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ETHNOMATHEMATICS EXPLORATION PETILASAN SRI AJI JAYABAYA KEDIRI DISTRICT

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ABSTRACT

Study This done for explore elements mathematics (ethnomathematics) in Petilasan Sri Aji Jayabaya. Method used in study This that is descriptive qualitative with approach ethnography. Data used is the data obtained through studies literature; observation; interview; and documentation. Data analysis techniques using Miles and Huberman's methods include data reduction, data presentation, as well Conclusion drawing and verification. Aspect culture from Reminiscences of Sri Aji Jayabaya obtained from studies literature and interviews. Aspect mathematical from Reminiscences of Sri Aji Jayabaya obtained from results observations made. Documentation Alone used as supporting data that has been obtained through studies literature; interview; and observation. Result of study This is there is elements mathematics (ethnomathematics) in Petilasan Sri Aji Jayabaya; that is draft mirroring; get up room side flat; get up room side curved; and wake up flat.

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1. INTRODUCTION

Reminiscences of Sri Aji Jayabaya Kediri Regency is a place trusted by the local community as the famous moksa of Prabu Sri Aji Jayabaya as king of the Kingdom of Kediri in the XII century or so around 1135 – 1157. Petilasan or ultimate This located in the village Win; Subdistrict Ceiling; Kediri Regency; East Java Province; Indonesia. According to folklore that Prabu Sri Aji Jayabaya was a great king in the land of Java. He famous as the incarnation of " Betara Vishnu" namely God custodian world safety and prosperity. He also made it predictions that are famous among the Javanese people are given the name “Jongko Joyoboyo”; he predicts matter matter What just will happens in this world in general; the island of Java in particular; and is highly trusted by the people of Java and even the Indonesian archipelago. There are 3 buildings located at the location recitation of King Sri Aji Jayabaya that is local muksa; local clothing; and local crown. Loka muksa is place or a point that is trusted by the local community as point muksa from Prabu Sri Aji Jayabaya. Moksha is a circumstances when soul feel very calm and enjoy real happiness Because No bound again by various type lust nor object material; so that when somebody Already reach moksha soul his Already regardless from cycle reincarnation and not can Again enjoy Like world sorrow so to the point moksha here it is happiness actually what Hindus hope for. (Bakar; 2020.)Fashion shop is place storage fashion from Prabu Sri Aji Jayabaya. Crown place is place storage crown from Prabu Sri Aji Jayabaya. Based on results interview excerpts from Sri Aji Jayabaya This was founded in 1975 initiated by the family big Handodento.

Figure 1. Footage of Sri Aji Jayabaya
Source: Lina Kristianti

Mathematics originate from Latin *mathematics* which mean Study or things learned, in Dutch it is called *wiskunde* or knowledge related with reasoning (Pemikirandan et al., 2019). Mathematics designed for explain experience life daily, based on providing Solutions to problem social, cultural and ecosystem natural (Zuliana et al., 2023:513). Mathematics is knowledge basic no regardless from Science and Technology, p the caused Because mathematics sustain development of science and technology (Kristina & Permatasari, 2021). Mathematics is one branch knowledge knowledge that has role important in development knowledge knowledge and technology as tool help in implementation field other sciences as well in development mathematics (Nursyeli & Puspitasari, 2021a). Mathematics is not a universal domain of formal knowledge, however, is a collection of representations and procedures constructed symbolic in a way cultural in certain community groups (Okta Marinka et al., 2018). Through mathematics ability think experience somebody will appear (Fajrina, 2022). Mathematics can meet in activity everyday, sometimes without We realize. However, most people think mathematics That difficult (Fauzi et al., 2022). Statement the in accordance with results *pretest* AKM class that has been implemented through campus programs Teaching Class 6 which is held at SMP Merak Wijaya Putra 6 Pringan show that of 20 AKM numeracy questions student only capable do 2 – 3 questions just especially when it comes to problems geometry. So, it's necessary exists A innovation or findings new for makes it easier student easy understand mathematics that is through ethnomathematics. Based on 2013 revised 2017 curriculum, on learning mathematics at school level base there is room scope material that is geometry (Lisnani et al., 2020). Geometry is one material discussed about form, location and presentation based on a images and matrices (Maskar & Anderha, 2019)Geometry Not only understand various form get up flat or get up room with various type the formula is there, but geometry need understanding about elements and their implementation in life a day day (Nurharyanto, 2023).

Ethnomathematics terms originate from which " *ethno "* originates from " ethnography " and "mathematics", from both of them We can interpret that ethnomathematics referring to the study mathematics in related with culture (wahyudin, 2018). Ethnomathematics can functioned For express mathematics and culture into the material school (Marsigit; 2018). Aligned with Marsigit; (Irsyad et al.; 2020)also said that ethnomathematics Can said as a process for look for connection between culture with mathematics. The relationship in question namely a mathematical process produced; transferred; distributed; and specialized in diverse existing culture around. Besides that, ethnomathematics is also utilized to organize learning mathematics contextual For increase literacy, numeracy, and character education participant educate (Widiantari et al., 2022). Ethnomathematics first introduced by D'Ambrosio. According to D'Ambrosio ethnomathematics can interpreted as practice mathematics in a group culture can identified as idea studies mathematics (Irsyad et al., 2020)Group The culture referred to by D'Ambrosio is group Community culture like tribe, group laborers, children child from group age certain and professional classes through jargon, code ethics, myths, symbols. Practice intended mathematics that is like encoding, calculating, measuring, classifying, inferring, modeling, and so on. According to language, ethnomathematics originate from the words ethno (culture) and mathematics. By historical, development mathematics own long historical notes; No A little draft mathematics own close contribution in life humans are one of them in life complex culture; refers to elements confidence; knowledge; arts; moral; law custom; ability; and habits other; in a way No direct mathematics born; grow; and develop from culture, Where is culture the always develop along development over time. So that appear term that mathematics is product unified culture in the life of the so-called Society with ethnomathematics (Nur et al., 2020a). Ethnomathematics is felt strongly the benefits in the world of education, namely for open potential considered pedagogical knowledge students obtained from study outside class (Nurhasanah & Puspitasari, 2022). Through ethnomathematics expected can increase ability student in solution problem as well as can understand material with easy (Khalimah et al., 2017). Object

ethnomathematics used that is that is like activity count determination location, measure, design, and explain (Nursyeli & Puspitasari, 2021b).

Education is an important process in life man For preparing and giving birth source Power quality human being (Nooryanti et al., 2020). In the realm of Education, ethnomathematics Can said as learning realistic mathematics because use example real form existing culture in the environment around school and environment around student.Irsyad et al., (2020) state that there is element ethnomathematics in the Asu Temple building; Nur. R, Dedi Muhtadi, Nani Ratnaningsih 2020 stated that there is element ethnomathematics in the Borobudur Temple building; Mohamad Yasin Fadillah, Sunardi, et al 2021 stated that there is element ethnomathematics in Jabung Temple buildings and can used as student teaching materials for mathematics subjects. This matter compare straight with understanding connecting ethnomathematics culture with mathematics and aim For makes it easier student in Study mathematics Because get real example that is originate from environment around student. Apart from that, ethnomathematics or learning mathematics based culture required in learning at school that is for transform values culture in students use build character nation (Pratiwi et al., 2020). With exists concepts embedded mathematics in practices - practices culture and acknowledge that everyone can develop mathematics with method special so matter the in grow love student to mathematics and culture around (Utami Sriwanti, 2022).

Until moment This Not yet There is attempted research explore elements mathematics in the Petilasan of Prabu Sri Aji Jayabaya. Based on description on; so, study This aim For explore ethnomathematics in the Petilasan of Prabu Sri Aji Jayabaya and for increase understanding mathematical student. So that study This can developed become material learning mathematics at school.

2. RESEARCH METHODS

Study This is typing study descriptive qualitative with approach ethnography.Putra et al., (2021:23) state that descriptive qualitative is study about research that produces descriptive data in the form of written words from background behind in a way intact or holistic. Whereas ethnography is branch knowledge anthropology used for describe, explain, and analyze element culture a Society, a tribe nation, or legacy historic (Sari et al., 2023). Subject from study This is Petilasan Sri Aji Jayabaya which is in the village Win; Subdistrict Ceiling; Kediri Regency; East Java Province; Indonesia. Data collection techniques from study This that is researcher as a research instrument. Study done with method studies literature, observation, interviews, and documentation. Literature study and interviews done for know aspect culture found in Petilasan Sri Aji Jayabaya. Observation done for know aspect existing mathematics in Reminiscences of Sri Aji Jayabaya. As well as documentation done for supports the data that has been obtained from results interviews and observations. In research This data analysis was carried out with Miles and Huberman's methods include data reduction, data presentation, as well withdrawal conclusion and verification.

3. RESULTS AND DISCUSSION

Indonesia is a country that is rich in wealth reserve culture. With exists reserve culture help generation young or race millennial for know the history of the past that is spread throughout remote areas of the archipelago in particular area around place each one lives. Like Reminiscences of Sri Aji Jayabaya located in the village Winning, District Pagu, Kediri Regency, East Java Province, Indonesia. Reminiscences of Sri Aji Jayabaya Already known by almost all over Indonesian society, many people often come visit to petilasan This especially on the 1st of Suro only for pray and honor ancestors. Ceremony custom 1 suro is ceremony down passed down from generation to generation by the ancestors of the Javanese people, especially those in the villages Win since 1976. Ceremony This done for pray and honor Sri Aji Jayabaya.

Sri Aji Jayabaya is the king of the Kediri Kingdom which is his lineage from the Panjalu Kingdom. He succeeds uniting the 2 kingdoms namely the Panjalu Kingdom and the Jenggala Kingdom become one kingdom, namely the Kingdom of Kediri. Sri Aji Jayabaya start ruled from 1130 to 1157. Sri Aji Jayabaya is a great king who is believed by the people to be the incarnation of "Batara Vishnu" namely God custodian world safety and prosperity. He also made it predictions that are famous among the Javanese people are given the name “Jongko Joyoboyo”, he said predict matter matter What just will occurs in the world in general, on the island of Java in particular, and is highly trusted by the people of the island of Java and even the archipelago. There are 3 buildings located at the location recitation of King Sri Aji Jayabaya that is local muksa, loka clothing, and location crown. Based on results interview excerpts from Sri Aji Jayabaya This was founded in 1975 initiated by the family big Handodento.

Geometry owns very important role in life everyday, especially in development. On a buildings, elements geometry is very inherent even become element main thing in the building. Statement the in accordance with research that has been carried out by (Nur et al., 2020b)the builder of Bororbudur Temple as object study For dig draft mathematics with use results design building, measuring, making pattern, as well method hook draft mathematics the in learning mathematics.

Research result show that pattern building at Petilasan Sri Aji Jayabaya made from results modeling mathematics. Form building the located throughout locations in the complex Petilasan that is, first on location muksa, loka muksa surrounded by a fence shaped divider beam elongated, in front local muksa there is sacred boundary pillars that form half circle, then on the building muksa his form get up room stacked blocks from the size big down to the smallest size. Second on location clothing, on location fashion there is shaped divider square, with form local the most basic clothing forming a trapezium later followed get up flat rectangle long to the very top forming a parabola. Relief on site fashion there is draft mirroring, and some get up flat like rectangle long, square three, and a pentagon. Lastly, location crown, on loka crown there is fence forming boundaries get up room beams all around local crown, on a building base local crown form get up room the cube above it there is circle followed with get up room cone. Relief found in the location crown form get up room cone and circle. Exploration results mathematics in Petilasan Sri Aji Jayabaya can made addition source learning mathematics with context culture can made as step beginning for increase passion and knowledge student in learn mathematics obtained from environment around student. Here are some ideas mathematics contained in building Reminiscences of Sri Aji Jayabaya,

3.1 Loka Muksa

Loka muksa is place or a point that is trusted by the local community as point muksa from Prabu Sri Aji Jayabaya. Moksha is a circumstances when soul feel very calm and enjoy real happiness Because no bound again by various type lust nor material objects, so when somebody Already reach moksha soul his Already regardless from cycle reincarnation and not can Again enjoy Like world sorrow so to the point moksha here it is happiness actually what Hindus hope (Bakar; 2020).

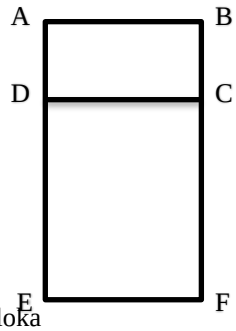


Figure 2. Mathematical ideas at the entrance to the muksa loka
Source: Lina Kristianti

As for the research results, it was found that the properties of congruence in these shapes were:

1. There is a concept of congruence, namely between rectangle ABCD and rectangle ABEF
2. $< A =< B =< C =< D =< E =< F = 90°$
3. Side AD with side AE =
4. Side AB = DC = EF
5. AB // DC // EF
6. AD // BC
7. DE // CF

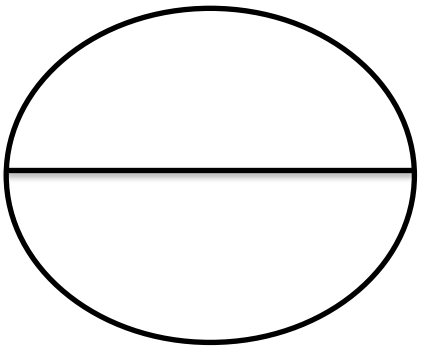


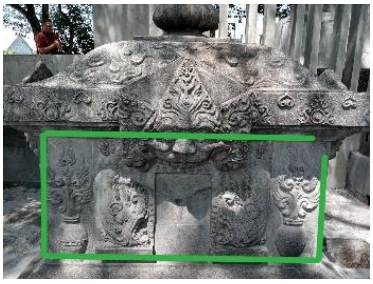
Figure 3. Mathematical ideas for the sacred boundaries leading to Loka Muksa
Source : Lina Kristianti

Form gets up: half circle

- Around: $\frac{1}{2}(2 \times \pi \times r)$
- Wide: $\frac{1}{2}(\pi \times r^2)$
- With: $\pi = \frac{22}{7}\ atau\ 3{,}14$
  $r = jari\ jari\ lingkran$

3.2 Clothing Shop

Fashion shop is place storage fashion from Prabu Sri Aji Jayabaya. Crown place is place storage crown from Prabu Sri Aji Jayabaya.



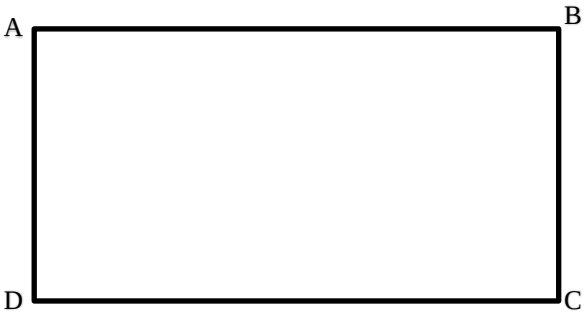


Figure 4. Mathematical modeling of fashion shop reliefs
Source: Lina Kristianti

The shape of the middle part of this fashion shop when viewed from a mathematical modeling perspective is to form a flat, rectangular shape. The middle part of this fashion shop is believed by the public to be the door. The following is a mathematical modeling of the shape of a fashion shop door.

- Around :$AB + BC + CD + DA$
- Wide :$panjang\ \times lebar$

In the middle of this fashion shop, when viewed from a spatial perspective, it forms a blocky spatial structure. This is supported by the properties of the blocks so that they can be expressed as block shapes. The following are the properties of the beam

1. Has 6 sides
2. Has 12 ribs
3. Has 12 diagonal fields
4. Has 8 corner points
5. Has 4 diagonal spaces
6. Has 6 diagonal fields

In this section, the block shape does not have a lid so it can be formulated as

- Around :$4(panjang + lebar + tinggi)$
- Volumes:$p \times l \times t$
- Surface area of the block without cover:$(p \times l) + 2(l \times t) + 2(p \times t)$

  Information :

  P = length

  l = width

  t = height

A

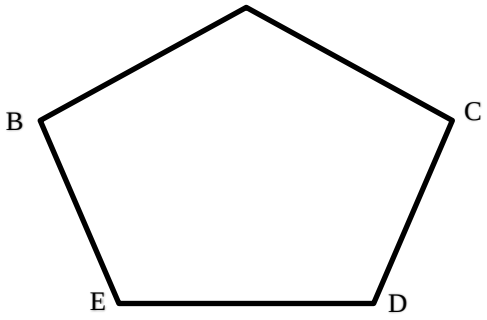


Figure 5. Mathematical modeling of the fashion relief form
Source: Lina Kristianti

The relief part of this fashion shop resembles a flat 5-sided shape. The following is a mathematical modeling based on observations.

- Around :$BA + AC + CD + DE + EB$
- Wide :$\left(\frac{5}{4}\right) a^2 \cot\frac{\pi}{5}$

  Information :

  $a = Side\ Length$

  $\pi = Angle\ Size$

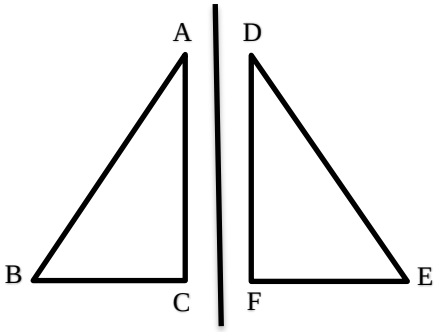


Figure 6. Mathematical modeling of the relief form of a fashion shop
Source: Lina Kristianti

3.3 Crown Place

In the relief form of this fashion shop there is a mathematical modeling concept, namely mirroring. In the results of the observations, it was found that there was a reflection of the DEF triangle reflected on the Y axis, the reflection results were obtained, namely the ABC triangle.

Figure 7. Modeling mathematics on local relief forms crown
Source: Lina Kristianti

There is draft geometry fractals in buildings local crown, concept geometry fractal This almost The same with draft modeling of the Borobudur Temple building. Fractals is form geometric with no details limited

and its structure is very complex, it has a number of size similarities self, where every inside it is scale small from overall part (Nur et al., 2020b). Modeling mathematics on site crown that is is in section lower resembling crown get up room cone. Following explanation modeling mathematics.

Characteristics get up room cone

1. Has 2 sides shaped circular and curved
2. Circle side are the base and sides curved is blanket
3. Has 1 rib shaped round
4. Has 1 corner at the end cone which is peak cone

Based on traits cone so can assumed that relief form on the site crown is get up room cone, with area, volume and perimeter as following

- Volumes: $\frac{1}{3}\pi r^3 t$
- Wide: wide circle + area blanket =$\pi r^2 + (r + s)$

  Information:

  $r = Radius\ of\ circle$

  $\pi = \frac{22}{7}\ or\ 3{,}14$

  $t = Height\ of\ cone$

  $s = Length\ of\ painter's\ line$

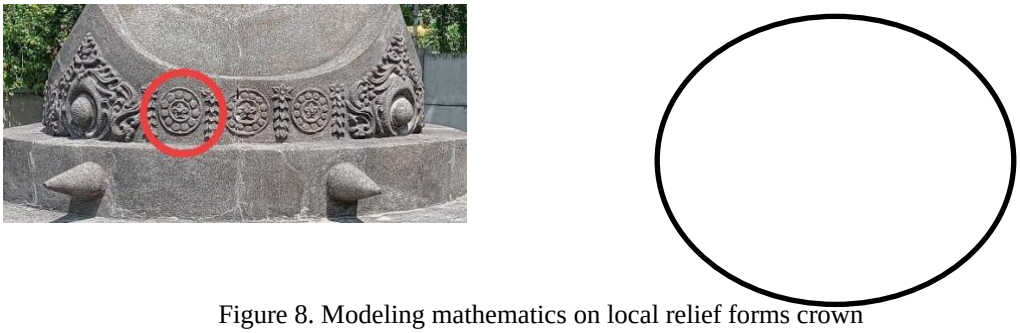


Figure 8. Modeling mathematics on local relief forms crown
Source: Lina Kristianti

Relief on site crown This has a similar motif get up flat circle, with area and circumference as following

- Around: $(2 \times \pi \times r)$
- Wide: $(\pi \times r^2)$

  With: $\pi = \frac{22}{7}\ atau\ 3{,}14$

  $r = Radius\ of\ circle$

4. CONCLUSION

Reminiscences of Sri Aji Jayabaya is place historic and trusted by the local community as place muksa from the King of the Kediri Kingdom, namely Prabu Sri Aji Jayabaya. There are 3 places history contained in the petilasan This that is First local muksa as place or the most sacred and considered location as center muksa from Prabu Sri Aji Jayabaya. Loka muksa usually used by the public for raise prayer. Second local fashion, local fashion is place storage fashion from Prabu Sri Aji Jayabaya. Third local crown, loka crown is place storage crown from Prabu Sri Aji Jayabaya. When local the be in one the area mentioned with Reminiscences of Sri Aji Jayabaya. There is element mathematics (ethnomathematics) in excerpts from Sri Aji Jayabaya said, at the location muksa there is draft congruence get up flat and awake flat. At the location fashion there is draft mirroring and building flat. At the location crown there is get up flat, wake up room side curve, and get up room side flat.

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