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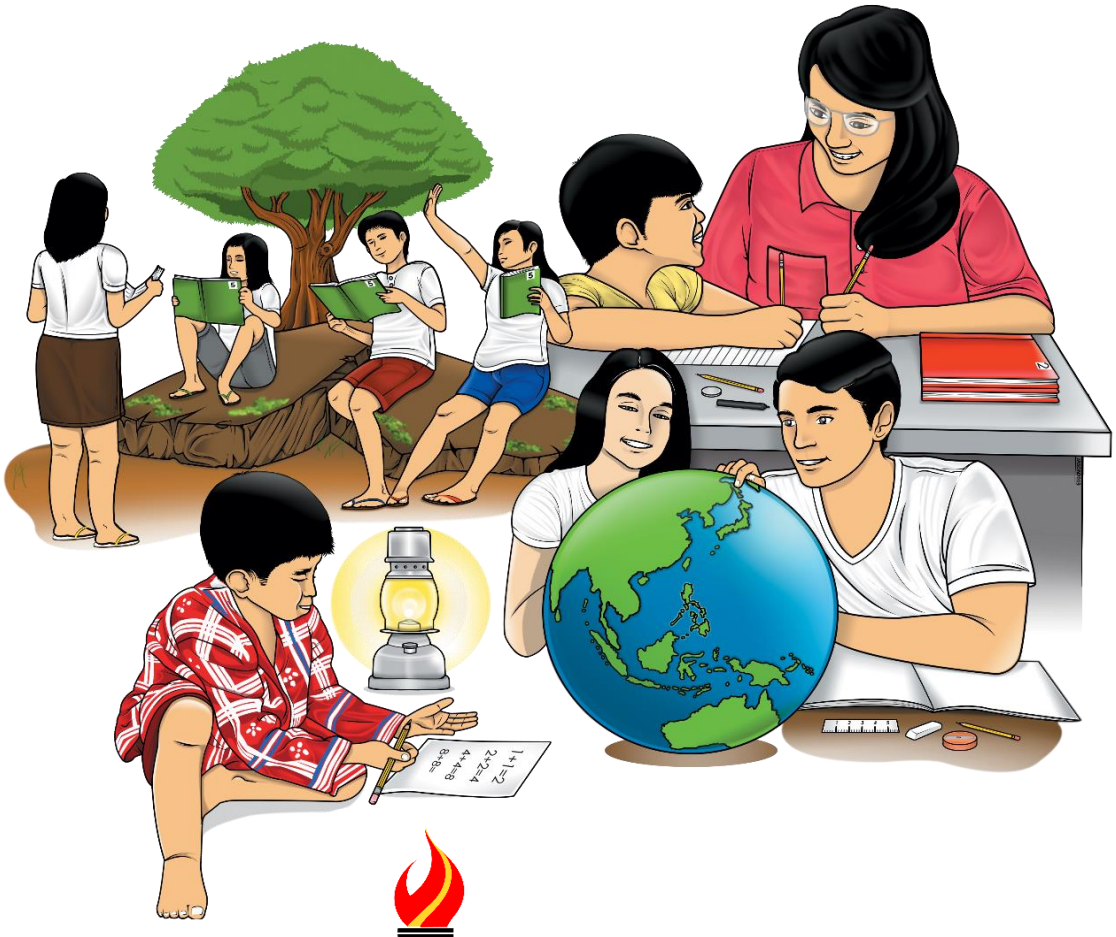
Mathematics
Quarter 2 – Module 2: Greatest Common Factor



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Secretary: Leonor Magtolis Briones
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Development Team of the Module

Writer: Michael L. Delgado

Editor: Elena D. Hubilla

Language Editors: Josephine Recebido, Sonia F. Aninipot

Reviewers: Annavi M. Maravilla, Antonio M. Herrera, Jr., Rhoderick A. Aninipot

Illustrators: Jason C. Borabo, Michael L. Delgado

Layout Artist: Teresa Vissia B. Suñga

Management Team: Regional Director: Gilbert T. Sadsad
CLMD Chief: Francisco B. Bulalacao Jr.
Regional EPS In Charge of LRMS: Grace U. Rabelas
Regional EPS In Charge of Math: Loyd H. Botor
Regional ADM Coordinator: Ma. Leilani R. Lorico
CID Chief : Monserat D. Guemo
Division EPS In Charge of LRMS: Florena M. Deuna

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Department of Education – Region V

Office Address: Regional Center Site, Rawis, Legazpi City 4500
Telefax: 0917-178-1288
E-mail Address: region5@deped.gov.ph

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Mathematics
Quarter 2 – Module 2: Greatest Common Factor

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

There are times that we encounter questions such as: Do we need to divide things into smaller groups? How many people are we going to invite in our birthday party? Are we trying to arrange something in rows or groups? These are instances when we need Greatest Common Factor (GCF).

Greatest Common Factor can be used in different applications in Mathematics. In this module, you will perform exercises that will help you understand GCF.

After going through this module, you are expected to:

1. write a given number as a product of its prime factors;
2. find the common factors and the greatest common factor (GCF) of two numbers using the following methods: listing, prime factorization, and continuous division; and
3. solve real-life problems involving GCF of 2 given numbers.

Lesson 1

Finding the Common Factors and the Greatest Common Factor of Two Numbers

What I Know

Let us try to see what you know about Greatest Common Factor (GCF).

Find the Greatest Common Factor (GCF).

1. 2 and 4
2. 3 and 6
3. 4 and 8
4. 6 and 9
5. 10 and 15
6. 6 and 12
7. 8 and 16
8. 12 and 15
9. 9 and 18
10. 14 and 21

If you are done answering the activity, please go to the ***Answer Key*** on page 19 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Hope you will do this until the end of this module.

What's In

Let us review first some of the concepts that can help you understand Greatest Common Factor (GCF).

A. Write each number as a product of its two factors.

1. 32 = _____
2. 48= _____
3. 70 = _____
4. 63= _____
5. 78 = _____

If you are done answering the activity, please go to the ***Answer Key*** on page 19 and check if your answers are correct.

Thank you for your honesty in answering and checking your work.

Notes to the Teacher

The activities may be supplemented and enhanced with some contextualized problems that will get the interest of the learners to perform well in finding the common factors and GCF of two numbers.

What's New

Let us start learning the new concept with the help of this story problem.

Read the story problem.

Nancy has 8 red and 12 pink *gumamela* flowers that will be given to her teachers. She will put them in vases with equal number of red and pink flowers. What is the greatest possible number of vases will she use?

What is asked in the problem?

- The greatest number of vases that Nancy will use.

What are the given facts that can help you solve the problem?

- 8 red *gumamela* flowers, 12 pink *gumamela* flowers

What can you say about Nancy? What kind of person is she?

- Nancy is grateful to have her teachers. She is thoughtful.

Try to answer the problem. Have patience and have fun!

We will find out on the next part of this module whether you answered the problem properly and correctly.

What is It

This problem is about finding the greatest common factor because it requires us to find the greatest quantity of equal groups that we can make with the red and pink flowers.

Greatest Common Factor (GCF) is the biggest factor or number common to the given numbers.

You can find the answer to the given problem using different methods.

Study the solutions below.

Method 1. Listing Method

List the factors of 8 and 12.

Factors of 8	**Factors of 12**
1 x 8 2 x 4	1 x 12 2 x 6 3 x 4

Arrange the factors from the smallest to biggest.

Factors of 8: 1 , 2 , 4 and 8
Factors of 12: 1 , 2 , 3 , 4 , 6 and 12

Find the common factor/s of 8 and 12.

Factors of 8: 1 , 2 , 4 and 8
Factors of 12: 1 , 2 , 3 , 4 , 6 and 12

Common Factors: 1 , 2, and 4

Get the Greatest Common Factor (GCF) of 8 and 12.

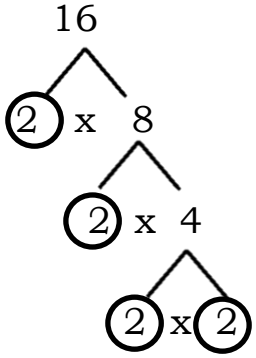
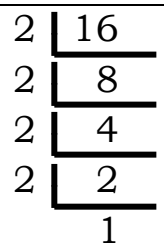
Greatest Common Factor (GCF): 4

In the next 2 ways of finding the greatest common factor of two numbers, it is important for you to know how to write a number as a product of its prime factors.

When a composite number is written as a product of all of its prime factors, we have the ***Prime Factorization*** of the number.

For example, the number 16 can be written as a product of its prime factors as: 16 = 2 x 2 x 2 x 2.

Examine how we arrived at the given prime factors using 2 ways.

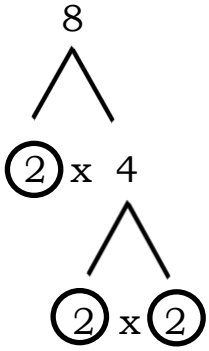
Factor Tree	Continuous Division
	
A factor tree is a diagram used to determine the prime factors of a number. The number 16 can be written in prime factorization as 2 x 2 x 2 x 2. All of the factors are prime numbers.	In Continuous Division, we need to divide number by its prime factor and continue dividing until we reach the quotient 1. The number 16 can be written in prime factorization as 2 x 2 x 2 x 2. All of the factors are prime numbers.

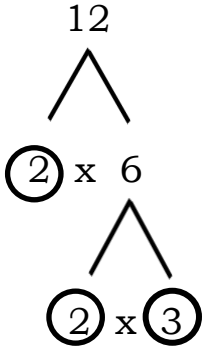
The expression "2 x 2 x 2 x 2" is said to be the ***Prime Factorization*** of 16.

Let us now solve the problem in *What's New* using Prime Factorization.

Method 2. Prime Factorization

Write each number as a product of its prime factors using factor tree method.





List down the prime factors of 8 and 12.

$8 = 2 \times 2 \times 2$
$12 = 2 \times 2 \times 3$

Multiply the common prime factors of 8 and 12 to get the GCF.

$8 = 2 \times 2 \times 2$
$12 = 2 \times 2 \times 3$

$2 \times 2 = 4$

Greatest Common Factor (GCF): 4

Method 3. Continuous Division

Continuous division is done following the steps below.

1. Write the given numbers horizontally and find a prime number that will divide all the given numbers without a remainder, if possible.
2. Divide the given numbers by that prime number and write the quotients below the dividends.
3. Continue the process until all the quotients have no more common prime divisor.

x	2	8	12
	2	4	6
		2	3

4. Multiply all the prime divisors common to the given numbers to get the GCF.

$2 \times 2 = 4$

Greatest Common Factor (GCF): 4

Therefore, 4 is the greatest possible number of vases that Nancy can use.

What's More

Let us see if you already know how to find the Greatest Common Factor (GCF) of a given pair of numbers.

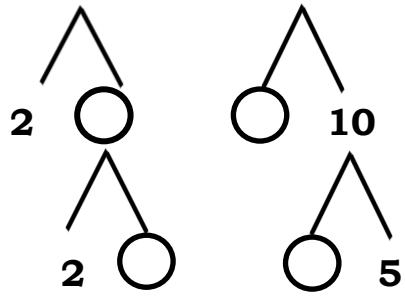
Activity 1. Find the Greatest Common Factor (GCF) by completing the needed data.

1. 6 : 1, __, 3, 6
   12 : 1, 2, 3, 4, __, 12
   Common Factors :_____
   GCF :_____
2. 9 : 1, __, 9
   12 : 1, 2, 3, 4, __, 12
   Common Factors :_____
   GCF :_____
3. 10 : 1, 2, 5, __
   15 : 1, 3, __, 15
   Common Factors :_____
   GCF :_____
4. 20 : 1, 2, 4, 5, __, 20
   40 : 1, 2, 4, 5, 8, 10, __, 40
   Common Factors :_____
   GCF :_____
5. 21 : 1, 3, 7, __
   35 : 1, 2, 5, __, 15, 30
   Common Factors :_____
   GCF :_____

Activity 2.

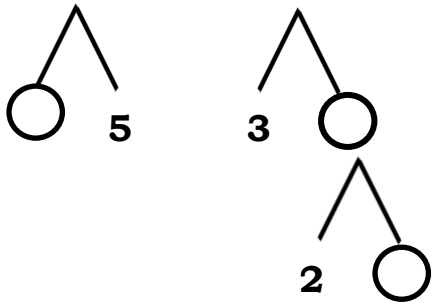
A. Find the Greatest Common Factor (GCF) of each pair of numbers using Prime Factorization (Factor Tree Method).

1. 12 and 20



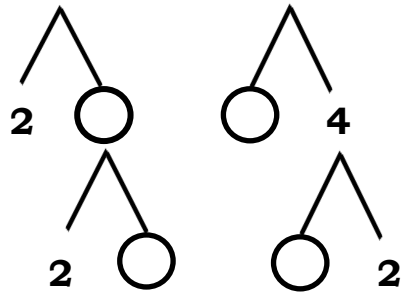
GCF:___

2. 10 and 30



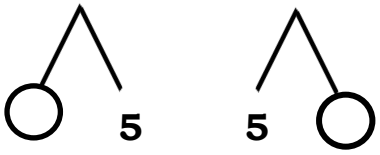
GCF:___

3. 12 and 8



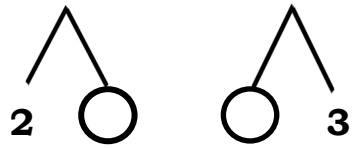
GCF:___

4. 15 and 25



GCF:___

5. 6 and 9



GCF:___

Activity 3. Find the Greatest Common Factor (GCF) of each pair of numbers using Continuous Division.

1. $7\overline{)\,21 \text{ and } 28}$

   3 4

   GCF : ____

2. $7\overline{)\,21 \text{ and } 35}$

   3 5

   GCF : ____

3. $2\overline{)\,12 \text{ and } 24}$

   $2\overline{)\,6 \quad 12}$

   $3\overline{)\,3 \quad 6}$

   1 2

   GCF : ____

4. $11\overline{)\,22 \text{ and } 11}$

   2 1

   GCF : ____

5. $3\overline{)\,15 \text{ and } 45}$

   $5\overline{)\,5 \quad 15}$

   1 3

   GCF : ____

If you are done answering the activity, please go to the ***Answer Key*** on page 19 and check if your answers are correct.

Thank you for your honesty in answering and checking your work.

What I Have Learned

You are doing great!

Just always remember:

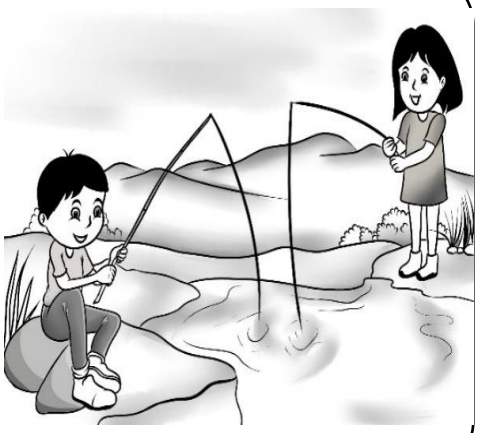
1. Greatest Common Factor (GCF) is the biggest factor common to the given numbers.
2. We can find the Greatest Common Factor (GCF) of 2 numbers by listing method, prime factorization and continuous division.

What I Can Do

Let us see if you are now ready to solve this problem.

Read and understand the problem, then answer the questions that follow.

Andrew and his younger sister Cassandra went to the nearby river to catch fish. Andrew caught 8 fish while Cassandra caught 4 fish. Each of them will share the fish to their cousins. What is the greatest number of fish each of their cousins get if they will give



1. What is asked in the problem?
2. What are the given facts that can help you solve the problem?
3. What is the GCF of 8 and 4?
4. What can you say about Andrew and Cassandra? What kind of children are they?

Assessment

You are now ready for the next activity.

Find the Greatest Common Factor (GCF) of the given pair of numbers using any of the following methods: listing, prime factorization, and continuous division.

1. 16 and 24
2. 10 and 30
3. 14 and 28
4. 20 and 40
5. 9 and 18
6. 10 and 50
7. 25 and 75
8. 12 and 48
9. 18 and 72
10. 50 and 100

If you are done answering the activity, please go to the ***Answer Key*** on page 20 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Congratulations!

Additional Activities

Let us try some more.

Find the Greatest Common Factor (GCF) of the given pair of numbers using any of the following methods: listing, prime factorization, and continuous division.

1. 8 and 16
2. 9 and 18
3. 8 and 20
4. 12 and 16
5. 14 and 35

If you are done answering the activity, please go to the ***Answer Key*** on page 20 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Congratulations!

Lesson 2 Solving Word Problems Involving Greatest Common Factor

What I Know

Let us see what you know about Greatest Common Factor (GCF).

Read each problem and answer the questions that follow.

1. Carlo has 14 apples and Anna has 21 apples. Each of them will share the apples to their friends. What is the greatest number of apples each of their friend gets if Carlo and Anna will give the same number of apples?
   a. What is asked in the problem?
   b. What facts are given?
   c. How will you solve the problem?
   d. Show your solution.
   e. What is the answer to the problem?

2. Peters has ₱ 14 while Carla has ₱ 18. They want to give the same amount of money to their friend. What is the greatest amount they can give?
   a. What is asked in the problem?
   b. What facts are given?
   c. How will you solve the problem?
   d. Show your solution.
   e. What is the answer to the problem?

If you are done answering the activity, please go to the ***Answer Key*** on page 20 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Hope you will do this until the end of this module.

What's In

Let us review first some of the concepts that can help you understand Greatest Common Factor (GCF).

A. Write each number as a product of its two factors.

1. 42 = _____ 4. 43= _____

2. 38= _____ 5. 81 = _____

3. 50 = _____

If you are done answering the activity, please go to the ***Answer Key*** on page 20 and check if your answers are correct.

Thank you for your honesty in answering and checking your work.

What's New

Let us start learning the new concept with the help of this story problem.

Read the story problem.

Mrs. Santos is preparing emergency kits to be given to each class in Grade 4. She has 30 bottles of water and 20 canned food, which she would like to distribute equally among the kids with no items left. What is the greatest number of kits can she make?

What can you say about Mrs. Santos? What kind of person is she?

- Mrs. Santos love the pupils. She is generous.

How will you solve the problem?

Try to answer the problem. Have patience and have fun!

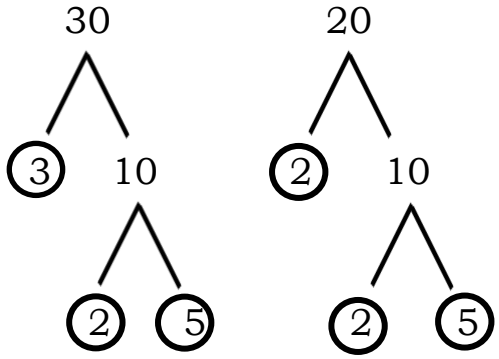
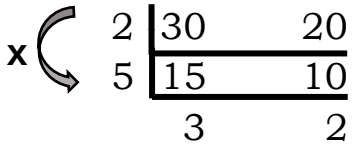
We will find out on the next part of this module whether you answered the problem properly and correctly.

What is It

This problem is about finding the Greatest Common Factor because it requires us to find the greatest quantity of equal groups that we can make with the bottles of water and cans of food.

You can use the 4-step plan in solving for the answer.

Step 1. Understand	
What is asked in the problem?	The greatest number of kits that Mrs. Santos can make
What facts are given?	30 bottles of water, 20 cans of food
Step 2. Plan	
How will you solve the problem?	By finding the Greatest Common Factor (GCF)

Step 3. Solve	
How is the solution done?	**Listing Method:** 30: 1, 3, 5, 6, 10, 30 20: 1, 2, 4, 5, 10, 20 GCF: 10 **Prime Factorization:**  30 = 2 x 3 x 5 20 = 2 x 2 x 5 2 x 5 GCF: 10 **Continuous Division:**  2 x 5 = 10 GCF: 10
Step 4. Check and Look Back	
What is the answer to the problem?	The greatest number of kits is 10.

Therefore, 10 is the greatest possible number of kits that Mrs. Santos can make.

What's More

Let us see if you already know how to solve word problems involving Greatest Common Factor (GCF).

Read each problem and answer the questions that follow.

1. Cassandra is creating individual servings of dessert. She has 16 pili nut candies and 24 chocolates. If she wants each serving to be identical, with all food included in the servings, what is the greatest number of servings Cassandra can create?

a. What is asked in the problem?

b. What facts are given?

c. How will you solve the problem?

d. Show your solution.

e. What is the answer to the problem?

2. Clark has 25 red marbles and 75 green marbles. If he wants to put them equally in jars with all marbles included, what is the greatest number of jars will he need?

a. What is asked for in the problem?

b. What facts are given?

c. How will you solve the problem?

d. Show your solution.

e. What is the answer to the problem?

If you are done answering the activity, please go to the ***Answer Key*** on page 20 and check if your answers are correct.

Thank you for your honesty in answering and checking your work.

What I Have Learned

You are doing great!

Just always remember that we can use 4-step plan in solving word problems involving Greatest Common Factor. These are as follow:

1. Understand
   a. What does the problem ask for?
   b. What facts are given?
2. Plan
   How will you solve the problem?
3. Solve
   How is the solution done?
4. Check and look back
   What is the answer to the problem?

What I Can Do

Let us see if you are now ready to solve this problem.

Read and understand the problem, then answer the questions that follow.

> Mrs. Perez has 45 pencils and 60 pens to be given to her pupils. Each pupil must receive the same number of pens and pencils and there will be no pens or pencils left. What is the greatest number of pupils in her class?

1. What is asked in the problem?
2. What facts are given?
3. How will you solve the problem?
4. Show your solution.
5. What is the answer to the problem?

Assessment

You are now ready for the next activity.

Read each problem and answer the questions that follow.

1. Allan has 18 blue balls and 27 red balls. He wants to group them of the same size. Each group must have the same number of blue and red balls. What is the greatest number of groups that he can form?

   a. What is asked in the problem?
   b. What facts are given?
   c. How will you solve the problem?
   d. Show your solution.
   e. What is the answer to the problem?

2. Troy is packing candies and chocolates for his birthday party. He has 42 candies and 70 chocolates. He wants to pack them with the same number of candies and chocolates. What is the greatest number of packs that he can make?

   a. What is asked in the problem?
   b. What facts are given?
   c. How will you solve the problem?
   d. Show your solution.
   e. What is the answer to the problem?

If you are done answering the activity, please go to the ***Answer Key*** on page 21 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Congratulations!

Additional Activities

Let us try some more.

Challenge yourself by answering the problem.

Kristine has 77 mangoes and 63 bananas. She wants to put all of the fruit in boxes with each box having the same number of pieces of fruit in it. What is the greatest number of boxes will she use?

If you are done answering the activity, please go to the ***Answer Key*** on page 21 and check if your answers are correct.

Thank you for your honesty in answering and checking your work. Congratulations!

Answer Key

LESSON 1: FINDING THE GREATEST COMMON FACTOR OF TWO NUMBERS

What I Know

1. 2	6. 6
2. 3	7. 8
3. 4	8. 3
4. 3	9. 9
5. 5	10. 7

What's In

1. 32 = 1x32, 2x16, 4x8
2. 48 = 1x48, 2x24, 4x12, 6x8, 3x16
3. 70 = 1x70, 2x35, 5x14
4. 63 = 1x63, 3x21, 7x9
5. 78 = 1x78, 2x39, 6x13, 26x3

What's More

Activity 1

1. 6 : 1, 2, 3, 6
   12 : 1, 2, 3, 4, 6, 12
   Common Factors : 1, 2, 3, 6
   GCF : 6
2. 9 : 1, 3, 9
   12 : 1, 2, 3, 4, 6, 12
   Common Factors : 1, 3
   GCF : 3
3. 10 : 1, 2, 5, 10
   15 : 1, 3, 5, 15
   Common Factors : 1, 5
   GCF : 5
4. 20 : 1, 2, 4, 5, 10, 20
   40 : 1, 2, 4, 5, 8, 10, 20, 40
   Common Factors : 1, 2, 4, 5, 10, 20
   GCF : 20
5. 21 : 1, 3, 7, 21
   35 : 1, 2, 5, 7, 15, 30
   Common Factors : 1, 7
   GCF : 7

Activity 2

Activity 3

1. 7
2. 7
3. 12
4. 11
5. 15

What I Can Do

1. The greatest number of fishes each of their cousins get.
2. 8 fish, 4 fish
3. 4
4. They are helpful to their family. They are hardworking.

Assessment

1. 8	6. 10
2. 10	7. 25
3. 14	8. 12
4. 20	9. 18
5. 9	10. 50

Additional Activities

1. 8
2. 9
3. 4
4. 4
5. 7

LESSON 2: SOLVING WORD PROBLEMS INVOLVING GREATEST COMMON FACTOR

What I Know

1. a. The greatest number of apples each of their friend get.
   b. 14 apples, 21 apples
   c. Find the GCF
   d. 14: 1, 2, 7, 14
      21: 1, 3, 7, 21
      GCF: 7
   e. 7
2. a. The greatest amount they can give to their friend.
   b. P 14, P 18
   c. Find the GCF
   d. 14: 1, 2, 7, 14
      18: 1, 2, 3, 6, 9, 18
      GCF: 2
   e. P 2

What's In

1. 42 = 1x42, 2x21, 6x7, 3x14
2. 38 = 1x38, 2x19
3. 50 = 1x50, 2x25, 5x5
4. 43 = 1x43
5. 81 = 1x81, 9x9, 3x27

What's More

1. a. The greatest number of servings Cassandra can create.
   b. 16 pili nut candies, 24 chocolates
   c. Find the GCF
   d. 16: 1, 2, 4, 8, 16
      24: 1, 2, 3, 8, 12, 24
      GCF: 8
   e. 8
2. a. The greatest number of jars Clark will need.
   b. 25 red marbles, 75 green marbles
   c. Find the GCF
   d. 25: 1, 5, 25
      75: 1, 3, 5, 15, 25, 75
      GCF: 25
   e. 25

What I Can Do

1. The greatest number of pupils in her class.
2. 45 pencils, 60 pens
3. Find the GCF
4. 45: 1, 3, 5, 9, 15, 45
   60: 1, 2, 3, 4, 6, 10, 15, 20, 30, 60
   GCF: 15
5. 15

Assessment

1. a. The greatest number of groups that he can form
   b. 18 blue balls, 27 red balls
   c. Find the GCF
   d. 18: 1, 2, 3, 6, 9, 18
      27: 1, 3, 9, 27
      GCF: 9
   e. 9
2. a. The greatest number of packs that he can make
   b. 42 candies, 70 chocolates
   c. Find the GCF
   d. 42: 1, 2, 3, 6, 7, 14, 21, 42
      70: 1, 2, 5, 7, 10, 14, 35, 70
      GCF: 14
   e. 14

Additional Activities

1. a. The greatest number of boxes she will use
   b. 77 mangoes, 63 bananas
   c. Find the GCF
   d. 77: 1, 7, 11, 77
      63: 1, 3, 7, 9, 21, 63
      GCF: 7
   e. 7

References

K to 12 Mathematics Curriculum Guide, August 2016

Tabilang, Alma R. et. Al, 2015, **Mathematics 4 Learner's Material** pp. 89-92,97-99, Department of Education

Tabilang, Alma R. et. Al, 2015, **Mathematics 4 Teacher's Guide** pp. 118-122,125-129, Department of Education

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph