Cadet Level: Class (7 & 8) **Max Time: 2 Hours**

3-Point Problems

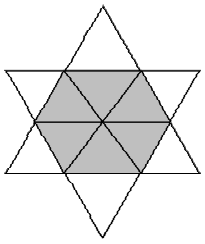
1. Among these numbers, which is even?

(**A**) 2009 (**B**) $2+0+0+9$ (**C**) $200-9$
(**D**) 200×9

2. At a competition there were 4 boys and 4 girls. Boys compete only with girls and girls compete only with boys. Afterwards we asked all of them, how many competitions they each had. The boys said: 3, 1, 2, 2. Three of girls said: 2, 2, 2. What number did the fourth girl say?

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

3. The star in the picture is formed from 12 identical small equilateral triangles. The perimeter of the star is 36 cm. What is the perimeter of the dark hexagon?

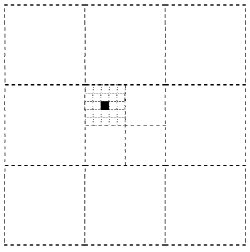


(**A**) 6 cm (**B**) 12 cm (**C**) 18 cm
(**D**) 24 cm

4. Harry delivers folders in Long Street. He must deliver a folder to all the houses with an odd number. The first house has number 15, the last one has number 53. How many houses does Harry deliver to?

(**A**) 19 (**B**) 20 (**C**) 27 (**D**) 38

5. The area of the big square is 1. What is the area of the black little square?



(**A**) $\frac{1}{300}$ (**B**) $\frac{1}{600}$ (**C**) $\frac{1}{900}$ (**D**) $\frac{1}{1000}$

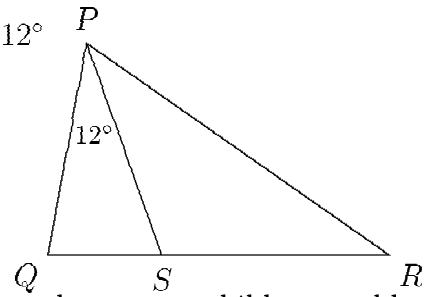
6. The product of four different positive integers is 100. What is their sum?

(**A**) 10 (**B**) 12 (**C**) 15 (**D**) 18

7. There are cats and dogs in the room. The number of the cats' paws is twice the number of the dogs' noses. Then the number of cats is

(**A**) twice the number of dogs (**B**) equal to the number of dogs
(**C**) half the number of dogs (**D**) $\frac{1}{4}$ of the number of dogs

8. In the figure on the right, QSR is a straight line, $\angle QPS = 12°$ and $PQ = PS = RS$. What is the size of $\angle QPR$?

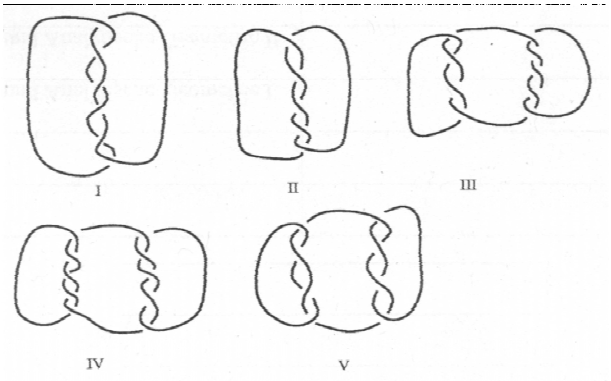


(**A**) 36° (**B**) 42° (**C**) 54° (**D**) 60°

9. The elevator can take either 12 adults or 20 children. At most how many children could go up with 9 adults?

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

10. Which of the following links consist of more than one piece of rope?



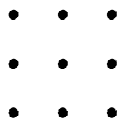
(**A**) I, III, IV and V
(**B**) III, IV and V
(**C**) I, III and V
(**D**) all of them

4-Point Problems

11. How many positive integers have equally many digits in the decimal representation of their square and their cube?

(**A**) 0 (**B**) 3 (**C**) 4 (**D**) 9

12. What is the smallest number of points in the figure one needs to remove so that no 3 of the remaining points are collinear (lie on the same straight line)?



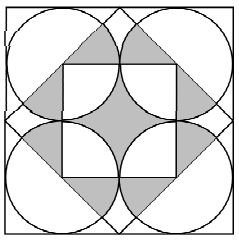
(**A**) 1 (**B**) 2 (**C**) 3 (**D**) 4

13. Nick measured all 6 angles in two triangles - one acute-angled and one obtuse-angled. He remembered four of those angles: 120°, 80°, 55°, and 10°. What is the smallest angle of the acute-angled triangle?

(**A**) 5° (**B**) 10° (**C**) 45°
(**D**) impossible to determine

14. What part of the outer square is shaded?

(A) $\frac{1}{4}$ **(B)** $\frac{\pi}{12}$ **(C)** $\frac{\pi}{4}$ **(D)** $\frac{1}{3}$

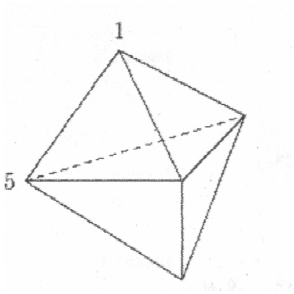


15. On the island of nobles and liars 25 people are standing in a queue. Everyone, except the first person in the queue, said that the person in front of him in the queue is a liar, and the first man in the queue said that all people standing behind him are liars. How many liars are there in the queue? (Nobles always speak the truth, and liars always tell lies.)

(A) 12 **(B)** 13 **(C)** 24

(D) impossible to determine

16. The picture shows a solid formed with 6 triangular faces. At each vertex there is a number. For each face we consider the sum of the 3 numbers at the vertices of that face. If all the sums are the same and two of the numbers are 1 and 5 as shown, what is the sum of all the 5 numbers?



(A) 9 **(B)** 12 **(C)** 17 **(D)** 18

17. In the equality $\frac{E \cdot I \cdot G \cdot H \cdot T}{F \cdot O \cdot U \cdot R} = T \cdot W \cdot O$ different letters stand for different digits while equal letters stand for equal digits. How many different values can the product $T \cdot H \cdot R \cdot E \cdot E$ have?

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

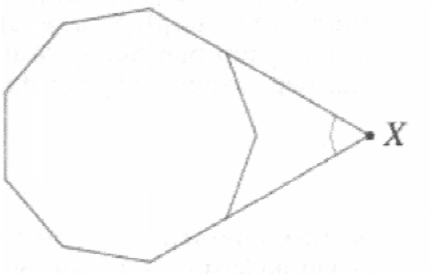
18. We want to colour the squares in the grid using colors P, Q, R and S in such a way that neighboring squares do not have the same colour (squares that share a vertex are considered neighbors). Some of the squares have been coloured as shown. What are the possibilities for the shaded square?

P	Q			
R	S			
		Q		
Q				

(A) only Q **(B)** only R **(C)** only S

(D) either R or S

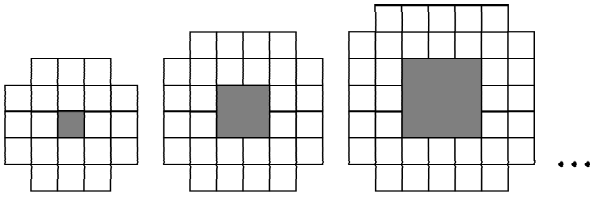
19. The diagram shows a regular enneagon (9-sided polygon).



What is the size of the marked angle at X?

(**A**) 45° (**B**) 50° (**C**) 55° (**D**) 60°

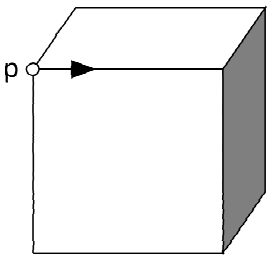
20. The first three patterns are shown. Not including the square hole, how many unit squares are needed to build the 10th pattern in this sequence?



(**A**) 80 (**B**) 84 (**C**) 92 (**D**) 100

5-Point Problems

21. Starting at point P, we move along the edges, starting in the direction of the arrow. At the end of the edge we have to choose: going to the right or to the left. At the end of the second edge we have to choose again. And so on. We choose alternating right and left. After how many edges do we return to point P for the first time?

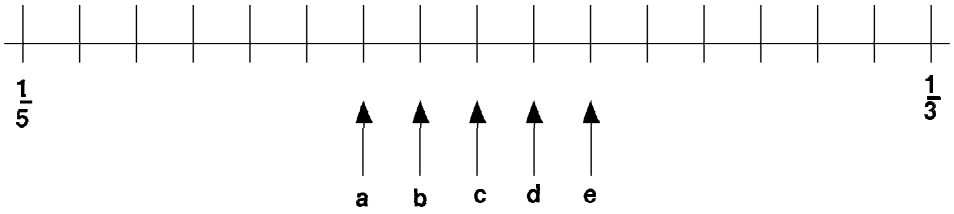


(**A**) 4 (**B**) 6 (**C**) 9 (**D**) 12

22. How many ten-digit numbers composed only of digits 1, 2 or 3 exist, in which any two neighboring digits differ by 1.

(**A**) 16 (**B**) 32 (**C**) 64 (**D**) 80

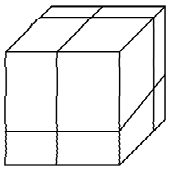
23. The fractions $\frac{1}{3}$ and $\frac{1}{5}$ are placed on a number-line.



Where is the fraction $\frac{1}{4}$?

(A) a **(B)** b **(C)** c **(D)** e

24. Three cuts are made through a large cube to make eight smaller cuboids. What is the ratio of the *total* surface area of these eight cuboids to the surface area of the original cube?



(A) 1 : 1 **(B)** 4 : 3 **(C)** 2 : 1 **(D)** 4 : 1

25. All divisors of the number N, not equal to N and to 1, were written in line. It occurred, that the greatest of the divisors in the line is 45 times as great as the smallest one. How many numbers N satisfy this condition?

(A) 1 **(B)** 2 **(C)** more than 2

(D) impossible to determine