

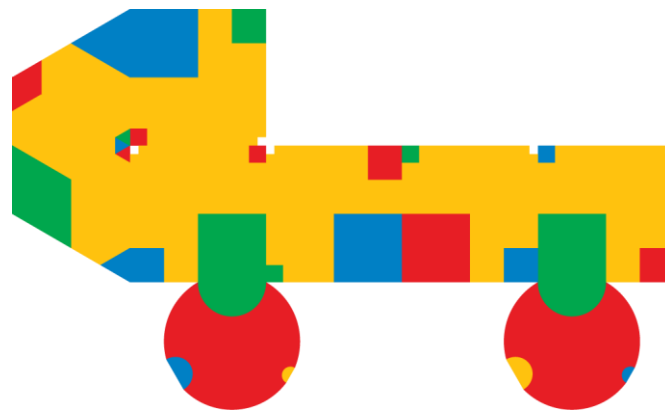
Good practices MATH_108BC_EN

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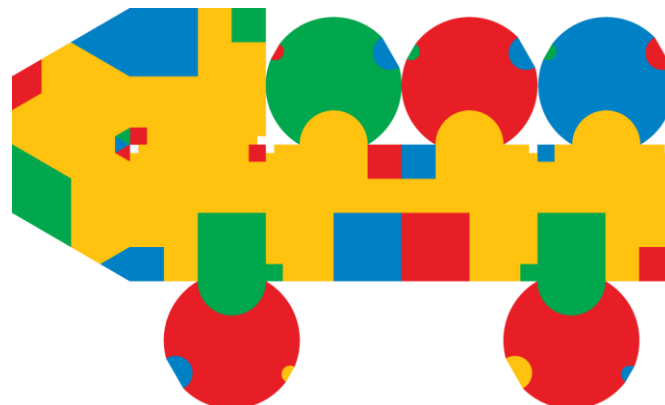
Description of the problem / exercise: **Delivery truck**

The task belongs to the topic of combinatorics. Used sets: square, triangle, and circle.

The following picture shows a truck. Create it using the square, triangle and circle.



- a) The truck's platform can hold a total of 3 circle consignments. How many ways can they load 3 consignments onto the truck's platform if their order matters and they have to have a different base color?



For consignments, we can choose from 4 basic colors to 3 places so that the colors cannot be repeated and the order of colors matters.

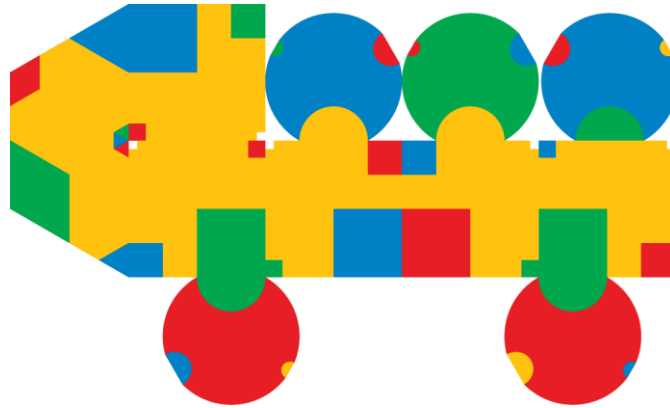
Behind the driver's cab, you can choose from 4 colors for the first place, 3 colors for the second place and 2 colors for the third place. This is a total of $4 \cdot 2 \cdot 3 = 24$ different ways.

- b) Different base colors for circle consignments mean different weights. The sum of the weights corresponding to the colors gives the total weight of the truck's load. Yellow corresponds to a mass of 4 tonnes, red to 1 tonne, green to 2 tonnes and blue to 3 tonnes.

What is the total mass of the consignments shown in the previous picture?

There are 1 green, 1 red and 1 blue consignment on the truck platform. This is a total of $2 + 1 + 3 = 6$ tonnes.

c) The maximum load capacity of the truck is 8 tonnes. In how many ways can 3 consignments be loaded onto the truck's platform to have a total mass of exactly 8 tons?



The essence of the task is to create a given sum using the numbers 1, 2, 3, 4.

There are several solutions to the problem and one of them is e.g. 1 green and 2 blue consignments, i.e. $1 \cdot 2 + 2 \cdot 3 = 8$ t.

Note: Of course, the task can also be given so that students look for as many or all of the solutions as possible. It means a higher level of solutions if the order and position of the consignments matter in the task.

- *Why this exercise is good:* Develops problem solving, logical thinking, inductive thinking, combinatorial thinking.
- *Level of teacher training:* Primary school upper grade, secondary school
- *School subject(s):* Mathematics