



## The Development of Student's Worksheet Oriented Scientific Approaches for Primary School and it's Application

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**Abstract.** This study aims to develop supporting teaching materials, namely student worksheets in fourth grade of mathematics subjects, especially about the perimeter and area of square, rectangular and triangle. The type of this research is using Research and Development (RnD) that using the 4D model (Four D Model) (define, design, develop, and disseminate). The subjects of this study were 1 teacher and 25 fourth grade students at SDN Serang 02. Data in this study were collected by tests, questionnaires, and documentations. Data analysis carried out is qualitative and quantitative. The results of the study obtained an average value of expert validation with an average score of 86.5% and included a very feasible category, the average value of teacher responses to worksheets was 86.2% with a very good category and the average response value of students was 86, 1% with a very good category and an average comprehension test score of 81.4 with a very good understanding category. Based on these data it can be concluded that the mathematical worksheet oriented scientific approach can be used in learning because it is considered feasible to be used as supporting teaching material in mathematics learning and is able to facilitate students' understanding of the material "perimeter and area of square, rectangular and triangle".

**Keywords:** worksheets, saintific, mathematics

**INTRODUCTION** ~ Learning planning must contain learning tools that are prepared, including understanding the curriculum, mastering the teaching materials, compiling learning programs, implementing learning programs and evaluating learning programs that have been implemented. One of the tools that must be prepared in learning planning is to master teaching materials. According to Majid (2014: 174), teaching material is a set of materials that are arranged systematically to create an environment or atmosphere which allows students to study well. Teaching materials are grouped into 4 types, namely printed material, audio teaching material, audio-visual teaching material, and interactive teaching material. The use of appropriate teaching materials also must be

accompanied by the implementation of appropriate learning. One of the learning implementation that can support the implementation of good teaching materials is using a scientific approach.

Based on the analysis results of the student worksheets requirements to 15 students of SDN Serang 02 as a sample, was obtained these following information: teaching materials used in mathematics learning are only textbooks, most of the material in the textbooks is understandable but the packaging of the book is unattractive in the colors and pictures. If the learning climate like this continues, the improvement of students' interest in mathematics teaching material will not be achieved. therefore, the results of the requirements analysis showed



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that there were 86.6% of students chose worksheets as the supporting teaching materials in mathematics learning. If compared with conventional worksheets that use opaque paper and without color, then students expect worksheets as the supporting teaching materials that are equipped with interesting pictures, activities, and coloring.

Based on the results of interviews conducted with the fourth-grade teacher at SDN Serang 02, was obtained information that the teaching materials used during the mathematics learning process were only textbooks or other supporting books. She explained that once in a while she had made worksheets for one lesson, but it was made if needed. She also stated that the conventional worksheets still need improvement, this is because the contents of these worksheets are not focused on activities that must be completed by students but rather on the material and questions. This causes the non-development student activity in learning by using the worksheets. The paper used in conventional worksheets is an opaque paper, that makes students less interested in learning using worksheets. With this, the teachers approved the need for the development of the conventional worksheets, with the hope that the developed worksheets are packaged with attractive appearance and content that are following the student characteristics

and able to develop students' activity in learning.

Based on these needs analysis, it is necessary to implement the learning that can fulfill the students' needs, one of them is the learning process using a scientific approach that is closely related to the curriculum 2013 implementation. The final goal of the scientific approach is to make students find learning experiences that are suited to their needs and interests. The scientific approach is a learning process that has been designed, so students can actively develop concepts, rules or principles through the stages of observing, formulating problems, formulating hypotheses, collecting data with various techniques, analyzing data, drawing conclusions, and communicating the concepts, rules or principles that have been found (Hosnan, 2014: 34).

The scientific approach requires a fun learning process and doing activities based on its principles, so one of the teaching materials that can be used is student worksheets. Student Worksheets are the sheets that contain instructions and steps for completing the assignment. (Majid, 2014: 176). According to Lismawati (2010: 40) Student worksheets have several benefits that can support the students' needs, namely: Worksheets can be learned anytime and anywhere without using special tools, can develop students' abilities to learn



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about facts and be able to explore general and abstract principles using realistic arguments, can explain words, numbers, music notation, two-dimensional drawings, and diagrams with very fast process and economically more efficient than other learning media. With these scientific approach principles, students are expected to be able to process information independently. The existence of teachers or educators is only as a facilitator in the learning process in the 2013 curriculum.

Based on these problems, it is important to develop student worksheets that are in line with the demands of the curriculum 2013, then the researchers tried to provide solutions to overcome these problems with "The Development of Mathematical Worksheets Based on Scientific Approaches for Elementary Students".

## METHOD

This research using the Research and Development method. The research and development method used in this study refer to the 4D model research design that consists of 4 stages of development, namely: the definition stage (define), the designing stage (design), the development stage (develop) and dissemination stage (disseminate) (Trianto, 2014: 93).

### a. Time, Place of Target / Research Subject

The place of research was conducted at SDN Serang 02 which is located at Jalan Ki

Mas Jong No.1, Serang City, Banten. The time of the research was conducted from November 2018 to March 2019 from the initial observation, proposal writing until reporting the research report. The target or research subjects involved in this research consist of 25 fourth-grade students and 1 fourth-grade teacher.

### b. Research Procedures

This Development Research using 4D Model, which consists of 4 stages of development, namely: the definition stage (define), the designing stage (design), the development stage (develop) and dissemination stage. define stage includes curriculum analysis activities, student analysis, needs analysis, material analysis and formulating learning objectives that want to be achieved. The design stage includes planning activities to make drafts of storyboards and designing research instruments. The develop stage includes product development activities and validation by the experts' team. The Dissemination stage is done in a limited deployment.

### c. Data, Instruments, Data Collection Techniques, and Analysis Data

The types of data used in this study are questionnaires, documentation, and comprehension tests. The instruments used in this study were expert validation questionnaires, user response questionnaires, and comprehension tests that had made



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the instrument drafting plans. The main purpose of a study is to obtain data. Therefore, the data collection technique is a strategic step in the research process as a data collector that will be described in the research. Data collection techniques in this study used a validation questionnaire, a user response questionnaire, a comprehension test, and documentation of the learning implementation. Data analysis in Research and Development study is consists of qualitative and quantitative analysis techniques. Qualitative analysis is used to describe the results of expert validation by revising based on expert advice, analyzing teacher and student response data towards the Mathematical Worksheet Based on Scientific Approaches. Quantitative analysis is used to determine student understanding based on the results of the comprehension test given.

## RESULTS

The results of research on the development of a mathematical worksheet based on a scientific approach are explained based on the research flow with the 4D research model, 4D model consists of 4 development stages, namely: the definition stage (define), the designing stage (design), development stage (develop), and the dissemination stage (disseminate), which is explained as follows

### Definition Stage (define)

This stage includes an analysis of the teaching materials' needs, curriculum, material, students and formulating goals. Analysis of needs at this stage is an analysis of teaching materials conducted by collecting information using interviews with teachers and questionnaires intended at teachers and fourth-grade students of SDN Serang 02. The results of interviews and questionnaires given to teachers and students indicate that teaching materials used in the fourth-grade of SDN Serang 02 are using textbooks. The process of learning mathematics at SDN Serang 02 does not use conventional student worksheets. Teachers and students need supporting teaching materials of math worksheets based on the scientific approach to the circumference and the area of the two-dimensional shapes of a square, rectangular and triangular, in the hope that learning will become more meaningful and facilitate students to understand the material.

Curriculum analysis conducted is to identify core competencies, basic competencies in fourth-grade mathematics subjects according to the curriculum 2013 syllabus, then determine the indicators and learning objectives according to student characteristics which include background knowledge and cognitive development of students. From these stages, the circumference and the area of the two-dimensional shapes of the square, rectangular and triangle are chosen. Based



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on the analysis of student characteristics, the introduction of various types of two-dimensional shapes was learned by students in the first grade and learning about the operation of multiplication that related to the circumference and area of two-dimensional shapes material has been studied before, this will be one of the supporting materials for students in understanding the circumference material and area of two-dimensional shapes.

### **Designing Stage (design)**

The designing stage or planning for student worksheets preparation is adjusted to the criteria of product that notice the feasibility of the media, material and language aspects. These criteria are adjusted to the requirements for the preparation of students worksheets according to Hendro Darmodjo and Jenny R.E (Widjajanti, 2008) namely didactic requirements, construction requirements, and technical requirements.

This worksheet preparation is also based on the principles of a scientific approach which consist of 5 stages: observing, asking questions, gathering information, associating, and communicating. In the observation stage, the worksheets present activities to observe various things related to the circumference material or the width of two-dimensional shapes. This activity is intended that students are accustomed to exploring their curiosity to make learning will be more meaningful. According to Ridlo, the

observing method is very beneficial for the fulfillment of students' curiosity, so the learning process has high meaningfulness. With the observation method, students can find the fact that there is a relationship between the object being analyzed and the learning material used by the teacher. Observing activities in the worksheet are observations on the images related to the circumference and width of the two-dimension shapes. In the picture, students are given a narrative text about things that are related to the concepts of the circumference and area, which engaged students to start thinking deeper about the meaning of the subject.

The next stage is asking questions, the questioning activities in the worksheet show questions asked or other questions that come from students' thoughts. Students are free to ask questions or measure their abilities related to the extent of the thought process that is owned when observing activities.

The next stage is gathering information, this activity is done by delve information from various activities or sources through a variety of ways. The activity of gathering information in the worksheets includes activities that require students' active role in each activity, starting from measuring, calculating, and conducting various experiments. Information gathering activities



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become a source of all information needed by students to reach understanding.

The next step is to associate, this activity is a reasoning activity. The reasoning is concluding the information that has been obtained previously. The reasoning or associating activities in student worksheets are deductive reasoning activities. Students are asked to be able to conclude from the information of general understanding into formula understanding.

The last stage is to communicate, this activity is one of the opportunities given fully to students to deliver information that has been obtained after doing the activities in the previous stages. In the worksheet are listed activities of communicating information obtained using group work visits.

### Development Stage (Develop)

The development stage is the refinement stage of the student worksheets that have been prepared. Students' worksheets that have been completed will be given an assessment of feasibility by experts, which are material experts, media experts, and linguists. Each aspect was assessed its feasibility by 2 experts who also provided comments and suggestions to improve the worksheets. The feasibility of the mathematical worksheet product based on the scientific approach was validated by 6 experts consisting of 2 material experts, 2 media experts, and 2 language experts who were experienced in the use and development of learning media for elementary schools.

#### a. Media Validation

This mathematical worksheet is validated by media validators with the results of the validation as follows:

**Table 1** Validation Results by Media Experts

No.	Assessment Aspects	Score	Validator I	Score	Validator II
			Percentage (%)		Percentage (%)
1.	Media	39	86,6	42	93,3
	Description		Very Feasible		Very Feasible

Based on the validation results of 2 media experts above, the assessment results obtained from the validator of media expert I with a percentage of 86.6% are included in the very feasible category and the assessment results of media expert validator II with a percentage of 93.3% are included in the very feasible category. These data show

that the mathematical worksheets based on on a scientific approach on the circumferential and the area of a two-dimensional shape material of square, rectangle, and triangle are included in the very feasible category from the media aspect. Researchers also get some suggestion from media experts to perfecting



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the worksheets that have been produced, experts and follow-up conducted by here are some suggestions from media researchers:

**Tabel 2** Suggestion and Follow-up from Media Experts

Validators	Suggestion	Follow-up
I	<ul style="list-style-type: none"> <li>Add a title or name of the activity at the top of the activity in accordance with the table of contents, so the activity can be more directed</li> </ul>	<ul style="list-style-type: none"> <li>Adding the title or name of the activity at the top of the activity in accordance with the table of contents.</li> </ul>
II	<ul style="list-style-type: none"> <li>Add symbols that characterize the 5M activities of the characters in each activity of observing, asking questions, gathering information, associating and communicating.</li> <li>Compile the bibliography according to the rules of writing</li> </ul>	<ul style="list-style-type: none"> <li>Adding the symbols that characterize the 5M activities of the characters in each activity of observing, asking questions, gathering information, associating and communicating.</li> <li>Compiling the bibliography according to the rules of writing.</li> </ul>

**b. Materials Validation**

Material validation is done to determine the feasibility of the material contained in the mathematics worksheet whether it is suitable for the material to be studied or not.

This mathematical worksheet is validated by a material expert validator with these following validation results:

**Table 3** Validation Results by Material Expert

No.	Assessment Aspects	Score	Validator I	Score	Validator II
			Percentage (%)		Percentage (%)
1.	Material Description	43	86	38	76
			Very Feasible		Feasible

Based on the results of the material experts' validation above, the assessment of the material expert validator I obtained with a percentage of 86% included in the very feasible category and the results of the assessment of the material expert validator II with a percentage of 76% included in the feasible category. These data show that the mathematical worksheets based on a

scientific approach on the circumferential and the area of a two-dimensional shape material of square, rectangle, and triangle are included in the very feasible category from the material aspect. Researchers also get some suggestions from media experts to perfecting the worksheets that have been produced, here are some suggestions from



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material experts and follow-up conducted by researchers:

**Table 4** Suggestion and Follow-up from Material Experts

Validators	Suggestion	Follow-up
I	<ul style="list-style-type: none"> <li>Adjust the associated activities to activity 1</li> </ul>	<ul style="list-style-type: none"> <li>Adjusting the associated activities to activity 1</li> </ul>
II	<ul style="list-style-type: none"> <li>Adjust the associated activities to activity 1</li> <li>Add HOTS (Higher order Thinking Skill) questions to the evaluation questions.</li> </ul>	<ul style="list-style-type: none"> <li>Adjusting the associated activities to activity 1</li> <li>Adding HOTS (Higher order Thinking Skill) questions to the evaluation questions.</li> </ul>

**c. Validasi Bahasa**

Language validation is done to determine the feasibility of the language contained in the mathematics worksheet whether it is

appropriate with the material to be studied or not. This mathematics worksheet is validated by a grammar validator (Linguist) with the validation results as follows

**Table 5** Validation Results by Linguist

No.	Assessment Aspects	Score	Validator I	Score	Validator II
			Percentage (%)		Percentage (%)
1.	Language Description	44	88	45	90
			Very Feasible		Very Feasible

Based on the validation results above, the assessment results obtained from the linguist validator I with a percentage of 88% are included in the very feasible category and the assessment results of the linguist validator II with a percentage of 90% are included in the very feasible category. These data show that the mathematical worksheets based on a scientific approach to the circumference

and the area of a two-dimensional shape material of square, rectangle, and triangle are included in the very feasible category from the aspect of language. Researchers also get some suggestions from linguists to perfecting the worksheets that have been produced, here are some suggestions from linguists and follow-up conducted by researchers:

**Tabel 6** Suggestion and Follow-up from Linguist

Validators	Suggestion	Follow-up
I	<ul style="list-style-type: none"> <li>Correct the language and words that not suitable with the students' cognitive development level.</li> <li>Correct some ineffective redaction sentences</li> </ul>	<ul style="list-style-type: none"> <li>Correcting the language and words that not suitable with the students' cognitive development level.</li> <li>Correcting some ineffective redaction sentences.</li> </ul>
II	<ul style="list-style-type: none"> <li>Correct some ineffective words</li> <li>Correct the punctuation in writing.</li> </ul>	<ul style="list-style-type: none"> <li>Correcting some ineffective words</li> <li>Correcting the punctuation in writing.</li> </ul>



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**d. User Respon (Teachers dan Students)**

The questionnaire response was given to 2 users, namely teachers and students. Teacher responses were given to 1 fourth-grade teacher at SDN Serang 02 and student responses were given to 25 fourth-

grade students at SDN Serang 02. The teacher's response to the mathematics worksheets based on the scientific approach was obtained by using the questionnaire responses that given directly and the obtained data is presented in the following table:

**Tabel 7** Analysis of Teacher Response Results Data

No.	Assessment Aspects	Score	Percentage (%)	Explanation
1.	Media	32	88,9	Very Good
2.	Material	33	82,5	Very Good
3.	Language	35	87,5	Very Good

Table 7 shows that the results of the teacher's response to the mathematics worksheet based on the scientific approach were very good. This is indicated by the assessment results of the aspects of media which scored 88.9%, 83.5% of material aspects and 87.5% of language aspects, where all these three aspects into the very good category.

Student responses to mathematical worksheets based on a scientific approach were obtained using a student response questionnaire given after the end of the learning process. The data obtained are presented in the following table:

**Tabel 8** Analysis of Student Response Results Data

No.	Aspek Penilaian	Skor	Persentase (%)	Keterangan
1.	Media	119	95,2	Very Good
2.	Material	157	89,7	Very Good
3.	Language	47	94	Very Good

In table 8 shows that the results of students' responses towards the mathematical worksheets based on scientific approaches are very good. This is indicated by the assessment results of the media aspects which obtained a score of 95.2%, material aspects of 89.7%, and language aspects of 94%, where all these three aspects are into the excellent category.

**e. Comprehension Tests**

The student comprehension tests are consist of 5 essay items and are given after the implementation of learning using student worksheets on February 27, 2019. The indicator of success on the comprehension test is if the student gets the comprehension score of  $60 < N \leq 80$  with good category. The



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data obtained is presented in the following table:

**Tabel 9** Data Analysis of Comprehension Tests Results

Student Comprehension Test	Question Number					Score
	1	2	3	4	5	
<b>Final Scores</b>	77,6	81,2	92,8	94,4	80	81,4
<b>Explanation</b>	Good	Very Good	Very Good	Very Good	Good	Very Good

Table 9 shows the lowest average score obtained by students from the test results of students' comprehension of the material after using a mathematical worksheet based on the scientific approach found in question number 1 with score of 77.6 and the highest average score in question number 4 was 94.4 and the average score of all students is 81.4, it shows a very good understanding category.

## DISCUSSION

Based on the research results that have been done, the results of interviews and questionnaires stated that the fourth-grade teacher at SDN Serang 02 approved the development of a mathematical worksheet in a scientific approach oriented. This is based on the fact of textbooks as the teaching materials in mathematics used in the school. Previously, this school did not use the conventional worksheets in mathematics, but teachers usually make worksheets for one-time learning. The textbooks and worksheets made by the teacher do not list the requirements of the good worksheets. Activities with a scientific

approach that became the learning approach of the curriculum 2013 are not listed.

Based on the needs analysis results, students prefer to choose the worksheets to be one of the supporting teaching materials in learning mathematics. Reflecting on conventional worksheets, students need a more colorful worksheet and have activities that must be done by students. Therefore, to fulfill the students' needs, the researchers develop worksheets with activities.

This is in accordance with the theory stated by Trianto (2014: 243) those regular student worksheets are containing guidelines sheets for students to do the programmatic activities so students can perform actively. Besides being able to do active learning activities, Majid (2014) states that student worksheets are also containing the assignments that must be done by students that contain instructions, steps to complete a task that leads to basic competencies to be achieved.

The Need for student worksheets that must contain activities to make students learn



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actively during the learning process makes researchers develop mathematical worksheets that following the curriculum 2013 and the scientific approach at this curriculum. According to Hosnan (2014: 34)

The scientific approach is a learning process that has been designed, so students can actively develop concepts, rules or principles through the stages of observing, formulating problems, formulating hypotheses, collecting data with various techniques, analyzing data, drawing conclusions, and communicating the concepts, rules or principles that have been found.

Sujarwanata (2012: 76) states that learning with a scientific approach requires students to be able to apply scientific methods, such as exploring knowledge through observing, classifying, predicting, designing, doing experiments, communicating knowledge to others using thinking skills, and using scientific attitudes such as curiosity, caution, objectivity, and honesty. So, this mathematical worksheet is based on a scientific approach with the "circumference and the area of two-dimensional shapes of a square, rectangular and triangular" material.

The development of this mathematics worksheet is packaged with a design that can attract the students' attention. The choice of text or writing is adjusted to the type and size of students so they can read

clearly. The packaging of colors, images, frames, and layout in this worksheet is adjusted to the needs. This is appropriate with Muljono's opinion (2007: 20) that a good textbook is physically presented with an attractive appearance and describes the textbooks' characteristics of textbooks that easy to read and use. Furthermore, according to the Ministry of National Education (2008: 23), the pictures that support the material content are very necessary for the teaching material because besides clarifying the explanations, it can also increase students' attraction to learn it.

The language used in the worksheets is made according to the cognitive level of students' development. It uses a simple, structured, communicative, and interactive sentences. This is in accordance with Muljono's opinion (2007: 20) which states that a good textbook is a book that contains information, messages, and knowledge as outlined in written form and can be logically communicated to the reader, easily accepted according to the development of the cognitive stages of the reader or user.

The achievement or feasibility of a mathematical worksheet based on a scientific approach is proven through validation from the media experts, material experts, and linguists with these following results: media expert validator I gave the score with a percentage of 86.6% and



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media expert validator II gave the score with a percentage of 93.3%. Material expert validator I give a score of 86% and the material expert validator II gave 76%. While the linguist validator I give a score of 88% and the linguist validator II gives 90%. Overall, the mathematical worksheets based on the scientific approach get a percentage of 86.5% out of 100%. These descriptions show that the mathematical worksheet based on a scientific approach for elementary students is included in the excellent category according to media experts, material experts, and language linguists so, this worksheet can be used in learning because it is considered appropriate as the supporting teaching material in mathematics learning.

After the mathematical worksheet based on a scientific approach was declared feasible by experts, then the product begins to be used in the learning process. The learning process using this worksheet is done twice on 26 and 27 February 2019. At the beginning of learning, students are asked to form groups with a maximum of 5-6 members. Then, the researcher made the apperception about the two-dimensional shape of square, rectangular and triangle. The researcher asks students to write the names of group members in the "identity" section in the worksheet. Then, students are asked to follow the stages of the activities listed in the worksheet. The researchers as students' facilitators while they are doing some

various activities, students are allowed to discuss and ask questions that are not understood.

Based on the learning process using the mathematical worksheet based on a scientific approach on the circumferential and the area of a two-dimensional shape material of square, rectangle, and triangle of grade fourth at SDN Serang 02, students are actively involved in carrying out various activities contained in the worksheet both individually and in groups. This is also proved by the research that has been done by Dewi (2013) and states that the learning process using student worksheets can open wide opportunities for students to participate actively in learning. Based on this, it can be concluded that the use of mathematical worksheets based on a scientific approach on the circumferential and the area of a two-dimensional shape material of square, rectangle, and triangle in the learning process can activate students.

After the learning process using a mathematical worksheet based on a scientific approach, researchers gave the questionnaire responses to 1 teacher and 25 at grade fourth of SDN Serang 02. Based on the results of the responses obtained, it is known that the teacher's response to the developed worksheets scored a percentage of 88.9% in the media aspect, 82.5% in the material aspect and 87.5% in the language aspect, so the average score



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is 86.2 % with the very good categories. Based on the results of the responses given by the teacher, the aspect of the media is the highest percentage. This shows that teachers are very interested in developed worksheets. The teacher states that the cover design, the accuracy of fonts used, the writing size on the worksheet is very good. The accuracy of the images and colors are also very good. The accuracy of the frames and layout of the worksheet is very good.

Next, the students' responses to the developed worksheets received a score of 95.2% in the media aspect, 89.7% in the material aspect and 94% in the language aspect, so it obtained the average score with a percentage of 86.1% as a very good category. The responses results given by students stated that the highest attractiveness percentage was in the media aspect. It shows that the students are very interested in the worksheets developed. The teacher states that the cover design, the accuracy of fonts used, the writing size on the worksheet is very good. The accuracy of the images and colors are also very good. The accuracy of the frames and layout of the worksheet is very good. Based on the user responses results, the teacher and students are interested in the worksheets that have been developed and can understand the material well. This is in accordance with Fitri's statement (2014) that worksheet with a display and design that

combines text, images and background worksheets with a display and design that combines text, images, and background with contrasting colors and non-boring material content will attract students' attention and support the learning process.

The mathematic worksheets based on a scientific approach was tested on 25 students of grade fourth of SDN Serang 02. In this trial, the researcher gave the comprehension test questions after learning using the worksheets. The average score obtained by students on the comprehension test was 81.4 which showed a very good understanding category. The overall students' understanding is included in the excellent category, but from the 5 questions, the highest students' understanding was in question number 4 with a score of 94.4. and the second was in question number 3 with a score of 92.8 and the third in problem number 2 with a score of 81.2.

Students' understanding of the three questions can be categorized as very good, and for questions number 1 and 5, the students' understanding is only scored 77.6 and 80. Based on the average score of the comprehension test obtained by students it can be stated that the use of a mathematical worksheet based on a scientific approach is able to facilitate students' understanding in the material of "the circumference and area of a two-dimensional shape of a square, rectangular



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and triangular". This is reinforced by the results of Khasanah's research (2016) which states that the worksheets are able to facilitate students' understanding with a percentage of more than or equal to 66.67.

Based on the discussion of the development results of a mathematical worksheet based on a scientific approach for elementary school students on the material of circumferential and the area of a two-dimensional square, rectangle, and triangle, then the worksheet is considered successfully developed for the better one, because it is packaged according to the design and able to provide benefits for learning. This is compatible with the theory by Atmojo (2012) that development is an effort that is done consciously, planned, and directed to make or improve something to be more beneficial to improve the quality.

### CONCLUSION

Based on the results of research and discussion, it can be concluded several things as follows:

1. The development of a mathematical worksheet based on a scientific approach developed through the 4D model (define, design, develop dan disseminate) is motivated by students' needs on supporting teaching materials namely the interesting student worksheet and include activities in mathematics subject.

2. The results of validation by media experts, material experts, and linguist has obtained an average score of 86.5% with a very decent category. Moreover, the results of teacher responses obtained an average score of 86.2% with a very good category and student responses obtained an average score of 86.1% in a very good category. Based on this, it can be concluded that a mathematical worksheet based on a scientific approach on the circumferential and the area of a two-dimensional shape material of square, rectangle, and triangle is feasible to use in the learning process.

3. The comprehension test after learning using a mathematical worksheet based on the scientific approach obtained an average score of 81.4 which indicates a very good understanding category. Based on the average score of comprehension tests obtained by students, it can be stated that the use of math worksheets based on a scientific approach is able to facilitate students' understanding of "the circumference and area of a square, rectangular and triangular shape" materials.

Based on the conclusions above, it is recommended that:

1. Mathematical worksheets oriented to the scientific approach can be one alternative of supporting teaching material to train students in understanding "the circumference and



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area of a two-dimensional shape of square, rectangular and triangular" materials.

2. For other researchers who will carry out expert testing or product validation, should be printed in small quantities to avoid wasting costs, energy and research time.
3. Is expected to develop media or teaching material with the different subject materials, so it can become a media or supporting material for other learning materials.

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