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ETHNOMATHEMATICS: LEARNING GEOMETRY FROM BANYUMAS BATIK PATTERNS

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Abstract
Ethnomathematics is a science used to express the relationship between culture and mathematics. Banyumas Regency has a variety of cultures, one of which is batik Banyumas. Batik Banyumas have a characteristic black base color with light color patterns or scribbles, and designs from batik Banyumas contain elements of flora and fauna in Banyumas. This study aims to discover the mathematical concept in batik Banyumas and how to analyze these mathematical concepts. This research is qualitative research with an ethnographic approach. The data collection process carries out by documentation. Data analysis uses data collection methods, data reduction, presentation, and drawing conclusions and verification—data validity technique using source triangulation. The mathematical concepts identified in Batik Banyumas are the concept of points, line segments, flat constructs (isosceles triangles, parallelograms, rectangles, rhombuses, and circles), congruence and similarity, as well as geometric transformations (translation, reflection, dilatation, and rotation). The results of this study can be used as a reference for teachers in the application of contextual learning related to learning resources that come from the environment around students and as an explanation to students that mathematics learning can connect to the culture around students, namely the batik Banyumas.
Keywords: *Ethnomathematics, Banyumas Batik, Mathematics Learning Resources*

INTRODUCTION

The principle of the mathematical approach in the learning process should begin by visualizing concrete things on an object or the surrounding environment before studying abstract things. In this regard, the appropriate learning alternative is contextual learning. Contextual learning links the material with the life of the environment around students. One approach that can realize understanding mathematical concepts through culture and the relationship between mathematics and civilization is ethnomathematics (Danoebroto, 2020).

According to D'Ambrosio (1985), ethnomathematics is a language construction of ethnic, mathema, and tics. Ethno defines something comprehensive that refers to the sociocultural context, including language, jargon, t codes of behavior, myths, and symbols. The basic word mathema means explaining, knowing, understanding, and carrying out activities such as coding, measuring, classifying, inferring, and modeling. The word tics comes from the word techne, which has the same meaning as the word technique (D'Ambrosio, 1985). The definition of ethnomathematics in mathematics practiced among cultural groups is identified nationally, such as tribal, national communities, labor groups, children from specific age groups, and professional classes (Abi, 2017).

Ethnomathematics is an activity related to mathematics defined explicitly by the people of a particular cultural group or region. These activities are real abstract experiences in everyday life into mathematics and vice versa, for example, calculations, measurements, making patterns, grouping things, designing a building, determining locations, and so on (Afifah et al., 2020).

The Banyumas have a diverse range of cultural practices. There are many different kinds of people, languages, religions, foods, and crafts. Batik is an example of the cultural diversity found in

Banyumas. Batik is a cultural heritage confirmed as a World Cultural Heritage by UNESCO (United Nations Educational, Scientific and Cultural Organization), which took place in France on October 2, 2009 (Yudhi, 2019). Well-known cultural ethnomathematics in Banyumas districts, such as tofu kalisari and kenthongan, have been explored (Kumala, 2022; Kumala et al., 2022). Indonesia has various kinds of batik patterns according to the meaning contained in them. One of them is Banyumas batik.

Banyumas batik is a batik pattern made by batik, with characteristics that characterize Banyumas batik. The element is that colors used are brown and blue. The designs used in batik patterns tend to use flora and fauna patterns that show people who are at one with nature, while the healthy way shows the Banyumas people who are cablaka or what they are (Sholikhah et al., 2017). Anto Djamil Batik House is one of the Banyumas batik production houses in Sokaraja, Banyumas Regency.

Through ethnomathematics, people can learn more about mathematics, and those mathematical concepts are also present in the culture. The use of Banyumas batik as a learning resource expect to facilitate students in understanding mathematical concepts when applied to mathematics learning and learning about Banyumas culture. This research also expects to enrich mathematics knowledge, that learning mathematics is not a formal lesson and refers to books only but can apply to sociocultural aspects. Local cultural values can be integrated into learning mathematics, as one example is Banyumas batik. Based on the description above, researchers are interested in conducting exploratory activities related to Banyumas batik produced by Anto Djamil Sokaraja Batik House, intending to reveal what mathematical concepts contain in Banyumas Batik and how to analyze them.

METHOD

The type of research used in this research is qualitative research. Qualitative research aims to understand a context by leading to a detailed and in-depth description of the portrait of conditions in a natural context about what happened was the field of study (Fadli, 2021). Researchers use qualitative methods because researchers intend to describe the mathematical concepts contained in Banyumas batik.

The approach used in this research is ethnographic. The ethnographic approach is an empirical and theoretical approach that aims to obtain an in-depth description and analysis of a cultural object based on the results of observations made by researchers in the field (Emzir, 2010). This study uses an ethnographic approach to describe, explain and analyze mathematical concepts contained in Banyumas batik.

In carrying out this research, the researcher dug up some information by conducting observations at the Anto Djamil Batik House and conducting documentation and interviews with resource persons, namely the administration and employees of the Anto Djamil Batik House Sokaraja. The researcher then reduces the data results to sort out the data needed by the researcher and deletes data that is not required. After that, the new data will present, then analyzed, and concluded.

RESULTS AND DISCUSSION

Results

1. Mathematical Concepts in Banyumas Batik

The identification of Banyumas batik shows that there are mathematical concepts in Banyumas batik. Mathematical concepts on Batik Banyumas are points, line segments, flat shapes (isosceles triangles, parallelograms, rectangles, rhombuses, and circles), congruence and similarity, and geometric transformations (translation, reflection, dilation, and rotation). Mathematical concepts in Banyumas batik based on data categories formulated from research results can see in table 1.

Table 1 Mathematical Concepts in Banyumas Batik

Mathematical Concepts	Banyumas Batik Patterns
Points	Serayu, Lumbon, Bumbon, Jae Rajang, and Pring
Line Segments	Jae Rajang and Pring
Isosceles Triangles	Making *Gethuk Goreng*
Parallelograms	Making *Gethuk Goreng*
Rectangles	Making *Gethuk Goreng*
Rhombuses	Bawor
Circles	Bawor
Congruence	Manggaran
Similarity	Making *Gethuk Goreng*
Translation	Manggaran
Reflection	Bawor
Dilation	Serayu
Rotation	Kawunganan

2. Analysis Of Mathematical Concepts in Banyumas Batik

a. Point Concept

The point concept in Banyumas batik in the Serayu, Lumbon, Bumbon, and Jae Rajang Pring patterns. Dots are essential in making batik because they can see from the origin of the

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name batik, which is short for the words *amba* and dot. So, the point concept is essential as a characteristic of batik. The idea of dots on batik patterns is as follows.

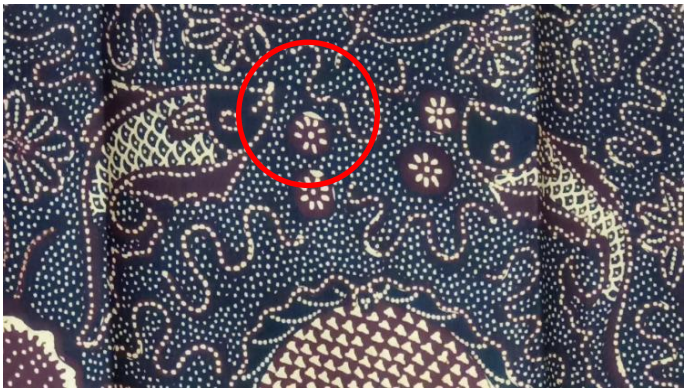

Figure 1 Point Concept in Serayu Pattern

Figure 2 Point Concept in Lumbon Pattern

Figure 3 Point Concept in Bumbon Pattern

Figure 4 Point Concept in Jae Rajang and Pring Pattern

b. Line Segments Concept

Based on the study's results, the concept of line segments finds in the Jae Rajang and Pring pattern. In this pattern, the line segment is two parallel lines. In this pattern, the line part is in the bamboo pattern, where in this pattern, there are two parallel lines, each of which other designs limit the base and end of the two lines. The concept of line segments in batik patterns is as follows:

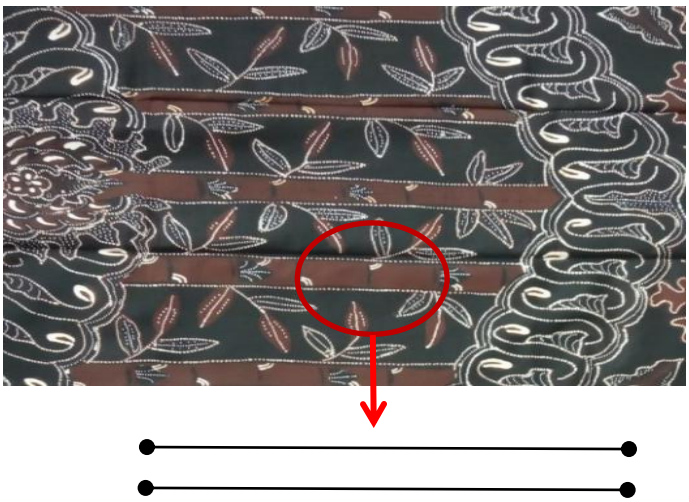

Figure 5 Line Segments Concept in Jae Rajang and Pring Pattern

c. Flat Constructs Concept

Based on the results of research on Banyumas batik, there are concepts of flat shapes, namely triangles, parallelograms, rectangles, rhombuses, and circles. A triangle is a geometric figure formed from three sides in the form of a straight line and three vertices. A parallelogram is a quadrilateral with two pairs of opposite sides that are parallel and of the same length. Moreover, opposite angles are equal. A rectangle is a two-dimensional flat shape formed by two pairs of edges, each of which is the same length and parallel to its partner and has four right

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angles. A rhombus is a two-dimensional flat shape formed by four equal-length ribs and has two pairs of non-right tips, each equal to the angle opposite it. A circle is a collection of points equidistant from a certain point called the circle's center. The concepts of triangles and rectangles find in the pattern of making *gethuk goreng*, while the ideas of circles and rhombuses are in the Bawor design.

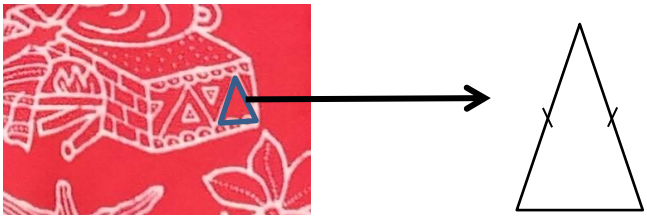

Figure 6 Isosceles Triangles Concept in Making Grthuk Goreng Pattern

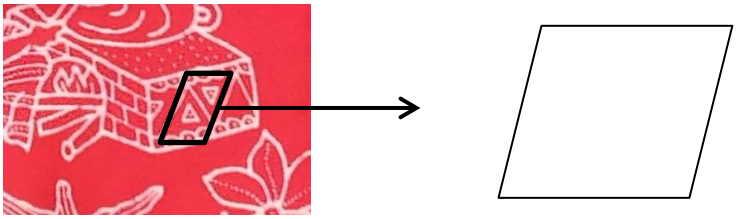

Figure 7 Parallelograms Concept in Making Grthuk Goreng Pattern

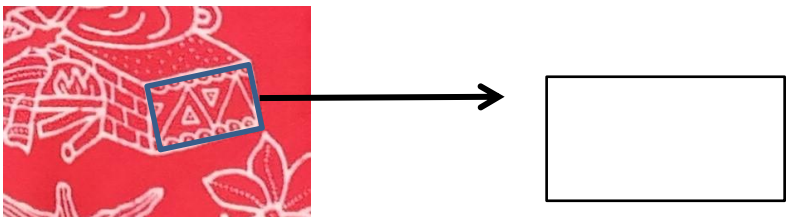

Figure 8 Rectangles Concept in Making Grthuk Goreng Pattern

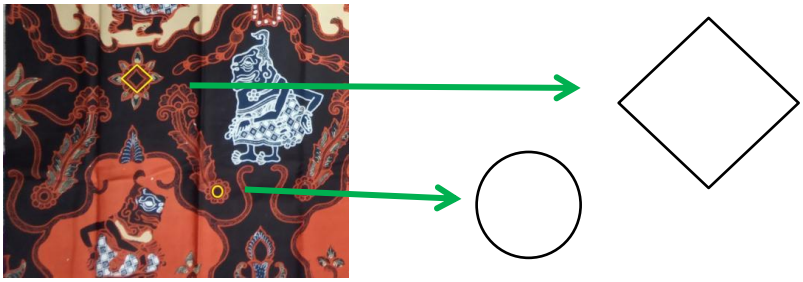

Figure 9 Rhombuses and Circles Concept in Bawor Pattern

d. Congruence and Similarity Concept

1) Congruence

Based on the research results on the Manggaran pattern, some patterns have the same shape and size. The evidenced when the batik production process is in the pattern-making process; the batik maker first draws one design and then makes another by tracing the previous pattern so that the design has the same shape and size.

Figure 10 Congruence Concept in Manggaran Pattern

2) Similarity

Based on the study results, there is a similar concept in the Making Gethuk Goreng pattern. In this pattern, the batik maker makes a sizeable triangular pattern and then makes a small triangle by adjusting the size of the large triangle. The results in the two triangles being congruent triangles. The concept of similarity in batik patterns is as follows.

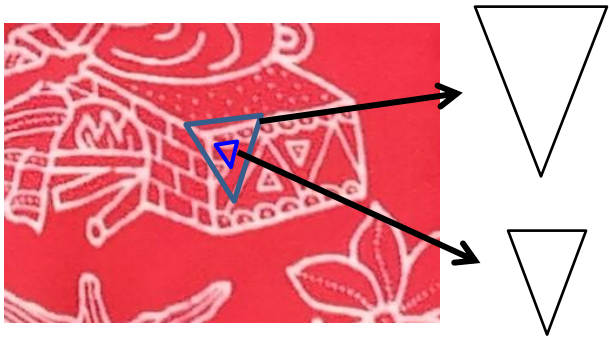

Figure 11 Similarity Concept in Making Gethuk Goreng Pattern

e. Geometric Transformations Concept

A geometric transformation is a bijective mapping from one point in the plane to another point in the same plane. The modification does not only apply to issues, but there can also be a collection of points (a particular line or plane). There are several geometric transformations: translation, reflection, rotation, and dilation.

1) Translation

Based on the research results on the Manggaran pattern, there is the concept of translation. In this pattern, the batik maker makes a pattern and then traces it repeatedly and horizontally on the fabric to produce a design with the same shape and size. For the distance from the displacement, the batik maker uses an approximate distance to make it look the same. The concept of translation in batik patterns is as follows.

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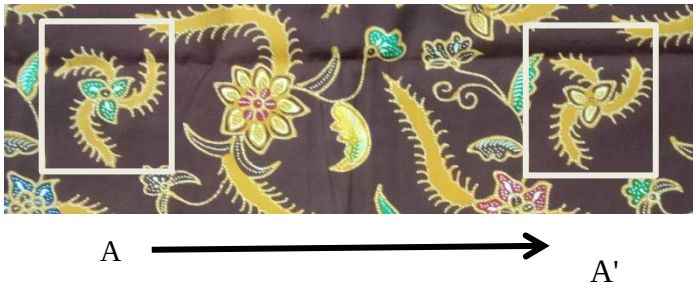

Figure 12 Translation Concept in Manggaran Pattern

2) Reflection

Reflection has the properties that the distance from the origin to the mirror is equal to the distance from the mirror to the image point, the image on the mirror has the same shape and size reflected plane, and the appearance on the mirror reflect the plane. Based on the research results, the Bawor pattern contains reflection or reflection. In this pattern, the author draws a design on the fabric, then traces it on the horizontal plane in reverse, resulting in the way having the nature of reflection or reflection. The following figure reviews the bawor pattern on the Y axis.

Figure 13 Reflection Concept in Bawor Pattern

3) Dilatation

The study's results found the concept of dilatation in the Serayu pattern. In this pattern, it can see that there are two circles in the illustration of fish bubbles in the Serayu river. The first bubble is circular, and the second bubble adjacent to it is an enlargement or dilatation of twice the first bubble. For example, the first bubble is a circle with center A (2,3) and passes through point B (2,2), then enlarged with a scale factor of 2 to the center point (0,0), then.

a) A (2,3)

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ 3 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$$

b) B (2,2)

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 4 \\ 4 \end{pmatrix}$$

So, the first bubble dilatation result is a circle with center P (4,6) and through point Q (4,4). The dilatation factor dilates the process, then the shape is enlarged and lies in the direction of the center of the dilatation with the original wake. The concept of dilatation in the Serayu pattern can see in the following image.

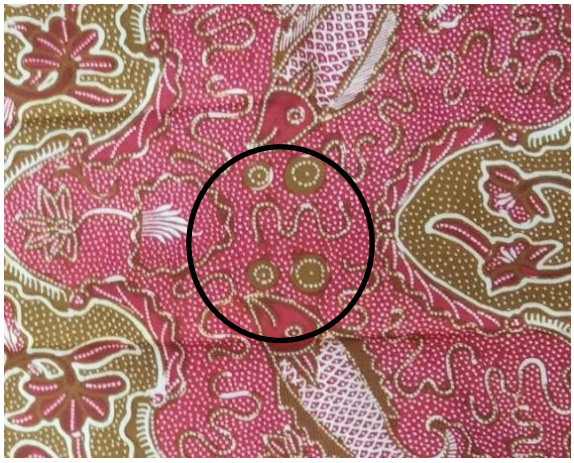

Figure 14 Dilatation Concept in Serayu Pattern

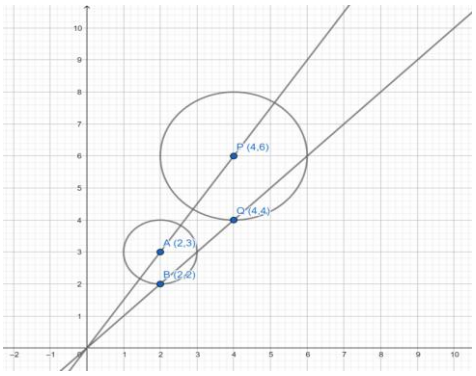

Figure 15 Dilation on a circle with k=2 with center (0,0)

4) Rotation

Based on the study's results, the concept of rotation finds in the Kawungan pattern. In this pattern, there is a rotation in the manufacturing process. Kawungan fruit slices seem to be

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rotated 90º clockwise about the center point (0,0). Because the direction of rotation is clockwise, it is negative. In this pattern, there are three rotations. For example, a slice of Kawungan fruit is in the shape of an ellipse with a vertex P (0.4).

a) P (0,4)

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & -sin\ \alpha \\ sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ (-\alpha) & -sin\ (-\alpha) \\ sin\ (-\alpha) & cos\ (-\alpha) \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & sin\ \alpha \\ -sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ 90° & sin\ 90° \\ -sin\ 90° & cos\ 90° \end{pmatrix} \begin{pmatrix} 0 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$$

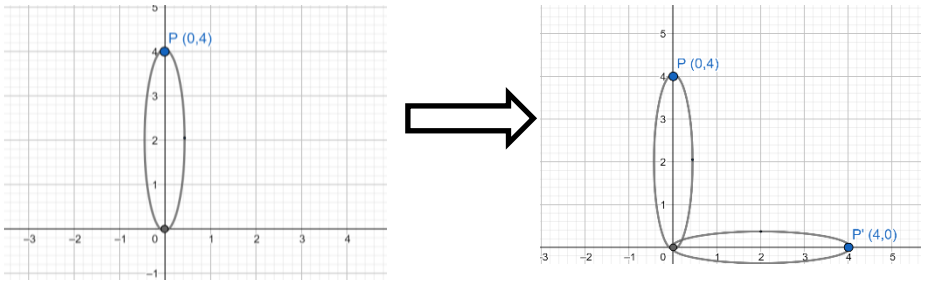

Figure 16 Rotation at Point P (0,4) by 90º to the center (0,0)

b) P′(4,0)

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & -sin\ \alpha \\ sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ (-\alpha) & -sin\ (-\alpha) \\ sin\ (-\alpha) & cos\ (-\alpha) \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & sin\ \alpha \\ -sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ 90° & sin\ 90° \\ -sin\ 90° & cos\ 90° \end{pmatrix} \begin{pmatrix} 4 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 4 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 \\ -4 \end{pmatrix}$$

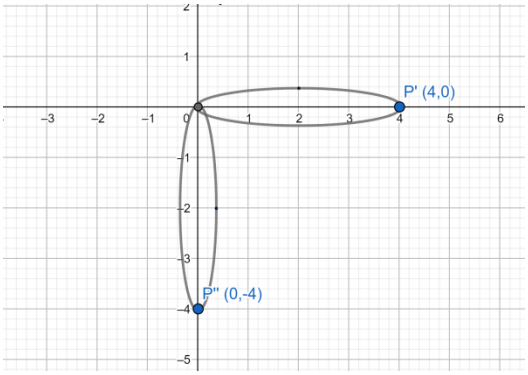

Figure 17 Rotation at Point P′(4,0) by 90º to the center (0,0)

c) $P''(0,-4)$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & -sin\ \alpha \\ sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ (-\alpha) & -sin\ (-\alpha) \\ sin\ (-\alpha) & cos\ (-\alpha) \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ \alpha & sin\ \alpha \\ -sin\ \alpha & cos\ \alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} cos\ 90° & sin\ 90° \\ -sin\ 90° & cos\ 90° \end{pmatrix} \begin{pmatrix} 0 \\ -4 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} 0 \\ -4 \end{pmatrix}$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} -4 \\ 0 \end{pmatrix}$$

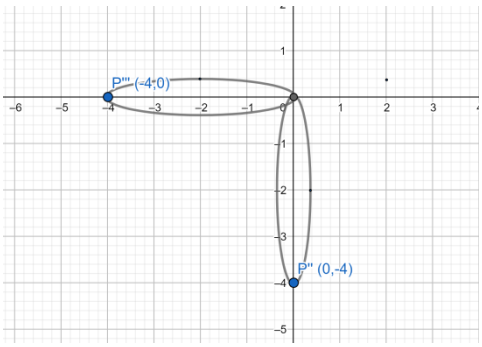

Figure 18 Rotation at Point $P''(0,-4)$ by 90º to the center (0,0)

So, the Kawungan fruit slice with the vertex P(0,4), which rotates 90º clockwise to the center (0,0), produces, then turn again in the same way and produced. The final rotation is also in the same way and produces. The three rotation results are congruent with the original plane. The three rotations' effects, seen in Figures 16, 17, and 18, will produce an image of

the Kawungan batik pattern. The concept of rotation on the Kawungan batik pattern can see in the following figure.

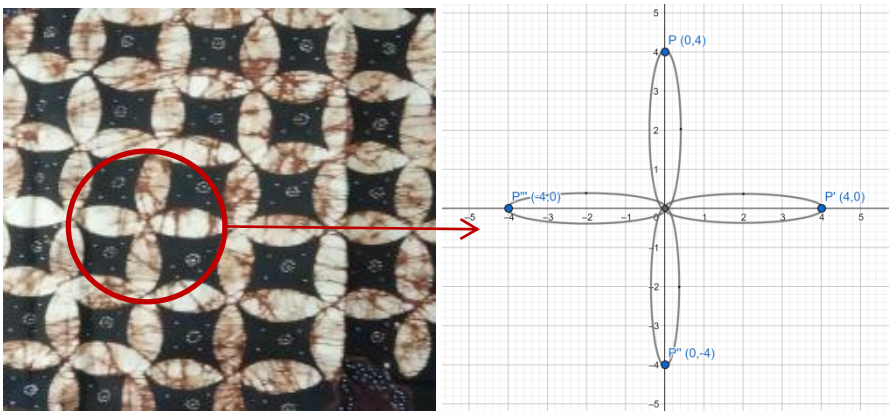

Figure 19 Rotation Concept in Kawungan Pattern

Discussions

According to AECT (Association for Educational Communication and Technology), learning resources are everything in the form of messages, people, materials (software), equipment (hardware), techniques (methods), and environments that are used independently or in combination to facilitate learning activities (Suhirman, 2018).

Based on the results of this study, the concepts identified from Banyumas batik can be a source of mathematics learning by linking mathematics and culture in the form of batik so that mathematics learners can understand concepts well, especially in geometry material. The source of mathematics learning contained in Banyumas batik is the concept of geometry. The geometric concepts include points, line segments, flat shapes (isosceles triangles, parallelograms, rectangles, rhombuses, and circles), congruence and similarity, and geometric transformations (translation, reflection, dilation, and rotation).

The source of mathematics learning contained in Banyumas batik is the concept of geometry. The geometric concepts include points, line segments, flat shapes (isosceles triangles, parallelograms, rectangles, rhombuses, and circles), congruence and similarity, and geometric transformations (translation, reflection, dilation, and rotation). The concept is in the Serayu, Lumbon, Bumbon, and Jae Rajang Pring batik patterns. In this pattern, the concept of batik exists as one of the batik arts used by batik, where the batik artist performs the art of batik by making a dot pattern directly on the fabric without following the existing design to display the beauty of batik. The next concept is the concept of line segments. The concept of line segments is in the combination of Jae Rajang and Pring patterns, and in this pattern, the line is in the bamboo pattern, where in this pattern, there are two parallel lines, each of which other ways limits the base and end of the two lines. Previous research conducted by Nabilah

Akmalia et al. The study also found the concept of dots and lines in batik. The pattern of dots and lines on the batik becomes *"isen*" to fill the batik pattern's void and make it look beautiful (Akmalia, 2020).

The concept of flat shapes found in Banyumas batik is a flat shape of isosceles, triangles, parallelograms, rectangles, rhombuses, and circles. The idea of bland, isosceles triangles, parallelograms, and rectangles in the Fried Gethuk Making pattern. The concept in the decoration of the *pawon* or the stove used for cooking. The idea of a flat rhombus and a circle in the Bawor design. A flat wake exists as a complementary decoration to the Bawor pattern in this pattern. It is in line with Roisatun Nisa's research, where there are also flat shapes in this study. The flat shapes in this study are triangles, rhombuses, rectangles, circles, and trapezoids (Nisa, 2020). Due to regional differences, the batik patterns are also different, but both contain the concept of a flat shape in the batik patterns.

The concept of congruence in the Manggaran pattern, In this pattern, two Manggaran ways have the same shape and less, so the Manggaran design has a congruent nature—the concept of similarity in the motive for Making Fried Gethuk. The idea of similarity in the furnace decoration on the pattern. In this pattern, there are two isosceles triangles: a large triangle and a small one. A small triangle makes by adjusting the size of the large triangle outside so that the two triangles are congruent. It is in line with research conducted by Nabilah Akmalia. This study identifies the concepts of congruence and similarity in the Sekar Jagad Blambangan batik pattern (Akmalia, 2020). Due to regional differences, the batik patterns are also different, but both contain the concepts of congruence and similarity.

The concepts of geometric transformation found in Banyumas batik include translation, reflection, dilation, and rotation. The idea of translation in the Manggaran batik pattern. The Manggaran design undergoes translation or a shift when made repeatedly on a horizontal plane to produce the same shape and size—the concept of reflection in the Bawor batik pattern. Bawor design, a reflection on the Y axis makes a shadow of the Bawor way, which is the original pattern. The concept of dilatation in the Serayu pattern. This concept is found in the bubble pattern on the fish in the river.

The concept of dilatation in the pattern is the enlargement of the center (0,0). The scale factor is, then, the result of the dilation is that the bubble is enlarged and lies in the direction of the center of the dilation original bow—the concept of rotation in the Kawungan pattern. The idea of rotation occurs in the Kawungan fruit slice pattern, which is rotated by 90º in a clockwise direction so that it has a negative value to the center (0,0). The rotation process on the Kawungan slice is three times. In the first rotation, where Point P (0.4) is rotated by 90º clockwise about the center (0,0), it produces a point. The point is turned again by 90º clockwise to the center (0,0) and makes a point.

Furthermore, the point is rotated again by 90º clockwise to the center (0,0) and produces energy. The result of the rotation is congruent with the original plane. When the three rotation processes are combined, they will have the Kawungan batik pattern, as seen in Figure 19. The concept of this geometric transformation is in line with the research conducted by Isnaini Mahuda. This study found that the Lebak batik pattern contains the idea of transformation geometry, namely translation, reflection,

dilation, and rotation (Mahuda, 2020). Due to regional differences, the identified batik patterns are also different, but both contain the concept of transformation geometry.

Based on the description above, it can see that Banyumas batik can use as a source of mathematics learning. It can be a reference for teachers as a source of mathematics learning and to explain to students that mathematics learning can link to the culture around students, namely Banyumas batik. The mathematical concepts described above can be a reference for teachers in learning geometry. In the patterns of Serayu, Lumbon, Bumbon, and Jae Rajang-Pring, teachers can use them as a lesson in introducing the concept of points and lines. The mathematical concepts identified in the patterns of Making Gethuk Goreng and Bawor can use by the teacher to identify the shapes of the flat forms, the properties of the balanced conditions, the side lengths, and the angles in the flat shapes. The mathematical concepts identified in the Manggaran pattern and the Making of Fried Gethuk can use as a reference by teachers in congruence and congruence learning in knowing the conditions for two flat shapes to be congruent or congruent. The mathematical concepts identified in the patterns of Manggaran, Bawor, Serayu, and Kawunganan can use as references by teachers in learning geometric transformations. In this case, it can use the teacher to identify the meaning of translation and the nature field that translate. Teachers can use the concept of reflection to determine the importance of reflection and the idea of reflection and identify the nature of the shadow that reflects. The concept of dilatation can use to determine the meaning of dilatation, the concept of dilatation. Teachers can use it to identify dilatation factors, the center of dilatation, and the nature of the dilated image or field. The idea of rotation can help understand the meaning of rotation, and identifying the center of rotation can be used to determine the importance of rotation, the magnitude of the rotation angle, and the nature of the image or field rotation.

CONCLUSION

Based on the data, analysis, and discussion results, it can conclude that mathematical concepts contained in the Banyumas batik pattern and ethnomathematical activities in the design process of Banyumas batik produced by Anto Djamil Sokaraja Batik House, Banyumas district. Mathematical ideas that identify in Banyumas batik, so the mathematical concepts contained in batik patterns are points, line segments, flat shapes (isosceles triangles, parallelograms, rectangles, rhombuses, and circles), congruence and similarity, and geometric transformations (translation, reflection, dilation, and rotation).

Through the results of this study, the mathematical concepts analyzed in Banyumas batik can be used as a source of mathematics learning and implemented in mathematics learning. It can be a reference for teachers as a source of mathematics learning and to explain to students that mathematics learning can link to the culture around students, namely Banyumas batik.

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