

Hypatia's Math

Synopsis

A young woman (Hypatia) in Roman Alexandria develops herself into a gifted geometer, mathematician and teacher, but her world is destroyed by the growing darkness and political strife that emerge. Religious fundamentalism builds steadily in this clash of cultures. Inspiring excerpts from classical works by Porphyry, Plotinus, Aristotle and Plato are woven into the action to further the plot and add to the classical mood, while the events in the play are based closely on extant historical texts. Dance and music, including an Homeric hymn, add to the artistic texture. Hypatia of Alexandria was the most famous woman mathematician of antiquity, and her story is as relevant now as it was in her day.

Cast Requirements

Minimum of six (6) actors.

Major Characters

Hypatia
Synesios

Minor Characters

Minor characters in the following list are grouped as they appear in various scenes to allow for ease of casting. For example, the same actor could play Emperor Constantios, Athanasios, Orestes, Cleonios, Heliodoros, Monk6, Theon, Bishop, and Hierax without any scenes conflicting.

Emperor Constantios	Athanasios	Orestes			
Empress	Theodosios	Heliodoros			
Martyrios	Gaios	Ammonios			
Messenger	Theotecnos				
Cleonios	Athanasios	Monk6	Theon	Bishop	Hierax
Trypho	Heliodoros				
	Gaios				

Others

Children	Disciples (Other)	People
Christians	Guards	Townpeople
Dancers	Jews	Women
Dancers (Women)	Monastics	

Artistry Details

Songs

Act I Scene II — Monastics

Act II Scene VI — Hypatia

Other Music

Flute: Act I Scene III

Kithera (or other stringed instrument): Act II Scene VI — Hypatia

Music: Act III Scene VIII

Dances

Act I Scene IV — Dancers

Act I Scene VI — Townspeople

Act I Scene VII — Dancers (Women)

Act II Scene II — Disciples, Women

Act II Scene VII — Dancers

Act III Scene I — Dancers

Act III Scene IV — Dancers (Women)

Act III Scene V — Dancers (Women)

Philosophy Texts Quoted

Act I Scene VI: *Porphyry, On the Cave of the Nymphs.*

Act II Scene II: *Plotinus, An Essay on the Beautiful.*

Act II, Scene IV: *Aristotle, Physics.*

Act II, Scene VI: “Hymn 14: To the Mother of the Gods.” *Homeric Hymns.*

Act II, Scene VII: *Plato, Crito; Or, the Duty of a Citizen.*

Act III, Scene II: Letters 10, 15 and 16. *The Letters of Synesius of Cyrene.*

See “Appendix: Text Sources” at the end of the play for more complete bibliographical information.

Dedication:

*To my parents, who have been supporting
my creative endeavors all these years.*

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Act I Scene I

Scene: private chambers of Emperor Constantios, where he and the Empress are bathing, both with water, and scraping with oils.

Characters

Emperor Constantios – Eastern Roman Emperor (4th century).

Empress

Two Servants – Martyrios and Messenger

EMPEROR CONSTANTIOS: My foot is Laodicea.

EMPRESS: Yes. Have there been uprisings in Laodicea this week?

EMPEROR CONSTANTIOS: Thankfully, no.

EMPRESS: Good. I'd hate to see bloodshed there.

EMPEROR CONSTANTIOS: Quite right. My right thigh is Eastern Aeolia.

EMPRESS: Yes. And have there been uprisings in Eastern Aeolia recently?

EMPEROR CONSTANTIOS: Let me see. Martyrios!? Yes, come here. Tell me news from Aeolia.

MARTYRIOS: None recent sir. The last was of massacres two years ago, outside of Jerusalem, young men.

EMPRESS: Where is that cut from?

EMPEROR CONSTANTIOS: This? (*points to ...*) A new wound, a reminder of mortality, the poke from a thorn, hunting, trying as I was to find solace in the chase, and never has it been so chaste – no luck with boars nor gazelles, strong luck ever from Our King who Saves, whose thorns hang down before my eyes, and blood, everywhere. But we are not in Heaven. And the boars and gazelles were shy today.

EMPRESS: It doesn't look that big.

EMPEROR CONSTANTIOS: Oh. (*Points to cut, then points to right thigh.*) Aeolia is rising. (*Points to foot.*) Laodicea, too. (*Points to navel*) Alexandria is rising.

EMPRESS: Oh. Has there been famine in Alexandria?

EMPEROR CONSTANTIOS: Our Lord is so merciful, no. I should think there has been enough food.

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EMPRESS: Let's see. ... Any predictions?

EMPEROR CONSTANTIOS: Maybe a fig. ... Any predictions? My wife, you remind me, like the sky which circles the stars for time, you are strong with hope and beauty, both. You remind me to call. To send a Messenger. Message! (*That last was a call for a messenger.*)

(*Addressing the Empress*) Laodicea will have its council soon, and this is good news for the (*points to self and Empress*) faithful. We've not had any problem in our body, but the body of this place does indeed have its (*points to head*) temples, and these temples are forever going to be a source of dogged and strong challenges, acts of turmoil.

With charlatan charts of the future, sacrifice a goat upon the altar, burn incense and find a trance from the sky, which will make the world blinder than an eye from that goat gazing at my navel. With tables to mark the stars, there is sure to be a mathematician or soothsayer bringing some armillary sphere into that chamber of insurrection which we have no intention of letting stand. Yes, we do not like to think such thoughts, not like this. (*Enter Messenger.*)

I think Laodicea will be fine. Let me make a strong edict.

(*To Messenger*) "No one may consult a soothsayer nor mathematician. So says Emperor Constantios, on pain of death." Have this sent to every single city and town large enough to have a marketplace. Thank you.

(*To Empress*) My wife, you remind me of hope and beauty, both, in the furnace of dark lands ruled by the Sun. I will never tire of seeing you rise.

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Act I Scene II

Scene: monastery in Constantinople, 4th century, monastics breaking bread (eating) together.

Characters

6 (or more) Monastics – dressed in dark robes

MONK1: What a miracle (*looks up at his hand, holding a piece of bread*) is bread. Risen from the silver coin which bought it. Greater than the coin.

MONK2: Go on?

MONK1: Bread is virtue, full and sweet, with no sword hiding to take the bread from your fingers. Some may steal your sandals or your purse, but hard pressed to take bread from your hand. It is yours, impressed like the Faith in Our Lord, inseparable from the flesh which holds it dear. (*To another*) Pass the fava beans.

MONK3: This is a nice salad, beautiful cucumbers.

MONK4: What is that – water or wine?

MONK5: Are those (*points to neighbor's sandals*) comfortable? Have you come far with them.

MONK6: Yes, Laodicea is far, and I have been three weeks walking, from Laodicea to Constantinople. Nothing special. The laces are (*lifts his foot*) a bit wide, that's all. Yes – they are good for the journey. Far and near, like those who practice.

MONK1: And those who sing – (*in song*) “Give us this day, our daily bread, and forgive us our trespasses.”

(*a few more join in*) “as we forgive those who trespass against us. And lead us not into temptation, for Thine is the Kingdom, and the Power, and the Glory, forever, Amen.”

(*To another*) Hope, Harmony and Beauty. Perfection's song, a Trinity, in the voice. I grow wise from ear to ear, and the ear becomes distinct as if it were a mother's voice, and from the mother comes a new Savior.

MONK4: Is that milk salted?

MONK2: Is that your Trinity? Hope, Harmony and Beauty? It's a good one. Or, Kingdom, Power and Glory? I'd like that. Or, Perfection, Ear and Mother? Which is your Trinity, or do you have another?

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MONK3: Mine's Grammar, Logic and Rhetoric. A Holy Trivium.

MONK6: (*To Monk3*) Quiet ...

MONK1: Certainly not Quadrivium – (*counts on his fingers*) Number, Harmony, Geometry, Astronomy. There's no ring to it. Do stars move in circles about the heavens? The kingdom of the sky is wide, says Our Lord, but none may enter except through Me.

MONK6: Just so ... Just so ... Just so ... and a fourth time. "Priests may not practice mathematics." That's from the Council, from Laodicea, this year.

MONK5: Apples, Honey and Wine, a Holy Trinity, I'll say.

MONK6: None's sweeter than a study of the Blood of Our Lord. Who would love so deeply and gave his life for his fellows, for life eternal. (*Quietly*) Pass the wine. (*To the group*) It was quite a sight, hundreds and ten thousand more priests and bishops, many drunk like wine on the philosophy and the writings of the day. You could have counted the literate more numerous than the illiterate for the first time in the history of Laodicea. We talked and ate, prayed and stayed in deep discussion very late. The result was this: "Priests may not practice mathematics." Keep the mind fast to the Word, to letters and writing, and far away from the works which bear such scant, little fruit, as Astronomy. To keep us safe, to build a wall around the priesthood, an unassailable wall. To keep us safe from dissolution in those dull practices, like divination, which are not rooted in reality. What is the number of this star or that star? Count the grains which fall on the side of a jar. And soon you are believing in a future of goats, sacrificed on the altar, whose guts spell out the word of God. Better just to study the Word. Lord keep us safe.

MONK3: Amen.

MONK5: How many are we? We'll say grace after meals.

MONK2: (*Says number of people present*)

MONK1: Shall I? (*Starts singing*)

(*lyric*) Blessed is The Lord our God, Sovereign of the universe, who sustains the entire world with goodness, kindness and mercy. God gives food to all creatures, for God's mercy is everlasting.

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Act I Scene III

Scene: 5th century Alexandria, a palatial home.

Character

Hypatia's Ghost

HYPATIA'S GHOST: *(Flitters around the scene) ... (Looks in a mirror)*

But alas! No reflection. ... It's hard to see what would or could not be as I am not myself, I am not me. ...

(Draws a circle in the air, then a triangle superimposed on the circle, then reaches through and pulls out an imaginary rose, and brings it to her nose) ...

The smell of flowers, how I miss them so, but better me to have had the light of mathematics, and of circles and geometry? *(Makes large frown)* But ... no nose for flowers. No head for thoughts. No life at all is left in me. All's quiet upon the waters of infinity.

(Flitters around the scene some more, then stops to face the audience. Stomps.)

Oh what gentle soul was my father, the noblest of men, happy Theon whose leadership made Alexandria shine. He lived in realms of pride, with lamps and oil and wicks – as with words of mathematics he'd make all the world divine. He sat and copied text and word, chart and all the Museum could contain, while there was yet time. He was the one to transmit Euclid to the world.

Divine. *(Holds up two hands)* "Di" is two and ... "vine" a wind. Blow and see which one will fall. Aristotle says not on chance, but on the strength of each, and every principle deducible within your easy reach. Come let us learn. Walking miles and talking. Do you believe it? Reason triumphs? Well?

Does it say so in this book? Or should you see for yourself? And if you would see the brighter things, mathematics, better come study. How many mathematicians do you know?

Euclid? Appolonios? Diophantos? Archimedes? Ptolemy?

Quickly – How many names did I say? Five. And a five-sided figure? A pentagon. And the subject of Euclid's *Elements*, book five? Magnitude and multiples. And the subject of *The Mathematical Collection* of Claudios Ptolemy, book five? Making astrolabes. And what is this?

(Holds up an astrolabe. Looks up and then at the instrument. Looks up again.)

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An astrolabe? It is (*Takes a quick sight with the lever on the back, then looks to the front, and says present time + some hours based on time zone*) if we're in Alexandria, Egypt. (*Points to astrolabe.*) I made this one.

My noble father Theon. A gift, to have given me my life and passion both, and this dream, a happy one.

(Flute melody plays)

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Act I Scene IV

Scene: The Museum of Alexandria, 4th century.

Characters

Theon

Young Hypatia

Dancers

YOUNG HYPATIA: Shall I start? (*Pulls out a scroll*) Look at this!

THEON: Eratosthenes! A good find, and maybe there will be time, time to copy all the wondrous things that you desire in here. You do so by design. And ours is now...?

YOUNG HYPATIA: You are back on Euclid, *Elements*, Book 3, writing and redacting commentary. And me?

THEON: None but mathematics, and beautiful heavens. The *Mathematical Collection* of Claudios Ptolemy, copying for you. Continue, my daughter, your majesty, your highness, preserve that work for history.

YOUNG HYPATIA: My father.

THEON: Come.

Dancers start, sharing the stage with Theon and Young Hypatia, who work on copying text from one scroll to the next. The following themes progress through the dancers' dance –

Writing & Work

Day, Night, Day

Which scrolls to save? What will be the most valuable?

Train the mind, a system of thought

Quiet

Writing and Collaboration

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Act I Scene V

Scene: 4th century Alexandria, a palatial home.

Characters

Young Hypatia

Five Disciples: Synesios, Athanasios, Theodosios, Gaios, Theotecnos

(Athanasios and Synesios are talking jovially; Theodosios is sharpening a small stick; Gaios is searching in a sack; Theotecnos taps his foot slowly and moves a hand in rhythm; Hypatia enters.)

YOUNG HYPATIA: *(To Gaios, smiling)*

My friend Gaios, Gaios, Gaios, are you eating enough?

(Gaios smiles back; Hypatia quickly turns to Ath. and Syn.)

And you? Athanasios? What foods there are at the market now!

(Gaios pulls out some dates and hands them to Syn. who takes some and gives to Ath. while Hypatia turns slowly to Theotecnos, speaking peacefully.)

Holy father, Theotecnos, there is a lot of good food at the temple.

(The dates are passed around).

Suppose fifteen types of food, all seasonal, all ripe, none in a dish by itself. Suppose a dish of five foods, all from the ocean. Suppose a dish of five foods, all sweet fruits. Suppose a dish of five breads, and their aromas. Now ... unity. Suppose fifteen types of food, all seasonal, all ripe, none in a dish by itself.

GAIOS: Hypatia, here is the reason for your fame.

YOUNG HYPATIA: Suppose two numbers. Suppose a number. Suppose another number. *(Repeats.)* Suppose two numbers. Suppose a square number, eighty one, for example. Suppose the second square number. *(Repeats.)* Suppose two numbers.

(To Gaios) Suppose two houses, each with square gardens.

(To Theotecnos) And the morning, with its prayers.

(To Theodosios) Suppose two flocks of birds.

(To Ath. and Syn.) Suppose two crowds of people.

Suppose just one? Suppose one number. 168. It is not 169. It is 168. Let us put 168 into 12 groups. Square 12.

GAIOS: 144.

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YOUNG HYPATIA: Square 13.

THEODOSIOS: 169.

YOUNG HYPATIA: 168. Let us put 168 into 12 groups. I suppose there is a difference between 144 and 168. What is the difference ...

THEODOSIOS: 24.

YOUNG HYPATIA: Now 12. Let us put 168 into 12 groups.

THEODOSIOS: Answer 14. 168 is the product of 12 and 14. 169 is square thirteen.

YOUNG HYPATIA: (*Smiles broadly.*) Suppose we have a number. One number. 80. It is not 81. It is 80. Let us put 80 into 8 groups. ... What is 80 into 8?

THEODOSIOS: Answer 10. 80 is the product of 8 and 10. 81 is square nine.

YOUNG HYPATIA: (*Smiles even more broadly.*) Whether by boat, camel, horse or chariot, we should go for an outing. We may need to take priests along, for safety. Let us take 80 priests. We may need to stop and get dates.

Suppose we have a number. 120. It is not 121. It is 120. Let us put 120 into 10 groups. ... Our number is 120.

THEODOSIOS: Answer 12. 120 is the product of 10 and 12. 121 is square eleven.

YOUNG HYPATIA: (*Smiles broadly.*) The Temple of Serapis is nearby. It is time to dress the statue. It is time to say prayers.

Suppose we have three numbers. Suppose we have three square numbers. Let us take 169, 81 and 121. ... squares ... Suppose we have three numbers. Suppose we have three numbers that are not squares. Let us take 168, 80 and 120. ... not squares ... Suppose there is a number to add ... that will make each a square. Let us take one.

Now ... there is a window to the heart of this place with people of learned grace. The temple. Suppose three numbers. Suppose three houses. Suppose three squares.

Appendix: Text Sources

Act I Scene II

lyric: Hillel translation of Birkat Hamazon.

https://www.jewishvirtuallibrary.org/jsource/Judaism/birkat_hamazon.pdf

Act I Scene VI

Porphyry, On the Cave of the Nymphs. (1917) English translation by Thomas Taylor.

London: John M. Watkins.

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London: John M. Watkins.

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Act II Scene IV

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Clarendon Press.

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“Hymn 14: To the Mother of the Gods” in *The Homeric Hymns and Homerica with an English Translation by Hugh G. Evelyn-White*. (1914) Cambridge, MA: Harvard University Press; London: William Heinemann Ltd.

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Oxford: Clarendon Press.

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Author Biography

Daniel S. Helman is a geoscientist and publishes articles on sustainability, geology, mental health and other issues. His two most cited works at the time of this writing are "Catching Lightning for Alternative Energy" and "Earth Electricity: A Review of Mechanisms which Cause Telluric Currents in the Lithosphere." His planned future book projects include: a popular book on using forestry (including urban forestry) plus biochar production to combat climate change, and a book about pedagogy and student-centered classroom discipline. A few patents are also in the works. He is also a doctoral student in the Prescott College sustainability education program. In addition, he founded and affiliates with The Winkle Institute: A Group of Independent Scientists, which exists to allow for more creativity in the sciences.

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