# TEACHING 5ᵀᴴ-GRADERS GEOMETRY AND MEASUREMENT CONTENT TOWARDS DEVELOPING CREATIVE THINKING

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**Abstract**

*Developing students' creative thinking is to incorporating creative-thinking characteristics into teaching activities. That means converting from psychological activities into educational activities. The article clarifies the concept and characteristics of creative thinking, expressions of creative thinking of 5ᵗʰ-graders in learning Geometry and Measurement content, thereby proposing procedure of designing teaching activities related to this content towards developing 5ᵗʰ-graders' creative thinking.*

**Keywords:** *5ᵗʰ-graders, creative thinking, Geometry and Measurement, student.*

# DẠY HỌC NỘI DUNG HÌNH HỌC VÀ ĐO LƯỜNG
# CHO HỌC SINH LỚP 5 THEO HƯỚNG PHÁT TRIỂN TƯ DUY
# SÁNG TẠO

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**Tóm tắt**

*Phát triển tư duy sáng tạo cho học sinh chính là chuyển những đặc tính của tư duy sáng tạo sang những hoạt động, những cách thức rèn luyện trong hoạt động dạy học. Nghĩa là chuyển từ những hoạt động tâm lý sang các hoạt động giáo dục. Bài viết làm rõ khái niệm và đặc trưng của tư duy sáng tạo, những biểu hiện tư duy sáng tạo của học sinh lớp 5 trong học tập nội dung Hình học và Đo lường, từ đó đề xuất quy trình thiết kế các hoạt động dạy học nội dung Hình học và Đo lường cho học sinh lớp 5 theo hướng phát triển tư duy sáng tạo.*

**Từ khóa:** *Học sinh, Hình học và Đo lường, lớp 5, tư duy sáng tạo.*

## 1. Introduction

Creative thinking is a high-level human intellectual activity. This thinking plays an important role in all areas of life, from learning, research, business, to arts, entertainment... Developing students' creative thinking is one of the top tasks of the education, with the focus being on the primary. This is clearly shown in the educational purpose of the school.

Currently, in our country there are many authors researching issues of developing students' creative thinking, such as: Hoang (1969) researched on fostering mathematical creativity in high school; Do (2014) mentioned developing some elements of creative thinking for elementary school students; Nguyen (2018) researched on teaching solving some types of Arithmetic problems to train creative thinking for good and excellent students in grades 8 and 9 in middle school; Phan and Nguyen (2019) researched developing creative thinking for high school students in teaching solving spatial geometry problems,... The research results have partly helped tearchers, who are directly involved in teaching, initially understanding creative thinking, finding the need to develop creative thinking for students and knowing some measures to develop creative thinking for students. However, those results are still not enough to meet current teaching practices in high schools in our country.

Geometry and Measurement are contents that have a lot of potential in developing creative thinking for elementary students. This article clarifies some typical manifestations of creative thinking, manifestations of creative thinking of 5th-graders in learning Geometry and Measurement contents. It also presents the process of designing teaching activities for Geometry and Measurement contents towards developing 5th-graders' creative thinking.

## 2. Contents

### 2.1. Creative thinking

Creativity is the highest form of intellectual activity, especially important for human development. The concept of creativity or creative thinking has been introduced by researchers from many different perspectives. When researching thinking, Le (2008) said that: creative thinking or exploratory thinking is a open thinking type, illogical thinking, closely relate to critical thinking or logical reasoning thinking in looking for solutions to solve problems. According to Nguyen (2008), flexibility, independence and criticism are necessary conditions of creative thinking, are characteristics about different aspects of creative thinking; the creativity of thinking is clearly shown in the ability to create new things, discover and find new directions.

Although the creative thinking concept is explained by many different angles, some common points can be drawn as follows: Creative thinking is an attribute, a special intellectual quality of humans; Creative activities take place everywhere, anytime, in every field; The nature of creative thinking is that people discover new problems, find new directions, new solutions and create new results.

### 2.2. Opportunity to develop 5th-graders' creative thinking through teaching Geometry and Measurement content

The thinking of 5th-graders is the final stage of concrete operational thinking. In this period, children's spatial awareness also improves significantly. That is, they are aware of the relationships between objects together besides the relationships within an object. Initially, their thinking can separate from the concrete and in some simple cases, make simple changes according to formal logic. Most 5th-graders have the ability to generalize on the basis of analysis, synthesis and abstraction by mind for symbol of things accumulated by experience. Children's thinking is not too tightly bound to realistic images but can manipulate verbal propositions and assumptions, pre-logical elements are formed. The ability to use language to express of 5th-graders has developed. They can use language to express their thoughts, can state evidence and reasons to solve problems, and know how to reason logically before concluding.

The content of Geometry and Measurement in the 5th-grade Math includes knowledge about flat shapes (triangles, trapezoids, circles), solid shapes (cubes, rectangular block), formulas for calculating the area and volume of objects, icons of quantities and units of quantity measurement, practice measuring quantities, calculating and estimating with number quantity measurements,... Studying Geometry and Measurement contents requests students' sharp thinking, imaginative ability (the nature of creative

thinking), and applying knowledge flexibly and creatively to solve problems in new situations, new circumstances. In particular, in teaching Geometry content, such as building formulas to calculate the area of shapes, requires students to know how to analyze, synthesize, and compare to propose implementation plans from which they have conditions for revealing and developing creative thinking. Thus, teaching Geometry and Measurement content in the 5th-grade Math has many opportunities to develop their creative thinking.

**2.3. The expressions of creative thinking of 5th-graders in learning Geometry and Measurement content**

According to Torrance (1962), creative thinking is characterized by the following main elements:

- *Flexibility* is the ability to easily move from one intellectual activity to another; flexibly apply basic thinking operations, existing experiences and skills to solve problems.

- *Fluency* demonstrates the ability to master thinking, master knowledge, skills and demonstrate the diversity of ways to solve problems; know how to consider problems from many angles, thereby proposing different solutions to a problem and choosing the optimal solution.

- *Originality* is the ability to find and decide on strange and unique methods to improve existing solutions to become more optimal.

- *Elaboration* is the ability to plan, coordinate thoughts and actions, develop ideas, test and prove ideas.

- *Problemsensibility* is the ability to detect problems, contradictions, mistakes, irrationalities quickly, have intuitive ability, have emotional richness, sensitive, and feel thoughts' other people.

The elements of creative thinking are closely related to each other and complement each other, in which originality is considered the most important in creative expression, problemsensibility is parallel with the mechanism of creative emergence. Flexibility and fluency are basis for achieving originality, problemsensibility, elaboration and perfection.

From the above characteristics, combining with researching the cognitive characteristics of 5th-graders, content and achieved requirements of Geometry and Measurement in the 5th-grade Math, we summarize some basic manifestations of flexibility, fluency and originality in creative thinking of 5th-graders when they learn Geometry and Measurement content as follows:

❖ *Flexibility*

- Knowing how to convert calculations and formulas for calculating perimeter and area for triangles, trapezoids, circles and some learned shapes; formulas for calculating lateral area and total area for rectangular prism and cubes; formulas for calculating velocity, distance, time of uniform motion to solve situations, problems in which containing Geometric and Measurement content.

- Explainable why that method was chosen to solve problems, expressable the content and ideas of the situation appearing in the problems of calculating circumference and area of triangles, trapezoids and circles, lateral area and total area for rectangular prism and cubes and uniform motion problems.

- Identifiabe relationships between geometric figures to cut, join and arrange triangles, trapezoids, circles, rectangular prism and cubes into many different geometric figures according to the requirements of the problem.

❖ *Fluency*

- Know how to cut, join, and divide a complex geometric figures into simple learned geometric figures such as triangles, trapezoids, squares, rectangles,... to solve the problem in many different ways and choose the best optimal solution.

- Systematize knowledge and finding relationships between unit of measurements, formulas for calculating circumference and area of learned geometric figures, formulas for calculating formulas for calculating velocity, distance, time by writing or drawing mind maps according to your understanding to facilitate math solving and learning..

- Mobilize learned knowledge of formulas, rules, mathematical properties and problem forms to present and solve problems rigorously, theoretical basis.

❖ *Originality*

- Know how to switch languages in the process of learning mathematics by using mathematical terms, mathematical symbols, and summary diagrams to accurately rewrite mathematical content conveyed through words or images, drawings.

- Know how to convert complex problems into familiar problems by finding new associations and combinations, relationships of rules, formulas for calculating circumference and area of geometric figures with learned mathematical forms to solve the problems.

- Know how to make assumptions as a basis for finding ways to solve problems of calculating circumference and area of geometric figures and problems of uniform motion.

**2.4. Designing teaching activities Geometry and Measurement content for 5ᵗʰ-graders towards developing creative thinking**

We propose the process of designing teaching activities Geometry and Measurement content for 5ᵗʰ-graders towards developing creative thinking consisting of the following steps:

*Step 1. Determining achieved requirements of the lesson.*

Based on the achieved requirements specified in the Math curriculum, combined with textbooks, tearchers determine the achieved requirements of the lesson suitable for students. The achieved requirements must be clarified issues: What tasks can students perform, what can they apply to solve problems in real life? What the qualities and competences especially creative thinking can be had opportunities to develop for students? The achieved requirements must be expressed by a specific, quantifiable verb (for example: know, understand, apply or perform) corresponding to students' level of knowledge and skills and has modifiers to clarify students' action level.

*Step 2. Determining contents having opportunities to develop creative thinking.*

This is an important step in the process of designing teaching activities towards developing creative thinking. Tearchers base on the achieved requirements of the lesson identified in step 1, the content of the lesson, students' level of awareness and expressions of creative thinking in learning Geometry and Measurement content to determine contents providing opportunities to develop creative thinking. Tearchers need to clearly show opportunities to develop which expressions of creative thinking through which contents and activities in teaching activities. When choosing

contents to develop creative thinking, tearchers need to be note not to impose on all contents and exercises. Tearchers need to choose appropriate contents to develop creative thinking.

*Step 3. Determining teaching method, teaching mean and teaching form.*

*- Determining teaching method:* Based on the content and achieved requirements of the lesson, the manifestations of creative thinking that tearchers expect from students, the teacher determines teaching methods. When teaching towards developing of creative thinking, besides choosing and coordinating teaching methods suitable for the teaching content and teaching objectives, the teacher needs to focus to promote students' positivity and creativity.

*- Determining teaching means:* In during the process eaching activities Geometry and Measurement contents, teaching mean is one of the important elements. Teaching mean is tool so that students perform experiencing, exploring, and finding knowledge activities. Based on the content and achieved requirements of the lesson, students' level of awareness, the manifestations of creative thinking that tearchers expect from students, tearchers determine teaching mean. Tearchers need to clearly identify the equipments and materials will be used in the lesson (What do tearchers need to prepare? What do students need to prepare?).

*- Determining teaching form:* Applying teaching forms suitable to contents is important to promote students' creativity and positivity. Each teaching form has its own advantages, functions and characteristics. The teacher needs to exploit the advantages of different teaching forms, coordinate them with each other to suit for the content and achieved requirements of the lesson and the environment to implement teaching activities, in which the teacher needs to determine which one is the center and which one is support. The selected teaching forms must have the effects such as: creating excitement for students, stimulating them to engage in learning activities and help all students having the opportunity to develop creative thinking during the lesson.

*Step 4. Designing teaching activities in detail.*

According to Official Dispatch 2345/BGDDT-GDTH, June 7, 2021, on guiding planing education for primary schools, a lesson usually includes 4

activities: Introduction, Forming new knowledge, Practicing and Applying, experiencing (if any). Depending on the type of lesson, the teacher can design different activities in a lesson.

Designing teaching activities is the most important step of the teaching process. Therefore, in this process, the teacher must design activities so that students are not only comprehensively formed and developed necessary skills but also developed creative thinking In each teaching activity, the teacher needs to define content and time clearly, especially need to clearly identify and analyze which manifestations of creative thinking will be developed for students through that activity. Specifically, teachers do the following tasks:

+ Determining the logical sequence of the lesson to come up with ideas designing teaching activities.

+ Imagine about teaching activities that the teacher can develop students' creative thinking.

+ Focus on student activities, students' existing knowledge and skills, the teacher determines needed teaching activities to achieve expected learning results.

+ Completely designing specific activities, operations of both the teacher and students in each teaching activity of the lesson.

The process of designing teaching activities towards developing creative thinking is described by the following diagram:
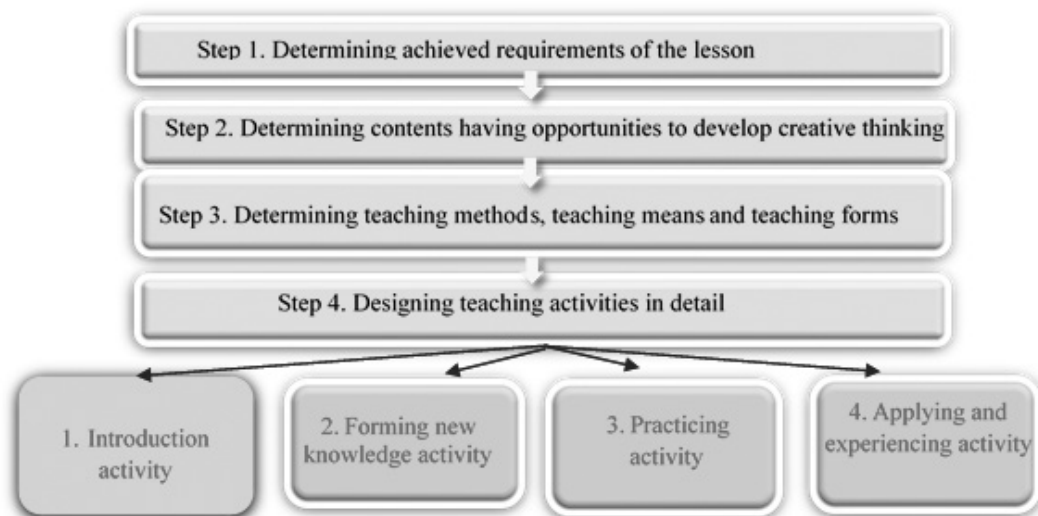


**Diagram 1. The process of designing teaching activities towards developing creative thinking**

*Example:* Designing teaching activities: *Area of a triangle* (5th Mathematics textbook, page 87)

*Step 1. Determining achieved requirements of the lesson.*

- After completing the lesson, students achieve the following requirements:

+ Discovering how to calculate the area of an any triangle through calculating the area of a specific triangle.

+ Can generalize the rule for calculating the area of an any triangle.

+ Appling the rules for calculating the area of a triangle to correctly solve exercises and practical situations.

- Students will be developed creative thinking.

- Students will be developed qualities: Honesty, responsibility when participating activities' tasks, helping others and cooperating with each other practicing and experiencing.

- Students will be developed competences: General competences and mathematical competences.

*Step 2. Determining contents having opportunities to develop creative thinking.*

In this lesson, the teacher can develop creative thinking through forming new knowledge activity (calculating the area of triangle ABC), as follows:

Using the method of dedecting and solving problems in teaching, the teacher states a problem situation that is: How calculate the area of a triangle?

- Students solve the problem by finding relationships with learned figures, cutting triangles to combine into learned figures, known their formulas calculating area → developing fluency, originality.

- Students use the formula calculating assembled figures area to convert into formula for calculating the area of the triangle → developing fluency.

- Students find many ways to calculate the area of the triangle and choose the most suitable way → developing originality.

*Step 3. Determining teaching method, teaching means and teaching forms.*

- Teaching methods: dedecting and solving problem method, practice method, learning game method, suggestive dialogue method, intuitive method.

- Means:

+ Teacher: Textbook, board, paper, scissor.

+ Students: Textbook, notebook, paper, scissor.

- Teaching forms: group teaching, individual teaching.

*Step 4. Designing teaching activities in detail.*

Based on the above steps, we design detailed teaching activities with the main teaching method is dedecting and solving problem method.

The design result:

| |
|---|
| **1. Introduction activity: Connect** <br> Objective: Creating excitement and restoring basic knowledge for students. <br> *Way to perfom:* (The teacher can let students playing games or answering some questions related to basic knowledge). <br> Question 1: State the rules to calculate the area of a rectangle. <br> Question 2: State the rules to calculate the area of a parallelogram. <br> Question 3: Draw the altitude of the triangle ABC (Figure 1). <br> Question 4: State the altitude and bottom of the triangle ABC (Figure 1). |
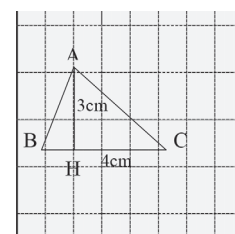


**Figure 1**

**2. Forming new knowledge activity: Discovery**

*Objective:*

- Discovering how to calculate the triangle area through calculating the area of a specific triangle.

- Can generalize the rule for calculating the triangle area

- Developing creative thinking for students through solving problem activities.

Teaching methods: dedecting and solving problem method, suggestive dialogue method, practice method.

*Teaching form:* group teaching

*Way to perfom:*

***Activity 1: Calculating the triangle area***

- The teacher states a problem situation that is: How calculate the area of the triangle ABC having base's length being a and altitude's length being h?

- Students discuss to propose solutions.

- The teacher suggests: To calculate the triangle area, we cut it into a pieces and then reassemble them into a rectangular. We will calculate the area of the triangle through the area of the rectangle.

✓ Cutting the triangle:

- The teacher orients: Draw a altitude, cut along the altitude; Cut from the mid-points of the two sides, the cut line is parallel to the bottom; Cut from mid-points of the two sides, the cut lines is parallel to the altitude.

- Groups of students do the work, the teacher connects and supports the groups.

✓ Assembling a rectangular:

- Students find relationships between the characteristics of the rectangle and the cut pieces to reassemble.

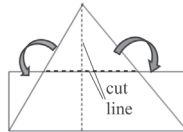- The teacher observes and supports student groups.

✓ Calculating the area of the rectangle:

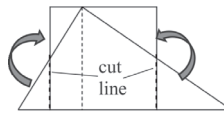- Student groups report their practice results, which can be done in many different solutions.

*Solution 1: Cut two equal triangles, assemble the cut pieces into a rectangle*
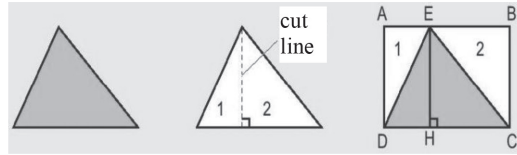
**Figure 2**

*Solution 2: Cut the triangle, assemble the cut pieces into a rectangle*



**Figure 3**

*Solution 3: Cut the triangle, assemble the cut pieces into a rectangle*



**Figure 4**

The remaining solutions can be introduced by the teacher at the end of the lesson.

✓ Comparing and contrasting geometric features in the newly assembled figure

The teacher randomly chooses one of the above methods to exploit. We exploit method 1 (according to the spirit of the textbook).

- The teacher asks students to compare:

+ The area of the rectangle ABCD with the triangle area EDC (The area of the rectangle is twice the area of the triangle because it is reassembled by 2 equal triangles).

+ The length of the rectangle and the bottom of the triangle (equal).

+ The width of the rectangle and the altitude of the triangle (equal).

✓ Calculating the area of the triangle

- Students discuss to find out fomular calculating the triangle area ABC, the fomular is:

$$S = a \times h : 2$$

- The teacher asks students discussing the solutions to find out the best solution.

***Activity 2: Generalizing the rule for calculating the triangle area***

- The teacher calls a student repeating the rule calculating the triangle area

- The teacher makes general comments and states the rule: "To calculate the triangle area, we multiply the length of the bottom with the length of the altitude (the same unit of measurement) and then divide by 2".

**3. Practicing activity**

*Objective:* Applying the rule calculating the triangle area to solve problems.

*Teaching method:* practice method.

*Teaching form:* individual teaching.

*Way to perfom:*

- Students read the topic of problems in textbook and solve the problems themselves.

- The teacher observes, supports and comments.

**4. Applying activity**

*Objective:* Applying the rule calculating the triangle area to solve real-life situation

*Teaching method:* practice method.

*Teaching form:* individual teaching.

*Way to perfom:*

The teacher presents a real-life situation/a real-life problem, asking students applying the rule calculating the triangle area to solve that situation/problem. Then, the teacher comments.

### 3. Conclusion

In the field of education and training, creative thinking plays an extremely important role and is an indispensable element of the comprehensive personality development process. To meet that requirement, right from the elementary level, developing creative thinking for students becomes extremely necessary. It can be affirmed that, in elementary school, every subject has the potential to develop creative thinking for students. In particular, Math has many characteristics similar to the main characteristics of creative thinking, so it has advantages in developing students' creative thinking, teachers need to take the advantages in the teaching process.

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