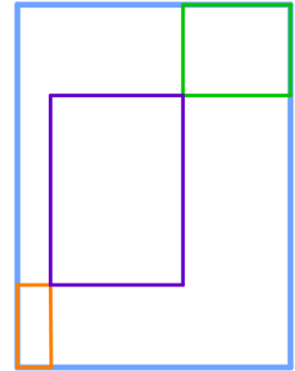


Grade 3 questions

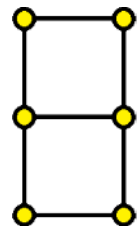
1. The blue rectangle has a circumference of 77 meters, the orange rectangle has a circumference of 14 meters, and the green rectangle has a circumference of 23 meters. Calculate the circumference of the purple rectangle.



2. A family of ducklings is swimming in a line. One of them is black, one is white, and the others are yellow. The number of ducklings behind the white duckling equals the number of ducklings in front of it. The number of ducklings behind the black duckling equals half the number of ducklings in front of it. Between the white and black ducklings there are exactly three yellow ducklings. How many ducklings are there in total?
3. A number will be called **fancy** if it is smaller than the sum of its divisors (excluding itself). Find the smallest fancy number.
For instance, 15 is not fancy: its divisors are 1, 3, 5 and 15, and the sum of them excluding 15 itself is $1+3+5=9$, which is less than 15.
4. In Miri's birthday party there were 34 balloons in 7 different colors (there is at least one balloon in each color). Each color has a different number of balloons. No color had exactly 4 or exactly 8 balloons. The color with the most balloons was blue. How many blue balloons were there?
5. A king has sent 5 servants to count the number of sheep in his kingdom. The reports he received back from his servants were:
 - The number of sheep in the kingdom is divisible by 5.
 - The number of sheep in the kingdom is divisible by 10.
 - The number of sheep in the kingdom is divisible by 20.
 - The number of sheep in the kingdom is divisible by 25.
 - The number of sheep in the kingdom is divisible by 40.

It is known that exactly 2 of the reports were false and that there are fewer than 100 sheep in the kingdom. What is the largest possible number of sheep in the kingdom?

6. In a far away country there are six cities connected by several roads as described in the image. The king wants to shut down some set of roads (containing at least one road) such that it is still possible to reach every city from every other city. In how many different ways can the king do so?



7. In a certain apartment there are three rooms: the living room, the bedroom and the office. It also has four cats: Whitey, Chubby, Skinny and Furry. Every night, each cat sleeps in one of the rooms – but if Furry and Whitey sleep in the same room together, then Chubby refuses to sleep in the same room with them. Every night, the four cats wish to sleep in a unique arrangements of rooms. How many different arrangements can they sleep in? (rooms may remain empty in some arrangements)