Activity Checklist

Day 1

❒ Video With Guided Notes

❒ Online Practice - Level 1

Day 2

❒ Activity: Factor Trees

❒ Online Practice - Level 2

Day 3

❒ Online Practice - Levels 3 & 4

❒ Bonus Activity: Code Breaker

Objectives:

I can...

❒ Define and provide examples of prime and composite numbers

❒ Use a factor tree to find the prime factorization of a given number

Necessary Skills:

- Basic multiplication and division fluency

Before you watch the video, complete these warm-up problems.

When you're ready, keep this PDF handy as you work your way through the video and guided notes.

Fill in the blanks to complete the equations below.

*There may be more than one correct answer!

1. _____ × _____ = 30
2. _____ × _____ = 42
3. _____ × _____ = 24
4. _____ × _____ = 56

Prime Factorization Guided Notes

Directions: Follow along with the lesson video. Fill in the blanks as you learn, answer the questions when you feel ready, and complete the practice as directed.

Factors -

_____ numbers that_____

together to result in another whole number

$2 \times 3=6$ $1 \times 6=6$

2, 3, 1, and 6 are factors of 6

Using your knowledge of factors, what is different about 5 and 8?

Prime number -

a number that has exactly ____

distinct _____: 1 and itself

Prime examples:
5

Composite number -

a number that has _____

than 2 factors

Composite examples:
8

Prime factorization -

the list of _____ numbers that, when _____ together,

result in the original number

$$12 = 2 \times 2 \times 3$$

Why can a number's prime factorization be compared to a secret code?

Factor tree -

a _____ used to determine the prime _____ of a number

Find the prime factorization of 20. 20	Find the prime factorization of 24. 24

Use the prime factorization clues to discover the code to the vault!

Bonus: Miacademy Spy School Vault

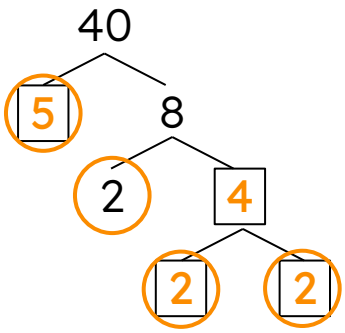
50 Gold

From the video, we know that the clues for the vault (2, 2, 3, and 5) are the prime factors for the lock code. There's another vault in the spy school with a lock code of 18. What should the prime factor clues be for this vault? (**Hint:** Use a factor tree!)

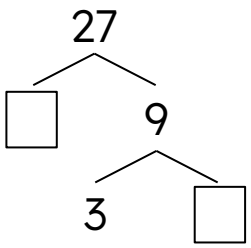
Activity: Factor Trees

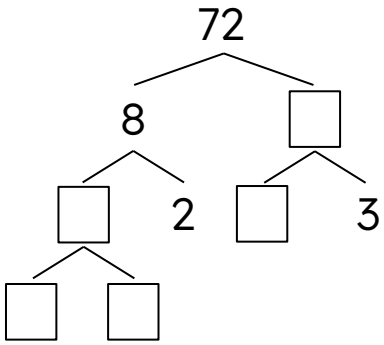
Directions: Find the **prime factorization** of each number by completing the factor trees.

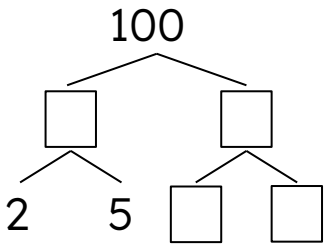
Example

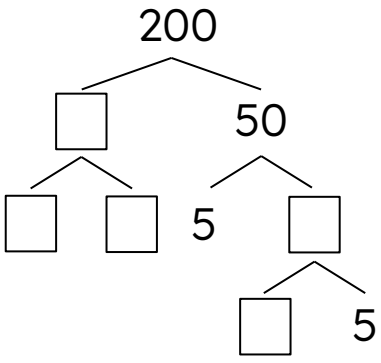


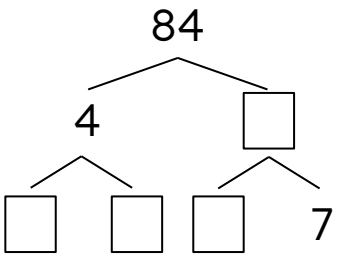
$2 \times 2 \times 2 \times 5$

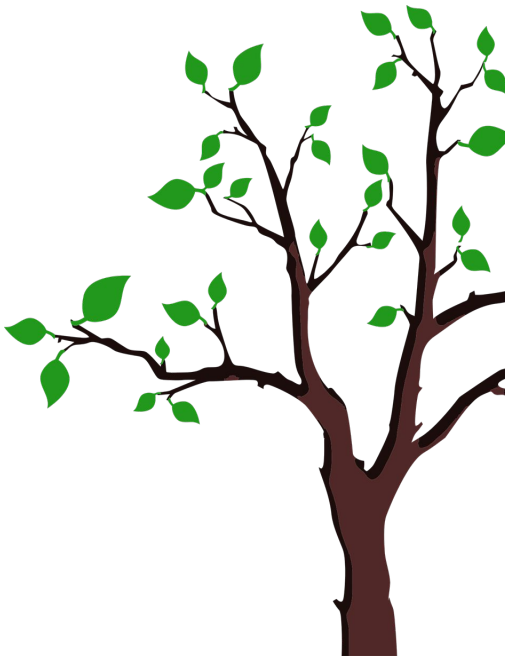












81

144

150

49

500

115

Bonus: 1 Number, Many Trees

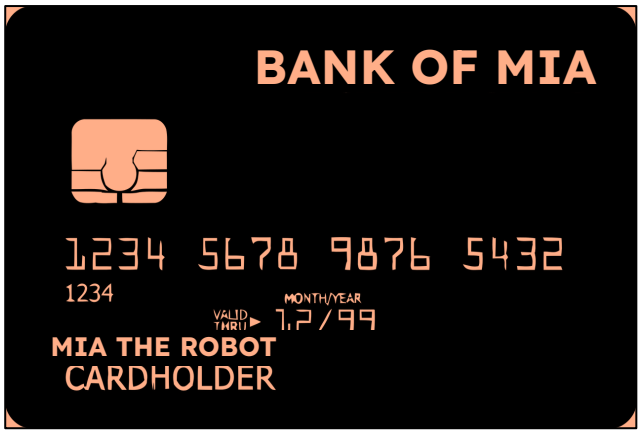
50 Gold

36 is a composite number that has a long list of factors. Because of this, there are several ways a factor tree for 36 could begin. In the space below, complete three different factor trees for the number 36. Remember, even if your factor trees for a number start differently, you should always end up with the same prime factorization!

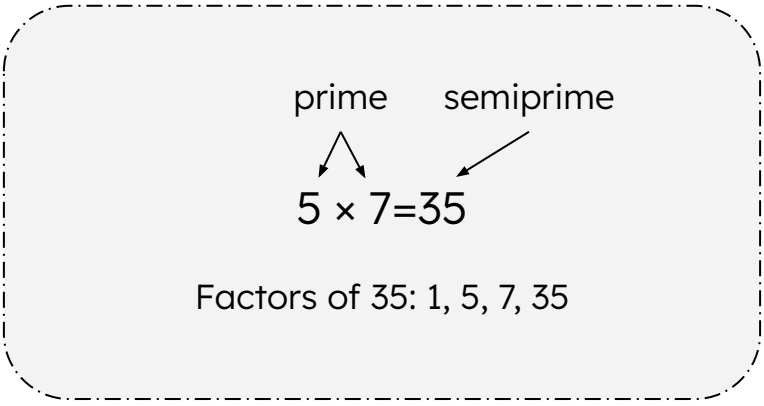
Bonus Activity: Code Breaker

Calculator use is allowed.

Have you or a parent ever bought anything online? To do that, you have to type in your credit card number, but we need to keep this information safe so that no one can steal it! So how do we keep it safe? You may be surprised to find out that it has almost everything to do with prime numbers!



We know what a prime number is, but what if we take two prime numbers and multiply them together? We get a special kind of number called a semiprime number. It's a number that is the result of two prime numbers hanging out together. Semiprime numbers are like a team — they have four friends: 1, themselves, and the two prime numbers that made them. Here's an example:



Banks use the idea of semiprime numbers to keep our credit card numbers safe online. But they don't just pick any prime numbers; they pick ones that are super huge. The prime numbers they pick are 308 digits long! They use these gigantic prime numbers to get an even more gigantic semiprime number. Then, they use this huge semiprime number to scramble our credit card number into a secret code that is very, very hard to unscramble. This is what we call encryption.

Encryption is like a secret code that helps protect information you send on the internet, like a password. It scrambles the information into a code that's hard to understand unless you have the special "key" to unlock it.

Computers are great at doing the scrambling part. They can multiply really big numbers together in a flash. But if they try to do it backward — to take a big semiprime number and find the two prime numbers that made it — they get really, really slow. That's why it's so hard for anyone to break the code!

Can you be a code breaker? Below are some semiprime numbers. Can you find the two prime number friends that made each one?