

Math Reader

WINNING MATH!



Math Reader

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Executive Editor: Hiroko K. Warshauer

Senior Editors: Terry McCabe, Max Warshauer,
Eugene Curtin

Special Writers: Tivadar Divéki, Jean Davis,
Laura Chavkin, Kevin Jones

Design: Jennifer LeGrévellec, Robert A. Gonzalez,
Amy Warshauer

Final Editing and Proofreading: David Nelson,
Michael Kellerman, Dan Shapiro

Administration: Lydia Carbuccia

Circulation: Kristi Carter

Webmaster: Peng Wu

Math Reader

Southwest Texas State University

San Marcos, TX 78666

Phone: (512) 245-3439, Fax: (512) 245-1469

e-mail: mathexplorer@swt.edu.

Visit our website: www.mathexplorer.com

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Kate Okikiolu

By Laura Chavkin



Kate Okikiolu, who received her Ph.D. from UCLA in 1991, is one of the rising stars in mathematics. She was the first African-American to receive the \$70,000 Sloan Research Fellowship, the most prestigious award for young mathematicians. She also won the Presidential Early Career Awards for Scientists and Engineers, which carries with it a \$500,000 grant and is the highest presidential honor awarded to sixty young scientists and mathematicians in the U.S.

Math runs in Kate's family. Her father, George Okikiolu, has written more mathematics papers than any other black mathematician.

The younger Okikiolu's research is on the "spectral determinant" of a drum, which is the number that you get when you multiply all of the sound pitches made by the drum. This number can reveal the shape of the drum. It is understood for two-dimensional drums, but Kate is looking into the special case of three-dimensional drums, which may help with research in quantum physics.

Kate also works with inner city children and plans to make a series of videos illustrating how math and measurements can be used in everyday life. She plans to use "hands-on" ideas such as designing models of bridges and mending bicycles to teach kids math concepts. Kate is also an athlete, having won long-jump competitions. Math has given her an exciting career, and she will continue to make math accessible to children and college students while she continues in her important research.

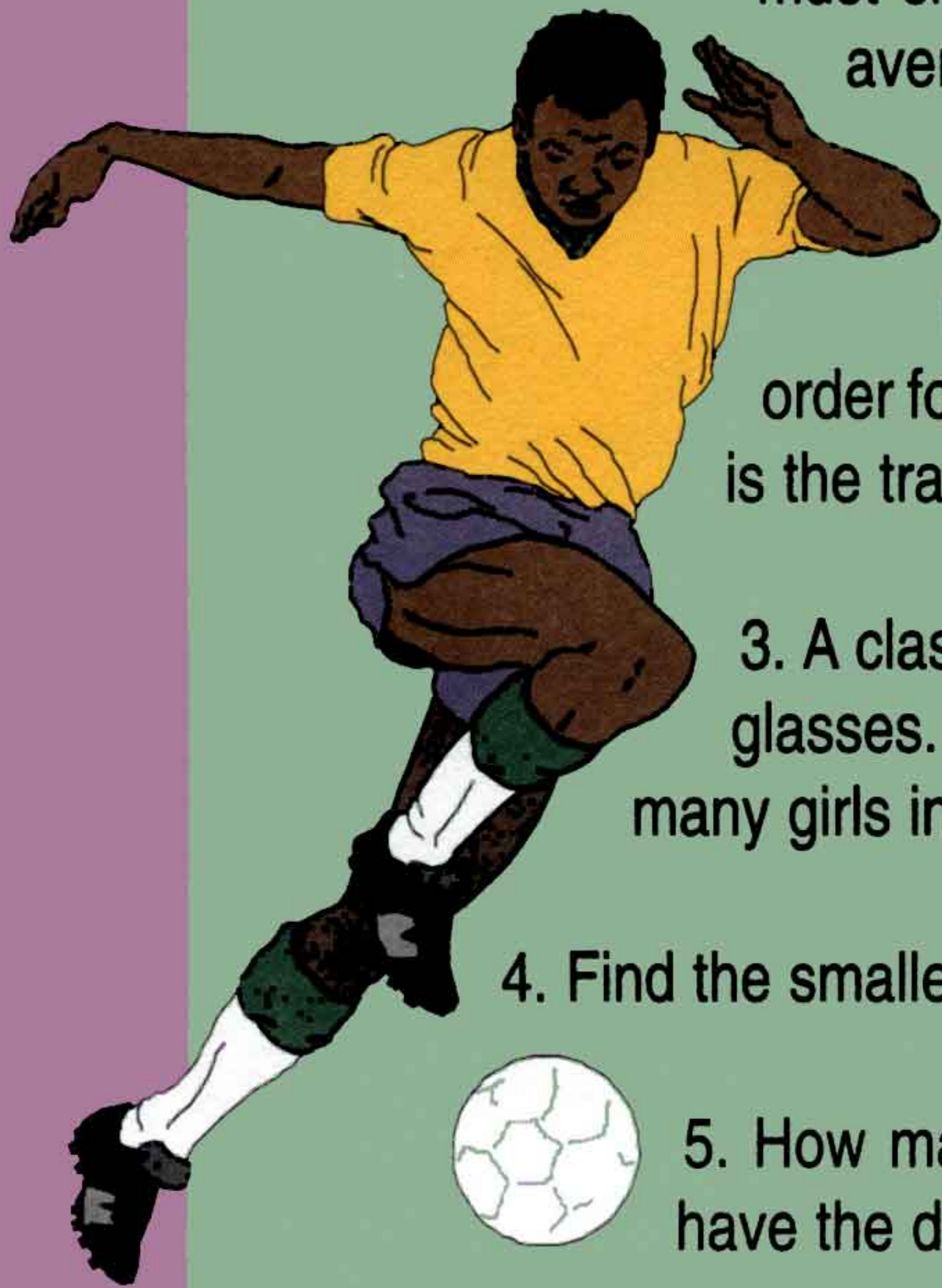
Source:

http://www.math.buffalo.edu/mad/PEEPS/okikiolu_katherine.html

by Laura Chavkin, who attends Yale University

PROBLEMS OF THE MONTH

1. Mindy has played 6 basketball games in which she scored 6, 12, 15, 11, 20 and 24 points respectively. What is her scoring average so far? How many points per game must she average in each of the remaining 4 games if she wants to average 16 points per game for the whole season?



2. The first runner on 4X400 meter relay team runs the first leg in 45.2 seconds. What must the other 3 runners average in order for the team to run the race in 2 minutes and 56.8 seconds, which is the track meet record?

3. A class has 35 students, of which 25 are girls and 12 students wear glasses. There are 7 boys in the class that do not wear glasses. How many girls in this class wear glasses?

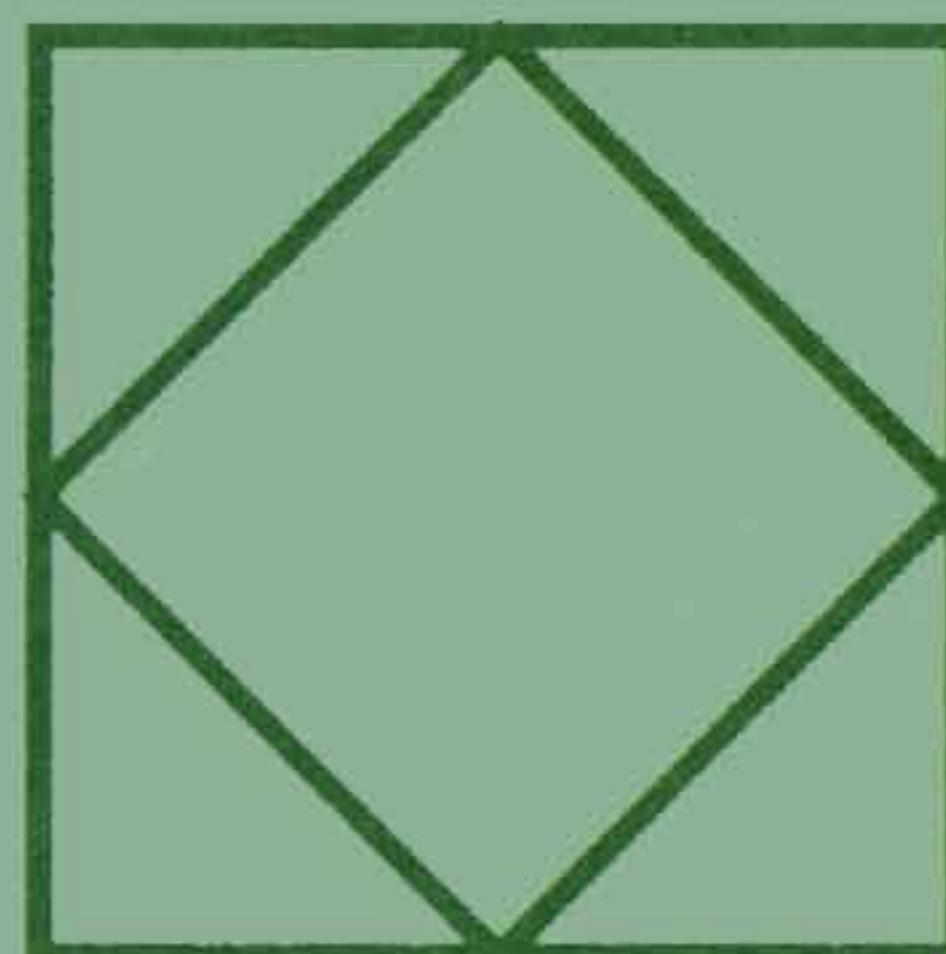
4. Find the smallest 4 digit number in which the product of the digits is 100.



5. How many numbers between 1 and 1000 have the digit 5 in them?

6. If it is 4 PM now, what time will it be in 200 hours?

7. In the figure to the right, the outer square has 8 square feet. What is the area of the inner square?



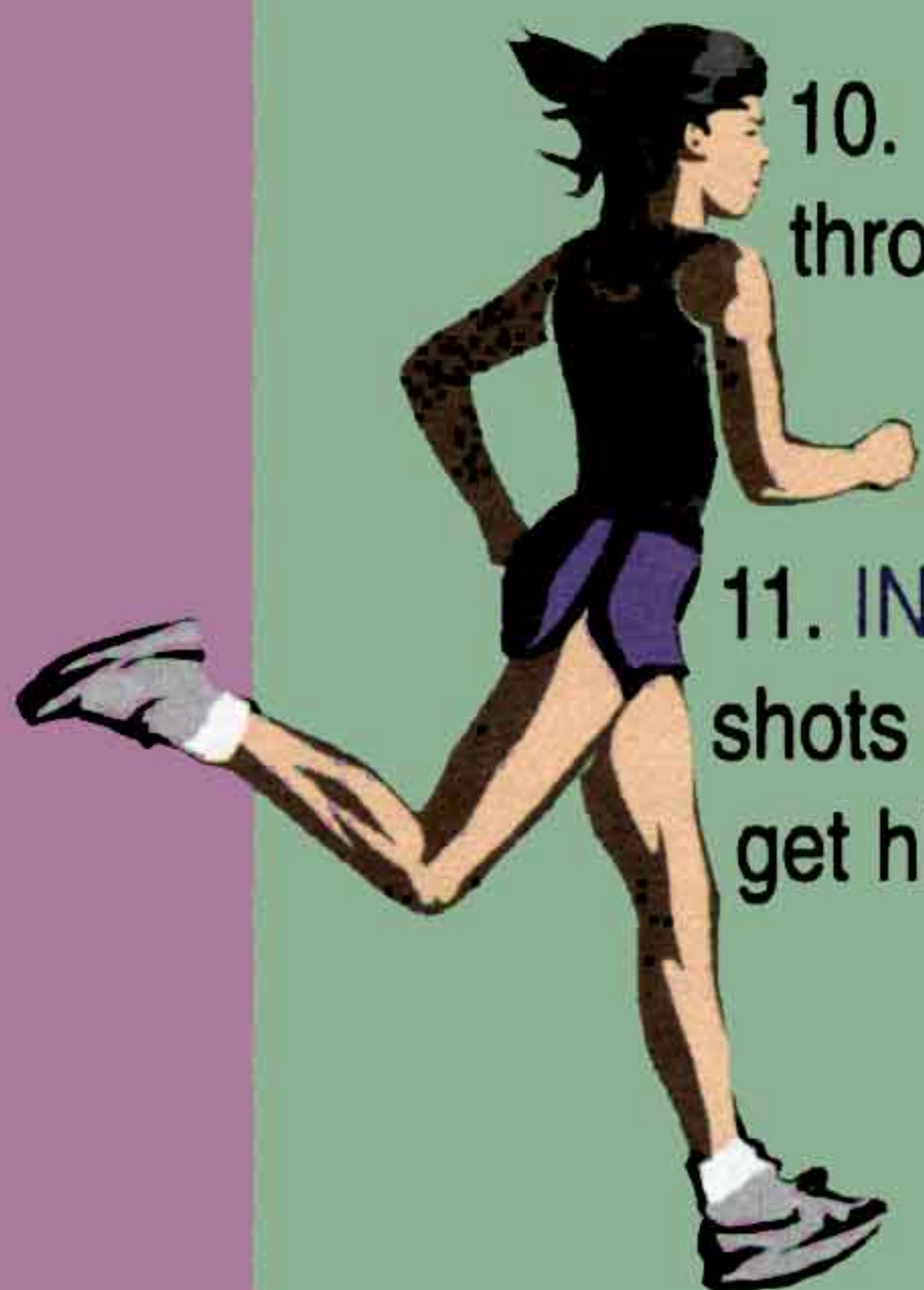
8. A soccer tournament is to be held with 8 teams. If the tournament is round robin (each team plays all the other teams once), how many games will be played?

9. Jenny plays in a baseball league. She has 10 hits in 40 times at bat (not including walks or other non-official at bats). This gives her a batting average of .250. How many consecutive hits must she get to raise her average to more than .300? How many consecutive hits must she get to raise her average to .400?



10. Jerry scored 24 points in a basketball game. If he did not make any free throws, what are the possible ways he could have made his 24 points? Remember that there are 2-point and 3-point shots in basketball.

11. **INGENUITY:** If a basketball player can consistently make 40% of his 3 point shots and 50% of his 2 point shots, which kind of shots should his coach try to get him to take? Explain your answer.



Send us your solutions! Every month, we will publish the best solutions on our website: www.mathexplorer.com. If we print your solutions, we will send you and your teacher free **Math Reader** pens!

Baseball

by Terry McCabe

Summer is a great time to play or watch baseball. It's fun to follow major league teams or players by looking at the statistics in the paper or online on a computer. Do you know the difference between a player having a good season, a bad season or a great season? We use numbers (statistics) to judge how a player is doing. Batting averages and on-base percentages help us to see how well a player is hitting. Earned run average (ERA) is used to help judge how well a pitcher is throwing. We will explain how some of these statistics are calculated.

What does it mean when people say that a player is a .300 hitter? Why do people say a player is having only a so-so season if he is hitting .250 and another player is said to be having a tremendous year if he is hitting .300 or more? What does hitting .300 mean? If a player bats officially 100 times (not counting walks, sacrifices or errors) and gets 25 hits, what is his or her batting average? What if one gets 30 hits?

$$\text{batting average} = \frac{\text{number of hits}}{\text{number of official at-bats}}$$

To calculate a batting average, you divide. (Use a calculator if you haven't learned how to do long division yet.) Divide the number of hits by the number of official at-bats that a player has had. So a player that has 25 hits and 100 at-bats has a batting average of .25, right? Not quite.

4 We always carry out the division to

three decimal places. So the batting average would be .250.

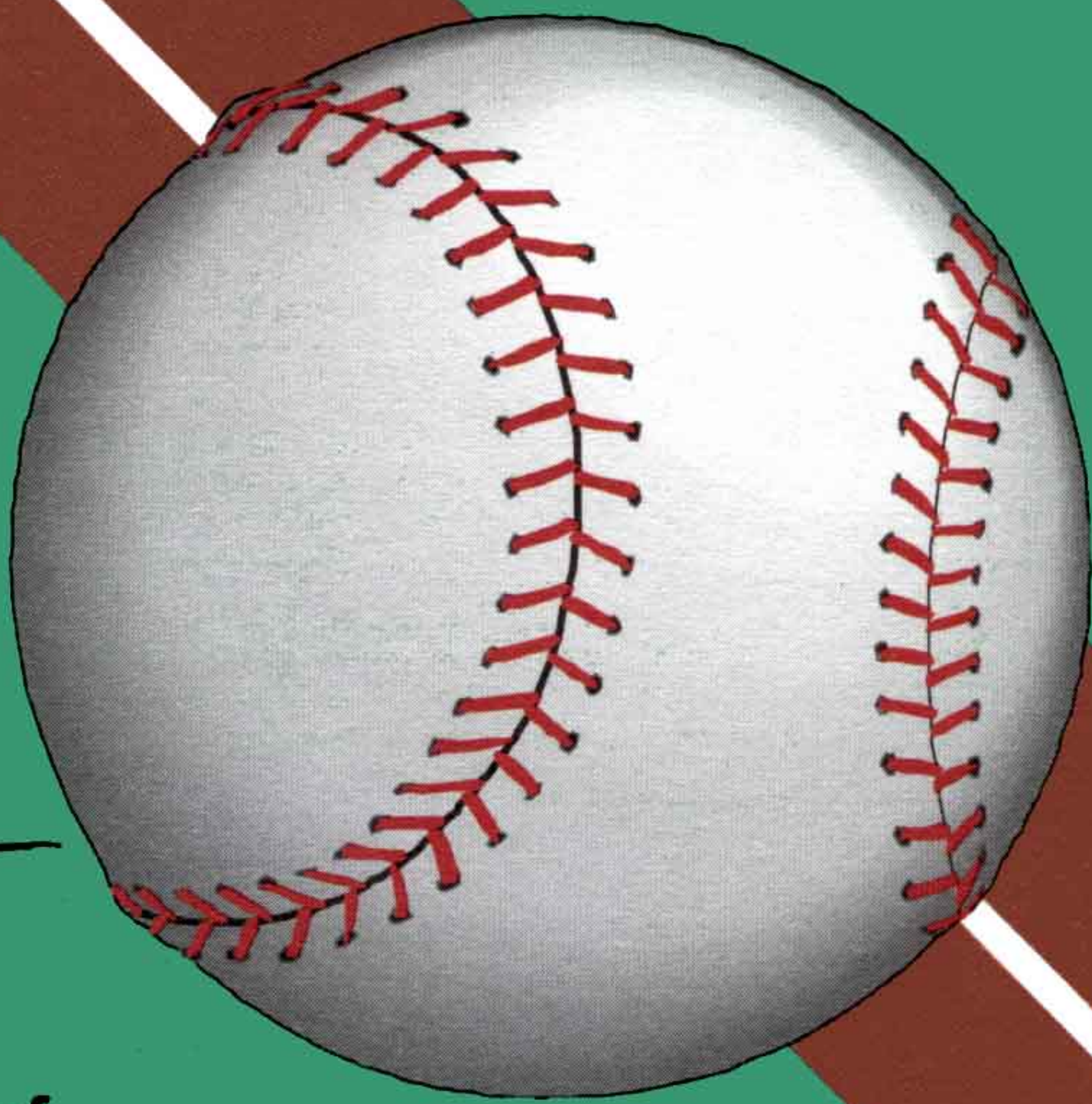
If a player has 30 hits in 100 official at-bats, then his batting average is .300 which means that he got a hit 30% of the time. A batter hitting .250 has gotten a hit 25% of the time. Just 5 extra hits in every 100 at-bats makes the difference between struggling to make the team and being a one of the best on the team.

Of course, if a player like Tony Gwynn averages 35 hits for each 100 at-bats over 10 to 15 seasons, then he is considered to be headed to the Hall of Fame.

Are hits the only good thing a batter can get? There is an old saying in baseball that "a walk is as good as a hit." The statistics of on-base percentage counts walks as well as hits to measure how productive a hitter is. Who are the leaders in the major leagues in this statistic? Don't be surprised that some of the leaders may not have batting averages over .300. (Hint: The player gets walked many times because he happens to hit a lot of homeruns.) Look in the newspaper (the Sunday edition) to find out.

To evaluate pitchers, we take the number of earned runs they have given up (runs not scored because of an error), divide by the total number of innings they have pitched and then multiply by 9 (the

Numbers



Other statistics on pitchers that are useful are the total number of innings pitched and the batting average that hitters had against the pitcher.

Look at the chart below. It contains statistics from just one game. Can you determine what the numbers and categories mean? You can keep track of how your favorite player is doing this season by looking at their statistics.

number of innings in a game). This number is called the earned run average (ERA) of a pitcher.

$$\text{ERA} = \frac{\text{number of runs given up}}{\text{total number of innings}} \times 9$$

What would be considered a good ERA for a pitcher? In 1999, the best pitchers on many teams (their ace) had an ERA of more than 3.5. This is evidence that we are in a period where hitting is more dominant than pitching. There has also been a large increase in homeruns in both leagues during the last few years.

While a batter wants a high number as a batting average, a pitcher would like the ERA to be as small as possible. Can you see why?

So who are considered to be the best pitchers the last 5 years? Greg Maddux had an ERA of less than 2.00 from 1995-1998. The pitcher who is considered to have had the best year is Pedro Martinez. What was his ERA last year?

4-Texas 8, 5-Houston 7

Texas					Houston				
	ab	r	h	bi		ab	r	h	bi
Nicholson 2b	5	1	3	1	Caraway 2b	4	1	2	0
West ss	5	1	3	1	Lee rf	4	2	3	1
Ermond cf/lf	4	1	1	0	Bitter c	4	1	2	2
Ontiveros 1b	4	2	1	1	Woodward 1b	4	0	1	1
Houser 3b	2	0	0	1	Schweitzer dh	5	0	1	0
Rosenberg rf	4	0	2	3	Wilken 3b	5	1	2	3
France lf	4	0	0	0	Melebeck ss	2	0	0	0
Pumo ph	0	0	0	0	Pekar cf	4	0	0	0
Covert ph	1	0	0	0	Nance lf	3	2	1	0
Carmichael cf	0	0	0	0					
Anderson dh	3	1	0	0					
Hubele c	4	2	2	1					
Totals	36	8	12	8	Totals	35	7	12	7

Texas	010	051	001	—	8	12	0
Houston	003	211	000	—	7	12	0

DP: Texas 1, Houston 1. LOB: Texas 8, Houston 8.
 2B: West, Rosenberg. 3B: Bitter. HR: Ontiveros (3), Hubele (1), Wilken (3). SB: Melebeck. CS: Caraway. SH: Houser, Caraway. SF: Woodward.

	IP	H	R	ER	BB	SO
Texas						
Leone	5	9	7	7	1	3
Clark	2	2	0	0	1	2
Jones (W, 4-2)	1	1	0	0	0	1
Thames (S, 6)	1	0	0	0	0	2
Houston						
Runser	4 ² / ₃	6	6	6	3	3
Torina	2 ² / ₃	2	1	1	0	2
Dieudonne (L, 1-1)	3	3	1	1	2	5
Jackson	0	1	0	0	0	0
Hooper	2 ² / ₃	0	0	0	0	0

WP: Leone. BK: Clark. HBP: Melebeck (Leone), Nance (Leone), Lee (Leone), Ontiveros (Dieudonne). Umpires: Rogers, Oros, King. Time: 3:33. Attendance: 4,481.

Puzzle Page

Math Readers:

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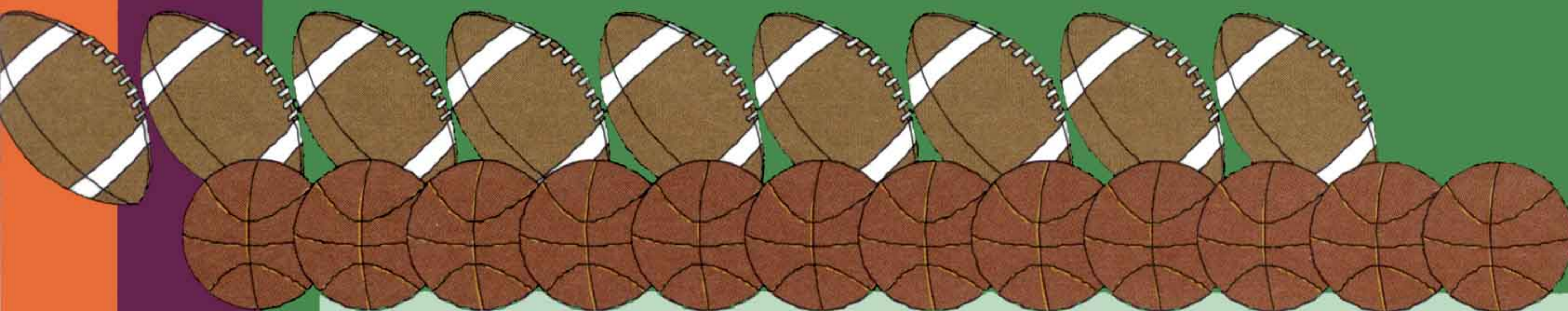
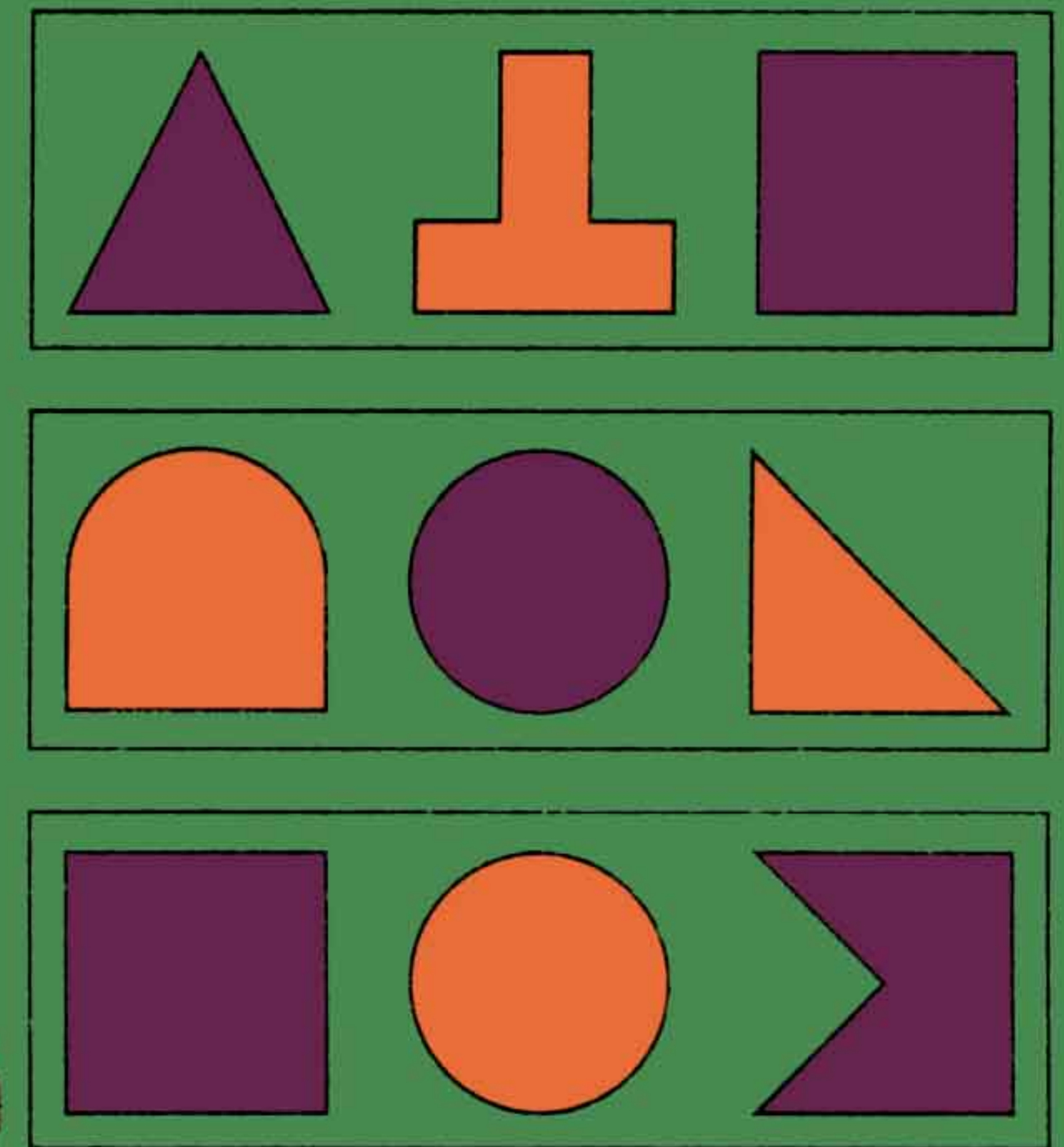
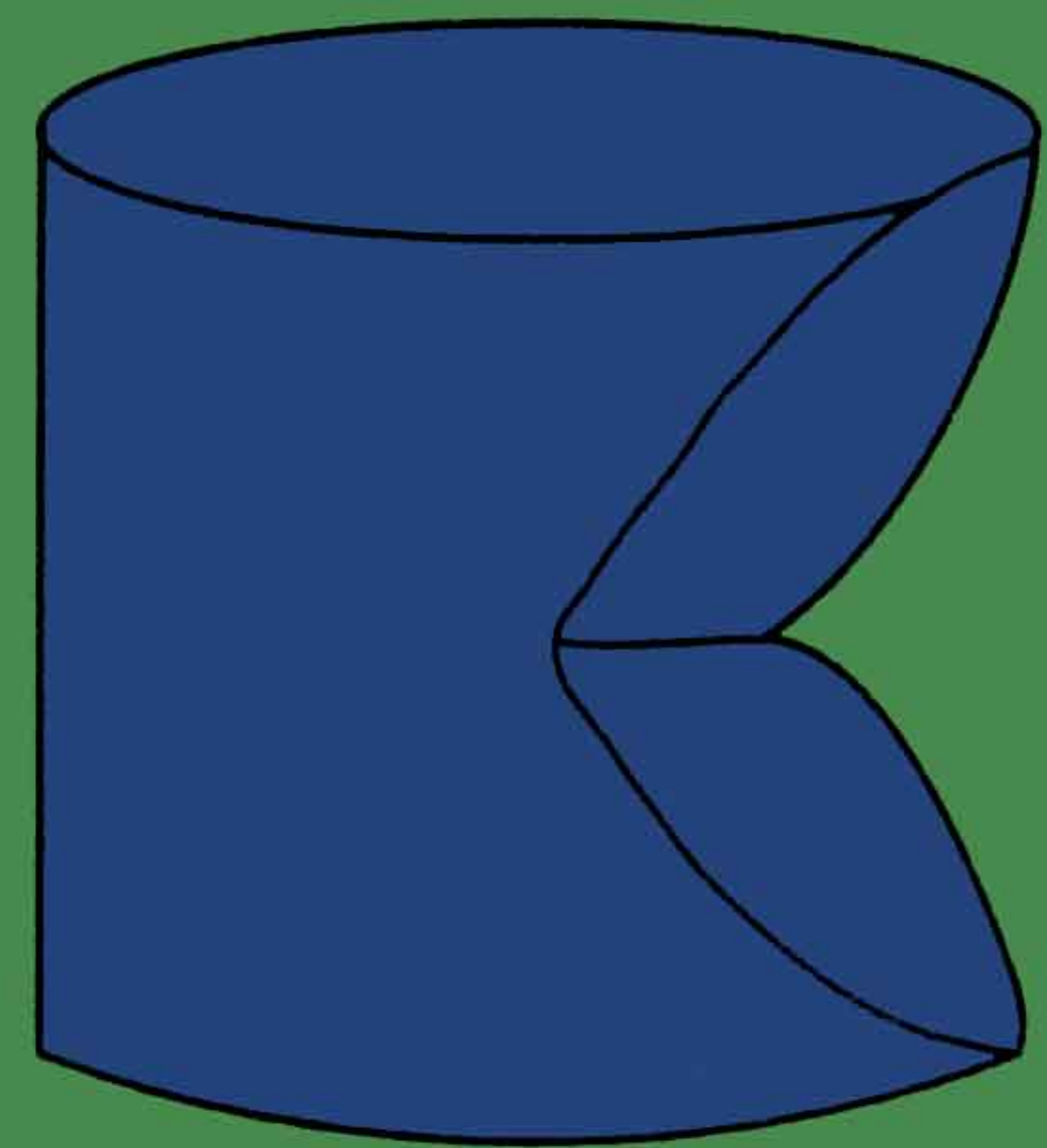
Word Search

Forwards or backwards, up, slanted, or down.
Where can the words in this puzzle be found?

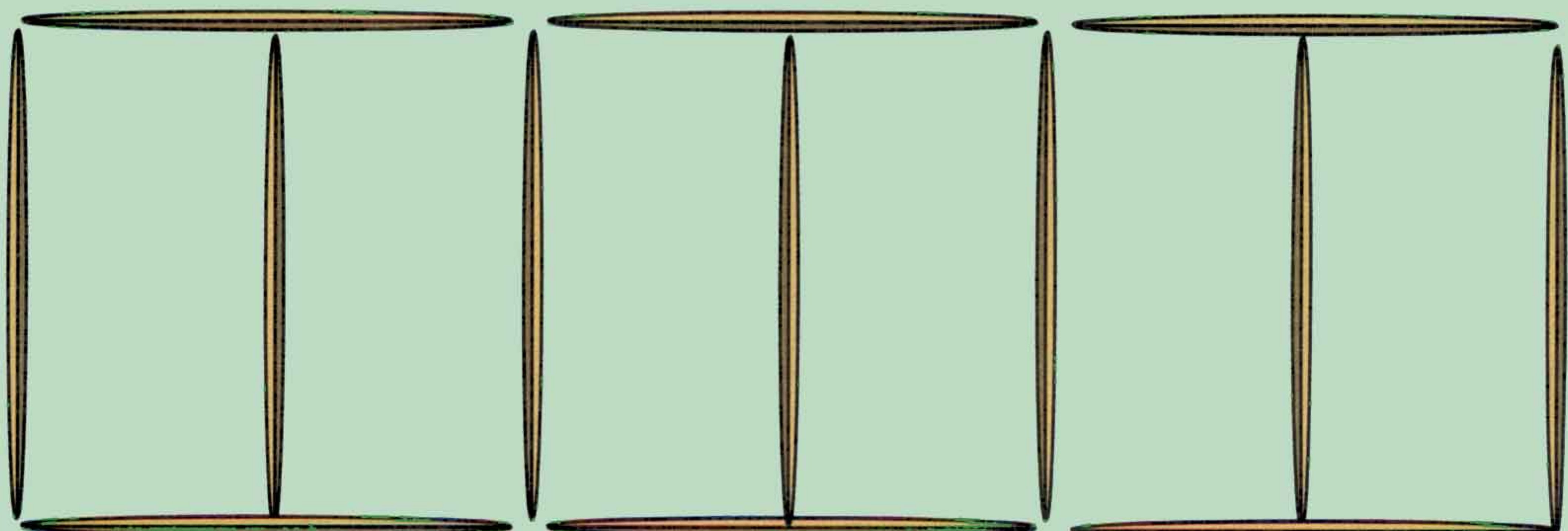
- Average
- Baseball
- Athlete
- Statistics
- Percentage
- Consecutive
- Tournament
- Elimination
- Division
- Score

J	Y	I	P	N	J	I	F	M	A	R	V	C	I
E	M	H	S	E	S	P	B	P	Q	N	B	N	A
N	N	N	B	H	R	E	W	U	I	O	T	T	F
Y	O	B	A	V	E	R	A	G	E	I	X	N	U
T	I	O	S	Q	N	C	C	J	A	S	T	E	N
R	T	F	E	T	A	E	U	E	E	I	A	M	D
I	A	W	B	C	A	N	O	P	T	V	S	A	M
E	N	E	A	N	S	T	I	I	E	I	J	N	B
S	I	A	L	Q	U	A	I	F	L	D	A	R	R
B	M	Z	L	X	H	G	B	S	H	S	M	U	R
L	I	G	C	O	Q	E	R	O	T	F	C	O	K
W	L	U	G	L	M	A	G	H	A	I	A	T	C
U	E	V	I	T	U	C	E	S	N	O	C	M	D
G	U	D	L	U	K	R	V	E	R	O	C	S	W

Which frame below will this object exactly fit through? Can you draw an object that will exactly fit through the frames?



As you can see in the following diagram, it is easy to create 6 identical areas using 13 toothpicks. How can YOU create 6 identical areas using 12 toothpicks?



Bulletin Board

Yes! I want to subscribe.

Check it Out!

Rice University has a website where mathematics teachers can access materials to develop lessons.

Try <http://www.rusmp.rice.edu>

Math is a science, so why not do a science project in math?

A nice list of ideas can be found at:

<http://MathCentral.uregina.ca/ScienceFairs/sciencefairlist.html>

Try This!

Find out about the Euclidean algorithm for finding the greatest common factor of two integers. Try it out, especially on some large integers. Why do you think it works? Yes, this is the same Euclid who we associate with Greek geometry in about 300 B.C.E.

Words of Wisdom

The Universe cannot be read until we have learnt the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it is humanly impossible to comprehend a single word.

--Galileo

Snapshot



Dr. John Edgell, Professor of Mathematics and Mathematics Educator at Southwest Texas State University, assists Robert, a student in a field research project at Goodwin Primary School, Comal ISD.

Robert is making a one-to-one correspondence between 7 numeral names and sets of geometric objects.

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Dear **Math Readers**,

How are mathematics and sports related you might ask? Mathematics can reveal records of teams or indicate athletic performance. Batting averages, rushing yardage, running times all involve working with numbers. Billiard players must study angles, and track athletes study speed. We'd like to know how you combine math and sports!

Good luck on this month's puzzles and problems. We'd like to encourage you to share your solutions with our readers.

Sincerely,

Hiroko K. Warshauer

Hiroko K. Warshauer

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Next year's magazines will be quarterly -- an issue each season -- bringing you biographies, puzzles, problems and articles that connect mathematics to the world around us. Be sure to subscribe now so you don't miss the fall issue!