



Solutions

1 **Method 1:** Make a table based on the numbers in the group of 9 or 10 numbers.

Numbers	Digit-sum
1 ~ 9	$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$
10 ~ 19	$1 + 2 + \dots + 9 = 45$ (sum of units digits) $1 + 1 + \dots + 1 = 10$ (sum of tens digits)
20 ~ 29	$1 + 2 + \dots + 9 = 45$ (sum of units digits) $2 + 2 + \dots + 2 = 20$ (sum of tens digits)
30 ~ 39	$1 + 2 + \dots + 9 = 45$ (sum of units digits) $3 + 3 + \dots + 3 = 30$ (sum of tens digits)
40 ~ 49	$1 + 2 + \dots + 9 = 45$ (sum of units digits) $4 + 4 + \dots + 4 = 40$ (sum of tens digits)
50	5
Sum of all digits	$45 \times 5 + 10 + 20 + 30 + 40 + 5 = 330$

Method 2: Make a table based on the group of same unit digits.

Digits	Numbers	Digit-Sum
1	1, 11, 21, 31, 41	$1 \times 5 + (1 + 2 + 3 + 4) = 15$
2	2, 12, 22, 32, 42	$2 \times 5 + (1 + 2 + 3 + 4) = 20$
3	3, 13, 23, 33, 43	$3 \times 5 + (1 + 2 + 3 + 4) = 25$
4	4, 14, 24, 34, 44	$4 \times 5 + (1 + 2 + 3 + 4) = 30$
5	5, 15, 25, 35, 45	$5 \times 5 + (1 + 2 + 3 + 4) = 35$
6	6, 16, 26, 36, 46	$6 \times 5 + (1 + 2 + 3 + 4) = 40$
7	7, 17, 27, 37, 47	$7 \times 5 + (1 + 2 + 3 + 4) = 45$
8	8, 18, 28, 38, 48	$8 \times 5 + (1 + 2 + 3 + 4) = 50$
9	9, 19, 29, 39, 49	$9 \times 5 + (1 + 2 + 3 + 4) = 55$
0	10, 20, 30, 40, 50	$1 + 2 + 3 + 4 + 5 = 15$
	Sum of all digits	$15 + 20 + \dots + 50 + 55 = 330$



Solutions

2 **Method** : List out all possible numbers.

For each pair of two colours there are 3 possibilities: $6 \times 3 = 18$

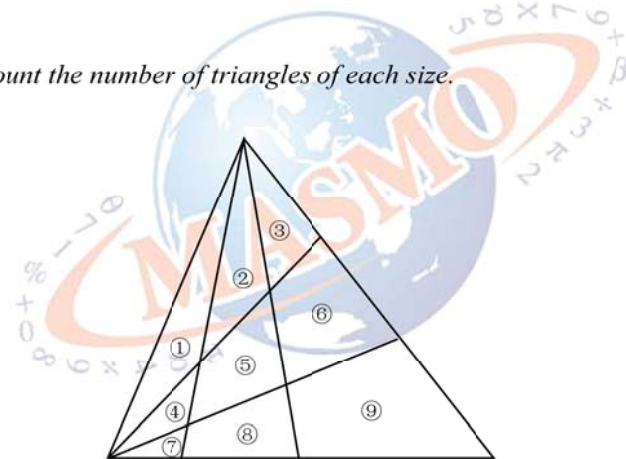
Blue & Yellow	Blue & Purple	Blue & Red	Yellow & Purple	Yellow & Red	Purple & Red
BBBY	BBBP	BBBR	YYYP	YYYR	PPPR
BBYY	BBPP	BBRR	YYPP	YYRR	PPRR
BYYY	BPPP	BRRR	YPPP	YRRR	PRRR

There is a maximum number of 18 children in the class.



Solutions

3 Method : Count the number of triangles of each size.



Combine two, three, four..... or nine triangles to form a bigger triangles.

Number of small triangles combined	Combination of triangles	Number of triangles
1△	①, ②, ③, ④, ⑦	5
2△	①②, ②③, ①④, ②⑤, ③⑥, ④⑤, ⑦⑧, ④⑦	8
3△	①②③, ④⑤⑥, ⑦⑧⑨, ①④⑦, ②⑤⑧, ③⑥⑨	6
4△	①②④⑤, ②③⑤⑥, ④⑤⑦⑧	3
5△	None. 5△ can not form a bigger triangles.	0
6△	①②③④⑤⑥, ④⑤⑥⑦⑧, ①②④⑤⑦⑧, ②③⑤⑥⑧⑨	4
7△	None. 7△ can not form a bigger triangles.	0
8△	None. 8△ can not form a bigger triangles.	0
9△	①②③④⑤⑥⑦⑧⑨	1
Total		27



Solutions

4 Method : Write the division and find the value of A, followed by BD and C.

$$\begin{array}{r}
 2 \ A \ 6 \\
 13 \overline{) 3 \ 4 \ C \ 8} \\
 \underline{2 \ 6} \\
 8 \ C \\
 \underline{B \ D} \\
 7 \ 8 \\
 \underline{7 \ 8} \\
 0
 \end{array}$$

From the given detail, $8C - BD = 7$.

Value of A		Value of BD	Description
5	$\times 13$	65	The value of BD is too small. Assumed that $C = 9$, $89 - 65 = 24$ (wrong) $C = 1$, $81 - 65 = 16$ (wrong)
6	$\times 13$	78	$8C - 78 = 7$ $C = 5$
7	$\times 13$	91	The value of BD is too large, it is larger than 8C.

If the 2-digit number $8C - 7$ is divisible by 13, **C represents 5**.



Solutions

5 **Method** : Analyse and use the rule of number 8 & 11.

Rule: If the last 3 digits of a given number is divisible by 8, then the given number itself is divisible by 8.

Rule: A number is divisible by 11 if the difference between the sum of the odd-place digits and the sum of the even-place digits is 0 or a multiple of 11.

Since the number is divisible by 8, the number 35Q formed by the last 3 digits of the given number is divisible by 8. Digit Q must be 2. $352 \div 8 = 44$.

Since $P76352$ is divisible by 11, the difference between the sum of its odd-place digits and the sum of its even-place digits is 0 or a multiple of 11. We need $(P + 6 + 5) - (7 + 3 + 2)$ to be 0 or a multiple of 11. In this case we need $(P + 6 + 5) - (7 + 3 + 2)$ to be 0.

We have $P + 11 - 12 = 0$, so $P = 1$.