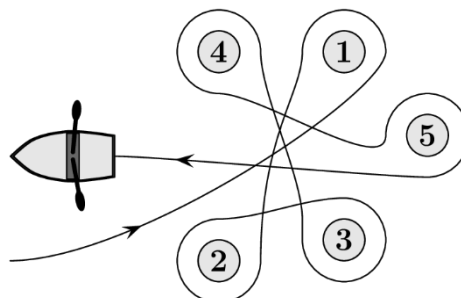


KSF 2022 – Cadet (C)

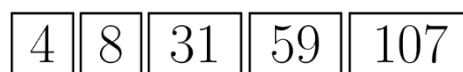
3 points problems

1. Meike paddled around five buoys, as shown. Around which of the buoys did Meike paddle in a clockwise direction?



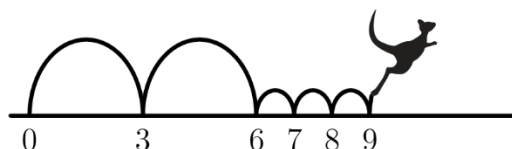
- (A) 2, 3 and 4 (B) 1, 2 and 3 (C) 1, 3 and 5 (D) 2, 4 and 5 (E) 2, 3 and 5

2. Beate rearranges the five numbered pieces shown to display the smallest possible nine-digit number. Which piece does she place at the right-hand end?



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

3. Kengu enjoys jumping on the number line. He always makes two large jumps followed by three small jumps, as shown, and then repeats this process over and over again. Kengu starts his jumping routine on 0. On which of these numbers will Kengu land during his routine?

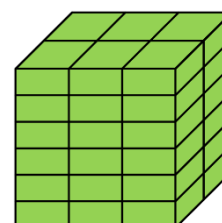


- (A) 82 (B) 83 (C) 84 (D) 85 (E) 86

4. The number plate of Kangy's car fell off. He put it back upside down but luckily this didn't make any difference. Which one of the following could be Kangy's number plate?

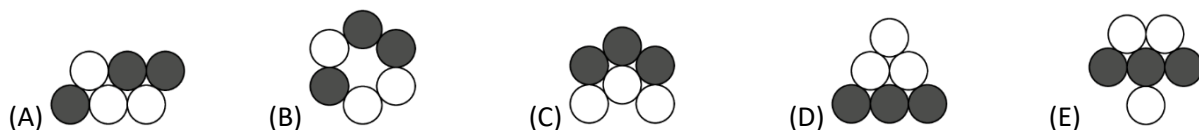
- (A) (B) (C) (D) (E)

5. Rob the Builder has a brick whose shortest side is 4 cm. He uses several such bricks to build the cube shown. What are the dimensions, in cm, of his brick?



- (A) $4 \times 6 \times 12$ (B) $4 \times 6 \times 16$ (C) $4 \times 8 \times 12$ (D) $4 \times 8 \times 16$ (E) $4 \times 12 \times 16$

6. The black and white caterpillar shown in the picture curls up to sleep. 
Which of the following could be seen?



7. In the statement below there are five empty spaces. Sanja wants to fill four of them with plus signs and one with a minus sign so that the statement is correct.

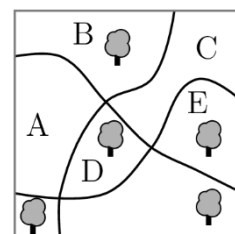
$$6 \square 9 \square 12 \square 15 \square 18 \square 21 = 45$$

Where should she place the minus sign?

- (A) Between 6 and 9 (D) Between 15 and 18
(B) Between 9 and 12 (E) Between 18 and 21
(C) Between 12 and 15

8. There are five big trees and three paths in a park. In which region of the park should a new tree be planted so that for each path, there are the same number of trees on both sides?

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



9. How many positive integers between 100 and 300 have only odd digits?

- (A) 25 (B) 50 (C) 75 (D) 100 (E) 150

10. Gerard wrote down the sum of squares of two numbers, as shown. Unfortunately some of the digits cannot be seen because they are covered in ink. What is the last digit of the first number?

$$(2\text{?})^2 + (1\text{?}2)^2 = 7133029$$

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

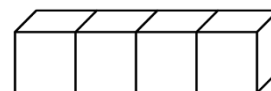
4 points problems

11. The distance between two shelves in the cupboard in Monica's kitchen is 36 cm. She knows that a stack of 8 of her favourite glasses is 42 cm tall and that a stack of 2 glasses is 18 cm tall. What is the largest number of glasses that can be stacked and still fit onto a shelf?

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7



12. On a standard dice, the sum of the numbers of dots on opposite faces is always 7. Four standard dice are glued together, as shown. What is the minimum number of dots that could lie on the whole surface?

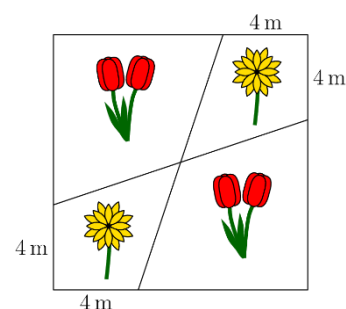
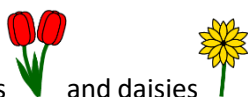


- (A) 52 (B) 54 (C) 56 (D) 58 (E) 60

13. Three sisters, whose average age is 10, each have different ages. When they get together in pairs, the average ages of two such pairs are 11 and 12. What is the age of the eldest sister?

- (A) 10 (B) 11 (C) 12 (D) 14 (E) 16

14. Tony the Gardener planted tulips and daisies in a square flowerbed with side-length 12 m, arranged as shown. What is the total area of the regions in which he planted daisies?



- (A) 48 m^2 (B) 46 m^2 (C) 44 m^2 (D) 40 m^2 (E) 36 m^2

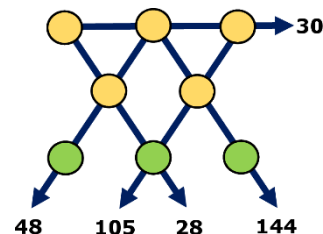
15. In my office, there are two clocks. One clock gains one minute every hour and the other loses two minutes every hour. Yesterday I set them both to the correct time but when I looked at them today, I saw that the time shown on one was 11:00 and shown on the other was 12:00. What time was it when I set the two clocks?

- (A) 23:00 (B) 19:40 (C) 15:40 (D) 14:00 (E) 11:20

16. Werner wrote several positive numbers smaller than 7 on a piece of paper. Ria then crossed out all Werner's numbers and replaced each of them with their difference from 7. The sum of Werner's numbers was 22. The sum of Ria's numbers is 34. How many numbers did Werner write down?

- (A) 7 (B) 8 (C) 9 (D) 10 (E) 11

17. The numbers 1 to 8 are placed, once each, in the circles shown. The numbers by the arrows show the products of the three numbers in the circles on that straight line. What is the sum of the numbers in the three circles at the bottom of the figure?



- (A) 11 (B) 12 (C) 15 (D) 17 (E) 19

18. Jenny decided to enter numbers into the cells of a 3×3 table so that the sum of the numbers in all four possible 2×2 squares will be the same. The numbers in three of the corner cells have already been written, as shown. Which number should she write in the fourth corner cell?

2		4
?		3

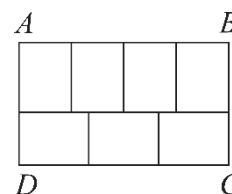
- (A) 0 (B) 1 (C) 4 (D) 5 (E) 6

19. The villages A, B, C and D are situated, not necessarily in that order, on a long straight road. The distance from A to C is 75 km, the distance from B to D is 45 km and the distance from B to C is 20 km. Which of the following **COULD NOT** be the distance from A to D?

- (A) 10 km (B) 50 km (C) 80 km (D) 100 km (E) 140 km

20. The large rectangle ABCD is divided into seven identical rectangles. What is the ratio

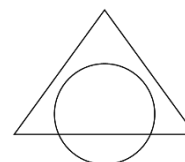
$$\frac{AB}{BC} ?$$



- (A) $\frac{1}{2}$ (B) $\frac{4}{3}$ (C) $\frac{8}{5}$ (D) $\frac{12}{7}$ (E) $\frac{7}{3}$

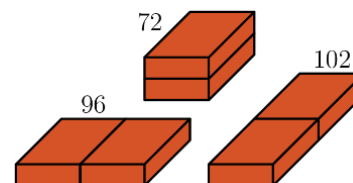
5 points problems

21. The area of the intersection of a circle and a triangle is 45% of the area of their union. The area of the triangle outside the circle is 40% of the area of their union. What percentage of the circle lies outside the triangle?



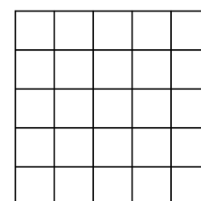
- (A) 20% (B) 25% (C) 30% (D) 35% (E) 50%

22. A builder has two identical bricks. She places them side by side in three different ways, as shown. The surface areas of the three shapes obtained are 72, 96 and 102. What is the surface area of the original brick?



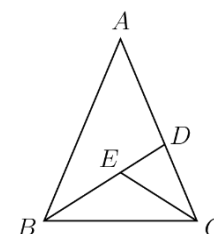
- (A) 36 (B) 48 (C) 52 (D) 54 (E) 60

23. What is the smallest number of cells that need to be coloured in a 5 x 5 square so that any 1 x 4 or 4 x 1 rectangle lying inside the square has at least one cell coloured?



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

24. An isosceles triangle ABC, with AB = AC, is split into three smaller isosceles triangles, as shown, so that AD = DB, CE = CD, and BE = EC. Note that the diagram is not drawn to scale. What is the size, in degrees, of angle BAC?



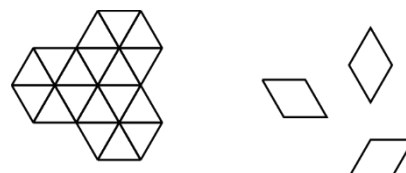
- (A) 24 (B) 28 (C) 30 (D) 35 (E) 36

25. Marc always cycles at the same speed and he always walks at the same speed. He can cover the round trip from his home to school and back again in 20 minutes when he cycles and in 60 minutes when he walks. Yesterday Marc started cycling to school but stopped and left his bike at Eva's house on the way before finishing his journey on foot. On the way back, he walked to Eva's house, collected his bike and then cycled the rest of the way home. His total travel time was 52 minutes. What fraction of his journey did Marc make by bike?

- (A) $\frac{1}{6}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

26. In how many ways can the shape on the left be completely covered using nine tiles like the ones on the right?

- (A) 1 (B) 6 (C) 8 (D) 9 (E) 12



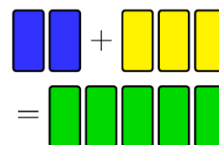
27. Mowgli asks a zebra and a panther what day it is. The zebra always lies on Monday, Tuesday and Wednesday. The panther always lies on Thursday, Friday and Saturday. The zebra says, "Yesterday was one of my lying days." The panther says "Yesterday was also one of my lying days." What day is it?

- (A) Thursday (B) Friday (C) Saturday (D) Sunday (E) Monday

28. Several points are marked on a line. Renard then marked another point between each two adjacent points on the line. He repeated this process a further three times. There are now 225 points marked on the line. How many points were marked on the line initially?

- (A) 10 (B) 12 (C) 15 (D) 16 (E) 25

29. A painter wanted to mix 2 litres of blue paint with 3 litres of yellow paint to make 5 litres of green paint. However, by mistake he used 3 litres of blue and 2 litres of yellow so that he made the wrong shade of green. What is the smallest amount of this green paint that he must throw away so that, using the rest of his green paint and some extra blue and/or yellow paint, he could make 5 litres of paint of the correct shade of green?



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

30. There are 2022 kangaroos and some koalas living across seven parks. In each park the number of kangaroos is equal to the total number of koalas in all the other parks. How many koalas live in the seven parks in total?

- (A) 288 (B) 337 (C) 576 (D) 674 (E) 2022