

Good practices

MATH_122A_EN

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Description of the problem / exercise: **Cookies**

Set used: Circle

Place cookies by fitting two circle elements together.

Cookies should be placed according to the following conditions.

- The base colour of the two circle elements must always be the same.
- The circle elements must be total side connected with same size and colour.

Tasks and questions related to the text:

1. Choose a base colour! Arrange all the cookies according to the criteria so that the large semi-circles are connected! How many different cookies can you make?
2. How many different cookies can you make using all 4 base colours?
3. Put out all the cookies that have medium or small semicircles that match! How many of these cases are possible?
4. How many different cookies could be made from the elements of the set according to the conditions?
5. You get more possibilities for the layout by using elements with different base colours. You can make any cookie you want by modifying or omitting the conditions.

Solutions:

1. After choosing a base colour, you can make from the 6 circles a cookie in a total of six ways, so that the large semicircles are connected. After placing one circle element of your choice, the other circle is given clearly, but you can fit it in two different ways.



2. With the elements of the other 3 base colours, there are a further 18 possibilities, making a total of 24 cookies. Of course, only 12 cookies can be made from the set at a time.
3. You can also connect the medium and small semicircles when making the cookie. These give you an additional 2×24 i.e. 48 possibilities.



4. You can only make 12 different cookies from the set at the same time, but the total number of possibilities is $3 \times 4 \times 6$, that is 72. You can make 6 shapes with one base colour, 4 colours make 4.6 and the size of the semicircle at the contact makes $3 \times 4 \times 6$.

- *Why this exercise is good: In this exercise, we deal with basic combinatorial cases in a playful way.*
- *Each case is put out, the number of cases is counted, as well the total number of possibilities, even those that cannot be put out of the set.*
- *Which level is recommended: Lower-grades of elementary school (6-10 years)*
- *School subject(s): Mathematics*