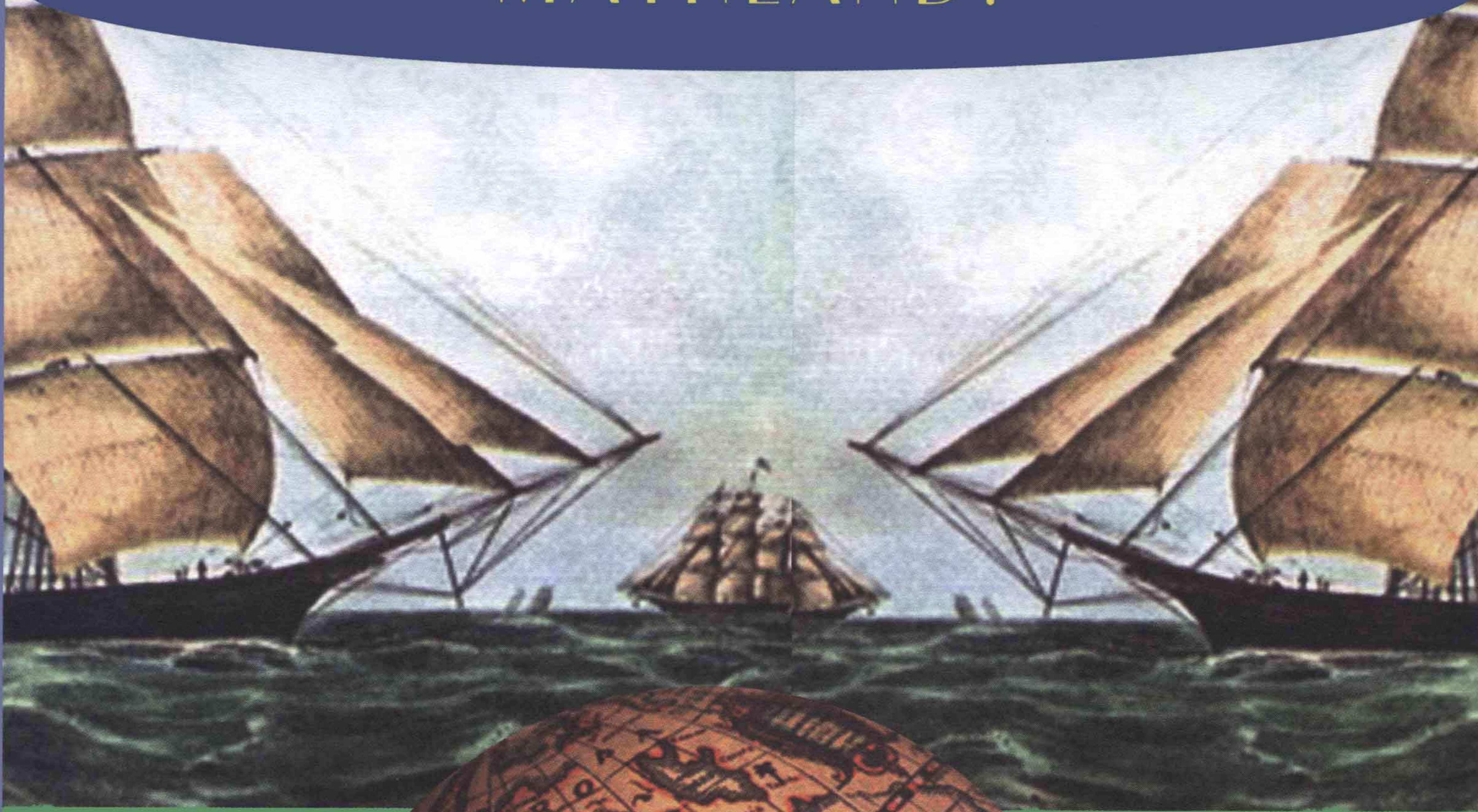


# Math Reader

MATHLAND!





# Math Reader

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# Emilie du Chatelet

Famous French mathematician Emilie du Chatelet was born in 1706. Her achievements are even more remarkable when you know that French society of that time discouraged education for women. She was also talented in learning other languages but her true love was mathematics.



Emilie loved the social life of the French nobility. She found the best mathematics tutors and became friends with the author and philosopher Voltaire, with whom she discussed philosophical and scientific topics. In 1759, Emilie completed the translation of **Principia**, Newton's famous book on the principles of mathematics, into French. She published her own book **Institutions de Physique** or **Institutions of Physics**. However, one of her tutors, a man named Koenig, started a rumor that what she had published was not original but instead a repeat of his work. Since Emilie had talked about the ideas in her books with other scholars, she turned to them for support. But because she was a woman, Emilie did not feel she received all of the credit she deserved for her mathematical work.

Even when she gave birth to a child, she continued her study. As Voltaire described it: "The little girl arrived while her mother was at her writing desk, scribbling some Newtonian theories, and the newly born baby was placed temporarily on a quarto volume of geometry, while her mother gathered together her papers and was put to bed."

Emilie made a significant contribution to mathematics and science by making the works of Newton accessible in French. She also enjoyed an active life in the society of Paris as the wife of Marquis Florent du Chatelet, governor of Semur en Auxois. A crater on Venus is named for her to commemorate the contributions Emilie made in science and mathematics.

[www-history.mcs.standrews.ac.uk/history/Mathematicians/Newton](http://www-history.mcs.standrews.ac.uk/history/Mathematicians/Newton)

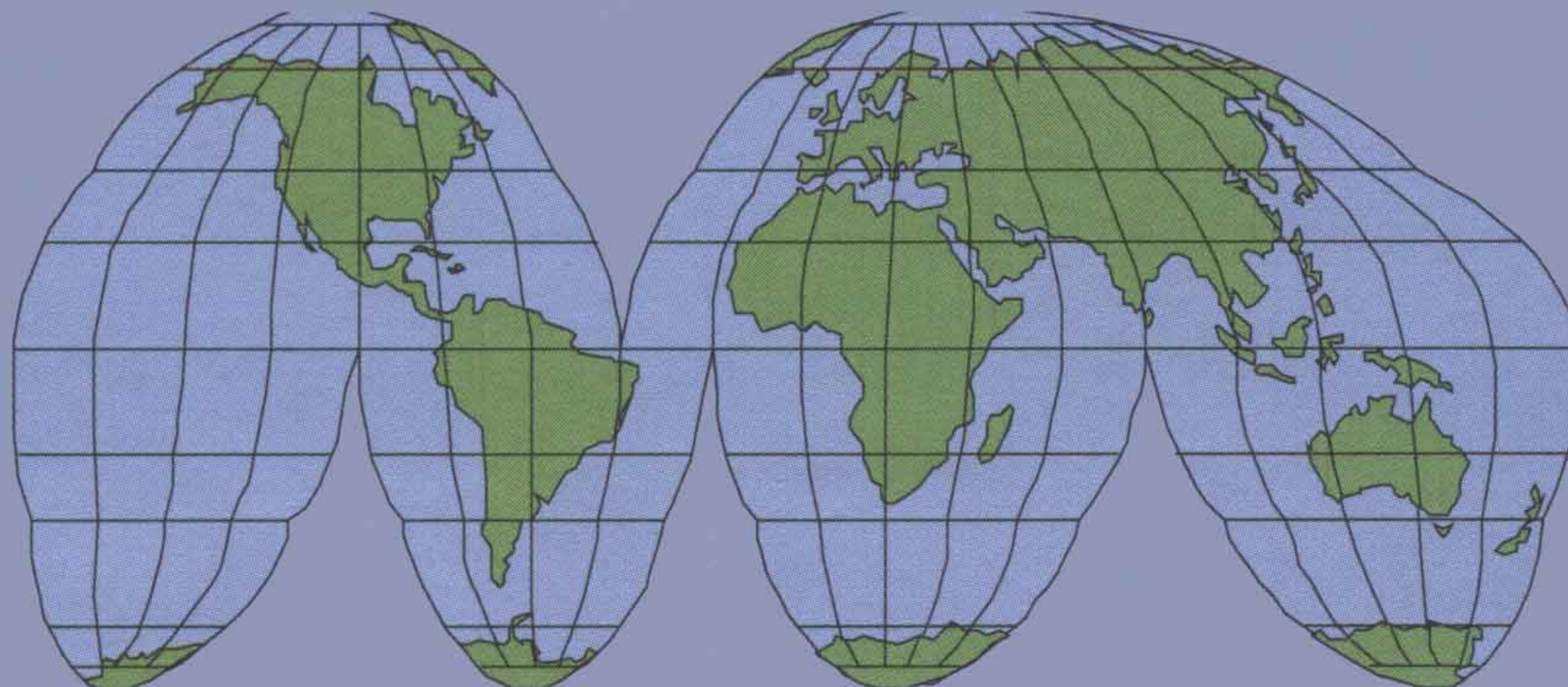
by Laura Chavkin, who attends Yale University. She enjoys American literature and writing.



## PROBLEMS OF THE MONTH

1. What latitude and longitude is the city of Brownsville, Texas? Can you find a town in the United States further south than Brownsville?

2. What is the latitude of London, England? Find a place in Asia and a place in North America at the same latitude. What do you know about the winters in these 3 locations?



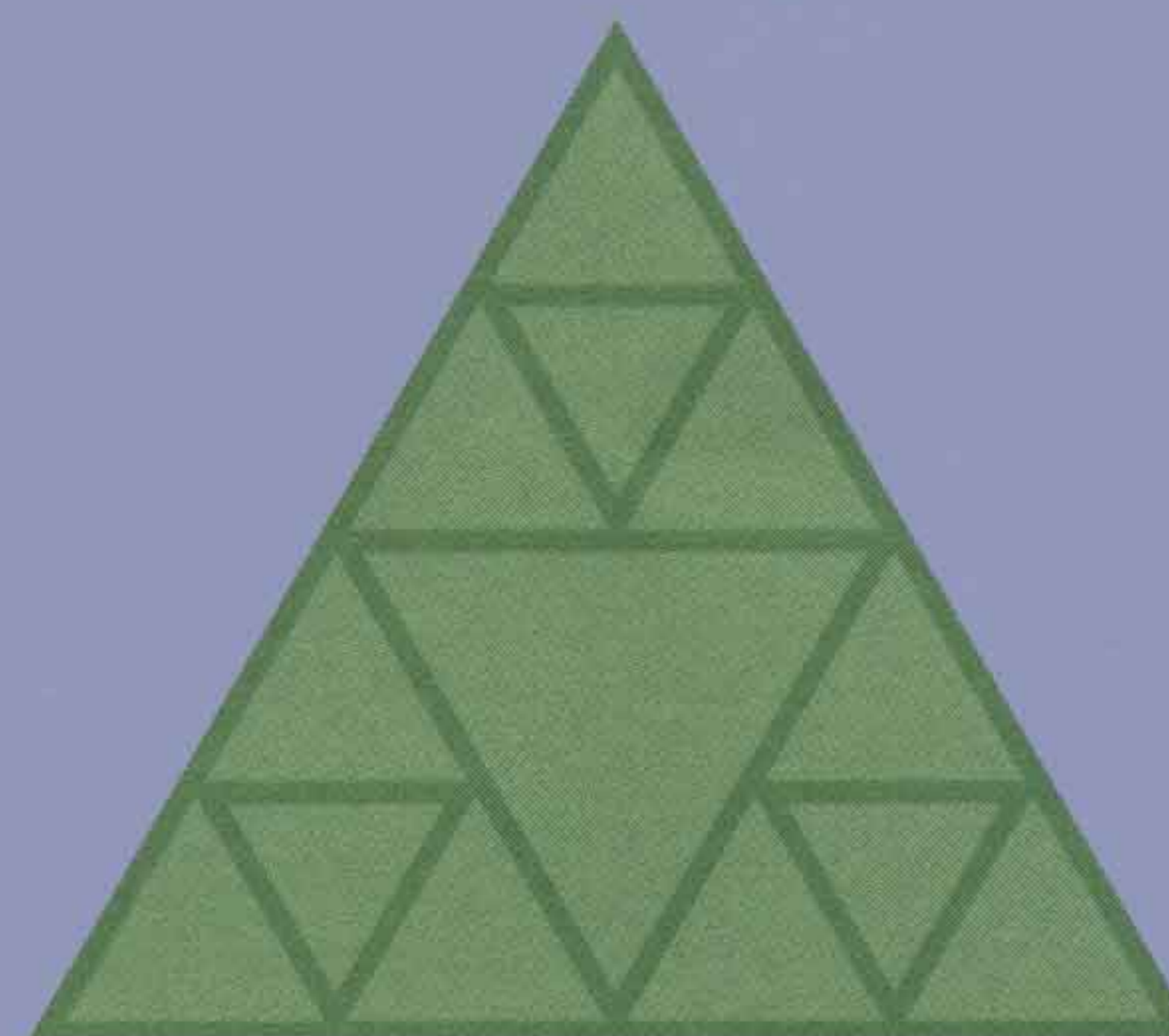
3. If you trace the path of longitude  $30^\circ$  west to the North Pole and keep going, on what longitude will you be and in what direction will you be going?

4. Sara has 6 coins in her pocket worth 23 cents. What are the coins and how many of each coin does she have in her pocket?

5. Which three numbers should you pick from the following table to get the largest possible total? You may only pick one number from each row and one number from each column.

12	9	10
5	1	2
7	3	5

6. What are the next 3 numbers in the following sequence:  
0, 3, 8, 15, 24, \_\_\_\_, \_\_\_\_, \_\_\_\_



7. How many triangles can you find in the figure to the right?

8. Maria has made squares and equilateral triangles using 17 tooth picks. The figures do not overlap. How many squares and triangles did she make? Can you use algebra to solve this problem?

9. If a  $2 \times 2 \times 2$  cube is made from 8 unit cubes, how many unit squares can you see on the surface? (a unit square has each side of length one unit; while a unit cube is a box with each side of length one unit.) How many unit squares can you see on the surface if you have a  $3 \times 3 \times 3$  cube? or a  $4 \times 4 \times 4$  cube? The number of unit squares on the surface is called the surface area.

10. If it is Sunday at 3 PM in New Delhi, India, what time is it in Dallas, Texas? What day is it?

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



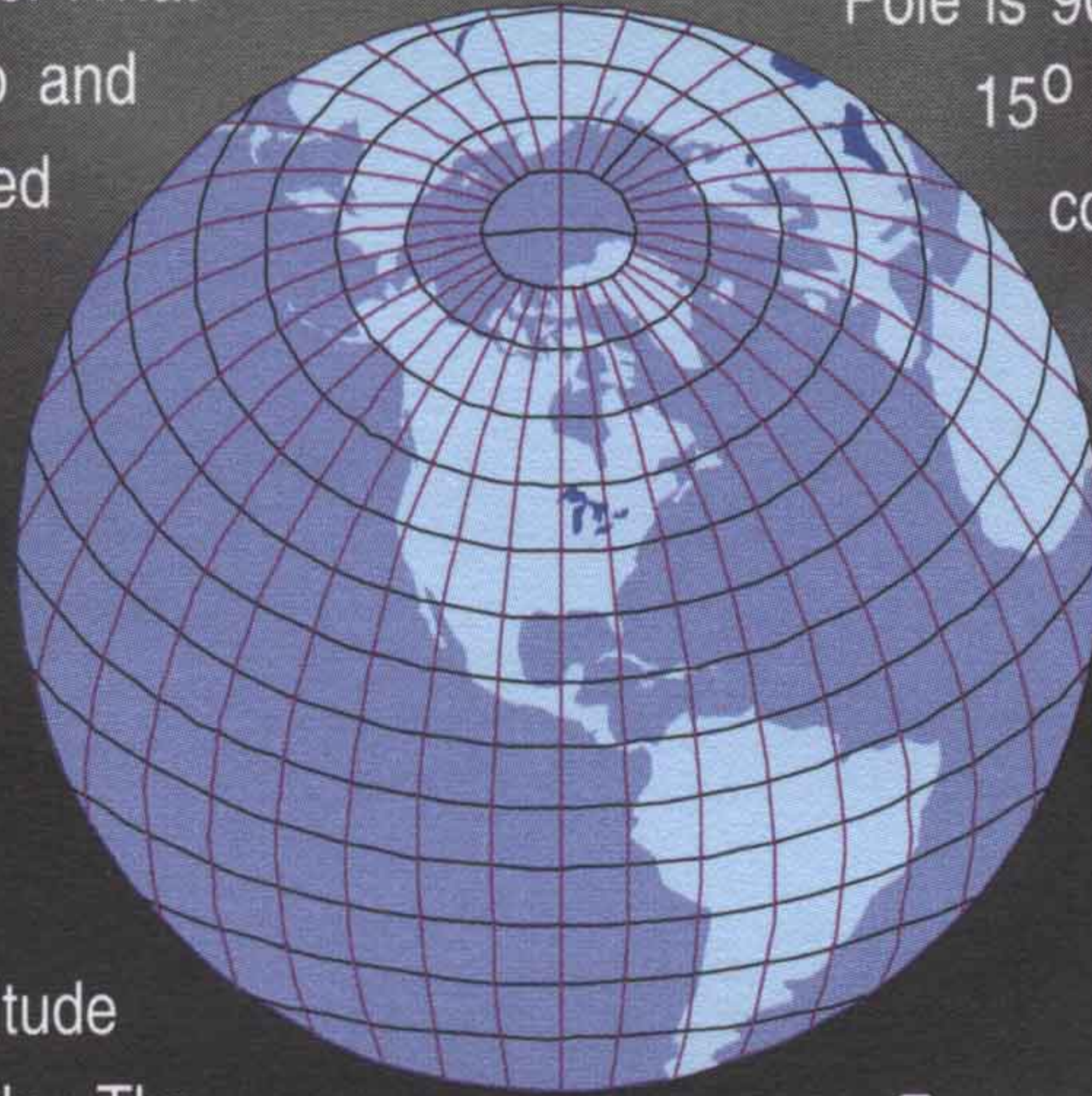
# Tracking a

Have you ever heard a weather report warning of a hurricane that is threatening the coast? The report usually gives the present location of a storm using numbers. What do these numbers mean? (Look at a world map and globe.) These numbers represent coordinates based on the grid of lines that you can see on a globe. Some of the lines, called **latitudes**, run east and west. They are parallel to the equator and form closed circles. Lines running north and south, called **longitudes**, also encircle the earth and intersect at the North and South Poles.

Since there are  $360^\circ$  in a circle, longitude and latitude lines are labeled using the measure of an angle. The longitude which gets the name  $0^\circ$  longitude goes through Great Britain and is called the **Prime Meridian**. Any other longitude line is identified by the angle it makes with the prime meridian at the North Pole and the direction you move to form the angle.

Check to see that longitude  $120^\circ$  west goes through California and, at the equator, is one third of the distance around the earth from where the equator crosses the prime meridian. The longitude  $120^\circ$  east goes through eastern Asian and western Australia. As you might notice, there is only one longitude  $180^\circ$ . Can you explain why? Latitude lines start with the equator as the  $0^\circ$  latitude.

Going north, the main latitudes are labeled every  $15^\circ$  until you reach the North Pole which is  $90^\circ$  north latitude. The South Pole is  $90^\circ$  south latitude. Can you find the  $15^\circ$  north latitude line? Name two countries it goes through.



What states in the United States does the  $30^\circ$  north latitude go through? About what latitude is the Arctic Circle?

On more detailed maps, you can see individual degree latitude and longitude lines. Can you find the coordinates of Washington D.C.? (They are about  $39^\circ$  north latitude and  $77^\circ$  west longitude.) Find the coordinates of where you live.

The most visible longitude lines are also every  $15^\circ$ . Since there are  $360^\circ$  around the earth, marking off every  $15^\circ$  breaks up the earth into 24 zones. These correspond to the 24 one hour time zones. Look on a globe and see how many time zones there are in the United States. Between each of these lines there are 15 smaller zones which correspond to  $1^\circ$  each. If you have a map of a smaller region of the earth, you can sometimes see the individual  $1^\circ$  longitude lines.

Between each degree there are 60 minutes which can be seen as lines on very detailed maps. At the equator, there is 1 nautical mile between the minute longitude lines. This brings up a very interesting question. How long is the distance around the equator? Use the information just given to calculate the



# Hurricane

by Terry McCabe

circumference of the earth, which is the length of the equator line.

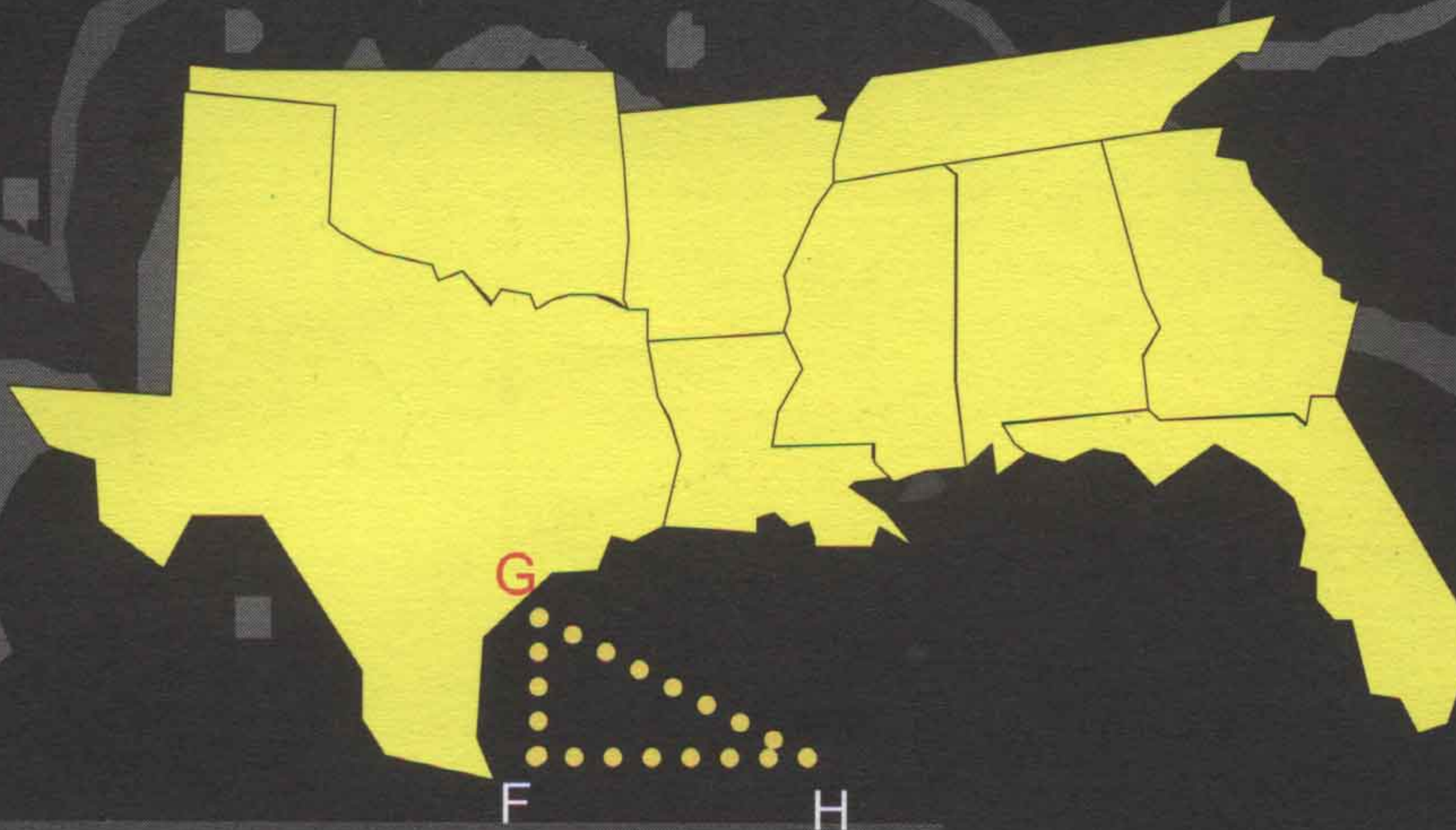
We are almost ready to find out how to estimate the distance to a hurricane if we know its coordinates. Start at the equator and follow two longitude lines as they move north. What happens? They get closer until you reach the North Pole

where they intersect. We can not assume the distance between two consecutive longitude lines is 60 nautical miles (60 minutes apart) after we move away from the equator.

Along the coast of Texas, longitude lines are about .866 nautical miles apart. As you move directly east toward Florida, this remains constant. Latitude lines do stay virtually the same distance apart as you move north or south. The distance between two consecutive  $1^{\circ}$  latitude lines is 60 nautical miles.

How do we know how far a hurricane is from a point on the shore like Galveston, Texas. On a map, mark a point G at Galveston and find its coordinates. Listen to the news for the coordinates of the hurricane and mark a point H at those coordinates. (We can pretend and pick a spot in the Gulf of Mexico.) If the point H is on the same latitude as the point G, just count the minutes of longitude between them and multiply by .866 to compute the distance in nautical miles. If the points G and H are on different latitudes, make

a triangle by drawing a line north or south from point G until you reach the latitude of the point H. Then, draw a line from there to the point H. Then draw a line from H to G. This triangle should be a right triangle and you can use the **Pythagorean Theorem** to calculate the distance from G to H. This calculation assumes that the triangle is on a flat plane (the earth is flat!) but if the area you are covering is not too large, this is a good approximation.





# Puzzle Page

## Math Readers:

We want to print your work! Send us original math games, puzzles, problems, and activities. If we print them, we'll send you and your math teacher free **Math Reader** pens.



## Word Search

Forwards or backwards, up, slanted, or down.

Where can the words in this puzzle be found?

LOCATION

NORTH

SOUTH

EAST

WEST

SPHERE

LONGITUDE

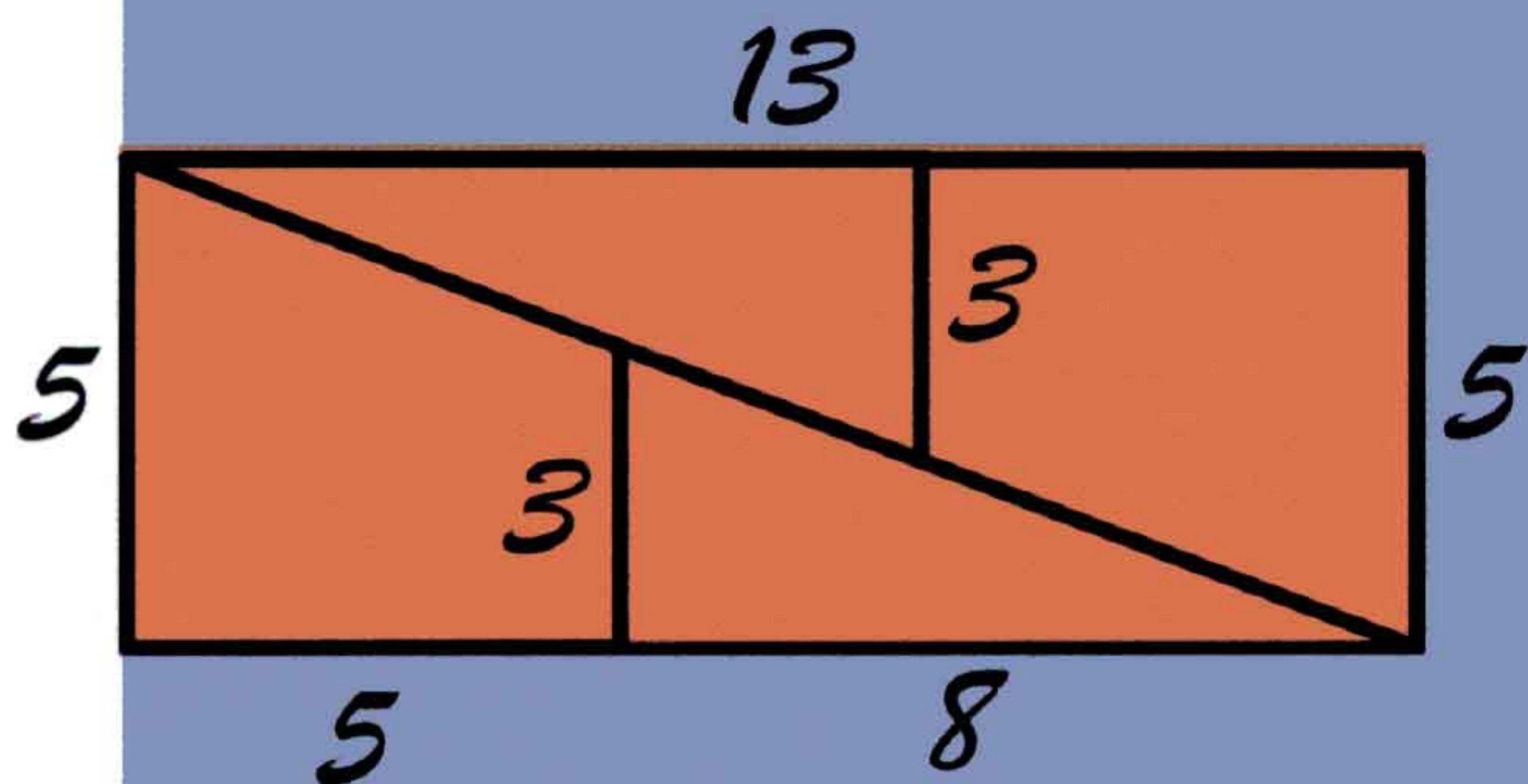
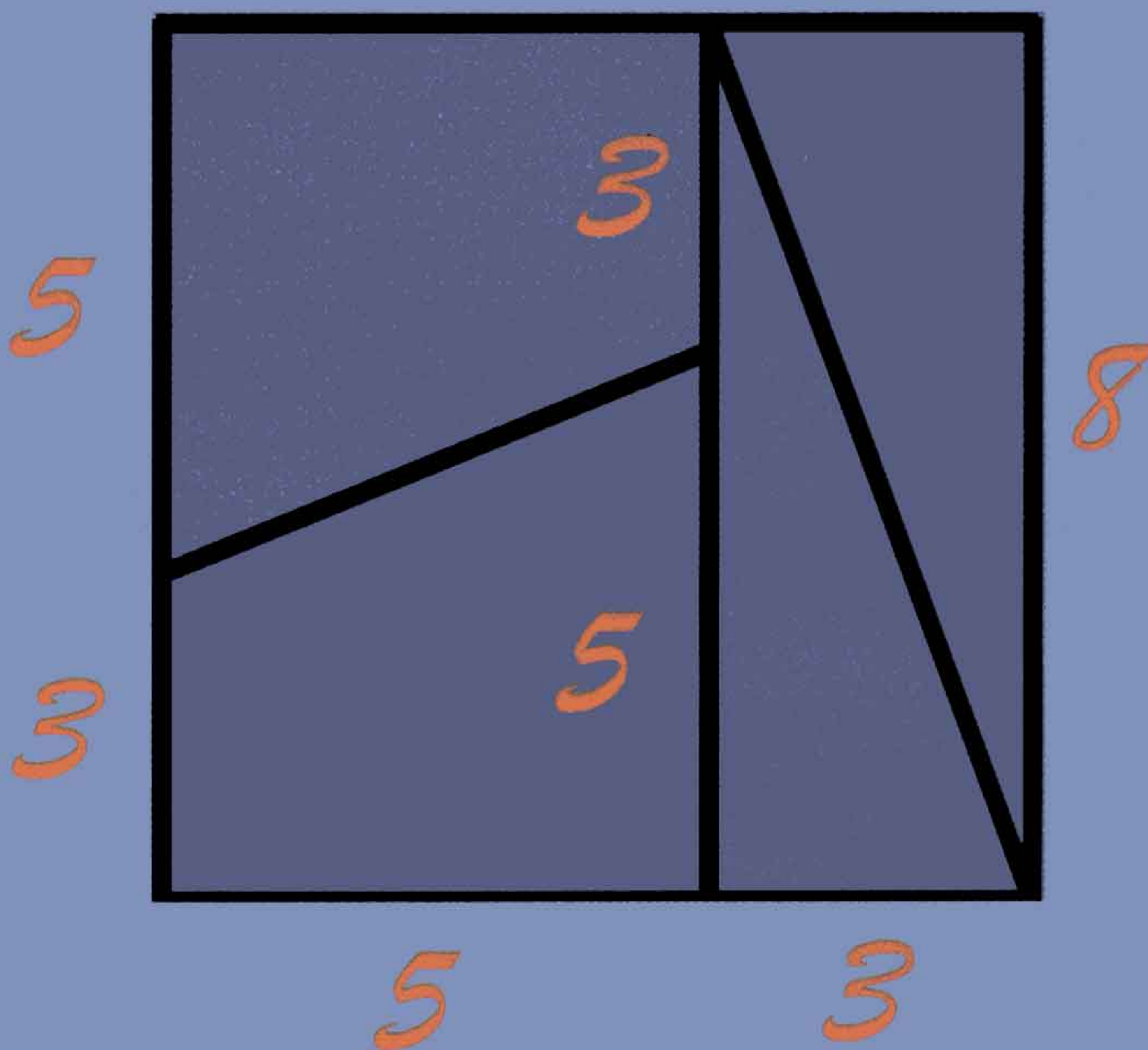
LATITUDE

MERIDIAN

POLE

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

Cut up an 8 X 8 square as shown on the right. Can you rearrange these pieces into a rectangle as shown below? Explain!





# Bulletin Board

Yes! I want to subscribe.

## Math Reader joins the web!

Visit our website: [www.mathexplorer.com](http://www.mathexplorer.com) to chat with other readers and share solutions to problems!

## Thanks to our Sponsors

The Fund for the Improvement of Post-Secondary Education (FIPSE) is helping to underwrite Math Explorer and Math Reader magazines. They also sponsor scholarships for students to attend the SWT Junior Summer Math Camp and SWT Honors Summer Math Camp! Thanks to FIPSE.

## What are those bar codes?

Many coupons have a bar code on them that is almost the same bar code that is on the package. How are they different? Pick up any package of food in your pantry. How many numbers can you find? Do you know what they mean?

## Check it Out!

For a lot of cool math activities for upper elementary grades, check out The Math Forum for Elementary School Teachers Place <http://forum.swarthmore.edu/teachers/elem/>

## Did you know?

Did you know that over one million earths would fit inside the sun?

Did you know that at the Sugar Sand Science Playground in Boca Raton, Florida, children can crawl and scramble along a three-dimensional variant of a Mobius strip?

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## Welcome to **Math Reader!**

Geography is the study of the earth and its life. Geographers take measurements of climate, weather, land and many other aspects that affect our planet. Mathematics is an important part of the study and we hope you'll enjoy reading about the connections it has to geography.

We at Math Reader would like to encourage you to send us your solutions to the puzzles and problems. We'd like to share them with the readers.

Sincerely,

*Hiroko K. Warshauer*

Hiroko K. Warshauer



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