Rules of Divisibility

Ends in Rules

Div. by 2-	**if the last digit ends in an even number**
Div. by 5-	**if the last digit ends in 0 or 5**
Div. by 10-	**if the last digit ends in 0**

Sums Rules

Div. by 3-	**If the sum of the digits is divisible by 3**
Div. by 9-	**if the sum of the digits is divisible by 9**

Last Digits Rules

Div. by 4-	**if the last 2 digits represent a number divisible by 4**
Div. by 8-	**if the last 3 digits represent a number divisible by 8**

Combo Rules

Div. by 6-	**if the number is divisible by 2 and by 3**

Independent Rules – Wow or Why Rules

Div. by 7- **if the number represented without its units digit minus twice the units digit of the original number is divisible by 7**

Div. by 11- **if the sum of the digits in the places places that are even powers of 10 minus the sum of the digits in the places that are odd powers of 10 is divisible by 11.**

These rules of divisibility are derived from the following definition and theorems:

If *a* and *b* are integers, then *b* divides *a*, written $b|a$, if and only if there is an integer such that $a = c \cdot b$

In other words b is a factor (divisor) of a.

Theorem: $\forall a, b, d \in J$,

1) **If $d \mid a$ and $d \mid b$, then $d \mid (a + b)$**
2) **If $d \mid a$ and $d \nmid b$, then $d \nmid (a + b)$**

Theorem: $\forall a, b, d \in J$,

1) **If $d \mid a$ and $d \mid b$, then $d \mid (a - b)$**
2) **If $d \mid a$ and $d \nmid b$, then $d \nmid (a - b)$**

Theorem: $\forall a, d \in J$,

If $d \mid a$ and k is an integer, then $d \mid k \cdot a$

1. Identify factors of the following numbers using the rules of divisibility

a.	102	b.	105	c.	210
d.	1024	e.	111	f.	1080
g.	2103	h.	3012	i.	81,324
j.	1,025	k.	4,311	l.	1,134
m.	16,425	n.	42,516	o.	213

2. Write a 5 digit number that is divisible by 2, 3, 4, 5, 6, 9 and 10.

3. Write a 5 digit number that is divisible by 2, 3, 4, 5, 6, 8 and 10, but not 9