**Lesson 19 Notes: Rational Numbers**

**What is a rational number?** A fraction!

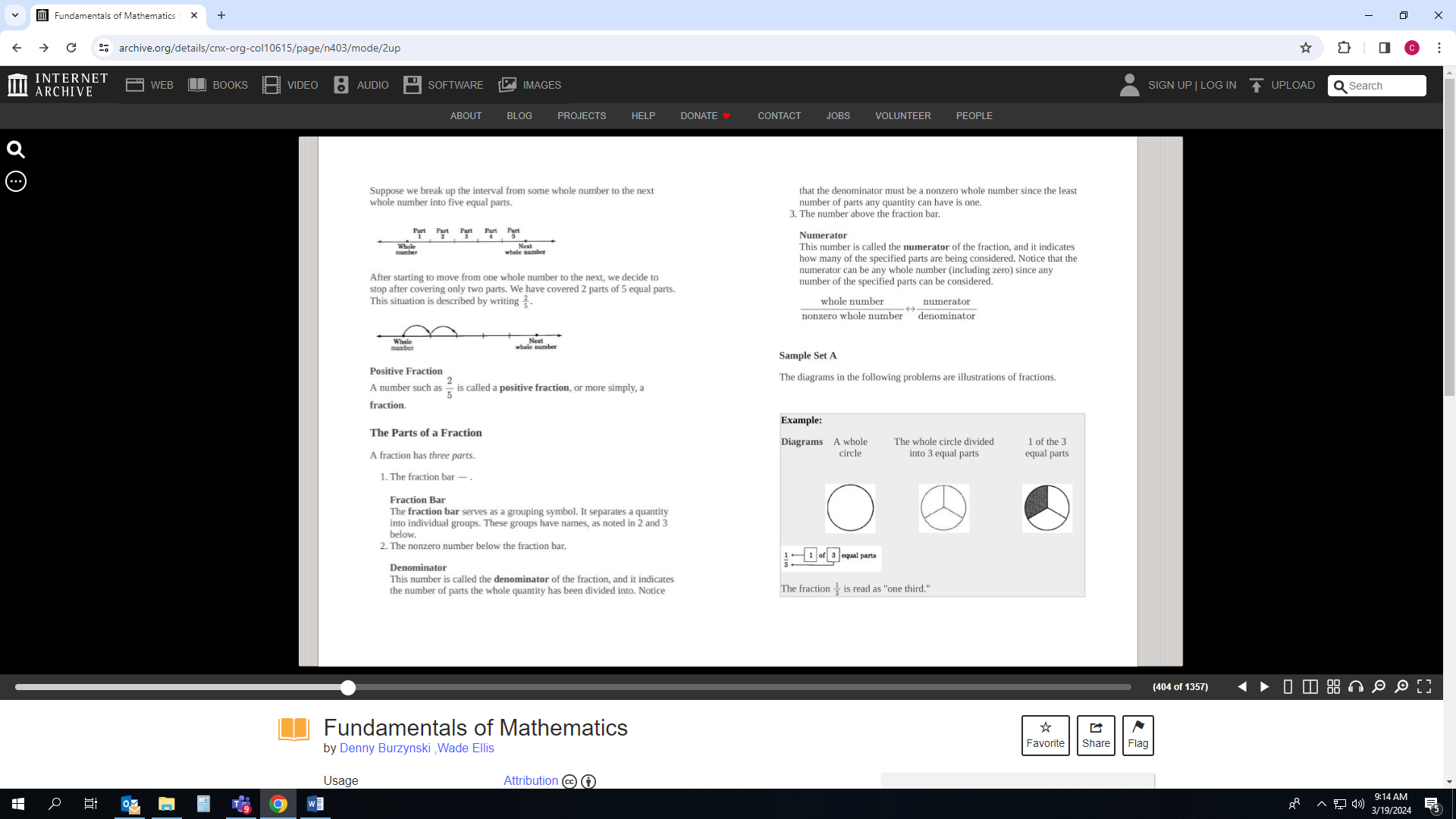
The idea of breaking up a whole quantity gives us the word *fraction* which comes from the latin word “*fractio*” which means a breaking or fracture.

The parts of a fraction:

1. Fraction bar - serves as a grouping symbol that separates a quantity into individual groups called the numerator and denominator.
2. Denominator – the nonzero number below the fraction bar. It indicates the number of parts the whole quantity has been divided into. The smallest number a whole quantity can be divided into is one, therefore the denominator must be a nonzero number.
3. Numerator- the number above the fraction bar. It indicates a specified part of the whole.
4. Fractions =

**Fraction Concepts:**

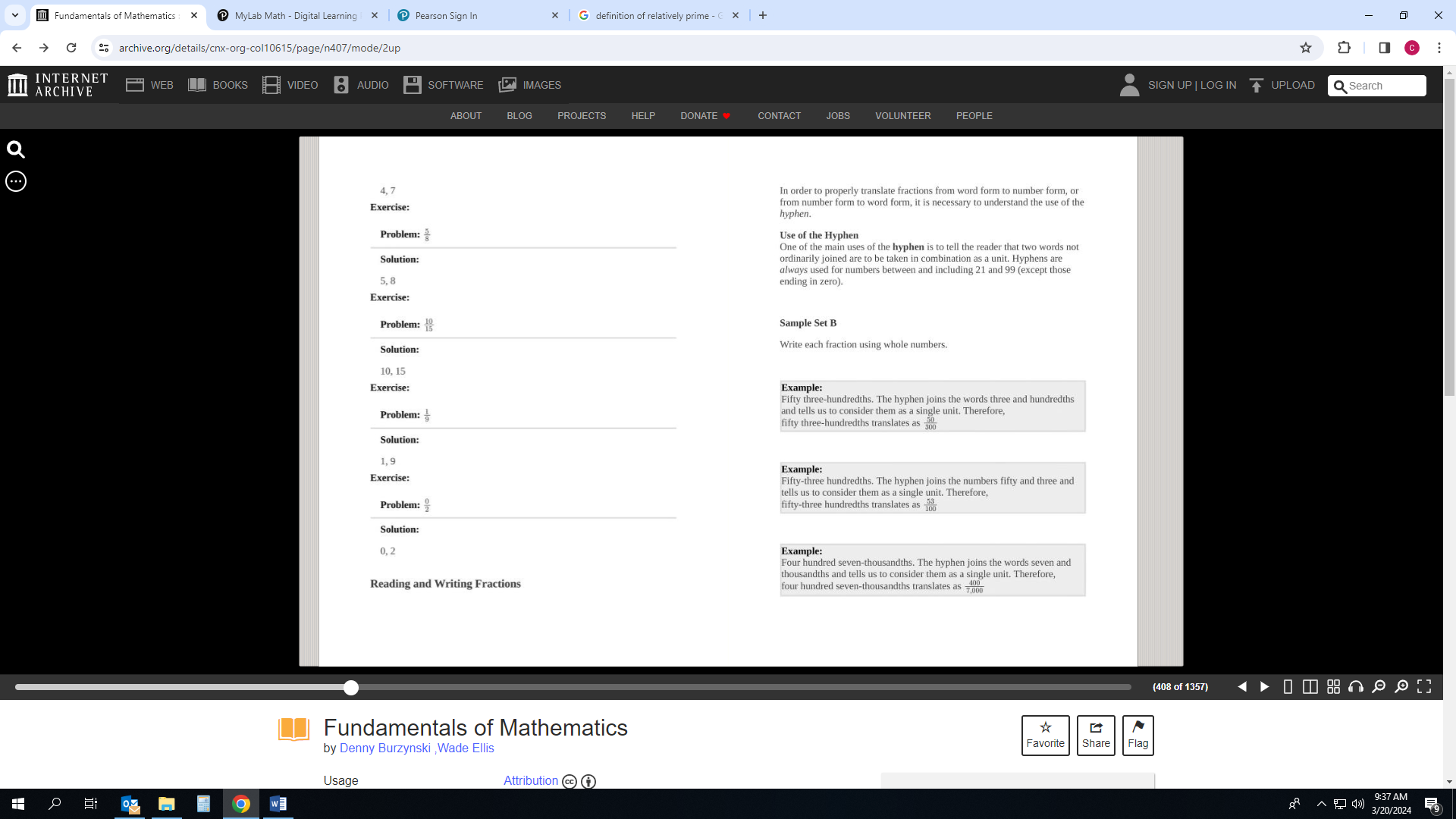
1. *Part-to-Whole*



1. *Fraction-quotient –* the division of one number by another
2. *Ratio –* to compare one amount to another. For example, the ratio of men to women is 1to 23*.*

Unit Fraction: a fraction whose numerator is 1

**Example 1**: Write the fraction fifty three-hundredths with whole numbers.



**Answer Key**

**Types of Fractions**

**Proper Fractions:** fractions in which the numerator is smaller than the denominator.

**Example 2:**

1

0

A proper fraction always lies between \_\_\_\_\_ and \_\_\_\_\_.

**Improper Fractions:** fractions in which the numerator is greater than or equal to the denominator.

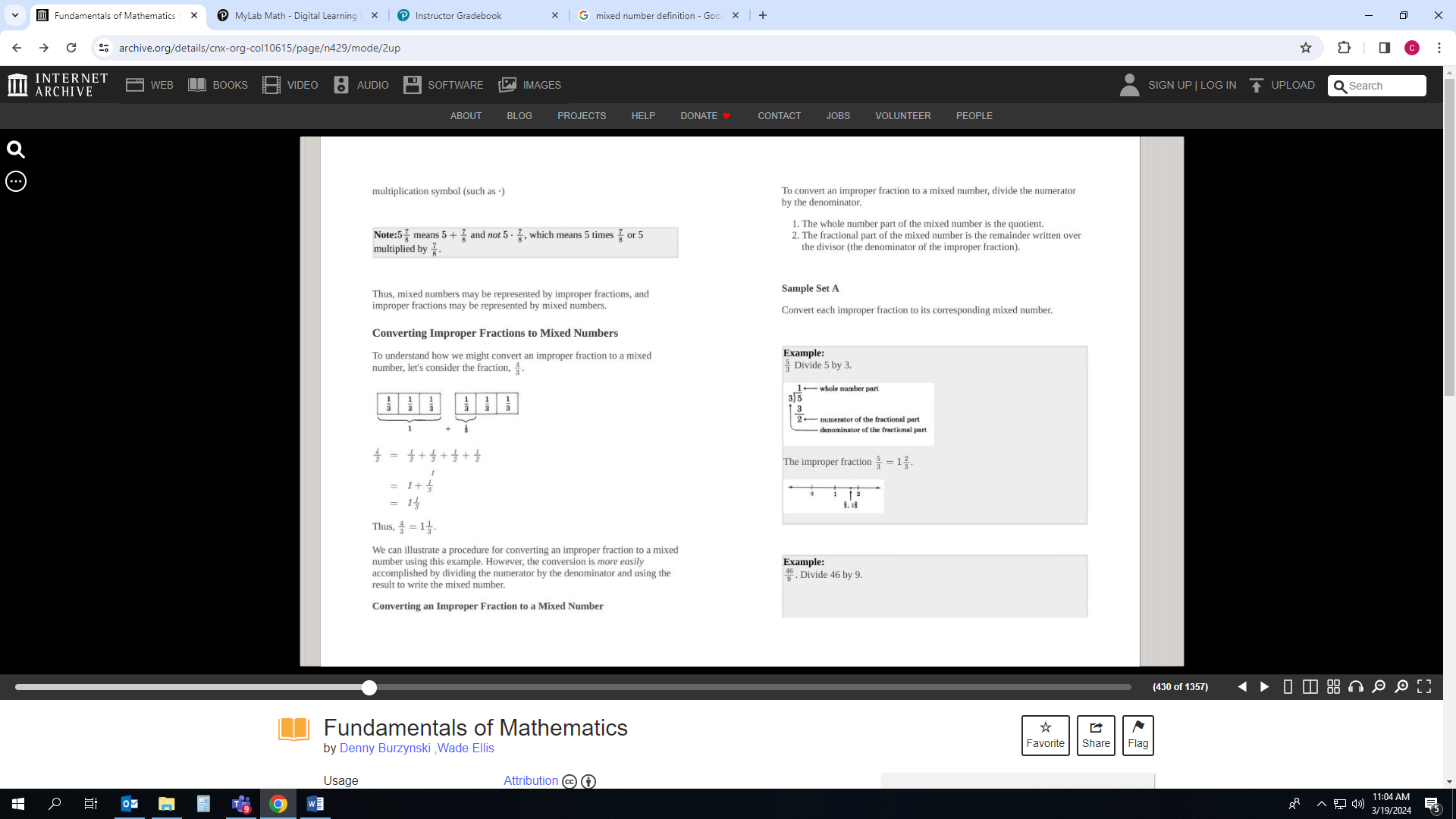
**Example 3:**

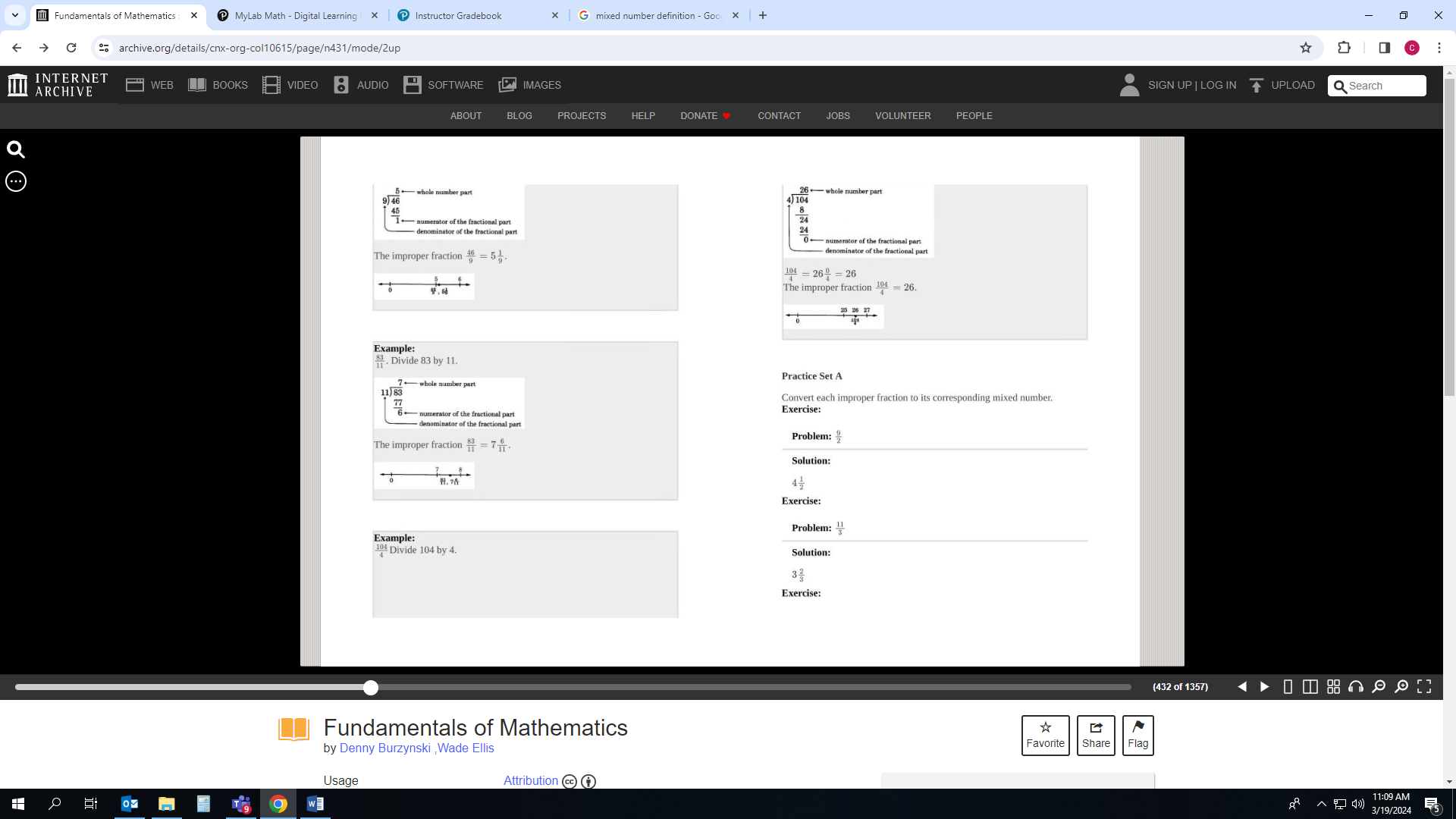
**Mixed Number:** a number made up of an integer and a proper fraction.

**Example 4:**

**Converting an Improper Fraction to a Mixed Number**

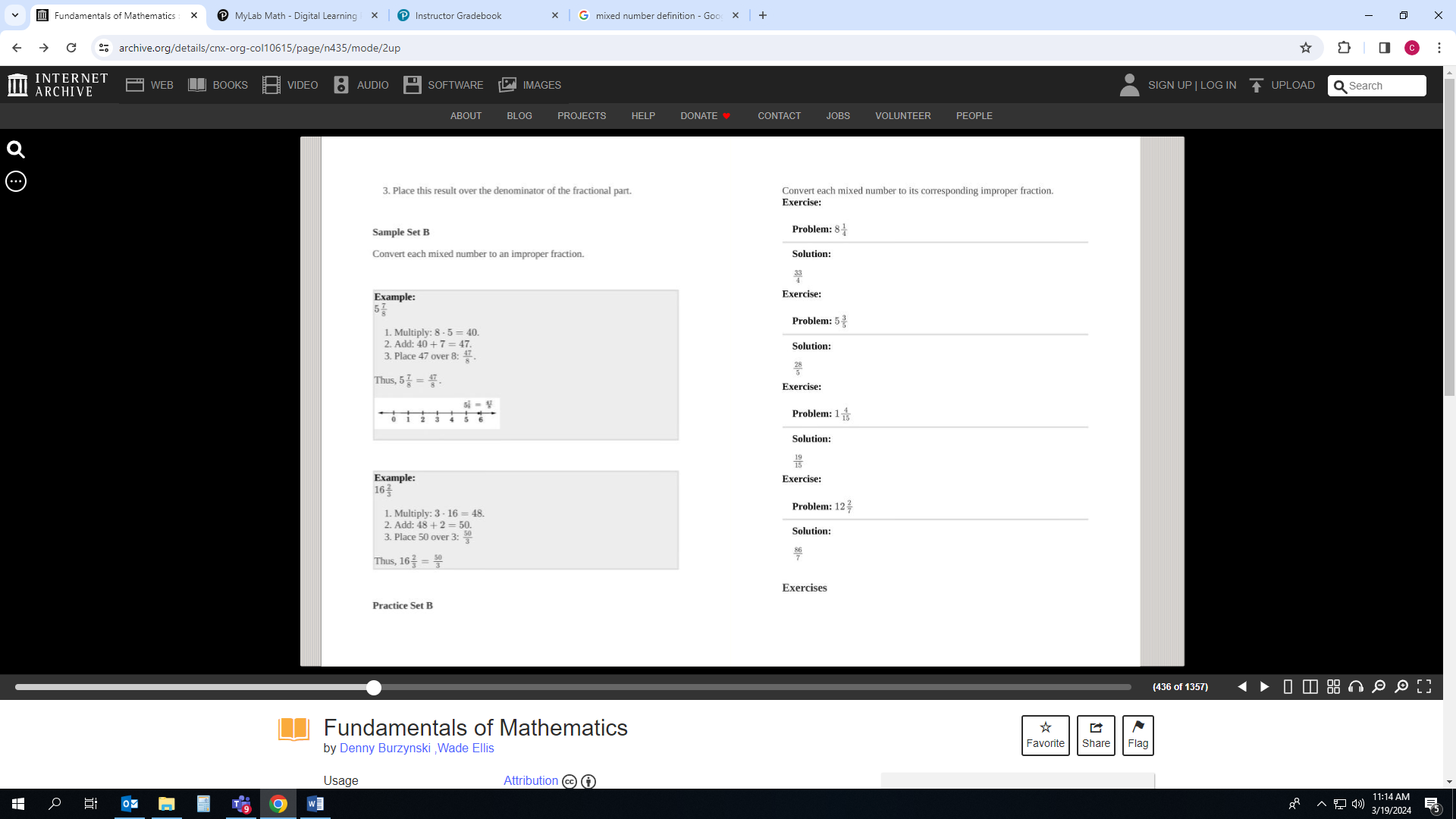
* Divide the numerator by the denominator

**Example 5:** Convert to a mixed number.

**Example 6:** Convert to a mixed number.

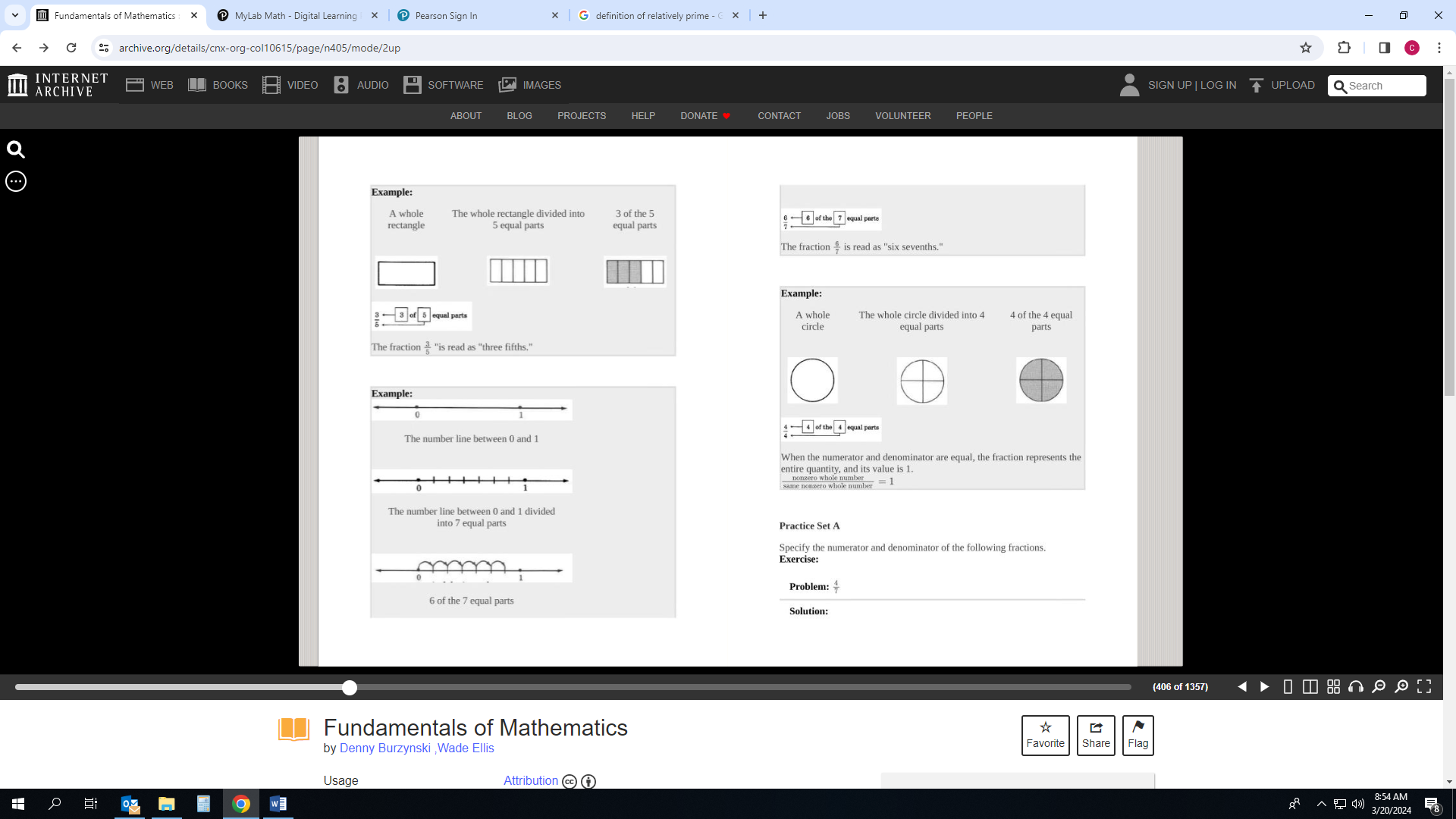
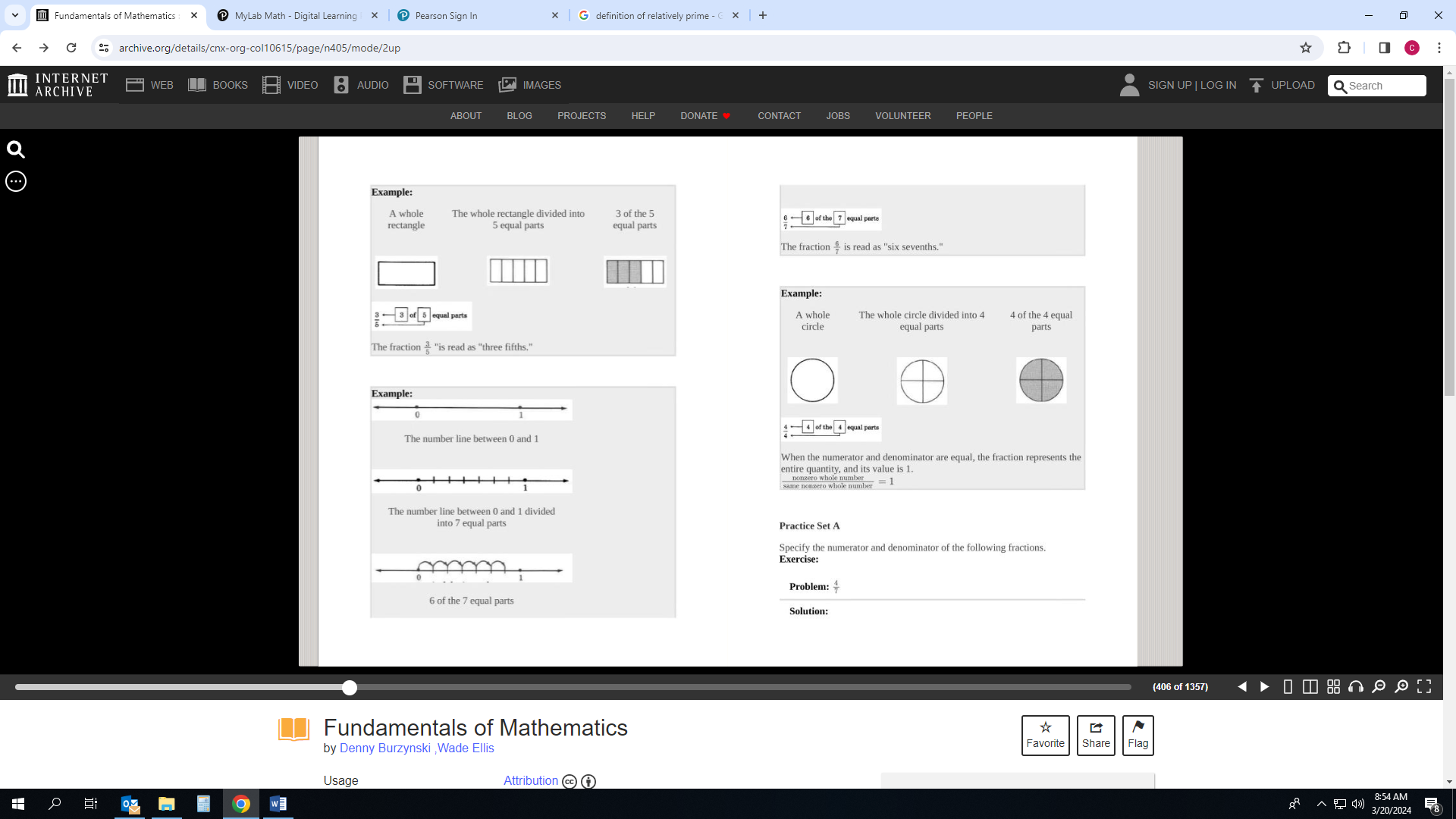
**Converting Mixed Numbers to Improper Fractions**

* Multiply the denominator of the fractional part of the mixed number by the integer part.
* To this product, add the numerator of the fractional part.
* Place this result of the denominator of the fractional part.

**Example 7:** Convert the mixed number to an improper fraction.

**Locating Fractions on the Number Line**

Fractions are located on a number line by using the part-to-whole concept. First, select a UNIT. Then, divide this interval into equal parts.



**Equality of Fractions Activity**

By using an area model in which part of a region is shaded, students can see how fractions are related to a whole unit, compare fractional parts of a whole, and find equivalent fractions.

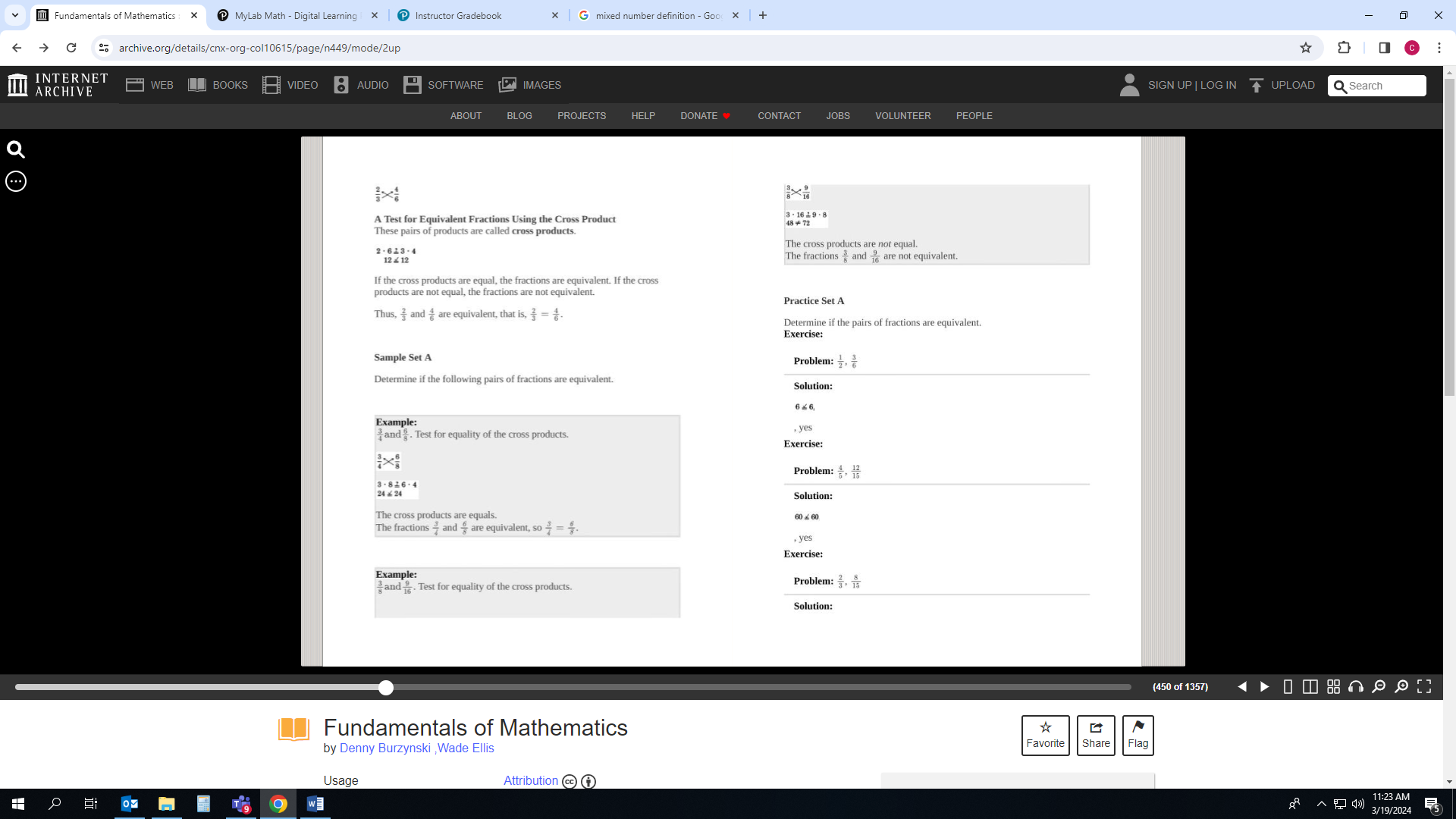
|  |  |  |  |
| --- | --- | --- | --- |
| **1** | | | |
|  | |  | |
|  |  | |  |

**Equivalent Fractions**

* Fractions that have the same value are called equivalent fractions.
* Equivalent fractions may look different but they are still the same point on the number line.

**A Test for Equivalent Fractions Using the Cross Product**

* If the cross products are equal then the fractions are equivalent.
* If the cross products are not equal then the fractions are not equivalent.

**Example 8:** Determine if are equal.

**Example 9:** Use the test for equality of fractions to determine which pairs of fractions are equal.

1. 2.3.

1470 = 1470 -6 = -6 35 = 36

Yes Yes No

**Inequality of Fractions**

[Click to watch a video of how a tower of bars illustrates many different equalities of fractions.](https://youtu.be/LZT-v8xoi6o?si=rAVyf_AtMBPSv8qA)1

Test for Inequality of Fractions:

**Example 10:** Determine the inequality for each pair of fractions using

*20 21*

*15 16*

1. b. c. d.

*36 35 21 20*

**Reducing Fractions to Lowest Terms**

* When a fraction is converted to the fraction that has the smallest numerator and denominator in its collection of equivalent fractions it is said to be reduced to lowest terms.
* The only whole number that divides the numerator and denominator without a remainder of a reduced fraction is \_\_\_\_\_\_\_\_\_\_.

1

GCF

If the numerator and denominator of a fraction are divided by their \_\_\_\_\_\_\_, the resulting fraction is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the fraction is said to be in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

relatively prime

simplest form

lowest terms

* Two numbers are considered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_if there are no common factors other than 1.

Two Methods of Reducing Fractions:

* Divide Out Common Primes
* Divide Out Common Factors

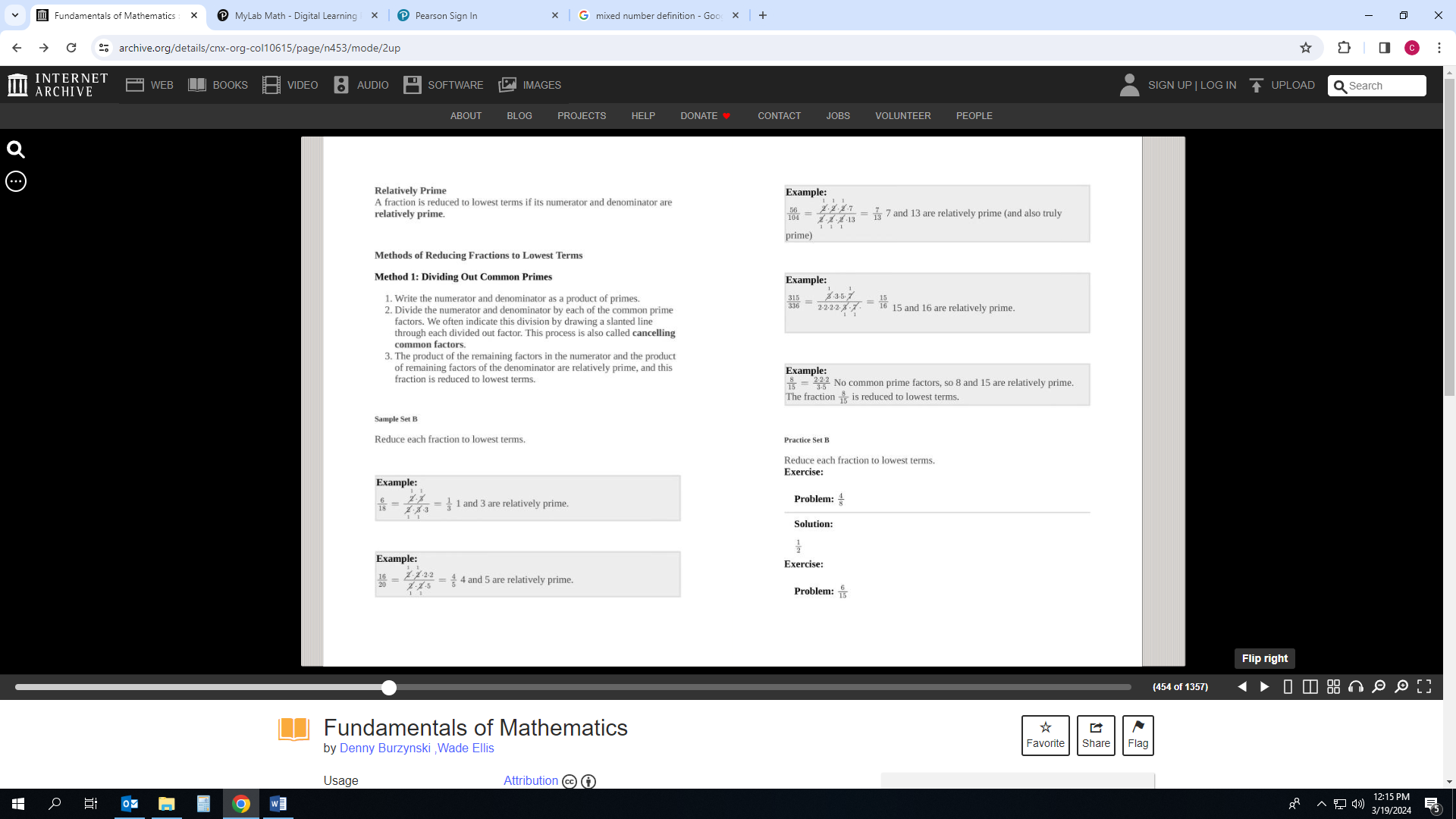
**Helpful Hint:** Share a catchy video with songs to help students remember the rules. Check out a video on reducing fractions by [NUMBEROCK](https://youtu.be/U-1KjlJAA6M?si=mC2A-YpI_d5j0hRk).2

**Methods of Reducing Fractions to Lowest Terms**

**Divide Out Common Primes**

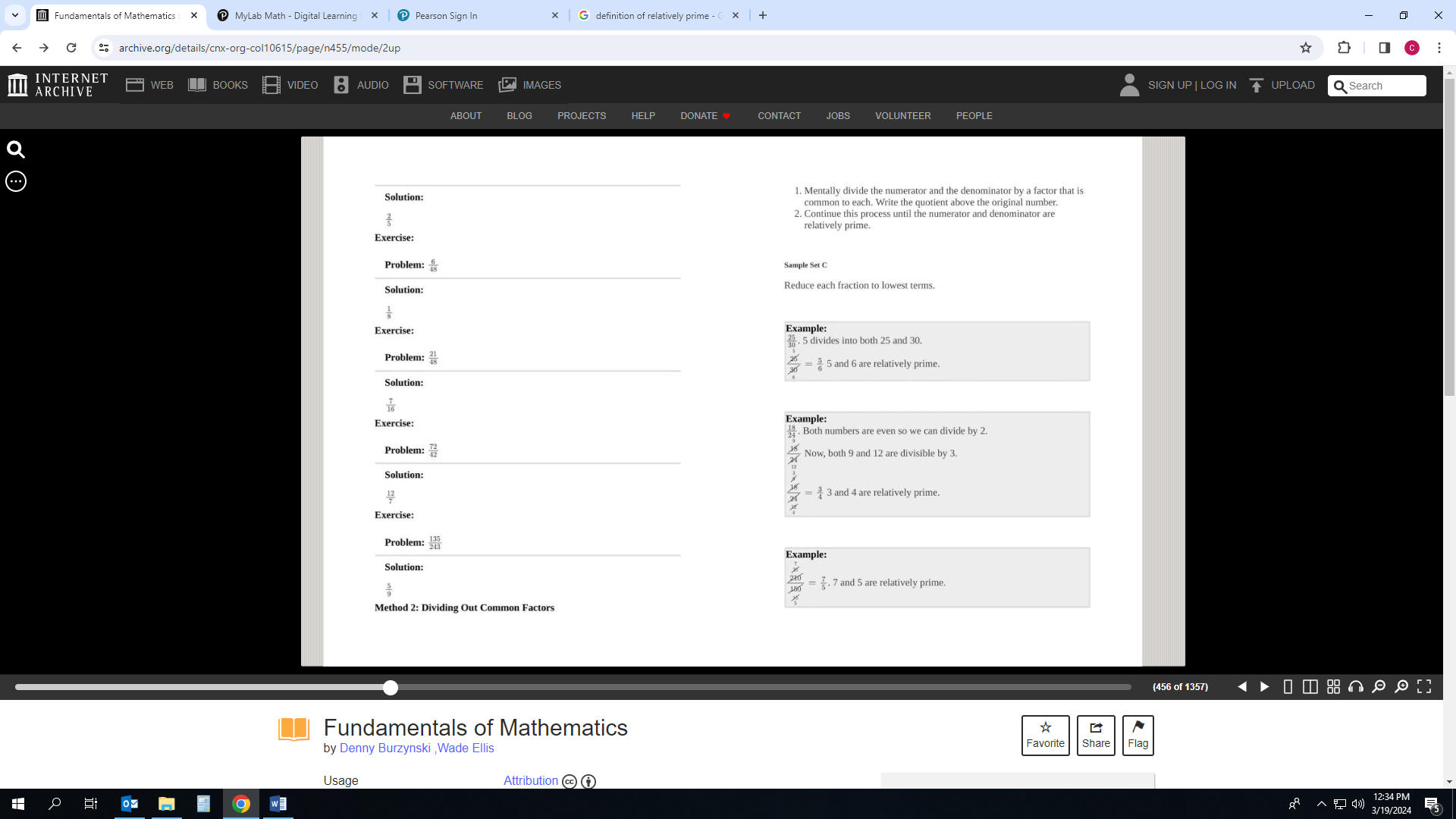
* Write the numerator and denominator as a product of primes
* Cancel out all common factors
* Multiply the remaining factors in the numerator and denominator.

**Example 11:** Reduce the fraction to lowest terms.



**Divide Out Common Factors**

* Mentally divide the numerator and denominator by a factor that is common to each.
* Continue this process until the numerator and denominator is relatively prime.

**Example 12:** Reduce the fraction to lowest terms.

**Example 13:** Write each fraction in simplest form using either method for reducing fractions.

1. 2. 3. 4.

**References**

# 1YouTube. (2012). *Inequality Step 2 - Decreasing and Increasing Fractions.*

YouTube. <https://youtu.be/LZT-v8xoi6o?si=lDFZgrRLeapFNDiT>

# 2YouTube. (2016, June 30). *Simplest Form Song: Simplifying Fractions by NUMBEROCK. YouTube.* <https://youtu.be/U-1KjlJAA6M?si=mcKcDPLfGOi8bnkF>