

Even and Odd Numbers

Whole numbers are the counting numbers and the number 0.

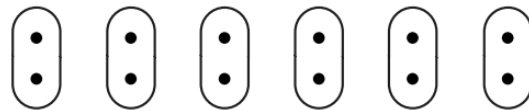
0, 1, 2, 3, 4, 5, 6, ...

Counting by twos, we say the numbers

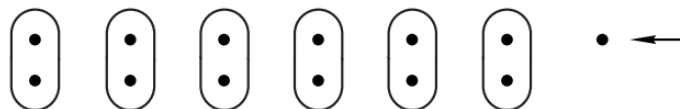
2, 4, 6, 8, 10, 12, 14, 16, 18, 20, ...

This is a special sequence. These numbers are **even numbers**. The number 0 is also an even number. The sequence of even numbers continues without end. The numbers 36 and 756 and 148,567,896,094 are all even. We can tell whether a whole number is even by looking at the last digit of the number. If the last digit is even, then the number is even. So even numbers end with 0, 2, 4, 6, or 8.

An even number of objects can be arranged in pairs. Twelve is an even number. Here we show 12 dots arranged in six pairs. Notice that every dot has a partner.



Next we show 13 dots arranged in pairs. We find that there is a dot that does not have a partner. So 13 is not even.



The whole numbers that are not even are **odd**. We can make a list of odd numbers by counting up by twos from the number 1. Odd numbers form this sequence:

1, 3, 5, 7, 9, 11, 13, 15, 17, ...

If the last digit of a number is 1, 3, 5, 7, or 9, then the number is odd. All whole numbers are either odd or even.

Example 1 Which of these numbers is even?

3586 2345 2223

Solution Even numbers are the numbers we say when counting by twos. We can see whether a number is odd or even by looking at the last digit of the number. If the last digit is even, then the number is even. The last digits of these three numbers are 6, 5, and 3, respectively. Since 6 is even and 5 and 3 are not, the only even number in the list is **3586**.

Example 2 Which of these numbers is not odd?

123,456 654,321 353,535

Solution All whole numbers are either odd or even. A number that is not odd is even. The last digits of these numbers are 6, 1, and 5, respectively. Since 6 is even (not odd), the number that is not odd is **123,456**.

Half of an even number is a whole number. We know this because an even number of objects can be separated into two equal groups. However, half of an odd number is not a whole number. If an odd number of objects is divided into two equal groups, then one of the objects will be broken in half. These two stories illustrate dividing an even number in half and dividing an odd number in half:

Sherry has 6 cookies to share with Leticia. If Sherry shares the cookies equally, each girl will have 3 cookies.

Herman has 5 cookies to share with Ivan. If Herman shares the cookies equally, each boy will have $2\frac{1}{2}$ cookies.

Lesson Practice

Describe each number as odd or even:

- a. 364
- b. 94,675
- c. 4,677
- d. 352,578
- e. The fruits in the basket are separated into two groups. The same number of fruits were in each group. Was the number of fruits in the basket an odd number or an even number?
- f. Kay has four chocolates to share with William. If Kay shares the cookies equally, how many chocolates will each person have?

Written Practice

Distributed and Integrated

1. If a whole number is not even, then what is it?

What is the last digit of each number?

2. 26,545,343
3. 349,876,523

Describe each number as odd or even:

4. 234
5. 875

6. Which of these numbers is even?

7654

8757

9551

7. Which of these numbers is not even?

8764

8657

9876

Write the next three terms in each counting sequence:

8. 6, 9, 12, __, __, __, ...

9. 18, 17, 16, __, __, __, ...

10. 45, 48, 51, __, __, __, ...

11. 32, 36, 40, __, __, __, ...

12. 11, 13, 15, __, __, __, ...

13. 54, 44, 34, __, __, __, ...

14. 63, 54, 45, __, __, __, ...

15. 24, 36, 48, __, __, __, ...

16. 84, 76, 68, __, __, __, ...

17. 5, 10, 15, __, __, __, ...

18. The students in the class were divided into two groups. An equal number of students were in each group. Which of the following could not be the total number of students in the class?

a. 25

b. 26

c. 28

19. What number is half of 7?

20. Which of these numbers is a whole number?
- a. half of 3 b. half of 7 c. half of 10