

GEOMETRY HUMANIZED: A School Play in One Act

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Source: *The Mathematics Teacher*, Vol. 21, No. 2 (FEBRUARY, 1928), pp. 92-101

Published by: [National Council of Teachers of Mathematics](#)

Stable URL: <http://www.jstor.org/stable/27951004>

Accessed: 25-02-2016 19:11 UTC

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# GEOMETRY HUMANIZED <sup>1</sup>

## A SCHOOL PLAY IN ONE ACT

BY ERMA SCOTT

*Greeley, Colorado*

### CHARACTERS

Geometry.

Plane and Solid.

Triangles P D Q and I O U.

Parallelogram B R A G.

Polygon A D U N C E.

Triangles A B C and A' B' C'.

Circle O.

The Teacher.

The Ghost of Euclid.

Mary, Elizabeth, Robert, Lewis, Lloyd, Charles, Florence, and several other high school pupils.

### INTRODUCTION

This little play was written for a sophomore class to give for an assembly program. At the time there was no intention of publishing it, but the play held the interest of the high school audience so well that the writer decided to put it on the market, thinking that other geometry teachers might find it useful for the same purpose.

The costumes were made in the school shops by members of the class. The triangles, the parallelogram, and the other polygon were light-weight wood frames covered with building paper. These the boys and girls held in front of them. Only the feet were visible, except when one's turn came to speak. Then he peered around from behind the figure. The original intention was to make openings for the faces in all the figures.

Geometry carried a large paper-covered rectangle on which was drawn a partially opened book. For the costume of Plane,

<sup>1</sup> Copyrighted Nov. 8, 1927.

all sorts of plane figures were cut from colored paper and fastened to a dress. A circle of stiffer material with an opening large enough for the face was tied to the head. Solid had an appropriate suit made from heavy boxes such as one can get at any grocery store. One large box slipped over the head and rested on the shoulders. Another cubical box fitted over the opening in the large one and formed the head. This, too, had an opening for the face. Both boxes were covered with bright-colored paper.

Circle O was made up of two large circles cut from wallboard. These were nailed to cross pieces of wood, allowing enough space between them for a small boy to roll the circles from the inside.

#### PROLOGUE

Geometry appears in front of the curtain accompanied by his two children, Plane and Solid.

*Geometry (with dignity)*: I am Geometry, and these are my children, Plane and Solid. (Plane and Solid curtsy.) I can see by the expressions on your faces that some of you have never heard of me. With a few of your number I may claim a passing acquaintance, but I regret that this acquaintance has not developed into friendship and understanding.

For the first time I have left my home and assumed the form of a human. At least I thought I looked human until I came here, for I tried to mould myself into a shape resembling one of my admirers—an extremely bookish geometry teacher.

I come from the land of Truth, a country only partially explored. Many have spent their lives trying to find it. Some do not recognize it when they see it, while others think they possess the whole land, when they are standing on a small corner facing the opposite direction. There are also those who are too indolent to seek it for themselves. They are content to accept the opinions of the more ambitious. I myself am familiar with only a minute area of my own country, but in that limited district I am sure of the ground.

I may boast of the wisdom of the ages, for I am thousands of years old. Civilizations have perished while I have remained the same. My friends have been the renowned of all generations—Thales, Pythagoras, Euclid, and others too numerous to mention.

All over the world you will find monuments to my importance.

In fact I have had a hand in every great building that has ever been constructed. It really ought to be beneath my dignity to boast of friends and achievements, but for the sake of my children I am willing to humble myself.

They claim that never in all their lives have they received such treatment as they have at your tongues. You have been accused of murdering the King's English, but that is a minor offense compared with what you have done to my family. If all you have said about us were true, our reputations for reliability would be ruined. In view of this alarming situation, we have decided to hold a conference of the outstanding figures of plane geometry to discuss measures for restoring our good names and warning those who have slandered us.

#### SCENE I

The scene is in a mathematics room of a high school. At the left is the teacher's desk. At the right the chairs have been pushed back. About the room are grouped all the figures except Circle O, who is late in arriving.

The time is evening when everyone except the janitor has left the building. The figures are engaged in conversation when the curtain rises.

*Triangle IOU:* Polygon ADUNCE, you don't look quite natural. Weren't you originally composed of three triangles? Now I see you have four. You had better try some reducing exercises.

*Polygon ADUNCE:* Yes, I have added a triangle since you saw me in Smith's Essentials. You notice any gain in me more than you do in some people, because the addition of a triangle changes my shape.

*Parallelogram BRAG:* (Proudly) I guess that is true. When I grow larger it isn't so noticeable. By increasing my base and my altitude ever so slightly I can become many square inches larger. If, for instance, my base is 8 inches and my altitude 3 inches, my area will be 24 square inches. But if my base is increased to 10 inches and my altitude to 4, my area will be 40 square inches. I shall be nearly twice as large, but the change in my shape will not be apparent.

*Triangle PDQ:* (Aside) Pretty well satisfied with himself, is

he not? (Aloud) In my opinion, Circle O can put it all over the rest of us. Did you ever see such a well-proportioned figure? If you increase his diameter, you increase his circumference in the same ratio, for his circumference is always approximately three and one-seventh times his diameter.

*Polygon A D U N C E*: Yes, Circle O is a smooth figure. One can't accuse him of having any rough edges. But who would want to be so smooth and characterless. I prefer to have some individuality. All circles look alike to me. Now if I cared to, I could easily be reduced to a triangle, or I could be made to look very nearly like a circle. Even close observers would exclaim, "Why, there is no difference at all between them." But there is a limit to everything and the circle is mine. I can't quite bring myself to the place where I am willing to lose my own personality.

*Parallelogram B R A G*: (With sarcasm) A fine speech, brother Polygon. I suppose we all have our good points, and everybody except you and me has some bad ones.

*Polygon A D U N C E*: Well, I think it is better to have a few bad points than not to have any points at all. I have always thought of a circle as rather an unstable figure, easily swayed from one side to another.

*Triangle A B C*: By the way, isn't it about time for Circle O to be showing up? One never can tell when he is going off on a tangent.

*Parallelogram B R A G*: He is a great protractor. I'll wager both my diagonals that he will come rolling in an hour late.

*Triangle A' B' C'*: Looking at it from all my angles, we haven't wasted any time. It does me good to talk everybody over, in a friendly spirit of course. I get so full I have to hold my sides to keep my altitudes erect.

*Triangle P D Q*: Sometimes I think people get away with a lot of meanness under the cover of friendship. (A noise is heard outside.) Hark! I believe Circle O is coming now.

*Parallelogram B R A G*: (Speaks as Circle O rolls in and stops near right entrance.) We had about given you up, Circle O. We hope you had no trouble on the way.

*Circle O*: I did have some tire trouble. About five miles from here I intersected a secant and punctured my inner tube, so I had to come in on the rim.

*Polygon A D U N C E*: That is too bad. I've never picked up a secant. I'm surprised that you did with chorded tires.

*Parallelogram B R A G*: We had better get down to business.

As you all know, we have met to discuss geometry students in general, and the ones in this school in particular. The situation doesn't appear alarming to me, but if it is serious, as most of you seem to think, I am willing to do my share in bringing about a reform.

*Polygon A D U N C E*: (Emphatically) I assure you I wouldn't have taken the trouble to come here if I hadn't considered it necessary to preserve the honor of Geometry.

*Circle O*: Do you think it as bad as that?

*Triangle A' B' C'*: Polygon knows what he is talking about. As I was coming through the halls, I peeked into a room where there were a lot of figures on the board. I shouldn't have recognized them if they hadn't been labeled. There were circles with centers nowhere, and with circumferences everywhere. Right triangles with no right angles, isosceles triangles, all lopsided, and parallelograms with no two sides parallel.

*Triangle I O U*: But that isn't the worst. Skepticism is creeping into the school. This morning I heard an argument between a boy and his teacher. The boy insisted that there was a possibility that parallel lines if produced far enough would meet. In vain the teacher tried to convince him that if the lines did meet they would not be parallel. It is enough to make Euclid rise from the dead.

*Parallelogram B R A G*: (Stubbornly) I still insist there is no great cause for alarm. I can't say I have been shown any disrespect. (Emphasis on "I.") Boasting is not in my line, but I really believe the boys and girls like me. They are always glad when they get to parallelograms. I have heard them say, "I like parallelograms better than any other figures in the book."

*Polygon A D U N C E*: I don't want to be uncomplimentary, but this is no time for covering up things. I can tell you why they all like you. It is because you are easy. They all like easy things. "Nice and easy" is a favorite expression these days. It doesn't take them long to see through you. (Boastfully) I have a great many more possibilities, if I do have to say it myself.

*Circle O:* My opinion is concurrent with that of Parallelogram B R A G. I don't care to be considered so deep. I'd rather be an all around good fellow—easy to meet, and entertaining. I frankly admit that I want people to like me, and I court the favor of all who come within my radius.

*Triangle A' B' C':* It seems to me that we are avoiding the point. To make a long story short, the pupils of this school have lied about us, drawn cartoons of us, and in other ways have threatened to destroy our dignity and reputation for truthfulness.

*Circle O:* Those are grave charges. I think we ought to visit one of these geometry classes, so each one of us can see for himself what has been going on.

*Triangle P D Q:* That is the most sensible suggestion that has been made yet. I move that we do that very thing.

*Circle O:* We shall have to hurry before the janitor locks us in.

## SCENE II

This scene is in the classroom the morning after the conference of the figures. It is nearly time for the first period class. All the pupils except a few stragglers are in their places when the curtain rises. Some are talking, others are trying to get their lessons at the last minute. The teacher is at her desk, making out the attendance slip.

Mary and Elizabeth enter from the right and take seats in the front row.

*Mary:* I can't understand these propositions about similar triangles at all.

*Elizabeth:* Neither can I. I never could understand proportion.

*Teacher:* Wait a few minutes, then I will explain it to all of you at the same time.

*Robert:* (Enters lazily dragging his feet, and takes a seat next to the aisle. Speaks as he enters.) When is spring vacation going to be?

*Teacher:* I don't know; they haven't informed us yet.

*Robert:* It can't come too soon to suit me. I'm getting all tired out working so hard. (Sprawls in his seat. The class is amused.)

*Lewis:* (Enters breathlessly, glances at his watch, is tripped by Robert, stumbles and drops books.) Cut it out!

*Teacher:* Lewis, can't you be more quiet?

*Lewis:* Yes, sir.

*Teacher:* (Addressing class) How many of you had trouble with today's lesson? (Nearly all raise hands.)

*Lewis:* I had a lot of trouble, but I worked on it until midnight, and I'm sure I can prove it.

*Teacher:* When did you begin to study, Lewis?

*Lewis:* At 11:45. (Laughter from class.)

*Teacher:* Come! Come! That will do!

*Lloyd:* I know it too. May I prove it first?

*Mary:* May I sharpen my pencil?

*Teacher:* No, you should have done that before you came to class.

*Mary:* How could I when I just broke it?

*Teacher:* Let us have quiet. I hear someone coming. I think we are going to have visitors. (Triangles  $ABC$  and  $A'B'C'$  enter from right and take a position at the back between the desk and the chairs.)

*Teacher:* Good morning.

*Triangle  $ABC$ :* We beg your pardon for intruding. We are here in the interests of Geometry, Plane Geometry in particular, and we would like to see what kind of work your pupils are doing.

*Teacher:* Very well, we will go on with the recitation. We are now studying similar triangles.

*Triangle  $A'B'C'$ :* Ah, that is of special interest to us, as I happen to be Triangle  $A'B'C'$ , and this is my close associate, Triangle  $ABC$ . If you don't mind, I think it would be more satisfactory to let us take charge of the recitation.

*Teacher:* That will be all right.

*Triangle  $A'B'C'$ :* (Turning to class) Cecil, do you recognize us?

*Cecil:* (Frightened) Yes, sir, you are Triangles  $ABC$  and  $A'B'C'$ .

*Triangle  $ABC$ :* What do you know about us?

*Cecil:* (Doubtfully) You can be proved congruent.

*Triangle  $A'B'C'$ :* Take another look at us. Do you still insist that we can be proved congruent?

*Cecil:* Yes, sir, you have the three angles of the one equal respectively to the three angles of the other.

*Triangle  $ABC$ :* What does congruent mean?

*Cecil:* It means equal in all respects.

*Triangle  $A'B'C'$ :* Do we look equal in all respects?



*Cecil:* No, you have the same shape but not the same size.

*Triangle A B C:* (With disgust) Can anyone tell us how we are related?

*Lewis:* You are similar.

*Triangle A B C:* That is much better. Can anyone prove us similar when our sides are respectively proportional? (Several hands are raised.)

*Triangle A B C:* Robert, let us hear from you.

*Robert:* (Walks up to figure confidently.) If two polygons have their sides respectively proportioned, they are similar triangles. Given the triangles  $A B C$  and  $A' B' C'$ , (hesitates) with  $A B = A' B'$ ,  $A C = A' C'$ , and  $B C = B' C'$ .

To prove the polygon congruent.

Proof: Place the polygon  $A' B' C'$  upon triangle  $A B C$  so that  $A B$  will equal  $A' B'$ . (One straight line and only one can be drawn through two given points.) Then  $B C$  will equal  $B' C'$ . (One straight line and one only can be drawn parallel to a given line.)

*Triangle A B C:* Take your seat. Not a thing you've said about us is true.

*Triangle A' B' C':* We must not be too hasty in drawing conclusions. We'll call upon Lewis. (Lewis walks up proudly and makes a perfect recitation, then takes his seat feeling very much pleased with himself.)

*Triangle A' B' C':* That is what I call good work.

*Charles:* I'd like to know if he can prove it with the letters changed?

*Lewis:* Sure I can. Do you want to hear me?

*Triangle A B C:* I'll call in Triangles  $I O U$  and  $P D Q$ ; I told them to wait outside. (Triangle  $A B C$  leaves through door at the left, and Triangles  $I O U$  and  $P D Q$  enter.) (Lewis starts the proof again, calling the letters  $A B C$  and  $A' B' C'$  as before.)

*Triangle A' B' C':* (Interrupts impatiently) Take your seat. That isn't right at all.

*Lewis:* I'd like to know why. I got it from the book.

*Triangle A B C:* Just as I feared. Lewis has been memorizing.

*Lewis:* (Grumbles as he goes back to his seat) What's the use in buying a book if it ain't any good?

*Triangle IOU*: Ah, I see my friend Parallelogram is coming.

(Class shows signs of pleasure.)

*Lloyd*: We're sure glad to see you. We all hate similar triangles.

*Triangle PDQ*: Such impertinence! That is because you do not understand us. We are the most misunderstood figures in Plane Geometry. The boys and girls of this age have no sense of proportion. They will go to any extremes to prove all proportions mean. With their antecedents it was different. If they didn't master their lessons, they knew only too well what the consequents would be.

*Parallelogram*: Boys and girls, what do you know about me?

*Mary*: Your opposite sides are parallel.

*Elizabeth*: Your opposite sides are equal.

*Charles*: Your opposite angles are equal.

*Robert*: Your diagonals bisect each other.

*Parallelogram BRAG*: I don't see anything wrong with this class. You Triangles scare the pupils, and I don't wonder at it. I've been connected with you all my life. We are composed of the same elements—straight lines and angles. Yet I confess you are sometimes too much for me.

*Polygon ADUNCE*: (Enters from right) What is all this fuss about: Children, you surely know me. I am Polygon ADUNCE. Florence, can you tell me what is the sum of my exterior angles?

*Florence*: What page are you on?

*Polygon ADUNCE*: What page am I on?

*Florence*: Yes, what page in Smith's Essentials?

*Polygon ADUNCE*: I must be obtuse, but I can't see what difference that makes. If you must know, I am on page 64.

*Florence*: (Brightening) Then the sum of your exterior angles is two straight angles. I can always prove the propositions better if I know what page they are on.

*Polygon ADUNCE*: (In exasperation) Well, I'll be bisected! This gives me a concave feeling. Pardon my rough speech. I have seen and heard about all I can stand. (Notices Circle O, who has come in from the right.) Circle O, do you have anything to say?

*Circle O*: No, I feel out of my locus. I've been standing behind the door trying to compass what has been going on, but I can't get a straight edge on the meaning of it all. If I stay around here much longer, I'll lose faith in the axioms.

(At this point the ghost of Euclid appears at the left. He is carrying a large roll of paper.)

*Ghost:* I am the ghost of Euclid. I have been listening and thinking. Like most conferences, this one seems to have accomplished nothing definite. You have been so occupied with thoughts about yourselves, your petty prides and jealousies, that you have forgotten that your coming together was for the good of all.

Still, the meeting has not been without results. You must have observed that Geometry can be interesting and thought-provoking at the same time. Where it has failed to be, there has been a reason. (Points an accusing finger at the teacher.) Geometry, the teacher, and the pupil have been considered incommensurable quantities. They have had no common unit of measure. Now it can be shown that the difference between commensurable and incommensurable may be less than one billionth or a trillionth of any positive value.

When you understand that Geometry can be humanized and that both teacher and pupil even now are human, then you can see that they are all quantities of the same kind and hence you can get a ratio between any two of them. Expressed in fractional form, their ratios would be as follows: (Unrolls paper and reads)

$$\frac{\text{Geometry}}{\text{Pupil}} = \frac{\text{Geometry}}{\text{Teacher}} = \frac{\text{Pupil}}{\text{Teacher}}.$$

It can be proved that these three ratios are equal. If Geometry to the teacher is uninteresting, then Geometry to the pupil will be uninteresting, and the pupil to the teacher will be uninteresting. Also since two equal ratios form a proportion and since in any proportion the product of the means is equal to the product of the extremes, if the value of the pupil is zero, then the teacher can amount to nothing. Likewise if the value of the teacher is zero, then Geometry will amount to nothing. Therefore when either the pupil or the teacher amounts to zero, nothing can be done with Geometry. A word to the wise is sufficient. I would like to have a private conference with the teacher.