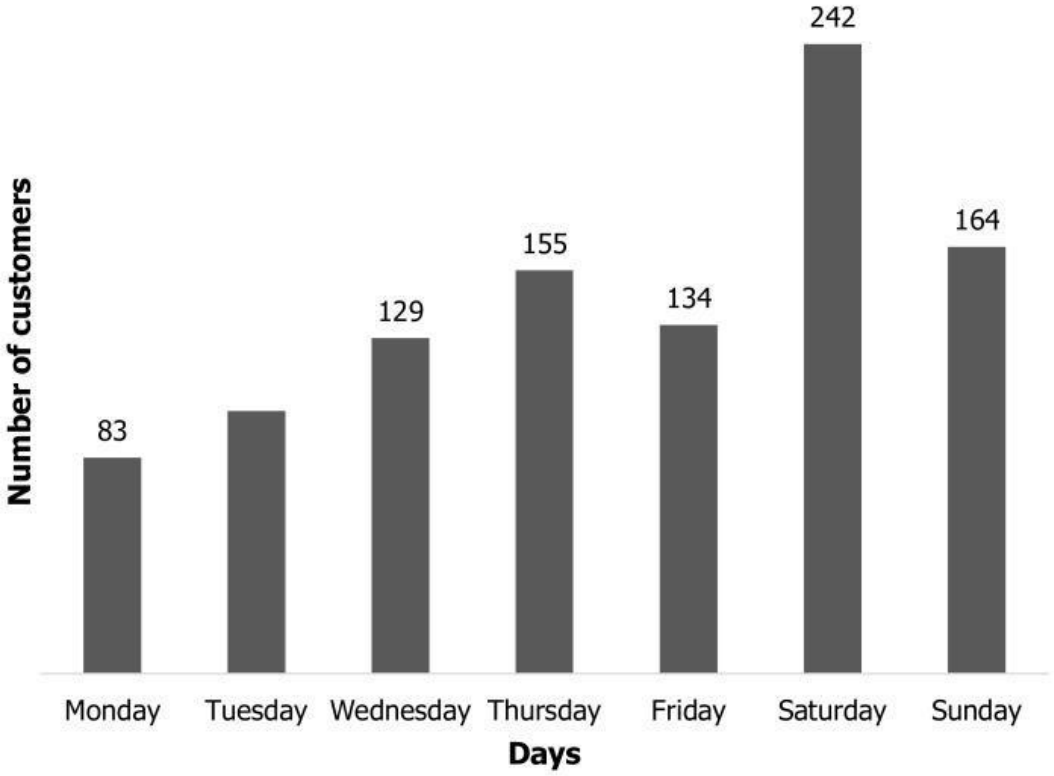
How many triangles are there in the figure below?



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Question 17

The following bar chart shows the number of customers per day a shop had last week. The average number of customers in the first 4 days was 65% of the average number of customers in the last 3 days. How many customers did the shop have last Tuesday?



Question 18

Annabelle, Betty, Cynthia and Dora were playing a new video game. After the first round of the game:

- Betty and Dora had the same number of gold coins.
- Number of Cynthia's gold coins was half the average number of gold coins of Annabelle and Betty had.
- Cynthia had 10 less gold coins than Dora.
- Annabelle's number of gold coins was half of Betty's.

What was their total number of gold coins after the first round?

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Question 19

What is the missing number in the sequence below?

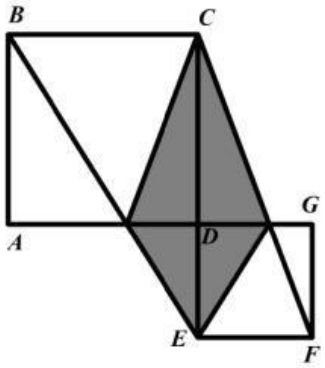
311, 282, 313, 304, 315, 306, 317, ?, 309

Question 20

Find the smallest positive integer n for which $225n$ is a multiple of 4500.

Question 21

In the diagram, $ABCD$ and $DEFG$ are squares with $AB = 15$ cm and $DE = 11$ cm. If $\angle CDG = 90°$, find the area (in cm^2) of the shaded quadrilateral.



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Question 22

How many 3-digit numbers have the following properties?

- The number is a multiple of 6.
- It remains a multiple of 6 when its tens and ones digits are switched.

Question 23

Find the sum of the digits of the following product.

$$\underbrace{333\ldots3}_{100\ \ 3s} \times 2019$$

LIVEWORKSHEETS

Question 24

In the following cryptarithm, all the different letters stand for different digits. What is the value of the sum R + E + D + A?

$$\begin{array}{cccccc} & & R & E & D \\ + & D & E & E & R \\ \hline & R & D & R & A \\ \hline \end{array}$$

Question 25

It is given that $159n + 49$ is a four-digit perfect square, where n is a positive integer. Find the value of n.

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