



Math Lab Lesson #1: Review of Numbers and Operations

What is a natural number? What is an integer?
How can we decompose integers using a base-10 system?
How can we operate with signed numbers?

SITUATING THE LESSON:

During Saturday Academy and Weekday, students have:

- Learned about the base 10 system
- Practiced using the associative, commutative, and distributive properties
- Operated with negative integers
- Explored the relationship between having a factor and being divisible by. For example, numbers that have a factor of 2 (i.e. even numbers) are divisible by 2.

Summary: In this lesson, students will review some of the key ideas that they have learned during their first three Saturday Academy lessons. This course is called “Numbers and Operations.” The main goal of the first few lessons was to have students explore operating on natural numbers and integers in a manner that will help them see an analogous connection between how numbers react to being operated on, and how variables react to being operated on. This analogy is at the heart of developing a deeper understanding of algebraic manipulation.

This week, we will: review the definitions of natural numbers and integers; review base-10 notation; practice operating with signed numbers, and review basic binomial factoring and the distributive property. The mathematical content of this lesson is a bit scattered, but this is because we are reviewing three lessons all together.

Preparation Before Class: Work through all problems and watch videos in advance. Read through and annotate the Lesson Plan in a way that will be useful to you.

Materials:

- **Math Lab Lesson #1: Classwork** (1 per student and instructor)
- **Math Lab Lesson #1: Group Activity** (1 per student and instructor)
- **Math Lab Lesson #1: Exit Ticket** (1 per student and instructor)



1st Hour

1. Lesson Launch (20 min)

A) INTRODUCTIONS (15 MIN)

- Have students introduce themselves and then introduce yourself. You may choose to do a brief icebreaker.
- Introduce Math Lab as an opportunity to build:
 - Content knowledge: this course will serve to reinforce material taught during Saturday Academy and Weekday lessons. No new material, it will all be review.
 - Studying skills: students will spend some time every day making flashcards based on the material that they learned, and they will learn how to use flashcards as a studying tool. Additionally, they will learn to consider their Saturday Academy Workbook and the internet as a resource for studying.
 - Growth Mindset: Students are in Math Lab because they scored very low on the Opening Assessment. **Much of the content that they will see here is designed so that they will feel more comfortable with the material on the Closing Assessment.** This experience (doing poorly, working hard, then doing better) will help students buy into a “growth mindset” mentality.
 - Community and a Positive Math Identity: Likely many students do not feel comfortable with math. They are confused in their classes and doing math is a frustrating and meaningless experience. When they begin to feel achievement within the context of this classroom community, this negative math identity may start to change.
- Explain that Math Lab sessions will be generally structured as follows:
 - First Hour: Quick introduction and Number Talk (not this week), then individual work based on SEO Math Videos
 - Second Hour: Finish up videos, group activity and presentations, creating and using math flashcards, then responding to an Exit Ticket

B) SATURDAY ACADEMY AND WEEKDAY REVIEW (5 MIN)

- Ask students what they have been learning in Saturday Academy and Weekday. What has been interesting? What have they struggled with? Take a few responses and jot them on the board.



- Ask students to get out their Workbook and find a Classwork (Level 1 or Level 2) problem that they understand. Have them pair up and give them one minute to explain it to their partner, then switch.

2. Individual Work: Math Lab Videos (45 min)

- Hand out the Classwork and help students access the following videos:
 - Video #1: Base-10 System Basics
 - Video #2: Natural Numbers, Integers, and Closure
 - Video #3: Operating with Negative Integers
 - Video #4: The Distributive Property and Factoring
- Direct students to take notes on the videos on their Classwork. Let them know that they should feel free to pause or rewind the video if anything is unclear, and they should raise their hand if they would like you to help them one-on-one.
- Once a student is done watching a video, they should **complete the Classwork problems that relate to that video**. After they do this (and ask any clarifying questions), they should start the next video.
- As you circulate, make sure that students are focused and on track (i.e. not surfing the web), and provide hints and help as needed.
- NOTE: It is okay if this part of the lesson takes longer than planned and spills into the 2nd Hour. Students may go at different paces. If some students finish before other students, feel free to have them discuss their answers with each other, then start the Group Activity in pairs or groups of three.

2nd Hour

3. Break (5 min)

4. Whole Class Share-Out (5 min)

- Ask students “what did you learn from these videos?” and have a few students share out. Be very supportive while also encouraging students to use precise mathematical language.



- Give students a few minutes to check their answers with each other, then go over any outstanding questions with the class. Encourage students to present/explain their work.

5. Group Activity and Presentations (30 min)

- Hand out the Group Activity. Have students work on this activity in pairs or groups of three. Circulate and provide support. Once everyone is done, have groups present their answers and reasoning. Clarify key ideas/concepts.
- If students finish earlier, allow them to take out their Workbooks and do a few problems from the Classwork that they have not done yet.

6. Flashcards (10 min)

- Have students create 5 flashcards from what they learned today. For example:
 - On one side of the flashcard they could write “rewrite 358 using the base-10 system” and the other side they could write the answer “ $3 \times 10^2 + 5 \times 10^1 + 8 \times 10^0$ ” or else a description “break it down to 100’s, 10’s, and 1’s place, then write 100 as 10^2 , 10 as 10^1 , and 1 as 10^0 .”
 - On one side of the flashcard they could write “integers” and on the other side they could write the definition and a key idea about integers “ $\{ \dots - 3, -2, -1, 0, 1, 2, 3, \dots \}$ all natural numbers are integers”
- Explain that you can create and use flashcards to study math concepts in the same way that you use them to learn vocabulary. You can write examples, key ideas, or even pictures (i.e. the “area model of multiplication”)
- Model how to study with flashcards.
 - Once you have a stack of flashcards, keep them in your pocket all week.
 - When you have free time (waiting for a subway or bus or elevator or whatever), take them out. Start with three. Go over them and mix them until you know them **in any order. Then, add one more card.**
 - Go over them and mix them until you know them in any order. **Then, add one more card.**



○ And so on. **Continue adding one card at a time and mixing them until you have memorized them all.** When you have memorized them all, **test yourself in reverse!**

7. **Exit Ticket** (5 min)

- If there is time left, hand out the Exit Ticket. Give students 3 minutes to work on it on their own silently, and then have them share out. Clear up any misconceptions, and dismiss the class.