November 10th Puzzle

Math History-Mystery Puzzle

Debut of Sesame Street

BY DAVID B. SPANGLER
AND KAREN S. CORDELL

Print & Digital

Contents

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The ActiveMath Team

November 10th Puzzle

Math History-Mystery Puzzle

Send all inquiries to:
ActiveMath, Inc.
2720 Dundee Road, PMB 146
Northbrook, IL 60062

Activemath39@yahoo.com
(847) 722–8690

Credits

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November 10: Debut of *Sesame Street*

On **November 10** of the *Mystery Year*, ***Sesame Street*, debuted on national public television stations.** It was the first preschool television program to base its content on educational goals and extensive research. The shows' content was brought to life through **Jim Henson's** Muppets, along with human actors. Through the use of humor, fast-moving action, short films, and music to engage young viewers, *Sesame Street*'s curriculum has expanded to include more relevant topics such as relationships, ethics, emotions, and cultural themes.

Sesame Street has won almost 200 Emmy Awards. The show currently reaches about 150 million children across the globe.

Big Bird,
with former First Lady, Barbara Bush (1989)

Mystery Year

Use the clues on the next page to find the *Mystery Year*.

Thousands	Hundreds	Tens	Ones

November 10 CLUES

Use these clues to find the *Mystery Year:*

- A "batch" of cookies is the quantity of cookies that *one recipe* produces. (For example, a batch might consist of 15 cookies.)

  Cookie Monster **has made $2\frac{2}{3}$ batches of chocolate chip cookies.**

  He then counted that he had 24 cookies in all.

  How many cookies are in *one* of his batches? This number is the ones digit of the *Mystery Year.*

- **Interesting facts about *Big Bird:* He is a flightless "canary" that is 8 ft 2 in. tall, his address is $123\frac{1}{2}$ Sesame Street, and he is a ___-year-old who questions everything.**

  The *area* of a right triangle, with legs 3 inches and 4 inches, is *Big Bird*'s age. (Note: The *legs* of a right triangle are the sides that form the right angle in the right triangle.)

  Big Bird*'s age is the tens digit of the *Mystery Year.

- ***The Count*** **loves to count things. He has 5 marbles and then starts to add groups of 3 marbles each to the five he started with. After adding some groups, he stops and counts all the marbles in his collection and says, "I NOW have 32 marbles!" How many groups of 3 marbles each did *The Count* add to his original 5 marbles?**

  The number of groups is the hundreds digit of the *Mystery Year.*

- **Caroll Spinney, American puppeteer and cartoonist, played the parts of *Big Bird* and *Oscar the Grouch* from *Sesame Street's* debut through 2018. *Sesame Street's* debut was $(1 + 2 \times 3)^{(3-(2-1))}$ years prior to 2018.**

  Evaluate the above expression to confirm the *Mystery Year.*

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_____	_____	_____	_____
Thousands	Hundreds	Tens	Ones

How to Use

Math History-Mystery Puzzles

Warm-up Activities for Middle School

Each puzzle begins with historical information about a particular person or event. The topics selected reflect the diverse nature of our society. Students use the clues that follow to determine the *Mystery Year* when the event occurred. In some cases, data needed to solve a clue is contained within the historical information. This reinforces what students experience in the real world: The data needed to solve a problem may not all appear in the same place.

The math content of the warm-ups is based on a ***spiral review of skills***. During the early months of the school year, they provide important math review skills drawn from Grades 5 and 6. As the year progresses, the skills advance to those of Grades 6 and 7 — with an abundance of real-world connections related to the contexts of the events. Towards the end of the school year, math skills from Grade 8 are included that can also be handled intuitively by students in earlier grades. It should be noted that many **high-school teachers** are using the puzzles with success to provide students with important skills review in context.

Students focus on a number of different math skills and concepts in the same warm-up. The spiral review is intended to help students keep their skills sharp. Also, the clues are intended to provide day-to-day mathematical variety. So, while students may be studying in unit, on, say, percent, they may be solving clues that review fractions or measurement.

Each clue produces a *digit* of the *Mystery Year.* As the clue is solved, students record the digit in the box to the right of the clue and into the place-value chart for the *Mystery Year* at the bottom of the first page of the puzzle. **The final clue with each puzzle provides a "check" for determining the correct *Mystery Year.***

Provided with each puzzle are extensive **Teacher Notes with Sample Solution Strategies** that include valuable teacher information that address the following:

- The specific **Common Core State Standards for Mathematical Content** that are addressed in the clues. When a clue employs skills that are not directly addressed by a Standard for Mathematical Content, one or more **Standards for Mathematical Practice** are cited.
- **Step-by-step solutions** designed so thoroughly that parents working with students at home are equipped to help their child. *Alternative solution strategies* are detailed to illustrate various paths to the solution.
- **Math Notes** that provide additional **mathematical background** for the teacher. This includes various pedagogical insights that include an analysis of related ***common student misconceptions*** **with** ***intervention suggestions.***
- **Extensions** that allow advanced students to take the content to the next level.
- **Multicultural Notes** to bring to light the contributions from various cultures related to the discovery / development of the content of the puzzle.
- **Historical Notes** to provide further context for the theme of the puzzle. Often these notes delve into **social justice issues** related to the theme of the puzzle. Included are links to **video clips** and uplifting **quotes**.

Even though we do not provide a separate puzzle for each day of a given week, we view the puzzles as being ***daily puzzles*** because of the extensive activities and extensions that are provided with the Teacher Notes that may be used during the other days of the week.

To download a FREE, more extensive document describing **How to Use** the puzzles, go to https://www.teacherspayteachers.com/Product/FREE-How-to-Use-Math-History-Mystery-Puzzles-for-Middle-School-manual-7037642

Teacher Notes and Sample Solution Strategies for November 10

November 10: Debut of *Sesame Street*

CCSS: 6.RP.3, 6.NS.1, 6.G.1, 7.EE.4a, MP7 (Look for and Make Sense of Structure), 6.EE.1, 6.EE.2.c.

Mystery Year: **1969**

- This clue involves working with a unit rate of a "batch" of cookies. Students may solve this by reasoning or algebraically (with an equation or a proportion).
  - *Using reasoning:* Students may reason that if it takes 24 cookies to make up $2\frac{2}{3}$ batches, then to find out how many cookies are in *one* batch, they need to divide 24 by $2\frac{2}{3}$:

    $$24 \div 2\frac{2}{3} = 24 \div \frac{8}{3} = 24 \times \frac{3}{8} = \frac{24 \times 3}{8} = 3 \times 3, \text{ or } 9$$

    The number of cookies in one batch is 9, so the ones digit of the *Mystery Year* is 9.
  - *Using a proportion:* Let x = the number of cookies in one batch.

    $$\frac{24 \text{ cookies}}{2\frac{2}{3} \text{ batches}} = \frac{x \text{ cookies}}{1 \text{ batch}}$$

    $24 = (2\frac{2}{3})x$ Cross multiply.

    $24 = \frac{8}{3}x$ Express the coefficient of x as an improper fraction.

    $24 \div \frac{8}{3} = \frac{8}{3}x \div \frac{8}{3}$ Divide each side by $\frac{8}{3}$ to isolate the variable.

    $24 \times \frac{3}{8} = x$ Invert and multiply on the left side. On the right side, $\frac{8}{3} \div \frac{8}{3} = 1$, so the coefficient of x is 1.

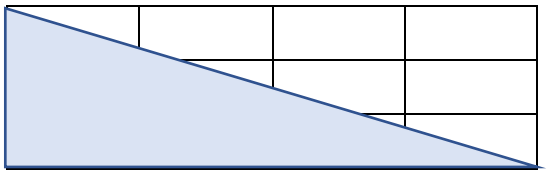
    $\frac{24 \times 3}{8} = x$ Multiply.

    $9 = x$ Simplify.

    The number of cookies in one batch is 9, so the ones digit of the *Mystery Year* is 9.

  Math Note: You may want to provide additional examples if students have difficulty processing the information in this clue. For example:
  I've baked 2 batches of cookies, and I have 20 cookies total. How many cookies are in 1 batch? (10) *How did you determine that?* (I divided the total number of cookies by the number of batches.)
- Students may approach solving this clue by relating a right triangle to half of a related rectangle, or by applying the formula for the area of a triangle.
  - *Relating a right triangle to half the area of a related rectangle:* By sketching a rectangle with length of 4 in. and width of 3 in., and drawing a *diagonal* through it, students can envision the right triangle being described in the clue, with *legs* of 4 in. and 3 in. By applying the area model for the region enclosed in the rectangle, students can multiply the number of rows (3) with the number of columns (4) to determine the area of the rectangle (12 in^2). Then, students can see that the area of a right triangle is exactly half of that area, or 6 in^2. Because *Big Bird*'s age

represented by the area of this triangle is 6, the tens digit of the *Mystery Year* is 6.



Rectangle: 3 rows by 4 columns = 12 units^2

Right triangle: Half of the region, or 6 units^2

- *Applying the formula for the area of a triangle:*

  $A = \frac{1}{2} \times b \times h$ OR $A = \frac{b \times h}{2}$

  $A = \frac{1}{2} \times 4 \text{ in.} \times 3 \text{ in.}$ Replace the base and height with 4 in. and 3 in.

  $A = 6 \text{ in}^2$ Multiply.

  Big Bird's age is represented by the measure of area of this triangle, so the tens digit of the *Mystery Year* is 6.

Math Notes: Some students multiply the measure of length and width without attending to the details. Here, the clue is asking for the area of the right triangle, not the rectangle. Encourage students to review the details of the clue and sketch the rectangle. You can further scaffold by asking: *What portion of the rectangle is the right triangle occupying?* (half). This should help cement understanding as to WHY the fraction $\frac{1}{2}$ is in the area formula for a triangle. You can also take advantage of the relevant vocabulary that applies to this clue and provide a review of such terms as: *right triangle, legs, hypotenuse, height/altitude, diagonal,* and *area* versus *perimeter.*

- Students may approach solving this clue by counting/reasoning or algebraically.
  - *By counting/reasoning:* Some students may count up from 5 by skip-counting in groups of 3. For example, 5 + 3 = 8, 8 + 3 = 11, 11 + 3 = 14, and so on, until they reach 32. Then, they would need to count how many times they skip-counted to end up at 32, which is 9 times. Additionally, students may find the use of a table to organize their reasoning to be helpful:

Beginning Number of marbles	Groups of 3 being added	Total Number of marbles
5	1 • (3) = 3	8
5	2 • (3) = 6	11
5	3 • (3) = 9	14
5	4 • (3) = 12	17
…	…	…
5	**9** • (3) = 27	32

  Because 9 is the number of groups of 3 marbles each that *The Count* added to his original 5 marbles, the hundreds digit of the *Mystery Year* is 9.
  - *Using algebra:* Students who observe a pattern, or for students with prior experience translating a linear scenario such as this into an equation and solving, may consider the 5 original marbles as *The Count*'s "starting amount" (or, *y-intercept,* if graphed), and the groups of 3 marbles each being added each time as the constant rate of change (or, *slope* of the line being represented by this scenario). This leads to the linear equation, $\mathbf{5 + 3x = 32}$. Solving this equation involves 2 steps: (1) subtract 5 from each side, and (2) divide each side by 3. The solution is 9. Because 9 is the number of groups of 3 marbles each that *The Count*

added to his original 5 marbles, the hundreds digit of the *Mystery Year* is 9.

Extension: Pose the following problem to students:

The Count *counted the number of people who attended a school soccer game on Monday.*

At Tuesday's game, he counted that only half as many fans were in attendance as compared to Monday's game.

On Wednesday, he counted that only a third as many fans were there as compared to Tuesday.

On Thursday, he counted that only 15 fans were in attendance. This was only a fourth as many who had attended on Wednesday.

How many fans attended the game on Monday?

Solution: An efficient problem-solving strategy to use is to *work backwards.*

Because the 15 fans at Thursday's game represent a fourth as many who attended on Wednesday, we know that 4×15, or 60 fans attended on Wednesday. Likewise, because the 60 fans who attended Wednesday represent a third as many who attended on Tuesday, we know that 3×60, or 180 fans attended on Tuesday. Finally, because the 180 fans who attended on Tuesday respresent half as many fans who attended on Monday, we know that 2×180, or 360 fans attended on Monday.

- The expression is evaluated as follows:

$(1 + 2 \times 3)^{(3-(2-1))}$

$(1 + 2 \times 3)^2$ Follow order of operations for the exponent: First subtract the exponent 1 from the exponent 2 in the innermost parentheses. Then subtract 1 from 3 to obtain the exponent 2.

7^2 Follow the order of operations for the base. First multiply 2 and 3. Then add 1 to obtain 7.

49 Find the square of 7.

Because the debut of *Sesame Street* occurred 49 years prior to 2018, subtract 49 from 2018 to find the year of the debut: 2018 – 49 = 1969. The digits already determined in the *Mystery Year* are __ 9 6 9, so 1969 is confirmed as the *Mystery Year*.

Historical Notes

Co-creator/producer Joan Cooney stated, "From the beginning, we — the planners of the project — designed the show as an experimental research project with educational advisers, researchers, and television producers collaborating as equal partners." *Sesame Street*'s positive educational impact on young viewers and long-standing effect on American culture has been documented by over 1,000 research studies. As a result, the success of *Sesame Street* has helped lead the way for greater children's television reform.

A key goal of the *Sesame Street* creators was to prepare young children for school. The creators were especially interested in reaching children from low-income families by using modeling, repetition, and humor to meet their educational needs. They made changes in the show's content to increase their viewers' attention and to increase its appeal, and encouraged "co-viewing" to encourage parents and older children to watch the show by including humor at a more sophisticated level, cultural references, and celebrity guest appearances. The show also recognized the need for more attention be given to children's developing affective skills. As a result, program themes that focused

on social competence, tolerance of diversity, and nonaggressive ways of resolving conflict were integrated into the format of the show.

At time of the show's 50th anniversary in 2019, *Sesame Street* had produced over 4,500 episodes, 35 TV specials, 200 home videos, and 180 albums. It has almost 5 million subscribers on its YouTube channel.

More about *Sesame Street's* Main Protagonist, *Big Bird:* On May 21, 1990, *Big Bird* appeared at **Jim Henson's** memorial service in New York City, singing *Kermit the Frog*'s signature song, "Bein' Green." (Jim Henson had performed Kermit until his death, which was on May 16, 1990 due to bacterial pneumonia.) Performer Caroll Spinney nearly broke down several times during the deeply touching performance, which was later described by *Life* magazine as "an epic and almost unbearably moving event." Watch it here: https://www.youtube.com/watch?time_continue=56&v=pl-esE_zZO8&feature=emb_title

Jim Henson

In 2000, *Big Bird* was named a Living Legend by the United States Library of Congress.

Among the honorees being acknowledged at the 2019 Kennedy Center Honors was *Sesame Street*, the first television program to receive this honor. Coincidentally, it was filmed on the day Caroll Spinney died (on December 8). Matt Vogel, Spinney's understudy, made an appearance in full regalia as *Big Bird* for the event. (Vogel was Spinney's understudy from 1998 until 2018, when he assumed the full-time role of *Big Bird*.)

Big Bird and Friends,
at the Kennedy Center Honors (2019

Article: "Big Bird Has 4,000 Feathers: 21 Fun Facts About *Sesame Street* That Will Blow Your Mind": https://parade.com/840056/debrawallace/big-bird-has-4000-feathers-21-things-about-sesame-street-that-will-blow-your-mind/

Video: John Legend singing "Come Together" song with characters from Sesame Street: https://www.sesamestreet.org/videos?vid=25701

"Rather than saying, 'I can't do this,' *Sesame Street* encourages us to say, 'I can't do this... yet!' That one word changes everything. It emphasizes that your capability isn't fixed. It highlights the reality that our brain is like a muscle."
—***Sal Khan*** *(1976–), American educator and founder of Khan Academy*

"*Sesame Street* was built around a single, breakthrough insight: **that if you can hold the attention of children, you can educate them."**
—***Malcolm Gladwell*** *(1963–), Canadian journalist, author, and public speaker*

"My hope still is to leave the world a bit better than when I got here."
"The most sophisticated people I know — inside they are all children."
—***Jim Henson*** *(1936–1990), American puppeteer, animator, cartoonist, actor, inventor, composer, filmmaker and screenwriter*