

Name _____ Date _____

Factors, Primes, and Composites

Tell whether each number is *prime* or *composite*.

1. 13 _____ 2. 18 _____ 3. 31 _____ 4. 32 _____
5. 45 _____ 6. 53 _____ 7. 72 _____ 8. 81 _____

Write the factors of each number.

9. 8 _____ 10. 15 _____ 11. 10 _____
12. 24 _____ 13. 35 _____ 14. 28 _____

15. 100 _____ 16. 65 _____ 17. 50 _____

18. 34 _____ 19. 40 _____ 20. 77 _____

21. 84 _____ 22. 45 _____ 23. 46 _____

MIXED APPLICATIONS

24. The sum of two numbers is 12. One number is prime and the other number is composite. What are the numbers?

25. Danny has 48 flowers to plant in his garden. If each row in his garden must have the same number of flowers, what different arrangements can Danny make?

NUMBER SENSE

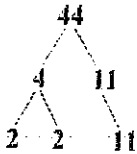
26. Name the greatest prime number less than 50. 27. Name the least prime number greater than 50.

Name _____ Date _____

Using a Factor Tree

Use a factor tree to find the prime factorization of each number in Exercises 1–6. The first one is done for you.

1. 44



2. 90

3. 48

4. 204

5. 400

6. 56

For Exercises 7–9, write the number whose prime factorization is given.

7. $3 \times 3 \times 11$

8. $2 \times 2 \times 7 \times 13$

9. $2 \times 3 \times 3 \times 3$

MIXED APPLICATIONS

10. A computer code is based on the prime factorization of 160. Find the prime factorization of 160.

11. The combination for a lock is a 3-digit number. The digits are the prime factors of 42 listed from least to greatest. What is the combination for the lock?

Greatest Common Factor and Least Common Multiple

Standard

The Number System

Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express $36 + 8$ as $4(9 + 2)$.

Model the Skill

- Ask:** What are the factors of 12? (1, 2, 3, 4, 6, 12) What are the factors of 8? (1, 2, 4, 8) List the factors on the board.
- Ask:** What are the common factors of 12 and 8? (1, 2, 4) If the common factors are 1, 2, and 4, what is the greatest common factor of 12 and 8? (4)
- Ask:** What are six multiples of 12? (12, 24, 36, 48, 60, 72) What are six multiples of 8? (8, 16, 24, 32, 40, 48) List the multiples on the board.
- Ask:** What is the least common multiple of 12 and 8? (24)
- Repeat with other number pairs. Then assign students the appropriate practice pages to support their understanding of the skill.

Assess the Skill

Use the following problems to pre-/post-assess students' understanding of the skill.

GCF of 5 and 10: _____

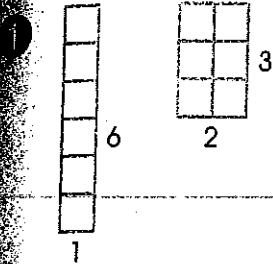
LCM of 5 and 10: _____

GCF of 6 and 9: _____

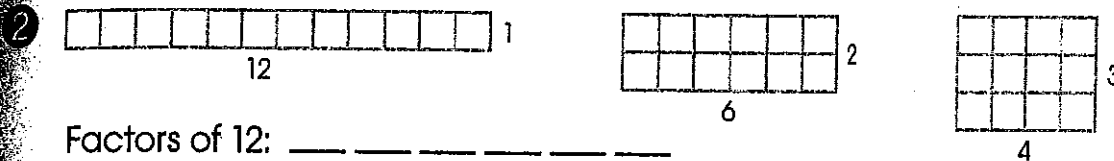
LCM of 6 and 9: _____

Name _____

1. List all the factors of each number.



Factors of 6: _____



Factors of 12: _____

3. What are the common factors of 6 and 12?

4. What is the greatest common factor (GCF) of 6 and 12?

5. Factors of 15: _____

Factors of 20: _____

6. What is the GCF of 15 and 20?

Write the first 5 multiples of each number.

7

x	1	2	3	4	5
3	3	6	___	___	___

Multiples of 3: _____

8

x	1	2	3	4	5
5	5	10	___	___	___

Multiples of 5: _____

9. What is the least common multiple (LCM) of 3 and 5? _____

Think: The least number other than 0 that is a multiple of each.

10. Multiples of 4: _____

Multiples of 6: _____

11. What is the LCM of 4 and 6? _____



50 is a multiple of what number? Draw a circle around that number.

Name _____

List all the factors for each number. Circle the common factors.

- ① Factors of 8: _____
Factors of 12: _____
Greatest common factor (GCF) of 8 and 12: _____

Remember a factor
of a number divides
that number evenly.

- ② Factors of 9: _____
Factors of 15: _____
GCF of 9 and 15: _____
- ③ Factors of 4: _____
Factors of 6: _____
GCF of 4 and 6: _____
- ④ Factors of 6: _____
Factors of 10: _____
Factors of 28: _____
GCF of 6, 10, and 28: _____
- ⑤ Factors of 12: _____
Factors of 15: _____
Factors of 18: _____
GCF of 12, 15, and 18: _____

Write the first 5 multiples of each number, other than 0. Circle the common multiples.

- ⑥ Multiples of 4: _____
Multiples of 5: _____
Least common multiple (LCM) of 4 and 5: _____

Think:
 $4 \times 1, 4 \times 2, 4 \times 3,$
 $4 \times 4, \text{ and } 4 \times 5$

- ⑦ Multiples of 3: _____
Multiples of 10: _____
LCM of 3 and 10: _____
- ⑧ Multiples of 9: _____
Multiples of 15: _____
LCM of 9 and 15: _____
- ⑨ Multiples of 6: _____
Multiples of 9: _____
LCM of 6 and 9: _____
- ⑩ Multiples of 8: _____
Multiples of 12: _____
LCM of 8 and 12: _____



Tell how you can find the LCM of 4, 7, and 14.

Find the greatest common factor (GCF) of each set of numbers.

1 10 and 25

2 12 and 8

3 6 and 15

GCF _____

GCF _____

GCF _____

4 24 and 60

5 16 and 6

6 12 and 21

GCF _____

GCF _____

GCF _____

7 10 and 30

8 16, 18, and 30

9 20, 36, and 48

GCF _____

GCF _____

GCF _____

Find the least common multiple (LCM) other than 0 of each set of numbers.

10 7 and 9

11 4 and 10

12 3 and 5

LCM: _____

LCM: _____

LCM: _____

13 4 and 6

14 9 and 6

15 8 and 12

LCM: _____

LCM: _____

LCM: _____

16 8 and 3

17 3 and 23

18 14 and 6

LCM: _____

LCM: _____

LCM: _____



Why do we not use 0 as the LCM of two numbers? Explain your thinking.

Solve.

- 1 Dan rides his bike to town every eighth day. Soo walks to town every third day. On which days are they likely to meet in town?
- 2 $\frac{32}{96}$ of the parents in the PTA wanted a bake sale instead of a car wash. What is the greatest common factor that you could use to simplify this fraction?
- 3 The ratio of students with bikes to students with scooters in the school is 85:51. What is the greatest common factor that you could use to simplify this ratio?
- 4 The biology class has a lab every 4 days. The earth science class has a lab every 3 days. On which day do both classes have lab?
- 5 What is the greatest common factor of 63 and 21?
- 6 What is the least common multiple of 7 and 12?

Circle the letter for the correct answer.

- 7 Twenty-eight girls and 35 boys signed up for the team challenge. Each team needs to have an equal number of girls and boys. What is the greatest number of teams possible?
 - a) 31
 - b) 14
 - c) 7
 - d) 5
- 8 Every 10 years the alumni have a reunion. Every 2 years the alumni have a soccer game. How often do the reunion and the game fall in the same year?
 - a) Once every 10 years
 - b) 5 times every 10 years
 - c) 20 times every 10 years
 - d) None of the above

TRY THIS!

List multiples to find the LCM of each pair of numbers.

2a. 4 and 9 _____

2b. 18 and 24 _____

REFLECT

2c. What is the LCM of two numbers when one number is a multiple of the other?
Give an example.

2d. What is the LCM of two numbers that have no common factors greater than 1?
Give an example.

PRACTICE

Find the LCM of each pair of numbers.

1. 6 and 9 _____

2. 9 and 21 _____

3. 8 and 56 _____

4. 16 and 24 _____

5. 12 and 30 _____

6. 6 and 10 _____

7. At a restaurant, after every 12th visit you receive a free beverage.
After every 15th visit you receive a free dessert. At which
visit will you first receive a free beverage and a free dessert?

Visit _____

8. Starting today (day 1) Lee will walk his dog Fido every 3rd day
and his dog Fifi every 5th day. On which day will Lee first walk
both dogs together?

Day _____

Use the train schedule for 9 and 10.

9. The red line and the blue line trains just
arrived at the station. When will they next
arrive at the station at the same time?
In _____ minutes

10. All three trains just arrived at the station.
When will they next all arrive at the station
at the same time? In _____ minutes

Train Schedule	
Train	Arrives Every...
Red line	8 minutes
Blue line	10 minutes
Yellow line	12 minutes

Least Common Multiple

Essential question: *How do you find the least common multiple of two numbers?*

COMMON
CORE

CC.6.NS.4

1 EXPLORE Least Common Multiple

For the next 100 days, Shannon will be training for a biathlon. She will swim every 6 days and bicycle every 8 days. On what days will she both swim and bicycle?

Step 1 Shade each day Shannon will swim.

Step 2 Circle each day Shannon will bicycle.

Shannon will both swim and bicycle on days _____.

The numbers of the days that Shannon will swim and bicycle are common multiples of 6 and 8.

The least common multiple (LCM) is the least common multiple of two or more counting numbers.

What is the LCM of 6 and 8? What does it represent in this situation?

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

2 EXAMPLE Least Common Multiple

A store is holding a grand opening promotion. Every 3rd customer receives a free key chain and every 4th customer receives a free magnet. Which customer will be the first to receive both a key chain and a magnet?

List the multiples of each number. Circle the common multiples.

Multiples of 3: _____

Multiples of 4: _____

What is the LCM of 3 and 4? _____

The first customer to get both a key chain and a magnet is _____.

One way to find the GCF of two numbers is to list all of their factors.

2 EXAMPLE Greatest Common Factor

A baker has 24 blueberry muffins and 36 apple muffins to divide into boxes for sale. Each box must have the same number of blueberry muffins and the same number of apple muffins. What is the greatest number of boxes that the baker can make using all of the muffins? How many blueberry muffins and how many apple muffins will be in each box?

- A List the factors of 24 and 36. Then circle the common factors.

Factors of 24: _____

Factors of 36: _____

- B What do the common factors represent in this situation?

- C What is the GCF of 24 and 36? _____

- D The greatest number of boxes that the baker can make is _____. There will be _____ blueberry muffin(s) and _____ apple muffin(s) in each box.

TRY THIS!

List the factors to find the GCF of each pair of numbers.

- 2a. 14 and 35 _____

- 2b. 20 and 28 _____

- 2c. The sixth-grade class is competing in the school field day. There are 32 girls and 40 boys who want to participate in the relay race. Each team must have the same number of girls and the same number of boys. What is the greatest number of teams that can be formed? How many boys and how many girls will be on each team?

REFLECT

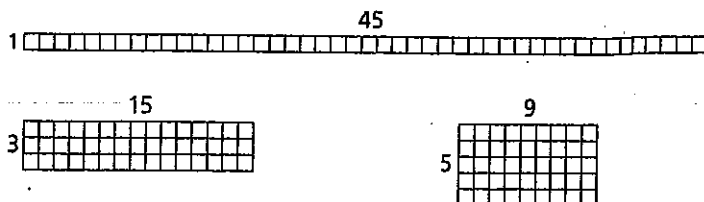
- 2d. What is the GCF of two numbers when one number is a multiple of the other? Give an example.

- 2e. What is the GCF of two prime numbers? Give an example.

You can use the Distributive Property to rewrite a sum of two or more numbers as a product of their GCF and another number.

E EXPLORE Distributive Property

You can use grid paper to draw area models of 45 and 60. Here are all of the possible area models of 45.



A What do the side lengths of the area models above (1, 3, 5, 9, 15, and 45) represent? _____

B On your own grid paper, show all of the possible area models of 60.

C What side lengths do the area models of 45 and 60 have in common? _____

What do these side lengths represent? _____

D What is the greatest common side length? What does it represent? _____

E Write 45 as a product of the GCF and another number. _____

Write 60 as a product of the GCF and another number. _____

F Use your answers above to rewrite $45 + 60$.

$$45 + 60 = 15 \times \quad + 15 \times \quad$$

Use the Distributive Property and your answer above to write $45 + 60$ as a product of the GCF and another number.

$$15 \times \quad + 15 \times \quad = 15 \times (\quad + \quad) = 15 \times \quad$$

TRY THIS!

Write each sum as a product of the GCF of the two numbers.

3a. $27 + 18$ _____ 3b. $120 + 36$ _____

REFLECT

3c. Does the same process work with subtraction? For example, can you write $120 - 36$ as a product of the GCF and another number? Explain.

PRACTICE

List the factors of each number.

1. 16 _____

2. 39 _____

3. 50 _____

Find the GCF of each pair of numbers.

4. 40 and 48 _____

5. 10 and 45 _____

6. 6 and 21 _____

7. 60 and 72 _____

8. 21 and 40 _____

9. 28 and 32 _____

10. 28 and 70 _____

11. 45 and 81 _____

12. 30 and 45 _____

13. 55 and 77 _____

14. Mrs. Davis is sewing vests. She has 16 green buttons and 24 yellow buttons. Each vest will have the same number of yellow buttons and the same number of green buttons. What is the greatest number of vests Mrs. Davis can make using all of the buttons? _____ vests

15. A baker has 27 wheat bagels and 36 plain bagels that will be divided into boxes. Each box must have the same number of wheat bagels and the same number of plain bagels. What is the greatest number of boxes the baker can make using all of the bagels? _____ boxes

16. Lola is putting appetizers on plates. She has 63 meatballs and 84 cheese cubes. She wants both kinds of food on each plate, and each plate must have the same number of meatballs and the same number of cheese cubes. What is the greatest number of plates she can make using all of the appetizers? _____ plates

17. The Delta High School marching band has 54 members. The Swanton High School marching band has 90 members. The bands are going to march in a parade together. The director wants to arrange the bands into the same number of rows. What is the greatest number of rows in which the two bands can be arranged? _____ rows

Write each sum as a product of the GCF of the two numbers.

18. $75 + 90$

19. 36 and 45

20. $56 + 64$

21. $48 + 14$

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Greatest Common Factor

Essential question: *How do you find and use the greatest common factor of two whole numbers?*

COMMON CORE

CC.6.NS.4

1 EXPLORE Greatest Common Factor

A florist plans to make bouquets of roses and tulips. She has 18 roses and 30 tulips. Each bouquet must have the same number of roses and the same number of tulips. She wants to use all of the flowers. What are the possible bouquets she can make?

A Complete the tables below.

Roses

Number of bouquets	1	2	3	6	9	18
Number of roses in each bouquet	18	9				

Tulips

Number of bouquets	1	2	3	5	6	10	15	30
Number of tulips in each bouquet	30							

B Can the florist make five bouquets? Why or why not?

If a number is a factor of two or more counting numbers, it is called a *common factor* of those numbers.

C What are the common factors of 18 and 30? What do they represent in this situation?

The **greatest common factor (GCF)** of two or more counting numbers is the greatest factor shared by the numbers.

D What is the GCF of 18 and 30? _____

If the florist wants the number of bouquets to be as large as possible, how many bouquets can she make? _____

How many roses will be in each bouquet? _____

How many tulips will be in each bouquet? _____

Name _____ Date _____

Exploring Common Factors

List the factors of each number.

1. 14

2. 12

3. 13

4. 24

5. 36

6. 32

7. 64

8. 91

List the factors of each number. Write the common factors for each pair of numbers.

9. 8, 16

8: _____

16: _____

10. 9, 24

9: _____

24: _____

11. 10, 15

10: _____

15: _____

12. 12, 13

12: _____

13: _____

List the factors of each number. Write the greatest common factor for each pair of numbers.

13. 9, 27

14. 12, 18

15. 13, 39

16. 14, 21

LOGICAL THINKING

Write all the common factors for each pair of numbers.

17. 7, 13 _____

18. 5, 19 _____

19. 23, 31 _____

20. 11, 41 _____

21. Name two ways in which problems 17–20 are alike.

Name _____

Date _____

Multiples and Least Common Multiple

Write the first three multiples of each number, excluding the number itself.

1. 4

2. 8

3. 10

4. 3

5. 5

6. 7

7. 11

8. 6

9. 9

10. 12

Find the LCM for each group of numbers.

11. 8, 10

12. 2, 12

13. 4, 7

14. 7, 9

15. 6, 10

16. 3, 8

17. 7, 12

18. 5, 8

19. 3, 7

20. 5, 7

21. 2, 3

22. 3, 4

23. 8, 12

24. 6, 9

25. 3, 9

MIXED APPLICATIONS

26. One model train can complete its track in 2 minutes. The other model train takes 3 minutes. If the two trains start at the same time, when will they both be at the starting point of their tracks at the same time?

27. Donald wants to buy the same number of apples and pears. Apples are sold in packages of 4 and pears are sold in packages of 7. What is the least number of apples he can buy?

LOGICAL REASONING

28. The LCM of a pair of numbers is 12. The sum of the numbers is 10. What are the numbers?

29. The LCM of a pair of numbers is 8. The difference between the numbers is 6. What are the numbers?

Name _____

Date _____

Uncle Goose

You've heard of Mother Goose, but how about Uncle Goose—her brother-in-law? While Mother Goose is famous for her rhymes and songs, Uncle Goose is not so well known. Even so, many experts think that Uncle Goose's stories are almost as good as Mother Goose's—except for one thing: Uncle Goose's stories are a little off-key; a little weird.

In fact, some of Uncle Goose's stories are *very* weird. To see what we mean, take a look at this famous Mother Goose rhyme:

Jack Sprat could eat no fat, his wife could eat no lean.
And so between the two of them, they picked the platter clean.

Now take a look at Uncle Goose's version of the story:

Joe Sproe could eat no dough, his wife no tomatoes or cheese.
So instead of pizza take-out, they always got Chinese.

A little weird, eh? Convinced yet? Here's another from Mother Goose:

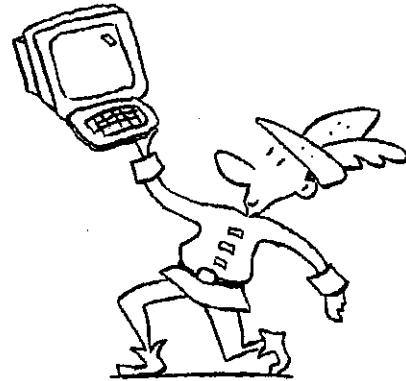
Sing a song of sixpence, a pocket full of rye,
Four and twenty blackbirds baked in a pie:
When the pie was opened, the birds began to sing;
And wasn't that a dainty dish to set before the king?

The king was in the parlour, counting out his money;
The queen was in the kitchen, eating bread and honey;
The maid was in the garden, hanging out the clothes,
Along came a blackbird and snapped off her nose!

And now, the Uncle Goose version:

Sing a song of Internet, red, blue, and green,
Four and twenty pop-ups on my computer screen.
When the site was opened, pop-ups began to flash;
What a crazy Web site, I hope this doesn't crash!

My dad was at the fax machine, trying to fix a jam;
My mom was in the office, reading e-mail spam;
My sister was on her home page, working out some bugs,
Along came baby brother, and yanked out the plug!



And finally, another familiar one from Mother Goose:

Little Boy Blue, come, blow your horn!
The sheep's in the meadow, the cow's in the corn.
Where's the little boy that looks after the sheep?
Under the haystack, fast asleep!

And from Uncle Goose:

Little Boy Green, come, blow your top!
You're late to work, your car's in the shop.
Where is the taxi, who said he'd come fast?
He's back at the gas station, out of gas!

THE END

LCM & GCF

Name _____ Date _____

Model

Two different Web sites show pop-up ads every 6 minutes and 8 minutes. If both sites are now displaying pop-up ads, how long will it take before they are both showing an ad at the same time again?

Find the Least Common Multiple, or LCM:

Multiples of 6: 6, 12, 18, **24**, 30

Multiples of 8: 8, 16, **24**, 32 LCM = 24

Find the LCM.

1. 4 and 6 _____

2. 5 and 10 _____

3. 3 and 5 _____

4. 6 and 3 _____

5. 6 and 9 _____

6. 8 and 10 _____

7. 12 and 9 _____

8. 15 and 9 _____

Model

Find the Greatest Common Factor, or GCF, of 12 and 18.

Factors of 12: **3 x 2** x 2

Factors of 18: 3 x **3 x 2** GCF = 6

Find the GCF.

9. 10 and 15 _____

10. 8 and 10 _____

11. 9 and 12 _____

12. 12 and 20 _____

13. 16 and 24 _____

14. 15 and 45 _____

15. 30 and 42 _____

16. 48 and 72 _____