LESSON 1 **Divisibility Rules**

OBJECTIVE

Use divisibility rules for 2.5 and 10 to find the common factors of umbers.

Use divisibility rules for 3,6 and 9 to find common factors.

Use divisibility rules for 4,8,12 and 11 to find common factors.

Solve routine and none routine problems involving factors multiples and divisibility rules for 2,3,4,5,6,8,9,10 and 11

Create problems involving factors multiples and divisibility rules for 2,3,4,5,6,8,9,10, 11 and 12

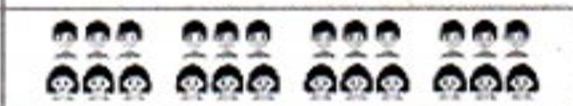
ENGAGE

In her birthday party, Cheska condacted a game called "The Boat" is sinking She asked her 24 guest kids to grouped themselves into 2,3,4,6 and 8. Each time she asked them to form groups no one is eliminated. But when she asked them group into 5 four kids were eliminated from the game

Why is that so? If she will group the remaining kids them into Three, how many of them will be eliminated?

EXPLORE

BIG IDEA
Divisibility rules help us find common factor easily

Group by	24 Kids	Eliminated Kids
2		
3		
4		
5		
6		
8		

When 24 kids were asked to group themselves by 2, 3, 4, 6 and 8 no one was eliminated because 24 divisible by 2,3,4,6 and 8. But when 24 kids asked to group themselves into 5, for kids will eliminated. This is because 24 is not divisible by 5 then, there are 20 kids left. Twenty is not divisible by 3, so two kids will be eliminated. Then there remain 18 kids. If Cheska asks them to group themselves into 3 no one will be eliminated since 18 is divisible by three.

EXPLAIN

Divisibility Rules

1. Divisibility rules for 2, 5 and 10

   The divisibility rules for 2, 5 and 10 are grouped together because they all require checking the ones digit of the whole number.

   Study the given table.

Numbers Divisible by		
3	6	9
3615	7254	108
96	1812	2925
342 114	126 222	50 733

How do we know if the number is divisible by 3, 6, and 9

2.1 Divisibility rule for 3

A number is divisible by 3 if the sum of all the digits is divisible by 3.

Example 7 Is 342 divisible by 3?

Solution:

$3 + 4 + 2 = 9$ (add all the digits)

$9 \div 3 = 3$ (divide the sum by 3)

Therefore, 342 is divisible by 3 because the sum of all digits which is 9 is divisible by 3. That is 342 divided by 3 is 114.

Example 8 The number 561 is divisible by 3 because $5 + 6 + 1 = 12$, and 12 is divisible by 3 to check 561 divided by 3 is 187

2.2 Divisibility rule for 6

If number is divisible by both 2 and 3 then its divisible by 6

Example 9 is 126 divisible by 6?

Solution:

126 can be divided by 2 as the ones digit 6, is even

$1 + 2 + 6 = 9$ (add all the digits)

$9 \div 3 = 3$ (divide the sum by 3)

Since 126 is divisible both 2 and 3, then 126 also divisible by 6.

Example 10 is 176 divisible by 6. The number is 176 is even indicating that it is Divisible by 2. However, 176 is not divisible by 3 since $1+ 7 + 6 =14$ and 14 is not divisible by 3. Therefore 176 is not divisible by 6.

2.3 Divisibilty rule for 9

A number is divisible by 9 if the sum of all the digits is divisible or multiply of 9

Example 11 is 135 divisible by 9?

Solution:

$1 + 3 + 5 = 9$ (add the digits)

$9 \div 9 = 1$ (divide the sum by 9)

Therefore, 135 is divisible by 9.

Example 12 The number 356 is not divisible by 9 because $3 + 5 + 6 = 14$, and 14 is not divisible by 9 or 14 is not multiple of 9.

Knowing the divisibility rules of 3, 6 and 9 will help you find the factors of a number just by examining digits.

Example 13 What are the factors of 558?

Since 558 is divisible by 3, 6 and 9, some possible pairs of the factor of 558

3 x 186

6 x 93

9 x 62

Identify mentally if the number are divisible by the given number. Write "Yes" if the number is divisible and "No" if the number is not divisible

1. Can 163 be divided by 3?
2. Can 516 be divided by 3?
3. Can 702 be divided by 3?
4. Can 918 be divided by 3?
5. Can 534 be divided by 3?
6. Can 456 be divided by 6?
7. Can 514 be divided by 6?
8. Can 684 be divided by 6?
9. Can 768 be divided by 6?
10. Can 789 be divided by 6?

3 Divisibility rules for 4, 8, 11, and 12

Consider the table below.

Numbers Divisible by			
4	8	11	12
812	1640	132 220	4416
2436	6472	264 385	7152
4860	104 120	495 946	71 556
2012	2000	979	102 744
2016	12 184	1364	118 488

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

3.1 Divisibility rule for 4

If the number formed by the last two digits of a number is divisible by 4, then the original number divisible by 4. Also, a number ending with two zeroes is always divisible by 4.

Example 14 is 812 divisible by 4?

Solution:

$12 \div 3 = 4$ (divide the last two digits by 4)

Therefore. 812 is divisible by 4. Specially, $812 \div 4$ is 203.

Example 15 The number 484 is divisible by 4 because the number formed by the last two digits 84 is divisible by 4. That is 484÷4 is 121.

Example 16 The number 6800 is divisible by 4 since it end with 2 zeroes.

3.2 Divisibility rule for 8

If the number formed by the last three digits of a number is divisible by 8, then the original number is divisible by 8, a number ending in three zeroes is always divisible by 8.

Example 17 is 12 184 is divisible by 8

Solution:

The three digits of 12 184 are 184.

$184 \div 8 = 23$

Therefore, 12 184 is divisible by 8 That is 12 184 divided by 8 is 1523

Example 18 The number 78 128 is divisible by 8 because 128÷8=16 is divisible by 8. Further, 78 128÷ = 9766.

Example 19 The number 85 000 is divisible by 8 since it ends with three zeros.

3.3 Divisibility rule for 11

A number is divisible by 11 if the difference of the sum of the digits in the odd places and the sum of those in the even places is 0 or divisible by 11.

Example 20 Is 583 divisible by 11

Solution:

The alternate digits of 583 are 5 and 3, whose sum is 5+3 =8,

The remaining digit is 8.

The difference of these two is 8-8 = 0, which is divisible by 11 so the original number 583 is divisible by 11 that is 583÷11=53.

Example 21 Is 35 794 divisible by 11?

Solution:

The alternate digits is 35 794 are 3, 7, and 4, whose sum is 3 + 7 + 4 = 14.

The remaining digits of 35 794 are 5 and 9, whose sum is 5 + 9 = 14.

The difference of these two is 14-14 = 0, which is divisible by 11.

So the original number 35 794 is divisible by 11. That is 35 794 ÷ 11 = 3254.

Example 22 The number 623 381 is divisible by 11.

Solution:

The alternate digits of 623 381 are 6,3, and 8 whose sum is 6 + 3 + 8 = 17.

The remaining digits are 2, 3, and 1 whose sum is 2 + 3 + 1 = 6.

The difference of these two sums is 17 – 6 = 11, so the original number,

623 381, is divisible by 11. To cheek, 623 381 ÷ 11 = 56 671.