2012 MIDDLE PRIMARY FIRST ROUND SOLUTION

1. We want to cut a 20 m stick into shorter sticks of length 4 m. We can only cut one piece of stick at a time. How many cuts are required?

（A）3　　（B）4　　（C）5　　（D）6　　（E）7

【Suggested Solution】

The wooden stick was cut into 20 ÷ 4 = 5 pieces, therefore we needs to cut 5－1 = 4 times.

Answer：（B）

2. What number must replace the □ in the mathematical sentence □ + 5 = 13－6 to make it correct?

（A）1　　（B）2　　（C）3　　（D）4　　（E）5

【Suggested Solution】

2+5=13－6.

Answer：（B）

3. Which of the following number is less than 2,010,000?

（A） two millions and ten thousands　　（B） 2,100,000

（C） one million and twenty thousands　　（D） 20,100,000

（E） two millions and one hundred thousands

【Suggested Solution】

2 010 000 is equal to A, less than B, greater than C, less than D, less than E.

Answer：（C）

4. What is the value of 999+99?

（A）1088　　（B）1098　　（C）1099　　（D）1889　　（E）1989

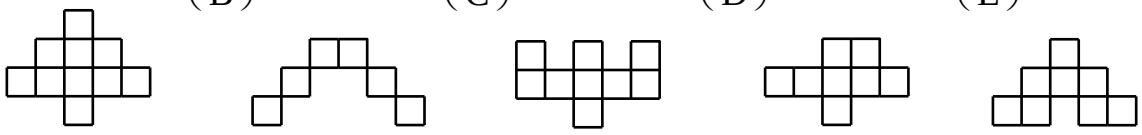
【Suggested Solution】

999+99=(1000－1)+ (100－1)=1100－2=1098.

Answer：（B）

5. The following figures are formed by identical squares. Which figure has the longest perimeter?

（A）　（B）　（C）　（D）　（E）



【Suggested solution】

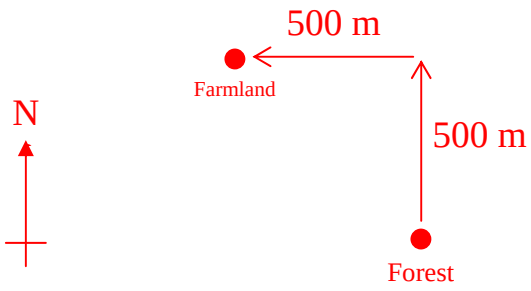
Let the side lengths of squares are 1.The perimeter of figure A is 18; the perimeter of figure B is 22; the perimeter of figure C is 20; the perimeter of figure D is 16; the perimeter of figure E is 18. Thus the figure with largest perimeter is B.

Answer：（B）

6. Starting from the forest, a rabbit hopped 500 m to the north, and then reached a farm by hopping 500 m to the west. In which direction from the forest is the farm?

（A）East　　（B）South　　（C）Northwest　（D）North　　（E）West

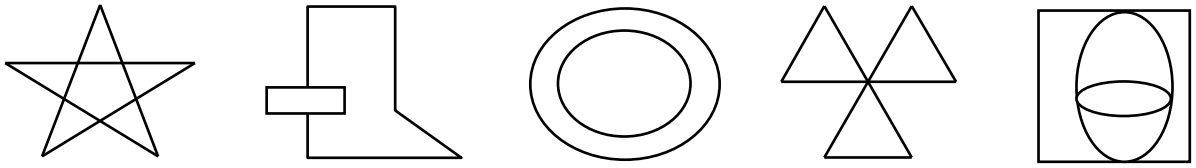
【Suggested Solution】
From the diagram below, we can determine the location of the Farmland and it is in the Northwest of the Forest.



Answer：(C)

7. Which of the following figures cannot be drawn without lifting the pencil off the paper and without going over any line twice?

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



【Suggested Solution】
Figures A, B, D and E can be drawn without lifting the pencil off the paper and without going over any line twice; it is only figure C that is not.

Answer：(C)

8. What operation signs must replace ○ and □ so that the mathematical sentence 2 + 8 + 3 = 2 ○ 8 □ 3 is correct?

(A) + for ○ and × for □ (B) × for ○ and − for □
(C) + for ○ and ÷ for □ (D) × for ○ and ÷ for □
(E) × for ○ and ＋for □

【Suggested Solution】
The value of the mathematical sentence on the left is equal to 13, when we fill × and －symbol in the mathematics sentence on the right, we have 2×8－3=13.

Answer：(B)

9. A ray consists of a point on a line and all the points on that line on one side of that point. How many rays can we draw through a point on a plane?

(A) 1 (B) 2 (C) 4
(D) 8 (E) Infinitely many

【Suggested Solution】
Using the given point as the endpoint, we can draw as many rays in different directions. Thus, we can draw many infinite rays. Answer：(E)

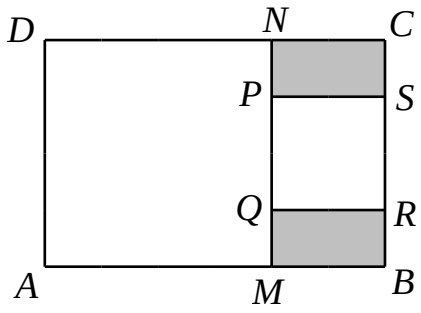
10. The birthdays of two sisters are on the same day. The elder sister is 4 years older than the younger sister. When the sum of their ages reaches 50 years, how old is the younger sister?

(A) 12 (B) 20 (C) 23 (D) 25 (E) 27

【Suggested Solution】
The difference between the ages of two sisters is 4 years old, so when the sum of their ages is 50 years old, the age of the younger sister is (50－4)÷2=23 years old.

Answer：(C)

11. The diagram below shows two squares *AMND* and *PQRS* inside a rectangle *ABCD*. The areas of the two squares are 16 cm^2 and 4 cm^2 respectively. What is the sum of area of the shaded regions in cm^2?



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

【Suggested solution】
The side lengths of two squares *AMND* and *PQRS* are 4cm and 2cm respectively. Hence *MN* = 4 cm，*PS* = *PQ* = *RQ* = 2 cm, the area of rectangle *ABCD* is 6×4=24cm^2 and the sum of areas of the shaded regions in the figure is24－16－4 =4 cm^2.

Answer：(B)

12. How many zeros are there in the end of the product of 20×30×40×50?

(A) 1 (B) 2 (C) 4 (D) 5 (E) 6

【Suggested solution】
20×30×40×50=1 200 000. There are 5 zeroes in the end of the product.

【Suggested solution】
There are 1 zero each in the end of 20, 30, 40 and 50. When 2 times 5 have one more zero in the end of the product, hence there are 5 zeroes in the end of the product.

Answer : (D)

13. Some students form a rectangle. Joseph is in the fourth row if we count from the front and in the seventh row if we count from the back. He is in the third column if we count from left and in the ninth column if we count from the right. How many students are there?

(A) 90 (B) 100 (C) 110 (D) 120 (E) 132

【Suggested Solution】
From the given information, each row of the rectangular queue has 3 + 9 －1 = 11 (student) while each column has 4 +7－1 = 10 (student), so the total number of students is 11 × 10 = 110.

Answer：(C)

14. Two pieces of straw can be joined together by overlapping one with the other for a length of 2 cm. If three pieces of straw are joined together to form a magic wand, what is the length, in cm, of the magic wand?

(A) 54 (B) 55 (C) 56 (D) 58 (E) 60

【Suggested Solution】
If there is no joint between any two straws, then the three straws will have a total length $20 \times 3 = 60$ cm, a joint is 2 cm, two joints need to be 4 cm. Therefore, the length of the magic wand is $60 - 4 = 56$ cm.

Answer：(C)

15. In the mathematical sentence below, A, B, C, D, E and F represent six distinct digits from 0 to 9. What is the numeral value of E?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

$$\begin{array}{rcccc} & & & 6 & A \\ \times & & & 3 & 5 \\ \hline & & 3 & 3 & B \\ & 1 & C & 8 & \\ \hline & D & E & F & B \end{array}$$

【Suggested Solution】
From the mathematical sentence, since the product of A and 3 is 8, then the only possible value of A is 6, so the value of C must be 9, it follows that B=0, G=0; thus F=1, E=3 and D=2.

Answer：(D)

16. A soccer match consists of two halves each lasting 45 minutes, with a 15-minute break in between. If a soccer match begins at 13:00 and there is no extension of the game, at what time will it end?
(A) 13：45 (B) 14：00 (C) 14：30 (D) 14：35 (E) 14：45

【Suggested Solution】
A complete soccer match will take 45+45+15=105 minutes in all, therefore the soccer match will end at 14：45.

Answer：(E)

17. Study the mathematical sentences below:

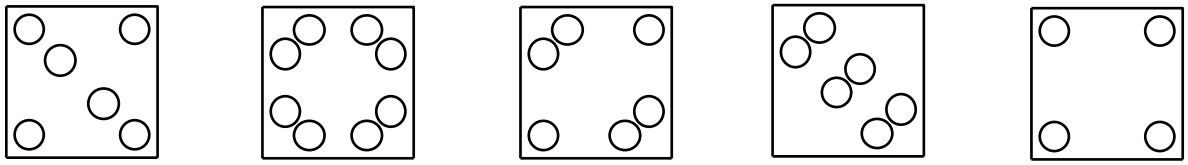
$$74 \times 6 = 444,$$
$$74 \times 12 = 888,$$
$$74 \times (\quad\quad) = 444888$$

What number must be filled in the parentheses so that the last sentence is correct?
(A) 6 (B) 12 (C) 444 (D) 888 (E) 6012

【Suggested Solution】
$444888 = 444000 + 888 = 74 \times 6000 + 74 \times 12 = 74 \times 6012$。

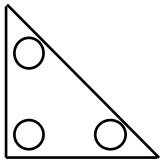
Answer：(E)

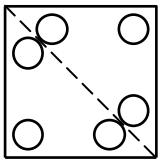
18. Let us fold a square piece of paper along a diagonal to make a triangle. Cut a small round hole near each of the three corners of the triangle. Which of the following figures is obtained when we unfold the piece of paper?
(A) (B) (C) (D) (E)



【Suggested Solution】

Refer to the illustrations below, the first diagram is the result of a square piece of paper, folded diagonally and then hole on three corners; the second diagram is how piece of paper looks like when unfolded.





Answer：(C)

19. Susan wrote five numbers on the board, represented by A, B, C, D and E. A is larger than B, C is larger than D, C is smaller than E, D is larger than B, and E is smaller than A. Which number is the third largest?

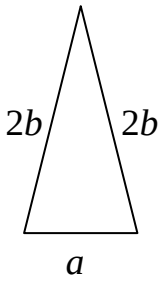
(A) A (B) B (C) C (D) D (E) E

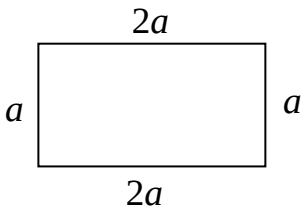
【Suggested Solution】

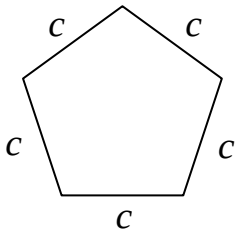
Since A > E > C > D > B, therefore the third largest number corresponds to C.

Answer：(C)

20. The three figures in the diagram below have equal perimeters. What is $a : b : c$?







(A) 1 : 1 : 1 (B) 2 : 4 : 5 (C) 4 : 6 : 5

(D) 16 : 20 : 25 (E) 20 : 25 : 24

【Suggested solution】

We have $4b+a=6a=5c$ so that $4b = 5a$ and $6a = 5c$. Thus $a : b = 4 : 5$ and $a : c = 5 : 6$, so that $a : b : c = 20 : 25 : 24$.

Answer：(E)

21. The mirror image of a mathematical expression reads ___=8105-5015. What is the correct difference?

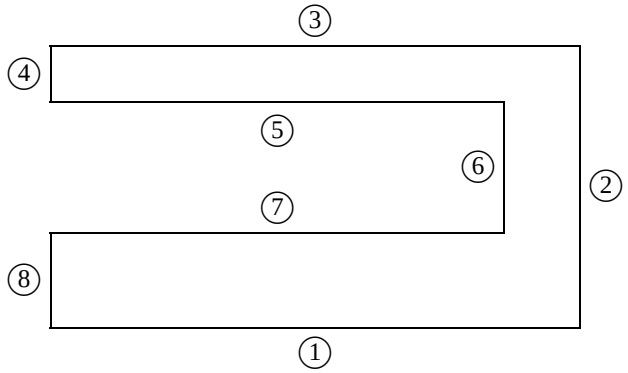
【Suggested Solution】

The mathematical expression that we saw in the mirror must be 2102-2018=___

Therefore, the correct answer is 84.

Answer：084

22. The following figure is composed of eight line segments. At the intersection of every two segments is a right angle, and each line segment is marked with a number. The easiest method to find the perimeter of the figure is by measuring three segments in the figure. What is the smallest three-digit number that is formed by the corresponding numbers of the three segments?



【Suggested Solution】

Since the intersection of every two line segments is a right angle, we can see the line segments ① and ③ are of equal length, line segments ⑤ and ⑦ are also of equal length, ④+⑥+⑧=②, so if simply measuring the segment ① (or segment ③), segment ② and segment ⑤ (or segment ⑦), then the perimeter of the given diagram can be determined easily. Therefore, the smallest three-digit number corresponding to three line segments is 125.

Answer：125

23. Let △, □ and ☆ represent three distinct digits. If 7△90901 is larger than 79□9001, which is in turn larger than 798900☆, what is the value of △ + □ + ☆?

【Suggested Solution】

In order 7△90901＞79□9001，then △must be filled in by the digit 9 only.
So that 79□9001＞798900☆，then 8 must be filled in □ while ☆ must filled in by the digit 0. Hence the sum of the three digits represented by △, □ and ☆ is 9+8+0=17.

Answer：017

24. The number of bicycles in the school bicycles lot is a three-digit number, and the number of bicycle wheels is also a three-digit number. These six digits are 2, 3, 4, 5, 6 and 7 in some order. At most how many bicycles are there?

【Suggested solution】

Let the total number of bicycles be $\overline{abc}$ and the total number of wheels be $\overline{def}$.

From the question , we have $\overline{def} = 2\overline{abc}$，so a can only be 2 or 3.

If $a = 3$，then d can only be 6 or 7。

When $d = 6$，b can only be 2, then $c = 7$, thus $\overline{abc} = 327$, $\overline{def} = 654$。

When $d = 7$，b can only be 6, there does not exist any suitable value for c。

If $a = 2$，the total number of bicycles is obviously less than 327, therefore there are at most 327 bicycles.

Answer：327

25. Helen has some $1, $2 and $5 coins. The total value is $80. All the $1 coins may be traded in for $10 coins, resulting in 36 fewer coins. All the $5 coins may be traded in for $10 coins, and all the $2 coins may be traded in for $5 coins. What is the largest possible numbers of coins Helen has?

【Suggested Solution】

When Helen traded every ten $1-coin into one $10-coin, the number of coins reduced by 9 pieces, there are 36 coins reduced from piggy bank, then a total of $ 40 was changed, so there are 40 pieces of $1 coins, which gives an amount of $40. Let the number of $2 coins as m and number of $5 coins as n, then $2m+5n=80-40$. From the given information, we know that m is a multiple of 5 and n is a multiple of 2. When $m=5$, $n=6$; when $m=10$, $n=4$；when $m=15$, $n=2$. When we consider m as a larger value, there is no n satisfies the given condition of the problem. The above three cases can conclude that the number of coins are 51, 54 and 57. Hence, there are at most 57 coins.

Answer：057