Where'd They Get That Idea?

Issues and Ideas in Science and Mathematics

Volume I

Student Guide

2026 International Mathematics Day Lesson Plan

$$\frac{df}{dx}(x_0) = f'(x_0) = \lim_{x \to x_0} \frac{f(x) - f(x_0)}{x - x_0} = \lim_{h \to 0} \frac{f(x_0 + h) - f(x_0)}{h}$$

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About the Touchstones® Discussion Project

The Touchstones Discussion Project is a nonprofit organization founded on the belief that all people can benefit from the listening, speaking, thinking, and interpersonal skills gained by engaging in active, focused discussions. Since 1984, Touchstones has helped millions of students and others develop and improve these skills in school, work, and life. For more information about the Touchstones Discussion Project, visit www.touchstones.org.

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Lesson 8

Do You Like Mathematics?

Text

Two Different Kinds of Minds

Blaise Pascal

Purpose

This lesson investigates whether there are different kinds of intelligence. Students will approach this general question by comparing two proposed types of people: those who are mathematical and those who seem to understand certain complex situations intuitively at a glance. The students will also consider whether people can be taught how to think in these ways or whether they are just born with these abilities. They will make these questions concrete by classifying different professions as more mathematical or more intuitive and evaluating themselves in regard to these categories. They will compare people who reason well from very general and abstract principles from those who grasp situations and ideas almost instantly.

Introduction

Mathematicians do not generalize from particulars as scientists do. Rather, they prove general truths (for example, that all triangles have an angle sum of 180 degrees) from axioms or postulates. This activity is also familiar to us. Though sometimes we do not have reasons for our beliefs, generally we feel uncomfortable if we cannot give any reasons at all for our opinions. When we try to convince others of something, we frequently try to find what we both agree on and then try to prove the new claim from these jointly accepted opinions. Mathematicians do exactly the same thing with axioms and theorems. The question that emerges is: What sort of thinking is involved in this activity? We will explore this by considering a text by the great mathematician Pascal.

In this lesson, students will be confronted with Pascal's belief that there are some people who have mathematical minds and some people who have intuitive minds. In one sense, this division is probably not new to most students. They undoubtably characterize themselves and one another as good at one particular subject or another. They may even characterize themselves as being better at school subjects than with people in social situations, or vice versa. The implication is that these abilities emerge from a specific way of thinking or of relating to the world. Though the text focuses on the contrast between mathematical and intuitive ways of thinking, you should use this as an occasion for your students to consider the full range of differences in people's various talents.

Pascal begins this text by stating that the mathematical minds "understand truths that are very obvious and clear. However, these are not the kinds of truths we come across in our daily, ordinary experience." He uses this fact to explain why we sometimes have difficulty paying attention when the time comes to think mathematically. Most of us would agree. Our daily habits do not encourage us to think mathematically. However, there are people who excel precisely in grasping the truths of mathematics. Often, these are the very people who have various difficulties "grasping the truths of their daily lives." On the other hand, there are people who excel at understanding these daily truths; these are people who are intuitive. Pascal believes that these people are able to see all the truths of ordinary experience and their interconnections at a glance. Clearly Pascal is talking about different sorts of truths. But what sorts of truths are these people grasping? Have your students try to articulate the differences between a mathematical truth and a truth about life and people.

Both the intuitive and the mathematical person are able to see many truths at once; they are similar in this way. However, Pascal says that it is rare to find someone who can think well in both these areas. Does it make sense to the class that a person who can think well in these two areas is rare and that being good at one might make it difficult to do the other? Is this also true of people who are very skilled in a certain field, such as those who are good at literature or music? Are they also good at math? Can they also show common sense?

After reading the text, let the students complete the worksheet individually. They are asked to locate various professions along a straight line whose extreme ends are intuitive people and mathematicians. When they are done, go through the worksheet and ask the students to report their choices. Now have the students consider themselves and place themselves somewhere along the line. Each should give a reason for their decision, and you should ask everyone to report.

Open the discussion on the text by asking if they think it is possible to improve their abilities in these areas. The second paragraph describes why it is difficult for the mathematical person to think intuitively and vice versa. You should raise this topic in the discussion as well.

Possible Questions

- Is it better to be intuitive or to be good at math?
- Are you mathematical or intuitive?
- Do you know anyone who is both? Can someone be both?
- Have you ever understood something by a "kind of feeling" and "without thinking" or just knew it? What was it?
- If you had to teach someone to have good common sense, how would you do it?
- Describe the difference between mathematical and intuitive thinking.
- Do we learn to think mathematically and intuitively, or are we just born that way?
- How does being able to think mathematically help us? What about thinking intuitively?
- Does Pascal's explanation make sense?
- Do intuitive people really understand something at a glance? Do mathematical people sometimes seem awkward because they approach their lives as if they were doing mathematics?
- Can you think of any people you know who are very intuitive? Mathematical?

Lesson Plan

1. Arrange Classroom . . . . . .3 mins.

2. Read Text . . . . . .3 mins.

- Read the text aloud. Have students read it again silently.
- Make sure students understand the word "intuitive."

3. Individual Work . . . . . .6 mins.

- Encourage students to come up with reasons for why they placed specific professions where they did.

4. Small Group Work . . . . . .8 mins.

- Divide the class into small groups. Have students choose a chairperson and a secretary. (Throughout the year, make sure each student gets a chance to hold each position.)
- Groups decide on a single arrangement for question 1 by discussing what makes each profession more or less mathematical.

5. Discussion . . . . . .20 mins.

- Have students move back into the circle.
- Chairpersons report.

  Having groups report is a good way to get students discussing general issues that may have come up in the small groups. You will also find out what really interested the students. There can be a gradual progression from these reports to a more inclusive full group discussion.

- Ask a question to open discussion.
- When possible, direct students to talk about what it means to be mathematical or intuitive, and how one could improve in these areas.

6. Journal Writing . . . . . .2 mins.

7. End Class . . . . . .3 mins.

- Have students rearrange the classroom.

Total Class Time . . . . . .45 mins.

Note: After today's class, collect the students' workbooks and read over the journal entries from the past three units.

Worksheet #8

Individual Work

1. **Arrange the professions below according to whether you think they are more mathematical or intuitive.** Place them along the straight line indicating whether you think the professions are closer to being intuitive or to being mathematical, which are at opposite ends of the line.

Intuitive _____ Mathematical

Lawyers (L)
Musicians (Mu)
Engineers (E)
Cooks (C)
Doctors (D)
Historians (H)
Teachers (T)

2. **Are you mathematical or intuitive?** Place your initials on the straight line above to indicate where you think you belong. Explain why you placed yourself there.

_____

_____

_____

_____

_____

_____

Small Group Work

I. Appoint a chairperson and a secretary.

II. Compare your answers to question #1. Come up with one arrangement on which you all agree.

Intuitive _____ Mathematical

Journal

Why are some people afraid of mathematics?

Two Different Kinds of Minds

Blaise Pascal

Some people are good at mathematics. Their minds understand truths that are very simple, obvious, and clear. However, these are not the kinds of truths we come across in our daily, ordinary experience. And, because of our usual habits, it is hard to turn our attention to truths of this sort. Other sorts of people have minds that grasp the truths of their daily lives without thinking. They are quick to understand everyday things. They understand things by a kind of feeling. We call these people intuitive. These truths of experience are right in front of us, but only some people have eyesight sharp enough to see them all since there are so many. And if you miss any one of these truths, you'll make mistakes since they are all connected.

People who are good at mathematics are used to very exact and simple truths and rules. They do not reason well unless they can carefully arrange and order these truths. So they get lost when they try to think about their daily experience. That is because the rules of daily experience cannot be arranged and organized. We feel these truths of daily experience rather than think about them. Intuitive people seize a conclusion immediately rather than reach it through a process of reasoning. So it is very rare to find someone who is good at mathematics and also intuitive. People good at mathematics often appear silly because they try to think about their everyday experiences mathematically. They want to start with definitions and simple rules and reason from these. On the other hand, people who are intuitive and judge things at a glance are shocked when they look at a piece of mathematics. They cannot understand why one has to start with definitions and carefully reason step by step to a conclusion. So these two types of people could not be more different.

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