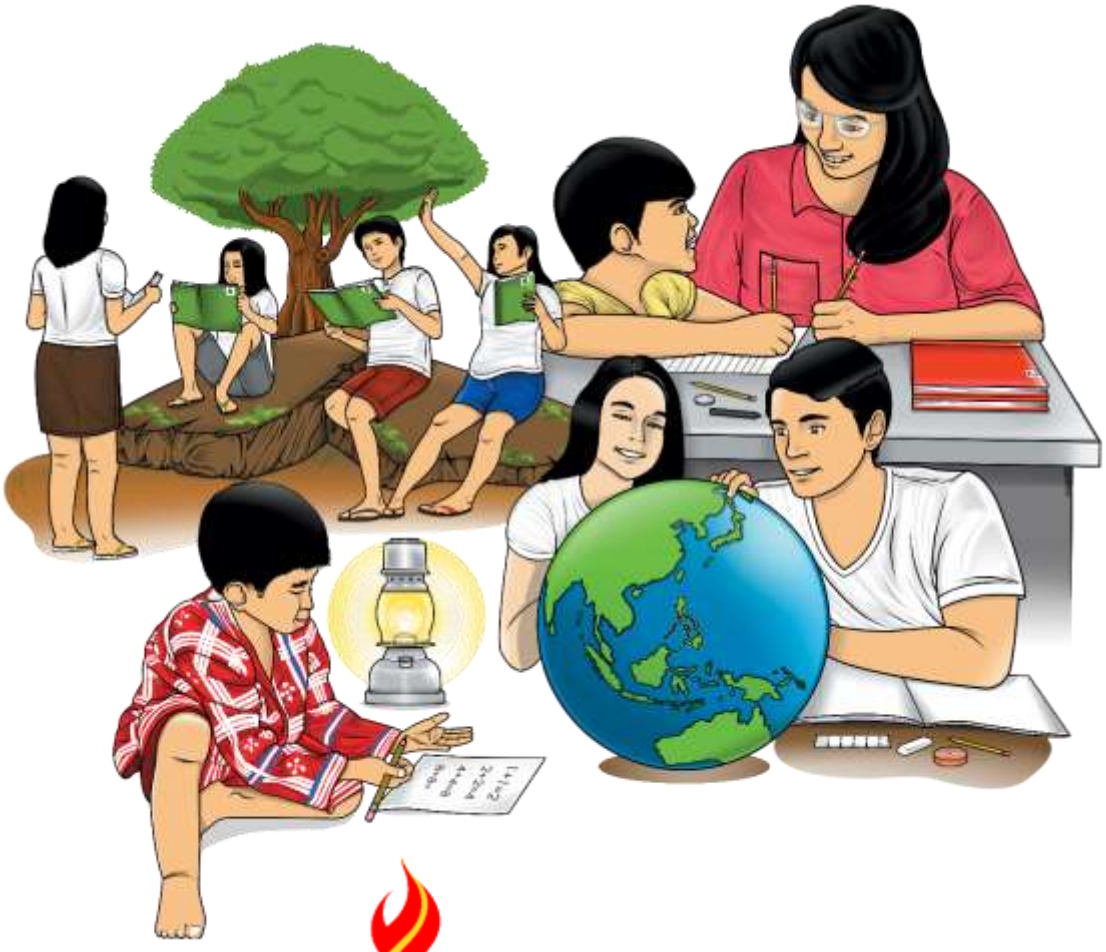
5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 1 – Module 3:
Using Divisibility Rules for 4, 8, 11 and 12



ALTERNATIVE DELIVERY MODE
ADM

What I Need to Know

Good day, Mathletes!

In this module, you are going to learn to use divisibility rules for 4, 8, 11, and 12 to find common factors. Using divisibility rules of 4, 8, 11, and 12 will help you find the factors of a number. The word divisible refers to the number being divided exactly by another number.

At the end of this module, you are expected to:

- use divisibility rules for 4, 8, 11, and 12 to find common factors; and
- appreciate the use of divisibility rules for 4, 8, 11 and 12 in finding common factors.

What I Know

Answer the test below. Take your time to recall what you have learned in the previous module. Enjoy!

A. Directions: Read the items below. Write the letter of the answer in your Worksheet or Math Activity Notebook.

1. Which of the following is divisible by 4 and 8?
   A. 44 B. 120 C. 124 D. 142

2. 4 is a factor of ____.
   A. 152 B. 130 C. 174 D. 182

3. Which of the following has common factors of 4 and 12?
   A.144 B. 146 C. 251 D. 54

4. Which set of numbers has a common factor of 4?
   A. 32, 46, 124, 154 C. 28, 46, 82, 132
   B. 36, 42, 54, 122 D. 24, 48, 128, 232

5. 11 is a common factor of ___.
   A. 143 and 275 C. 324 and 214
   B. 143 and 432 D. 182 and 43

B. Directions: Read the mathematical statements below and find out whether they are correct or not. Explain your answer briefly.

1) If a number is divisible by 4, it must be divisible by 8.

2) All numbers ending in zero are divisible by 8.

3) If a number is divisible by 8, it must be divisible by 4.

4) The sum of two consecutive odd numbers is always divisible by 11.

5) If a number exactly divides the sum of two numbers, it must exactly divide the numbers separately.

Lesson 1 Divisibility Rules for 4, 8, 11, and 12 to Find Common Factors

A divisibility rule is a simple way of determining whether a given number is divisible by another number. It can be used to quickly find the factors of given numbers. "Divisible by another number" means a number can be divided by another number without any remainder.

What's In

In the previous modules, you have learned the divisibility rules for 2, 3, 5, 6, 9 and 10. Recall what you have learned by doing the exercise below.

Directions: See if the numbers in the first column are divisible by 2, 3, 5, 6, 9 or 10. Mark (X) on the corresponding columns. Copy the table with your answers on a separate sheet of paper.

Divisible by	**2**	**3**	**5**	**6**	**9**	**10**
120						
125						
180						
324						
660						

What's New

Study the table below. Find out why the given numbers are divisible by 4, 8, 11 or 9.

Directions: Put a check mark in the corresponding column to identify whether each number in the first column is divisible by 4, 8, 11, or 12. Copy the table with your answers on a separate sheet of paper.

	4	8	12	11
1) 88				
2) 48				
3) 22				
4) 132				
5) 264				

What Is It

Divisibility Rules for 4, 8, 11, and 12

Here are examples of numbers that are divisible by 4, 8, 11 and 12.

Numbers Divisible by			
4	**8**	**11**	**12**
28	32	33	46
812	96	242	180
124	176	495	240
2020	200	253	732

How do we know if a number is divisible by 4, 8, 11 or 12?

- **Divisibility Rules for 4**
  A number is divisible by 4 if the number formed by its last two digits is divisible by 4. If its last two digits are both zeros, then it is also divisible by 4.

- **Divisibility Rules for 8**

  A number is divisible by 8 if the number formed by its last three digits is divisible by 8. If the number ends in three zeros, then it is also divisible by 8.

- **Divisibility Rules for 11**
  A number is divisible by 11 if the difference of the sum of the odd-positioned digits (starting from the left) and the sum of the even-positioned digits (starting from the left) is zero or if it is a multiple of eleven.

- **Divisibility Rules for 12**
  A number is divisible by 12 if the sum of its digits is divisible by 3, and the number formed by its last two digits is divisible by 4.

Study the discussions and samples below:

From the table above, let us find out if 264 is divisible by 4, 8, 11 or 12.

Divisible by 4;

The number formed by the last two digits of 2<u>64</u> is 64.
64 is divisible by 4, because 64 ÷ 4 = 16.
Therefore, 264 is divisible by 4.

Divisible by 8;

264 has exactly three digits.
264 ÷ 8 = 33, which is a whole number.
Therefore, 264 is divisible by 8.

Divisible by 11;

<u>2</u>6**<u>4</u>** The underlined digits are odd-positioned.
Add the odd-positioned digits: 2 + 4 = 6

2**<u>6</u>**4 The underlined digit is even-positioned.
Subtract the sum of odd-positioned digits from the even-positioned digits: 6 – 6 = 0

The difference is 0. Therefore, 264 is divisible by 11.

Divisible by 12;

264 is divisible by 4, because the number formed by its last two digits can be divided by 4.
The sum of the digits of 264 is 2 + 6 + 4 = 12, which is divisible by 3.
Therefore, 264 is divisible by 12.

This means that 264 is divisible by 4, 8, 11 and 12.

Finding the common factors of the given numbers.

1. Find the common factors of 264 and 176 using the divisibility rules.

Factors of 264

264 ÷ 1 = 264
264÷ 2 = 132
264 ÷ 3 = 88
264 ÷ 4 = 66
264 ÷ 8 = 33
264 ÷ 11 = 24
264 ÷ 12 = 22

Factors of 176

176 ÷ 1 = 176
176 ÷ 2 = 88
176 ÷ 4 = 44
176 ÷ 8 = 22
176 ÷ 11 = 16

The factors of

264: 1, 2, 3, 4, 8, 11, 12, 22, 24, 33, 66, 88, 132, 264.
176: 1, 2, 4, 8, 11, 16, 22, 44, 88, 176

Therefore, the **common factors** of 264 and 176 are: **1, 2, 4, 8, 11, 22,**

2. Find the common factors of 528 and 792

Factors of 528

528 ÷ 1 = 528
528 ÷ 2 = 264
528 ÷ 3 = 176
528 ÷ 4 = 132
528 ÷ 6 = 88
528 ÷ 8 = 66
528 ÷ 11 = 48
528 ÷ 12 = 44

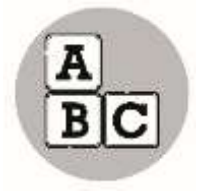
Factors of 792

792 ÷ 1 = 792
792 ÷ 2 = 396
792 ÷ 3 = 264
792 ÷ 4 = 198
792 ÷ 6 = 132
792 ÷ 8 = 99
792 ÷ 11 = 72
792 ÷ 12 = 66

Thus, the factors of:

56: 1,2,3,4,6,8,11,12,44,48,66,88,132,176,264,528
792: 1,2,3,4,6,8,11,12, 66, 72, 99, 132, 198, 264, 396, 793

Therefore, the **common factors** of 56 and 792 are: **1,2,3,4,6,8,11,12,132**



What's More

Apply the divisibility rules in doing the exercises below.

Independent Activity 1

Directions. Use the divisibility rules for 4, 8, 11 or 12 to list down all the factors of each pair of numbers. Then, encircle the common factors.

1) 160 and 320
2) 132 and 264
3) 528 and 396
4) 288 and 120
5) 240 and 112

Independent Activity 2

Directions. Using the divisibility rules, write True on the blank if the number on the left column is a common factor to the numbers on the right column, and False or Not.

_____1.) 4	192 and 670
_____2.) 8	432 and 864
_____3.) 11	462 and 330
_____4.) 12	240 and 500
_____5.) 12	480 and 960

Independent Activity 3

Directions: Shade the box of 4, 8, 11 or 12 if they are common factors of the given numbers. Copy the table with your answers on a separate sheet of paper.

1) 154 and 132	4	8	11	12
2) 48 and 144	4	8	11	12
3) 36 and 60	4	8	11	12
4) 44 and 88	4	8	11	12
5) 32 and 64	4	8	11	12

What I Have Learned

How do you use divisibility rules for 4, 8, 11, and 12 in finding the common factors? Supply the missing terms below.

A number is divisible by (1) _____ if the last two digits are zero (0).

If the number formed by the last (2)_____ digits of a given number is divisible by 8, then the original number is divisible by 8. If a number ends in (3) _____ zeros, then it is also divisible by 8.

A number is divisible by 11 if the (4) _____ of the sum of the odd-positioned digits and the sum of those in even-positioned digits, counted from right to left is 0 or divisible by 11.

A number is divisible by 12 if the sum of its digits is divisible by 3 and the number formed by its last two digits is divisible by (5)_____.

What I Can Do

Directions: Use divisibility rules to help you solve the problem inside the box.

Write your answers in your Math Activity Notebook.

How many whole numbers from 20 to 40 are divisible by 4? 8? 11? 12?

Assessment

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. 432 is divisible by 4 because_____.
   A. The last two digits is divisible by 4
   B. The last digit is even
   C. The sum of the digits is 9
   D. The hundred's digit is 4.

2. Which of the following is NOT divisible by 4?
   A. 1 000 B. 1 566 C. 5 740 D. 2 024

3. Which of the following numbers are divisible by 11?
   A. 418 653 B. 639 284 C. 927 421 D. All of the above

4. Which of the following numbers are divisible by 12?
   A. 39 628 B. 54 936 C. 76 924 D. All of the above

5. By what numbers is 3 440 divisible?
   A. 4 and 8 B. 8 and 12 C. 11 and 12 D. 4 and 11

6. 401 000 is divisible by 8 because_____
   A. The number has 4 zeros
   B. The last 3 digits are zeros
   C. It is even number
   D. It is a multiple of 5

7. Which of the following is divisible by 8?
   A. 7135 B. 7316 C. 7136 D. 7236

8. By what number is 40 634 divisible?
   A. 4 B. 8 C. 11 D. 12

9. Which is NOT divisible by 8?
   A. 9 634 B. 5 408 C. 3 440 D. 8 168

10. By what numbers is 3 936 divisible?
    A. 8 and 11 B. 4 and 12 C. 12 and 11 D. 11 and 4

Additional Activities

Here is another activity.

Directions: Read the items carefully. Write the letter of the answer in your worksheet.

1. Which pair of numbers has the common factor of 4?
   A. 24 and 36 C. 26 and 32
   B. 24 and 38 D. 34 and 40

2. Which number is divisible by 8 and 12?
   A. 28 B. 38 C. 67 D. 72

3. What is the common factor of 286 and 363?
   A. 4 B. 8 C. 11 D. 12

4. Which pair of numbers are common factors of 132 and 156?
   A. 11 and 13 C. 4 and 11
   B. 2 and 3 D. 4 and 13

5. 4, 8, 11, and 12 are the factors of _____.
   A. 333 B. 542 C. 528 D. 464

Answer Key

What I Know:

A. 1. B 2. A 3. A 4. D 5. A

B. 1. No 2. No 3. Yes 4. No 5. Yes

What I have learned 1. 4 2. Three, ends 3. 11 4. 12

What's In:

Divisible by	2	3	5	6	9	10
120	X	x	x	x		x
125			X			
180	x	x	x	x	x	X
324	2	x		x	X	
660	x	x	x	x		x

What's New:

	4	8	12	11
1) 88	/	/		/
2) 48	/	/	/	
3) 22				/
4) 132	/		/	/
5) 264	/	/	/	/

What's More:

Independent ACTIVITY 1

1. Common factors of 160 and 320: 1,2,3,4,5,10,32,40,80,160
2. Common factors of 132 and 264: 1,2,3,4,6,11,12,22,33,44,66,132
3. Common factors of 528 396: 1,2,3,4,6,11,12,66
4. Common factors of 288 and 120: 1,2,3,4,8,12
5. Common factors of 240 and 112: 1,2,4,8

Independent ACTIVITY 2

1. False/Not
2. True
3. True
4. False/Not
5. True

Independent ACTIVITY 3

1) 154 and 132	4	8	11	12
2) 48 and 144	4	8	11	12
3) 36 and 60	4	8	11	12
4) 44 and 88	4	8	11	12
5) 32 and 64	4	8	11	12

What I Can Do:

1. 4
2. 3
3. 3
4. difference
5. 4

Assessment

1. A	6. B
2. B	7. C
3. C	8. C
4. B	9. A
5. A	10. B

Additional Activities

1. A
2. D
3. C
4. B
5. C