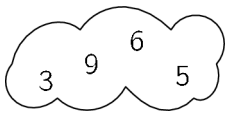
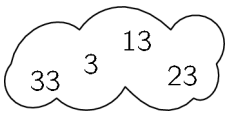
KSF 2019 - Problems Cadet (Class 7 & 8)

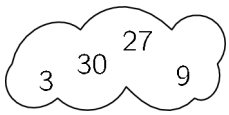
Time Allowed: **150 minutes**

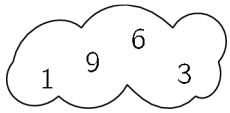
SECTION ONE - (3 point problems)

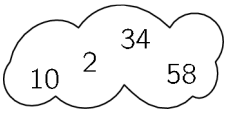
1. Which cloud contains four even numbers?

(A) 

(B) 

(C) 

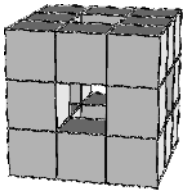
(D) 

(E) 

2. How many hours are there in ten quarters of an hour?

(A) 40 **(B)** 5 and a half **(C)** 4
(D) 3 **(E)** 2 and a half

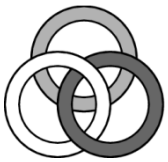
3. A $3 \times 3 \times 3$ cube is built from $1 \times 1 \times 1$ cubes. Then some cubes are removed from front to back, from left to right and from top to bottom, as shown. How many $1 \times 1 \times 1$ cubes are left?



(A) 15 **(B)** 18 **(C)** 20
(D) 21 **(E)** 22

4. Three rings are linked as shown in the diagram. Which of the following diagrams also shows the three rings linked in the same way?

(A) 

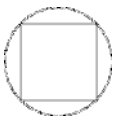
(B) 

(C) 

(D) 

(E) 

5. Which of the diagrams below cannot be drawn without lifting your pencil off the page and without drawing along the same line twice?

(A) 

(B) 

(C) 

(D) 

(E) 

6. Five friends met. Each of them gave a cupcake to each of the others. They then ate all the cupcakes they had been given. As a result, the total number of cupcakes they had decreased by a half. How many cupcakes did the five friends have at the start?

(A) 20 **(B)** 24 **(C)** 30 **(D)** 40 **(E)** 60

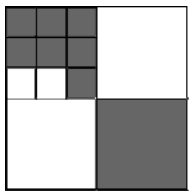
7. In a race, Lotar finished before Manfred, Victor finished after Jan, Manfred finished before Jan and Eddy finished before Victor. Who finished last of these five runners?

(A) Victor **(B)** Manfred **(C)** Lotar **(D)** Jan **(E)** Eddy

8. The pages of the book Juliet is reading are all numbered. The numbers used on the pages contain the digit 0 exactly five times and the digit 8 exactly six times. What is the number of the final page?

(A) 48 **(B)** 58 **(C)** 60 **(D)** 68 **(E)** 88

9. A large square is divided into smaller squares. What fraction of the large square is colored grey?



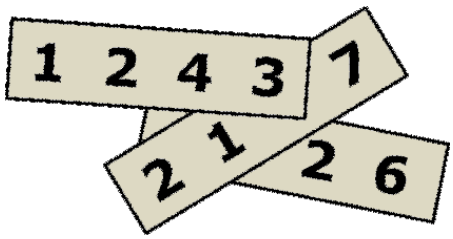
(A) $\frac{2}{3}$ **(B)** $\frac{2}{5}$ **(C)** $\frac{4}{7}$ **(D)** $\frac{4}{9}$ **(E)** $\frac{5}{12}$

10. Andrew divided some apples into six equal piles. Boris divided the same number of apples into five equal piles. Boris noticed that each of his piles contains two more apples than each of Andrew's piles. How many apples does Andrew have?

(A) 60 **(B)** 65 **(C)** 70 **(D)** 75 **(E)** 80

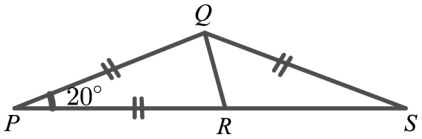
SECTION TWO - (4 point problems)

11. Four-digit integers are written on each of three pieces of paper. The pieces of paper are arranged so that three of the digits are covered, as shown. The sum of the three four-digit integers is 10126. Which are the covered digits?



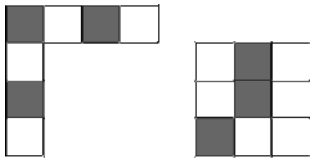
(A) 5, 6 and 7 **(B)** 4, 5 and 7 **(C)** 4, 6 and 7 **(D)** 4, 5 and 6 **(E)** 3, 5 and 6

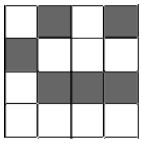
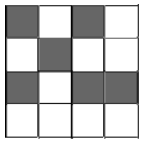
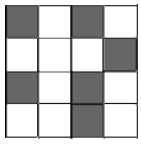
12. In the diagram, $PQ = PR = QS$ and angle $\widehat{QPR} = 20°$. What is the size of angle $\widehat{RQS}$?

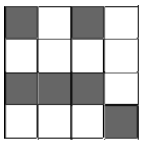
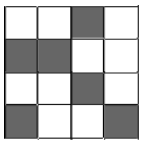


(A) 50° **(B)** 60° **(C)** 65°
(D) 70° **(E)** 75°

13. Which of the following 4×4 tiles cannot be formed by combining the two given pieces?



(A)  **(B)**  **(C)** 

(D)  **(E)** 

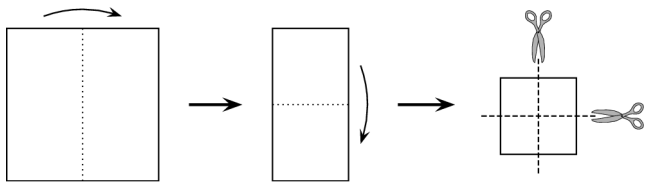
14. Alan, Bella, Claire, Dora, and Erik met at a party and shook hands exactly once with everyone they already knew. Alan shook hands once, Bella shook hands twice, Claire shook hands three times and Dora shook hands four times. How many times did Erik shake hands?

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

15. Jane is playing basketball. After a series of 20 shots, Jane had scored 55% of the time. Five shots later, her scoring rate had increased to 56%. On how many of the last five shots did she score?

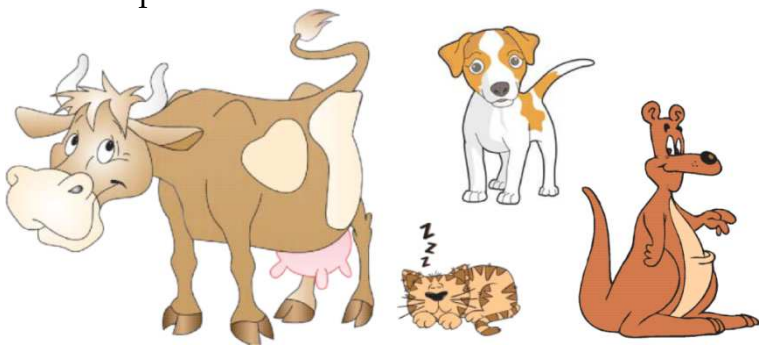
(A) 1 **(B)** 2 **(C)** 3
(D) 4 **(E)** 5

16. Cathie folded a square sheet of paper exactly in half twice and then cut it in the middle twice, as shown in the diagram. How many of the pieces that she obtains are squares?



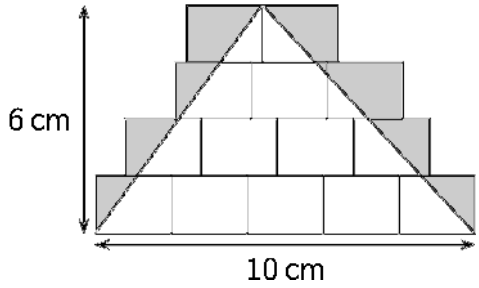
(A) 3 **(B)** 4 **(C)** 5
(D) 6 **(E)** 8

17. Michael keeps dogs, cows, cats and kangaroos as pets. He tells Helen that he has 24 pets in total and that $\frac{1}{8}$ of them are dogs, $\frac{3}{4}$ are NOT cows and $\frac{2}{3}$ are NOT cats. How many kangaroos does Michael keep?



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

18. Some identical rectangles are drawn on the floor. A triangle of base 10*cm* and height 6*cm* is drawn over them, as shown, and the region inside the rectangles and outside the triangles is shaded. What is the area of the shaded region?

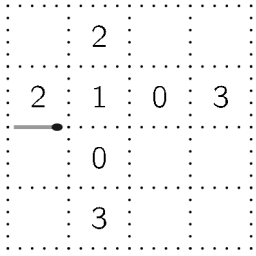


(A) 10 cm^2 **(B)** 12 cm^2 **(C)** 14 cm^2
(D) 15 cm^2 **(E)** 21 cm^2

19. Julio has two cylindrical candles with different heights and diameters. The first candle lasts 6 hours, while the second candle lasts 8 hours. He lit both candles at the same time and three hours later both candles were the same height. What was the ratio of their original heights?

(A) 4: 3 **(B)** 8: 5 **(C)** 5: 4
(D) 3: 5 **(E)** 7: 3

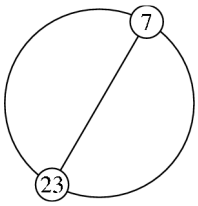
20. Aylin wants to create a path of matches using as few matches as possible. She places each match on the piece of paper like the one shown, along one of the dotted lines. Her path returns to the left-hand end of her original match. The numbers shown in some of the cells are equal to the number of matches around that cell.How many matches are in this path?



(A) 12 **(B)** 14 **(C)** 16
(D) 18 **(E)** 20

SECTION THREE - (5 point problems)

21. The integers from 1 to n, inclusive, are equally spaced in order round a circle. The diameter through the position of the integer 7 also goes through the position of 23, as shown. What is the value of n?

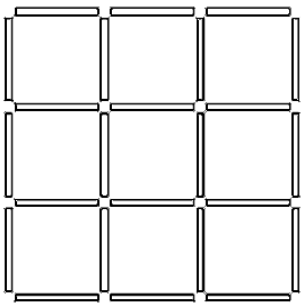


(A) 30 **(B)** 32 **(C)** 34
(D) 36 **(E)** 38

22. Liam spent all his money buying 50 soda bottles at the store for 1 Euro each. He sells each bottle at the same higher price. After selling 40 bottles, he has 10 Euros more than he started with. He then sells all the remaining bottles. How much money does Liam now have?

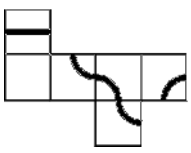
(A) 70 Euro **(B)** 75 Euro **(C)** 80 Euro
(D) 90 Euro **(E)** 100 Euro

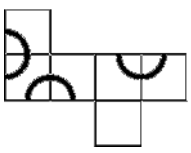
23. Natasha has many sticks of length 1. The sticks are coloured either blue, red, yellow or green. She wants to make a 3 × 3 grid, as shown, so that each 1 × 1 square in the grid has four sides of different colours. What is the smallest number of green sticks that she could use?

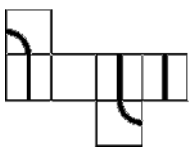


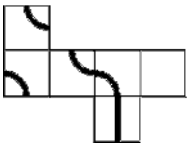
(A) 3 **(B)** 4 **(C)** 5
(D) 6 **(E)** 7

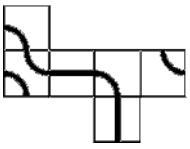
24. An ant would like to walk along a marked line on the surface of a cube until it returns to its starting point. From which one of the following nets could a cube be made so that such a journey is possible?

(A) 

(B) 

(C) 

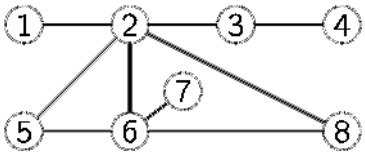
(D) 

(E) 

25. Elisabeta had a large bag of 60 chocolates. She started by eating one 10th of them on Monday, then one 9th of the remainder on Tuesday, then one 8th of the rest on Wednesday, then one 7th on Thursday and so on until she eats half of the remaining chocolates from the previous day. How many chocolates does she have left?

(A) 1 **(B)** 2 **(C)** 3
(D) 4 **(E)** 6

26. Prab painted each of the eight circles in the diagram either red, yellow or blue such that no two circles that are joined directly are painted the same colour. Which two circles are necessarily painted the same colour?



(A) 5 and 8 **(B)** 1 and 6 **(C)** 2 and 7
(D) 4 and 5 **(E)** 3 and 6

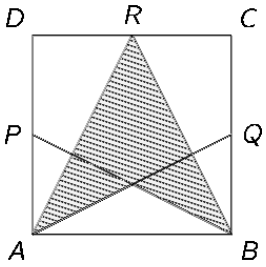
27. When Ria and Flora compared their savings, they found that the ratio of their savings was 5:3. Then Ria bought a tablet for 160 Euro and the ratio of their savings changed to 3:5. How many Euro did Ria have before buying the tablet?

(A) 192 **(B)** 200 **(C)** 250
(D) 400 **(E)** 420

28. Some three-player teams enter a chess tournament. Each player in a team plays exactly once against every player from all the other teams. For organisational reasons, no more than 250 games can be played in total. At most, how many teams can enter the tournament?

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

29. The diagram shows the square $ABCD$ with P, Q and R the midpoints of the sides DA, BC and CD respectively. What fraction of the square $ABCD$ is shaded?



(A) $\frac{3}{4}$ **(B)** $\frac{5}{8}$
(C) $\frac{1}{2}$ **(D)** $\frac{7}{16}$ **(E)** $\frac{3}{8}$

30. A train is made up of 18 carriages. There are 700 passengers travelling on the train. In any block of five adjacent carriages, there are 199 passengers in total. How many passengers are in the middle two carriages of the train?

(A) 70 **(B)** 77 **(C)** 78
(D) 96 **(E)** 103

-- Good Luck --