Divisibility

What exactly does it mean?

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“Divisible by” means…

- If you divide one number by another, the result is a whole number WITHOUT a remainder.
- Examples:

  12 6 = 2

  No remainder, so 12 is divisible by 6.

  15 5 = 3

  No remainder, so 15 is divisible by 3.

“Divisible by” means…

- Another way of saying this is that every whole number is divisible by its factors.
  - Ex. The factors of 12 are 1, 2, 3, 4, 6, 12

- Every number is divisible by itself and by 1, but most numbers are also divisible by other factors.

Ch. 1.1

Divisibility by 2, 5, and 10.

Divisibility Rules (2)

- A number can be divided by 2 if
  - the last digit is even (0, 2, 4, 6, 8)

Divisibility Rules (5)

- A number is divisible by 5 if
  - the last digit is a 5 or a 0

Divisibility Rules (10)

- A number can be divided by 10 if
  - the last digit is a 0

Ch. 1.2

Divisibility by 3 and 9.

Divisibility Rules (3)

- a number is divisible by 3 if
- the sum of the digits is 3 or a multiple of 3

Check Divisibility (3)

a) 627

b) 3278

c) 4002

d) 37782

Divisibility Rules (9)

- A number is divisible by 9 if
- the sum of all the digits will add to 9 or a multiple of 9

Check Divisibility (9)

a) 627

b) 3278

c) 4002

d) 37782

Regrouping to show Divisibility

- One way to help show divisibility is to regroup the number using place value charts.
- This sometimes makes it clear whether the number is divisible.

- Ex. 1240 =
  - 124 tens + 0 ones
- Ex. 52 255 =
  - 52 thousands + 2 hundreds + 5 tens + 5 ones

Ch. 1.3

Divisibility by 6.

Divisibility Rules (6)

- A number can be divided by 6 if

- the last digit is even **and** the sum of all the digits is 3 or a multiple of 3.

Divisibility Rules (6)

- In other words, it must be divisible by both:
- 2 and 3

Check Divisibility (6)

a) 348

b) 2987

c) 5630

d) 46 524

Ch. 1.4

Divisibility by 4 and 8.

Divisibility Rules (4)

- a number is divisible by 4 if
  - the number made by the last two digits can be divided by 4

Check Divisibility (4)

a) 3466

b) 1288

c) 39804

d) 64 684

Divisibility Rules (8)

- A number is divisible by 8 if
- the number made by the last three digits will be divisible by 8

Check Divisibility (8)

a) 3466

b) 1288

c) 39804

d) 64 684

Ch. 1.1 – 1.4

Divisibility Rules Review

Divisibility Rules Review

- 2, the last digit will be an even number
- 3, all the digits will add to a multiple of 3
- 4, the number made by the last two digits can be divided by 4
- 5, the last digit will be a 5 or 0

Divisibility Rules Review

- 6, the last digit will be even (rule for 2) and the digits will add to a multiple of 3
- 8, the number made by the last three digits will be divisible by 8

Divisibility Rules Review

- 9, the sum of the digits will be 9 or a multiple of 9
- 10, the last digit will be a 0
- There is no easy test for 7. Although some methods have been invented, however it is easier to simply do the regular division.

Divisibility Rules

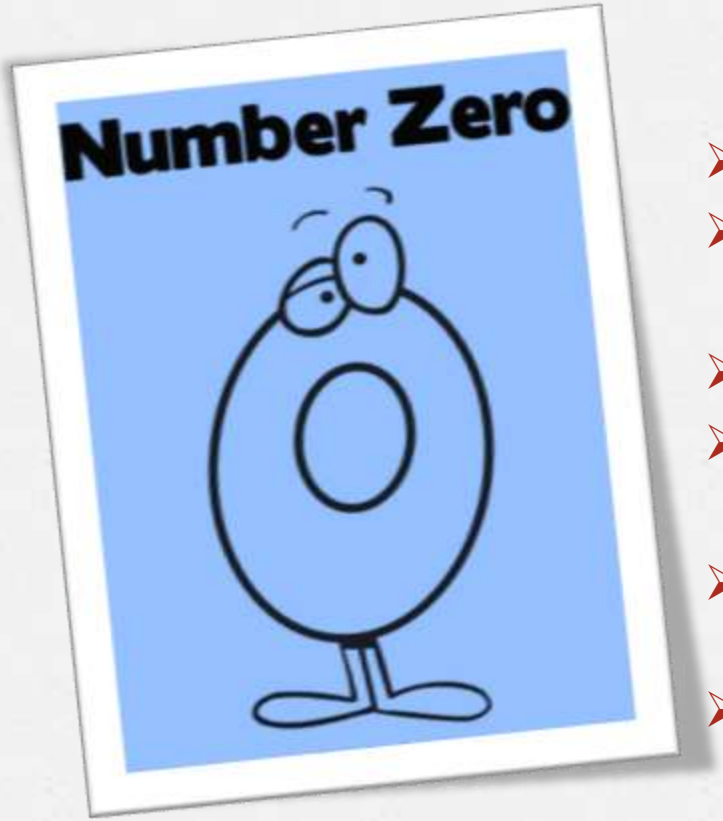
- Apply divisibility rules to these numbers:

a) 74,673,042
b) 444,555,448
c) 61,616,168
d) 732,510
e) 66,666,666
f) 179,131,590

Ch. 1.5

Divisibility by 0

Why can't you divide by zero?

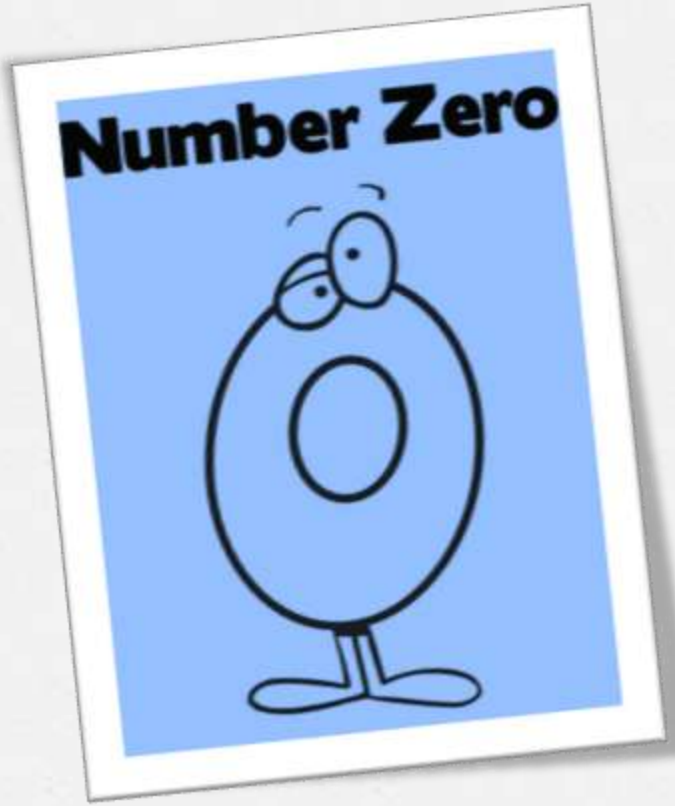


- 12 ÷ 4 = 3
- 4 x 3 = 12

- 12 ÷ 0 = ?
- ? x 0 = 12

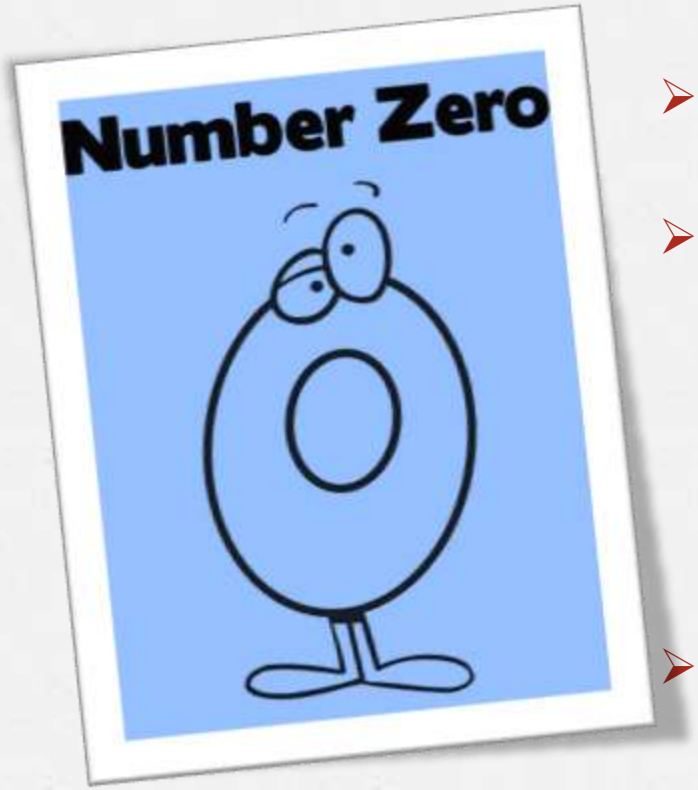
- What x 0 = 12? Is there any answer?
- What does your calculator say?

Why can't you divide by zero?



- Or, another way to think of it:
- 12 ÷ 4 = 3 means 12 divided into groups of 4 gives 3 groups of 4.
- 12 ÷ 0 = ? Means 12 divided into ? groups of 0.
- How many groups of 0 do you need to equal 12?

Why can't you divide by zero?



- Or, another way to think of it:
- What is…
  - 12 ÷ 0.1?
  - 12 ÷ 0.01?
  - 12 ÷ 0.001?
  - 12 ÷ 0.000001?
  - 12 ÷ 0.00000001?
- As you divide by numbers closer and closer to zero, what happens to the answer?