

**HEAT ROUND / VÒNG CHUNG KẾT QUỐC GIA**  
**ĐỀ SỐ 1: Đề thi Vòng Chung kết quốc gia năm học 2019 – 2020**

**Logical Thinking / Tư duy lô-gic**

1. Andy's father's age this year minuses 2, is divided by 4, adds 7 and is multiplied by 12. The result will be 252 years old. How old is Andy's father this year?

2. There are a total of 30 chickens and rabbits in a farm. The animals have a total of 74 legs. How many rabbit(s) is / are there?



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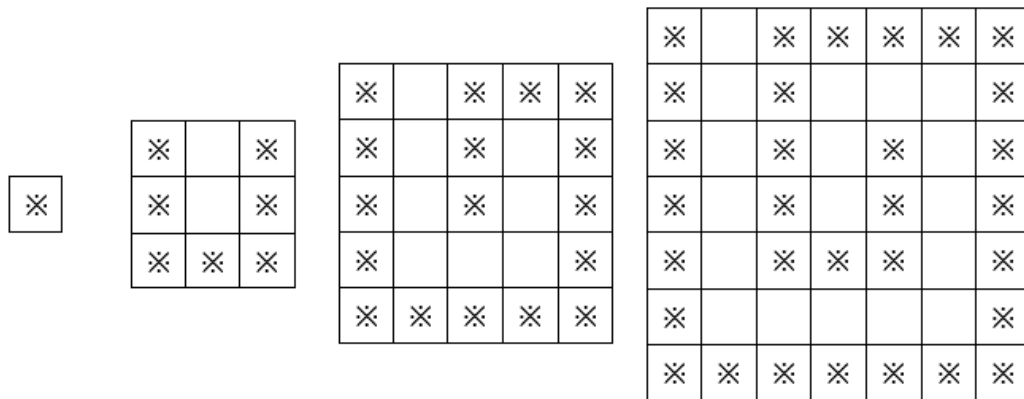
3. There are 16 blue balls, 28 red balls and 30 green balls in a bag. At least how many balls should be picked up to ensure there are 5 balls for each colour?

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4. . It requires 8 people to take 21 days to complete a task. How many day(s) is / are needed for 12 people to finish the same task?

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5. According to the pattern shown below, how many ✖ is / are there in the 10<sup>th</sup> group?



1<sup>st</sup> Group

2<sup>nd</sup> Group

3<sup>rd</sup> Group

4<sup>th</sup> Group



**Arithmetic / Số học**

6. Find the value of  $x$  if  $\frac{3x - 8}{7} = 7$

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7. Find the value of  $16 + 20 + 24 + \dots + 64 + 68$ .

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8. Find the value of  $13 \times 81 + 27 \times 12 - 9 \times 123$ .

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9. Find the value of  $\frac{1}{7' 8} + \frac{1}{8' 9} + \dots + \frac{1}{26' 27} + \frac{1}{27' 28}$



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10. Find the value of  $\frac{5}{3} + \frac{5}{6} + \frac{5}{9} + \frac{5}{12} + \frac{5}{15} + \frac{5}{18} + \frac{5}{21} + \frac{5}{24}$

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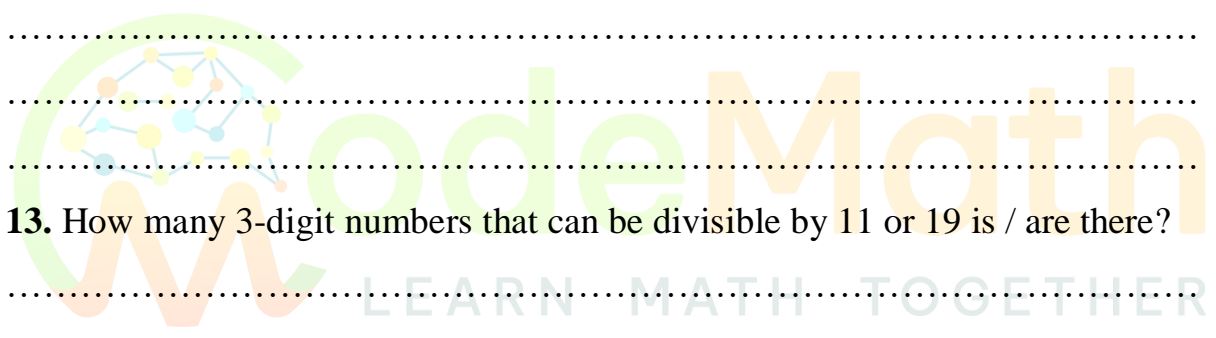
**Number Theory / Lý thuyết số**

11. If a 9-digit number  $\overline{20204621A}$  is divisible by 11, find the value of A.

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12. Define the operation symbol  $a \otimes b = \frac{(a+b)' (a-b)}{(a-1)' b}$ ,  $a \neq 1$  and  $b \neq 0$ , find the value of  $19 \otimes (6 \otimes 4)$ .

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13. How many 3-digit numbers that can be divisible by 11 or 19 is / are there?

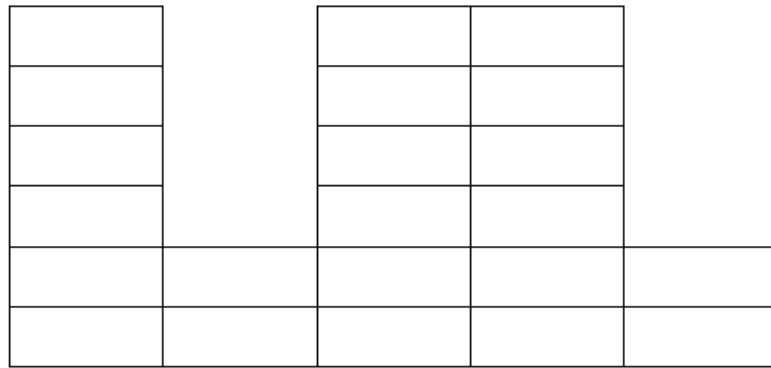
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14. The sum of two positive numbers A and B is 198. Find the minimum value of the product of A and B.

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16. How many rectangle(s) is / are there in the figure below?



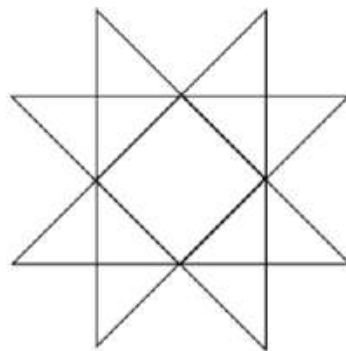
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17. How many side(s) does a regular polygon which has  $36^\circ$  exterior angle have?



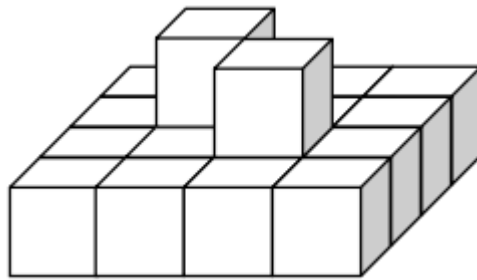
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18. How many right-angled triangle(s) is / are there in the figure below?



*Tài liệu Toán Olympic 5*

19. 18 small cubes with side length 1cm are combined. According to the pattern shown below, find the surface area in  $\text{cm}^2$ .



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20. A square is formed by 162 rectangles that are  $1\text{cm} \times 2\text{cm}$ . Find the decrease in perimeter in cm.

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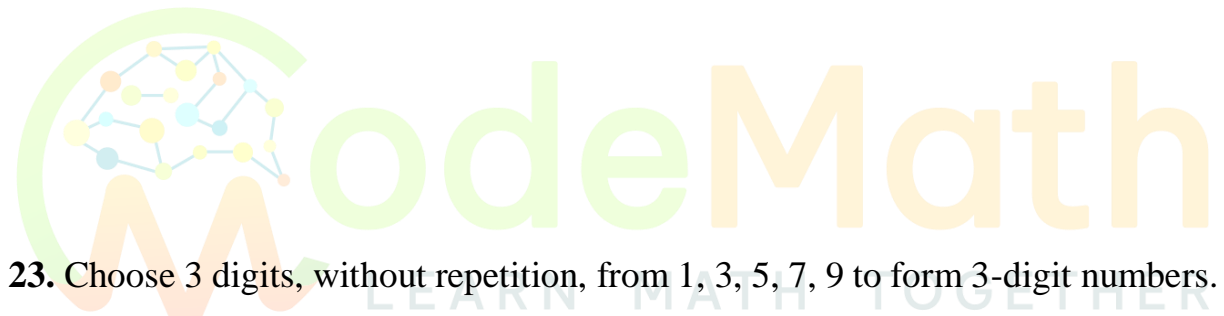
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**Combinatorics / Tổ hợp**

**21.** How many way(s) is / are there to split 256 students in groups of equal sizes?

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**22.** A flight of stairs has 11 steps. Peter can go up for 1 step or 3 steps each time. How many way(s) is / are there for Peter to go up the stairs?



**23.** Choose 3 digits, without repetition, from 1, 3, 5, 7, 9 to form 3-digit numbers. How many number(s) can be divisible by 11?

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**24.** Numbers are drawn from the 81 integers 100 to 180. At least how many numbers are drawn at random to ensure that there are two numbers whose sum is 300?

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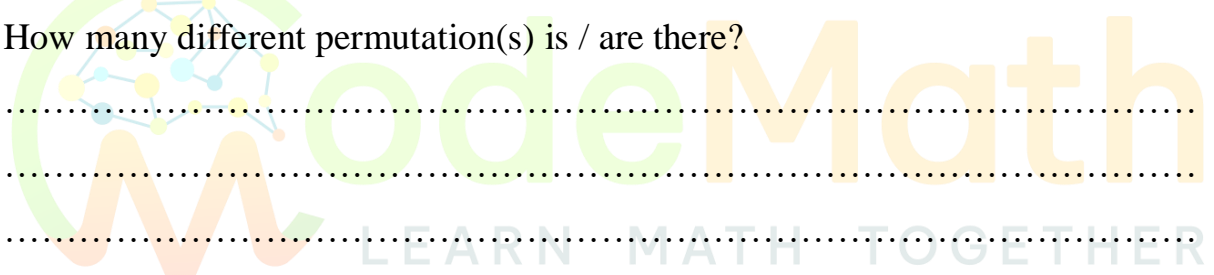
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**25.** 5 identical black books and 4 identical white books are put from left to right. How many different permutation(s) is / are there?



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