| First Name: _____ | Last Name: _____ | Grade: _____ |
| Teacher: _____ | Parent's email: _____ | |

Birthdays

Welcome to Math Challenge #14. Birthdays are celebrated in most cultures. We often celebrate birthdays with a gift or a party. In this challenge, you are invited to solve math problems involving birthdays**.**

Kinder & First Grade: solve <u>at least</u> 4 problems.
Second & Third Grade: solve <u>at least</u> 7 problems.
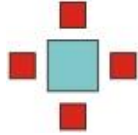**Fourth Grade and above: solve <u>at least</u> 12 problems.**

Answer

1.	Today is Lindsey's birthday. Her mom placed some candles on her birthday cake. How old is Lindsey today?	*8 years old*

2.	Lindsey received a painting kit, a book, 3 dolls, 2 balls, 3 stuffed animals and 2 candy bars as birthday presents. How many presents did she get?	*12*

Problems 3 through 7 are related. They are about Hannah, who is turning 9 years old. Her family is preparing for the birthday celebration.

3.	Hannah's birthday was on Thursday. Her brother's birthday was 9 days earlier. What day of the week was her brother's birthday?	*Tuesday*

4.	Hannah's mom is making a 'Happy Birthday' decoration and painting one letter each day. She painted the first letter on Wednesday. On what day will she complete painting the decoration?	*Monday*

5.	Hannah's parents set up 9 tables for the birthday party. Each table can accommodate 4 chairs around it. When Hannah, her brother, and all their guests sat down, there were still 7 empty seats. How many **guests** came to the party? 36 – 7 – 2 = 27	*27*

6.	Hannah's cousin, Andy, will celebrate his 11th birthday in 20 days. If today is Sunday, what day is Andy's birthday? In 7, 14, and 21 days it will be Sunday again, so in 20 days it will be Saturday	*Saturday*

7.	In 14 years, Hannah's mom will celebrate her 50th birthday. How old was Hannah's mom the year Hannah was born? 50 – 14 – 9 = 27 years old.	*27 [years old]*

8.	You are at a birthday party and the cake is brought in. The birthday candles on the cake are in a growing pattern: **red**, yellow; **red**, yellow, blue; **red**, yellow, blue, green; … The pattern continues, adding pink, orange, purple, and white candles. How many total candles are on the cake if the last candle is white? *The pattern would go as follow:* *R, Y, R, Y, B, R, Y, B, G, R, Y, B, G, P, R, Y, B, G, P, O, R, Y, B, G, P, O, P, R, Y, B, G, P, O, P, W* *Or 2 + 3 + 4 + 5 + 6 + 7 + 8 = 35*	*35*
9.	Loretta's aunt asked Loretta to guess her age. These are the clues she gave: • I'm older than you. • My age is an odd number of years. • I am less than a hundred years old. • I am older than people who are allowed to drive in Washington, which is 16. • My age is less than the answer to half of 54. • The sum of its digits is 7. How old is Loretta's aunt?	*25*
10.	Dallas had some money. Then his grandfather gave him $50 as a birthday gift. After spending $72 on biking gears, he had $65 left. How much money did he have at first? *Work backward:* *1) Before spending the $72 on biking gears, he must have $65 + $72 = $137.* *2) Before his grandfather gave him $50, he must have only $137 – $50 = $87*	*$87*
11.	On her 75th birthday, Grandma Gennie received a very expensive pearl necklace. The necklace has 33 pearls with the largest and most valuable in the middle. Each pearl, starting from each end through the 8th, is worth $450. The 9th pearl through 16th, are worth $650 each. What is the value of the middle pearl, if the whole necklace cost $20,000? *The value of the middle pearl: $20,000 – (8 x $450) x 2 + (8 x $650) x 2 = $2,400*	*$2,400*
12.	After Marie's birthday party, there were $2\frac{2}{3}$ pizzas left. Marie gave half of the leftover pizza to her friend to take home. Marie ate $\frac{1}{4}$ of what was left. How much pizza did she eat? *Half of the leftover: $2\frac{2}{3} \div 2 = 1\frac{1}{3}$. One-fourth of $1\frac{1}{3} = \frac{1}{3}$. She ate $\frac{1}{3}$ of a pizza*	$\frac{1}{3}$ *of a pizza*
13.	When asked about his birthday, Mr. Jacobson said, "The day before yesterday I was only 25 and next year I will turn 28." This is true only one day in a year - when was Mr. Jacobson born? *He must have been born on Dec 31 and spoke about it on January 1st*	*Dec 31*
14.	At Alfanso's birthday party, his guests can build their own dessert. They start by choosing either a waffle cone, sugar cone, or a bowl. Then they choose from the following ice cream flavors: vanilla, chocolate, strawberry, or rocky road. Next, they add either chocolate sauce or sprinkles. Finally, they can add a cherry on top if they wish. How many different dessert combinations are possible? *3x4x2x2=48.*	*48*
15.	Tony's great grandmother was born on February 29th, 1920. Her first "true birthday" was February 29th, 1924. By today, how many "true birthdays" has his grandmother celebrated? *(2019-1920)/4=24 R 3. So, there's 24 true birthdays his grandmother celebrated.*	*24 [true birthdays]*

16.	Zack was born on the Nth day of March. From **your age** in years **(yes, your age!)**, you can calculate N and therefore find out Zack's birthday. Follow these steps:
	    1) Make a 6-digit number by writing your age three times. For example, if you are 23 years old, you would write 232323.
	    2) Divide your 6-digit number by 1443.
	    3) Add 133 to that answer.
	    4) Divide that result by 7.
	    5) From that answer, subtract your age in years. Your final answer is N.
	When is Zack's birthday?
		March 19

17.	Kari is celebrating her birthday today. She is twice as old as Lisa. Three years from now, the sum of their ages will be 42. How old is Kari?	*24 [years old]*

Now   in three years

Kari: ▭▭ ▭▭ +3

Lisa: ▭ ▭ +3   42

To find each unit: (42 – 3 – 3)/3 = 12
Lisa: 1 unit = 12 years old.
Kari is twice as old as Lisa; therefore, Kari is 2 x 12 = 24 years old.

Another way: set up an equation to solve x (Lisa's age).
$(2x + 3) + (x + 3) = 42$
$3x + 6 = 42$
$3x = 36 \rightarrow x = 12$

18.	A class has 37 students. If I draw names one at a time, how many names must I draw to be certain that a) at least two of the names drawn have the same birthday month? b) at least three of the names drawn have the same birthday month? This is an example of the **Pigeonhole Principle.** It can easily be modeled with a calendar and a set of student names. a) Once 12 names have been drawn, if each has a unique birthday month, the next name guarantees a match. b) Again, if 24 names have been drawn and they are all paired, then the 25th name will produce a triple.	*a. 13* *b. 25*

Solution is available on May 10, 2019 at www.mathinaction.org