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INVESTIGATION ON THE EXISTENCE OF MATHEMATICAL DOMAINS AND CONCEPTS IN THE QURAN

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Abstract:

Mathematical domains refer to specific sets or areas of mathematics that focus on particular types of objects, structures, or functions. Whilst mathematical concepts are fundamental ideas or principles in mathematics that help us understand and describe various phenomena. This study aims to explore the specific domain of mathematics namely numbers, arithmetic operations, geometry, and measurement that exist in the Quran using an exploratory-qualitative research approach. The investigation reveals that there are a number of verses in the Quran that mentioned about mathematical domains and concepts such as numbers in surah al-Baqarah, an-Nisa', al-Maidah, an-An'am, al-Anfal, al-Furqan, as-Sajdah, as-Saffat; arithmetic operations in surah al-A'raf, al-Baqarah, al-'Ankabut, al-Anfal, an-Nisa'; geometry in surah al-Baqarah; and measurement in surah al-Kahf, Yunus, al-Hajj, al-Baqarah, an-Najm. The findings can be used as a supplement idea for the teachers or educators to attract students to enjoy learning mathematics as it relates to their religion and real-life situations.

Keywords:

Arithmetic Operations, Geometry, Measurement, Numbers, Quran

Introduction

Mathematics is needed in our daily lives whether in education, business, architecture, and many more. Moreover, mathematics is a compulsory subject that needs to be learned in school. Furthermore, Carl Friedrich Gauss (1777-1855) referred to mathematics as the queen of

science. However, many students perceive mathematics as not an easy subject and the least enjoyable and attractive subject in school. In mathematics education, D' Ambrosio (1985) defined mathematics as mathematics that is practiced among identifiable cultural groups such as labor groups, children of certain age brackets, national-tribe societies, professional classes, and many more where these identity cultural groups have the same or share similar experiences, practices, and interests. Other than D' Ambrosio, many researchers have defined their own definition of mathematics, for instance, Yadav (2017) concluded the exact definition of mathematics as the study of assumptions, properties, and applications.

Mathematical domains refer to specific sets or areas of mathematics that focus on particular types of subjects, structures, or functions such as algebra that deal with equations and symbols, while geometry focuses on the properties of shapes and spaces. On the other hand, mathematical concepts are fundamental ideas or principles in mathematics that help us understand and describe various phenomena. Mathematics concepts include things like numbers, equations, functions, and geometric shapes which provide the building blocks for mathematical reasoning and problem-solving.

Awan (2009) stated that knowledge of mathematics that is related to mathematical concepts can be extracted from the Quran such as the regulation of the lunar calendar, the regulation of the times of five daily prayers, the determination of sacred direction, the distribution of inheritance, and the geometry of Islamic decorative art. In Arabic, surah is a word that represents the chapter in the Quran. The surah has been revealed over 23 years and the total number of surahs in the Quran are 114 surahs. The surah in the Quran has been classified into several characteristic categories such as the place of revelation and its length (Hamidah et al., 2022). For the place of revelation, the surah has been classified into two categories that are Makkiah, in which the surah was revealed in Makkah in the first 13 years, and Madaniyah, in which the surah was revealed 10 years later in Medina. As for the length of the surah, it has been divided into four parts. The first part is *Assabu' thiawaal* which is seven long surahs. The second part is *al-Mi'un* which is the surah of more than a hundred verses. The next part is *al-Matsaani* which is a surah that is close to a hundred verses, and the last part is *al-Mufassal* which is the short surah.

Previous research conducted by Khairussyahidah (2020) investigates the angles found in prayer, the concept of straight lines and circles in prayer *saf*, the concept of equations in *wuduk*, the concept of pairing in the Quran, the number one and the divine concept, and the patterns and architecture of the mosque. Nihayati et al. (2022) investigated the integration of moral values with mathematical operations in the Quran and concluded that the concepts of addition, subtraction, multiplication, and division can be found in the Quran. Furthermore, Kusumastuti and Priatna (2020) said that storytelling had an effective influence on students' mathematics literacy skills. Hence, the stories of the Quran related to the mathematical domains and concepts may attract students to learn mathematics and influence their mathematics literacy skills.

In the present era of digital technology, we enjoy effortless access to a diverse array of assets, including information, data, books, translation of the Quran, and numerous other resources, all readily available online. However, to search for it without themes and knowing what we are searching for would make one lose in his exploration (Ishak et al., 2020). Abdussakir and Rosimanidar (2017) stated that many educators have problems in implementing the integration of mathematics and the Quran. Furthermore, educators are having problems in teaching

mathematics due to a lack of teaching materials and insufficient lesson hours (Sethi, 2021; Karali, 2022). Hence, some efforts are needed to clearly explain how the mathematical domain and concepts can be related to the mathematics language in the Quran. Thus, this study aims to explore the specific domain of mathematics namely numbers, arithmetic operations, geometry, and measurement that exist in the Quran which can be used as a supplement idea for teachers or educators to attract students to enjoy learning mathematics as it relates to their religion and real-life situation.

Literature Review

This section intends to provide a brief overview of previous research pertaining to the relation between mathematics and Quran. Nihayati et al. (2022) have done research that aims to show the integration of mathematics with moral values in the Quran. The results showed that operation addition can be found in Surah al-A'raf verse 142, Surah al-Kahfi verse 25, Surah al-Baqarah verse 196; subtraction in Surah al-Muzammil verses 3-4, Surah al-Ankabut verse 14; multiplication in Surah al-Baqarah verse 261; and division in Surah al-Anfal verses 65-66 Surah al-Hajj verse 47, Surah al-Ma'arij verse 4. The researchers concluded that the existence of moral values in the verses of the Quran related to the mathematics operations are morals to Allah such as *taqwa*, *taubat*, *khauf*, *raja'*, *tawakkal*; and individual morals are *istiqamah*, *mujahadah*, *syukur*, *sabar*.

Khairussyahidah (2020) has shown the application of ethnomathematics in Islam where the researcher investigates the angles found in the prayer, the concepts of straight lines and circles in prayer's *saf*, the concept of equity in steps of *wuduk*, the concept of pairing in the Quran, the relevance of number one and divine concept, and the patterns and architecture of the mosque. The relation between ethnomathematics and Islam brings teachers and students to a greater appreciation of the spiritual aspects of mathematics teaching. This ethnomathematics approach will make teaching and presenting mathematics more effective.

Research by Nuril Huda (2020) aimed to examine the verses of the Quran that contain geometry and measurement has revealed that the Quran contains 14 concepts of measurement which are six units of times, five units of weight, two units of area, and two units of length of distance. Meanwhile, the Quran also contains five concepts of geometry that are three concepts of line and two concepts of angle. Nuril Huda presents the result by using the storytelling method and explains the content of the verses using mathematical language. Kusumastuti and Priatna (2020) said that storytelling had an effective influence on students' mathematics literacy skills. Storytelling is a powerful tool that can be meaningful and lasting images to students (Goral & Gnadinger, 2006), and using stories also is yet another pedagogical tool to help students connect to the mathematics they need to learn (Kusumastuti & Priatna, 2020). Hence, this research can be used by educators as teaching material to enhance the students' understanding of mathematics which relates to real-life situations.

Methodology

This research uses an exploratory-qualitative research method to explore the availability of mathematical domains and concepts in the Quran through articles, journals, books, and Quran translations. There are three (3) steps involved in conducting the study.

Step 1: Explore the verses related to the mathematical domain.

The mathematical domains and concepts chosen are numbers, arithmetic operations, geometry, and measurement. For example, one of the verses that related to mathematical domain and concepts is from Surah Yasin verse 40 where it highlights the natural order and balance in the universe, emphasizing that neither the sun overtakes the moon nor does the night outstrip the day; they all follow precise orbits set by Allah. Then, scientists found that the moon travels in a curved line where it moves circularly and not in a straight line (Thayyarah, 2013). The idea of the line is that each celestial body has its own orbit. Similarly, the rotation of the Earth on its axis causes the alternation of day and night.

Step 2: Determine the mathematical concept of the selected verses.

Surah Yasin verse 40 falls under domain geometry with line concepts since the verse talks about the orbit of the sun and the moon where the orbit is in the form of a line. This verse also can be classified as a circle concept since NASA said that the moon is orbiting the earth in the form of a circle of the viewpoint above the North Pole.

Step 3: Develop an example of a mathematics problem using the mathematical concept of the verse.

From the shape of the orbit, which is a circle, students can learn about the properties of a circle which are radius, circumference, center, segment, sector, arc, chord, and diameter. An example of a mathematics problem that can be developed is what is the radius between the earth and the moon with the earth as the center?

Result And Discussion

The result and discussion of the mathematical domain and concepts with the related verses of the Quran are explained in this chapter. Domains found are numbers, arithmetic operations, geometry, and measurement.

Numbers

In the Quran, there are many verses that mention numbers but only 10 verses are chosen randomly. The examples of the verse are listed in Table 1 as follows:

Table 1: Example Of Numbers Used In The Quran Verses.

No.	Verse	Number
1	“It is He Who hath created for you all things that are on earth; Moreover, His design comprehended the heavens, for He gave order and perfection to the seven firmaments; and of all things He hath perfect knowledge.” (2:29)	7
2	“And remember We appointed forty nights for Moses, and in his absence ye took the calf (for worship), and ye did grievously wrong.” (2:51)	40
3	“...For parents, a sixth share of the inheritance to each, if the deceased left children; if no children, and the parents are the (only) heirs, the mother has a third ; if the deceased Left brothers (or sisters) the mother has a sixth ...” (4:11)	1/6 and 1/3
4	“They do blaspheme who say: Allah is one of three in a Trinity: for there is no god except One Allah. If they desist not from their word (of	3

	blasphemy), verily a grievous penalty will befall the blasphemers among them.” (5:73)	
5	“He that doeth good shall have ten times as much to his credit: He that doeth evil shall only be recompensed according to his evil: no wrong shall be done unto (any of) them.” (6:160)	10
6	“O Prophet! rouse the Believers to the fight. If there are twenty amongst you, patient and persevering, they will vanquish two hundred : if a hundred , they will vanquish a thousand of the Unbelievers: for these are a people without understanding.” (8:65)	20, 100, 200, and 1000
7	“So they stayed in their Cave three hundred years, and (some) add nine (more).” (18:25)	9 and 300
8	“He Who created the heavens and the earth and all that is between, in six days, and is firmly established on the Throne (of Authority): Allah Most Gracious: ask thou, then, about Him of any acquainted (with such things).” (25:59)	6
9	“He rules (all) affairs from the heavens to the earth: in the end will (all affairs) go up to Him, on a Day, the space whereof will be (as) a thousand years of your reckoning.” (32:5)	1000
10	“And We sent him (on a mission) to a hundred thousand (men) or more.” (37:147)	100,000

Table 1 shows that the verses related to the domain numbers used whole numbers and rational numbers. There is research regarding numbers where the researchers said that the integration of verses in the Quran related to numbers with Islamic values can be obtained (Nihayati et al., 2019). Other than that, there is various research pertaining to the miracle of numbers in the Quran. For instance, number 7 (Imran Ali, 2023; Hayati & Munir, 2020; Abdud Daim, 2008), and number 19 (Imran Ali, 2023; Rashid Khan, 2017; Nazari et al., 2013). Then, some of the whole numbers can be classified as prime numbers such as numbers 3 and 7. An example of a mathematics question regarding numbers is that, prove that the numbers 3 and 7 are the prime numbers.

Operations

Then, mathematical operations such as addition, subtraction, multiplication, and division are also found in the Quran.

Addition

Addition is a fundamental operation that combines two or more numbers to produce a sum or total. It involves the process of adding quantities together to find their collective values. One of the verses about addition is found in surah al-A'raf verse 142.

“We appointed for Moses thirty nights, and completed (the period) with ten (more): thus, was completed the term (of communion) with his Lord, forty nights. And Moses had charged his brother Aaron (before he went up): “Act for me amongst my people: Do right, and follow not the way of those who do mischief.”” (7:142)

The verse reveals that Allah SWT promised Moses by giving the Taurat book for 30 nights and completed the night with another 10 nights. This verse can be transformed into a mathematical sentence as follows:

$$30 \text{ nights} + 10 \text{ nights} = 40 \text{ nights}$$

Next, addition is also found in surah al-Baqarah verse 196 (2:196) where the verse is about someone who wishes to continue umrah or hajj, it is obligatory for them to perform a sacrifice if they are capable. However, if not, then they must fast for three days during the hajj and an additional seven days after returning.

“... if any one wishes to continue the 'umrah on to the hajj, He must make an offering, such as he can afford, but if he cannot afford it, He should fast three days during the hajj and seven days on his return, Making ten days in all. This is for those whose household is not in (the precincts of) the Sacred Mosque. And fear Allah, and know that Allah Is strict in punishment.” (2:196)

Below is the mathematical sentence that can be constructed from the verse (2:196):

$$\text{Total of days one needs to fast} = 3 \text{ days} + 7 \text{ days} = 10 \text{ days}$$

In total, they must fast for 10 days if they cannot afford to make the sacrifice in order to continue the umrah or hajj.

Subtraction

Subtraction involves taking away or deducting a number from another number where it is a process of finding the difference between two quantities. In the Quran, the concept of subtraction can be found in surah al-Ankabut verse 14.

“We (once) sent Noah to his people, and he tarried among them a thousand years less fifty: but the Deluge overwhelmed them while they (persisted in) sin.” (29:14)

Verse (29:14) is about Allah SWT sent Prophet Noah to live with his people for 1,000 years less 50 years. The verse also states that the flood eventually overtook Noah's people where this flood was a divine punishment sent by Allah as a consequence of their persistent wrongdoing and refusal to heed Noah's message. From the verse, a mathematical sentence with a subtraction concept can be constructed.

$$\text{Total of years Noah lives with his people} = 1,000 \text{ years} - 50 \text{ years} = 950 \text{ years}$$

Then, in Surah al-Anfal verses 65-66, the subtraction concept can be applied to find the difference in power between the Muslims and non-Muslims during the war.

“O Prophet! rouse the Believers to the fight. If there are twenty amongst you, patient and persevering, they will vanquish two hundred: if a hundred, they will vanquish a thousand of the Unbelievers: for these are a people without understanding.” (8:65)

“For the present, Allah hath lightened your (task), for He knoweth that there is a weak spot in you: But (even so), if there are a hundred of you, patient and persevering, they will vanquish

two hundred, and if a thousand, they will vanquish two thousand, with the leave of Allah: for Allah is with those who patiently persevere.” (8:66)

Below are the arithmetic equations with the subtraction concept:

$$\begin{aligned} 200 - 20 &= 180 \text{ soldiers} \\ 1000 - 100 &= 900 \text{ soldiers} \\ 200 - 100 &= 100 \text{ soldiers} \\ 2000 - 1000 &= 1000 \text{ soldiers} \end{aligned}$$

Based on the equations above, there is a huge gap in numbers between the two teams. However, Allah says that the glory will side with those who patiently persevere with the leave of Allah.

Multiplication

Multiplication involves combining two or more numbers to find a product. It is the process of repeated addition where a number, called the “multiplier” is added to itself a certain number of times, indicated by another number called the “multiplicand”. The result of the multiplication is called the “product”

“The parable of those who spend their substance in the way of Allah is that of a grain of corn: it groweth seven ears, and each ear Hath a hundred grains. Allah giveth manifold increase to whom He pleaseth: And Allah careth for all and He knoweth all things.” (Al-Baqarah (2):261)

In the Quran, there is a concept of reward and sin which is mentioned in the verse (2:261). The verse is about the reward for Muslims if they do a good deed such as almsgiving or donation. Even when they perform their prayers or fasting, they will also get rewards. The verse above can be converted into a mathematical sentence with multiplication concept as follows:

$$1 \text{ grain} \times 7 \text{ ears} \times 100 \text{ grains} = 700 \text{ grains}$$

From Ibn Abbas it is said that “*Dirham that was spend (infaq) in jihad and hajj will be doubled to 700 times*” and therefore, Allah says, “*Is similar to a grain that grows seven ears, each ears grows hundred grains*” (Setiawan, 2015). The Ibn Majah tells a hadith from Ali and Abu Darda’ which tells about the Rasulullah SAW that said “*Whoever spend their property in a good way, every dirham that was spend (infaq) will be 700 dirhams, and whoever goes to war, then spend (infaq) their property, thus every dirham will be 700 dirhams on the day of judgment,*” (Setiawan, 2015).

The mathematical sentence below is an example of rewards earned when someone is doing an almsgiving using the multiplication concept above. Ali plans to make a donation of RM 1, 000 to the Kasih Orphanage. Thus, how much reward will he earn from Allah in return? From the hadith above, it said that every dirham will be doubled to 700 dirhams. RM 1,000 convert to dirham will be 785.92 dirham (RM 1 = 0.79 dirham).

$$785.92 \text{ dirham} \times 7 \times 100 = 550,144 \text{ rewards}$$

Hence, Ali will get 550,144 rewards in return from his good deed.

Division

Division is a mathematical operation that involves splitting a quantity into equal parts or groups. While fraction is a mathematical representation of a part of a whole or a ratio between two quantities. However, fractions and division are interrelated because fractions can represent the results of division operations. Fractions express the division of quantities into parts or ratios; division operations can be represented as fractions.

In the Quran, the application of division can be found in the theme of the distribution of inheritance in surah an-Nisa' verses 11 and 12.

“Allah (thus) directs you as regards your Children's (Inheritance): to the male, a portion equal to that of two females: if only daughters, two or more, their share is two-thirds of the inheritance; if only one, her share is a half. For parents, a sixth share of the inheritance to each, if the deceased left children; if no children, and the parents are the (only) heirs, the mother has a third; if the deceased Left brothers (or sisters) the mother has a sixth. (The distribution in all cases ('s) after the payment of legacies and debts. Ye know not whether your parents or your children are nearest to you in benefit. These are settled portions ordained by Allah; and Allah is All-knowing, Al-wise.” (4:11)

“In what your wives leave, your share is a half, if they leave no child; but if they leave a child, ye get a fourth; after payment of legacies and debts. In what ye leave, their share is a fourth, if ye leave no child; but if ye leave a child, they get an eighth; after payment of legacies and debts. If the man or woman whose inheritance is in question, has left neither ascendants nor descendants, but has left a brother or a sister, each one of the two gets a sixth; but if more than two, they share in a third; after payment of legacies and debts; so that no loss is caused (to any one). Thus, is it ordained by Allah; and Allah is All-knowing, Most Forbearing.” (4:12)

Below is an example of the distribution of inheritance situations solved based on the verses in surah an-Nisa' (4:11-12) using an application at the e-Faraid website. Suppose that Aminah is a single parent. She has a son, two daughters, and her parents-in-law are still alive. The amount of RM 500,000 is to be distributed. How much will each of them receive?

Table 2: The Distribution of Inheritance of Aminah's Family

The Heir	Part		Total (RM)
Wife	1/8	12/96	62,500.00
Father	1/6	16/96	83,333.33
Mother	1/6	16/96	83,333.33
Son	Asobah (remaining)	26/96	135,416.67
Daughter 1	Asobah (remaining)	13/96	67,708.33
Daughter 2	Asobah (remaining)	13/96	67,708.33

From Table 2, Aminah gets 1/8 which is equal to RM 62,500, the parents-in-law get 1/6 each which is equal to RM 83,333.33 and the remaining is passed to the children where the son gets a share equal to two of the daughters.

Next, in the Surah an-Nisa' verse 176 is also about the distribution of inheritance called *kalalah*.

“They ask thee for a legal decision. Say: Allah directs (thus) about those who leave no descendants or ascendants as heirs. If it is a man that dies, leaving a sister but no child, she shall have half the inheritance: If (such a deceased was) a woman, who left no child, her brother takes her inheritance: If there are two sisters, they shall have two-thirds of the inheritance (between them): if there are brothers and sisters, (they share), the male having twice the share of the female. Thus, doth Allah make clear to you (His law), lest ye err. And Allah hath knowledge of all things.” (4:176)

Below is the example of the distribution of inheritance situation for *kalalah* solved based on the verse in surah an-Nisa' (176) using an application at the e-Faraid website. Suppose that Abu left his property to his brother and two of his sisters. The amount of RM 380,000 is to be distributed. How much will each of them receive?

Table 3: The Distribution of Inheritance of *Kalalah*

The Heir	Part	Total (RM)
Brother	2/4	190,000.00
Sister 1	1/4	95,000.00
Sister 2	1/4	95,000.00

From Table 3, Abu's brother received 2/4 which is equal to RM 190,000. While the remaining property is divided equally between two of his sisters.

Geometry

In geometry, the concept of angle was found in the Quran. The explanation of the concepts is given in the following sub-section.

Angle

In the Quran, qibla is one of the topics that has been talked about and it can be found in Surah al-Baqarah verse 144. Qibla is the direction that Muslims face during their prayers. It is the direction of the Kaabah, which is the sacred building located in the Masjid Al-Haram Mosque in Mecca, Saudi Arabia. The qibla serves as a focal point for Muslims around the world to align themselves while praying, symbolizing the unity of the Islamic community in worship. Determining the qibla direction is essential for Muslims to properly perform their prayers no matter where they are located on the Earth.

In finding the qibla, the concept of geometry and measurement is needed. Bearing is one of the topics that has been discussed under the geometry and measurement domain. Bearing is a navigational term that indicates the direction of one point with respect to another point, typically measured in degrees clockwise from a reference direction, such as north. Based on a previous study by Abdali (1997), below is the mathematical equation for the direction of qibla:

$$Z = \frac{\sin(L_a - L_b)}{[(\cos F_a \times \tan F_b) - (\sin F_a \cos(L_a - L_b))]} \quad (1)$$

Where:

Z = The direction of qibla

F_a = Latitude of the desired location

L_a = Longitude of the desired location

F_b = Latitude of Mecca (21.4225° north)

L_b = Longitude of Mecca (39.8262° east)

Below is an example of finding the direction of qibla using the equation (1).

Example: Find the direction of the qibla of location Universiti Teknologi MARA (UiTM) Shah Alam (3.0698° North, 101.5037° East)

Answer:

$$Z = \frac{\sin \sin (101.5037^\circ - 39.8262^\circ)}{[(\cos 3.0698^\circ \times \tan 21.4225^\circ) - (\sin 3.0698^\circ (\cos (101.5037^\circ - 39.8262^\circ)))]}$$

$$Z = [0.8803 \div (0.3918 - 0.02541)]$$

$$Z = 67.4^\circ \text{ West of North or } 292.6^\circ \text{ North}$$

Based on the answer above, the direction of qibla of location Universiti Teknologi MARA (UiTM) Shah Alam is 67.4° West of North or 292.6° North.

Measurement

There are three concepts found under domain measurement which are day, time, distance or length. The description is as follows.

Day

In Surah al-Kahfi, it has four stories that have good lessons to learn. The stories are (1) the people of the cave, (2) the owner of the two gardens, (3) Messenger Musa and al-Khadir, and (4) the story of the King Dhul-Qarnayn. Here, the story of the people of the cave are discussed. The story is about a group of young men who sought refuge in a cave to escape religious persecution. Then, they fell asleep and were miraculously preserved by Allah SWT for 300 years (Syamsiah calendar) or and 309 years (Qamariyah calendar). Below is the verse about the people of the cave.

“So they stayed in their Cave three hundred years, and (some) add nine (more)” (al-Kahfi (18):25)

The duration mentioned in the verse is in the Syamsiah calendar and Qamariah calendar. The Syamsiah calendar or also known as Solar or Gregorian calendar is based on the rotation of the earth around the sun. It takes a year or 365.242191 for the earth to complete an orbit around the sun. The Qamariyah calendar also known as the Lunar calendar uses the moon that is rotating around the earth as the main reference. The rotation period of the moon is known as month which is 29.530589 days and the period for a year is 354.367068 days. Surah Yunus verse 5, highlights the creation of the sun and the moon as resources of light and the regulation of movement, which allows humans to measure time and reckon years.

“It is He Who made the sun to be a shining glory and the moon to be a light (of beauty), and measured out stages for her; that ye might know the number of years and the count (of time).

Nowise did Allah create this but in truth and righteousness. (Thus) doth He explain His Signs in detail, for those who understand.” (Yunus (10):5)

From the verses (al-Kahfi (18):25) and (Yunus (10):5), below is the mathematical sentences that can be constructed:

The difference of days between the calendars:

$$\begin{aligned} &\text{Syamsiah calendar} - \text{Qamariah calendar} \\ &365 - 354 = 11 \text{ days} \end{aligned}$$

Conversion from Syamsiah to Qamariah calendar:

$$(300 \times 365) / 354 = 309.32 = 309 \text{ days}$$

Time

The concepts of "world" and "hereafter" often have different connotations in different religious, philosophical, and cultural contexts. In the context of the world or physical reality, time is typically understood as the sequential progression of events from the past, through the present, and into the future. It's a linear concept that we use to measure and organize the duration and order of events in our everyday lives. The concept of time in the hereafter or afterlife can vary significantly based on religious beliefs and philosophical viewpoints. In many religious traditions, the afterlife is considered to be a realm that exists beyond the physical world, where individuals' souls or consciousness continue to exist after death. The nature of time in the hereafter is often thought to be different from the linear time we experience in the world.

In the Quran, surah al-Hajj verse, 47 emphasizes that Allah's promise is certain and that He will fulfil it in His own time. The concept of a day with God being equivalent to a thousand years of human counting underscores the idea that time and its perception are different in the divine context.

“Yet they ask thee to hasten on the Punishment! But Allah will not fail in His Promise. Verily a Day in the sight of thy Lord is like a thousand years of your reckoning.” (al-Hajj (22):47)

Based on the verse above, 1,000 years in the world is equal to one day in the hereafter. Here is an example of a situation that can be solved using the verse's information. If a person with an age of 24 years old is in the world, what is the estimated length of time as compared to the hereafter?

$$24 \div 1000 \times 24 \text{ hours} = 0.576 \text{ hours}$$

There is a multiplication of 24 hours because one day is equivalent to 24 hours. The answer above can also be changed to minutes by multiplying with 60. Then, the answer is, that 24 years in this world is like 0.576 hours or 34.56 minutes in the hereafter.

Distance/Length

Distance or length refers to the extent of space or the gap between two points, objects, or locations. It is a measurement that indicates how far apart two entities are from each other in

terms of physical space. One of the verses in the Quran that can be related to distance is in the surah al-Baqarah verse 158. This verse pertains to the pilgrimage rituals of hajj and umrah in Islam called *Saie*. *Saie* is an Arabic term that refers to the act of walking or moving back and forth for seven laps between the hills of Safa and Marwah during the pilgrimage rituals of hajj and umrah in Islam. Safa and Marwah are two small hills located near the Kaaba in Mecca.

“Behold! Safa and Marwa are among the Symbols of Allah. So, if those who visit the House in the Season or at other times, should compass them round, it is no sin in them. And, if any one obeyeth his own impulse to good, - be sure that Allah is He Who recogniseth and knoweth.” (al-Baqarah (2):158)

The distance between Safa and Marwah is approximately 450 meters and for seven laps back and forth, the calculation is as follows:

$$7 \times 450 \text{ meters} = 3,150 \text{ meters}$$

The total distance that Muslims will travel from Safa to Marwah is 3,150 meters or can be divided by 1,000 to convert to kilometer unit where it will equal to 3.15 kilometers (1 kilometer = 1,000 meters).

“And was at a distance of but two bow-lengths or (even) nearer;” (an-Najm (53):9)

Another verse that relates to distance or length is from surah An-Najm verse 9 (53:9). In the verse, it said that once Gabriel emerged at the highest point of the sky, he proceeded towards the Prophet Muhammad (peace be upon him), eventually reaching a point where he hovered directly above him in mid-air. Then, he inclined toward the Prophet and approached to a distance as close as two bow lengths, if not even closer. The gap separating Gabriel and Prophet Muhammad during their encounter was likened to the span between two extended arrowheads. According to Tafsir Ibn Kathir (2003), this span is equated to two cubits, akin to the endpoints of an arrow, as conveyed through Ibn Wahb's narration by Ibn Jarir and Ibn Abu Hatim. While the exact length of the bow isn't explicitly defined mathematically, it's constructed in terms of cubits, with 1 cubit approximately measuring 45 centimeters. Hence, the length of Prophet Muhammad and Gabriel is calculated below:

$$2 \times 45 \text{ centimeters} = 90 \text{ centimeters}$$

Conclusion

Based on the results and discussion, the use of mathematical domains and concepts can be found in the Quran. Mathematical domains found are numbers, arithmetic operations, geometry, and measurement. Meanwhile, mathematical concepts found are addition, subtraction, multiplication, division, angle, day, time, and distance or length. Table 4 below is the summarization of the findings in the previous section.

Table 4: Results of the Findings

No.	Domain	Concept	Surah and Verse
1	Numbers	Numbers	Al-Baqarah (2:29) Al-Baqarah (2:51) An-Nisa' (4:11) Al-Ma'idah (5:73) Al-An'am (6:160) Al-Anfal (8:65) Al-Furqan (25:59) As-Sajdah (32:5) As-Saffat (37:147)
2	Arithmetic Operations	Addition	Al-A'raf (7:142) Al-Baqarah (2:196)
		Subtraction	Al-'Ankabut (29:14) Al-Anfal (8:65-66)
		Multiplication	Al-Baqarah (2:261)
		Division	An-Nisa' (4:11-12) An-Nisa' (4:176)
3	Geometry measurement	Angle	Al-Baqarah (2:144)
4		Day	Al-Kahf (18:25) Yunus (10:4)
		Time	Al-Hajj (22:47)
		Distance/Length	Al-Baqarah (2:158) An-Najm (53:9)

This result can be used by educators as teaching materials and the students will get to know more content in the Quran while learning mathematics. For further research, it is recommended to explore other mathematical domains such as mathematical logic and algebra. Other than that, future research also can relate the content in the Quran with other subjects such as science.

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