DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

INTERNATIONAL OLYMPIAD ACADEMY

GRADE–10

JUNIOR – 2

TEST PAPER

MATH KANGAROO COMPETITION

Test Booklet Series Set- A

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Roll No.:

Student's Name:

Maximum Time: 90 Minutes **Maximum Marks: 120**

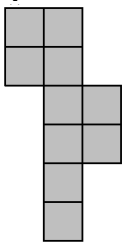
INSTRUCTIONS

1. Please **DO NOT OPEN** the contest booklet until the proctor has given permission to start.
2. There are 30 questions in this paper. **Easy:** 3 points for each correct answer. **Medium:** 4 points for each correct answer. **Hard:** 5 points for each correct answer. 1 point will be deducted for each incorrect answer, and no penalty for skipping a question.
3. All questions are compulsory. There is only ONE correct answer to each question.
4. No electronic devices capable of storing and displaying visual information are allowed during the exam.
5. Use of **calculator** is strictly prohibited in the exam.
6. Fill your **Name, Roll No., Grade and School Name** in the answer sheet.
7. To mark your choice of answers by darkening the circles in the Answer Sheet, use an HB Pencil or a **Blue/Black Ball Point Pen** only.
8. Shade your answer clearly as per the example is shown below:

CORRECT	INCORRECT
(A) ● (C) (D)	(A) ⊗ ● ◑

SECTION – A (3 POINT PROBLEMS)

1. The diagram shows a shape made from ten squares of side length 1 cm joined edge to edge.



What is the length of its perimeter?

(A) 14 cm (B) 18 cm (C) 30 cm (D) 32 cm (E) 40 cm

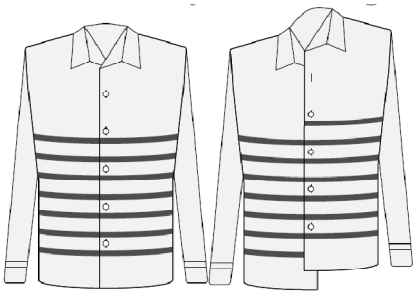
2. When the answers to the following calculations are put in order from smallest to largest, which will be in the middle?

(A) 1 + 2345 (B) 12 + 345 (C) 123 + 45 (D) 1234 + 5 (E) 12345

3. Who is the mother of the daughter of Anne's mother's mother?

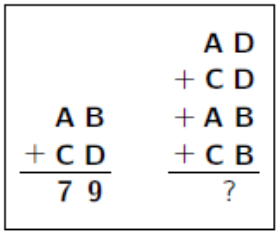
(A) Anne's sister (B) Anne's niece (C) Anne's mother (D) Anne's aunt
(E) Anne's grandmother

4. When Cosmo wears his new shirt properly as shown on the left, the horizontal stripes form seven closed rings around his waist. This morning he buttoned his shirt wrongly, as shown on the right. How many closed rings were there around Cosmo's waist this morning?



(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

5. In the calculations shown each letter stands for a digit. They are used to make some two-digit numbers. The two numbers on the left have a total of 79. What is the total of the four numbers on the right?



(A) 79 (B) 158 (C) 869 (D) 1418 (E) 7979

6. The sum of four consecutive integers is 2. What is the smallest of these integers?

(A) –3 (B) –2 (C) –1 (D) 0 (E) 1

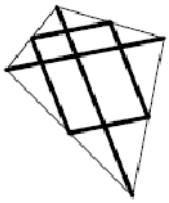
7. The years 2020 and 1717 both consist of a two-digit number repeated twice. How many years after 2020 will it be until the next year which has this property?

(A) 20 (B) 101 (C) 120 (D) 121 (E) 202

8. **Mary has ten pieces of paper. Some of these are squares and the rest are triangles. She cuts three squares diagonally from corner to corner. She counts the total number of vertices of the 13 pieces of paper she now has and gets the answer 42. How many triangles did she have before making the cuts?**

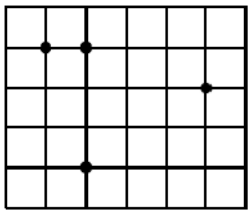
(A) 8 (B) 7 (C) 6 (D) 5 (E) 4

9. **Martin made a kite by cutting a straight wooden pole into 6 pieces. He used two of them, of lengths 120 cm and 80 cm, as the diagonals. The remaining four pieces connected the midpoints of the sides of the kite, as shown. How long was the pole before it was cut?**



(A) 300 cm (B) 370 cm (C) 400 cm (D) 410 cm (E) 450 cm

10. **Four points are marked on a grid of squares of side-length 1. Forming a triangle using three of these points, what is the smallest area that can be obtained?**



(A) $\frac{1}{2}$ (B) 1 (C) $\frac{3}{2}$ (D) 2 (E) $\frac{5}{2}$

SECTION – B (4 POINT PROBLEMS)

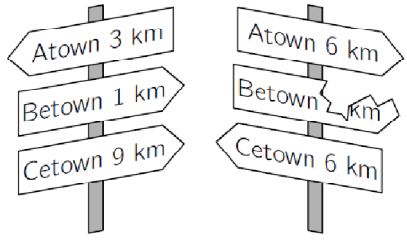
11. **Helen wants to spend 18 consecutive days visiting her Grandma. Her Grandma reads her story books on story days Tuesday, Saturday and Sunday. Helen wants to spend as many story days with her Grandma as possible. On which day of the week should she start her visit?**

(A) Monday (B) Tuesday (C) Friday (D) Saturday (E) Sunday

12. **The integers *a*, *b*, *c* and d satisfy *ab* = 2*cd*. Which of the following numbers could not be the value of the product *abcd*?**

(A) 50 (B) 100 (C) 200 (D) 450 (E) 800

13. **The shortest path from Atown to Cetown runs through Betown. Walking on this path from Atown to Cetown, we would first find the signpost shown on the left. Later we would find the signpost shown on the right. What distance was written on the broken sign?**

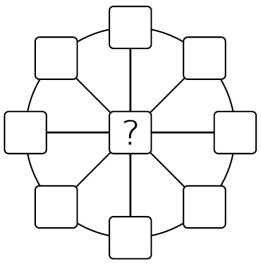


(A) 1 km (B) 2 km (C) 3 km (D) 4 km (E) 5 km

14. **An isosceles triangle has a side of length 20 cm. Of the other two side lengths, one is equal to 2/5 of the other. Which of the following values is the perimeter of this triangle?**

(A) 36 cm (B) 48 cm (C) 60 cm (D) 90 cm (E) 120 cm

15. Tom wants to write a number in each of the nine cells of the figure shown. He wants the sum of the three numbers on each diameter to be 13 and the sum of the eight numbers on the circumference to be 40. What number has Tom to write in the central cell?

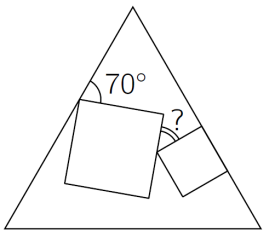


(A) 3 (B) 5 (C) 8 (D) 10 (E) 12

16. Masha put a multiplication sign between the 2nd and 3rd digits of the number 2020 and noted that the resulting product 20 · 20 is a square number. How many numbers between 2010 and 2099 (including 2020) have the same property?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

17. Two squares of different size are drawn inside an equilateral triangle. One side of one of these squares lies on one of the sides of the triangle, as shown. What is the size of the angle marked by the question mark?



(A) 25° (B) 30° (C) 35° (D) 45° (E) 50°

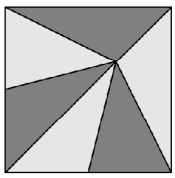
18. Luca began a 520 km trip by car with 14 litres of fuel in the car tank. His car consumes 1 litre of fuel per 10 km. After driving 55 km, he reads a road sign showing the distances from that point to five petrol stations ahead on the road. These distances are 35 km, 45 km, 55 km, 75 km and 95 km. The capacity of the car's fuel tank is 40 litres and Luca wants to stop just once to fill the tank. How far is the petrol station that he should stop at?

(A) 35 km (B) 45 km (C) 55 km (D) 75 km (E) 95 km

19. Let $17x + 51y = 102$. What is the value of $9x + 27y$?

(A) 54 (B) 36 (C) 34 (D) 18
(E) The value is undetermined.

20. A square shaped stained glass window of 81 dm^2 is made out of six triangles of equal area (see figure). A fly is sitting exactly on the spot where the six triangles meet. How far from the bottom of the window is the fly sitting?



(A) 3 dm (B) 5 dm (C) 5.5 dm (D) 6 dm (E) 7.5 dm

SECTION – C (5 POINT PROBLEMS)

21. The digits from 1 to 9 are randomly arranged to make a 9-digit number. What is the probability that the resulting number is divisible by 18?

(A) $\frac{1}{2}$ (B) $\frac{4}{9}$ (C) $\frac{5}{9}$ (D) $\frac{1}{3}$ (E) $\frac{3}{4}$

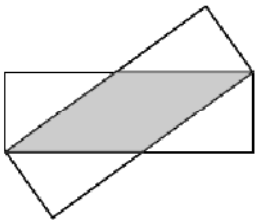
22. A hare and a tortoise competed in a 5 km race along a straight line. The hare is five times faster than the tortoise. The hare mistakenly started perpendicular to the route. After a while he realized his mistake, then turned and ran straight to the finish point. He arrived at the same time as the tortoise. What is the distance between the hare's turning point and the finish point?

(A) 11 km (B) 12 km (C) 13 km (D) 14 km (E) 15 km

23. There are some squares and triangles on the table. Some of them are blue and the rest are red. Some of these figures are large and the rest are small. We know the following two facts are true:
1) if the figure is large then it is a square and
2) if the figure is blue then it is a triangle.
Which of the statements A–E must be true?

(A) All red figures are squares.
(B) All squares are large.
(C) All small figures are blue.
(D) All triangles are blue.
(E) All blue figures are small.

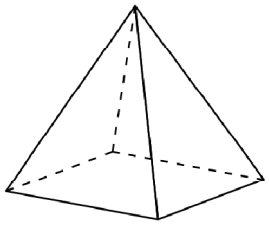
24. Two identical rectangles with sides of length 3 cm and 9 cm overlap, as shown in the diagram.



What is the area of the overlap of the two rectangles?

(A) 12 cm^2 (B) 13.5 cm^2 (C) 14 cm^2 (D) 15 cm^2 (E) 16 cm^2

25. Kanga labelled the vertices of the square-based pyramid using 1, 2, 3, 4 and 5 once each. For each face Kanga calculated the sum of the numbers on its vertices. Four of these sums are 7, 8, 9 and 10. What is the sum of the numbers at the vertices of the fifth face?



(A) 11 (B) 12 (C) 13 (D) 14 (E) 15

26. A large cube is built using 64 smaller identical cubes. Three of the faces of the large cube are painted. What is the maximum possible number of small cubes that have exactly one face painted?

(A) 27 (B) 28 (C) 32 (D) 34 (E) 40

27. Anna wants to write a number in each of the squares of the grid so that the sum of the four numbers in each row and the sum of the four numbers in each column are the same. She has already written some numbers, as shown. What number does she write in the shaded square?

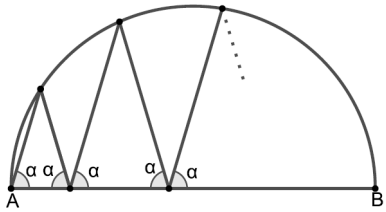
1		6	3
	2	2	8
	7		4
		7	

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

28. Alice, Belle and Cathy had an arm-wrestling contest. In each game two girls wrestled, while the third rested. After each game, the winner played the next game against the girl who had rested. In total, Alice played 10 times, Belle played 15 times and Cathy played 17 times. Who lost the second game?

(A) Alice
(B) Belle
(C) Cathy
(D) either Alice or Belle could have lost the second game
(E) either Belle or Cathy could have lost the second game

29. A zig-zag line starts at the point A, at one end of the diameter AB of a circle. Each of the angles between the zig-zag line and the diameter AB is equal to α as shown. After four peaks, the zig-zag line ends at the point B. What is the size of angle α?



(A) 60° (B) 72° (C) 75° (D) 80° (E) Another answer

30. Eight consecutive three-digit positive integers have the following property: each of them is divisible by its last digit. What is the sum of the digits of the smallest of the eight integers?

(A) 10 (B) 11 (C) 12 (D) 13 (E) 14

***

ANSWER KEY

1	B	**7**	B	**13**	B	**19**	A	**25**	C
2	D	**8**	E	**14**	B	**20**	D	**26**	C
3	E	**9**	C	**15**	A	**21**	B	**27**	C
4	A	**10**	A	**16**	C	**22**	C	**28**	A
5	B	**11**	D	**17**	E	**23**	E	**29**	B
6	C	**12**	B	**18**	D	**24**	D	**30**	D