Support Coach™

6 TARGET Foundational Mathematics

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GCF and LCM

PLUG IN   Factor Pairs

In the sentence $2 \times 3 \times 4 = 24$, 2, 3, and 4 are called **factors** of 24. You multiply 2, 3, and 4 to get the **product** 24. If only two factors are used to get a product, then the two factors are called a **factor pair**. The number 18 has three factor pairs:

$$1 \times 18 = 18$$

$$2 \times 9 = 18$$

$$3 \times 6 = 18$$

A multiplication table can be used to find factor pairs. The numbers at the beginning of each column and row are factors that can be multiplied together to get a product.

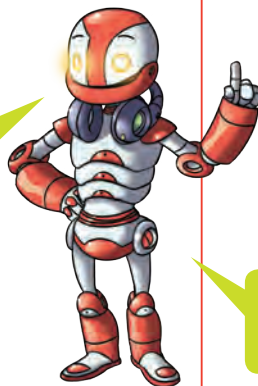| ×	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9
2	0	2	4	6	8	10	12	14	16	**18**
3	0	3	6	9	12	15	**18**	21	24	27
4	0	4	8	12	16	20	24	28	32	36
5	0	5	10	15	20	25	30	35	40	45
6	0	6	12	**18**	24	30	36	42	48	54
7	0	7	14	21	28	35	42	49	56	63
8	0	8	16	24	32	40	48	56	64	72
9	0	9	**18**	27	36	45	54	63	72	81

$$2 \times 9 = 18$$
$$3 \times 6 = 18$$

I see! The numbers of equal rows and columns of an array show a factor pair of a number.

I get it! The factor pairs of 18 are 1×18, 2×9, and 3×6.

Words to Know

factor
a number that is multiplied in a multiplication sentence

$$2 \times 3 \times 9 = 54$$

2, 3, and 9 are factors of 54.

factor pair
two factors that can be multiplied together to get a product

$$18 \times 3 = 54$$

18×3 is a factor pair of 54.

product
the answer to a multiplication problem

$$18 \times 3 = 54$$

54 is the product of 18×3.

DISCUSS   Does every number have a factor pair?
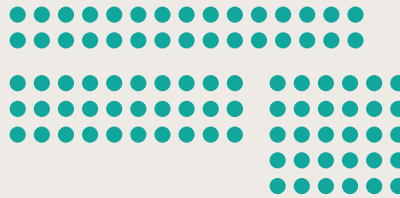
A You can use counters to find factor pairs of a number.

DO Find all the factor pairs of 30.

1 Write the factor pair that has 1 as a factor.

___**1**___ × _____

2 Arrange counters in equal rows and columns to show as many factor pairs as you can.

3 Write the factor pairs that the models show.

The factor pairs are _____ × _____, _____ × _____,

_____ × _____, and _____ × _____.

B You can use a multiplication table to find factor pairs of a number.

DO Find the factor pairs of 20.

1 Write the first factor pair.

___**1**___ × _____ = 20

2 Look in the multiplication table for all the 20s. Write equations for each product of 20.

___**2**___ × _____ = 20, ___**4**___ × _____ = 20

___**5**___ × _____ = 20, ___**10**___ × _____ = 20

3 Write the factor pairs. Only list a factor pair one time.

The factor pairs of 20 are _____ × _____,

_____ × _____, and _____ × _____.

Multiplication Table can be found on p. 211.
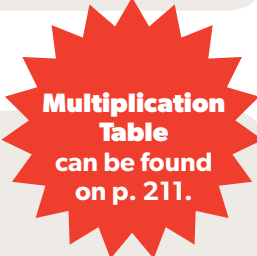
PRACTICE

Write the factor pairs shown by the model of a number.

1 16

Factor pairs: ___**1**___ × _____, _____ × _____, _____ × _____

Complete the factor pairs. Use a multiplication table.

2 15

_____ × _____

_____ × _____

3 25

_____ × _____

_____ × _____

4 49

_____ × _____

_____ × _____

POWER UP | Multiples

In the sentence $32 = 4 \times 8$, 32 is a multiple of 4 and 8. Use a multiplication table to tell if a number is a **multiple** of another number.

Is 24 a multiple of 6?

1. Find 6 in the top row.

2. Follow the column down to 24. So 24 is a multiple of 6.

3. Follow the row across from 24 to the number at the beginning of the row, 4. This means that 24 is also a multiple of 4.

×	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6
2	0	2	4	6	8	10	12
3	0	3	6	9	12	15	18
4	0	4	8	12	16	20	24
5	0	5	10	15	20	25	30
6	0	6	12	18	24	30	36

Except for 0, each number within the multiplication table is a multiple of the numbers at the beginning of its column and row.
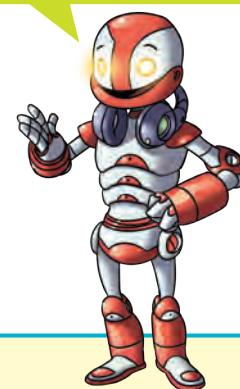
Words to Know

multiple
a number that is the product of a given number and another number

$$2 \times 3 = \mathbf{6}$$

6 is a multiple of both 2 and 3.

DISCUSS What multiples of 5 are shown in the multiplication table above?

A You can use a multiplication table to tell if a number is a multiple of another number.

DO Is 16 a multiple of 3?

1. Circle the row for 3.

2. List the multiples of 3 that are shown in the table.

3. See if the multiples of 3 include 16.

×	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6
2	0	2	4	6	8	10	12
3	0	3	6	9	12	15	18
4	0	4	8	12	16	20	24
5	0	5	10	15	20	25	30
6	0	6	12	18	24	30	36

The multiples of 3 are _____**3**_____, _____, _____,

_____, _____, and _____.

So, 16 _____ a multiple of 3.

B You can write multiplication facts to help determine if a number is a multiple of another number.

Now I see! I can think of a multiple as a product. When two numbers are multiplied, the product is a multiple of those numbers.

DO Is 48 a multiple of 8?

1 Write some multiplication facts for 8.

2 List the multiples of 8 that you found.

3 See if the list includes 48.

$8 \times 1 =$ __8__ $8 \times 5 =$ _____

$8 \times 2 =$ _____ $8 \times 6 =$ _____

$8 \times 3 =$ _____ $8 \times 7 =$ _____

$8 \times 4 =$ _____ $8 \times 8 =$ _____

Some multiples of 8 are _____, _____, _____,

_____, _____, _____, _____, and _____.

48 _____ a multiple of 8.
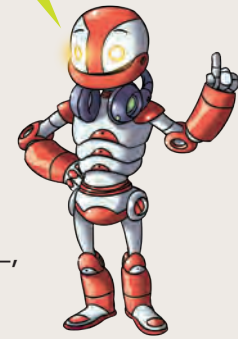
C You can use multiplication facts to find missing multiples.

DO Fill in the missing multiples of 6.

6, _____, _____, 24, 30, 36, _____, 48, _____

1 Write some multiplication facts for 6.

2 Determine which multiples are missing.

3 Write the missing multiples.

$6 \times 1 =$ __6__ $6 \times 4 =$ _____ $6 \times 7 =$ _____

$6 \times 2 =$ _____ $6 \times 5 =$ _____ $6 \times 8 =$ _____

$6 \times 3 =$ _____ $6 \times 6 =$ _____ $6 \times 9 =$ _____

The missing multiples are _____, _____, _____, and _____.

DISCUSS How do you know if a number is a multiple of another number?

PRACTICE

Write *is* or *is not* to tell if the number is a multiple of the other number.

1 28 _____ a multiple of 7.

2 48 _____ a multiple of 9.

Fill in the missing multiples.

3 Multiples of 4: 4, 8, _____, 16, 20, 24, _____, 32, _____

4 Multiples of 7: 7, 14, 21, _____, 35, 42, _____, _____, _____, 70

GCF and LCM

To find the **greatest common factor (GCF)** of two numbers, list all the factors of each number. Then find the factors they have in common. Look for the greatest factor that appears in both lists.

Factors of 14: **1**, 2, **7**, 14
Factors of 35: **1**, 5, **7**, 35

The common factors of 14 and 35 are **1** and **7**.

The greatest factor in both lists is **7**.

> I get it! The GCF of 14 and 35 is 7.

To find the **least common multiple (LCM)** of two numbers, list the first few multiples of each number. Then find the multiples they have in common. Look for the least multiple that appears in both lists.

Multiples of 4: 4, 8, **12**, 16, 20, **24**
Multiples of 6: 6, **12**, 18, **24**, 30, 36

12 and **24** are two common multiples of 4 and 6.

The least multiple in both lists is **12**.

> OK! So the LCM of 4 and 6 is 12.

Words to Know

greatest common factor (GCF)
the common factor of two numbers that has the highest value

Factors of 18: **1**, **2**, **3**, **6**, **9**, 18
Factors of 27: **1**, **3**, **9**, 27

The GCF of 18 and 27 is **9**.

least common multiple (LCM)
the common multiple of two numbers that has the smallest value

Multiples of 3: 3, 6, 9, 12, 15, 18, 21, **24**, 27
Multiples of 8: 8, 16, **24**, 32

The LCM of 3 and 8 is **24**.

DISCUSS How do you know when you can stop listing multiples when finding the LCM?

LESSON LINK

PLUG IN	POWER UP	GO!

PLUG IN

You can use arrays or a multiplication table to help you find factor pairs of a number.

2×3 is a factor pair of 6.

POWER UP

You can use multiplication facts to help you find multiples.

$4 \times 1 = 4$ $4 \times 3 = 12$
$4 \times 2 = 8$ $4 \times 4 = 16$

4, 8, 12, and 16 are some multiples of 4.

GO!

> I see! Knowing how to find factors and multiples will help me find the GCF or LCM of two numbers.

WORK TOGETHER

You can use Grid Paper to find the GCF of two numbers.

- Find the greatest common factor of 18 and 12.
- The rectangles show the factor pairs and factors of 18 and 12.
- The factors that 18 and 12 have in common are 1, 2, 3, and 6.
- The greatest common factor is 6.

1×18

2×9

3×6

Factors of 18:
1, **2**, **3**, **6**, 9, 18

1×12

2×6

3×4

Factors of 12:
1, **2**, **3**, 4, **6**, 12
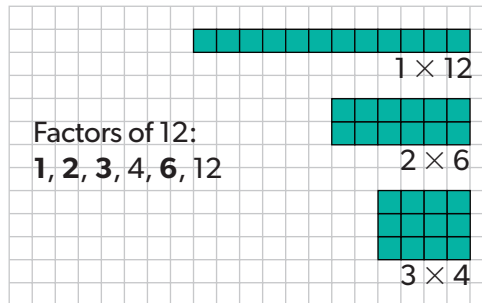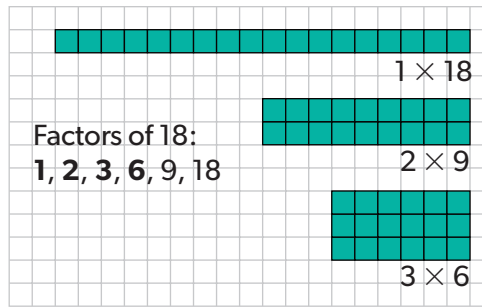
The GCF can never be greater than the numbers you start with.

Grid Paper can be found on p. 241.

A You can use Grid Paper to find the GCF of two numbers.

DO Find the GCF of 42 and 56.

1. Draw rectangles to find the factor pairs of 42 and 56.

2. List the factors.

3. Write the factors that 42 and 56 have in common.

4. Write the greatest common factor.

Factors of 42: _____, _____, _____, _____, _____, _____, _____, _____

Factors of 56: _____, _____, _____, _____, _____, _____, _____, _____

The common factors are _____, _____, _____, and _____.

The GCF is _____.

DISCUSS Zach used counters to find the LCM of 2 and 3.

2

4

6

3

6

Did Zach find the LCM, or does he need more counters? Explain.

I need to multiply when finding the LCM.

PRACTICE

Find the GCF of the pair of numbers.

1 7 and 27

GCF = _____

2 24 and 30

GCF = _____

3 10 and 14

GCF = _____

4 32 and 60

GCF = _____

5 18 and 45

GCF = _____

6 12 and 72

GCF = _____

Find the LCM of each pair of numbers.

7 10 and 12

LCM = _____

8 8 and 4

LCM = _____

Find the LCM of the pair of numbers.

9 3 and 7

10 9 and 12

LCM = _____

LCM = _____

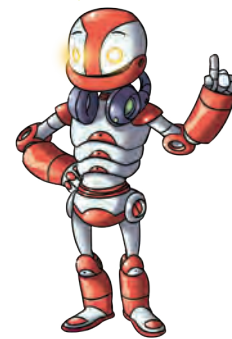*I know! I'll list the numbers between 11 and 19 that are multiples of 4.*

Solve.

11 The GCF of two numbers is 4. The two numbers are between 11 and 19. What are the two numbers? _____

12 The LCM of two numbers is a multiple of 10 and a multiple of 6. The two numbers are both less than 10. What is the LCM? _____

I need to list multiples of each number until I find a common multiple.

DISCUSS

Analyze

Emma says that another way to find the LCM of two numbers is to multiply the two numbers and then divide the product in half. Use Emma's advice to find the LCM of the numbers below. Write *is* or *is not*.

Find the LCM of 10 and 12.

$10 \times 12 = 120$

$120 \div 2 = 60$

60 _____ the LCM of 10 and 12.

Find the LCM of 5 and 6.

$5 \times 6 = 30$

$30 \div 2 = 15$

15 _____ the LCM of 5 and 6.

Find the LCM of 11 and 4.

$11 \times 4 = 44$

$44 \div 2 = 22$

22 _____ the LCM of 11 and 4.

Explain why you agree or disagree with Emma, based on the results you found.

PROBLEM SOLVING

FRUIT BASKETS

READ

David is making baskets of fruit. He has 12 apples and 20 pears. If each basket will contain the same number of apples and the same number of pears, what is the greatest number of baskets he can make?

PLAN

• What is the problem asking you to find?

　The _____ number of baskets David can make

• What do you need to find to solve the problem?

　The GCF of _____ and _____.

• How can you find the GCF of the two numbers?

　List the factors of each number. Then find the GCF.

SOLVE

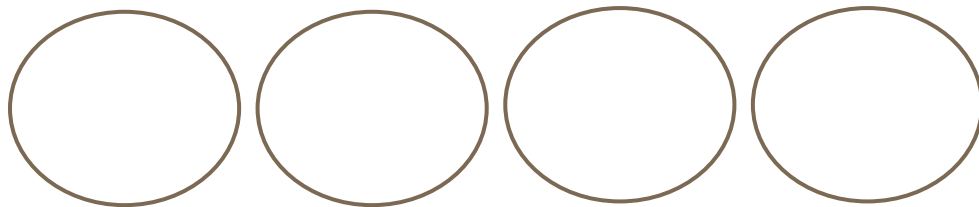List the factors of each number to find the greatest common factor.

12　　Factors: _____, _____, _____, _____, _____, and _____

20　　Factors: _____, _____, _____, _____, _____, and _____

The common factors are _____, _____, and _____. The GCF is _____.

CHECK

Model the problem. Draw an oval to represent each basket.

Divide 12 apples and 20 pears equally among the 4 baskets.

There are _____ apples in each. There are _____ pears in each.

The greatest number of baskets David can make is _____.

PRACTICE

Use the problem-solving steps to help you.

1 A pet store fills aquariums with fish. The store has 27 angelfish and 45 lionfish. If the aquariums will contain the same number of each kind of fish, what is the greatest number of aquariums that the store can fill?

CHECKLIST
- [ ] READ
- [ ] PLAN
- [ ] SOLVE
- [ ] CHECK

2 Tara is making a scrapbook using 24 photos and 8 newspaper clippings. She wants to put the same number of photos and clippings on each page. What is the greatest number of scrapbook pages Tara can make?

CHECKLIST
- [ ] READ
- [ ] PLAN
- [ ] SOLVE
- [ ] CHECK

3 Wyatt wants to make bags of party favors to give to his friends. Toy cars come in packages of 6. Gliders come in packages of 8. What is the least number of toy cars and gliders Wyatt can buy to have an equal number of each?

CHECKLIST
- [ ] READ
- [ ] PLAN
- [ ] SOLVE
- [ ] CHECK

4 Frankie's Meats sells frankfurters in packages of 10, and hot dog buns in packages of 8. What is the least number of frankfurters and buns Selma can buy to have an equal number of each for a barbecue?

CHECKLIST
- [ ] READ
- [ ] PLAN
- [ ] SOLVE
- [ ] CHECK