



| Research Article / Araştırma Makalesi |

The Effect of Writing to Learn Activities on 5th Grade Students' Academic Achievement on Triangles and Quadrilaterals and Students' Opinions¹

Öğrenme Amaçlı Yazma Aktivitelerinin 5. Sınıf Öğrencilerinin Üçgenler ve Dörtgenler Konusunda Akademik Başarılarına Etkisinin ve Öğrenci Görüşlerinin İncelenmesi

Medine ASLAN², Ferhat ÖZTÜRK³

Keywords

1. Writing to learn
2. Diary writing activity
3. Letter writing activity
4. Triangles and quadrilaterals

Anahtar Kelimeler

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Abstract

Purpose: The purpose of this study is to examine the effect of diary and letter writing activities, which are writing to learn activities, on the academic achievement of 5th grade students in the subject of triangles and quadrilaterals and to examine students' opinions about the activities.

Methodology: An explanatory design from mixed research methods was used in the study. The sample of the study consisted of a total of 96 students studying in the 5th grade of a public school in Şanlıurfa city center. One of these classes was randomly selected as the control group and three as the experimental group. The data collection tools of the study consisted of an academic achievement test and a semi-structured interview form. Since the data obtained from the academic achievement test conformed to the normal distribution, ANOVA was used to analyze these data. Content analysis method was used to analyze the data obtained from semi-structured interview forms.

Findings: According to the findings obtained from the academic achievement test, it was determined that diary and letter writing activities increased academic achievement. However, no difference was found between diary and letter writing activities in terms of academic achievement. According to the findings obtained from the semi-structured interview form, it was determined that diary and letter writing activities have positive features such as understanding the subject, repetition and permanent learning, as well as some difficulties based on students' written expression skills.

Highlights: In line with the results obtained from the study, it is concluded that journal and letter writing, which are writing to learn activities, can increase academic achievement in mathematics courses and provide teachers with important opportunities to assess students' learning by identifying their comprehension and misconceptions and to provide feedback to them.

Öz

Çalışmanın amacı: Bu araştırmanın amacı öğrenme amaçlı yazma aktivitelerinden günlük ve mektup yazma aktivitelerinin, 5. sınıf öğrencilerinin üçgenler ve dörtgenler konusunda akademik başarılarına etkisinin ve aktivitelere yönelik öğrenci görüşlerinin incelenmesidir.

Yöntem: Araştırmada karma araştırma yöntemlerinden açıklayıcı desen kullanılmıştır. Araştırmanın örneklemini Şanlıurfa il merkezindeki bir devlet okulunun 5. sınıflarında öğrenim gören toplam 96 öğrenci oluşturmaktadır. Bu sınıflardan birisi kontrol ve üçü deney grubu olarak rastgele belirlenmiştir. Araştırmanın veri toplama araçlarını akademik başarı testi ve yarı yapılandırılmış görüşme formu oluşturmaktadır. Akademik başarı testinden elde edilen veriler normal dağılıma uygun olduğundan bu verilerin analizinde ANOVA kullanılmıştır. Yarı yapılandırılmış görüşme formlarından elde edilen verilerin analizinde ise içerik analizi yönteminden faydalanılmıştır.

Bulgular: Akademik başarı testinden elde edilen bulgulara göre günlük ve mektup yazmanın akademik başarıyı artırdığı belirlenmiştir. Ancak günlük ve mektup yazma aktiviteleri arasında akademik başarı yönünden herhangi bir fark bulunamamıştır. Yarı yapılandırılmış görüşme formundan elde edilen bulgulara göre ise günlük ve mektup yazma aktivitelerinin konuyu anlamayı, tekrar yapmayı ve kalıcı öğrenmeyi sağladığı gibi olumlu özelliklerinin yanı sıra öğrencilerin yazılı ifade becerilerine dayalı bazı zorluklarının olduğu tespit edilmiştir.

Önemli Vurgular: Araştırmadan elde edilen sonuçlar doğrultusunda, öğrenme amaçlı yazma aktivitelerinden günlük ve mektup yazmanın matematik derslerinde akademik başarıyı arttırabileceği ve öğrencilerin kavrayışlarını ve kavram yanlışlarını belirleyerek öğrenmelerini değerlendirmede ve onlara geri dönüt sağlamada öğretmenlere önemli fırsatlar sunacağı değerlendirilmektedir.

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² Şanlıurfa Provincial Directorate of National Education, Prof. Dr. Necmettin Erbakan İmam Hatip Middle School, Şanlıurfa, Türkiye; <https://orcid.org/0000-0002-6480-0950>

³ Corresponding Author, Kırıkkale University, Faculty of Education, Department of Mathematics and Science Education, Kırıkkale, Türkiye; <https://orcid.org/0000-0003-2849-8325>

INTRODUCTION

In developed countries, education continues in a flexible structure that is open to innovations and change, and it is considered that knowledge should be used in experiences rather than memorizing and learning in schools. In this context, the principle of learning by doing and experiencing, which is one of the leading contemporary educational approaches, also manifests itself in the act of writing. Thanks to writing, students can organize and realize their own knowledge by concretizing what is in their minds and thinking more slowly (Kartalci, 2018). Because thoughts are developed and processed in the process (Emig, 1977). Therefore, if students are encouraged to develop their ideas about writing, their conceptual understanding will improve (Shield & Galbraith, 1998). As a matter of fact, writing is considered as a unique form of learning because it has different learning strategies both as a process and as a result, and it is emphasized that the aspect of structuring knowledge is strong. In this context, the fact that writing is an activity with benefits such as repetition, revealing learning, reshaping, explaining, establishing cause and effect relationships, and reasoning has made writing important (Mason & Boscolo, 2000). In addition, writing also strengthens the communication between the student and the teacher. Even if the student who wants to meet with the teacher cannot have this opportunity at school, he/she has the opportunity to communicate about the lesson, what he/she has learnt or not learnt through writing (Miller, 1991). Writing, which is a sub-skill of communication, enables students to interpret their own learning and learn meaningfully by giving them the opportunity to think (Rivard & Straw, 2000). In addition, writing about a concept helps students to realize their own knowledge (Bicer, Capraro & Capraro, 2013). By writing, students can change their feelings about their own learning, realize the topics they understand and do not understand, gain perspective with the work of their friends, expand the topics they understand and make connections with previous topics (Braun, 2014), and consciously transfer these thoughts to the other party.

One of the most effective ways that writing serves learning is writing to learn activities (Kasa, 2009). Writing to learn contributes to increasing the retention of information and associating previous knowledge with new ones (Raquid & Litao, 2023; Rivard & Straw, 2000; Van Dijk, Van Gelderen & Kuiken, 2022) and learning difficult concepts (Hohenshell, Hand & Staker, 2004; Van Dijk et al, 2022). In addition, writing to learn is also effective in structuring information easily, concretizing abstract concepts and making learning permanent (Ay, 2018).

The role of the teacher as the conductor of writing to learn activities in the classroom is important. The teacher should decide how to structure which activity in the classroom and for what purpose. Prain and Hand (1996) put forward a model to guide teachers in this regard. According to this model, writing activities for learning consist of five components: topic, activity, purpose, addressee and text production method. Firstly, it should be decided on which topic to write on. Then it should be determined which activity will be more appropriate. In this sense, although traditional writing activities such as summarizing and note-taking are mostly used in schools, writing to learn activities such as stories, letters, brochures, diaries, diagrams, poems and posters should be used more. After deciding on a suitable writing activity, the purpose should be determined. Depending on the purpose of writing, the activity can be applied at the beginning of the lesson, during the lesson or after the lesson. While applying it at the beginning of the lesson is done to determine readiness, applying it during the lesson serves the purpose of reinforcing the learnt information. After the lesson, on the other hand, it can be done to evaluate learning, transfer knowledge to new situations and persuade someone. Another component is the addressee. In other words, it is necessary to consider to whom the text will be addressed. The last component is the text production method. In other words, the act of writing can be done collaboratively with the group or individually.

Writing to learn activities used in education have been categorized in different ways in many studies. Wills (1993) grouped writing to learn activities according to the purpose of writing in three ways: reflective or meaningful writing (diary writing, story writing, problem solving, definitions, future writing, review writing, summaries, letter writing), informative formal writing, creative writing. Burns (2004) categorized writing for learning activities into four groups: keeping a diary, writing about mathematical problems, explaining mathematical ideas and writing about the learning process. Uğurel, Tekin, and Morali (2009), without making a specific classification, listed the preferred writing activities in mathematics education as meaningful writing, formal writing for communication, poetic writing, diary writing, informative writing, stimulating writing, stimulating improvisation, e-mail diaries, mathematical biographies, letter writing, summarizing writing, article writing, rewriting, warm-up writing, problem solving, reflective writing, learning logs, creative writing, informal writing and formal writing. In this study, diary and letter writing activities among writing to learn activities are discussed.

Journal writing is an educational tool based on students' writing to learn and can be defined as a type of writing in which students write about their feelings, thoughts and learning throughout the process without following formal writing rules (Lynch, 2003). Diaries reflect students' thoughts on some topics and concepts under the guidance of teachers (Ho, 2019; Ishii, 2003). Wills (1993) states that students who have not done writing to learn before can start with a diary and that diaries can be written for different reasons such as providing information exchange between teachers and students and personalizing learning. Journal writing, one of the most widely used writing activities (Borasi & Rose, 1989), provides students with the opportunity to become aware of their own learning while transferring what they have learnt (Ediger, 2006). Therefore, students can both have information about their own learning and have the opportunity to repeat the lesson that day. On the other hand, when students check their diaries for the past, they can realize their own progress. Thus, by giving students the opportunity to evaluate their own learning, it enables students to take personal responsibility and to be aware of what and how they learn (Crawford, 2005). In addition, while journal writing provides students with the opportunity to learn, it also provides teachers with the opportunity to access information about the student and establish a good dialogue (Hiemstra, 2001).

Letter writing activity is when a student writes a letter to a younger person, teacher or peer (Carpenter, 2012). Letter writing, which aims to make an explanation, is thought to provide conceptual understanding and reconstruction of information by preventing the repetition of information without understanding (Hohensel, Hand & Staker, 2004). Students need to get down to the level of the addressee in order for the addressee to understand. Thus, they need to perform some cognitive activities while thinking about the way of expression. These cognitive activities can be expressed as recalling, reinterpreting and structuring existing knowledge, and the whole of these activities provides learning (Galbright, 1999). One of the most typical examples of letter writing is when a student writes a letter to a peer (real or imaginary) who is not in the classroom in order to explain a certain concept, summarize a lesson or unit, or explain a lesson that was missed (Enyart & Van Zoest, 1998).

Writing to learn activities, which are included in the curricula of many countries, have not yet been sufficiently addressed in mathematics education in Turkey. In terms of developing scientific literacy, which is one of the objectives targeted in education systems, and providing meaningful learning, writing to learn is an area waiting to be explored (Günel, 2009). The importance of writing to learn activities in terms of increasing student success, providing students with the opportunity to express themselves, and contributing positively to learning and teaching is better understood day by day (Biber, 2012; Öztürk, Öztürk & Işık; 2016). In Turkey, studies on writing to learn activities are concentrated especially in the field of science teaching and similar studies should be increased in the field of mathematics teaching (Akkuş & Darendeli, 2020). However, there are a limited number of studies examining the effects of writing to learn activities on mathematics achievement (Çontay, 2012; Çontay & Duatepe-Paksu, 2018; Kasa, 2009; Yıldırım, 2016; Yılmaz, 2014). In addition, the fact that there is no study on writing to learn activities on triangles and quadrilaterals and the fact that writing to learn activities that provide conceptual understanding can contribute to the teaching of triangles and quadrilaterals and increase academic achievement has made it important to conduct a study on this subject. In this context, the aim of the study is to examine the effect of diary and letter writing activities, which are among the activities of writing to learn, on the academic achievement of 5th grade students in the subject of triangles and quadrilaterals and to examine student opinions about the activities. In this context, answers to the following problems were sought in the research:

1. Is there a significant difference between the academic achievement of 5th grade students in the groups in which diary and letter writing activities were used together, only diary writing activity was used, only letter writing activity was used and no writing activity was used for any learning purpose?
2. How are the opinions of the 5th grade students in the groups where diary writing, letter writing and both activities were used together about the writing to learn activities?

METHOD

Research Design

Explanatory design, one of the mixed research methods, was used in the study. In explanatory design, quantitative data are collected first and then qualitative data are collected (Baki & Gökçek, 2012). The quantitative part of the study was designed with a quasi-experimental design using a pretest-posttest control group model. In accordance with this model, three classes were determined as the experimental group and one class as the control group and a total of four groups were formed. The research model is summarized in Table 1.

Table 1. Research model

Groups	Pre-Test	Writing Activity	Final Test	Interview
First Experimental Group	Preliminary Knowledge Test	Diary and Letter Writing	Academic Achievement Test	Semi-structured Interview
Second Experimental Group	Preliminary Knowledge Test	Diary Writing	Academic Achievement Test	Semi-structured Interview
Third Experimental Group	Preliminary Knowledge Test	Letter Writing	Academic Achievement Test	Semi-structured Interview
Control Group	Preliminary Knowledge Test	-	Academic Achievement Test	-

Sample

The sample of the study consisted of a total of 96 students studying in the 5th grade of a state secondary school in Şanlıurfa city center. Four branches were randomly selected among the 5th grade classes in the secondary school where the study was conducted, and 1 control and 3 experimental groups were randomly selected among these classes. There were 23 male students in the experimental group in which letter and diary writing activities were performed together and this group was coded as LDG, 25 male students in the experimental group in which only diary writing activity was performed and this group was coded as DG, and 25 male students in the experimental group in which only letter writing activity was performed and this group was coded as LG. In the control group, there were 23 male students and this group was coded as CG. Since the school was an Imam Hatip Secondary School, all of the students were male. All students participated in the study voluntarily. Necessary permissions were obtained from official institutions for the study.

In determining the control and experimental groups, the statistical results of the preliminary knowledge test (PKT) scores of the groups were taken into consideration. The PKT was formed by taking into account the 5th grade first semester acquisitions of the students and consisted of 16 multiple-choice questions appropriate to the level of the students. This test was prepared by the researcher by selecting the questions from the achievement tests published by Ministry of National Education (MNE) and the questions that appeared in the central exams held by MNE in the past years. In the process of preparing the test, the opinions of two mathematics teachers working in secondary schools affiliated to MNE and an expert in mathematics education were taken. In the expert opinions, attention was paid to the fact that the questions in the test included all the topics in the first semester of the 5th grade, were appropriate for the level of the students, and the time given to the students to solve the questions was appropriate. The prepared SCT was administered one week before the implementation process of the study. In this direction, the results of the normality test analysis according to the PKT scores of the control and experimental groups were $p > 0.05$ for LDG ($p = 0.163$), DG ($p = 0.305$), LG ($p = 0.282$) and CG ($p = 0.076$) and since they showed normal distribution and the assumption of homogeneity of variances was met, One-Way Analysis of Variance (ANOVA) was used to determine whether there was a significant difference between the groups in the pre-knowledge test. The significance value calculated as a result of ANOVA was $p > 0.05$ and no significant difference was found between the pre-knowledge test scores of the control and experimental groups ($F(3, 92) = 2.330$; $p = 0.079$). Therefore, since the groups were equivalent in terms of achievement, the control and experimental groups were randomly determined.

On the other hand, semi-structured interviews were conducted with 6 students from the LDG, 5 students from the DG and 7 students from the LG who performed the activities regularly. The students in the LDG with whom semi-structured interviews were conducted were coded as LD₁, LD₂, LD₃, LD₄, LD₅, LD₆, the students in the DG were coded as D₁, D₂, D₃, D₄, D₅ and the students in the LG were coded as L₁, L₂, L₃, L₄, L₅, L₆, L₇.

Data Collection Tools

The quantitative data collection tool of the study is academic achievement test and the qualitative data collection tool is a semi-structured interview form.

Academic Achievement Test (AAT)

In the study, the AAT consisting of 16 multiple-choice questions about triangles and quadrilaterals was applied as a post-test. The questions in the test were prepared in line with the subject acquisitions of triangles and quadrilaterals in the mathematics curriculum and were selected from the questions in the central exams held by the MNE in previous years. In the process of preparing the test, the opinions of two mathematics teachers working in secondary schools affiliated to the MNE and an expert lecturer in mathematics education were taken. In order to ensure the content validity of the AAT, four questions were prepared from each learning outcome. In addition, the KR-20 reliability coefficient of the AAT was found to be 0.853. The reliability coefficient of 0.853 indicates that the reliability of the test is quite high (Johnson & Christensen, 2014). The distribution of the questions in the AAT according to the objectives is given in Table 2.

Table 2. Distribution of the questions in the AAT according to the objectives

Learning Outcome	Question Number
M.5.2.2.1 Names, forms and recognizes the basic elements of polygons.	1, 2, 3, 4
M.5.2.2.2 Construct triangles according to their angles and sides, classify different triangles according to their side and angle properties.	9, 10, 11, 12
M.5.2.2.3 Determines and draws the basic elements of rectangle, parallelogram, rhombus and trapezoid.	5, 6, 7, 8
M.5.2.2.4 Determines the sum of the measures of the interior angles of triangles and quadrilaterals and finds the angle not given.	13, 14, 15, 16

In order for the scoring to be reliable, an answer key was created before the implementation of the AAT and it was decided how the scoring would be done. In this direction, each correct answer is evaluated as 1 point, incorrect and blank answers are evaluated as 0 points and the maximum score that can be obtained from the test is 16 points.

Semi-structured Interview Form

In the study, a semi-structured interview form was used to determine the students' thoughts about the diary and letter writing activities. The questions in the interview form were prepared by the researchers in line with the relevant literature. Pilot application was made with the questions and since it was seen that similar answers were given to some questions; the questions were edited. In addition, the opinion of an expert in the field of mathematics education who has previous experience in preparing interview forms was taken during the process of creating the interview form. In line with the expert opinion, since it was stated that some questions contained guidance and similar answers were given to some questions as a result of the pilot study, the relevant questions in the interview form were revised and some questions were removed from the interview form. During the interviews, the students' consent was obtained and audio recordings were made to be analyzed later.

Data Collection Process

One week before the beginning of the study, a pre-test was applied to all groups to determine whether there was a significant difference between the groups in terms of achievement, and since there was no significant difference between the groups, the control and experimental groups were randomly selected. During the study, the subject of triangles and quadrilaterals in the

control and experimental groups was taught by the same teacher for three weeks in the same way within the curriculum. Each group received a total of 15 hours of instruction, 5 hours per week in the form of 2+2+1. The control and experimental groups were given the same activities in and out of the lesson, but the experimental groups were additionally given related learning-oriented writing activities as homework. In this direction, diary writing instructions were given to the DG and explained with examples, and at the end of each lesson, the diary writing activity was done as homework. The LG was given instructions on letter writing, explained with examples, and at the end of the week, letter writing activity was assigned as homework. Similarly, diary writing and letter writing instructions were given to the LDG, explained with examples, and diary writing activities at the end of each lesson and letter writing activities at the end of the week were done as homework. A total of 9 diaries were written by the students in the groups where the diary writing activity was performed, and a total of 3 letters were written by the students in the groups where the letter writing activity was performed. Examples of diaries and letters written by the students are included in the Appendix. At the end of the application, AAT was applied as a post-test. Finally, semi-structured interviews were conducted separately with 18 students in the experimental groups using the interview forms prepared in advance.

Data Analysis

In the study, SPSS 23 programme was used to analyze the quantitative data obtained from AAT. In order to decide which analysis method to use for the data in the AAT, the normality distributions of the control and experimental groups were examined first. In this direction, since the results of the normality test analysis according to the AAT scores of the control and experimental groups; $p > 0.05$ for LDG ($p = 0.075$), DG ($p = 0.133$), LG ($p = 0.114$) and CG ($p = 0.146$) showed a normal distribution and according to the Levene's Test result ($p = 0.300$) $p > 0.05$ and the assumption of homogeneity of variances was met, ANOVA was used to determine whether there was a significant difference between the groups in the academic achievement test. LSD test, one of the multiple comparison tests, was used to determine which group was in favor of the significant difference.

In the study, content analysis method was used to analyze the qualitative data obtained from semi-structured interviews conducted to determine the students' thoughts about the diary and letter writing activities. Content analysis is a process that starts with data collection and ends with category and code extraction, and the interpretation and synthesis of data is done by researchers (McMillan & Schumacher, 2010). In content analysis, similar data are brought together within the framework of certain concepts and themes and interpreted by organizing them in a way that the reader can understand (Yıldırım & Şimşek, 2011). The data obtained from the interviews were analyzed by content analysis and firstly codes and then categories were formed by bringing together similar codes, if any. This code and categorization process was repeated at different times in order to obtain accurate and reliable findings. While creating codes and categories, data considered to be outside the scope of the study were not taken into consideration. In order to make these codes and categories understandable, they are presented in tables in the findings section and explained.

FINDINGS

In this section, the findings obtained as a result of the analysis of the data collected to answer the sub-problems of the research are presented. The findings are presented separately in line with the sub-problems of the research, as the findings obtained from the AAT scores and the findings obtained from the interviews.

Results obtained from AAT Scores

In this section, the findings obtained for the sub-problem "Is there a significant difference between the academic achievement of 5th grade students in the groups in which diary and letter writing activities were used together, only diary writing activity was used, only letter writing activity was used and no writing activity was used for any learning purpose?" are presented.

The descriptive statistics of the AAT scores of the control and experimental groups are given in Table 3.

Table 3. Descriptive statistics obtained from AAT scores

Group	N	X	sd
LDG	23	8.13	3.334
DG	25	8.00	2.972
LG	25	8.52	2.632
CG	23	5.70	1.941

According to Table 3, the group with the highest mean was LG ($X = 8.52$) and the group with the lowest mean was CG ($X = 5.70$).

The ANOVA results to determine whether there is a significant difference between the AAT scores of the control and experimental groups are given in Table 4.

Table 4. ANOVA results for AAT scores

	Sum of Squares	df	Mean Squares	F	p	Significant Difference
Between groups	115.021	3	38.340	4.998	0.003	LDG*-CG
In-group	705.718	92	7.671			DG*-CG
Total	820.740	95				LG*-CG

*: Indicates the group in favor of the significant difference.

When Table 4 is examined; since the significance value calculated as a result of ANOVA is $p < 0.05$, there is a significant difference between the AAT scores of the experimental and control groups ($F(3, 92) = 4.998$; $p = 0.003$). LSD test, one of the multiple comparison tests, was performed to determine which group was in favor of the significant difference. According to the LSD test results, a significant difference was found between LDG and CG in favor of LDG ($p = 0.004$), between DG and CG in favor of DG ($p = 0.005$) and between LG and CG in favor of LG ($p = 0.001$). In addition, the effect size value was calculated as 0.14. According to Green and Salkind (2014), 0.14 is interpreted as a large effect size.

Findings from the Interviews

In this section, the findings obtained for the sub-problem "How are the opinions of the 5th grade students in the groups in which diary writing, letter writing and both activities were used together about the writing to learn activities they used?" are presented.

The students in the LG and LDG who used the letter writing activity were asked the question "Can you explain how the letter writing activity affected you?" and the findings of the answers given by the students to this question are given in Table 5.

Table 5. Effects of letter writing activity

Code	Student	Frequency
Understanding the topic	L ₄ , L ₅ , L ₆ , LD ₁ , LD ₄ , LD ₅ , LD ₆	7
Do not repeat	L ₁ , L ₂ , L ₅ , L ₇ , LD ₄	5
Helping others	L ₂ , LD ₂	2
Attention enhancement	LD ₃	1
Permanent learning	LD ₅	1
Transferring emotions	L ₃	1

When Table 5, which includes students' opinions on the effects of letter writing activity, is analyzed, it is seen that 7 students stated that letter writing helped them to understand the subject, 5 students stated that it helped them to repeat the subjects, 2 students stated that it helped them to cooperate and 1 student each stated that it helped them to increase attention, permanent learning, to write well and to convey their feelings.

The students coded L₅ and LD₅, who stated that the letter writing activity contributed to understanding the subject, expressed these thoughts;

It opened my mind, so I could understand the subjects better (L₅)

It made me understand the lessons better (LD₅)

The students expressed their opinions about the letter writing activity providing subject repetition. The students coded L₁ and L₇ expressed their opinions about the letter writing activity providing subject repetition;

Repetition of the topic (L₁)

It was a repetition of the course topics (L₇)

L₂ coded student expressed his/her opinion that letter writing activity provides cooperation;

It felt like helping someone (L₂)

expressed with the sentence. The student coded LD₃ stated that the letter writing activity increased attention;

I was listening more attentively to the lecture so I could write the letter (LD₃)

The student stated in the form of. LD₅ coded student;

Writing down the information I remembered made it more permanent (LD₅)

drew attention to the fact that letter writing activity provided permanence in the subjects. The student coded as L₃ stated that the letter writing activity enabled the transfer of emotions;

It was like writing my inner thoughts on a piece of paper, transferring my inner feelings (L₃)

with the statement of his opinion.

The students in the LG and LDG who used the letter writing activity were asked the question "Did you encounter any difficulties in the letter writing activity? If so, what are these difficulties?" and the findings of the answers given by the students to this question are presented in Table 6.

Table 6. Difficulties of the letter writing activity

Code	Student	Frequency
Inability to remember the topic	L ₁ , L ₂ , L ₃ , L ₅ , L ₆ , L ₇	6
Inability to express oneself	LD ₄	1
Compliance with spelling rules	LD ₂	1
Did not meet	L ₄ , LD ₁ , LD ₃ , LD ₅ , LD ₆	5

Table 6 shows that 8 students stated that they encountered various difficulties in the letter writing activity, while 5 students stated that they did not encounter any difficulties.

Students coded L₆ and L₇ had difficulty in remembering the subject while writing a letter;

I came across my teacher because it was difficult to think. Sometimes I couldn't remember, I was looking from the notebook (L₆)

I forgot topics. I had to look at the notebook. Sometimes I remembered that I wrote incompletely and corrected it (L₇) expressed with these words. LD₄ coded student stated that he had difficulty in expressing himself;

For example, I couldn't find exactly how to express it and I was thinking about it a lot (LD₄)

While the student with the code LD₂ explained that he had difficulty in complying with the spelling rules;

I had some difficulty in punctuation (LD₂)

in the form of "I did not encounter any difficulties in the letter writing activity". On the other hand, students coded L₄ and LD₅ stated that they did not encounter any difficulties in the letter writing activity;

I had no difficulty because I put the information I remembered there (LD₅)

No, teacher, I did not encounter because I was repeating the topics before, then I was writing the letter (L₄)

They explained it with the following sentences.

The students in the DG and LDG who used the diary writing activity were asked the question "Can you explain how the diary writing activity affected you?" and the findings of the students' answers to this question are given in Table 7.

Table 7. Effects of the diary writing activity

Code	Student	Frequency
Understanding the topic	D ₁ , D ₂ , D ₄ , LD ₄	4
Self-development	LD ₁ , LD ₂ , LD ₅	3
Do not repeat	D ₂ , LD ₆	2
Enjoyment	D ₅ , LD ₃	2
Enduring learning	D ₃	1

According to Table 7; 4 students stated that the diary writing activity provided understanding of the subject, 3 students stated that it provided development, 2 students stated that it provided repetition, 2 students stated that It provided having fun and 1 student stated that it provided permanent learning.

Students coded D₁ and LD₄ for the diary writing activity to ensure understanding of the subject;

It was like an activity for us to understand the subjects better (D₁)

I understood better all the subjects we covered during the day (LD₄)

While the student with the code LD₁ expressed his/her opinion about the self-development of the diary writing activity;

When my teacher was writing a diary, we were writing on paper what we learnt every day. That's how I was improving myself (LD₁)

with these sentences. The student coded LD₆ for the repetition of the diary writing activity;

When we switched to a topic, I was always repeating it and I was ready for the next day because we stopped on the same topic for two or three days (LD₆)

While the student with the code D₅ stated that the diary writing activity provided fun;

It had a nice effect. It's fun (D₅)

with these words. Finally, the student coded D₃ expressed his/her opinion on the permanence of the diary writing activity;

When I write and read the topics, it stays in my mind more (D₃)

expressed as follows.

The students in the DG and LDG who used the diary writing activity were asked the question "Did you encounter difficulties in the diary writing activity? If so, what are these difficulties?" and the findings of the students' answers to this question are presented in Table 8.

Table 8. Difficulties of the diary writing activity

Code	Student	Frequency
Can't keep up with your writing	D ₁ , LD ₁ , LD ₆	3
Did not meet	D ₂ , D ₃ , D ₄ , D ₅ , LD ₂ , LD ₃ , LD ₄ , LD ₅	8

When Table 8 is analyzed, it is seen that 3 students stated that they had difficulty in completing the diary writing activity, while 8 students did not encounter any difficulties.

The student with the code LD₁ stated that the diary writing activity was difficult to complete;

I faced difficulties sometimes. While I was thinking about what I was going to write, time was passing and sometimes I could not complete all what I was going to write (LD₁)

While the student with the code D₄ stated that he did not encounter any difficulties while writing a diary,

No, I have not (D₄)

in a statement.

DISCUSSION AND CONCLUSION

As a result of the analyses on the effect of diary and letter writing activities on academic achievement, it was determined that there was a significant difference in the post-test scores of the experimental and control groups in favor of the experimental groups. Therefore, it can be said that diary and letter writing activities, which are writing to learn activities, are effective in increasing academic achievement. This result obtained from the study is similar to the results of the studies examining the academic achievement of writing activities for learning in mathematics teaching (Ayyıldız, 2010; Bell & Bell, 1985; Bicer et al, 2013; Borasi & Rose, 1989; Cisero, 2006; Çontay & Duatepe-Paksu, 2018; Frenkel, 2004; Karadağ & Öztürk, 2022; Kasa, 2009; Klishis, 2003; Raquid & Litao, 2023; Roskin, 2010; Stack, 1998; Teuscher, Kulinna & Crooker, 2015; Uslu, 2009; Ünlü & Soylu, 2017; Van Dijk et al, 2022; Yıldırım, 2016; Yılmaz, 2014). For example, Ünlü and Soylu (2017) stated that different learning-oriented writing activities used in secondary school mathematics course increased student achievement, attitude and metacognitions. In another study, Karadağ and Öztürk (2022) stated that writing letters and diaries, which are writing to learn activities, increased 7th grade students' achievement in the subject of ratio, proportion and percentages. Yılmaz (2014) stated that diary writing and various writing activities applied to secondary school students in algebra teaching increased student achievement. On the other hand, Kasa (2009) applied different writing activities, including letter and diary writing activities, in his study with primary school students and concluded that the application increased students' mathematics achievement and positively affected their attitude towards the course. Kesebir (2019) concluded that mathematics diaries kept by fourth grade students increased achievement, metacognition and motivation. In another study, Ayyıldız (2010) concluded that there was a significant difference between the post-test scores of the experimental group and the control group students in favor of the experimental group. This result showed that learning diaries, which enable students to be mentally active, are successful in increasing conceptual development. In addition, Yıldırım (2016) concluded that the letter and diary writing activities applied in teaching algebraic expressions to 6th grade students increased student achievement and that the activities were not superior to each other. This result coincides with the research result.

On the other hand, there are studies in the literature that differ from the results of this study. For example, Jurdak and Zein (1998) concluded that writing to learn activities had no effect on achievement, but had positive effects such as providing conceptual understanding and increasing communication. Since writing to learn activities enable students to construct the knowledge they have learned and express it in their own words, they may not be directly reflected in exam success or grades, since success criteria are often based on memorization and standardized test performance. However, writing to learn activities can be said to contribute to deeper learning in the long run as they strengthen conceptual understanding and increase students' engagement with knowledge. Strengthening communication can be explained by enabling students to express their thoughts more clearly and effectively.

When the interviews with the students in the experimental groups were evaluated after the application of the post-test in the study, the students who used the letter writing activity mentioned the positive effects of this activity such as providing a better understanding of the subject, repeating the subject, providing permanent learning, providing cooperation, transferring emotions, and increasing attention. On the other hand, students who used diary writing activities stated that diary writing had positive effects such as providing a better understanding of the subject, providing permanent learning, and repetition. There are studies with similar results in the literature (Aktepe, 2020; Çontay, 2012; Köksal, 2019; Öztürk & Demiroğlu-Çiçek, 2024; Sample, 1998; Tekin-Aytaş & Uğurel, 2016). Rivard and Straw (2000) stated that letter writing activity provides long-term retention of scientific knowledge. Again, according to Mason and Boscolo (2000), these activities facilitate students' conceptual changes and ensure that the relevant concepts are successfully and permanently structured by students. In addition, Aktepe (2020) stated in his study that the students learnt the subject better, thought that they helped someone and repeated the subject. Tekin-Aytaş and Uğurel (2016), on the other hand, stated that students revised the subject with writing activities and realized their deficiencies.

All of the students who wrote diaries and letters expressed positive opinions about the comprehension of the learning writing activities used and stated that they understood better by writing (Atasoy, 2005; Ay, 2018; Çontay, 2012; Nahrang & Peterson, 1986; Öztürk, Kaymaköğlu & Demiroğlu-Çiçek, 2022; Sample, 1998; Yılmaz, 2014). Köksal (2019) reached similar student opinions in his study and stated that writing to learn activities provide learning the subject in detail, easy understanding, reinforcement, retention of the subject in memory and realizing the unlearned parts.

Regarding the difficulties of the writing to learn activities used in the study, the students who used the letter writing activity stated that they had difficulty in expressing themselves, remembering the subject and following the spelling rules. Very few of the

students who used diary writing activities stated that they had difficulty. Çontay (2012) and Sample (1998) stated in their studies that the majority did not have difficulty in writing to learn activities. In this context, diary and letter writing activities can be used to increase comprehension in mathematics lessons. In addition, diary and letter writing activities provide important opportunities to evaluate students' learning by determining their comprehension and misconceptions and to provide feedback to them.

RECOMMENDATIONS

Diary and letter writing activities can be used to increase comprehension in mathematics lessons. In addition, diary and letter writing activities provide important opportunities to evaluate students' learning by determining their comprehension and misconceptions and to provide feedback to them.

Considering that only diary and letter writing activities were used in this study, it should not be forgotten that the results of studies in which other writing activities (poster preparation, story, poem, etc.) were used can also make an important contribution to the literature.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest with any institution or person within the scope of the study.

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Statements of publication ethics

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

Researchers' contribution rate

The authors contributed equally to all processes of the article. The authors have read and approved the final version of the article.

Ethics Committee Approval Information

The ethics committee document of this study was approved by the decision of Kırıkkale University Social and Human Research Ethics Committee dated 18.03.2022 and numbered 03.

REFERENCES

- Akkuş, R., & Darendeli, D. (2020). Research trends on writing-to-learn in mathematics in Turkey: Between 2005 and 2020. *International Journal of Educational Studies in Mathematics*, 7(1), 1-13.
- Aktepe, Z. T. (2020) *An investigation of the effect of writing to learn activities on academic achievement in fourth grade introducing matter* (Doktoral dissertation). Obtained from Council of Higher Education Thesis Center. (Tez No. 633829)
- Atasoy, E. (2005). *Use writing in teaching mathematics* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 170952)
- Ay, A. (2018). *The effect of using letter and poetry as writing to learn activities on student success in social studies program* (Doktoral dissertation). Obtained from Council of Higher Education Thesis Center. (Tez No. 486539)
- Ayyıldız, N. (2010). *The investigation of effect of learning logs on remedying students' misconceptions concerning 'hello of geometry' topic in 6th grade mathematics lesson* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 263662)
- Baki, A., & Gökçek, T. (2012). A general overview of mixed method researches. *Electronic Journal of Social Sciences*, 11(42), 1-21.
- Bell, E. S., & Bell, R. N. (1985). Writing and mathematical problem solving. *School Science and Mathematics*, 85(3), 210-221.
- Biber, B. (2012). *Science teachers' perceptions toward writing and levels of writing-to-learn implementations* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 319665)
- Bicer, A., Capraro, R. M., & Capraro, M. M. (2013). Integrating writing into mathematics classroom to increase students' problem solving skills. *International Online Journal of Educational Sciences*, 5(2), 361-369.
- Borasi, R., & Rose, B. J. (1989). Journal writing and mathematics instruction. *Educational Studies in Mathematics*, 20, 347-365.
- Braun, B. (2014). Personal, expository, critical, and creative: Using writing in mathematics courses. *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 24(6), 447-464.
- Burns, M. (2004). Writing in math. *Educational Leadership*, 62(2), 30-33.
- Carpenter E. (2012). Demonstrating Knowledge and Understanding through Mathematical Writing. Erişim adresi: <https://www.gcsu.edu/sites/files/page-assets/node-808/attachments/carpenter.pdf>

- Cisero, C. A. (2006). Does reflective journal writing improve course performance?. *College Teaching*, 54(2), 231-236.
- Çontay, E. G. (2012). *The effect of journal writing in surface area and volume of geometric solids on achievement and geometry self-efficacy of 8th grade students* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 330564)
- Çontay, E. G., & Duatepe-Paksu, A. (2018). The effect of journal writing on achievement and geometry self-efficacy of 8th grade students. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, 12(2), 167-198.
- Crawford, A., Wendy S., Samual, R. M., & James, M. (2005). *Teaching and learning strategies for the thinking classroom*. United States of America: International Debate Education Association.
- Ediger, M. (2006). Writing in the mathematics curriculum. *Journal of Instructional Psychology*, 33(2), 120-123.
- Emig, J. (1977). Writing as a mode of learning. *College Composition and Communication*, 28(2), 122-128.
- Enyart, A. M., & Van Zoest, L. R. (1998). Mathematics the write way. In L. Leutzinger (Edt.), *Mathematics in the middle* (pp. 165-169). Reston, VA: National Council of Teachers of Mathematics.
- Frenkel, J. J. (2004). *Writing use and its effectiveness on high school students' mathematics performance* (Master Thesis). *University of Wisconsin-Oshkosh*, Wisconsin.
- Galbraith, D. (1999). Writing as a knowledge-constituting process. In D. Galbraith and M. Torrance (Edt.), *Knowing what to write: Conceptual processes in text production. Studies in writing* (pp. 139-160). Amsterdam: Amsterdam University Press.
- Green, S. B., & Salkind, N. J. (2014). *Using SPSS for windows and macintosh: Analyzing and understanding data* (7. Edition). United Kingdom: Pearson Education.
- Günel, M. (2009). Writing as a cognitive process and learning tool in elementary science education. *Elementary Education Online*, 8(1), 200-211.
- Hiemstra, R. (2001). Uses and benefits of journal writing. In L. M. English & M. A. Gillen (Eds.), *Promoting journal writing in adult education* (pp. 19-26). San Francisco: Jossey-Bass.
- Ho, L. (2019, July 9). The Power of Tapping into Your Hidden Creativity [Web log post]. Retrieved from <https://www.lifehack.org/842582/power-of-tapping-into-hidden-creativity>
- Hohenshell, L., Hand, B., & Staker, J. (2004). Promoting conceptual understanding of biotechnology: Writing to a younger audience. *The American Biology Teacher*, 66(5) 333-338.
- Ishii, D. K. (2003). First-time teacher-researchers use writing in middle school mathematic instruction. *The Mathematics Educator*, 13(2), 38-46.
- Johnson, B., & Christensen, L. (2014). *Educational research: Quantitative, qualitative and mixed research* (4. Edition). (Trans. S.B. Demir). Ankara: Eğiten Book.
- Jurdak, M., & Zein, R. A. (1998). The effect of journal writing on achievement in and attitudes toward mathematics. *School Science and Mathematics*, 98(8), 412-419.
- Karadağ, S. Ş., & Öztürk, F. (2022). The effect of writing to learn activities on the academic achievement of 7th grade students on ratio, proportion and percentages. *International Journal of Education Science and Technology*, 8(2), 99-110.
- Kartalçı, S. (2018). *The effect of writing technique to development of metacognitive behaviour in mathematics teaching* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 545754)
- Kasa, B. (2009). *The effect of writing activities on achievement and attitude of students for mathematics in primary education level* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 239592)
- Kesebir, G. (2019). *Effects of student mathematics diaries on success, motivation and metacognitive awareness: Mixed methods design* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 552391)
- Klishis, L. A. (2003). *The impact of student discourse and journal writing on the mathematics achievement of fifth grade students* (Doctoral dissertation). Department of Curriculum and Instruction, West Virginia University, West Virginia.
- Köksal, A. P. (2019). *The effect of writing activities for learning purposes on the academic achievements of fifth grade students about electricity, permanence and their attitudes towards science lesson* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 582870)
- Lynch, R. K. (2003). *Implementing journal writing in the mathematics classroom: Cases of three middle school teachers* (Doctoral dissertation). *Indiana University*, USA.
- Mason, L., & Boscolo, P. (2000). Writing and conceptual change. What changes? *Instructional Science*. 28, 199-226.
- McMillan, J. H., & Schumacher, S. (2010). *Research in education: Evidence-based inquiry* (7th Ed.). New York: Pearson Publishing.
- Miller, L. D. (1991). Writing to learn mathematics. *Mathematics Teacher*, 84(7), 516-521.
- Nahrang, C. L., & Peterson, B. T. (1986). Using writing to learn mathematics. *Mathematics Teacher*, 79, 461-465.
- Öztürk, B., & Demiroğlu-Çiçek, S. (2024). The effects of writing to learn activities on the 10th grade on teaching of ecosystem ecology. *Kastamonu Education Journal*, 32(4), 652-667.

- Öztürk, B., Kaymakoğlu, H., & Demiroğlu Çiçek, S. (2022). The effect of writing to learn activities on the academic achievement of 8th grade students on periodic system. *Journal of Science Teaching, 10*(1), 115-138.
- Öztürk, F., Öztürk, B., & Işık, A. (2016). The opinions of secondary school mathematics teachers on writing and writing-to-learn activities. *Journal of Bayburt Education Faculty, 11*(2), 306-328.
- Prain, V., & Hand, B. (1996). Writing for learning in the junior secondary science classroom: Issues arising from a case study. *International Journal of Science Education, 18*(1), 117-128.
- Raquid, D. A. N., & Litao, R. A. (2023). Writing activities as intervention for improving academic achievement in mathematics. *European Journal of Mathematics and Science Education, 4*(3), 181-190.
- Rivard, R., & Straw, S. (2000). The effect of talk and writing on learning science: An exploratory study. *Science Education, 84*, 566-593.
- Roskin, J. (2010). *Writing and student achievement and engagement in mathematics classroom* (Master thesis). Caldwell College, New Jersey.
- Sample, C. R. (1998). *Urban algebra I students' perceptions of journal writing and its effects on achievement with integers and students' attitudes toward mathematics* (Doctoral dissertation). The University of Mississippi, Mississippi.
- Shield, M., & Galbraith, P. (1998). The analysis of student expository writing in mathematics. *Educational Studies in Mathematics, 36*, 29-52.
- Stack, R. V. (1998). *The effects of journal writing on the geometric understanding of preservice elementary University of South Dakota, South Dakota teachers* (Doctoral dissertation).
- Tekin-Aytaş, Ç., & Uğurel, I. (2016). The effects of an instruction practice based on the writing activities on students' learnings in a mathematics class. *Journal of National Education, 45*(211), 113-146.
- Teuscher, D., Kulinna, P. H., & Crooker, C. (2015). Writing to learn mathematics: An update. *The Mathematics Educator, 24*(2), 56-78.
- Uğurel, I., Tekin, Ç., & Morali, H. S. (2009). An overview from the literature on writing activities used in mathematics education. *E-Journal of New World Sciences Academy, 4*(2), 494-507.
- Ünlü, V., & Soylu, D. (2017). The effects of writing activities on students' achievement, attitudes and metacognition in mathematics course. *Gazi University Journal of Gazi Education Faculty 37*(1), 345-360.
- Uslu, H. (2009). *Student' ideas about writing journals in science and technology and mathematics lessons in the sixth and seventh grades* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 256149)
- Van Dijk, A., Van Gelderen, A., & Kuiken, F. (2022). Effects of instruction in writing-to-learn on low-achieving adolescents in biology and mathematics classes. *Education Sciences, 12*(9), 595.
- Wills, H. (1993). *Writing is learning: Strategies for math, social studies and language arts*. United States of America: EDINFO.
- Yıldırım, A., & Şimşek, H. (2011). *Qualitative research techniques in social science*. Ankara: Seçkin Publishing.
- Yıldırım, Z. (2016). *The effect of writing activities on mathematic achievement and attitudes of the secondary school students* (Master thesis). Obtained from Council of Higher Education Thesis Center. (Tez No. 423760)
- Yılmaz, N. (2014). The impact of using writing activities in teaching algebra on secondary school seventh grade students' achievements. *Bolu Abant İzzet Baysal University Journal of Faculty of Education, 15*(1), 357-376.

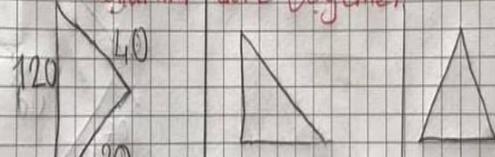
APPENDIX

Examples of Diaries Written by Students

Sergili Günü

Bugün dün öğrendiğim konuyla ilgili bir kaç soru çözdük. Ondan yeni konuya geçtik şimdi yeni konuyla ilgili bir kaç bilgi vermek istiyorum:

Açılarına Göre Üçgenler



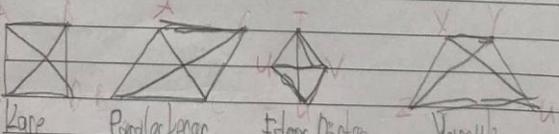
bu bir (geniş) açıdır mesela bir kenarı geniş açı olan üçgenlere denir.

Bu bir (dik) açıdır bu bir bir açısı 90° açılardan denir.

Bu bir (dar) açıdır bir açısı 90° dan az olan üçgenlere denir.

Östüm günlük,

Geçen dersde dörtgenlere konusundan dikkatimi çektiğim bu dersde devamını yapıyoruz. Dörtgenin özelliklerinde dikkatimden farklı bir özellik vardır. Bunlar: Köşegenlerin birbirini dik kesmesi ve dikkatimden özel biridir. Dörtgenler: Karşılıklı kenarlarına eşittir. Köşegen uzunlukları birbirinden farklıdır. Köşegenleri birbirini aynı açı ortalar. Karşılıklı kenarları birbirine paraleldir. Köşegen: Karşılıklı kenarları birbirine paraleldir. Karşılıklı kenarları birbirine eşittir. Köşegen uzunlukları birbirinden farklıdır. Köşegenleri birbirini dik keser. Yan kenarları ise sadece bir paraleldir. Ayrıca bir geniş açı ile bir dar açının toplamı 180° 'dir. Bunlarla ilgili yerde konuşabiliriz. Mesela okulla, paralel, abaküste, parkta ve evde konuşabiliriz.

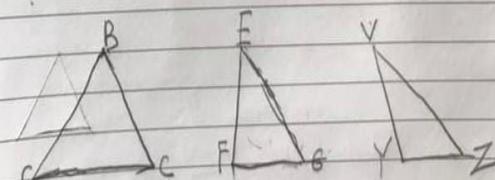


Kare Paralelkenar Eşkenar Dörtgen Yaprak

Canım günlüküm,

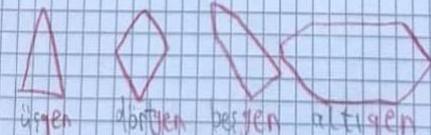
Öğretmenimizin verdiği ödevi devam ediyorum. Geçen dersde geometrik cisimleri işledik. Bugünki ödevde de çevre göre üçgenler konusunu işledik. Biz tüm açılar 90° küçükse dar açı, 90° ise dik açı 90° büyük ise geniş açı olarak adlandırırız. Bu açıları günlük hayatta mimaride eşitine bir şekilde kullanıyoruz. Daha çok farkına varalım. Bunu yaparken olanların daha iyi algılayıp kavrayabiliyoruz. Ve beni mutlu etti. Aynı zamanda evlerin, binaların, insanların kısıtlı yapıldığını gördük. Daha fazla, daha güzel daha kaliteli yaşamamızın kolaylaştırıp imkanlar sundu.

Konuyu matematikçi çocukları her yerde kullanarak hayata taşıyor. Kolaylaştırıp yön veriyor.



Sergili Günü,

uzun zamanın günlük tutmuyordum, ama şimdi yeniden tutmaya başladım, ama bu tuttuğum günlük matematik günlüğüydü ve mat. dersinde işlediğimiz konuları anlatmak istediğim konuların hemen paylaşabileceğim konuların üçgenler ve dörtgenler: çokgenlerin kenarları, doğrular, kapalı ve kenar sayısına göre isimlendirilmiştir. En az 3 doğru parçasının uç uç birleştirilerek oluşan kapalı şekillere çokgen denir ve kenar sayılarına göre adlandırılır. Mesela:



üçgen dörtgen beşgen altıgen

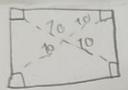
kısacası bugün sadece 1 mat. dersimiz olduğu için sadece bunları işledik. neyse, benden bu kadar. yarın görüşürüz.

Examples of Letters Written by Students

Merhaba ----- bu hafta gelemediğin için bu haftaki konuları ben anlatacağım, hadi başlayalım

Dörtgenler

1- Dikdörtgen



- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Tüm açıları 90° 'dir.
- * Köşegen uzunlukları birbirine eşittir ve birbirini ortalar.

2- Kare



- * Dikdörtgenle aynı

3- Paralel kenar



- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Karşılıklı açıları birbirine eşittir.
- * Köşegen uzunlukları birbirinden farklıdır.
- * Köşegenler birbirini dikey açıyla ortalar.

4- Etkensiz dörtgen



- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Karşılıklı açıları birbirine eşittir.
- * Köşegen uzunlukları birbirinden farklıdır.
- * Köşegenler birbirini dikey açıyla ortalar.

5- Yamuk

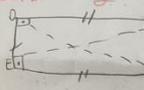


- * Kenar uzunluklarından sadece iki paraleldir.
- * Ardışık bir geniş açı ile bir dar açının toplamı 180° 'dir.

= DÖRTGENLER =

Merhaba Sevgili Ömer bu hafta öğrendiğim dörtgenler konusunu sana anlatacağım, Hadi başlayalım

1- Dikdörtgen



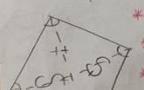
- * Tüm açıları 90° 'dir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Köşegen uzunlukları birbirine eşittir ve birbirini ortalar.

2- Kare



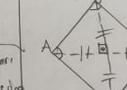
- * Tüm kenar uzunlukları birbirine eşittir.
- * Tüm açıları 90° 'dir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Köşegen uzunlukları birbirine eşittir.
- * Köşegenler birbirini dikey keser.
- * Köşegenler birbirini ortalar.
- * Dikdörtgenin özel hâlidir.

3- Paralel kenar



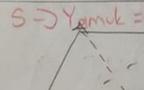
- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Köşegen uzunlukları birbirinden farklıdır.
- * Karşılıklı açıları birbirine eşittir.
- * Köşegenler birbirini dikey açıyla ortalar.

4- Etkensiz Dörtgen



- * Köşegenleri birbirini dikey keser.
- * Köşegenler birbirinden farklıdır.
- * Köşegen uzunlukları birbirinden farklıdır.
- * Karşılıklı açılara birbirine eşittir.

5- Yamuk



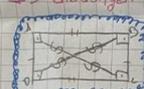
- * Kenar eşitlerinin sadece iki paraleli vardır.
- * Ardışık bir geniş açı ile bir dar açının toplamı 180° 'dir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Karşılıklı kenar uzunlukları birbirine eşittir.

Sevgili arkadaşlarım geçen hafta öğrendiğimiz dörtgenler konusunu şimdi sizlere anlatayım.

Dörtgenler

Dörtgenlerin 5 paralel ve özel şekli vardır. Şimdi anlatayım.

1- Dikdörtgen



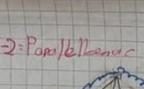
- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Paralel kenar uzunlukları birbirine paraleldir.
- * Tüm açıları 90° 'dir.
- * Köşegen uzunlukları birbirine eşittir ve birbirini ortalar.

2- Kare



- * Tüm kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları birbirine paraleldir.
- * Tüm açıları 90° 'dir.
- * Köşegen uzunlukları birbirine eşittir ve birbirini ortalar.
- * Köşegenler birbirini dikey keser.
- * Dikdörtgenin özel hâlidir.

3- Paralel kenar

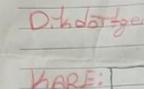


- * Karşılıklı kenar uzunlukları birbirine eşittir.
- * Karşılıklı kenarları paraleldir.
- * Karşılıklı açıları birbirine eşittir.
- * Köşegen uzunlukları birbirinden farklıdır.

SEVGİLİ ARKADAŞIM

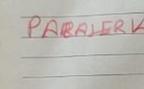
Sevgili arkadaşlarım bu hafta dörtgenleri işledik. Dörtgenler başlıca aşağıdaki şekillerde olur. Şimdi anlatayım.

Dikdörtgen



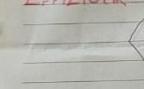
- * Karşılıklı kenar uzunlukları eşittir.
- * Karşılıklı kenarları birbirine paraleldir.

KARE



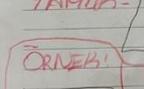
- * Karşılıklı kenar uzunlukları eşittir.
- * Karşılıklı kenarları paraleldir.

PARALEL KENAR



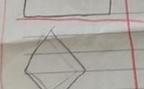
- * Karşılıklı kenar uzunlukları eşittir.
- * Karşılıklı kenarları paraleldir.

ETKENSİZ

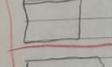


- * Karşılıklı kenar uzunlukları eşittir.
- * Karşılıklı kenarları paraleldir.

YAMUK



- * Karşılıklı kenarlarından biri eşittir.

ÖRNEK	Yamuk	Etkensiz	P.kenar	Kare	Dikdörtgen
					✓
		✓			
					✓
	✓				