Objectives:

- Students will memorize the multiplication table, as evidenced by them passing "minute quizzes."
- Students will divide positive integers to find the quotient and remainder, as evidenced by them completing a warm-up worksheet.
- Students will find the prime factorization of whole numbers, as evidenced by them completing a homework assignment where they do so.

Student Materials on Desk Corner:

- Homework #2-4
- Homework Checker
- Readiness Checker

Student Materials for Class:

- Homework Log
- Binder Paper
- Pencils

Teacher Materials:

- "Warm-up 2-5" for each student
- "Minute Quiz 2-5" for each student
- "Homework #2-4" answer key and grading roster for TA
- "Homework #2-5" handout for each student

Homework:

- Homework #2-5

Time	Activity
Before Bell	**DO NOW** As students enter the classroom, shake hands and give them a copy of the **warm-up**. Remind students that there is a minute quiz, so students need to be seated quietly with a pencil when the bell rings.
5 min	**MINUTE QUIZ, HOMEWORK COLLECTION, AND WARM-UP** **Minute Quiz** When the bell rings, quickly go around and put the **minute quiz** on each student's desk, facedown. Then, start everyone on the quiz at the same time and give everyone one minute. While students are working on the quiz, stamp the **readiness checkers** of students who were ready when the bell rang and had their readiness checkers out. **Homework Collection** Instruct the TA go around and collect **homework** and stamp **homework checkers**. Give the TA the answer key and have him or her grade the homework that was collected. **Warm-up** After the minute quiz, students should work on the **warm-up** while you take **attendance**.
30 min	**LESSON: PRIME FACTORIZATION** **Notes** Follow the handwritten Cornell Notes. **Homework** Pass out the ""Homework #2-5" handout and have students write down the assignment on their homework logs. Remind students that you will be available after school for office hours.
45 min	**ALEKS** Students should continue with **ALEKS**. Use this student work time to **return graded homework**.

Numeracy
Minute Quiz 2-5 A

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

11 • 9 =	11 • 2 =	4 • 4 =
10 • 12 =	7 • 8 =	3 • 12 =
7 • 1 =	1 • 12 =	2 • 1 =
8 • 1 =	12 • 11 =	5 • 11 =

Numeracy
Minute Quiz 2-5 A

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

11 • 9 =	11 • 2 =	4 • 4 =
10 • 12 =	7 • 8 =	3 • 12 =
7 • 1 =	1 • 12 =	2 • 1 =
8 • 1 =	12 • 11 =	5 • 11 =

Numeracy
Minute Quiz 2-5 A

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

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10 • 12 =	7 • 8 =	3 • 12 =
7 • 1 =	1 • 12 =	2 • 1 =
8 • 1 =	12 • 11 =	5 • 11 =

Numeracy
Minute Quiz 2-5 B

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

1 • 1 =	3 • 11 =	3 • 4 =
6 • 12 =	7 • 1 =	12 • 5 =
9 • 6 =	4 • 6 =	9 • 12 =
3 • 6 =	7 • 8 =	6 • 8 =

Numeracy
Minute Quiz 2-5 B

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

1 • 1 =	3 • 11 =	3 • 4 =
6 • 12 =	7 • 1 =	12 • 5 =
9 • 6 =	4 • 6 =	9 • 12 =
3 • 6 =	7 • 8 =	6 • 8 =

Numeracy
Minute Quiz 2-5 B

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

1 • 1 =	3 • 11 =	3 • 4 =
6 • 12 =	7 • 1 =	12 • 5 =
9 • 6 =	4 • 6 =	9 • 12 =
3 • 6 =	7 • 8 =	6 • 8 =

Numeracy
Minute Quiz 2-5 C

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

8 • 9 =	8 • 8 =	10 • 4 =
5 • 8 =	12 • 10 =	11 • 1 =
10 • 10 =	7 • 11 =	2 • 12 =
12 • 2 =	6 • 3 =	8 • 9 =

Numeracy
Minute Quiz 2-5 C

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

8 • 9 =	8 • 8 =	10 • 4 =
5 • 8 =	12 • 10 =	11 • 1 =
10 • 10 =	7 • 11 =	2 • 12 =
12 • 2 =	6 • 3 =	8 • 9 =

Numeracy
Minute Quiz 2-5 C

Name:
Date: Period:

Solve the following multiplication problems. You have exactly one minute!

8 • 9 =	8 • 8 =	10 • 4 =
5 • 8 =	12 • 10 =	11 • 1 =
10 • 10 =	7 • 11 =	2 • 12 =
12 • 2 =	6 • 3 =	8 • 9 =

Numeracy
Warm-up 2-5

Name:
Date: Period:

Solve the following division problems by finding the quotient and the remainder.

1) 54 ÷ 6

2) 4 ÷ 1

3) 135 ÷ 27

4) 90 ÷ 20

5) 488 ÷ 61

6) 807 ÷ 86

7) 2968 ÷ 53

8) 4691 ÷ 55

Numeracy
Warm-up 2-5

Name:
Date: Period:

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1) 54 ÷ 6

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7) 2968 ÷ 53

8) 4691 ÷ 55

Lesson 2-5
Numeracy

Tom Wong
10/15/08

Prime Factorization

Section → Definitions

factor — Factors are the numbers you multiply together to get another number.

Ex: $2 \cdot 3 = 6$ or $1 \cdot 6 = 6$

factor factor factor factor

So, 6 has four factors: 1, 2, 3, 6.

Ex: $1 \cdot 5 = 5$

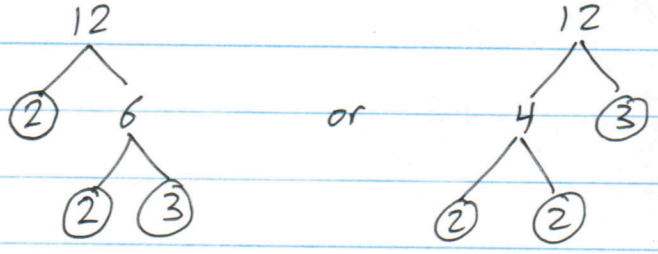
So, 5 has two factors: 1, 5.

prime # — 5 is called a prime number. A prime number is any whole number greater than 1 whose only factors are 1 and itself.

prime factorization — Prime factorization is finding which prime numbers you need to multiply together to get the original number.

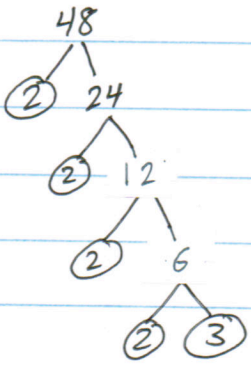
Section → Examples

Ex: Find the prime factorization of 12.



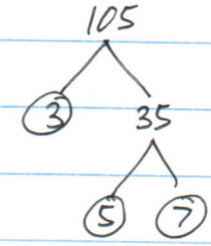
So, $12 = 2 \cdot 2 \cdot 3$ (or $2^2 \cdot 3$)

Ex: Find the prime factorization of 48.



So, $48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$ (or $2^4 \cdot 3$)

Ex: Find the prime factorization of 105.



So, $105 = 3 \cdot 5 \cdot 7$

Ex: Find the prime factorization of 47.

So, $47 = 47$ since 47 is a prime number.

Prime Factorization

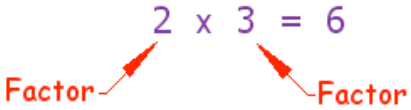
Prime Numbers

A **Prime Number** is a whole number, greater than 1, that can be evenly divided *only* by 1 or itself. Read more about Prime and Composite Numbers.

The first few prime numbers are: 2, 3, 5, 7, 11, 13, and 17 ..., and we have a prime number chart if you need more.

Factors

"Factors" are the numbers you multiply together to get another number:



Prime Factorization

"Prime Factorization" is finding **which prime numbers** you need to multiply together to get the original number.

Example 1

What are the prime factors of 12?

It is best to start working from the smallest prime number, which is 2, so let's check:

$$12 \div 2 = 6$$

But 6 is not a prime number, so we need to factor it further:

$$6 \div 2 = 3$$

And 3 **is** a prime number, so:

$$\mathbf{12 = 2 \times 2 \times 3}$$

As you can see, every **factor** is a **prime number**, so the answer must be right - the

prime factorisation of 12 is $2 \times 2 \times 3$, which can also be written as $2^2 \times 3$

Example 2

What is the prime factorization of 147?

Can we divide 147 evenly by 2? No, so we should try the next prime number, 3:

$$147 \div 3 = 49$$

Then we try factoring 49, and find that 7 is the smallest prime number that works:

$$49 \div 7 = 7$$

And that is as far as we need to go, because all the factors are prime numbers.

$$\mathbf{147 = 3 \times 7 \times 7 = 3 \times 7^2}$$

Why?

A prime number can only be divided by 1 or itself, so it cannot be factored any further!

Every other number can be broken down into prime number factors.

So, in a way, the prime numbers are the building blocks of all other numbers.

And there is only one (unique!) set of prime factors for any number.

> Example The prime factors of 330 are 2, 3, 5 and 11. There is no other possible set of prime numbers that can be multiplied to make 330.

In fact this idea is so important it is called the **Unique Factorization Theorem**, and also the **Fundamental Theorem of Arithmetic**. Wow!

Cryptography

In fact Prime Factorization is very important to people who try to make (or break) secret codes based on numbers. If you want to know more, the subject is "encryption" or "cryptography".

Another Method

We showed you how to do the factorization by starting at the smallest prime and working upwards, but sometimes it is easier to break a number down into any factors you can, then work those factor down to primes.

> Example: What are the prime factors of 90?
>
> Break 90 into 9×10
>
> - The prime factors of 9 are **3 and 3**
> - The prime factors of 10 are **2 and 5**
>
> So the prime factors of 90 are **3,3, 2 and 5**

Prime Factorization Tool

OK, we have one more method ... use our Prime Factorization Tool that can work out the prime factors for numbers up to 2,147,483,647.

here's more ...

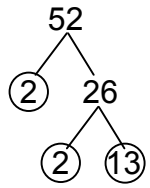
- Prime and Composite Numbers
- Prime Numbers Chart
- Prime Factorization Tool
- Divisibility Rules

Numeracy
Homework #2-5 – Prime Factorization

Name:
Date: Period:

Find the prime factorization of the following whole numbers:

Ex.) $52 = 2 \cdot 2 \cdot 13 = 2^2 \cdot 13$



1) 48

2) 84

3) 56

4) 65

5) 36

6) 100

7) 11

8) 30

9) 81

10) 59

11) 45

12) 99

13) 38

14) 24

15) 76

16) 40

17) 92

18) 130

19) 150

20) 175