



# Divisibility Rules

Simplify your math!



# When to Use These Rules

- Divisibility rules are only useful if they make things easier.
- So if anything in this tutorial is too complicated to remember or not useful enough to remember, then *FORGET IT!*
- Memorize only what is helpful (or interesting).
- The general purpose is to find factors without doing any long division.



# Rules for 2, 4, and 8

- A number is divisible by 2 if it is even.
- A number is divisible by 4 if its last two digits form a number divisible by 4.  
(because  $4 = 2^2$ .)
- A number is divisible by 8 if its last three digits form a number divisible by 8.  
(because  $8 = 2^3$ .)
- Can you guess at the rule for 16? ( $16 = 2^4$ )



# Shortcut for 8

- Dividing three digits by 8 is still too much work! We're trying to avoid doing any long division at all. Here's a shortcut:
- A number is divisible by 8 if the hundred's place digit is even and the last two digits form a number divisible by 8. (e.g. 216, 688)
- OR if the hundred's place digit is odd and the last two digits form a number divisible by 4 but not 8. (examples: 104, 336)



# Rules for 3 and 9

- A number is divisible by 3 if the sum of its digits is divisible by 3. (e.g. 354, 822)
- A number is divisible by 9 if the sum of its digits is divisible by 9. (e.g. 549, 18036)
- If you sum the digits and you still have a number that is two digits long, just sum the digits again.



# Rule for 6 and 12

- A number is divisible by 6 if it meets the rules for both 2 and 3. (because  $2 \times 3 = 6$ )
- A number is divisible by 12 if it meets the rules for both 4 and 3. (because  $4 \times 3 = 12$ )



# Rules for 5, 10, and 25

- A number is divisible by 5 if it ends in either 5 or 0.
- A number is divisible by 10 if it ends in 0. (That's the same as saying it meets the rules for both 2 and 5.)
- A number is divisible by 25 if its last two digits are divisible by 25. (if it ends in 00, 25, 50, or 75)



# Rule for 7

- Remove the last digit and double it.
- Subtract that answer from the remaining digits.
- If the answer is divisible by 7, then so is the original number.
- Example: 301. Double last digit = 2.  
 $30 - 2 = 28$ . Since 28 is divisible by 7, so is 301.



# Rule for 11

- Start with the one's digit. Subtract the ten's digit, then add the hundred's digit...etc.
- If the final answer is a multiple of 11, then so is the original number.
- Example: 517.  $7 - 1 + 5 = 11$ . Therefore, 517 is a multiple of 11.



# Other Rules

- Every number has a rule, but some are too complicated to remember, especially if we don't use them very often.
- You can sometimes make your own rule out of other rules you know.
- Example:  $3 \times 5 = 15$ . So a number is divisible by 15 if it meets the rules for both 3 and 5.
- Can you make your own rules for 14, 18, and 20?