Name: _____ ( ) Class: ____

INVESTIGATE DIVISIBILITY RULES

Practice 1

Objective:
To investigate and generate divisibility rules for 2 and 8

Instructions:
In this task, you are required to:
- select and apply mathematical problem-solving techniques to recognize divisibility rules for 2 and 8.
- describe the multiples of 2 and 8 as relationships or general rules
- verify whether your divisibility rules works for other examples.

Hints:
1. List some 3-digit numbers, which are multiples of 2 or 8.
2. Investigate the numbers see if you can recognize simple pattern between these numbers.
3. You might find out more than 1 rule to test if a number is completely divided by 2 or 8.
4. Describe your rule in mathematical language (words, sentence, symbol, diagrams, tables, etc.)
5. Test your rule with other bigger numbers (say 4-digit numbers, some divisible by 2 or 8 and some do not).
6. You might use calculator to avoid careless calculation mistake.
7. Present your work neatly, tidily and logically.

Suggested Solution:

Investigate and generate divisibility rules for 2

Step 1: List some small numbers that are multiples of 2 to find the pattern of divisibility rules for 2
1-digit multiples of 2: 2, 4, 6, 8, 10
2-digits multiples of 2: 10, 12, 14, 16, 18, 20…32, 34, 36, 38, 40…
3-digits multiples of 2: 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120…

By looking at the last digit of the above numbers, they are all 0, 2, 4, 6 or 8 and all the above numbers are even numbers.

Step 2: Describe patterns and rules
From the above multiples of 2, I found out two divisibility rules for 2:

1. If a number has the last digit as 0, 2, 4, 6 or 8 it must be completely divided by 2 (without remainder).
2. If a number is an even number, it must be divisible by 2.

Step 3: Test my rules with larger numbers (4-digits and 5-digits)

Examples: 1004, 3006, 5007, 7985, 40248, 50879

When applying my rules: 1004, 3006, 40248 are divisible by 2 since they are all even numbers and their last digits are 4, 6, and 8.

When applying my rules: 5007, 7985, 50879 are not divisible by 2 since they are not even numbers and their last digits are not 4, 6, and 8.

Testing: 1004÷2 =502 3006÷2=1503 40248÷2=20124

Testing: 5007÷2 =2503 R 1 7985÷2=3992 R 1 50879÷2=25439 R 1

Therefore, I have verify my rules are collect since 1004, 3006 and 40248 are divisible by 2 and they all fulfill the divisibility rules of 2. Meanwhile, 5007, 7985 and 50879 are not divisible by 2 and they don't fulfill the divisibility rules of 2, their last digits are not 0, 2, 4, 6 or 8 and they are not even numbers.

Suggested Solution:

Investigate and generate divisibility rules for 8

Step 1: List some small numbers that are multiples of 8 to find the pattern of divisibility rules for 8
1-digit multiples of 8: 8
2-digit multiples of 8: 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96
3-digit multiples of 8: 104, 112, 120, 128, 136, 144, 152, 160, 168 …

Investigation:
By looking at the last digit of the above numbers, they are all 0, 2, 4, 6 or 8 and all the above numbers are even numbers, BUT that does not mean that all even numbers are divisibility by 8, it just rules out all odd numbers.
If I add up the last 2 or even 3 digits the numbers are random, so no rule there.
Let me try 4 digit numbers:
4-digit multiples of 8: 1000, 1008, 1016, 1024, 1032 …… 1104, 1112, 1120 …

By looking at these numbers the last 3 digits are the same as the previous multiples of 8, therefore if the last 3 digits make a number that can be divided by 8 then it is a divisibility by 8 number. Success!

BUT, what about 1000? It is divisible by 8 as above. So is 2000, 3000 and 4000.

Step 2: Describe patterns and rules
From the above multiples of 8, I found out two divisibility rules for 8:

1. All odd numbers are not divisibile by 8
2. A number can be divided by 8 if the last 3 digits make a number that can be divided by 8
3. If the last 3 digits are 000 the number is divisible by 8.

Step 3: Test my rules with larger numbers (4-digits and 5-digits)

Examples: 1105, 1340, 2016, 3000, 5591, 20120

When applying my rules: 1105 and 5591 can be ruled out, they are not divisible by 8 since they are all odd numbers as their last digits are 5 and 1.

When applying my rules: 1340 is not divisibility by 8 as the last 3 digits cannot be divided by 8.

When applying my rules: 2016 and 20120 are divisible by 8 as the last 3 digits can be divided by 8.

When applying my rules: 3000 is divisible by 8 since the last 3 digits are 000.

Further Testing

Testing: 1005÷8 = 138 R 125 1340÷8=167 R 5 2016÷8=252

Testing: 3000÷8 =12 5591÷8 =698 R 875 20120÷8=2515

Therefore, I have verified my rules are collect as 2016, 3000 and 20120 are divisible by 8 and they all fulfill the divisibility rules of 8. Meanwhile, 1005, 1340 and 5591 are not divisible by 8 and they don't fulfill the divisibility rules of 8, their last 3 digits do not make a multiple of 8, are not 000 and some are not even numbers.