

MATHESIS

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SCENE

The scene is an underground studio or workshop. Incense is burning in a large black kettle hanging from a black tripod at front of stage. A red electric bulb under the kettle is surrounded by sticks of kindling wood. Two large portable blackboards are placed one at each side of front stage. Small table with white paper spread ornamented with black paper figures (circle, trapezoid, triangle, etc.) is concealed behind left blackboard. On the table are the following articles: cardboard cylinder, three ice cream cones filled with sand and having same base and height as cylinder. Two eighteen-inch boxes at right front stage covered with white paper and ornamented with black circles to imitate dice.

CHARACTERS

The boys wear black or dark trousers and white blouses; the girls, black skirts and white middies. Each pupil having a speaking part has large white card hung with black ribbon about the neck. On the card is drawn the proper symbol in large black type—*i.e.* Simple Interest has the percent sign (%) on his card. Plane Geometry (II), etc. Characters to be written on cards are in parentheses.

{Witch—Black dress and cape, tall pointed black hat, long hair made from unbraided rope and carries broom with long black handle.

Mr. Decimal Point (.)—black bow, white arrow.

Simple Interest (%).

Cutey Angle (V)—Black cap with long white plume.

Two Cone People—Carry ice cream cones filled with white cotton streaked with red ink.

Plane Geometry (II)—Carries white hoop with black string tied across for diameter.

Isosceles Triangle (Δ)—Carries large white protractor.

Mr. L. W. H. ($v=lwh$)—Carries white measuring stick.

Miss Numerator—Denominator ($5/8$).

Miss Elementary Algebra (x^2y^3z).

Small Number (3).

Large Number (984,762,351).

Zero (0).

Infinity (∞).

As many more as stage will accommodate in order to have a crowd of interested lookers-on.

THE PLAY

*Music.*¹—Enter Witch, who advances slowly toward kettle and stirs contents with large black spoon while Decimal Point sneaks up from rear of stage imitating motions of witch. Music ceases.

Witch (much astonished): My little man, what are you doing down here in this cave of the underworld? How *dare* you come here?

Mr. Decimal Point: O witch, my name is Decimal Point and I'm not afraid of anything. I go *everywhere*. I crawl into all sorts of places whether I'm welcome or not. With my bow and arrow I can shoot anything I meet. You see I've been out hunting with my friends and when we discovered this cave they wished me to enter and inquire what you are doing and to whom this cave belongs.

Witch: This is the cave of Æolus, the king of the winds, and this is the isle of Æolia where Æolus and his six sons and six daughters live, keeping eternal carousal.

I, boy, am Hecate, a mysterious divinity. *I* represent the darkness and terrors of night. *I* haunt the crossroads and graveyards. *I* am the Goddess of Sorcery and Witchcraft. *I* am seen only by the dogs whose barking tells of my approach.

Mr. Decimal Point (stealing up to the kettle): May *I* ask what you are boiling in that kettle?

Witch: Tut, tut, my boy, *I* am boiling up answers.

Mr. Decimal Point: Boiling up answers, answers to what, pray tell.

¹ Kolling, Carl, Op. 147, No. 3. Flying Leaves. Century Music Co. 231-235 W. 40th St., New York City.

Witch: The king of the winds has two henchman, Boreas, the North Wind who blows directly north from our isle for 300 leagues until he reaches the City of Ignorance, and Eurus who blows directly east for 400 leagues until he reaches the City of Inaccuracy. King Æolus has commanded me to boil out the number of leagues that a third wind must blow in whirling cross country from the City of Ignorance to the City of Inaccuracy.

Mr. Decimal Point: O, witch, that's easy. Do you mind if I write on this wall? (Looks at blackboard at left where odd-shaped white marks have been made.) But what are all these marks?

Witch: Those are records of my evil deeds—all the crimes I have committed this week.

Mr. Decimal Point: Sorry to upset your bookkeeping, but let me show you how to find the number of leagues for the third wind. (Advances to board at left stage, erases it and illustrates his talk by the use of a large right triangle.) This is 300 leagues to the north and this the City of Ignorance, then 400 leagues to the east and here is the City of Inaccuracy. Now the square of 300 is 90,000; the square of 400 is 160,000. The sum of the two squares is 250,000 and the square root of 250,000 is 500. Now the third wind must blow 500 leagues according to the teachings of dear old Pythagoras.

Witch: And who is the *god* Pythagoras?

Mr. Decimal Point (with disgust): Pythagoras is not a *god*. He lived on the isle of Samos and he has taught us that in any right triangle the square of the hypotenuse is equal to the sum of the squares of the legs. Now, witch let me call in my friends who are waiting outside the cave, they can tell you a great many more interesting things.

(Witch sits down on large dice at right stage. Much noise and laughter off stage. Mr. Decimal Point goes to rear and beckons. Noise ceases, music.²)

(Enter all other characters, also sufficient number of pupils to make stage well filled.)

Mr. Decimal Point: Now, Simple Interest, will you sing a mathematical song to our honored hostess of the underworld?

² Smith, Seymour. Dorothy—Old English Dance. Century Music Co.

Simple Interest: With great pleasure, Mr. Decimal Point. (Steps to front stage and sings the Number Song.³)

Mr. Decimal Point: That's fine; thank you very much, Simple Interest. I didn't know that you could sing so well.

Cutey Angle (Skips forward in a rollicking fashion): Bet yer I know some mathematical sums that you can't answer. What's a tall coffee pot in use called? (All shake heads.) Give it up? Hypotenuse.⁴

If you should lose your parrot what would you say? (All shake heads.) Give it up? (With a giggle) Poly-gone.⁴ What's an article for serving picnic ice cream?⁴

The Cones (coming forward eating their ice cream): Cones.

Cutey Angle: I must go out now to see the race.

Witch: What race?

Cutey Angle: Human race—don't worry, you don't belong to it.⁵

Mr. Decimal Point (to cones): What do you know about cones?

First Cone: A cone is formed by rotating a right triangle about one of its sides.

Second Cone (to First Cone): How many cubic inches of ice cream does your cone hold. (Borrows white measuring stick from Mr. L. W. H.) It is 4 inches high and has a radius of one inch, so it holds $\frac{1}{3}$ of $3\frac{1}{7}$ times the square of one times 4 cubic inches or $4\frac{1}{5}$ cubic inches.

First Cone: For the land's sake, lucky you multiplied by $3\frac{1}{7}$ to make the answer larger. I don't feel as if I had eaten even $4\frac{1}{5}$ cubic inches of strawberry ice cream. Why not multiply by $19\frac{7}{8}$ or something to make us feel as if we had really had a good feed.

Mr. Decimal Point (in disgusted manner to Cutey Angle who has procured the Witch's broom and is sweeping the floor): What in the world are you trying to do with that broom, Cutey Angle?

Cutey Angle: I'm sweeping up the jokes that didn't get over the footlights.

Plane Geometry (anxiously coming to front stage holding up a white hoop): I can tell you about that $3\frac{1}{7}$. See my hoop.

³ MATHEMATICS TEACHER, Vol. XVIII, October, 1925, page 353.

⁴ MATHEMATICS TEACHER, Vol. XVIII, October, 1925, page 356.

⁵ From Criss Cross as played by Fred Stone, New York City, 1927.

I have broken it so I tied it up with a string. This black string is the diameter and it is 17 inches long. When I multiply the length of the diameter by $3 \frac{1}{7}$ I obtain $53 \frac{3}{7}$ inches, which is the distance around my hoop. The Greeks used their letter Pi (points to the "Π" on his card) to represent $3 \frac{1}{7}$. Pi is the Greek letter P, and stood for "periphery" which means "circumference." Many values have been used for Pi, ranging from 3 to the value out to 707 decimal places. At present every school boy knows it as 3.1416 or about $3 \frac{1}{7}$.

First Cone: I may be dumb, but I don't see yet what the $3 \frac{1}{7}$ and the length of the circumference has to do with my ice cream. I don't eat the cone or the rim around the top. I eat what's inside.

Plane Geometry: Well, let me have the floor once more, and I'll explain again. Before you can find the volume of your ice cream . . .

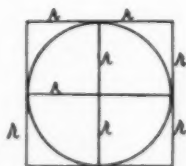
Cutey Angle (breaking in from the right side): It will all be melted.

Plane Geometry: Before you can find the volume of your strawberry ice cream you have to find the area of its base which would be a circle.

Cutey Angle (with a giggle): Ice cream with a "base," strawberries with a "sporano"—Ha, ha, ha.

Mr. Decimal Point: Silence please; no more nonsense from you, Cutey Angle. Continue now, Plane Geometry, please.

Plane Geometry (steps to large blackboard at right): Here's your circle with radius called "r." How many squares are there?



Whole Class (witch looking on): Four squares.

Plane Geometry: What is the area of one square?

Whole Class: r square.

Plane Geometry: What is the area of all four squares together?

Whole Class: Four r square ($4r^2$).

Plane Geometry: Do you think the area of the circle is more than the area of the four squares?

Whole Class: No, the circle area is a little less than the area of the four squares.

Plane Geometry: Well, it is $3\frac{1}{7}r^2$ and not quite $4r^2$. So the area of every circle is found by squaring the radius and then multiplying by $3\frac{1}{7}$. Now First Cone do you understand that brother second cone was right when he told you to square one and then multiply by $3\frac{1}{7}$. Then the cream is 4 inches deep so you have to take that into account, and your cone (borrows the cone from Second Cone) is pointed and holds just $\frac{1}{3}$ as much as a cylinder, provided they have the same sized bases and equal heights. Let me show you. (Motions to two pupils who bring out small table from behind left blackboard and place it at front stage.) See this cylinder. Its base has the same area as the base of this cone. (Compares the two bases carefully.) The cylinder is empty, but each of these three cones is filled with sand. Watch me. (Empties sand from three cones into cylinder slowly so all can see. Witch appears to be quite overcome.) It takes three cones full to fill the cylinder, therefore one cone holds just $\frac{1}{3}$ as much as the cylinder provided the dimensions are the same.

The formula for the volume of a cone is $V = \frac{1}{3}bh$.

Isosceles Triangle (who has been measuring the angles which the tripod made with the floor by using the large protractor): Just see, folks, what I've found. These sticks form an isosceles triangle with the floor of the cave as a base. Each base angle measures 55 degrees, and since there are 180 degrees in every triangle, there must be 70 degrees in the angle up here. (Measures the vertex angle above the kettle.) Yes, there are 70 degrees in the vertex angle.

Mr. L.W.H.: Pardon me, Witch, but are you aware that the white box upon which you are sitting is a cube. What use do you make of the dots on it?

Witch: I toss these dice and count the black spots on them. They tell me how many *evil deeds* I must do each night.

Mr. L.W.H.: O Witch, don't be so cruel, let me explain what wonderful mathematical forms your dice are. The length, width, and height are all equal. (Measures carefully with white measuring stick.) It is just 18 inches on an edge, so its volume will be $18 \times 18 \times 18$ cubic inches or 5,832 cubic inches.

Mr. Decimal Point: Is our poetess, Miss Numerator Denominator, present?

Miss Numerator Denominator: Yes, Mr. Decimal Point.

Mr. Decimal Point: Will you recite one of your latest poems for us—the one you composed while you were on your vacation at Mount Quadratic last summer with your friend Miss Elementary Algebra.

Miss Numerator Denominator: With great pleasure Mr. Decimal Point. (Comes to front stage and recites poem entitled First Aid in Algebraic Fractions.⁶)

Mr. Decimal Point: We could tell you many more interesting facts, old Witch, but now that you have learned that it is 500 leagues from the City of Ignorance to the City of Inaccuracy, I hope your boss, old King Æolus, will not scold you for spending a little of your time with us. We must all return to the upper world now and go back to our duties at our beloved ---- School. In parting, we'll sing you a song. (Entire group forms acute angle on stage with vertex at rear and sings the Number Song.⁷ (Pupils point to the cards of the following as they are mentioned in the song: "numbers great," "numbers small," "vast infinity," "zero.")

Exit All

⁶ MATHEMATICS TEACHER, Vol. XIX, February, 1926, page 101.

⁷ MATHEMATICS TEACHER, Vol. XVIII, October, 1925, page 353.