Math 191 Fundamentals of Mathematics II
8.2: Even and Odd, 8.3: Divisibility Tests, and 8.4 Prime Numbers
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Even and Odd

We say a _____ is _____ if

- it is _____ OR
- it can be _____ as _____ OR
- you can divide that number of objects into _____ with _____ OR
- you can divide that number of objects into _____ with _____.

These definitions are all _____, meaning that if one holds, they all do.

On the other hand, we say a _____ is _____ if

- it is _____ OR
- it can be _____ as _____ OR
- you can divide that number of objects into _____ with _____ OR
- you can divide that number of objects into _____ with _____.

How do we tell if a number is even or odd?

Why does this work?

Imagine representing a counting number with _____. For example, 6531 is represented by

Then we can _____ each bundle into groups of two. We do this for the bundles of 10, 100, 1000 and so on.

Therefore, we see that the powers of 10 bundles can always be divided evenly into groups of twos, and the original full number of sticks can be divided evenly into groups of twos exactly when

Divisibility Tests

That was an example of a _____, that is, a way of telling if a number is divisible by another.

Divisibility test for 2: A number is divisible by 2 if

Divisibility test for 10: A number is divisible by 10 if

Divisibility test for 5: A number is divisible by 5 if

The explanations for the divisibility tests for 10 and 5 are similar to the way we tested for whether a number is even.

Divisibility test for 3: A number is divisible by 3 if

Example: This test tells us that 248 is not divisible by 3 because $2 + 4 + 8 = 14$ is not divisible by 3.

Why does this work? Again think of our number as being represented by base-ten bundles of sticks. So 248 is represented by

Now if we try to divide these bundles into _____, the bundles of 10 will each

The bundles of 100 will each

If we combine the leftover sticks from each bundle with the individual sticks from the ones place, we have _____ in total. If these sticks can _____ _____, the original number is _____, and if not, _____.

This works for any number because the bundles of powers of ten will always have one stick left over when divided into groups of three.

A more algebraic explanation is, if the number we're testing is $ABCD$,

This tells us that $ABCD$ is divisible by 3 if _____ and it is not divisible by 3 if _____.

Divisibility test for 9: A number is divisible by 9 if

Divisibility test for 4: A number is divisible by 4 if

Prime Numbers

A _____ is a _____ other than _____ that are _____. The opposite of prime is _____, and a _____ is a counting number other than _____ that is _____.

Primes are the building blocks of the counting numbers because

In fact, every counting number greater than 1

This is called the _____.

We can find prime numbers using the Sieve of Eratosthanes. The method is:

(1) _____ the number _____, and _____ every second number after that.

(2) _____ the _____ which is _____. Cross out every _____ after 3.

(3) _____ the _____ and cross out every _____ after this.

(4) Repeat this process, circling the _____ N that _____ and cross out every _____ number after N, until every number has either been circled or crossed out.

The circled numbers are the primes.

	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40