

Amazing



Birthday Cards

1 3 5 7

9 11 13 15

17 19 21 23

25 27 29 31

16 17 18 19

20 21 22 23

24 25 26 27

28 29 30 31



Amazing Birthday Cards

Birthday Cards Number Pattern

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

_____	_____	_____	_____
_____	_____	_____	_____
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_____	_____	_____	_____

_____	_____	_____	_____
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_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____





Amazing Birthday Cards

Birthday Cards Mathematics

The Base 2 Number System

The Amazing Birthday Card Activity works because the person demonstrating the activity (whether she knows it or not) is using the base 2 number system to identify the unknown number. In our base 10 number system each place value column is worth ten times the previous column and the highest number that can be used in a column in the base 10 system is a nine. In the base 2 system each place value column is worth two times the previous column and the highest number that can be used in a column is a one.

As you complete the chart below pay especially close attention to the way that the first five numbers are made in the base 2 system. Placing a “1” under a column in the base two number chart is the same as saying “yes” on the birthday card that has that place value number in the top left-hand corner of the card. Placing a “0” in a column is the same as saying “no” when that number is in the top left-hand corner of a card.

Base Ten			Number	Base Two						
100	10	1		64	32	16	8	4	2	1
			3							
			5							
			8							
			25							
			31							
			43							
			75							
			100							





Amazing Birthday Cards

Teacher Tips (1 of 2)

Lesson Description: Amazing Birthday Cards is an activity in which students respond “yes” or “no” to five numbered cards and the teacher uses mathematical patterns to determine the birthdays of these students based on their responses. Students discover the mathematical pattern that enables the teacher to identify the birthdays and they come to understand that this activity is based upon the base 2 number system. Comparing our base 10 number system to the base 2 number system also deepens student understanding of our system. Amazing Birthday Cards never ceases to amaze the students!

Math Content: Number Patterns, Logic, Base 2 Number System, Other Number Systems

Time Required: 1 Class Period (or small parts of several class periods)

Amazing Birthday Cards includes:

- * 1 Amazing Birthday Cards Teacher Notes page
- * 5 Amazing Birthday Cards Numbered Activity Cards
- * 1 Amazing Birthday Cards Number Pattern worksheet
- * 2 Amazing Birthday Cards Mathematics worksheets
- * 2 Amazing Birthday Cards Mathematics worksheet Answer Keys
- * 2 Amazing Birthday Cards Teacher Tips pages
- * 1 Amazing Birthday Cards Cover Sheet

14 pages in all!

Materials Needed: None

Suggested Grade Level: 5th - 8th

Teacher Testimonial:

Amazing Birthday Cards is an activity I use every year. The students enjoy participating in this activity and are amazed that by simply saying “yes” or “no” in response to the five cards that I hold up, I can tell them their birthdays. I only take a few of the many volunteers I have each day, thereby building up the suspense before I reveal the mathematical basis for my success in the activity. (Some students think that I actually take my class rosters home and memorize 200+ birthdays each year! As if I had time for that!) The Birthday Cards Number Pattern worksheet allows the students to generate the number pattern themselves and try it out on their friends and family.

Teacher Tips:

- * Amazing Birthday Cards is an activity that can be divided into three parts. The teacher may choose to use one or all of the parts of this activity depending upon the time available and the mathematical objectives of the teacher. As the teacher, you may just want to present the activity to your students without having them delve into the mathematical basis for its success. I always want students to understand the mathematical basis of this activity so I have them complete the Number Pattern worksheet. This takes just a few minutes. As an extension, a quick study of different base systems helps to clarify student thinking about the activity and our own base 10 number system.

