Lesson # 93

Binary Numbers – Base 2

Date

The Binary or Base-Two Number System

Converting between the two number systems.

Homeschool Honor Roll
Learn ~ Persevere ~ Succeed

Pre-Algebra and Geometry I
Wendy Harper
www.HsHonorRoll.com

Lesson # 93

Binary Numbers – Base 2

Date

Warmup:

1. Write the names of each place value in the decimal number system.

_____ _____ _____ _____ ones

2. Simplify:

10^0 = _____

10^1 = _____

10^2 = _____

10^3 = _____

10^4 = _____

3. Simplify:

2^0 = _____

2^1 = _____

2^2 = _____

2^3 = _____

2^4 = _____

2^5 = _____

2^6 = _____

2^7 = _____

I. The Base-2 or Binary Number System

The digits in the base-10 number system are:_____

The digits in the base-2 number system are:_____

Why is the number 234 read two hundred thirty-four? _____

_____

_____ _____ _____

Base-10 Number System	Base-2 Number System

To convert binary numbers to decimal numbers:

2^5	2^4	2^3	2^2	2^1	2^0
32	16	8	4	2	1

When there is a 1, add the place value to the final answer.

Determine the decimal value of the binary number 1011

Determine the decimal value of the binary number 10001

4. Fill in the blanks with numbers to make a true statement.

The binary number system has _____ digits, they are _____ and _____.

5. When a place value for a base-2 number has a _____, meaning it is _____. Use the place value in the number.

6. Determine the decimal value of the binary number 11001

II. Writing Decimal Numbers as a Binary or Base-2 Number

To convert decimal numbers to binary numbers:

1. Determine the largest place value that is less than or equal to the decimal number. Write a one in this place value.
2. Subtract the place value from the decimal number.
3. Write a one in the largest place value possible with the remaining amount, then subtract it from the remaining decimal amount
4. Continue this process until the remaining amount is zero.

2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
256	128	64	32	16	8	4	2	1

2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
256	128	64	32	16	8	4	2	1

Write the decimal number 17 as a base-2 number.

Write the decimal number 75 as a base-2 number.

Complete the table by writing the decimal numbers as binary numbers.

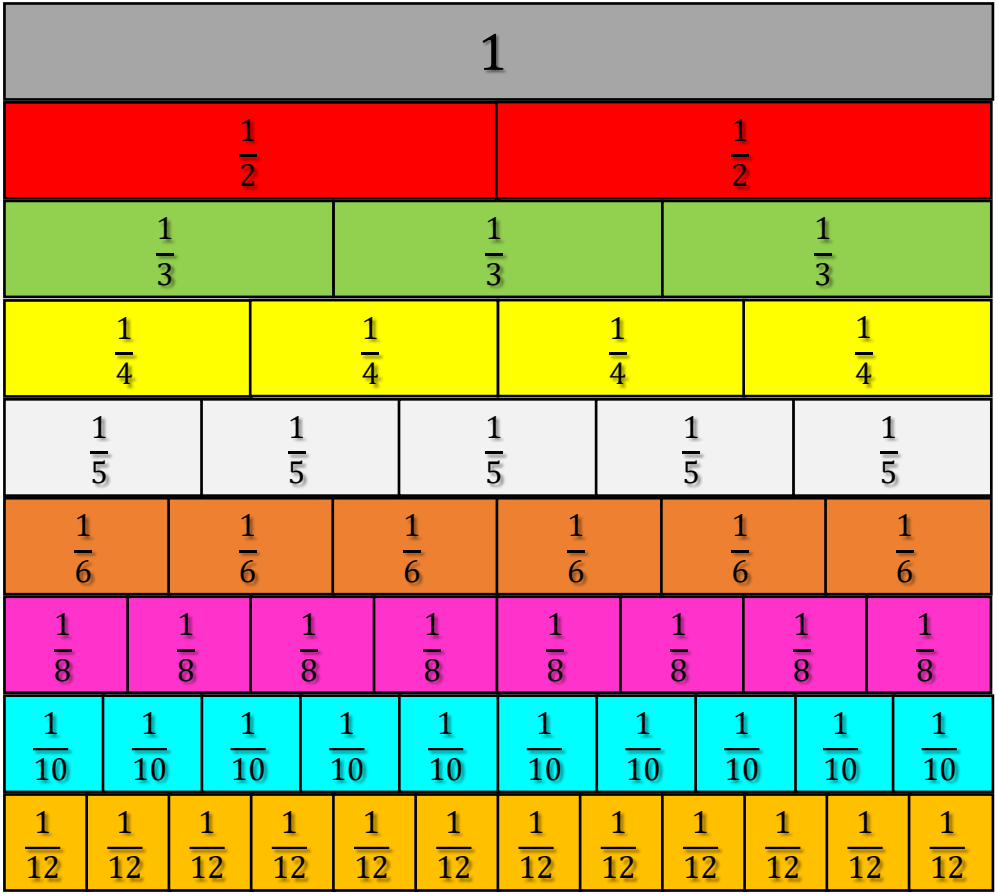
Decimal Number	Work Area	Binary Number
2		
3		**8.**
4		**9.**
5		**10.**
6		**11.**
7		**12.**

Complete the table by writing the decimal numbers as binary numbers.

Decimal Number	Work Area	Binary Number
8		**13.**
9		**14.**
10		**15.**
11		**16.**
12		**17.**

18. Convert the decimal number 26 to a base-2 number.

19. Anna wants to express her math test score as a binary number. She scored a 100%. Write 100 as a binary number.


1
1/2 1/2
1/3 1/3 1/3
1/4 1/4 1/4 1/4
1/5 1/5 1/5 1/5 1/5
1/6 1/6 1/6 1/6 1/6 1/6
1/8 1/8 1/8 1/8 1/8 1/8 1/8 1/8
1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10 1/10
1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12