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EXPLORING ETHNOMATHEMATICS IN THE ARCHITECTURE OF TRADITIONAL HOUSES OF THE ALAS TRIBE IN SOUTHEAST ACEH

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ABSTRACT

The traditional houses of the Alas tribe are a cultural heritage that possesses architectural value and incorporates various mathematical concepts that can be studied from an ethnomathematics perspective. However, studies on ethnomathematical concepts and the cultural meanings embedded in the structure and ornamentation of the Alas Tribe's Traditional House remain limited. Therefore, this study aims to explore these ethnomathematical concepts and describe the cultural meanings found in the Alas Tribe's Traditional House in Southeast Aceh Regency. This study employs a qualitative approach with an ethnographic design. Data were collected through observation, semi-structured interviews with traditional leaders and traditional house managers, and documentation. Data analysis was conducted using the Miles and Huberman model, which includes data reduction, data presentation, and drawing conclusions. The results of the study indicate that the traditional houses of the Alas tribe incorporate various mathematical concepts in the form of plane figures—namely, triangles, squares, rectangles, circles, and rhombuses—as well as three-dimensional figures such as cuboids, octahedrons, and spheres. Additionally, geometric transformation concepts—including translation, reflection, and repeating patterns—were identified in the various ornaments of the traditional houses. Interview results indicate that each part of the traditional house not only serves a structural function but also carries philosophical meanings that reflect the values of togetherness, mutual cooperation, local wisdom, and the cultural identity of the Alas tribe. This study contributes to enriching the field of ethnomathematics, particularly regarding the traditional houses of the Alas tribe, and can be utilized as a source for context-based mathematics learning rooted in local culture.

Keywords: Ethnomathematics, Traditional Houses of The Alas Tribe, Geometry, Local Culture, Mathematics Education.

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PRELIMINARY

Indonesia is a country rich in diverse cultures. Every region in Indonesia has its own unique and distinct culture. Indonesian culture encompasses various ethnic groups and traditions, including regional dances, traditional clothing, and traditional houses that showcase the richness and diversity of culture in each region. Traditional houses represent the highest expression of culture within ethnic and national communities, embodying the

unique and distinctive architectural heritage of a particular region in Indonesia. These structures reflect the distinctiveness, or culture, of the local community. According to data from the Ministry of Education and Culture in 2020, there are 175 types of traditional houses classified based on their architectural styles. These classifications include places of worship, residential houses, meeting houses, and several other types of houses (Yudanti, 2022) . This cultural diversity demonstrates that culture plays a vital role in people's lives, including in the field of education. The existence of traditional houses as part of this cultural heritage not only holds historical and social value but also preserves various forms of knowledge that can be studied across various academic disciplines, including mathematics (Ameliya et al., 2024; Siregar & Nuh, 2024) . Ethnomathematics serves as an approach capable of linking mathematical concepts with culture, thereby making learning more contextual and meaningful for students.

Mathematics and culture are two interrelated and inseparable aspects, much like two sides of a coin that mutually support and reinforce each other (Anggraini et al., 2026) . Culture serves as the philosophical foundation of education, including mathematics education, while education preserves culture by fostering individuals who embody cultural values (Murtiyasa & Wulandari, 2020) . The influence of mathematics on cultural aspects is clearly evident in the design of traditional houses, the creation of batik or traditional fabric patterns, and the calculations involved in cultural philosophy (Nasution & Maysarah, 2024; Sintiya et al., 2021) . This connection between mathematics and culture demonstrates that mathematical concepts are not only present in formal settings but are also reflected in various activities people engage in during their daily lives. These activities are tangible manifestations of the application of mathematics that has evolved and been passed down within a society's culture. (Fitriza et al., 2022; Nasution & Maysarah, 2024) . Various elements of local culture contain geometric and measurement concepts that can serve as resources for culture-based mathematics learning.

Mathematical activities refer to tasks that involve the process of abstracting real-life experiences into mathematical concepts, and vice versa. This encompasses a variety of activities, including grouping, counting, measuring, designing structures, creating patterns, identifying locations, playing, explaining, and so on (Raymond et al., 2021) . Mathematics is essential in science and technology (Masdul, 2018) . Learning is a deliberate, purposeful, and systematic effort with predetermined objectives, carried out under effective supervision (Wahyuni et al., 2022) . Therefore, a learning approach is needed that can connect mathematical concepts with real-world experiences and cultural contexts so that

ethnomathematics becomes more meaningful and easier to understand (Purwoko et al., 2024; Simanjuntak et al., 2024) . Research on ethnomathematics indicates that a community's cultural activities can be used to help understand mathematical concepts in a more concrete way.

According to D'Ambrosio (1985), ethnomathematics is the method or technique used by specific cultural groups to understand, explain, and solve problems related to their daily lives. Ethnomathematics is also an approach that links mathematical concepts to the culture that has developed within a society (Sholokhova et al., 2008) . Through ethnomathematics, mathematical concepts can be understood through real-life experiences that are closely tied to students' lives, thereby making learning more meaningful (Fauziah & Maknun, 2022) . Ethnomathematics connects mathematical content with students' experiences and social lives, and even touches on the realm of local arts and culture, thereby deepening their understanding of mathematical concepts (Wulandari et al., 2022) .

Ethnomathematics is a discipline that can be used to help students understand how mathematics is adapted from a particular culture to reveal the connection between culture and mathematics. Using ethnomathematics greatly helps students in understanding mathematical concepts (Febriani & Umbara, 2025) . Explorations of ethnomathematics across various cultural elements show that mathematical concepts can be found in people's daily activities and have the potential to serve as contextual learning resources for students (Mahendra & Hasanah, 2023; Nasution & Hasanah, 2023) . Therefore, ethnomathematics can be used as an approach to uncover various mathematical concepts found in elements of local culture, including in the traditional houses of the Alas tribe. Various studies show that ethnomathematics not only plays a role in identifying mathematical concepts in cultural objects but can also be utilized as a contextual learning resource. Through this approach, students can understand mathematical concepts based on a culture that is close to their daily lives, thereby making learning more meaningful and supporting the preservation of local culture.

The Alas tribe is an ethnic group inhabiting Southeast Aceh Regency, Aceh Province, which possesses a rich and distinctive culture and traditions, including traditional houses known as Khumah Alas or Alas traditional houses. These traditional houses are an important part of the Alas people's cultural identity and reflect social values, local wisdom, and a traditional way of life that has been passed down from generation to generation. Research conducted by Nurbaya et al. (2026) indicates that the traditional houses of the Alas people serve not only as dwellings but also embody symbolic meanings that reflect the cultural

values, social structure, and worldview of the Alas community. Although various studies have identified mathematical concepts in traditional houses across different regions, research on the relationship between the cultural meanings of geometric shapes and transformations in the traditional houses of the Alas people remains very limited and requires further investigation.

Various studies have examined ethnomathematics in traditional houses in Indonesia and shown that traditional buildings contain geometric concepts relevant to mathematics education. Research by Eriyanti and Malasari (2023) found geometric shapes such as lines, angles, plane figures, and solid figures in the carving patterns of traditional Javanese houses. Mar et al. (2021) also revealed that the structure of the Manunis Ka'umnais traditional house incorporates concepts of points, lines, two-dimensional shapes, three-dimensional shapes, similarity, and reflection. Additionally, Sari et al. (2022) stated that the traditional tanean-lanjang houses in Madura contain concepts of area, volume, and spatial regularity that can serve as sources for contextual learning. Iraratu et al. (2021) identified the concepts of squares, circles, cylinders, and elliptical geometry in the traditional houses of Lorulun Village. Research by Jannah et al. (2024) also demonstrated that the Gayo traditional house, Rumah Kantur, incorporates concepts of three-dimensional shapes and symmetry relevant to geometry curriculum. In addition to serving social and cultural functions, the structure of the Alas Tribe's traditional house also incorporates various shapes, patterns, and geometric elements that have the potential to represent mathematical concepts. Therefore, this study was conducted to explore and identify the mathematical concepts present in the Alas Tribe's traditional house through an ethnomathematics approach.

Although various studies have examined ethnomathematics in traditional houses across Indonesia, research specifically exploring mathematical concepts in the traditional houses of the Alas tribe in Southeast Aceh Regency remains very limited. Most previous studies have focused only on identifying geometric shapes and transformations without comprehensively linking them to the cultural meanings embedded in each architectural element of the traditional houses. Therefore, research on the traditional houses of the Alas tribe is still needed to fill this research gap. The novelty of this study lies in its exploration, which integrates the identification of geometric concepts and transformations with an analysis of the cultural meanings embedded in the structure and ornamentation of the traditional houses of the Alas tribe. This study not only describes the mathematical forms discovered but also explains the relationship between mathematical concepts and the cultural values of the Alas

community, thereby making a new contribution to the development of ethnomathematics research based on local culture.

Based on this description, this study aims to explore the ethnomathematical concepts found in the traditional houses of the Alas tribe in Southeast Aceh Regency and to describe the cultural meanings embedded in each architectural element. The results of this study are expected to enrich ethnomathematics research, support the preservation of local culture, and serve as a source of contextual mathematics learning in the classroom.

METHODS

This study employs a qualitative approach with an ethnographic design in the field of ethnomathematics. This approach is used to examine and describe mathematical concepts found within a community's culture**.** According to D'Ambrosio (1985), ethnomathematics is the way a cultural group develops, understands, and applies mathematical concepts through everyday activities. Furthermore, Rosa and Orey (2011) state that ethnomathematics is an approach that studies how mathematical concepts develop across various cultural groups and how that knowledge is used in daily life. This approach emphasizes the importance of understanding mathematics as part of a community's cultural knowledge system (Rosa & Orey, 2011) , particularly in the traditional houses of the Alas tribe in Southeast Aceh. The research was conducted from April 28 to May 4, 2026, at the Alas Tribe's traditional house located in Pulonas Village, Babussalam Subdistrict, Southeast Aceh Regency, Aceh Province. The research location was selected through purposive sampling because it still preserves the authenticity of the Alas Tribe's traditional house architecture and is still used for various traditional activities of the Alas Tribe.

Informants for this study were selected using purposive sampling based on their knowledge and involvement in the preservation of the Alas Tribe's traditional house. The informants consisted of a 69-year-old traditional leader who has served in that role for 37 years, and a 59-year-old caretaker of the Alas Tribe's traditional house who has served in that capacity for 30 years. Both informants were selected because they possess in-depth knowledge of the history, architectural structure, functions, and cultural significance of the Alas Tribe's Traditional House, ensuring that the information provided aligns with the research objectives.

The research data consisted of primary and secondary data. Primary data were obtained through direct observation of the building's structure and the ornaments of the traditional house, as well as through semi-structured interviews with the informants. Secondary data

were obtained from scientific articles, books, documents, and other bibliographic sources relevant to the study. Data collection techniques included observation, semi-structured interviews, and documentation. Observations were conducted to identify the geometric shapes found in various parts of the Alas Tribe's traditional houses. Interviews were conducted to obtain information regarding the philosophical meanings, cultural functions, and reasons for the use of geometric shapes in the architecture of traditional houses. Documentation in the form of photographs, measurement results, and field notes was used to corroborate the findings from observations and interviews. Data validity was assessed using source triangulation and methodological triangulation. Source triangulation involved comparing information obtained from informants, while methodological triangulation involved comparing the results of observations, interviews, and documentation to ensure the data had a high level of reliability.

Data analysis was conducted using the Miles and Huberman model (2022). This process included data reduction, data presentation, as well as drawing conclusions and verification. During the data reduction stage, the researcher selected and grouped the data according to the research focus. Next, the data were presented in the form of descriptive narratives and visual documentation to facilitate interpretation. The final stage involved drawing conclusions regarding the concepts of ethnomathematics and the cultural meanings embedded in the traditional houses of the Alas tribe based on the analysis of all the data obtained.

RESULT AND DISCUSSION

The traditional house of the Alas tribe, which served as the research site, is located in Pulonas Village, Babussalam Subdistrict, Southeast Aceh Regency. This traditional house is one of the cultural heritages of the Alas tribe that is still preserved to this day. In addition to serving as a residence, the traditional house is also used in various traditional ceremonies and serves as a symbol of the Alas people's cultural identity.

Figure 1. Traditional House of the Alas Tribe

1. Description of Research Findings

Based on the researcher's observations of the Alas tribe's traditional house in Southeast Aceh, several concepts of ethnomathematics were identified in the structure of the traditional house, as follows:

I. Two-Dimensional Shapes

a. Triangle

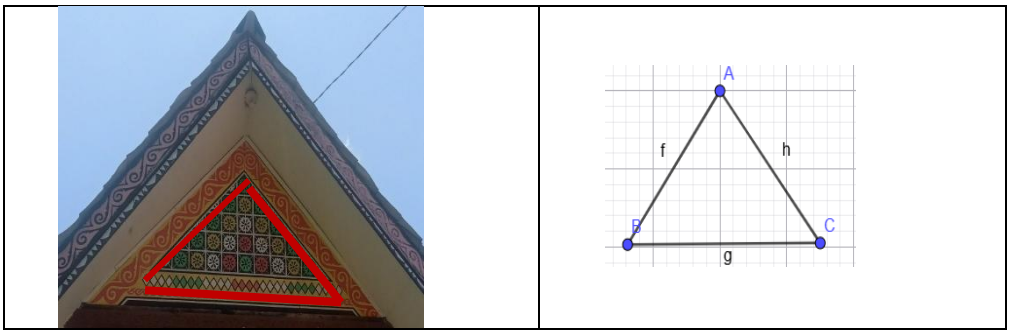

Figure 2. Carvings on the Front Roof of the Traditional House of the Alas Tribe

Based on measurements, the rear roof has a base of 60 cm and two sloping sides, each measuring 46 cm. This shape indicates the use of the concept of a triangle in the ornamental structure of the Alas tribe's traditional house.

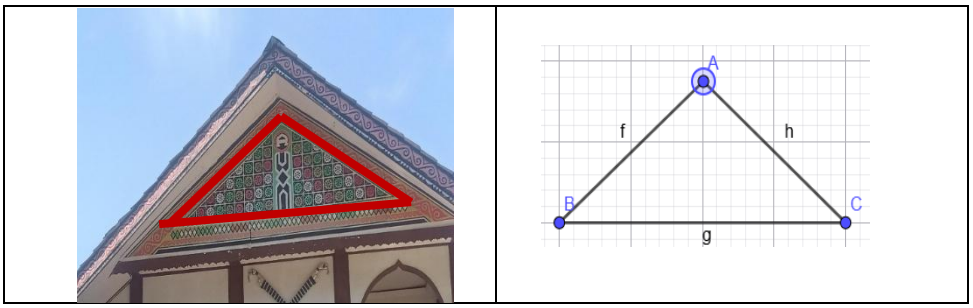

Figure 3. Carvings on the Rear Roof Section of the Alas Tribal Traditional House

Based on the measurements, the front roof of the traditional house has a base of 78 cm and two sides of equal length, each measuring 57 cm. This indicates that the geometric shape of this section is an isosceles triangle because it has two sides of equal length.

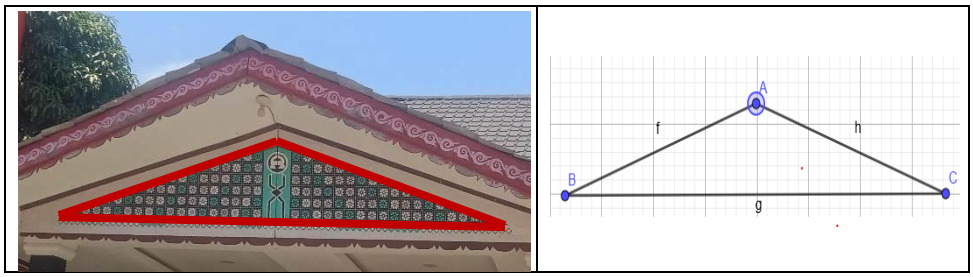

Figure 4. Carvings on the Side Roof of the Alas Tribe's Traditional House

On the side roof of the traditional house, a scalene triangle was found. This shape is characterized by the fact that the lengths of its three sides are all different from one another. This scalene triangle is formed by the arrangement of the roof frame, which adapts to the shape of the building on the side of the traditional house. In geometry, a scalene triangle is a triangle in which all sides and angles have different measurements. Measurements show that the side roof has a base of 98 cm, a sloping side of 72 cm, and a right side of 75 cm. The shape of this triangle demonstrates the application of geometric concepts in the construction of traditional Alas tribal houses.

b. Circle

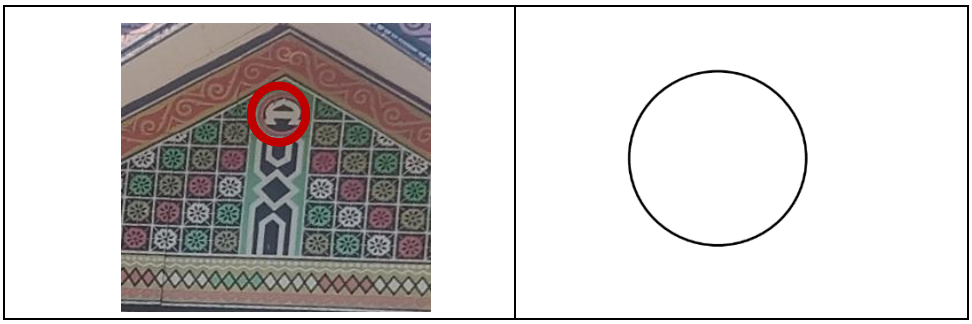

Figure 5. Circular Ornament on a Traditional House of the Alas Tribe

Based on the measurement results, the circle has a diameter of 4 cm and a radius of 2 cm. These dimensions indicate that this ornament has a perfect circular shape with equal distances from the center point to all points along its circumference.

c. Diamond

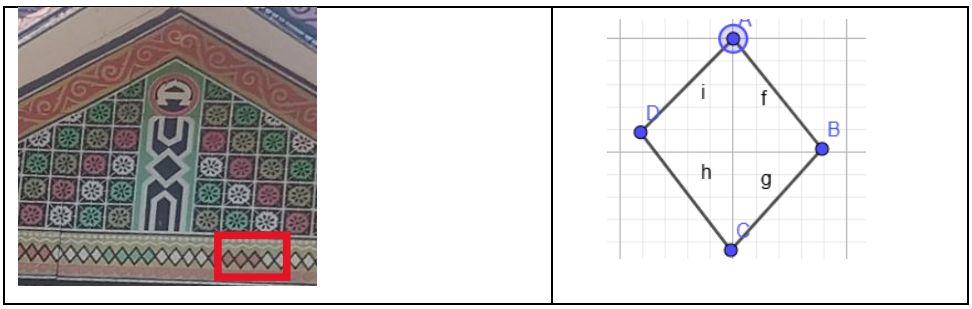

Figure 6. Rhombus Motifs on the Traditional Houses of the Alas Tribe

Based on the measurements, the diamond-shaped motif on the ornaments of the Alas tribe's traditional houses resembles a diamond with side lengths of 1 cm and 2 cm and diagonals of 1 cm and 2 cm. These dimensions indicate that the ornament has a shape resembling a rhombus with two diagonals that intersect at their midpoint. Although relatively small in size, this motif still demonstrates the application of geometric concepts in traditional house ornaments. The presence of this rhombus

shape indicates that the Alas people have incorporated orderly and symmetrical geometric patterns as decorative elements in their traditional architecture.

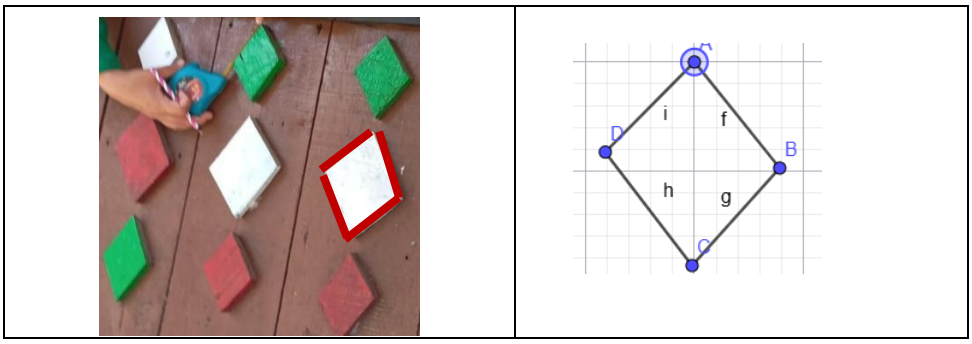

Figure 7. Rhombus ornament on a traditional Alas house

Based on measurements, the ornamental motif resembles a diamond shape with side lengths of approximately 8 cm and 9 cm and diagonals of approximately 8 cm and 9 cm. Although the side lengths are not exactly the same, the shape visually exhibits the characteristics of a diamond used as a decorative motif on the traditional houses of the Alas tribe.

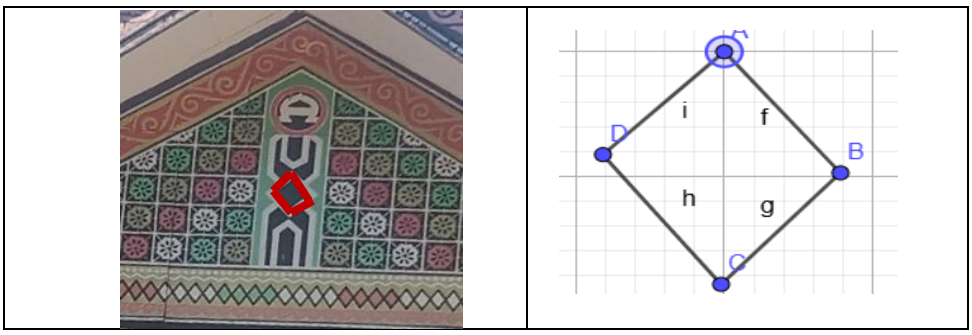

Figure 8. Rhombus-shaped ornament on a traditional Alas house

Based on the measurement results, the diamond-shaped ornaments on the traditional houses of the Alas tribe have a shape resembling a diamond with side lengths of 3 cm and 4 cm and diagonals of 3 cm and 4 cm. Additionally, the lengths of the sides are not equal, so the shape of the ornament does not form a mathematically perfect diamond. However, visually, the ornament resembles a diamond shape and is arranged in an orderly manner as part of the traditional house's decoration. The presence of this ornament demonstrates the application of geometric concepts—specifically similarity, symmetry, and pattern regularity—in the traditional woodcarving art of the Alas people.

d. Square

Figure 9. Square on a pillar of the Alas Traditional House

The length of the square's side was measured at 35 cm. Since all four sides are of equal length, the shape on the pillar of the traditional house meets the characteristics of a square.

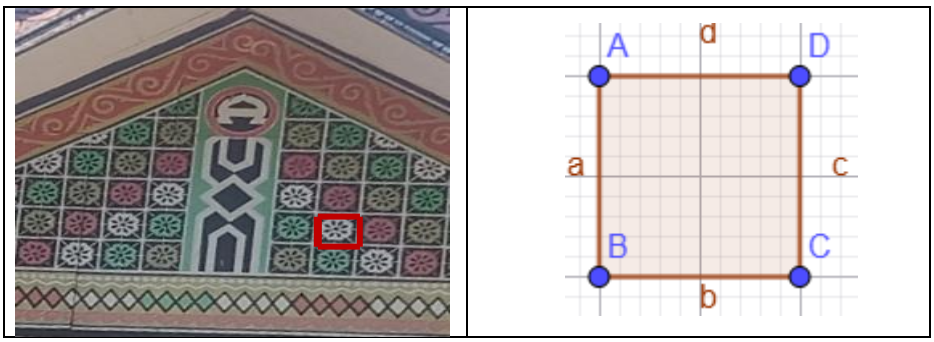

Figure 10. Square Motif on the Carvings of the Alas Tribe's Traditional House

Measurements show that the square motif in the carving has a side length of 2.5 cm. The identical size of each side indicates the application of the concept of a square in the traditional house's ornamentation.

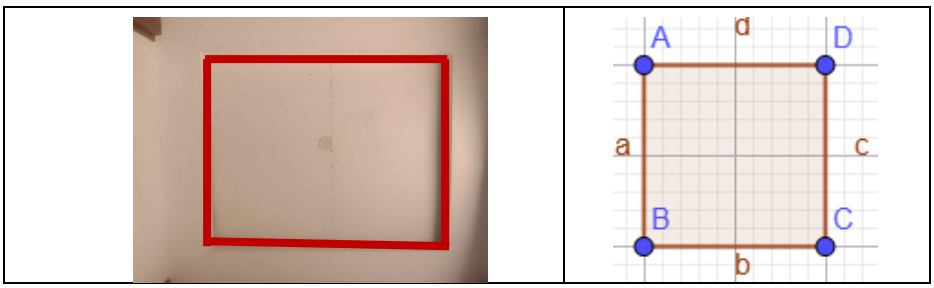

Figure 11. Square Motifs on the Ceiling of an Alas Tribal Traditional House

Based on the measurements, the length of each side of the square was found to be 77 cm. This indicates that the ceiling of the traditional house utilizes the square shape to create a neat and symmetrical arrangement.

e. Rectangle

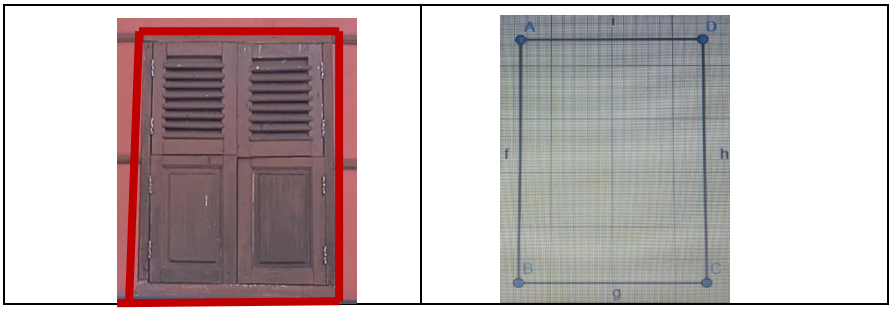

Figure 12. Rectangle on the window of an Alas traditional house

Measurements show that the window is 59 cm long and 59 cm wide. The difference in length and width indicates that the window is rectangular.

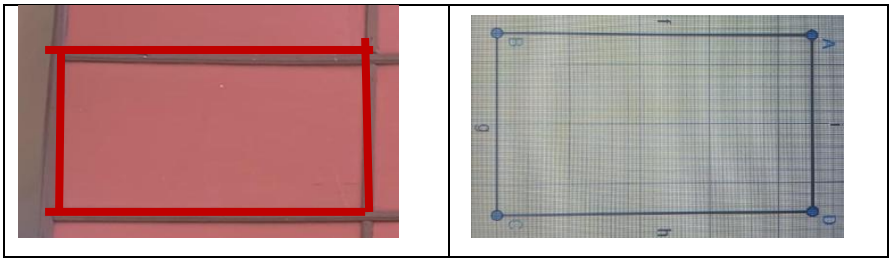

Figure 13. Rectangle on the wall of a traditional Alas house

Measurements show that the window is 59 cm long and 43 cm wide. The difference between the length and width indicates that the window is rectangular.

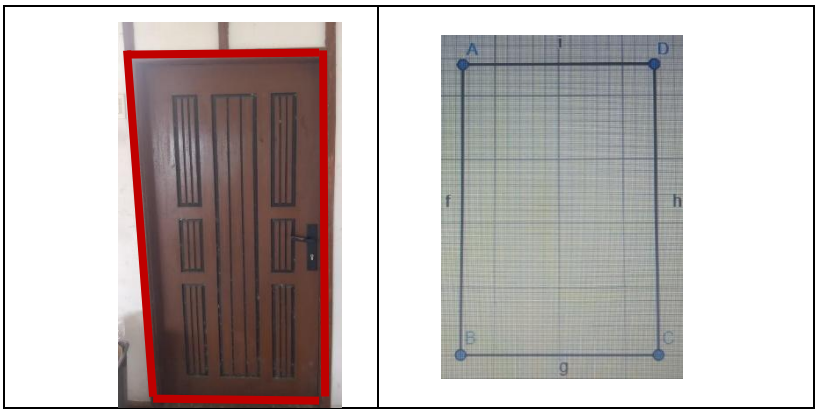

Figure 14. Rectangle on the door of an Alas traditional house

The measurement results show that the door is 190 cm high and 77 cm wide. With two pairs of opposite sides of equal length, the door is a rectangular plane figure.

II. Three-Dimensional Shapes

a. Sphere

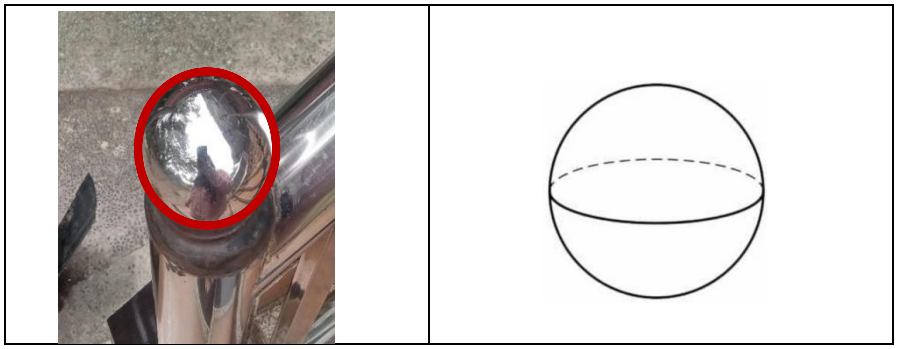

Figure 15. Sphere-Shaped Ornament on a Traditional House of the Alas Tribe

Based on the measurements, the sphere has a diameter of 6.5 cm and a radius of 3.25 cm. This shape demonstrates the application of the concept of a sphere in the ornamentation of the Alas tribe's traditional house.

b. Octahedron

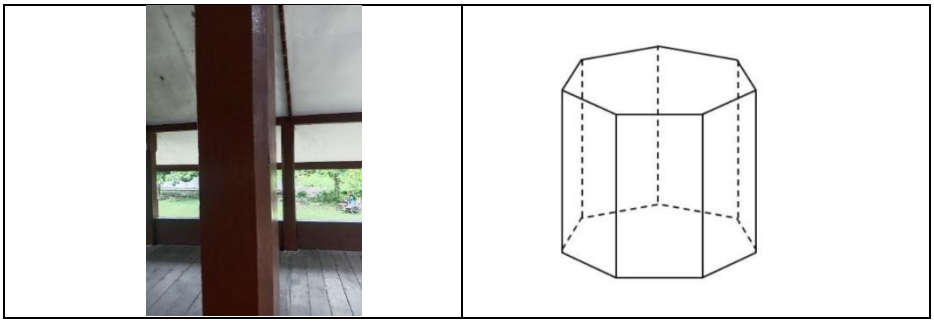

Figure 16. Octahedral-Shaped Upper Post on the Traditional House of the Alas Tribe

Based on the measurement results, the octahedral prism on the upper pillar of the Alas tribe's traditional house has a height of 290 cm with varying side lengths, namely 6 cm and 14 cm. Sides 1 and 5 are 14 cm long, while sides 2, 3, 4, 6, 7, and 8 are 6 cm long. These measurement results indicate that the cross-section of the upper pillar is octagonal and extends upward, forming an octagonal prism. This shape demonstrates the application of three-dimensional geometric concepts in the construction of the Alas tribe's traditional house, particularly in the pillar section, which serves both as a structural support and as an aesthetic element of traditional architecture.

c. Rectangular Prism

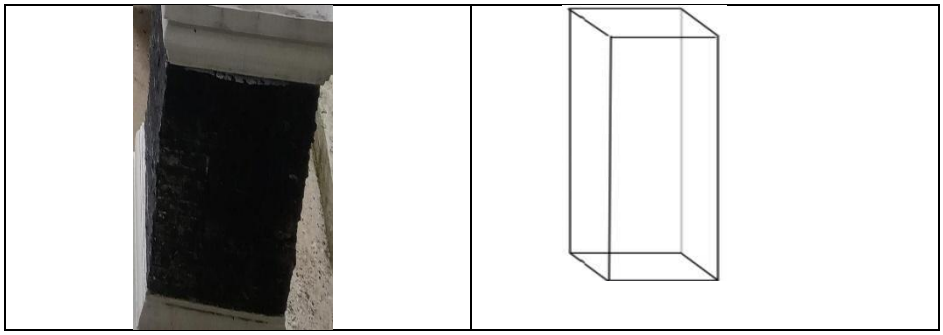

Figure 17. The Lower Posts of the Alas Tribe's Traditional House Are Shaped Like Rectangular Prisms

Based on the measurements, the beam was found to be 52 cm long, 32 cm wide, and 32 cm high. These dimensions indicate that the lower posts of the traditional house are shaped like beams that serve as supports for the structure

III. The Concept of Translation

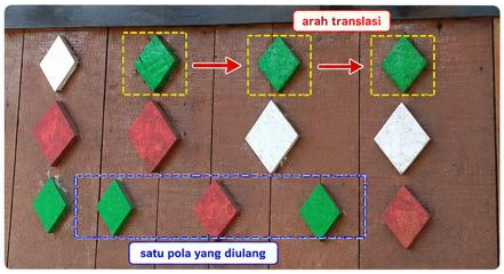

Figure 18. Dindin Motif of the Alas Tribe's Traditional House

The green, red, and white diamond-shaped motifs are shifted horizontally to the right by an equal distance without changing their shape, size, or orientation. This shift exemplifies the concept of translation. The green, red, and white diamond-shaped motifs are shifted horizontally to the right by an equal distance without changing their shape, size, or orientation. This shift exemplifies the concept of translation

IV. The Concept of Folding Symmetry (Vertical Axis)

Figure 19. Mesikhat motifs on the roof of a traditional Alas house

The front view of the traditional house shows vertical fold symmetry. If a vertical line is drawn down the center of the building (red line), the left and right sides have nearly identical shapes and ornamental arrangements, like mirror images.

2. The Concept of Ethnomathematics in the Traditional Houses of the Alas Tribe

Based on observations and interviews, it was found that the Alas Tribe's traditional house incorporates various geometric concepts in the form of two-dimensional and three-dimensional shapes. Triangular shapes are found on the roof, rectangles on the walls, floors, doors, and windows, while rectangular prisms are visible in the house's support pillars. In addition, some of the traditional house's ornaments feature rhombus and octagon shapes, as well as repeating geometric patterns and the concept of fold symmetry. The presence of these shapes indicates that the Alas people have applied mathematical concepts in the construction of their traditional houses, even though the process is carried out traditionally and passed down from generation to generation.

Research findings indicate that the construction of Alas traditional houses is not carried out randomly but is based on local knowledge passed down through generations. Based on interviews with traditional leaders and caretakers of the traditional houses, the dimensions of each building component are determined based on the experience of traditional craftsmen and guidelines inherited from previous generations. Although measuring tapes are now widely used, in the past the community relied on traditional units derived from body measurements, such as the jengkal, hasta, and depa. These units were used to ensure the building's proportions remained balanced and the measurements were easy for the community to apply. In addition to traditional units, the Alas people also apply specific ratios when determining the dimensions of the house's components. For example, the height of the posts is adjusted to match the height of the raised floor, while the dimensions of the doors, windows, and roof are balanced to ensure the building is sturdy, comfortable, and aesthetically pleasing. This demonstrates that the concepts of ratio and proportion have been applied in the construction of traditional houses, even though the community does not formally refer to them as mathematical concepts.

A triangular shape is chosen for the roof because it provides better structural strength to support the building's load and facilitates the flow of rainwater. According to traditional leaders, the roof's shape also symbolizes the hope that the community's life will always be directed toward the One True God. Thus, the triangular shape serves both a technical function and a philosophical meaning. Symmetry on the front facade of the traditional house reflects a balance between the left and right sides of the building.

According to informants, this balance symbolizes harmony, justice, and harmony in community life. From a mathematical perspective, symmetry indicates regularity of form, while from a cultural perspective, it reflects the values of the Alas community, which upholds balance in interpersonal relationships.

The concept of translation is evident in the repetition of Mesikhat ornaments arranged at fixed intervals and in fixed directions. These patterns are repeated to create a neat and beautiful appearance while preserving the distinctive motifs of the Alas community. Based on interview findings, each motif is passed down by artisans to the next generation as part of a cultural identity that must be preserved. Therefore, the translation patterns identified not only demonstrate the concept of geometric transformation but also serve as a medium for preserving local culture. The process of constructing the Alas Traditional House is passed down through direct, hands-on learning— —from parents to children or from senior traditional craftsmen to the younger generation. Knowledge regarding the building's form, dimensions, construction techniques, and the meaning of each ornament is continuously practiced, ensuring its preservation to this day. This process of transmission demonstrates that mathematical concepts evolve alongside a community's culture and are preserved through tradition.

The findings of this study have implications for mathematics education, particularly in the area of geometry. The various two-dimensional and three-dimensional shapes, symmetry, translation, and concepts of proportion found in the traditional houses of the Alas tribe can serve as contextual learning materials. By utilizing local culture as a learning resource, students not only understand mathematical concepts more concretely but also develop an appreciation for their region's cultural heritage. Thus, the ethnomathematics approach connects mathematical concepts to students' real-life experiences, making learning more meaningful.

These findings align with research conducted by Fitriza et al. (2022) and Nova & Putra (2022) which states that the ethnomathematics approach can help students understand geometric concepts because cultural objects contain various geometric shapes that can be observed directly. These studies demonstrate that cultural elements can serve as concrete media for understanding mathematical concepts, thereby making learning more meaningful. The results of this study also support the research by Astuti et al. (2022) , which explains that mathematical concepts can be found in community cultural activities through the ethnomathematics approach. This is evident among the

Alas tribe, who utilize specific measurements, shapes, and patterns in constructing their traditional houses.

Furthermore, several studies—including those by —indicate that traditional cultural elements contain various mathematical activities, such as measurement, comparison, circular shapes, and equations, which can be integrated into mathematics instruction. These findings reinforce the results of this study, which indicate that traditional structures such as the Alas Tribe's Traditional House serve as tangible representations of the application of mathematical concepts in community life. The findings of this study are also supported by the research by Iskandar et al. (2022) , which concludes that various traditional houses in Indonesia incorporate geometric concepts such as plane figures, solid figures, symmetry patterns, and geometric transformations that can serve as sources for culture-based mathematics learning. This study indicates that traditional houses are one of the most frequently used objects in ethnomathematics research on geometry.

Thus, the geometric shapes and transformations found in the traditional houses of the Alas tribe demonstrate that the community has applied mathematical concepts in their daily lives. This knowledge has been passed down from generation to generation through the cultural tradition of building traditional houses, thereby becoming an integral part of the Alas tribe's cultural identity**.**

3. Symbolic Meanings and Ethnomathematical Values in the Traditional Houses of the Alas Tribe

Based on interviews with traditional leaders and caretakers of the Alas Tribe's traditional houses, it was learned that every part of the traditional house holds philosophical meaning that reflects the cultural values of the Alas community. The traditional house serves not only as a dwelling but also as a symbol of cultural identity passed down through generations. The Alas Tribe's traditional house is built as a stilt house, symbolizing caution, protection for the family, and the Alas people's ability to adapt to natural conditions. The stilt house design was chosen to ensure the safety of the occupants from animal disturbances and adverse environmental conditions. In addition to its practical function, this design also demonstrates the community's local wisdom in adapting their architecture to their living environment.

Based on interview findings, the traditional house also serves as a center for various community activities, such as traditional deliberations, the performance of traditional ceremonies, and a gathering place for extended families. These functions reflect that the traditional house stands as a symbol of unity, togetherness, and kinship—values still

highly cherished by the Alas people. Informants explained that the use of various geometric shapes in traditional houses—such as triangles, squares, rectangles, rhombuses, octagonal prisms, and rectangular prisms—is not only intended to strengthen the building's structure but also to illustrate balance, order, and precision in the construction process. This demonstrates a connection between cultural values and the concepts of ethnomathematics that have been passed down through generations by the Alas indigenous people.

The brown color that dominates traditional houses stems from the use of wood as the primary construction material. According to informants, this color symbolizes simplicity, the Alas people's closeness to nature, and gratitude for the natural resources used to build their traditional homes. Interview findings also indicate that traditional Alas houses have 32 main posts. This number of posts was not chosen arbitrarily but holds philosophical significance as a symbol of the 32 customs that serve as guidelines for the lives of the Alas people. In addition to supporting the structure to keep it sturdy, the presence of these 32 posts also symbolizes the community's unity in preserving and maintaining the customs passed down by their ancestors. Before the construction of the traditional house begins, the Alas community holds a ceremonial feast as part of their traditional customs. According to interview findings, this feast is an expression of gratitude to God Almighty as well as a prayer that the construction process will proceed smoothly, that the structure will bring blessings, and that it will ensure the safety of all the house's occupants.

Thus, the Alas Traditional House not only incorporates concepts of ethnomathematics—such as plane figures, solid figures, translation, reflection symmetry, repeating patterns, and mirror images—but also carries cultural significance that reflects the values of togetherness, mutual cooperation, respect for guests, and the preservation of ancestral heritage. Furthermore, the Mesikhat ornaments that adorn the walls and roofs of the traditional house symbolize mutual aid, brotherhood, hard work, courage, and harmony between the community and its surrounding environment. The orderly arrangement of these ornaments also reflects the community's aesthetic values and craftsmanship in creating cultural works that possess both artistic value and philosophical meaning. The repetitive arrangement of Mesikhat ornaments reveals regular geometric patterns. These patterns reflect geometric transformation concepts such as translation and reflection.

From an ethnomathematics perspective, cultural patterns such as these not only serve an aesthetic function but also contain mathematical concepts that can be studied in geometry education. These findings align with the research by , which explains that culture-based geometry education can help students understand the relationships between geometric shapes and patterns in a more concrete way. Furthermore, Khairunnisa & Ginting (2022) and Sulfayanti et al. (2022) explain that ethnomathematics serves as a bridge between culture and mathematics because mathematical concepts can be found in various cultural activities of a community. Therefore, the geometric patterns found in the traditional houses of the Alas tribe can serve as a contextual learning resource as well as a means of preserving local culture.

The findings of this study are also consistent with the views of who state that ethnomathematics is a way to understand how communities develop mathematical ideas in accordance with their needs and culture. Therefore, the geometric concepts found in the traditional houses of the Alas tribe not only demonstrate mathematical aspects but also reflect the cultural values, philosophy of life, and identity of the Alas people, which have been passed down from generation to generation.

CONCLUSION

This study successfully identified various ethnomathematical concepts found in the traditional houses of the Alas tribe, including concepts of plane figures (triangles, squares, rectangles, circles, and rhombuses), solid figures (cubes, octagonal prisms, and spheres), as well as geometric transformations in the form of translations and symmetries reflected in the building's structure and the ornaments of the traditional houses. The interview results indicate that these concepts not only serve as structural elements but also carry philosophical meanings that reflect the values of balance, togetherness, mutual cooperation, cultural identity, and the local wisdom of the Alas community, which have been passed down from generation to generation. The contribution of this research lies in its exploration, which integrates the identification of geometric concepts with an analysis of the cultural meanings embedded in each part of the Alas Traditional House. This study not only describes the geometric forms identified but also explains how mathematical concepts are applied in the construction process of the traditional house, preserved through community traditions, and become part of the local cultural heritage. Thus, this study enriches the field of ethnomathematics, particularly regarding the traditional architecture of the Alas tribe. The findings of this study have implications for culture-based geometry instruction by utilizing

the traditional houses of the Alas tribe as a contextual learning resource. The various geometric concepts identified can be used to help students understand geometry through cultural objects that are familiar to them, thereby making learning more meaningful while supporting the preservation of local cultural heritage.

This study is still limited to exploring ethnomathematical concepts found in the traditional houses of the Alas tribe. Therefore, future research is recommended to develop ethnomathematics-based learning media, modules, or tools centered on the traditional houses of the Alas tribe and to test their effectiveness in improving students' understanding of geometry. In addition, further research could explore other cultural objects of the " " (Alas Traditional House) within the Alas community so that ethnomathematics studies can continue to develop and make a broader contribution to mathematics education and cultural preservation.

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