Niels Bohr and the Barometer

Readers Theater Play Script and Performance Notes

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CHARACTERS

SLEEPING BOY
STUDENT #1
STUDENT #2
STUDENT #3
CLASS CLOWN
PROFESSOR
NARRATOR
NIELS BOHR
EAGER BOY
HEADMASTER
JANITOR

If there are performance notes, they can be found on the pages following the script

Scene 1 – Classroom

[**Stage Set:** There are two sets on stage – a classroom on one side, and the HEADMASTER'S office on the other. In the classroom, desks or tables are placed in rows. At front is a large desk for PROFESSOR. Behind this is a chalkboard with these scattered words: "Pythagorean tuning, pure perfect fifth, 3:2, tetrachord, 16th century, 6th century," along with a few musical notes. (**See Performance Notes** for suggestions on how to set up the stage.)]

[Students dressed in uniforms sit quietly, hands folded on their desks. Most struggle to pay attention. SLEEPING BOY is slumped back in his chair, loudly snoring. CLASS CLOWN sits in the corner with a silly cap on his head. Two desks or table spots remain empty.]

[A formidable PROFESSOR points at the chalkboard with a long pointer.]

[SLEEPING BOY stops snoring so the audience can hear the speakers.]

[NARRATOR enters.]

NARRATOR:
Hello, everyone. This story comes from a tale told about Niels Bohr (pronounce: neels BOAR), the famous physicist. Ever hear of Albert Einstein, the genius? Well back in the day, the two of them were good friends. The two of them would debate together about the universe – What is it? What is it made of? Where did it come from, anyway?

PROFESSOR:
Class! Faces front. (*sighs*) Let's try to pay attention for once, will you?

[All students other than SLEEPING BOY sit up in attention.]

[NARRATOR paces stage addressing all sides of audience.]

NARRATOR:
This story about Niels Bohr takes place when he was a high school student in Denmark. What you are about to hear is based on a true story, and it's called "Niels Bohr and the Barometer." You'll find out about the barometer in just a few minutes. The play is brought to you by *Stories to Grow by*.

PROFESSOR:
(*exasperated*) Do you think you can all look at me and pay attention? (*points to blackboard*) As you can plainly see here, the Pythagoras (pronounce: pie-THAH-gor-us) theorem is a fundamental relation in geometry–

[The door (if you have one) opens quietly. NIELS BOHR creeps across the room to his desk.]

PROFESSOR:
Pythagoras showed us that musical notes could be translated into mathematical equations by–

[PROFESSOR catches sight of NIELS BOHR just as he reaches his desk. He slams the pointer down on his own desk with a thunderous WAP. All students jump a mile. SLEEPING BOY wakes with a start.]

SLEEPING BOY:
(*wakes from dream*) Penguins!!!

PROFESSOR:
What?!

SLEEPING BOY:
(*wipes at drool on his face*) Nothing, Sir.

[Class snickers.]

PROFESSOR:
(*turns to Niels Bohr*) Niels Bohr.

[NIELS BOHR reluctantly gets to his feet.]

PROFESSOR:
Late again, are we?

[NIELS BOHR lowers his head and stuffs his hands in his pockets, as STUDENTS stifle laughter and whisper.]

PROFESSOR:
Don't tell me. You were collecting seashells again?

NIELS BOHR:
But you can see Fibonacci's (pronounce fib-oh-NAH-cheeze) sequence in the shells. You know, where you find a number by adding the two numbers before it.

[PROFESSOR shoves a pile of papers at him.]

PROFESSOR:
I'm WELL AWARE of Fibonacci's sequence. That's not the topic today! Look, make yourself useful. Pass these out.

[NIELS BOHR walks down the aisles passing out the graded homework. STUDENTS show various signs of disappointment, shoulders droop, slump in chair, heads hang, groans, etc., as they each receive their papers.]

PROFESSOR:
As you can see by your grades, your understanding of physics is abysmal! (pronounce: a-BIZ-mahl)

[CLASS is confused by the word "abysmal" in the comments that follow.]

STUDENT #1:
What?

STUDENT #2:
What did he say?

STUDENT #3:
Did you hear?

EAGER BOY:
Something about Pepto-Bismol?

CLASS CLOWN:
Why are we talking about Pepto-Bismol?

PROFESSOR:
Come on, class. SOMEONE must be able to tell us what the word "abysmal" means.

STUDENT #1:
(*raises hand*) Not so good?

PROFESSOR:
First correct answer today!

[NIELS BOHR takes his seat. He is the only one without a paper.]

PROFESSOR:
(spins around and points accusingly to Niels Bohr) No paper at your desk? Perhaps you WOULD have had your paper returned IF your name had been on the paper. One would think that a boy who can recite the Fibonacci sequence would have the presence of mind to put his own name on his own paper! (*glares at Niels Bohr)*

[NIELS BOHR shrinks in his seat.]

NIELS BOHR:
Yes, sir.

PROFESSOR:
(*to class)* Let us review yesterday's homework assignment, shall we? You (*to Eager Boy*). Read the assignment.

[EAGER BOY happily stands.]

EAGER BOY:
(*reads aloud*) "Using a barometer, how do you determine the height of a building?" Professor, I probably should have asked this BEFORE I started the assignment but, uh, what's a barometer?

PROFESSOR:
(*sighs & holds up barometer)* (**See Performance Notes** for how to make a barometer) This! Doesn't ANYONE listen? A barometer measures the pressure of the atmosphere. It's used to forecast the weather or calculate the height of the atmosphere. Or to do other things here on land, such as find out the height of a building. Which is today's topic. (*holds up a paper*) Neils, no doubt you figured out how to measure the height of a building using a barometer. Read aloud your homework assignment, and (*makes a grand gesture*) enlighten us.

NIELS BOHR:
(*reads*) "Give an example of how to determine the height of a building using a barometer." (*clears throat*) This is what I wrote, Professor. (*reads*) "You climb to the rooftop. You tie a string to the barometer. You lower the barometer until it touches the ground. Then all you need to do is pull up the barometer and measure the length of the string."

[CLASS CLOWN applauds. The classroom erupts in guffaws.]

PROFESSOR:
Settle down now! Class, settle down!

STUDENT #1:
That would definitely work!

STUDENT #3:
Why didn't I think of it?

STUDENT #2:
Here I was doing all this MATH.

STUDENT #3:
I know, right? What's the point?

[PROFESSOR snatches the paper from NIELS BOHR, rolls it up and uses it to point at the class.]

PROFESSOR:
Math IS the point! You were asked how to measure the height of a building using a BAROMETER. NOT by climbing to a rooftop and dangling a barometer from a string to the ground.

STUDENT #2:
(*in a low voice*) Uh, why not?

STUDENT #1:
(*another low voice*) Yeah, it seems like it would work.

PROFESSOR:
(*to Student # 2 and Student #3*) Because it's not scientific! (*to Niels Bohr*) Niels, use that brain of yours. Tell the class the REAL way to measure the height of a building using a barometer.

NIELS BOHR:
No problem. I can think of LOTS of ways.

PROFESSOR:
Do share. *(hands him the barometer)*

NIELS BOHR:
It's simple, really. You set the barometer on the ground on the first floor of the building.

PROFESSOR:
Uh-oh. (*mutters*) Why do I have a bad feeling about this?

NIELS BOHR:
(*gets more excitedf as he talks*) You mark the top of the barometer on the wall, in pencil. Then you turn the barometer upside down and make a new mark. You keep turning around the pencil and marking the new top until the barometer gets to the very top of the building. Then you count all the marks. You know how many inches a barometer is, so that's how you figure out the height of the building!

[CLASS applauds.]

STUDENT #3:
That would work, too!

STUDENT #1:
Brilliant!

STUDENT #2:
Who knew a barometer could be so useful?

STUDENT #3:
I didn't!

EAGER BOY:
Uh, what's a barometer again?

PROFESSOR:
(*to the class*) Everyone, zip it! (*to Niels Bohr*) Niels, you know very well that is NOT the methodology what I was looking for–

NIELS BOHR:
Wait! Here's another one.

PROFESSOR:
(*under breath*) Here we go…

NIELS BOHR:
You drop the barometer from the rooftop and count how much time it takes to hit the ground. And voila! (pronounce: vwah-LAH) that's how you can figure the height of the building. (*to audience*) Though you may go through a lot of barometers that way.

[CLASS laughs again.]

PROFESSOR:
Okay, that's IT!

[PROFESSOR grabs NIELS BOHR by the collar and *gently* pushes him toward the door. Remember, this is pretend!]

PROFESSOR:
Let's go! We're going to the principal's office. (*calls over his shoulder*) I don't want to hear a word out of this classroom!

[PROFESSOR and NIELS BOHR exit.]

[CLASS CLOWN grabs PROFESSOR'S pointer. He mimics the PROFESSOR'S style.]

CLASS CLOWN:
Ladies and Penguins, step right up! We are now going to discuss how to find the height of a building using a penguin!

[CLASS laughs.]

[ALL exit.]

Scene 2 – Headmaster's Office

[Scene set: A large desk, one chair behind the desk, and two chairs either in front of the desk or beside it. Scattered about are the sort of content you would see in a utility closet — a stepladder, mops, brooms, buckets, etc.]

[HEADMASTER enters, carrying a small paper bag as he carefully makes his way through the mess and trips over various obstacles in his way to his desk nearly dropping his bag. He clutches it close.]

HEADMASTER:
Confound it! Just because the janitor is fixing the leak in the ceiling doesn't mean he can just leave all his tools around wherever he drops them. Why doesn't he store all this nonsense in a closet like other janitors do?

[HEADMASTER makes it to the desk and opens his bag taking out a very large pastry. The pastry can also be an exaggeratedly-large cut-out, for comic intent. HEADMASTER is about to take a bite when there's a knock at the door. He looks at the door, tries to take a quick bite of the pastry. Another knock and he reluctantly puts the pastry down.]

HEADMASTER:
Come in.

[PROFESSOR pushes NIELS BOHR into the office. They avoid the mess.]

HEADMASTER:
(*stands)* Professor? What's the problem?

[PROFESSOR thrusts NIELS BOHR's paper into his hand. HEADMASTER reads it and hands it back to PROFESSOR who rolls it up again.]

PROFESSOR:
He is! Niels Bohr is a recalcitrant (pronounce: ree-KAL-se-trint) student!

HEADMASTER:
I see, of course. (*rubs chin because he does not know what "recalcitrant" means*) And we all know what "recalcitrant" means. Why don't you tell us, Niels?

NIELS BOHR:
Yes, sir. Pig-headed, stubborn.

HEADMASTER:
Right, I knew that! So– *(turns to Professor*) What exactly is this student recalcitrant ABOUT?

PROFESSOR:
He is refusing to complete a simple scientific assignment. Instead, he brings balderdash (Note: "balderdash" means nonsense) to the classroom.

HEADMASTER:
Does he now?

NIELS BOHR:
I answered the question. THREE times!

[PROFESSOR bops him on the head with the rolled-up paper.]

PROFESSOR:
You see what I have to deal with? (*to Niels Bohr)* You know very well you never answered the question the way you were SUPPOSED to answer the question.

HEADMASTER:
Well then let's try this again, shall we? Uh, what was the question?

PROFESSOR:
How to determine the height of a building using a barometer.

HEADMASTER:
Right! (*under the breath*) Easy–peasy.

PROFESSOR:
(to Niels Bohr) I will NOT accept answers like dangling a barometer from a string, or wiggle-waggling a barometer up the walls, or throwing expensive barometers off the roof.

HEADMASTER:
Absolutely not! Waste not, want not. Niels, no doubt you can provide your Professor with the real answer to the question.

NIELS BOHR:
Those were real answers.

[NIELS BOHR sighs. There's a knock at the door. JANITOR sticks his head in.]

JANITOR:
Janitor here. Just come for the mop is all.

[JANITOR picks the mop and nods to HEADMASTER.]

HEADMASTER:
Be on your way, then.

[JANITOR exits.]

NIELS BOHR:
(*looks at where Janitor had exited*) Hmm, there's another way. You go to the basement. You knock on the janitor's door. And you say: "If you can tell me how tall this building is, I will give you this barometer!"

[NIELS BOHR spins around to face audience and stretches out both arms wide in a victory sign. HEADMASTER puts both hands on his head in despair. PROFESSOR cries "AUGHH!" and falls (*carefully!*) flat on the stage floor.]

[NARRATOR enters.]

NARRATOR:
This was Niels Bohr as a teenager. When he grew up, he became a famous atomic scientist. He won many awards, including the Nobel Prize in Physics.

NEILS BOHR:
You don't say? I'm going to be FAMOUS!

[NIELS BOHR makes victory signs to the audience, first to one section of the audience, then to the other.]

PROFESSOR:
(lifts head up) Wait, you said the Nobel Prize? (s*tands and brushes off his pants*) Niels? I find that hard to believe.

[HEADMASTER shrugs.]

NARRATOR:
It's true. And one time you will say to another scientist: "We all agree that your theory is crazy. The question is if it's crazy enough to have a chance of being correct. My own feeling is that it is not crazy enough."

NIELS BOHR:
Yeah. I can see me saying that.

[NIELS BOHR returns to making victory signs.]

NARRATOR:
(*to Niels Bohr*) Time to bow. (*Niels Bohr is still making victory signs.*) BOW! (*Niels Bohr bows)* That's better.

[NARRATOR turns to audience.]

NARRATOR:
And that's the real-life story of "Niels Bohr and the Barometer."

[If you have a curtain, close it now. If you do not, fade the lights. If you have no stage lights, all actors come on stage and bow to the audience.]

Performance Notes
for Niels Bohr and the Barometer

THREE WAYS THAT STUDENTS AND TEACHERS CAN UTILIZE THIS PLAY

1. *Students can read the play aloud while sitting in the classroom.* Ask the readers to skip all bracketed stage directions. You may prefer to rotate your actors to give all students a chance to read the speaking parts.

2. *Students can perform the play in the classroom.* Clear an area that can be used as the stage. Have the audience sit on the floor in front of the stage. Students in the play can make simple costumes and/or sets as described below. When the scene change, the characters "on stage" simply walk to the back of the room where they wait until their next appearance "on stage."

3. *Students can perform the play on stage.* Refer to the production notes that follow. Ask the actors to enter from the back of the room and move through the audience as they approach the stage.

COSTUMES

- NARRATOR— Simple, nice clothes.
- STUDENTS— Matching uniforms of blue or white collared shirts tucked in to and khaki, gray, or black pants or skirts. (One color top and one color bottom should be chosen and all students should be within that same color scheme.)
- CLASS CLOWN— School uniform and a silly hat.

- NIELS BOHR— School uniform, but can look slightly disheveled, perhaps with his shirt un-tucked.

- PROFESSOR and HEADMASTER— Khaki or brown pants, white button-up shirts. If possible, floor length black teaching robes. Another option is a black blazer or sweater.

- JANITOR— Blue or gray pants and shirt.

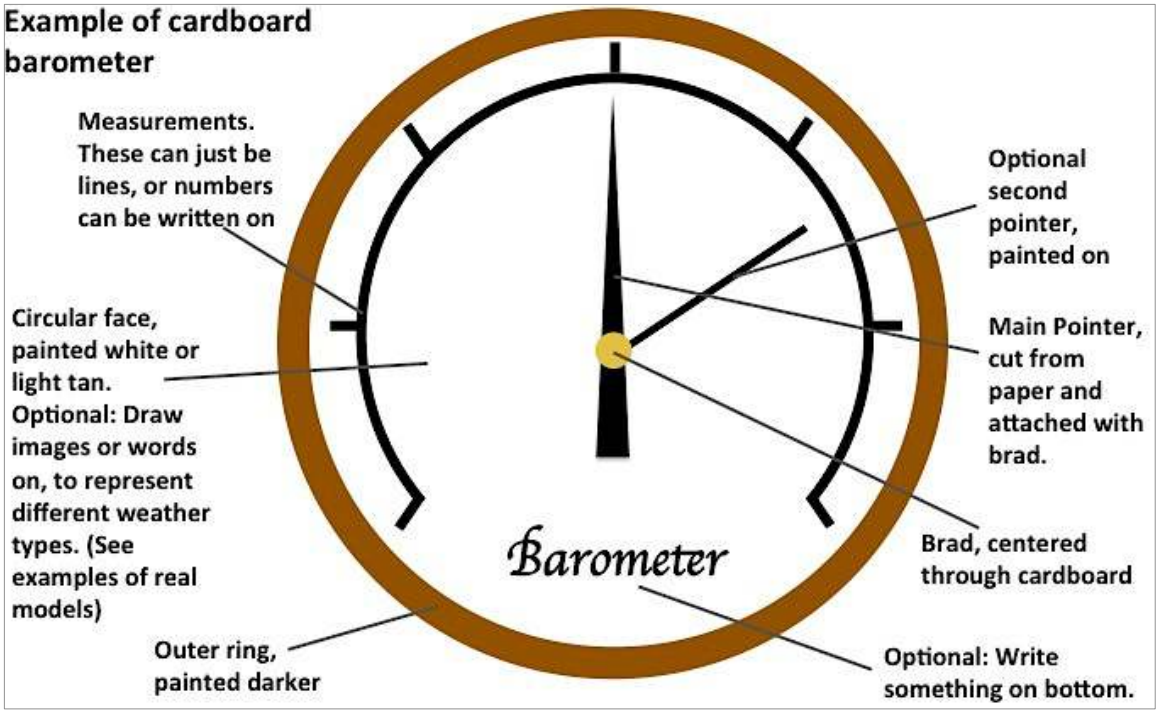
PROPS

Scene 1

- A pile of papers, one for each STUDENT, for PROFESSOR to hand to NIELS BOHR.
- Pointer for PROFESSOR.
- Silly cap for CLASS CLOWN.
- Barometer for PROFESSOR. This can be can be made using an old wall clock or analog alarm clock. Plastic is better than glass, to avoid the possibility of breakage.

  Another option is to can make one from cardboard. Simply cut out a circle of desired size, paint it white or light tan. Paint the outer rim another color, such as black or brown and draw or paint numbers onto the face. For the pointer, you can draw or paint that on as well, or you can make a movable pointer. To do this, cut a pointer from construction paper or cardstock and punch a small hole near the base of the hand. Punch a hole in the center of the cardboard, and use a brad to attach hands. You can also paint on a skinnier second pointer.

  See next page for various images of barometers and an example of a cardboard model:



Scene 2

- Small paper bag for HEADMASTER to carry.
- A type of pastry or bread for HEADMASTER to eat. This is carried in the small bag.

SETS

To make Scene transitions easier, the stage is split into two sections. On one side of the stage is the classroom and on the other side is the headmaster's office. The chalkboard can act as a sort of divider between the two space.
If you would like to paint a backdrop, it can show the interior of a drab school building typical of the 1890's. A window or two can be painted, depicting a bright sunny day.

- **Scene 1—** Classroom, on one side of the stage. The classroom can take up 2/3 of the stage, since there are more actors and more action in this scene. On stage there is a desks and a chair for each STUDENT. In lieu of desks, you can use small tables, or you can use one or two longer tables with several chairs at each table. Towards the middle of the stage is the PROFESSOR'S desk, which can be a table.

  Behind the PROFESSOR'S desk there is a chalkboard. You can use a real portable chalkboard, or you can make something to resemble a chalkboard. For the latter, you can cut flatten a large cardboard box and paint it black. Another option would be to cover the cardboard in black paper. Tape the cardboard to an easel or to a tall chair/stool- something that will allow it to be free-standing and taller than the PROFESSOR'S desk/table.

  For the writing on the board, you can use real chalk, or you can use white paint or paint markers.

- **Scene 2—** Headmaster's office, on the other side of the stage. There should be a large desk or table in the center of the space. One chair can be behind the desk/table and two other on the sides.

  Scattered around the space are various janitorial supplied- brooms, mops, buckets, etc.

See below for an example of how to set up the furniture on the stage: