

James Dashow

Archimedes

Begin

Marcellus, an older man, now Consul, seated on a curula, holding an Archimedean planetarium. At his feet a Child is sitting. M toys intermittently with the planetarium.

Marcellus a story?
I'll tell you
 the story,—as I remember it.
 [Pause]
 [Musing] I had a chance,
 once,
 to change . . . the world,
 for good,
 for *the* Good—
 Imagine! An end of war, famine, plague . . .
 all that suffering. . .
 [sitting up] Listen! Here is how I failed. . . .
 And not just I. *[Gestures somewhat vaguely skyward]*
 [amused, weary] Aaah: the comedy of it! *[Pause..]*
 [excited] A golden age . . . it was a *thing* . . . I could touch it,
 feel it, smell it. *[Resigned]* But I was a soldier.
 Even Archimedes didn't grasp it,
 until the very end. And perhaps not even then.

[Enter first lieutenant]

First Lieutenant You called for me, sir?

Marcellus No! . . . no... not yet...you don't.... no, not yet.

[As he withdraws]

Child Marcellus, who is that?

Marcellus My first lieutenant . . .*[again gestures vaguely skyward]*
 But you'll see.

I'll begin at the beginning: with the original
mistake. I see now--but I could not see then
where the experiment was taking place;
or the magnitude
of the failure.

[Pause].

Well, then, look...here's the way it all began,
...apparently.... at least...
according to one old fellow....

[To the Child, and to the audience] Listen!

Prologue

[Dark. Music for the "Big Bang"; while it subsides, the two "whoosh" sounds bring up a light on the Prime Mover; he is in black, so that we see only his mouth which should be suggestive of a clown's mouth. The actor should say his lines with a great deal of irony, even sarcasm, mixed with a bit of surprise.. after all, he is creating all this like a sort of improvisation. If possible, Marcellus is still barely visible in the same stage area as in the preceding scene]

Prime Mover

With chaos we begin, a vast unbounded
turbulence, a churning of the whole
material mass, little more than a shadow
of one Idea.

And now I wrest
it into order corporeal: the visible,
fire; and after it the tangible, earth;
for a bond between them, air and water,
all combining in this world, I shape
As on a lathe into a perfect sphere.

Here, at the center, I fix the sacred flame--so:
its warmth, its wrath, interfusing all things.
This world, a sphere turning and turning in a sphere,
speaks immediate, inviolate, alone
unto itself--image without time.

Eternity is motionless, and this sphere
moves in seamless sequence, number constituting
time. Look! heaven and time are coming out
together. And to figure time, in its measured course,
I will create sun and moon--there--hot light and cold,
and then . . . and then

The stars! a billion, burning in black ice expanding,
shrinking. . . . And now, this blue globe, I set spinning,
round a warming sun, circled by an ice-bright moon,
regularly -- a rhythm that for sentient beings makes time
and number.

To set a seal upon this little world
Now will I people it. First godlings,
forged of fire, that they be the brightest, shine
brightest in the dome of mind.

Then other
creatures that fly and creep and swim and grow in place
and smell sweet and bear fruit and yearn and increase
their number.

And lastly you, Demiurge, I bid arise.

[Lights come up on - two-personed Demiurge: He, dressed in black; she, in white. They are joined together at the waist by a silk multi-colored sash; at his end the sash color fades into white, at her end, it fades into black]

To you falls the riddle of man: create
the tribe of humans so, and so--that they
may not equal gods but may imitate
them perfectly.

[Smiles]

And now I fill this cup . . .

[Cup only is lit, then shatters; PM vanishes]

Demiurge

. . . this cup, already shattered outward
scattering spirits, shards, equal in number
and in brilliance to the stars.

. Now I, wielding equal parts
of fire and water, earth and air, create
my mortals: first, mind as it gropes for heaven
and time; next, the senses,
rivetting men to earth, charging them with
pleasure, chaining them to change. Turning
and turning around them, always, flux,
a turbulence, swelling and subsiding,
mirror of their passions. But the elixir
of the cup ... this I fix in them as long
as life remains.

[Pause]

And now I come to one.
I fashion his flesh, yes, like the rest; but
through it interfuse a larger share of flame,
prime fire. And I shall name him, prime minded,
Archimedes.

All this I set in motion
And withdraw. . . for now. Let's see how well
pure flame and burnished revelations fare
in this unstable harmony.

ACT I

Scene 1

In Which He Grows Up

[For images, and electronic music an animated video sequence - including drawings of children – that suggests the progress of children growing from age 0 on up to age 18 is projected on the planetarium dome in a dance of images.]

[After the last sound-ff and fade-lights come up slowly on Marcellus who is in the same position as before]

Marcellus *[with avuncular sympathy]*

Certainly he'd gotten through those early phases,
Not *always* laughing, but you have the idea....perhaps . . . :
He's no longer a child, not yet a man.
But the geometry: the proportions, the ratios,
They all ignite; and then, a becoming;
Something takes hold; he begins to understand that
He *understands*, and magnificently

[Archimedes, about 18 years old, enters for the following scene, for mime, electronic sounds and electronic stagecraft projected on the dome]

Scene 2

Young Archimedes

[For computer graphic-animations, with optional mime solo.]

[MATHEMATICS I]

[The sequence of images projected on the planetarium dome begin with simple geometrical figures, as Archimedes is learning the basic ideas of geometry...a point becomes a line which becomes a square which is revolved to become a cylinder. The images become more advanced as Archimedes progresses to a variety of three-dimensional objects, and then his learning takes off... we see a variety of geometrical designs such as the spiral and the cylinder in the sphere. Some of these ideas seem to work, others are less successful notions, as he continues to learn. He becomes playful with all he has begun to understand, and the images progress to some fantastic three-dimensional objects, including a quirky dancing human figure made out of a pyramid, a sphere, cubes and cylinders. These all finish with some abstract designs that give us an idea

the boy, well, not exactly a boy any more,
has possibilities. .

FS Agh! I'm off to flirt with statues!

SS Wait! wait! wait! wait! wait! Hieron's
messenger is due today. We've got
to tidy up and properly
anoint our thinking thing.

Archimedes *[speaking to himself, drawing in the sand]*

Lovely! Figures self-willed,
self-fulfilling, perfect forms,
gods, yes, I kneel before them, so.
Where are they, I wonder? Here
are only traces in the sand.

[FS and SS grip A the arms, raise him laboriously and guide him towards the bath]

SS He hasn't found an answer
yet, has he?

FS What was the question?

SS Silly! That Roman Consul, Marcellus,
who won the northern war against the Gauls,
Sent our good king a wreath of solid gold
To honor Syracuse, his ally. But
Hieron cannot tell if the Roman gift
Is true, or mixed with baser metal.
The priests, as usual, are clueless.

FS You mean he's asked this meditating mud
To scabble up the truth?

SS Exactly.

[By now they have led him into the bath, in which they stand with him. They should be visible from just below the waist up. They undress him and begin to pour water over him and sponge him during the following exchange.]

SS This is torture.

FS That's why they call us slaves.

SS We've got it worse than Aphrodite's slaves.

FS *Their* white temple, high above the sea,

SS Shines in the sun,

FS sending shafts of light
That strike fire in the hearts of mariners

SS of mariners
Far out at sea

FS and draws them, magically,

FS & SS To the dark cliff of Eros, draws them, fire
from light, to them, and . . .

[A, now naked, stands still in the bath (possibly legs apart and arms outstretched, like the Renaissance model of man--though he's only half visible to the audience FS and SS look at him.)]

FS & SS . . . draws him to them and . . .

[Having poured water over him and rubbed him with sponges, they now apply oils to him with their hands. A lowers his arms, stares at the water, then traces diagrams on the slaves' tunics with his finger, begins to do some solid geometry using the materials at hand]

Archimedes First I draw the axis of a paraboloid
and through it draw a plane perpendicular to
the surface of the fluid intersecting the
paraboloid in *this* parabola which is
the base of the segment *here* and the plane of the
surface of the fluid in the chord *there* of the
parabola. Draw another axis *here*
and call it the fixed diameter of a right
angled conoid, the vertex *there* the point where a
plane first touches. And obtuse angled conoids are
similar if their enveloping conoids are
similar. *[squeeze]*
I revolve an acute angled cone
about its major axis to get an oblong
spheroid; around its lesser axis will produce
a flat spheroid.

[Gradually they seem to be caressing rather than anointing A. They guide him slowly down into the water descending with him, one in front, one behind, both extending their arms towards A]

FS & SS (simultaneously with A.)	draws fire from light draws him there to the dark cliff of Eros.
A.	The diameter drawn <i>here</i> bisecting <i>there</i> and I have the portion of the parabola above the surface of the. . .

[The bath overflows. A jumps up, out of the bath]

Archimedes Eureka! Eureka!
 Eurekaaaaaaaaaa! *[laughing, he rushes offstage]*

Marcellus Yes, you found it.
 --But he found in fact
 More, far more, than he then knew.
 But was it the math
 or ... the bath? *[Begins to laugh to himself, then catches*
 himself stopping in mid-laugh or trailing off]
 Well, that's the idea. It's not to be denied.
 [Resuming narrator's attitude]
 Hieron, wise king of Syracuse, is pleased, of course;
 but it's only the beginning.

Scene 4

Archimedes goes to Syracuse

Archimedes Observe then. Here is a sphere of silver,
 Here, another, of gold. Each weighs three librae:
 The weight of the wreath of Marcellus.
 Here are two cylinders filled with water
 to an equal height.

[Carefully drops the gold sphere into the first cylinder.]

Hieron The liquid rises to the column's lip.

[Archimedes carefully drops the silver sphere into the second cylinder. The liquid overflows.]

And here it overflows.

[Archimedes now takes the gold sphere out of the first cylinder, and carefully drops the wreath into the cylinder. The water overflows]

[Hieron takes the wreath]

Ingenious proof.

Well done, Archimedes, bravo!

4 Citizens in Hieron's Court (*tenor*) Bravo!

(*alto*) Bravo!

(*soprano*) Bravo!

(*all 4*) Bravo, Archimedes!

(*baritone*) Arcibravo! (*pronounced as in italian,*

Leporello style)

Hieron They say it came to you
while . . . bathing.

Archimedes . . .yes, . . . well, . . . that is . . . the idea . . .

Hieron By all means then, do bathe, and often . . .

Archimedes . . . the idea . . .it just . . .

Hieron . . bathe every day, by all means,
bathe....

4 Citizens (*soprano*) Bathe,
(*tenor*) bathe,
(*alto*) bathe,
(*all 4*) by all means, bathe...
(*baritone*) . . .more than once a day....

Archimedes well...it... the *form* of the idea came . . .
[makes suggestive gestures with his hands]

Hieron They say two young slaves were bathing you when . . .

Archimedes it appeared, for the first time, appeared . . .

Hieronappeared?

4 Citizens (*alto*) appeared...

(*soprano*) appeared...
(*tenor*) it just
(*tnr, alto, sop*) appeared...
(*baritone*) oh, what a fine view!...

Hieron [*smiling*] Indeed I do see. And has nothing else
appeared to you before or since?

Archimedes [*embarrassed*] Umm . . . well . . . of course . . . a few.
Here, I'll try to show you:
[*with increasing excitement*]
My method is simplicity.
With my eyes, these, I notice . . .
a snail . . . a bird . . . a cat . . . a spider . . .
a wave curling in to shore . . .
an overflowing bath!
You see?

4 Citizens (*separately*) [*tenor*] Snails?

[*alto*] Birds?.....

[*soprano*] Baths? ...

[*all 4*] Spiders????

(*baritone*) One bath too many...

Archimedes Then I ask: by what means may I
repeat these motions?
Mechanics! And then I ask:
what is their principle?
Geometry! My diagrams become
regular and the rule, divided,
Proportion! And these bring me to the logic
I suspect is true and then,
most ravishing of all to the mind's eye,
the proof! You see?

4 Citizens (*baritone*) The sense of this escapes me.
 (*alto*) What is he saying?
 (*tenor*) What does he mean?
[*together, to Archimedes*]
 What ARE you talking about?

[*During the following Archimedes' excitement transforms into distraction, totally absorbed in his ideas. Images appear on the planetarium dome corresponding to A's descriptions, ending with his famous idea of the sand reckoner; a night-time sky image full of stars, comets, nebulae, galaxies*]

Archimedes

Look: here are some geometries.
Water spirals up in a never ending circle;
ships float like parabolas
poised in equilibrium along a center line;
small balances great at unequal distances,
one man can move a mountain
with ratios and a rope.
I measure the universe with a grain of sand;
Proportions, mechanics, geometry,
Luminous thought; radiant thought....

[Now the mechanical gadgets and mathematical business described by Archimedes are acted out by several mime., the water-screw, the laws of floating bodies, levers, launching objects through the air; at the end Archimedes himself joins in with the mimes, moving in a joyous but quite awkward dance.]

Full Chorus and Hieron *[they interrupt Archimedes' antics, gently grabbing him, and with more than a little exasperation]*

Bravo, bravo, Archimedes, arcibravo!

[they calm him down, the mimes remain in a final fixed position.]

Hieron

Archimedes, I have built a magnificent ship,
filled and adorned with the finest splendors
made by Syracusan hands.
It is the emblem of all that I've
achieved in years, years, of peaceful rule.
But the vessel is too huge to move.

Archimedes

You yourself will move it with your own arm.

[Archimedes directs the mimes – with appropriate pushes, pulls, tugs and pokes - into positions that resemble a fantastic arrangement of ropes and pulleys; the mime nearest to H. and A. partially extends an arm with one finger pointing out, perhaps looking a little like a famous fresco...]

Now, pull this small rope.

4 Citizens

[alto] That cannot be!

[baritone] One man can move *THAT* ship?

[soprano] Show us.

[tenor] Let us see.

[all 4] Pull the rope!

Full Chorus

Show us, show us, let us see, pull the rope.

4 Citizens

[baritone] I can't bear to watch this!

Hieron *[pulls the rope effortlessly, the shadow of the great ship moves]*
 And yet it moves!

4 Citizens *[tenor]* Look!
 [soprano] Look!
 [alto] A prodigy!
 [tenor] What god is in Archimedes?
 [baritone] That boy is SMART!

Full Chorus Archimedes is a god!
 Hail, Archimedes!
 Hail, Archimedes, the god!

Archimedes No god! Only pure geometry...you see?
Give me a place to stand and I can even move the world.
It is just a playing with forms and numbers,
but founded on mathematical law,
grasped by a human mind. Once known here,
it is for all times known, and everywhere.

Hieron But *my* time is *now*, and *here* is my Syracuse,
 and yours as well.
[during the following, images of ancient Syracuse are projected on the dome]
 Here is my work, done for these times,
 and for nowhere else. This peaceful kingdom,
 the temples and the palaces that glow
 ochre in the sun; the shaded echoing porticoes;
 theaters; academies; the broad agora
 filled with life, with talk, with the works of men.

[Final image of a sun-drenched piazza, serene and at the same time suggestive of an immensely civilized place to live, is fixed on the dome.....but during the following – including the music after A's speech - the images transform into Archimedean sketches of immensely complex geometrical proofs.]

Archimedes How beautiful it is!
 Not *beauty*,
 not clarity,
 not the same; but beautiful still.

Hieron *[gesturing toward the images on the dome];*
 In your timeless world, beauty and clarity are one.
 But *that's not* the point, Archimedes.
[A's geometrical sketches immediately dissolve, the dome is now dark.]
 In my world, here and now, of men and women,
 beauty is harmony, a human harmony,

not discovered, but devised.
A harmony that's hard won,
and harder still to maintain.

Chorus Harmony of the forms, but in the world;
an unstable harmony.

Hieron Look around you, Archimedes!
This city, my heart's work *and* my arm's.
Lend to it your mind,
give to it your gift. You and I, together, we can still
perfect, and preserve this golden age,
beyond our own brief time.

Archimedes Harmony and beauty...now I see.
Here is no end to strife.
Peace and beauty are in the ideas,
harmony in their relations,
each to each.

[A. is again lost in thought. Abstract images fleetingly appear on the dome - geometrical designs transform into ordinary objects and back into new geometrical abstractions.]

Hieron Join me, together we will form
this fragile harmony!

Chorus Join us,
 join us,
 join us,

Hieron and Chorus together we will form
this fragile harmony,
together we can keep it safe!
Ahhhhh.....

[The action freezes. The crowd are in a penumbra. A and H are in spots. A third spot picks up a messenger, who hurries across the stage to deliver a message to H.]

Hieron *[reads; then, ambiguously:]* Marcellus!

[Hieron exits quickly and determinedly, suddenly very worried. Lights come back up on crowd, music picks up from where it was interrupted. A. looks on, does not participate in the general jubilation, aware of something important about to happen, but unable to comprehend exactly what.]

Chorus Ahhhhh.....

- END of ACT 1 -

ACT 2

Scene 1

In which Marcellus changes roles

Marcellus *[may be made to look a bit younger {in fact he died about six years after the siege of Syracuse} still dressed as the narrator, but during the course of the scene he pulls on and fastens the elements of a general's dress. Only he is visible, spotlit. Toward the end of this first speech, images of dour Senators, just their heads – “ Kilroy” like – gradually become visible ringing the lowest perimeter of the planetarium dome.]*

Then I entered the scene.
Syracuse needed to defend herself
against – well, against me, actually.
Great and wise Hieron was dead, his
imbecile of a grandson had allied Syracuse
with Carthage, and Hannibal was scourging Italy.
Our Senate ordered me to crush Syracuse,
that fair city whose gentle customs and just laws
had tempered our boisterous Roman republic.

[the images of senatorial heads begin to appear around the planetarium dome;]
[now to the Senate] Overwhelming force! Terrify them! Let them tremble before
the might of Rome. That will subdue them.
But spare the city; I will not turn Hieron's bright,
well-ordered realm into ash and rubble.

[again as narrator, one final time; he looks around at the senators with an expression of disgust on his face]

To no avail; Senators are pampered men,
for whom the blood of others in some far off war
is but a minor detail in the quest for power, for glory,
for wealth and empire.

Pax Romana, indeed.
I, Marcellus, the Sword of Rome,
am ordered to become its axe.

[Marcellus is now fully dressed as a Roman general; he waves his hand contemptuously toward the Senate images which fade; a light comes up on Archimedes seated at his worktable]

Scene 2

Syracuse comes to Archimedes

[Chorus and soloists generally not visible, located either behind the dome (and above the audience) or offstage and scattered around the theater so that the voices come from different points. Far off military sounds fade to darkness and silence; then single isolated sounds begin, each accompanied by an incompleting 2-dimensional black and white geometrical sketch on the dome which fades immediately; gradually a light comes up on Archimedes working at his table, drawing diagrams in a box of very fine glass dust with a thin wooden stylus, and writing on papyrus as he follows his arguments through. Isolated images continue to emerge seemingly from his head onto the dome and fade away, until suddenly a full color 3Dimensional image emerges moving around the dome beginning the first of 3 sequences that make up Mathematics II.]

Archimedes *[to himself]* ... if then we draw the perpendicular...
so that it follows....
....whence....
....thus....
....and therefore....
....so that we obtain...
Now if....
....and in like manner....
....combining....
....And, by hypothesis....

*[full color polygons begin to combine into Archimedes' semi-regular polyhedra, and the images now emerge in continuously transforming development with the First Sequence of **MATHEMATICS II**, for images on the planetarium dome and electronic sounds. This first sequence begins with the Archimedean semi-regular polyhedra...some of which resemble unusually shaped soccer balls...A. can playfully bat these into the air...which become Kepler's rendering of the 5 platonic "atoms", then Kepler's drawing of the universe as the several polyhedra inside each other, Kepler's elliptic understanding of the planets' orbits, also K's drawing of a circle made out of straight lines, to Galileo's ball rolling down an inclined plane, Pascal's cycloids, which transform into topological shapes, , which become topological shapes*

*of various kinds ending up including the solid graph of Fermat's $x^{**n} + y^{**n} = 1$...with $n = 3$ and then $n = 5$; followed by a rich selection of minimal surface images...gradually are heard the voices of the people of Syracuse and at a particular point the images on the dome dissolve or collapse into nothing as **A.** is interrupted.]*

[Whereas the chorus are invisible in the catwalk around the outside of the planetarium dome, the solo voices are visible on stage or even out in the audience, light coming up for each sung fragment and fade out when finished]

Voice Archimedes, help us . . .

Voice We need help, Archimedes

Voice Syracuse needs your help,
Archimedes!

Voice Help save Syracuse Archimedes!
[the images on the dome collapse about here]

Voices *[overlapping]*

Roman galleys blacken the horizon
Roman soldiers shake the earth.
Our soldiers have fled in panic,
Hieron is long dead,
War is on us.
Help us, save us, Archimedes!
The wolves of Rome are at our gates,
The walls of Syracuse are shaking,
We have no refuge, Archimedes.
We have no place to hide.
War is on us, Archimedes, war, war,
is on us. .

Full Chorus Help us, Archimedes!
Help save Syracuse, Archimedes!

Archimedes How can *I* help?
What can a man like me have to do with war?
I study lines and curves, the spiral and the sphere;
I wander in light, in timeless forms,
Ideas without change. These are not the things of war.
Pure knowledge not deadly utility.

*[He turns his attention again to his table, and the images begin again to emerge from his head and dance around the planetarium dome, as before: first separate "bubbles" of black and white 2-dimensional sketches that quickly fade, and then burst into full color 3-dimensional figures for the start of the Second Sequence of **Mathematics II.**]*

Archimedes *[again, to himself]*....If in a sphere....
...in this case the height is equal to the diameter....
...moreover....
from what has been proved it follows...
...and thus by the properties of triangles....
And these ratios, respectively, determine the proportions....
...therefore, since it is neither greater nor less....

[This Second Sequence begins with the invention of Cartesian coordinates and a wide variety of curves are drawn and animated into fantastic shapes; then suggestions of Desargues and Pascal's early developments of projective geometry; some abstract shapes emerge that congeal into the equations of the curves and then transform themselves into the curves, and vice versa.. generally following the history of mathematics through Euler (esp his formula and complex numbers), Gauss (including his astronomic work); the Fourier harmonic series as a sum of sines appear, starting simple and becoming very complex; these transform into Hamiltonian quaternions, the graphical projection of these, and finally to Riemannian non-euclidean geometries, with spheres, pseudo-spheres and etc. which begin to form the space-curve image of general relativity, before collapsing during the next chorus interruption.]

Voice Archimedes, the Romans are massed to strike!

Voice Our generals have fled, Archimedes....

Voice Our soldiers don't know where to turn.

Voice They have lost the will to fight.

Voices We will be crushed
And crushed will be our Syracuse.
Your Syracuse, Archimedes.

Voices *[overlapping]* Help us, Archimedes:
with your pulleys, with your levers,
with your cylinders and spheres,
your cones and planes;
find a way to use your perfect arcs,
unerring lines and curving spirals;
transform your diagrams
into a mighty shield;
protect your city, Archimedes.

Full Chorus Archimedes, be our shield!
Help us, save us. Save Syracuse!

Archimedes *[somewhat agitated growing more impatient]*
Shields, weapons, mere mechanics.
I have no business with contraptions.
Pure form, true ideas and timeless number,
Are not the stuff of sordid application.
You have no right to ask these
things of me, and I have no right to build them.

*[Archimedes again turns his attention to his work; the Third Sequence of 3-dimensional full color images starts to emerge **immediately** from his head and dance around the dome beginning with the way A. determined the area of a triangle and a circle with calculus-like methods, then Cavalieri's concentric circles with an Archimedean spiral imposed on top, then a ball traces a curve which becomes a graphic realization of Fermat's tangent to the curve at a given point, the curve is imposed on top of Cartesian coordinates and then the idea of how the calculus is graphed is shown, the curve becomes the S shape of the calculus sign, followed by a dance of the dy/dx symbols in various complex combinations; again equations transform into shapes and vice versa, especially Laplace's partial differentiation equation, ending with Clerk Maxwell's differential equations surrounded by electrical crackling and free shapes, and these begin to transform into crystal shapes of varying degrees of complexity which then evolve into huge strands of DNA constructed out of tubes and A's semi-regular polyhedra rather than the usual lines and spheres; which all **abruptly** stops with the chorus interrupt.]*

Full Chorus Help us, Archimedes!
Shield us from the Roman wolves!
Arm us, Archimedes!

Voice Three sons I've lost to war, three.
Must I lose my last because you will not act?

Voice Would you be free
to diagram in sand,
finding ideas of form and number
if *they* burnt your house to the ground
and attacked you with axe and sword?

Voice Do you have the right to let perish
all Hieron's creation, a harmony
of gentleness and peace?

Voices Build us weapons, Archimedes.

Full Chorus Build us weapons,
Archimedes!

Voice Don't let our city end!

Voices End it will,
 if you do not act,
 in fire and blood;
end the city, end the world,
in fire and blood.

Full Chorus Help us, }
 save us } Archimedes!
Save Syracuse }
 } Archimedes!
help us Save Syracuse}

Archimedes *[without looking up, sweeps violently from the table the tray of glass dust in which he has been, throughout, diagramming. Clatter--diagrams disintegrating into random colored particle of glass dust accompanied by an appropriate flash of confused images on the dome.]*

No! That's *not* right!
There is no pure solution.

[Pause. during the following, and into the longer pause, images of curves and lines becoming launched spears, cylinders become missiles carved from tree trunks, cones become huge arrowheads, the Galileo ball on a plane becomes a huge catapulted rock, Pascal's cycloid becomes a huge cauldron on a pulley dumping burning oil, etc.]

Toys I will teach you how to build:
toys—*[more softly]* examples, demonstrations, proofs!
that crush and burn.
Everything. Everyone. *[longer pause]*
[now angrily]
The wolves at the gates
Are no more dangerous than the wolves within. *[pause again]*
[resigned, then with immense sadness]
Toys. Mere mechanics.
[with decision]
Come.
[again, with deep sadness]
Come.

[A. hurries off stage with the same sense of determination as Hieron at the end of Act I, followed by several of the chorus; all lights off and then a spotlight comes up on Marcellus for the next scene]

Scene 3

Archimedes at war

[Dark. Only Marcellus spotlighted--on raised platform if possible. Senate opposite, barely visible. Marcellus is both in the midst of the battle and recounting it to Senators, the two times and places indistinct.]

Marcellus Raise the scaling walls!
And they raised the scaling walls
from the ships lashed below, heaving in the foam
beneath the walls of Syracuse.
And a hundred men abreast they climb,
hundred after hundred, surging up the walls
of Syracuse, a raging tide
of men, now thousands climbing, rising
to the parapet . . . and
O! the walls! the walls! the walls!
ten thousand iron spikes bristle, long,
from the walls, impaling thousands, thousands
of men. They hang now like speared fish,
high above the ships, writhing and howling,
spitted there, clawing the empty air with hands and feet,
wailing to a deaf sky for death.
[to the Senate]
And then it rained blood, fat drops
spat into the sea and on the ships
and ran down our bodies and made the decks slick
and we fell in the gore.
[Pause; to himself] And the cries stopped; and the vultures came.

Chorus of Senators Marcellus! Marcellus!
We deplore this loss of life, Marcellus!
We always mourn the death of our brave soldiers.
But this is war, Marcellus!
Attack! Attack!
And yet again, attack, Marcellus!

Marcellus *[Turns away from the Senate – he is once again the general
in the midst of battle]*
Range the ships!
Prepare all weapons!
Ready the men and horse for the assault on land!
Breach the walls and tear them down!

Chorus of Senators Attack! Attack!
Attack! Marcellus!
Launch stones,
let javelins fly:
this is more
like war.

Marcellus LOOK!

Ch. of Senators Look where? Where?

Marcellus Up there! THERE!

Senator 1 Look. A claw.

Senator 2 A beak.

Senator 3 Where?

Senator 1 There!

Senator 2 There! In the air
above that bastion.

Ch. of Senators From a high triangle
dangles an iron claw.

Senator 2 Is it moving?

Senator 1 By the gods, it moves!

Ch. of Senators It moves!

Senator 3 What is it?

Senator 4 A birdcatcher?

Senator 1 A weathervane?

Senator 2 A sculpture?

Senator 3 An offering to their gods?

Marcellus Fools! Like a hawk on a hare now
it drops on a ship, grips it whole,
heaves it whole out of the sea,
hoists it high in the air,
higher, higher, higher,
shakes it, shakes it brutally,
to and fro, to and fro—
till the crew—
fists clinging to yard and gunnel, useless,
--- they drop like dead birds
onto the waiting rocks, the vessel's carcass
hurled down after them,
crashing and splintering over their corpses.

Ch. of Senators Attack, Marcellus!
Launch stones,
Marcellus,
Let javelins fly!
Batter the ramparts!
Undermine the walls.
Attack! Attack!
Attack again, Marcellus!

Marcellus Launch the stones we did, and
let javelins fly.
And in reply
to our stones, boulders, big as houses,
hewn in perfect spheres;
and to our javelins, columns tall as trees
filled with liquid fire. And not shot
wildly, but tracing
perfect arcs against the pure sky,
they rose and fell—not one
fell short, not one fell wide
nor overshot its mark.
Men and horse, crushed like insects,
ships erupting into flames.

Ch. of Senators Twenty thousand men, Marcellus,
one hundred ships of war,
three thousand horse, Marcellus!

Marcellus *[paces back and forth]*
Our advantage: brute force
and iron discipline... And cunning.
Our war machines are playthings
to Archimedes. Set them aside.
I must pierce the gate! But at what price?
Three thousand lives or more, or more....
*[crouches down and begins to draw
with a stick in the dust with motions
resembling those of Archimedes at work]*
Bring half a legion on either flank
to face the seaward gate of Syracuse:
Each ship pay out
a length of cable to the shore and then
spread wide across the bay.
At tide's ebb attack!
*[Marcellus and the Senate watch the various actions
on the planetarium dome]*
Wave upon wave
of slaughtered men, until the armored gate
is pierced, the cables fixed, and THEN...
Neptune, and twelve thousand straining oars,
will rip the gates of Syracuse from its walls.

[Marcellus is aghast as he watches the terrible slaughter... a tempest of burning rocks and liquid fire fall on the attackers, the cables are cut through with enormous pendulum axes that emerge out of the city walls like monstrous propeller blades, the cables whiplash back onto the ships causing enormous destruction; all of these machines first appear on the planetarium dome as Archimedean geometrical sketches which transform into the real, devastating weapons.]

[Senators lit in half-light. A general ponderous, futile, grumbling.]

Ch. of Senators What is happening, Marcellus?
 Why are we retreating?
 Why do we not breach the walls?

[The following are divided up among 6 soloists, 1 pair each of high baritones, low baritones and basses, becoming increasingly more agitated, and, needless to say, pompous.]

Senator 1 An outrage . . .

Senator 2 . . . unacceptable . . .

Senator 3 . . . a travesty . . .

Senator 1 Never before...

Senator 2 ...the Roman people...

Senator 3Rome will not tolerate...

Senator 1 ...will not permit . . .

several Senators ...outrageous!!...

Senator 3 . . . cannot, I say...

Senator 1 ...cannot accept...

several small groups of Senators *[the following all simultaneously]*

...will not suffer...

...Rome will not allow...

...There is no thought at Rome of...

...Rome will not tolerate...

all Senators Defeat!

[On the word "defeat" Marcellus is spotlit. He is standing, having risen but not moved. He addresses the Senators across a considerable space, preferably dark.]

Marcellus You do not see
the catastrophe!

Senators You are wasting treasure
. . . and blood.

Marcellus You do not see!
We are not fighting *men*.
We *saw* no men!
Machines! MACHINES!
And then...and then...

Senators You have every machine money can buy!

Senator 1 Every Roman engine.

Senator 2 Every Roman warship.

Senator 3 Forests have been felled for you.

[general hubbub, phrases emerge “outrageous” “never before” “failure” “defeat” “machines” “nonsense” “why do we..” etc.]

Marcellus AND THE SUN! . . .
but brighter than the sun: points
of fiery light flash from the bastions
flash from points on the curve of the bay
The sun, the sun itself,
shoots rays through the trembling air striking
ship after ship, igniting ship after ship.

Huge torches now. Men on fire
fall screaming in the sea. The sea
the very sea caught flame,
and water, water! flared and blazed;
ships ablaze, men burning, crying,
choking—Ahhhhh, *gods!* . . .

*[Marcellus and the Senators watch the
horrible unimaginable destruction unfold on the
planetarium dome...an inferno]*

And when the sinking sun painted
pink the far horizon, the quiet bay
lay before me, sooty with charred timbers
and incinerated flesh.

*[All in darkness as the imagery on the dome fades; total silence also.
At the low “bell” sound a single light on Marcellus; after the second
low “bell” sound, lights gradually come up on the Senate]*

Senator 3 If Rome bows to this paltry Greek city
the hand of Carthage will be on our necks.

Senator 2 Rome humbled by one Greekling city . . .

Marcellus By one man! . . .

all Senators By one man?

Senator 3 Who IS this man?

Marcellus *[More to himself rather than to the Senate]*
One man sees clear, sees straight into the heart of things.
To him I must speak.

solo Senators Who is this man?
Find this man!
Capture this man!
Take him prisoner!
Who IS this man?

Marcellus *[to the Senate, but then immediately to himself]*
Archimedes...
...will render Rome invulnerable.
An age of peace.

Senator 1 Rome *invincible!*
Senators 2 and 3 Invincible!
All Senators empire!

[The following are simultaneous between Marcellus and the Senators who are working themselves up into a frenzy]

| **Marcellus** Rome *invulnerable!* Safe from Carthage,
| protected from the Celtic tribes,
| the Illyrian threat contained,
| the Parthian frontier secure.

| **Senators** Destroy Carthage.
| Defeat the Celtic tribes.
| Conquer Illyria, invade Anatolia.
| Overrun the Parthian frontier.

| **Marcellus** Peace. A golden age....

| **Senators** Conquest.
| Empire.
| Invade.

—

| **Marcellus** of peace.

| **Senator soloists** [*single voices in a frenzy*]
| Destroy! Overpower! Invade!
| Defeat! Crush!

all Senators Conquer!
 Invincible empire!

Marcellus [*Oblivious of the Senate, to himself*]
 A golden age.
 I *must* speak with Archimedes.

Senators Bring us Archimedes!

Marcellus Then the siege must end. I forbid
 sack and plunder
 I will catch gently one straight-seeing man
 in a net spun of treachery
 and deceit.

[*Senate falls dark.*]

Marcellus Find me one crooked man of Syracuse!

- **END of ACT 2** -

ACT 3

The Final Scene

Death of Archimedes

[Archimedes, Marcellus. Archimedes seated in front of a table. His tablet of glass dust is visible on the table. His planetarium is also on the table. A log is burning in a fire above which a polished steel mirror (or convex mirror) hangs in such a way as to reflect the audience. Forward, a shallow trough.]

Marcellus I don't see.

Archimedes Observe, Marcellus: that patient log
gives up its substance, slowly, to the flame.
But look now! Take from the fire a glowing twig
and touch it to that still water there.

Marcellus *[silently takes a twig from the fire to the trough and thrusts it in].* So! *[Small explosion, big flash of light.]*

Archimedes *[wan chuckle]* Not just water. But you see . . .

Marcellus See!? I see . . . I don't know what
I see.

Archimedes Not yet, not yet. Soon, perhaps.

Marcellus I've seen a power of mind so great
it will eternalize the flame of Rome.

Archimedes Sometimes fire and light,
sometimes fire and not light,
sometimes light and not fire,
sometimes not light and not fire;
sometimes in stone,
sometimes in steel,
sometimes in trees,
sometimes in dust.
[softly, looking intently at the fire]
It is all one.

Marcellus *[takes his sword and plunges it into the burning log]*

The flame licks at the steel, Archimedes,
but doesn't bite; sword it remains.
And so, too, stone remains stone.

Archimedes Strike steel to stone, Marcellus and there flies . . .

Marcellus ...a spark! And if a sword of fire and light . . .
Roman peace will sweep around the world;
nothing will resist—the golden age, Hieron's dream,
but cast wide across the globe!

Archimedes *[picking up the planetarium] [A bit wryly]*

Our globe is in the universe,
Marcellus. Have it, please.

Marcellus *[takes the planetarium, revolves it, muses briefly; then with martial authority]*

Good, then! Prepare to leave for Rome!

Archimedes This one thought, *[gesturing to his design tablet]*

I must follow
to its conclusion...

Marcellus Very well. I will send my man to help, when you are ready. *[exits]*

Archimedes *[Archimedes turns back to his glass-dust tablet and begins to diagram; pauses]*

Well, well. *[Pause.]* Marcellus has dreamed Hieron's dream;
fashioned out of it his own.

The fruit of my noble . . . contribution . . .
lies bleeding in the fields and rotting in the sea.

Yet in itself, the dream . . . the dream . . . perhaps. . .
. . . perhaps I see . . .

[Mathematics III]

[Images once again seem to flow out of Archimedes' head onto the planetarium dome;

now we see fantastic geometric shapes (from 20th century mathematical physics – Feynman diagrams, cloud chamber images, relativity images, chaos images, twistors, superstring and brane theory) configure themselves into a magnificent city; strands of sinuously beautiful DNA molecules configure into fields of grain, and especially a richly colored forest that surrounds the city and creates a sense of a protective glow over it all. The image of the city is in front of Archimedes, while the forest is behind him. During this, a Roman soldier, Marcellus' aide, enters; he wears a helmet that covers all of his face except his mouth]

Soldier [*respectfully, but firmly*]
Sir; I have been ordered to accompany you to Marcellus' camp.

Archimedes [*ignores him, the images keep moving and developing on the entire Planetarium dome*]

Soldier [*steps closer to A's table, with a more hostile and commanding tone*]
In the name of Marcellus, consul of Rome and conquerer of Syracuse,
you are to proceed immediately to the Roman camp.

Archimedes [*continues to ignore him, gazing rather at the images on the dome, moving his hands much like the actions of his younger self in Act I, scene ii*]

Soldier [*enraged, comes next to A's table clearly intent on overturning it, his hand goes to the hilt of his sword*]

I order you to stop what you are doing and come with me, *now!*

Archimedes Stand away from my diagrams!

Soldier [*draws his sword and is about to strike Archimedes*]

Archimedes Why this impatience, this anger, this threat of death?
Why are you so quick to draw your sword,
so quick to kill?

[*The Soldier transforms into the Demiurge; the special light effect that has always accompanied the Demiurge brings into view the female half of the Demiurge, the soldier takes off his helmet, and we see the face – the mask – of the male half of the Demiurge. The many colored sash connecting the two personages of the Demiurge becomes visible, glowing warmly.*]

[*during the following exchange, the images on the dome slowly crumble or go up in flames, at first only the images behind Archimedes, which he doesn't see: the trees in the luxuriant forest begin to fall one by one.*]

Demiurge You have seen too much, too soon, Archimedes.
They are too slow to understand what I have shown to you,
the good it can do.
And yet how quick the sacred flame
becomes first a sword of fire, succumbs to it.
Too far, Archimedes, you have gone too far.

Archimedes I do not understand.
There is still so much to do....
I have not gone far enough!

Demiurge This you do not see?
They are not yet ready for so much
[Archimedes does not turn around, he sees only the part of the dome in front of him whose images have not yet begun to decay.]
Destroy all your works and plans, Archimedes.
My work and plan have failed, *my* experiment.
Too much, too soon, you have gone too far,
we have gone too far.

Archimedes But the universe tamed, the world tamed
by one benevolent power—one mind—the elements unified,
earth, water, fire, air . . . *[gestures to the part of the dome in front of him where the images are still whole]*
It is all one.

Demiurge *[angrily]* Pictures! Diagrams! Mere lines and angles,
futile points and curves!
[now the images in front of Archimedes begin to crumble slowly as well, including perhaps a shooting of a buffalo, or a gorilla being slaughtered]
Clumsy guesses at the truth. There is only one idea.
Men must tame *themselves*,
must tame themselves!
The rest is easy.
Destroy every work and plan.

Archimedes I do not see. I cannot follow.

Demiurge Not yet? Not yet?
Still you cannot see?
Still you do not follow?
But now... One last insight
will I grant you. *[gestures to the part of the dome behind Archimedes]*
Look, Archimedes! Now do you see?

[Archimedes turns and gazes at the final image, the remains of a destroyed forest, burnt stumps in a desolate waste-land. Archimedes says nothing; the two Demiurge characters both have swords in their hands. The swords flash down on Archimedes, black-out]

Epilogue

[The area of the stage where Marcellus had begun telling the story is quickly illuminated, a small isolated circle of light; Marcellus, once again dressed as the narrator, is seated bent over with his head in his hands, consumed by sorrow.

The small child is on the floor in front of him playing with the Planetarium.

The light fades.]

End of opera