KSF 2018 – Level C

3 point problems

1. What is the value of $(20+18)\div(20-18)$?

(A) 18 (B) 19 (C) 20 (D) 34 (E) 36

2. When the letters of the word MAMA are written vertically above one another, the word has a vertical line of symmetry. Which of these words also have a vertical line of symmetry when written in the same way?

(A) ROOT (B) BOOM (C) BOOT (D) LOOT (E) TOOT

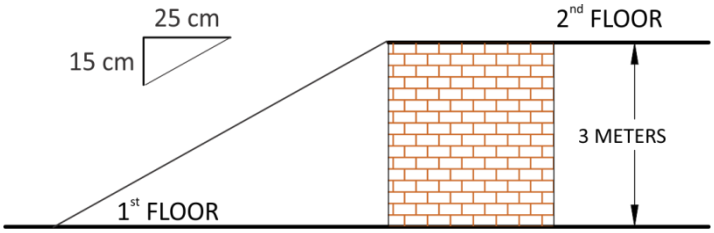
3. A triangle has sides of length 6, 10 and 11. An equilateral triangle has the same perimeter. What is the length of each side of the equilateral triangle?

(A) 6 (B) 9 (C) 10 (D) 11 (E) 27

4. Which number should replace the symbol # in the equation $2\cdot18\cdot14=6\cdot\#\cdot7$ to make it correct?

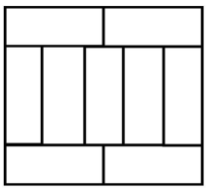
(A) 8 (B) 9 (C) 10 (D) 12 (E) 15

5. In a building, steps are 15 cm tall and 25 cm deep, as shown in the diagram. How many steps does the stair that leads from the first to the second floor have?



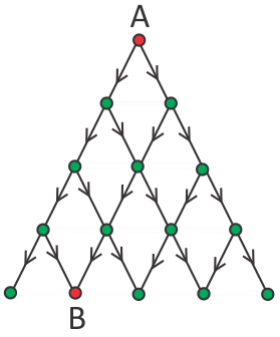
(A) 8 (B) 10 (C) 15 (D) 20 (E) 25

6. A rectangle is made up of nine identical rectangles whose longest sides are 10 cm long. What is the perimeter of the large rectangle?



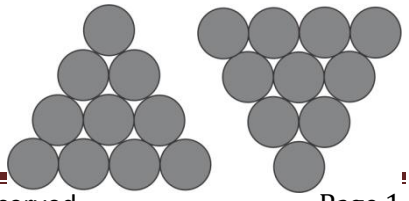
(A) 40 cm (B) 48 cm (C) 76 cm (D) 81 cm (E) 90 cm

7. An ant wants to go from point A to point B walking from top to bottom along the segments indicated by the arrows. In how many different ways can she do it?



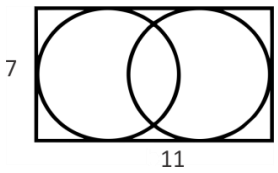
(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

8. Joana made the triangle with ten coins, seen to the left. His brother moved a few coins and got the triangle to the right. At least, how many coins did he move?



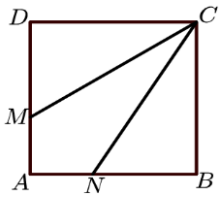
(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

9. A rectangle of dimensions 7×11 contains two circles so that each one touches three of the sides of the rectangle, as shown. What is the distance between the centers of the two circles?



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

10. Square $ABCD$ has sides of length 3 cm. The points M and N lie on AD and AB so that CM and CN split the square into three pieces of the same area. What is the length of DM?



(A) 0,5 cm (B) 1 cm (C) 1,5 cm (D) 2 cm (E) 2,5 cm

4 point problems

11. Martha multiplied two 2-digit numbers correctly. Then she scribbled out three digits as shown. What is the sum of the three digits she scribbled out?

(A) 5 (B) 6 (C) 9 (D) 12 (E) 14

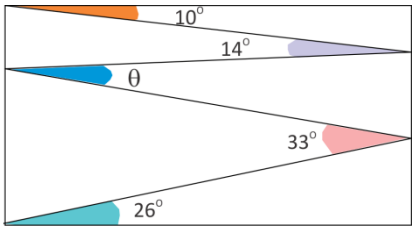
12. A board has exactly 40 identical squares and more than one line. Andrew chose the middle line and painted all its squares. How many squares of the board did he not paint?

(A) 20 (B) 30 (C) 32 (D) 35 (E) 39

13. A lion is hidden in one of three rooms of a house. A note on the door of room 1 says "The lion is here". A note on the door of room 2 says "The lion is not here". A note on the door of room 3 says "$2+3=2\times3$". Only one of these sentences is true. In which room is the lion hidden?

(A) 1 (B) 2 (C) 3 (D) It may be in any room. (E) It may be in either room 1 or room 2.

14. Valery draws a zig-zag line inside a rectangle, creating angles of 10°, 14°, 33° e 26°, as shown. What is the value of angle θ ?



(A) 11° (B) 12° (C) 16° (D) 17° (E) 33°

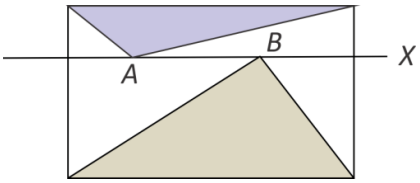
15. Alice wrote down a list of prime numbers less than 100, using each of the digits 1, 2, 3, 4, and 5 exactly once and no other digits. Which prime number must be for sure in her list? Note: number 1 is not a prime number.

(A) 2 (B) 5 (C) 31 (D) 41 (E) 53

16. A hotel on a Caribbean island advertises that it is located in a place with "350 days of sun every year!". If this is true, at least how many days does Rita have to plan to stay at the hotel next year to make sure she has two consecutive days of sunshine?

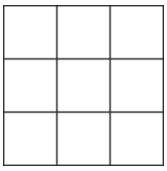
(A) 17 (B) 21 (C) 31 (D) 32 (E) 35

17. In the figure, line X is parallel to the base of the rectangle and the points A and B, inside the rectangle, belong to the line. The sum of the areas of the shaded rectangles is equal to 10 cm^2. What is the area of the rectangle?



(A) 18 cm^2 (B) 20 cm^2 (C) 22 cm^2 (D) 24 cm^2
(E) It depends on the positions of A and B

18. Jane numbered from 1 to 9 the cells a 3×3 table. Then she calculated the sum of the numbers in each row and in each column of the table and got 12, 13, 15, 16 and 17, in some order. Which of the numbers below is the missing sum?



(A) 13 (B) 14 (C) 15 (D) 16 (E) 17

19. In a school, $\frac{2}{3}$ of the students enjoy Mathematics and $\frac{3}{4}$ of the students enjoy Portuguese. Which is the smallest fraction of students who enjoy both subjects?

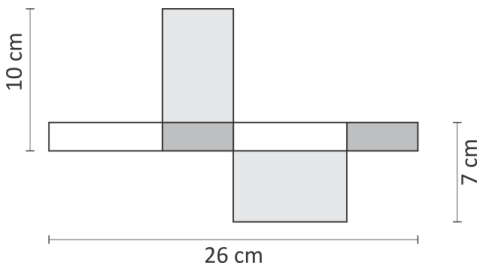
(A) $\frac{1}{12}$ (B) $\frac{5}{12}$ (C) $\frac{1}{2}$ (D) $\frac{5}{7}$ (E) $\frac{8}{9}$

20. In a straight line, eleven points were marked. The sum of all the distances between the first point to the left and the other points is 2018. The sum of all the distances between the second point to the left and the other points, including the first one, is 2000. What is the distance between the first and second points?

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

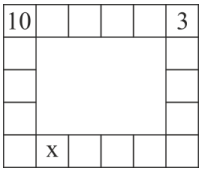
5 point problems

21. The figure shows the net of an unfolded rectangular box. What is the volume of this box, in cubic centimeters?



(A) 43 (B) 70 (C) 80 (D) 100 (E) 1820

22. Ria wants to write a number in every square on the border of a 5×6 table. In each square, the written number must be equal to the sum of the two numbers in the squares with a common side with that square. Two of the numbers are given in the diagram. What number must be written in the square marked with the letter x?

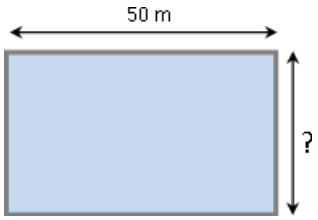


(A) -13 (B) -3 (C) 7 (D) 10 (E) 13

23. In a school, there are three candidates for a presidential election of the fraternity and 130 students are voting. Adam has 24 votes so far, while Brian has 29 votes and Charles has 37. How many more votes does Charles need to be elected?

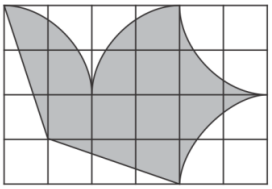
(A) 13 (B) 14 (C) 15 (D) 16 (E) 17

24. Simon and Ian decide to have a race. While Simon runs five full laps around the pool, Ian goes three times and returns three times swimming the length of the pool. Simon's speed is three times Ian's speed. How wide is the pool?



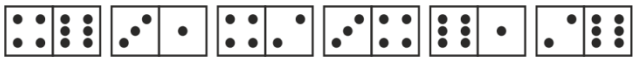
(A) 25 m (B) 40 m (C) 50 m (D) 80 m (E) 180 m

25. In the grid shown, the area of the gray draw is 192 cm^2. All parts of the perimeter of the draw are either parts of a circle or straight lines. What are the dimensions of the grid?



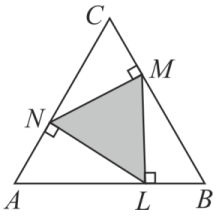
(A) $6cm \times 4cm$ (B) $12cm \times 8cm$ (C) $20cm \times 12cm$ (D) $24cm \times 16cm$ (E) $30cm \times 20cm$

26. Paul intends to arrange correctly the domino tiles, that is, parts with equal points must be in contact. He can do this by two moves: by swapping the position of any two tiles, without spinning, or by spinning only one piece. What is the least number of moves he needs to arrange all the tiles correctly?



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

27. Points *N*, *M* and *L* lie on the sides of the equilateral triangle *ABC*, such that $\overline{NM} \perp \overline{BC}$, $\overline{ML} \perp \overline{AB}$ and $\overline{LN} \perp \overline{AC}$, as shown in the diagram. The area of triangle *ABC* is 36. What is the area of triangle *LMN*?



(A) 9 (B) 12 (C) 15 (D) 16 (E) 18

28. Anna, Bruce and Choo went shopping. Bruce spent only 15% of what Choo spent and Anna spent 60 % more than Choo. Together they spent 55 USD. How much did Anna spend?

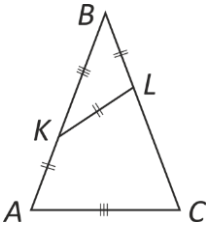
(A) 3 (B) 20 (C) 25 (D) 26 (E) 32

29. Vivi is practicing long jump. The average distance she has jumped so far is 3.80 meters. Today she jumped 3.99 meters and so her average was increased up to 3.81 meters. What distance must she jump next time to increase her average up to 3.82 meters?

(A) 3.97 m (B) 4.00 m (C) 4.01 m (D) 4.03 m (E) 4.04 m

30. In the isosceles triangle *ABC*, points *K* and *L* are marked on sides $\overline{AB}$ and $\overline{BC}$, respectively, so that $AK = KL = LB$ and $KB = AC$.

What is the size of angle ABC ?



(A) 30^o (B) 35^o (C) 36^o (D) 40^o (E) 44^o