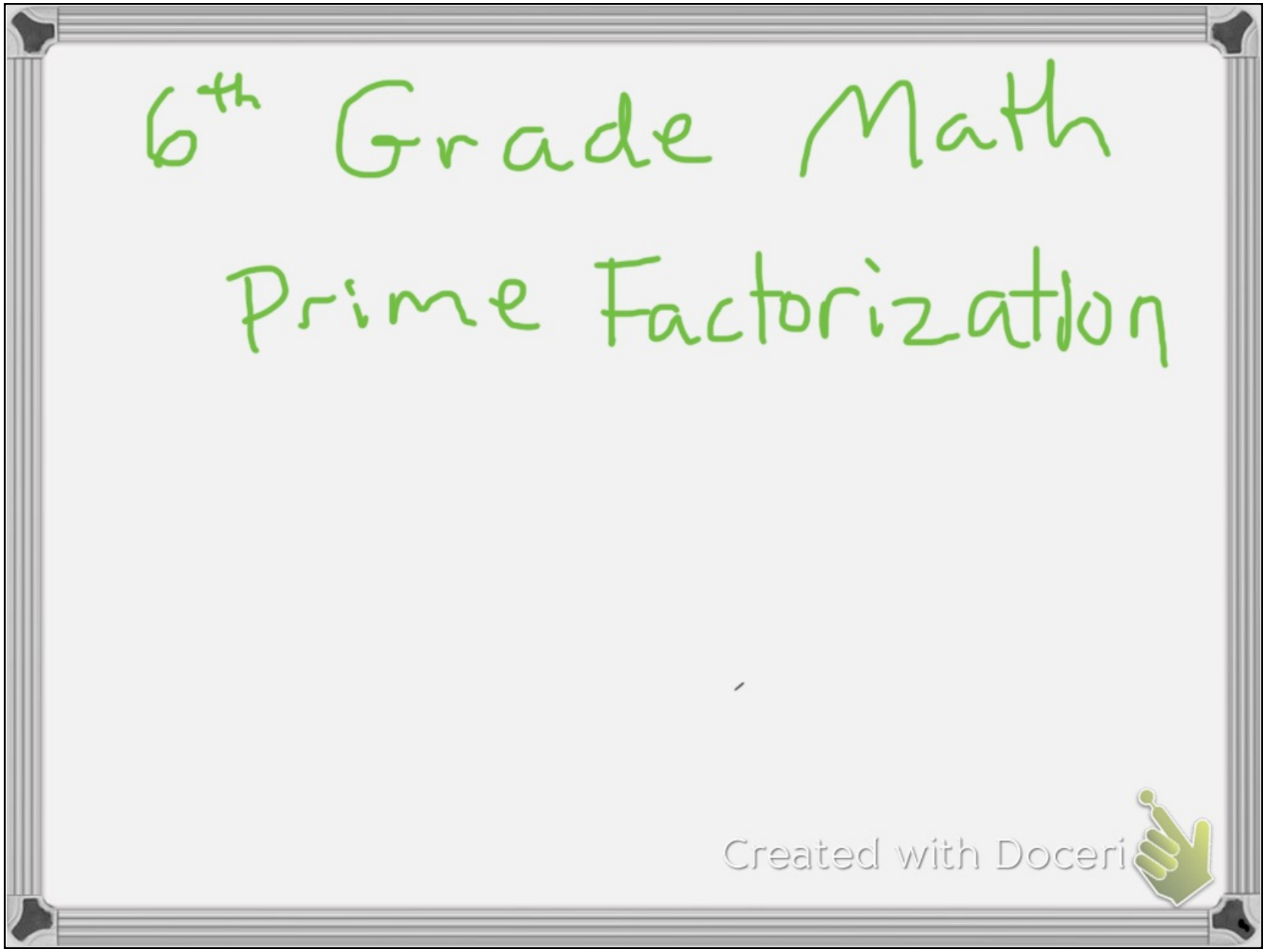
6th Grade Math
Prime Factorization
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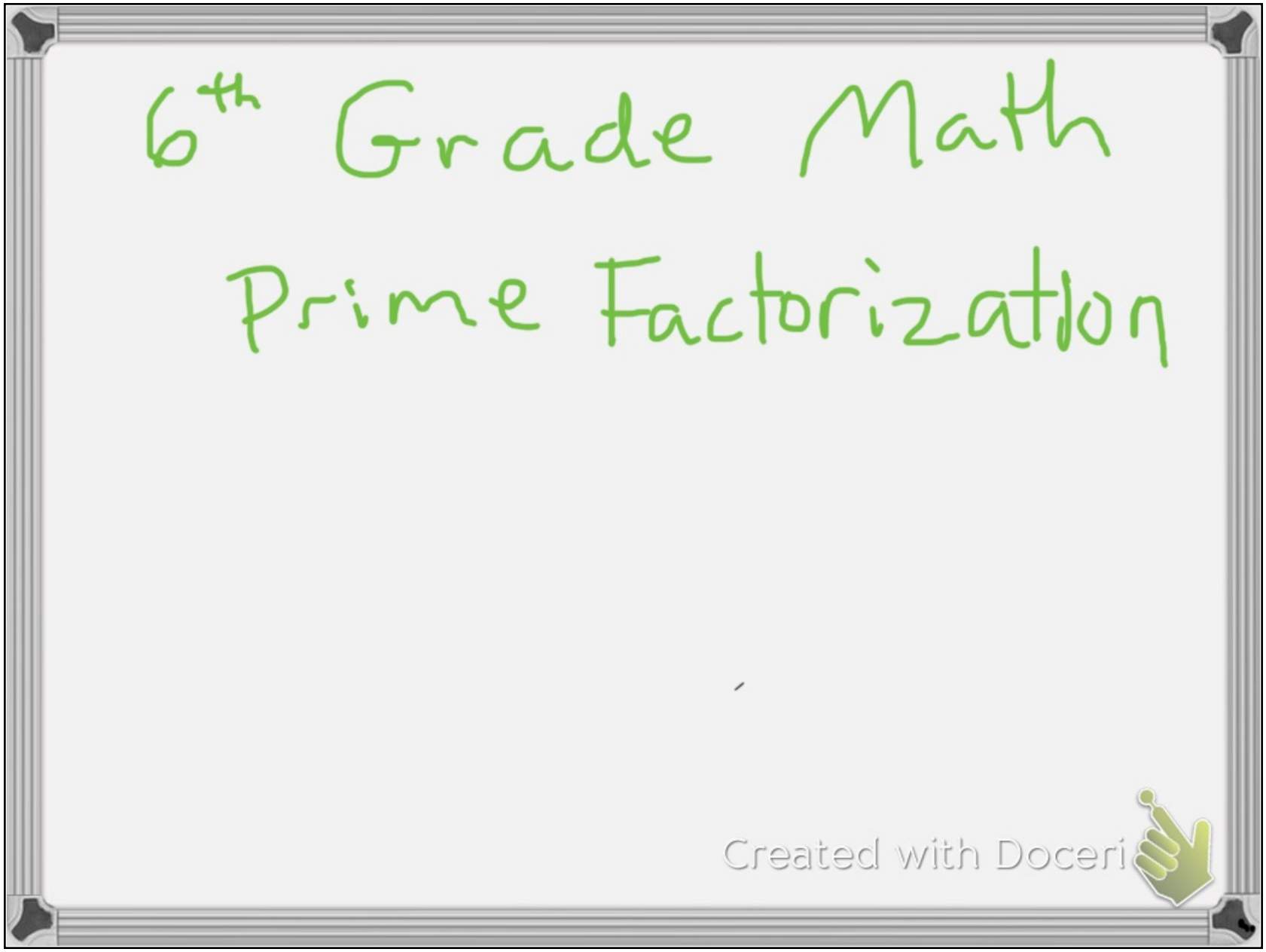
6th Grade Math
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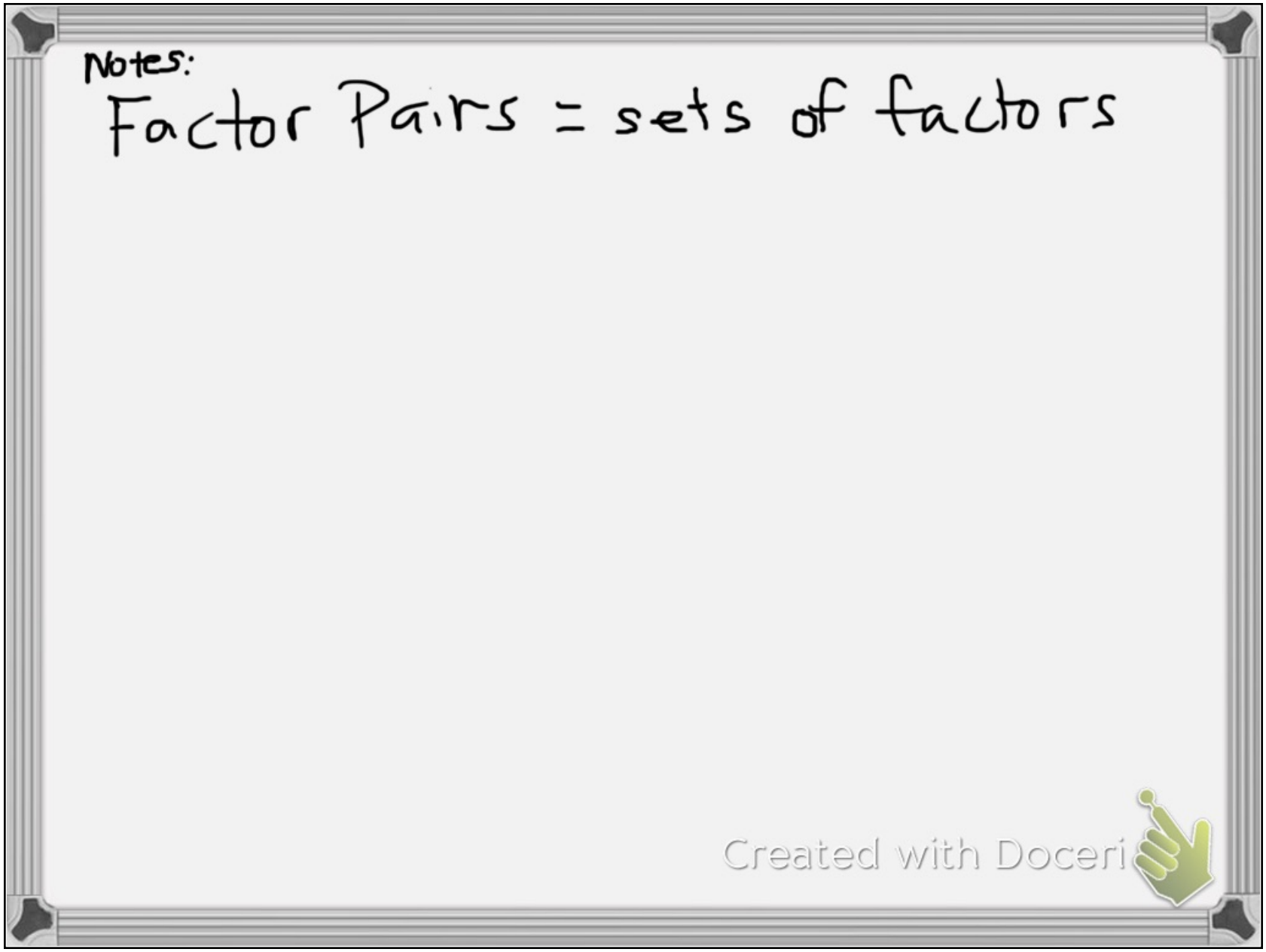
Notes:
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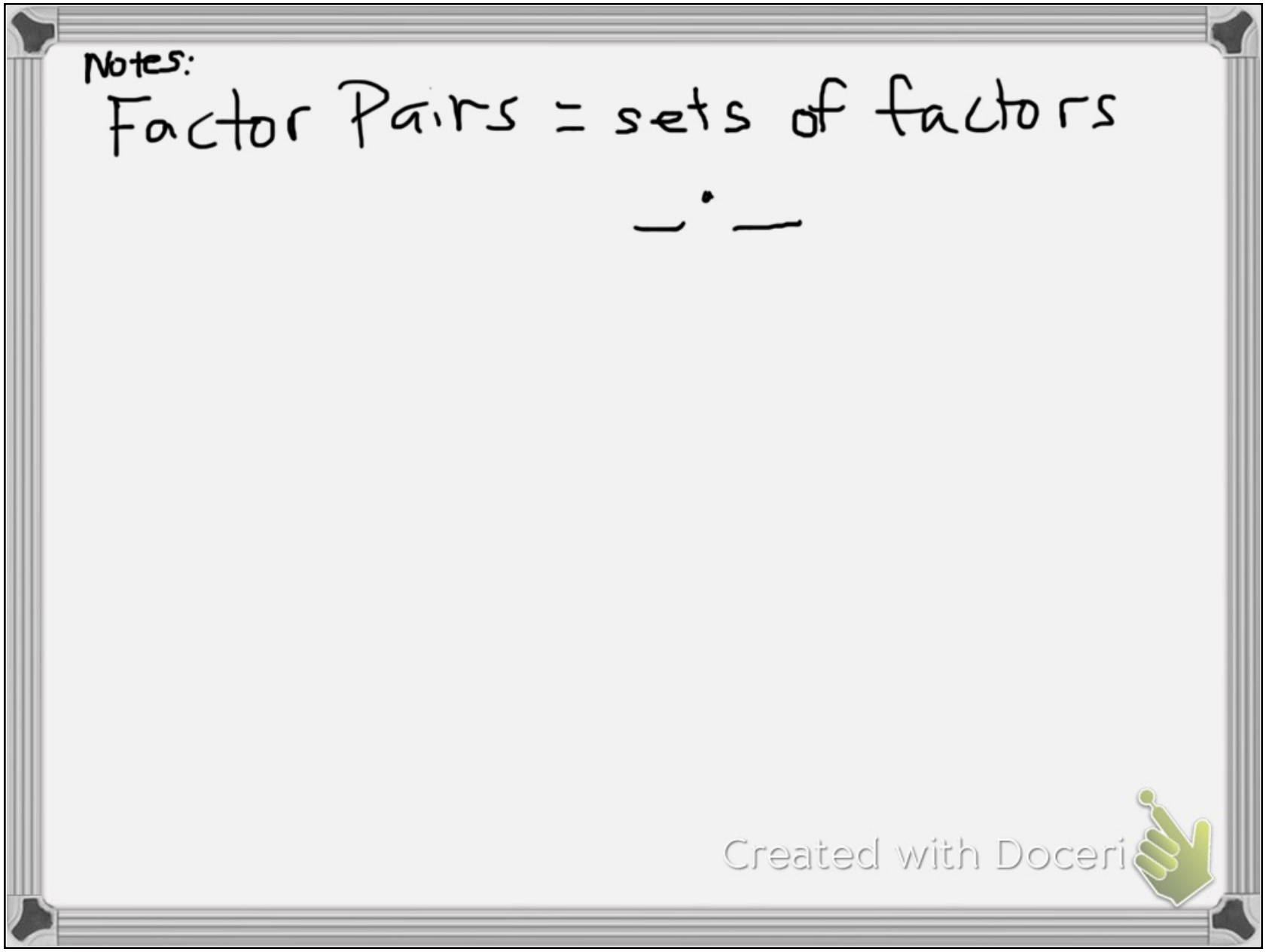
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_ • _
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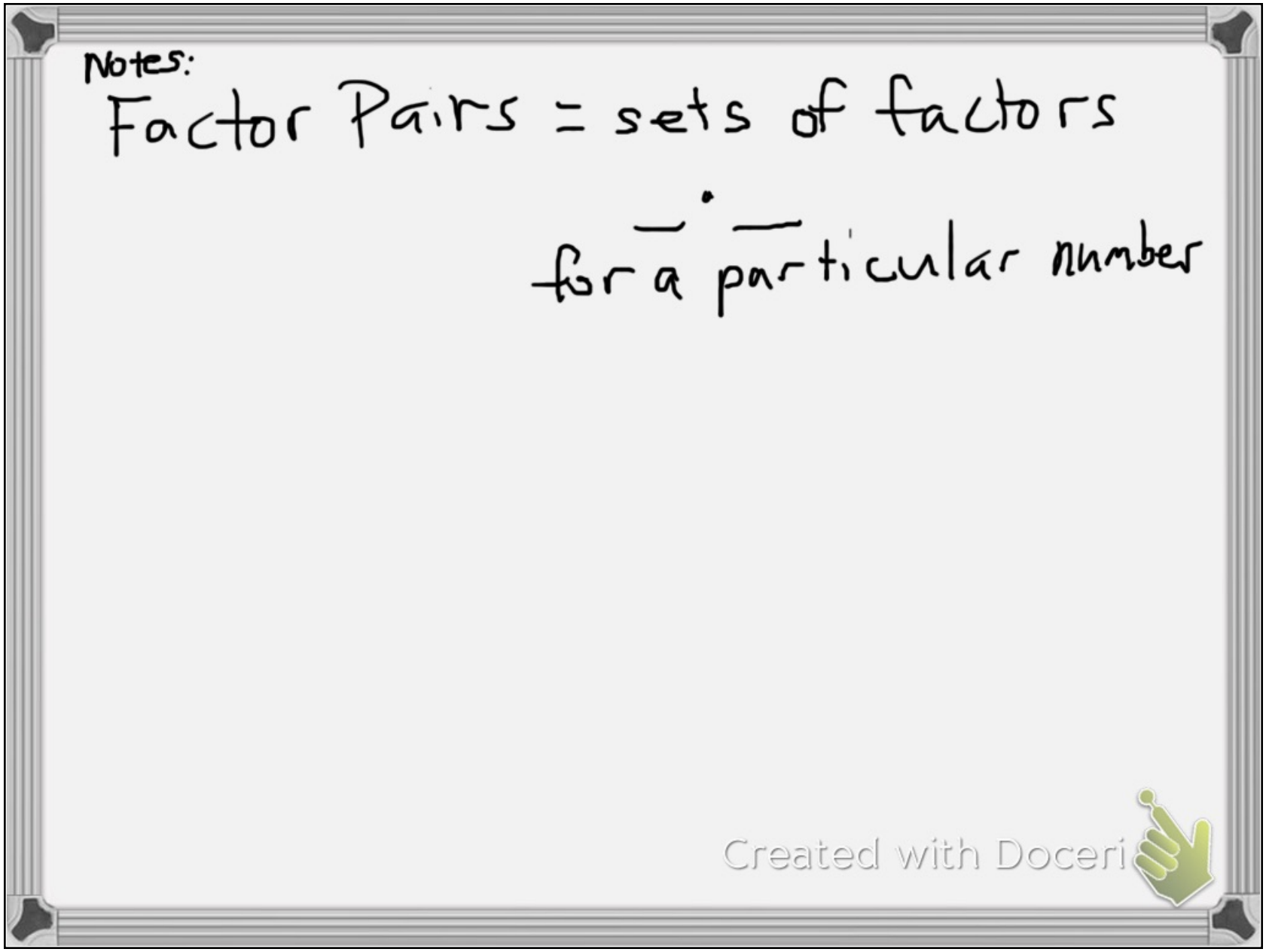
Notes:
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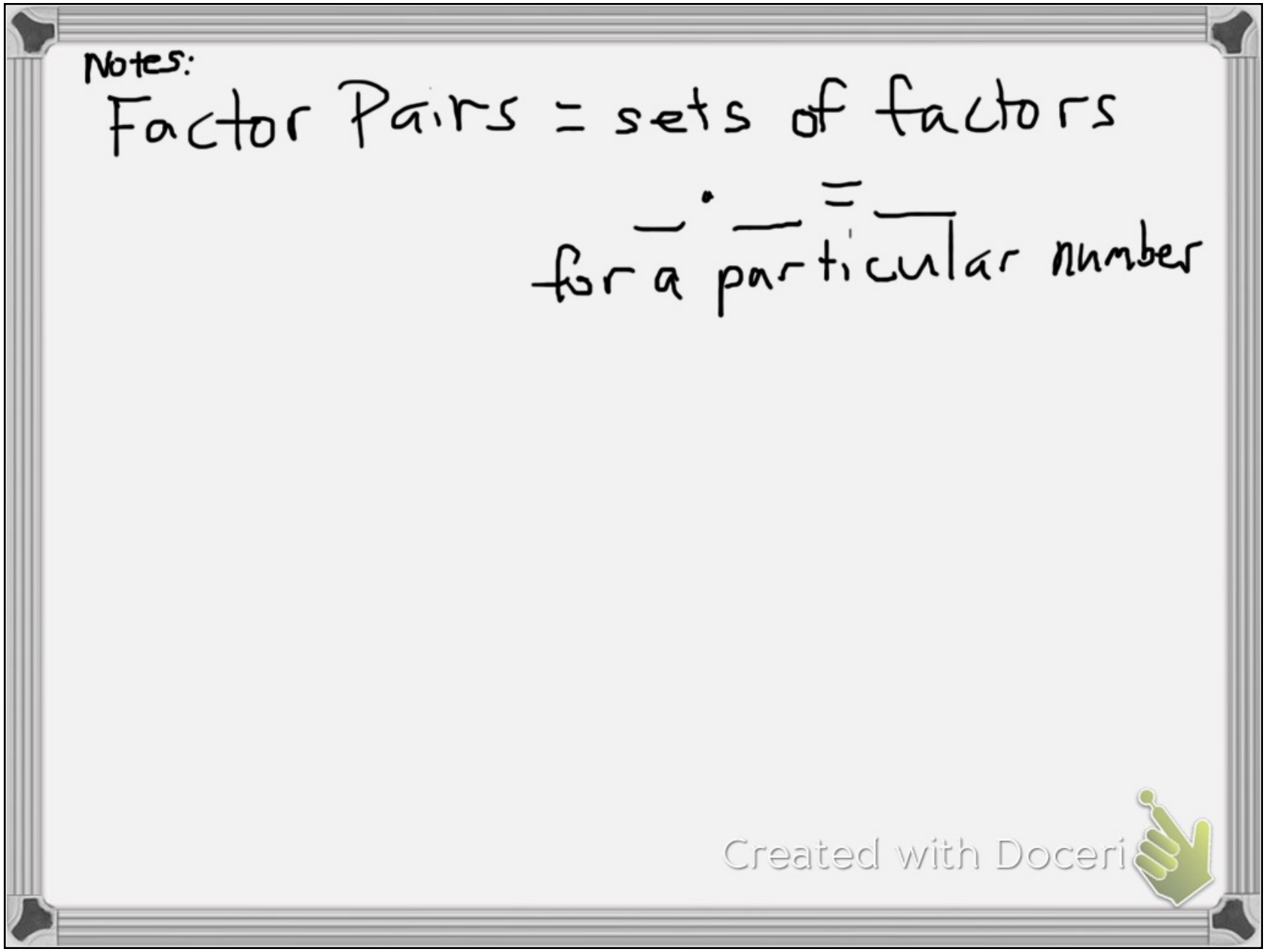
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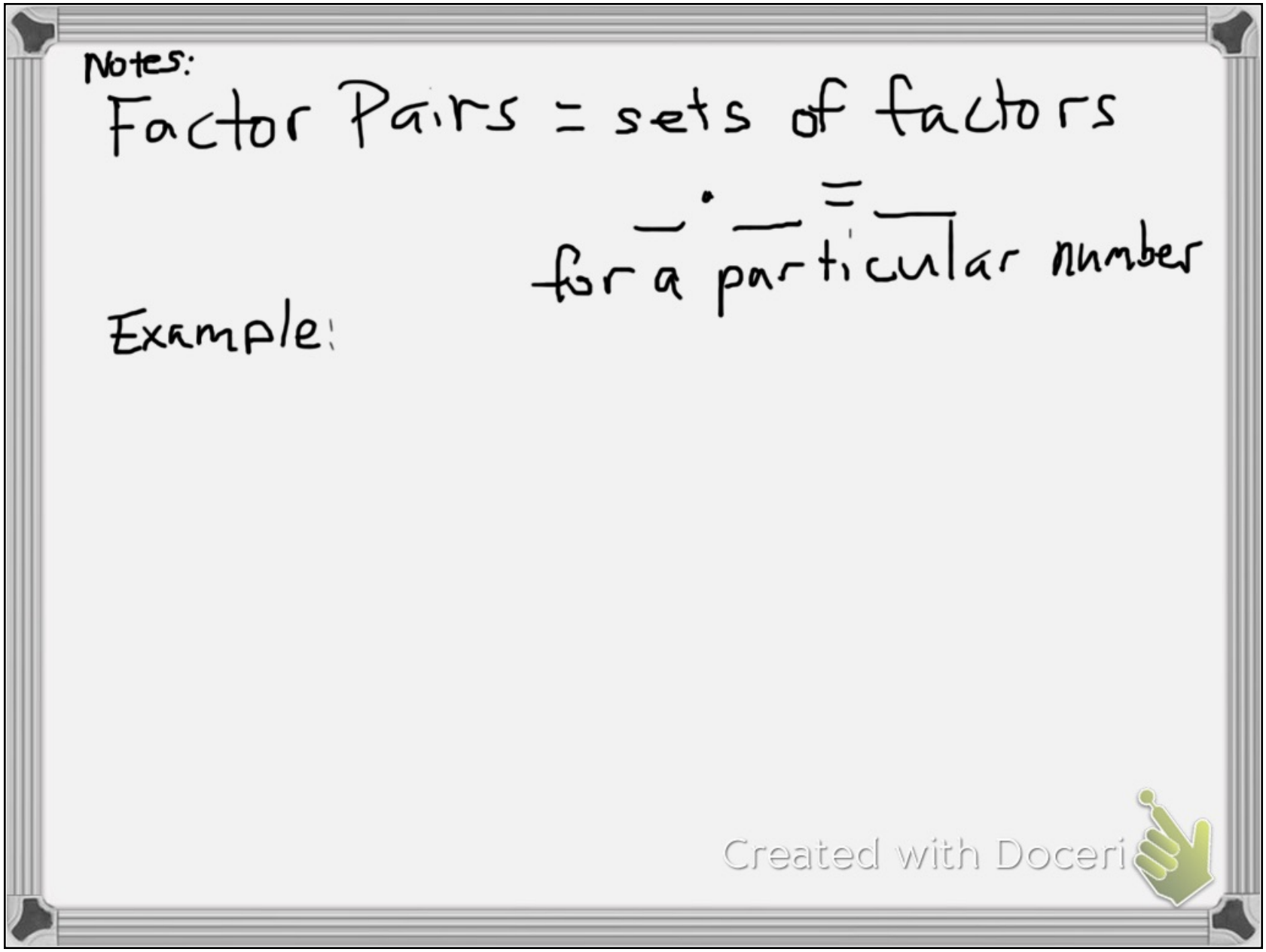
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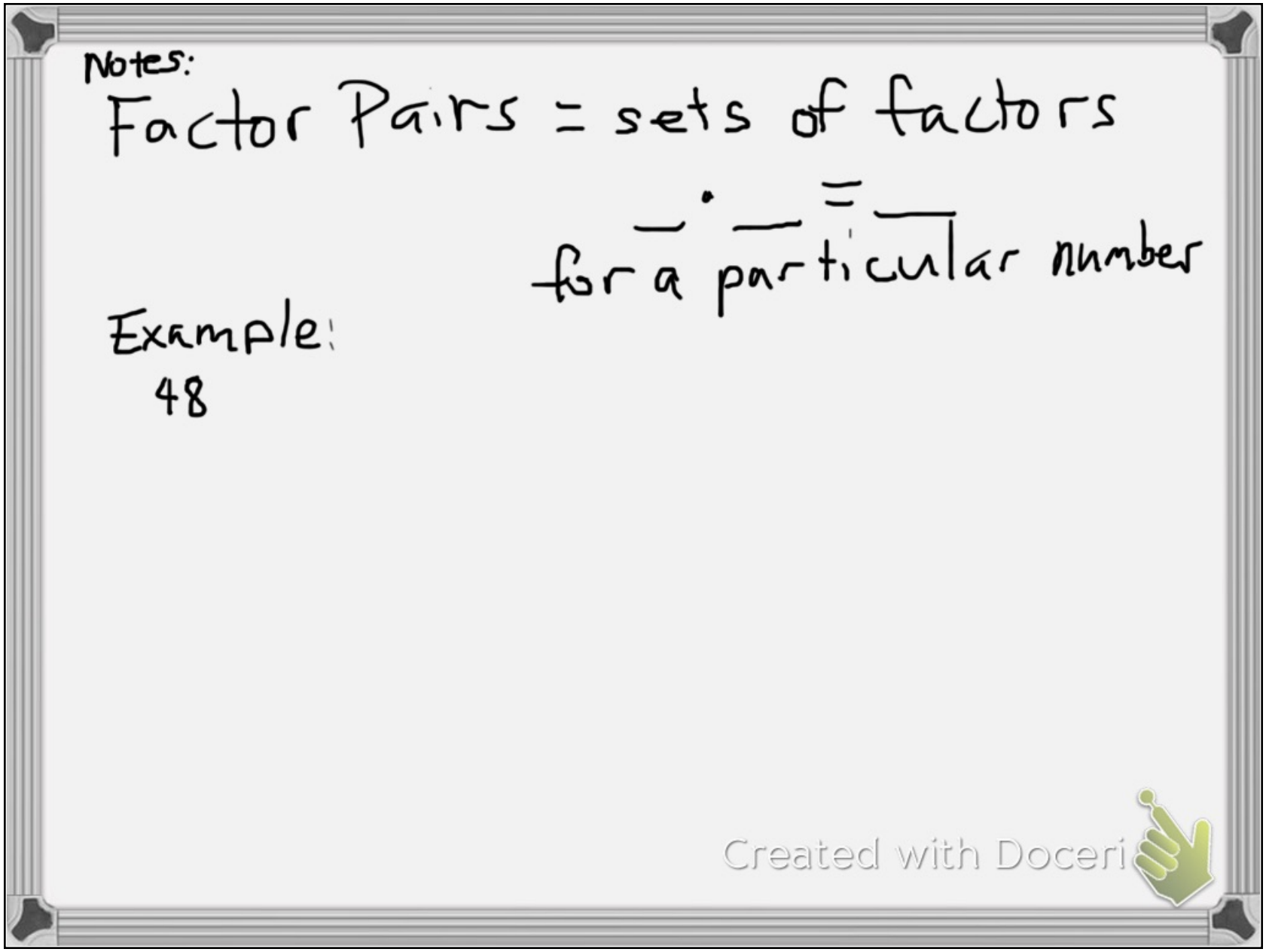
Notes:
Factor Pairs = sets of factors
_ • _ = _
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Example:
48
Created with Doceri

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

= 2 · 24

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

= 2 · 24

= 3 · 16

Notes:

Factor Pairs = sets of factors

$\_ \cdot \_ = \_$

for a particular number

Example:

$48 = 1 \cdot 48$

$= 2 \cdot 24$

$= 3 \cdot 16$

$= 4 \cdot 12$

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

= 2 · 24

= 3 · 16

= 4 · 12

= 6 · 8

Notes:

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_ · _ = _

for a particular number

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48 = 1 · 48

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= 4 · 12

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Factor Pairs of 48

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

= 2 · 24

= 3 · 16

= 4 · 12

= 6 · 8

Factor Pairs of 48

1 · 48, 2 · 24, 3 · 16, 4 · 12, and 6 · 8

Notes:

Factor Pairs = sets of factors

_ · _ = _

for a particular number

Example:

48 = 1 · 48

= 2 · 24

= 3 · 19

= 4 · 12

= 6 · 8

Now Try for 36

Factor Pairs of 48

1 · 48, 2 · 24, 3 · 19, 4 · 12, and 6 · 8

Notes:

Factor Pairs = sets of factors

_ · _ = _

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Example:

48 = 1 · 48

= 2 · 24

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= 4 · 12

= 6 · 8

Factor Pairs of 48

1 · 48, 2 · 24, 3 · 19, 4 · 12, and 6 · 8

Now Try for 36

36 = 1 · _

Notes:

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_ · _ = _

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Example:

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= 2 · 24

= 3 · 19

= 4 · 12

= 6 · 8

Factor Pairs of 48

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Now Try for 36

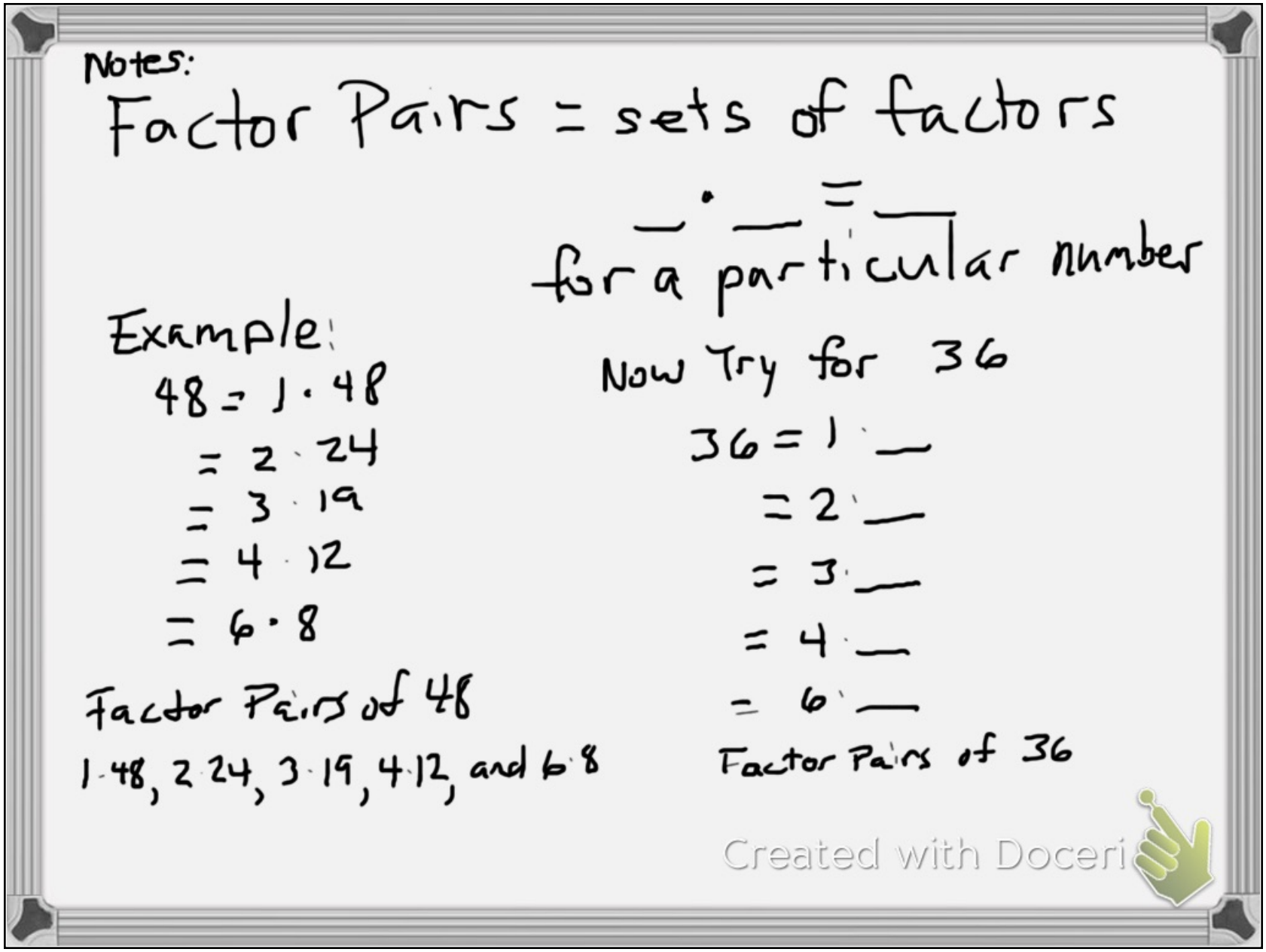
36 = 1 · _

= 2 · _

= 3 · _

= 4 · _

= 6 · _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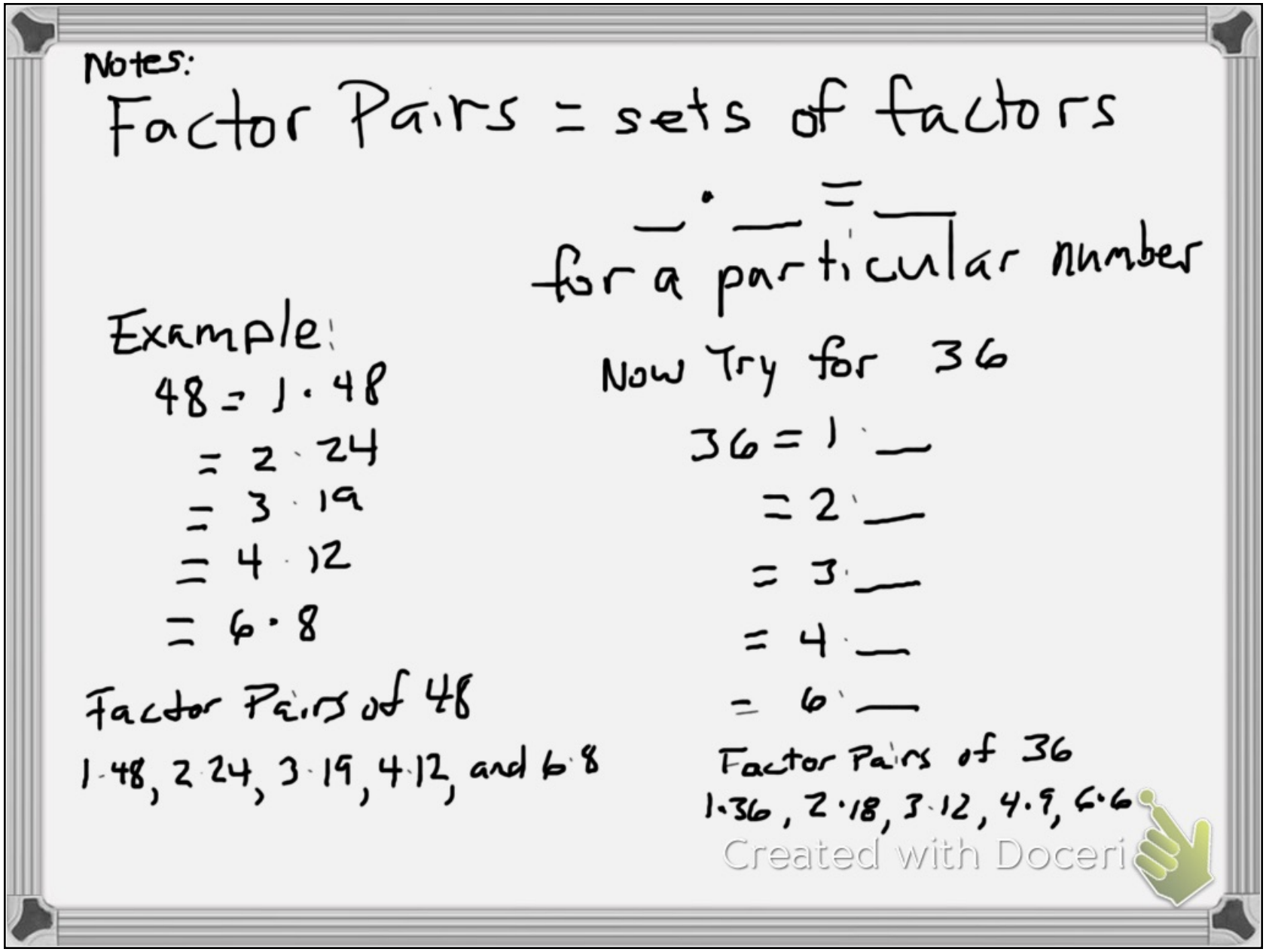
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Now Try for 36
36 = 1 · _
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= 4 · _
= 6 · _
Factor Pairs of 36
1·36, 2·18, 3·12, 4·9, 6·6
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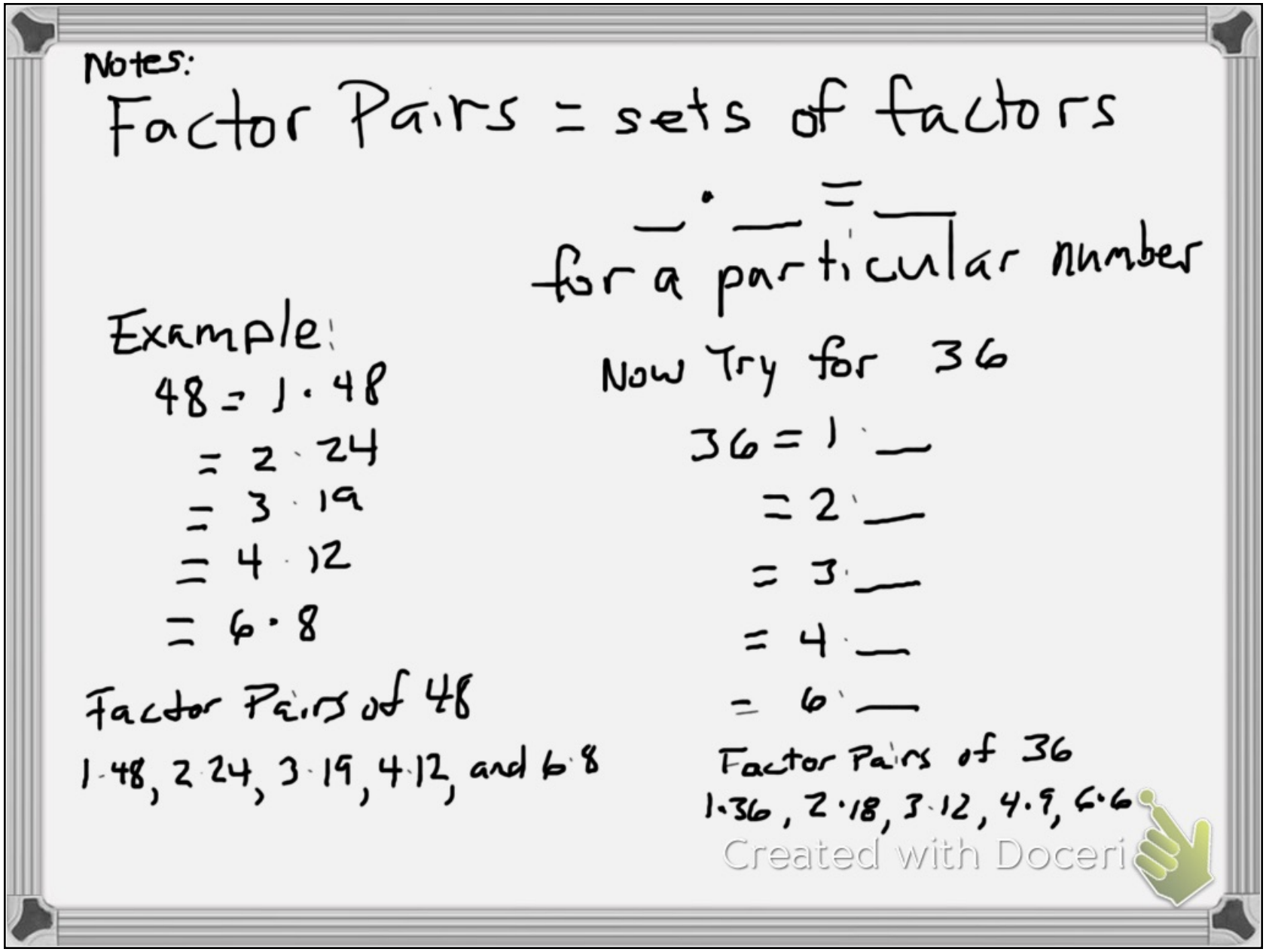
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Key Idea

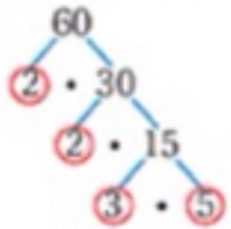
Remember

A *prime number* is a whole number greater than 1 with exactly two factors, 1 and itself. A *composite number* is a whole number greater than 1 with factors other than 1 and itself.

Prime Factorization

The **prime factorization** of a composite number is the number written as a product of its prime factors.

You can use factor pairs and a **factor tree** to help find the prime factorization of a number. The factor tree is complete when only prime factors appear in the product. A factor tree for 60 is shown.



$60 = 2 \cdot 2 \cdot 3 \cdot 5$, or $2^2 \cdot 3 \cdot 5$

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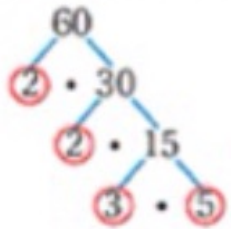

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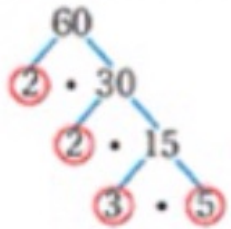

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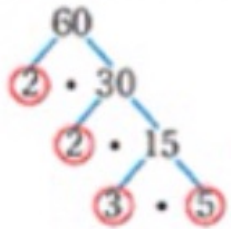

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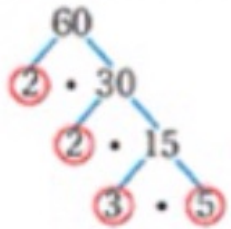

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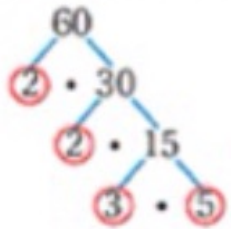

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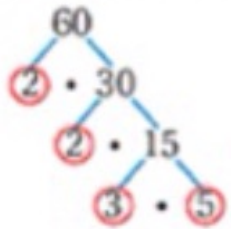

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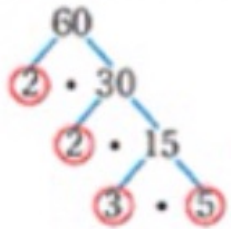

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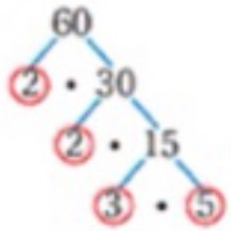

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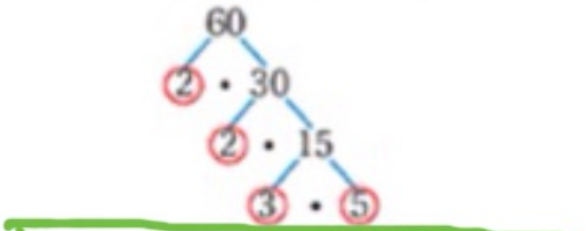

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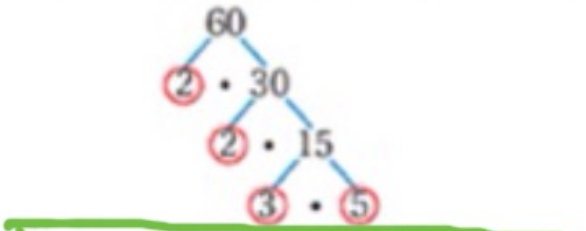

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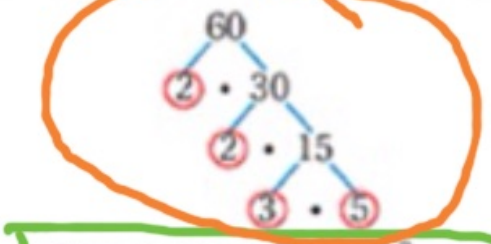

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Multi-Language Glossary at BigIdeasMath.com

EXAMPLE 2 Writing a Prime Factorization

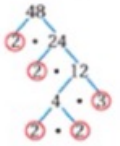
Write the prime factorization of 48.

Choose any factor pair of 48 to begin the factor tree.

Study Tip

Notice that beginning with different factor pairs results in the same prime factorization. Every composite number has only one prime factorization.

Tree 1

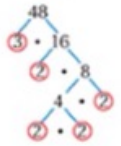


Find a factor pair and draw "branches."

Circle the prime factors as you find them.

Find factors until each branch ends at a prime factor.

Tree 2



$48 = 2 \cdot 2 \cdot 3 \cdot 2 \cdot 2$

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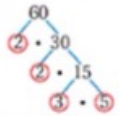

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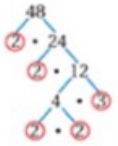

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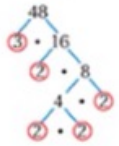

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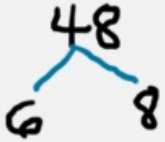

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Choose any factor pair of 48 to begin the factor tree.

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Notice that beginning with different factor pairs results in the same prime factorization. Every composite number has only one prime factorization.

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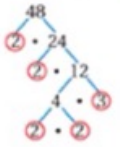

Find a factor pair and draw "branches."

Circle the prime factors as you find them.

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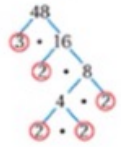

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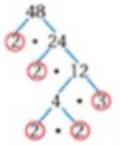

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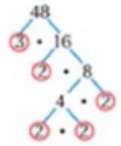

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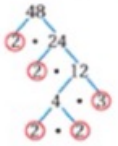

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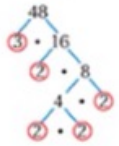

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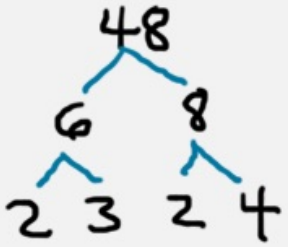

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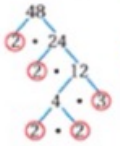

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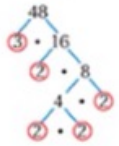

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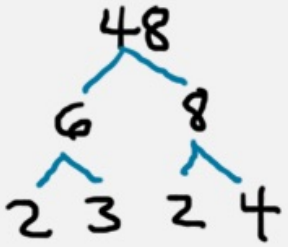

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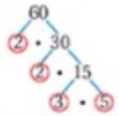

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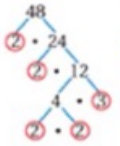

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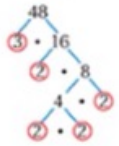

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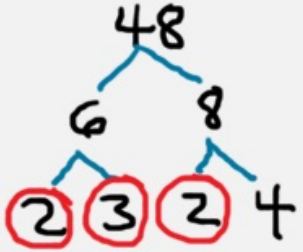

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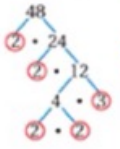

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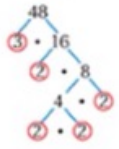

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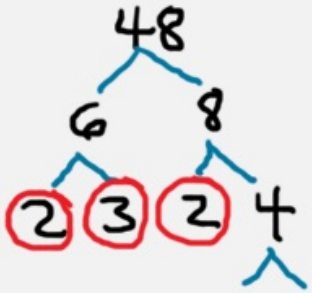

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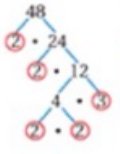

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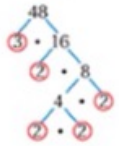

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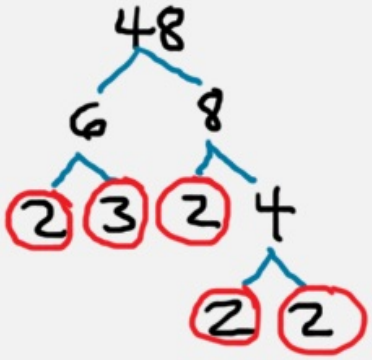

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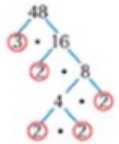

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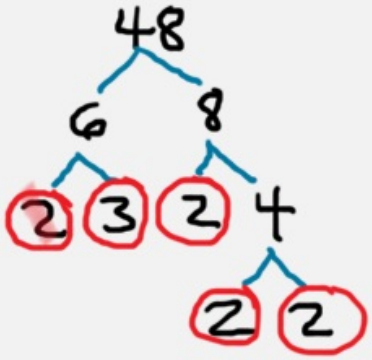

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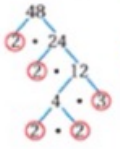

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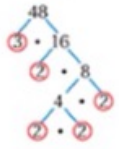

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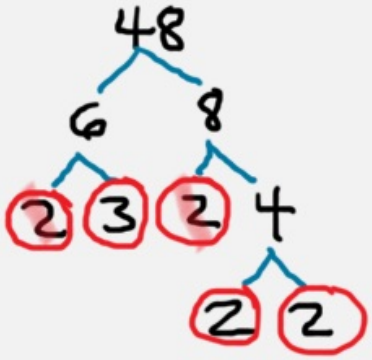

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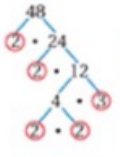

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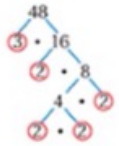

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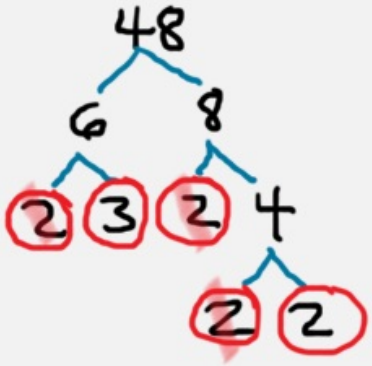

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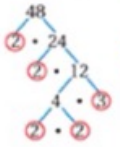

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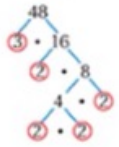

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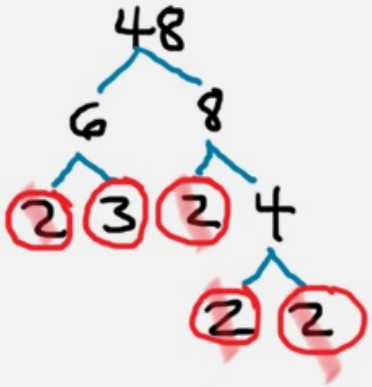

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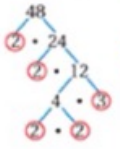

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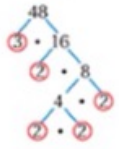

$48 = 2 \cdot 2 \cdot 3 \cdot 2 \cdot 2$

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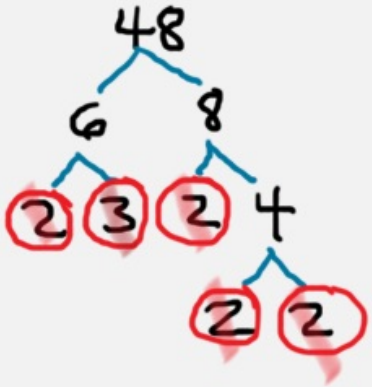

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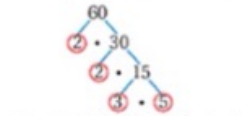

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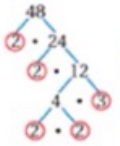

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Circle the prime factors as you find them.

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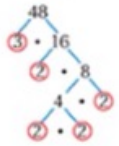

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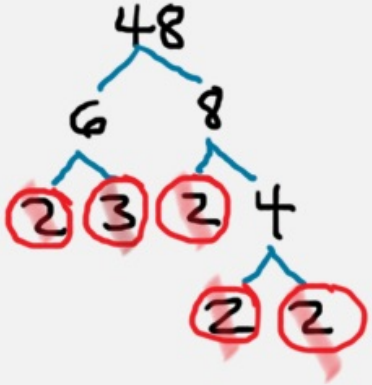

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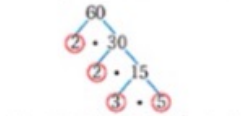

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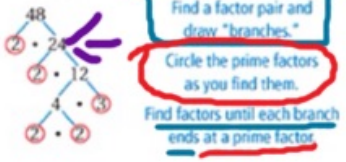

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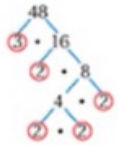

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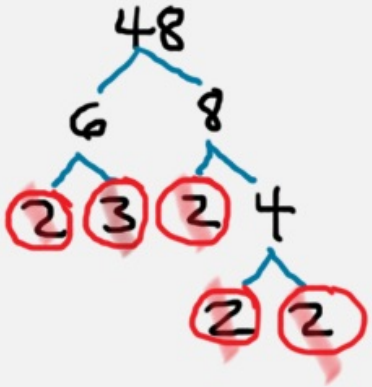

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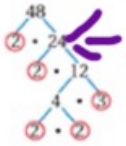

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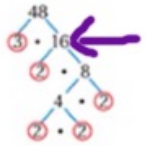

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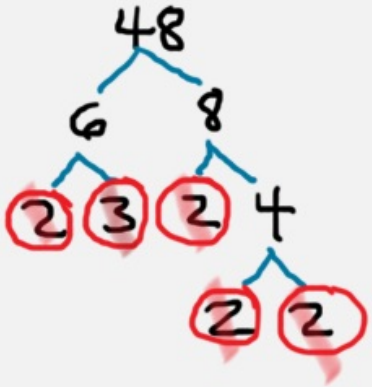

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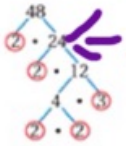

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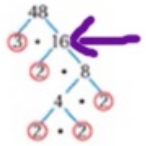

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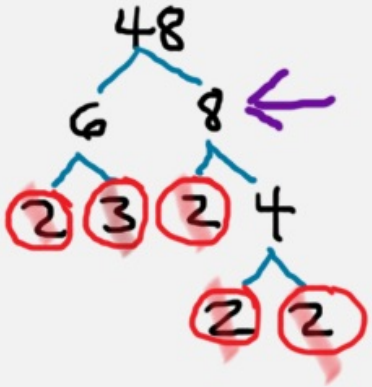

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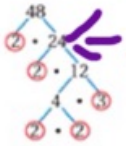

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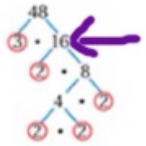

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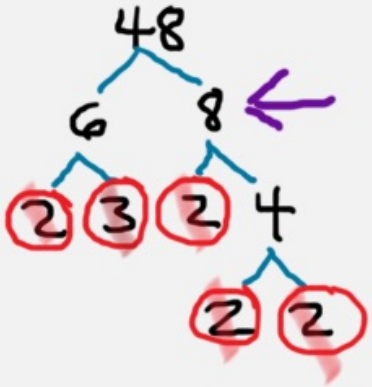

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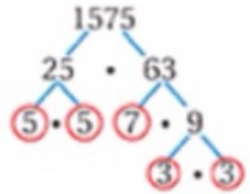
3 Using a Prime Factorization

What is the greatest perfect square that is a factor of 1575?

Because 1575 has many factors, it is not efficient to list all of its factors and check for perfect squares. Use the prime factorization of 1575 to find any perfect squares that are factors.



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$3 \cdot 3 = 9$ $5 \cdot 5 = 25$ $(3 \cdot 5) \cdot (3 \cdot 5) = 15 \cdot 15 = 225$

So, the greatest perfect square that is a factor of 1575 is 225.

On Your Own

Write the prime factorization of the number.

5. 20 6. 88 7. 90 8. 462

9. What is the greatest perfect square that is a factor of 396? Explain.

Perfect Square

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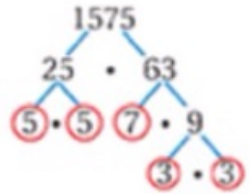

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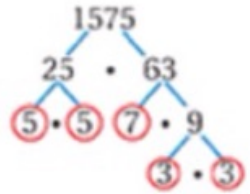

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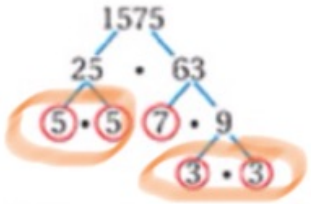

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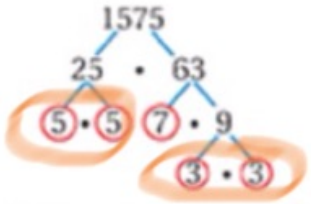

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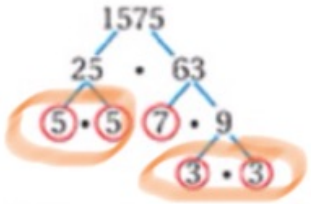

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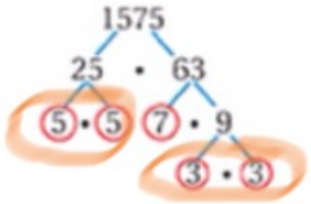

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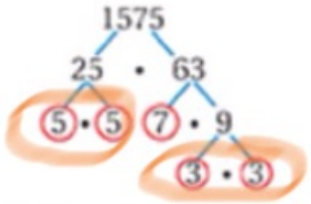

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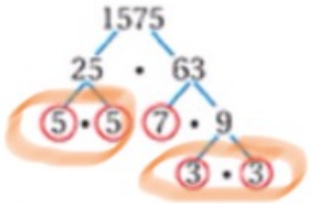

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Practice and Problem Solving

Use divisibility rules to determine whether the number is divisible by 2, 3, 5, 6, 9, and 10. Use a calculator to check your answer.

4. 1044 **5.** 1485 **6.** 1620 **7.** 1709

List the factor pairs of the number.

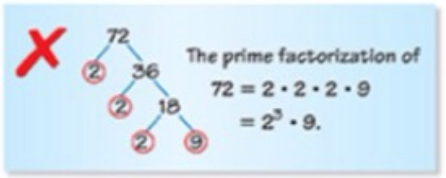
8. 15 **9.** 22 **10.** 34 **11.** 39

12. 45 **13.** 54 **14.** 59 **15.** 61

Write the prime factorization of the number.

16. 16 **17.** 25 **18.** 30 **19.** 26

20. 84 **21.** 54 **22.** 65 **23.** 77



24. ERROR ANALYSIS Describe and correct the error in writing the prime factorization.

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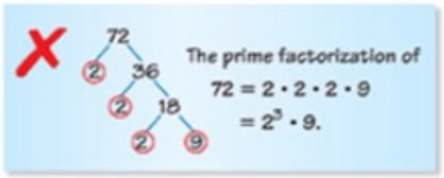

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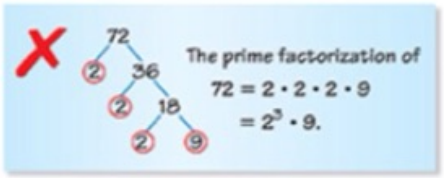

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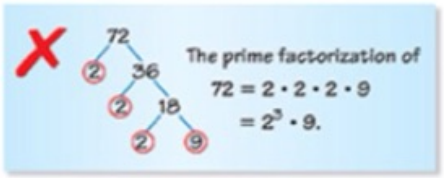

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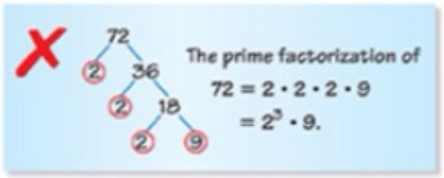

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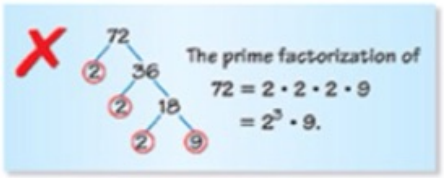

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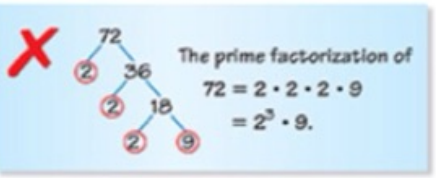

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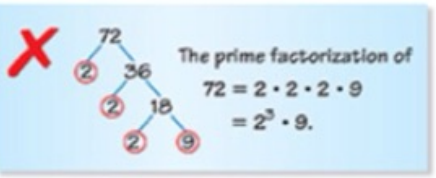

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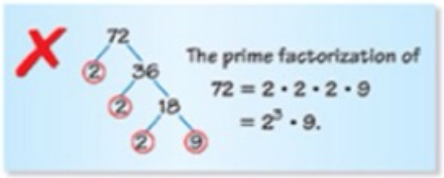

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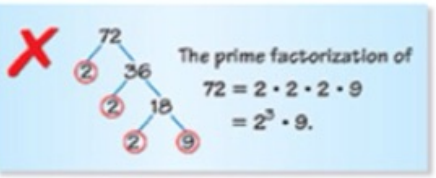

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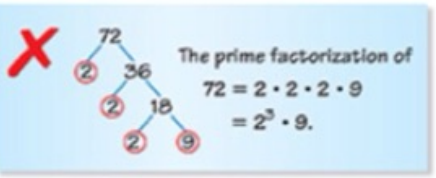

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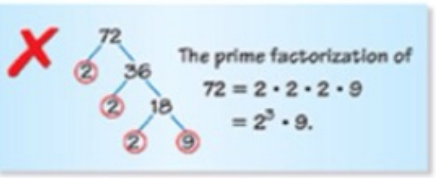

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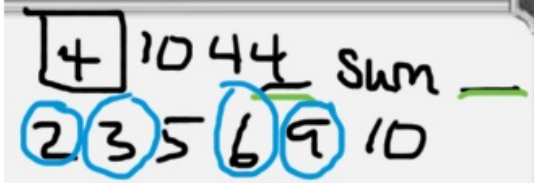

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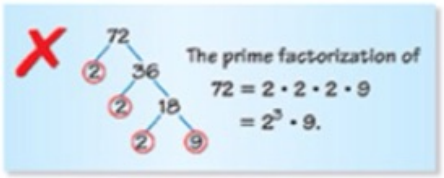

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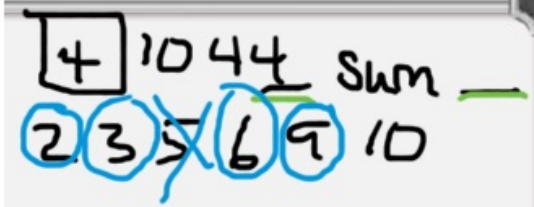

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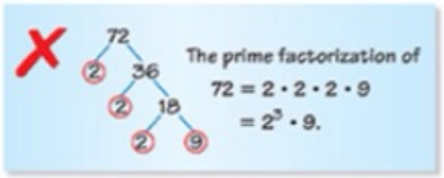

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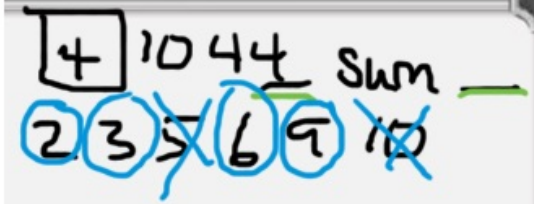

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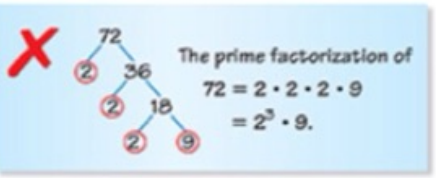

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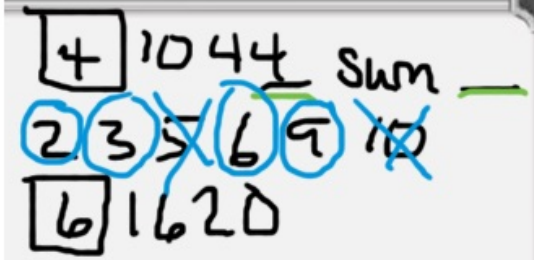

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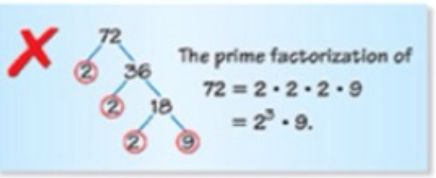

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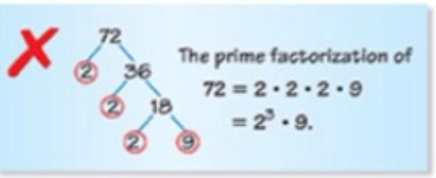

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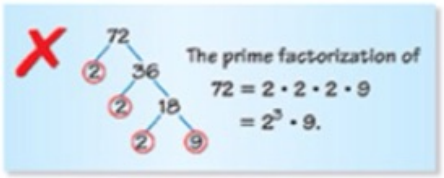

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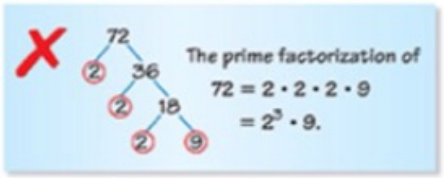

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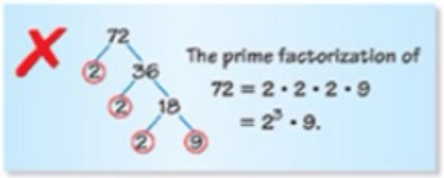

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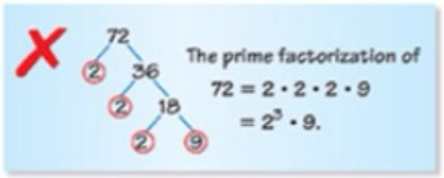

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10 34

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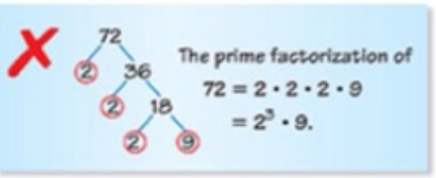

The prime factorization of
$72 = 2 \cdot 2 \cdot 2 \cdot 9$
$= 2^3 \cdot 9.$

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8 15 = 1 · 15

3 5

10 34 = 1 ·

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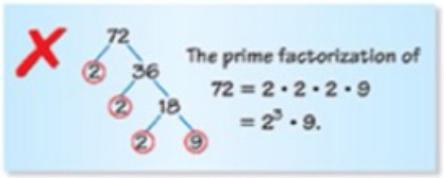

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8 15 = 1 · 15

3 5

10 34 = 1 · 34

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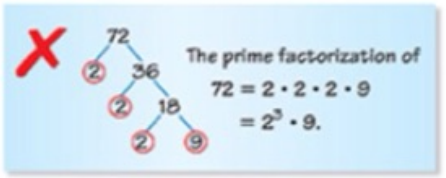

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8 15 = 1 · 15

3 5

10 34 = 1 · 34

= 2

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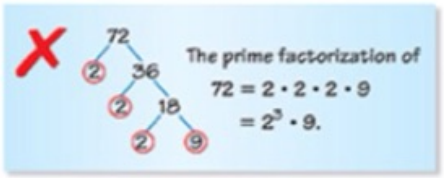

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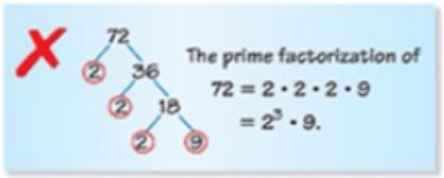

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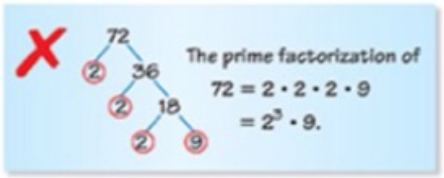

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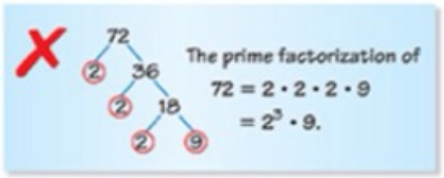

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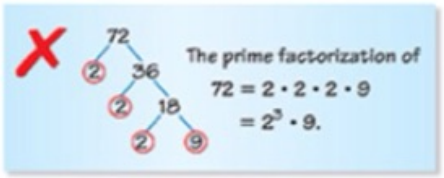

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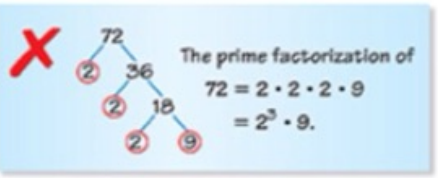

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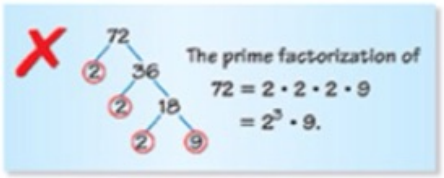

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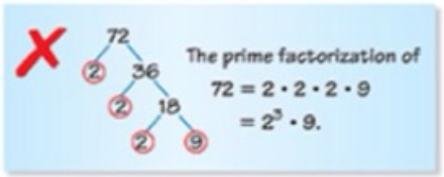

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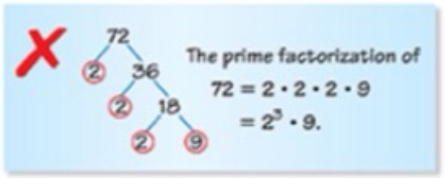

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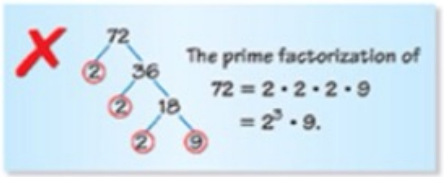

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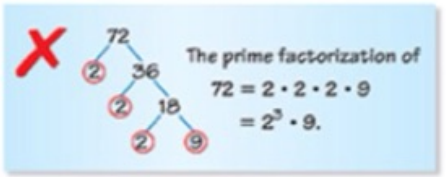

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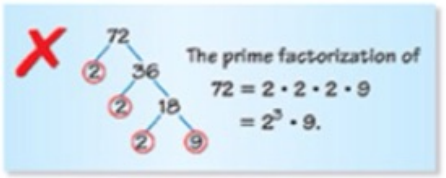

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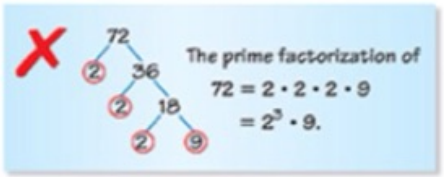

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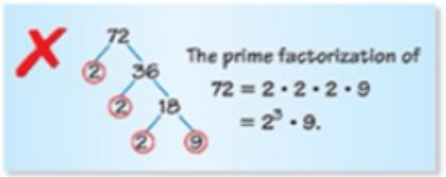

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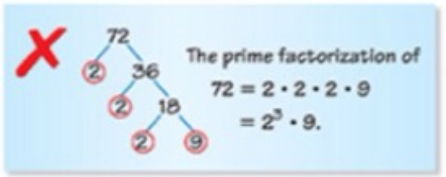

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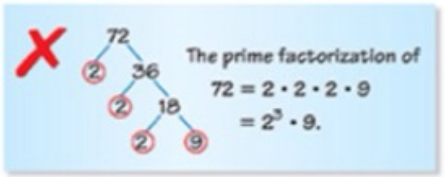

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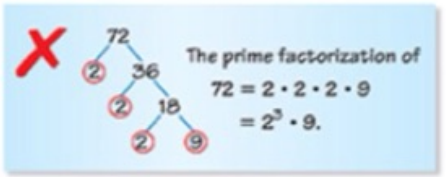

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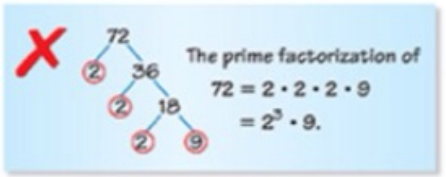

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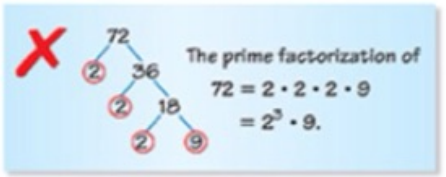

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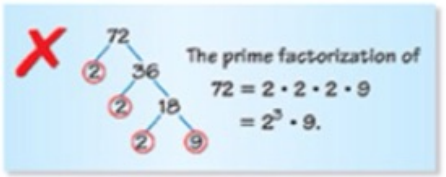

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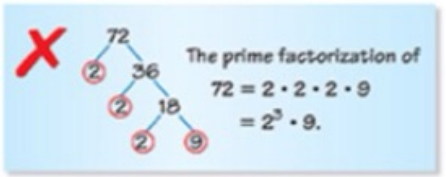

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Use divisibility rules to determine whether the number is divisible by 2, 3, 5, 6, 9, and 10. Use a calculator to check your answer.

4. 1044 5. 1485 6. 1620 7. 1709

List the factor pairs of the number.

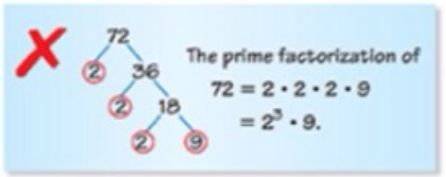
8. 15 9. 22 10. 34 11. 39

12. 45 13. 54 14. 59 15. 61

Write the prime factorization of the number.

16. 16 17. 25 18. 30 19. 26

20. 84 21. 54 22. 65 23. 77



24. **ERROR ANALYSIS** Describe and correct the error in writing the prime factorization.

4 1044 sum

2 3 5 6 9 10

6 1620

2 3 5 6 9 10

8 15 = 1 · 15

3 · 5

10 34 = 1 · 34

= 2 · 17

12 sum 45 = 1 · __

= 3 · __

= 5 · __

= 9 · __

16 16 = 2 · 2 · 2 · 2

2 8

2 4

2 2

18 30 = 2 · 3 · 5

3 10

2 5