

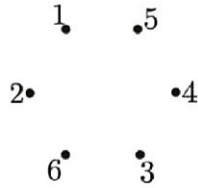
# 32<sup>nd</sup> INTERNATIONAL KANGAROO MATHEMATICS CONTEST 2022

## KSF - Problems Benjamin (Class 5 & 6)

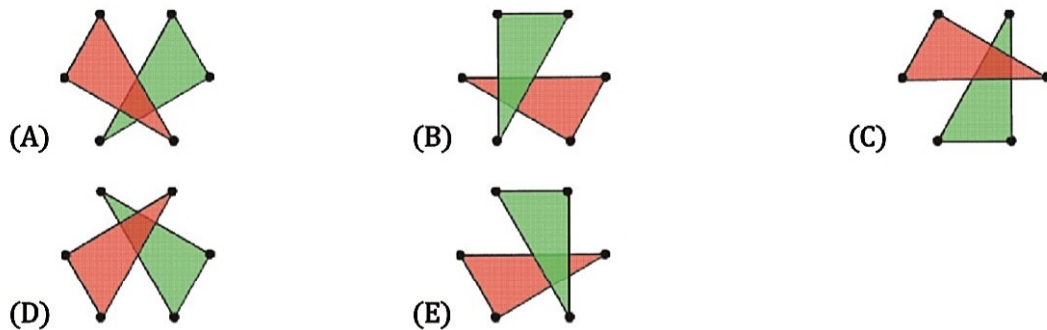
Time Allowed: 180 minutes

### SECTION ONE - (3 point problems)

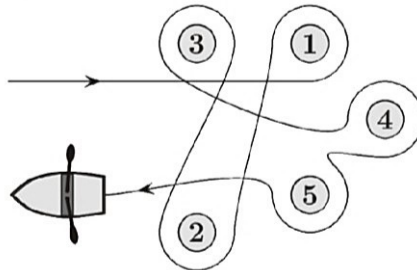
1. Six points are numbered as shown.



Kirsten draws two triangles, one by joining the even numbered points and one by joining the odd numbered points, and colours the inside of one of the triangles red and the inside of the other green. Which of the five options shows the picture Kirsten draws?



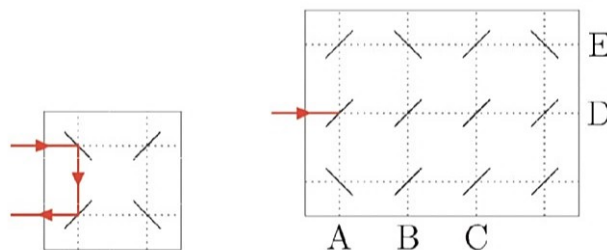
2. Eileen rowed around five buoys, as shown.



Which buoys did Eileen row around in an anticlockwise direction?

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

3. Laser beams reflect in mirrors in the way shown in the picture. At which letter will this laser beam end?



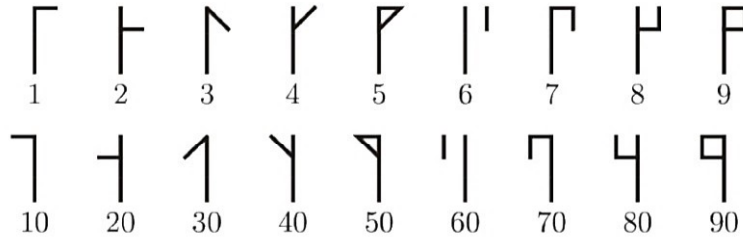
- (A) A                      (B) B                      (C) C  
 (D) D                      (E) E




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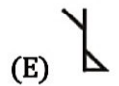
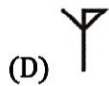
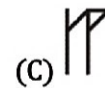
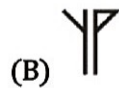
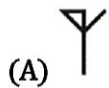
## KSF - Problems Benjamin (Class 5 & 6)

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4. Cistercian numerals were used in the early thirteenth century. Any integer from 1 to 99 can be represented by a single glyph formed by combining two of the glyphs shown below.



The glyph for 24 looks like , the glyph for 81 looks like  and the glyph for 93 looks like . What does the glyph for 45 look like?



5. Marbles are sold in packages of 5, 10 or 25. Tom buys exactly 95 marbles. What is the minimum number of packages he could buy?

(A) 4  
(D) 8

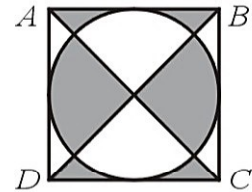
(B) 5  
(E) 10

(C) 7

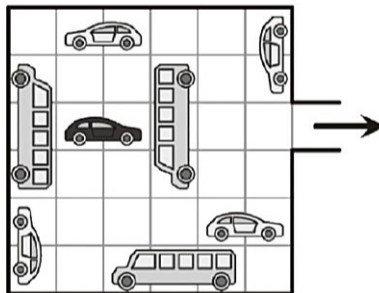
6.  $ABCD$  is a square with side-length 10 cm. What is the area of the shaded part?

(A)  $40 \text{ cm}^2$   
(C)  $50 \text{ cm}^2$   
(E)  $60 \text{ cm}^2$

(B)  $45 \text{ cm}^2$   
(D)  $55 \text{ cm}^2$



7. In the garage shown in the picture, vehicles can only move forward or backward but cannot turn. What is the smallest number of vehicles that have to move for the black car to be able to exit the garage?



(A) 2  
(D) 5

(B) 3  
(E) 6

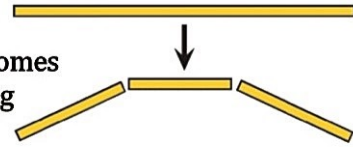
(C) 4

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8. Giulia has one long string of spaghetti she needs to make smaller. Every time she breaks one piece of spaghetti, it becomes three pieces as shown in the picture. Which of the following numbers of pieces could she not get?



- (A) 13 (B) 17 (C) 20  
(D) 23 (E) 25

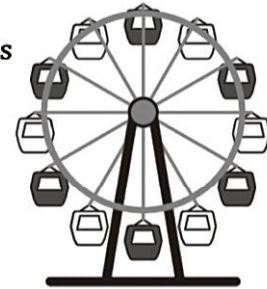
9. Bodil rearranges the 7 pieces shown to get the smallest possible 12 digit number.

4 69 113 9 51 5 67

What are the last 3 digits of this number?

- (A) 699 (B) 113 (C) 551  
(D) 967 (E) 459

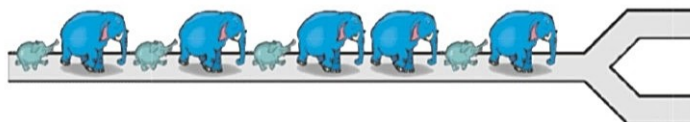
10. Which of the following fractions of a whole turn should the Ferris wheel turn to bring a white pod to the top?



- (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$   
(C)  $\frac{1}{6}$  (D)  $\frac{1}{12}$   
(E)  $\frac{5}{6}$

### SECTION TWO - (4 point problems)

11. Five big elephants and four small ones are walking along a path, as shown.



When they reach the junction, each elephant turns either to the left or to the right. Which of the following cannot be the situation after they all pass the junction?

- (A)
- (B)
- (C)
- (D)
- (E)

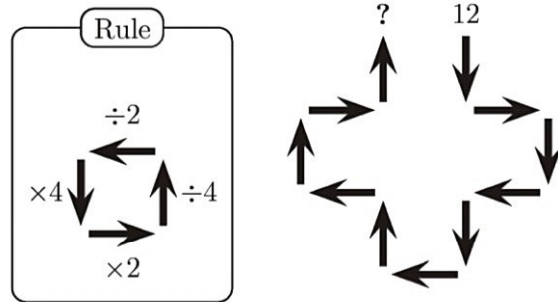
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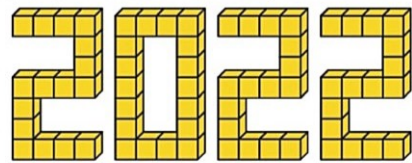
12. Clara starts with 12 and follows the arrows using the rules shown in the picture on the left. What number will she finish with?

- (A) 3  
(B) 6  
(C) 12  
(D) 24  
(E) 48

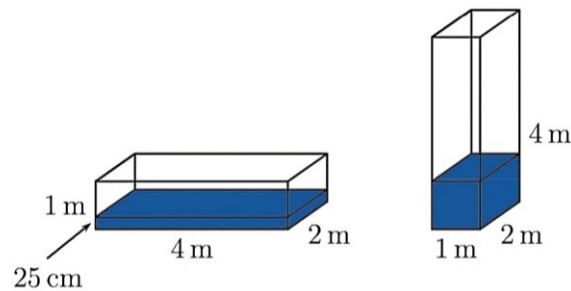


13. Masoud and his friends built the number 2022 with 66 cubes, as shown in the picture. They painted the whole surface of the structure yellow. How many of the cubes have exactly 4 faces painted?

- (A) 16  
(B) 30  
(C) 46  
(D) 54  
(E) 60

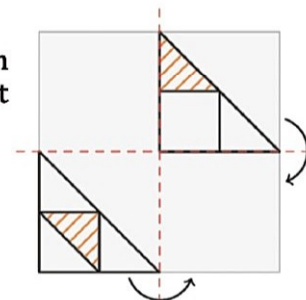



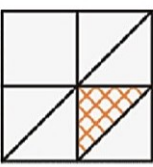



14. A rectangular-based water tank has dimensions  $1\text{ m} \times 2\text{ m} \times 4\text{ m}$ . It contains water to a depth of  $25\text{ cm}$ , as shown in the left-hand picture. The tank is turned so that a  $1\text{ m} \times 2\text{ m}$  face becomes the base, as shown in the right-hand picture. What is the depth of the water now?



- (A) 25 cm  
(B) 50 cm  
(C) 75 cm  
(D) 1 m  
(E) 1.25 m

15. The picture shows a piece of transparent paper with a design drawn on it. The paper is then folded twice, as shown. What would be seen on the folded paper?



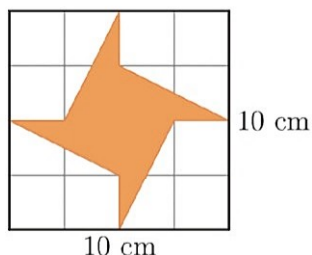
- (A) 
- (B) 
- (C) 
- (D) 
- (E) 

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16. The area of the square is  $100 \text{ cm}^2$ .

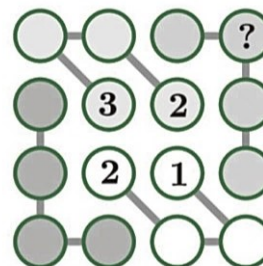


What is the area of the shaded figure?

- (A)  $20 \text{ cm}^2$                       (B)  $25 \text{ cm}^2$                       (C)  $30 \text{ cm}^2$   
 (D)  $35 \text{ cm}^2$                       (E)  $40 \text{ cm}^2$
17. The year 2022 is a special year because the digit 2 appears three times. This is the third time Eva the tortoise has lived through such a year with three identical digits. What is the youngest Eva could be by the end of 2022?

- (A) 18                      (B) 20                      (C) 22  
 (D) 23                      (E) 134

18. Andrew wants to complete the picture so that each row, each column and each set of four circles connected by line segments contains the four numbers 1, 2, 3, and 4. What number should he write in the circle containing the question mark?

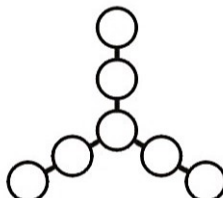


- (A) 1                      (B) 2  
 (C) 3                      (D) 4  
 (E) It cannot be determined

19. Lisa has 4 dogs. Each of the 4 dogs weighs an integer number of kg. No two of them weigh the same. Their total weight is 60 kg. The second heaviest dog weighs 28 kg. How heavy is the third heaviest dog?

- (A) 2 kg                      (B) 3 kg                      (C) 4 kg  
 (D) 5 kg                      (E) 6 kg

20. Jessi writes the seven numbers 3, 4, 5, 6, 7, 8, and 9 in the circles in the picture so that the sums of the three numbers on each line are equal. What is the largest possible sum of three numbers on a line that Jessi can get?



- (A) 28                      (B) 18                      (C) 22  
 (D) 16                      (E) 20

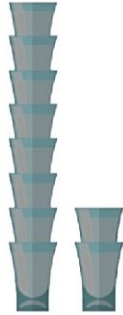
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KSF - Problems Benjamin (Class 5 & 6)

Time Allowed: 180 minutes









SECTION THREE - (5 point problems)

21. Some glasses are stacked on top of each other. A stack of 8 glasses is 42 cm high and a stack of 2 glasses is 18 cm high. How high is a stack of 6 glasses?



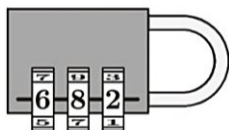
- (A) 22 cm (B) 24 cm (C) 28 cm  
(D) 34 cm (E) 40 cm

22. In the picture below, each animal represents a positive integer and different animals represent different integers. The sum of the two integers in each column is written below that column. What is the largest possible sum of the four integers in the first row?

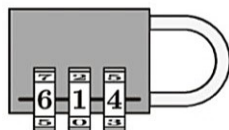
|   |   |   |  |   |
|---|---|---|--|---|
|  |  |  |  | ? |
|  |  |  |  |   |
| 15  | 11  | 3   | 7  |   |

- (A) 18 (B) 19 (C) 20  
(D) 21 (E) 22

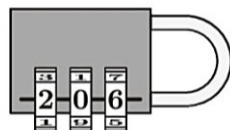
23. To unlock this lock, you get the following four hints.



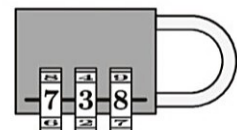
One of these digits is correct and in the right place.



One of these digits is correct but in the wrong place.



Two of these digits are correct but in the wrong place.



All of these digits are incorrect.

What is the correct code for the lock?

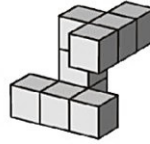
- (A) 604 (B) 082 (C) 640  
(D) 042 (E) 046

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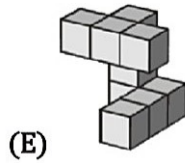
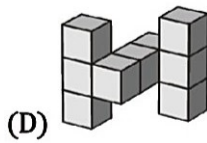
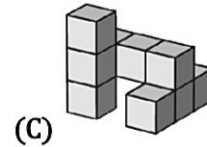
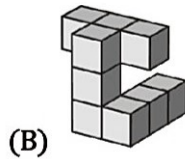
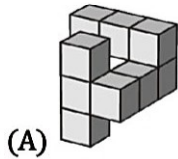
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24. Anna has the shape shown on the right.



Which of the following shapes is the same as Anna's?



25. Werner chooses four of the numbers 2, 3, 4, 5 and 6 and writes one in each box so that the calculation is correct. How many of the five numbers could Werner write in the shaded box?

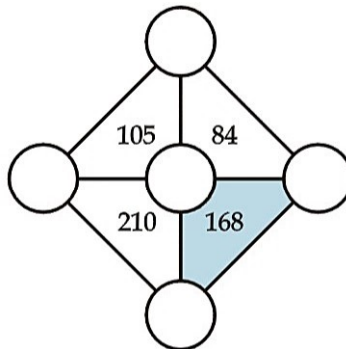
$$\square + \square - \square = \square$$

- (A) 1  
(D) 4

- (B) 2  
(E) 5

- (C) 3

26. The numbers 3, 4, 5, 6 and 7 are to be placed in the five circles below so that the number inside each triangle is the product of the three numbers on its vertices.



What is the sum of the three numbers on the vertices of the coloured triangle?

- (A) 12  
(D) 17

- (B) 14  
(E) 18

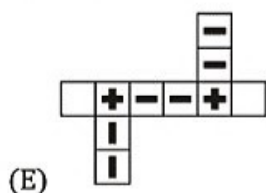
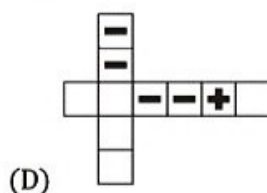
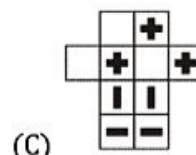
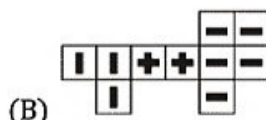
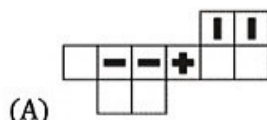
- (C) 15

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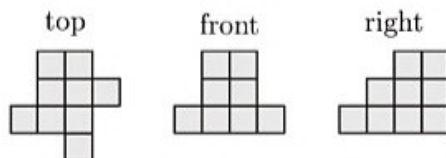
27. Which of the following nets cannot be folded into the solid  ?



28. The four villages A, B, C and D lie along a road in that order. The distance between neighbouring villages is 10 km. There are 10 students who live in village A, 20 students who live in village B, 30 students who live in village C and 40 students who live in village D. The villagers want to build a school so that the total distance travelled by the students when going to school is as small as possible. Where should they build the school?

- (A) in A                                      (B) in B                                      (C) in the middle between B and C  
 (D) in C                                      (E) in D

29. The three pictures show a structure made from cubes as seen from the top, from the front and from the right. What is the maximum number of cubes that could have been used to build the structure?



- (A) 18                                      (B) 19                                      (C) 20  
 (D) 21                                      (E) 22

30. 30 people are sitting round a circular table. Some of them are wearing a hat. Those who do wear a hat always tell the truth while those who do not wear a hat can either lie or tell the truth. Each person says "At least one of my two neighbours is not wearing a hat." What is the largest number of people who could be wearing a hat?

- (A) 5                                      (B) 10                                      (C) 15  
 (D) 20                                      (E) 25



-- Good Luck --