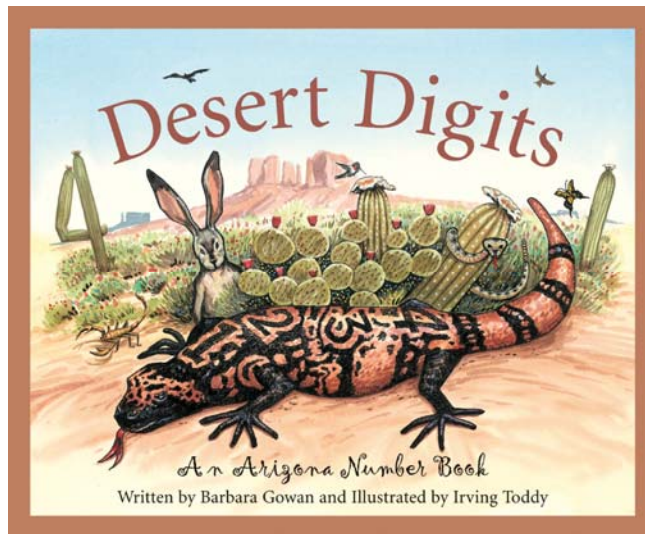


Teacher's Guide



Desert Digits An Arizona Number Book

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BUTTERFLY MATH

A **pair** is a **set of two** things that match or belong together like a pair of shoes or a pair of mittens. Insects are animals with pairs of antennae, wings, and legs.

A butterfly has one pair or 2 antennae, two pairs or 4 wings, and three pairs or 6 legs.

How many...

antennae on one butterfly? _____

legs on three butterflies? _____

wings on two butterflies? _____

legs on one butterfly? _____

antennae on three butterflies? _____

wings on one butterfly? _____



0 1 2 3 4 5 6 7 8 9

Number Writing

There are different ways to name numbers.

You can use symbols called numerals or digits – *12,633*.

You can use words – *twelve thousand, six hundred and thirty-three*.

Or you can write in **expanded notation**, which breaks the number down into its **place value** or parts - units or ones, tens, hundreds, thousands, and higher.

In expanded notation, 12,633 is written $10,000 + 2,000 + 600 + 30 + 3$

12,633 feet is the height of Humphreys Peak, the tallest mountain in Arizona.

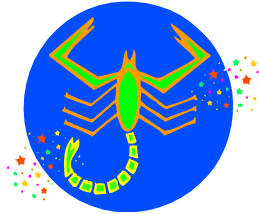
Write these Arizona numbers in expanded notation.

1. **21** – number of Indian tribes in Arizona
2. **135** – number of mammal species in Arizona
3. **277** – number of miles of Colorado River in the Grand Canyon
4. **798,200** – number of bales of cotton grown in Arizona

Skip Counting

Counting the legs on a scorpion "by twos" is an example of skip counting. In this pattern, you skip or jump over the next number in line.

1 2 3 4 5 6 7
8 legs on a scorpion



Can you identify the pattern and determine the next number in these number strings?

1. 10, 20, 30, 40, 50, _____

pattern- _____

2. 5, 10, 15, 20, 25, _____

pattern- _____

3. 9, 12, 15, 18, 21, _____

pattern- _____

4. 21, 25, 29, 33, 37, _____

pattern- _____

5. 2, 3, 5, 8, 12, _____

pattern- _____

Make up your own pattern and number string problem.

Colorado River measurements go metric!

There are many characteristics of the Colorado River that can be measured such as length, width, depth, and velocity. The average velocity or speed of the river is 4.2 miles per hour, which means that if you were floating in the river, you would travel just over four miles in one hour. You could travel twice as fast through the swift moving rapids.

THE COLORADO RIVER WITHIN THE GRAND CANYON NATIONAL PARK

<i>Length (how long it is)</i>	277 miles
<i>Average width (distance across)</i>	300 feet
<i>Average depth (distance from the surface to the bottom)</i>	40 feet
<i>Greatest depth (deepest point in river)</i>	85 feet
<i>Average velocity (speed at which the river flows)</i>	4.2 miles per hour

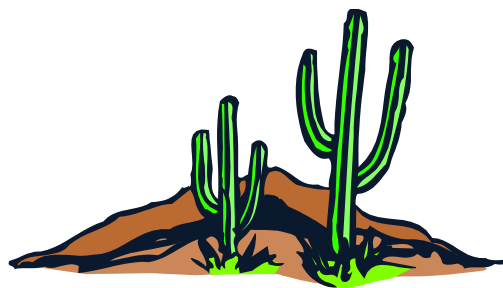
These measurements of miles and feet are given in the U.S. customary system that is only used in the United States. There are many foreign visitors to the Grand Canyon who would not easily understand these measurements. The metric system is used worldwide except in the United States. Can you convert these measurements to kilometers and meters of the metric system?

1 mile = 1.60934 kilometers (km.) - **round to 1.61 km.**
 1 foot = 30.48 centimeters (cm.) = .3048 meters (m.) - **round to .305 m**

USE A CALCULATOR TO HELP YOU SOLVE THESE PROBLEMS!

THE COLORADO RIVER WITHIN THE GRAND CANYON NATIONAL PARK

- Length (how long it is)* _____ km.
 - Average width (distance across)* _____ m.
 - Average depth (distance from the surface to the bottom)* _____ m.
 - Greatest depth (deepest point in river)* _____ m.
- Average velocity (speed at which the river flows)* _____ km. per hour



Spanish Words

Read the text to discover the meaning of these Spanish words. Match the Spanish word to its English translation.

___ 1. *tortilla*

___ 2. *masa*

___ 3. *comal*

___ 4. *mantequilla*

___ 5. *taco*

___ 6. *piñata*

___ 7. *dulces*

___ 8. *juguetes*

___ 9. *palo*

A candy or sweets

B butter

C bat

D thin, flat bread

E toys

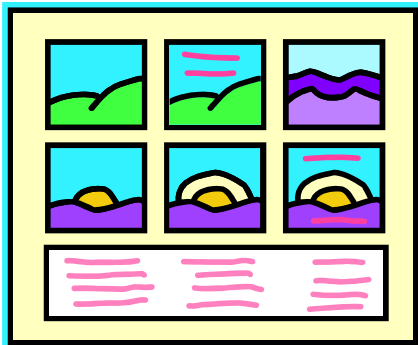
F heavy, round griddle

G corn flour

H party decoration made of papier-mâché and tissue paper

I tortilla filled with meat, cheese, or beans

What other Spanish words do you know? List them.



Weather Predictions

Arizona is known for its hot weather in its deserts but as you climb in elevation to the mountains, the temperature gets colder. The temperature decreases or drops about 4 degrees for every increase in 1,000 ft. elevation.

	Phoenix	Payson	Flagstaff
Elevation	1,110 ft.	5,000 ft.	7,006 ft.

<u>January</u>	Phoenix	Payson	Flagstaff
Average high temp.	66		42
Average low temp.	41		15
<u>July</u>			
Average high temp.	106		82
Average low temp.	81		51

Calculate the temperature averages for Payson.
HINT: What is the difference in elevation between Phoenix and Payson? Round to the nearest thousand.

HINT: The temperature drops about 4 degrees for every increase in 1,000 ft. of elevation. From the Phoenix temperatures, subtract 4 degrees for every thousand-foot difference.

Arizona Animals - Who Am I?

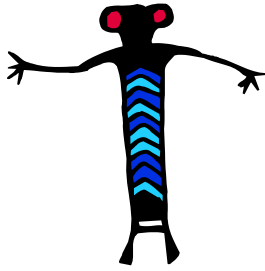
Match the animal to its description.

- ___ 1. *Who am I?* I am the largest lizard in the United States.
- ___ 2. *Who am I?* I smell with my knobbed antennae and taste with my legs.
- ___ 3. *Who am I?* My heart beats up to 1,200 times in a minute so I can fly as fast as a car.
- ___ 4. *Who am I?* At the end of my long, curved tail is a sharp stinger that injects deadly poison.
- ___ 5. *Who am I?* I am a flying mammal that can consume 600 mosquitoes in one hour.
- ___ 6. *Who am I?* When frightened, I can leap up to 20 feet.
- ___ 7. *Who am I?* Using twigs and cones, I build basketball-size nests in the ponderosa pine forest.
-

- A. Abert's squirrel
- B. bat
- C. Gila monster
- D. hummingbird
- E. jackrabbit
- F. scorpion
- G. butterfly

Write a *Who am I?* clue about your favorite Arizona animal.

Who am I?



Design a Gila monster with your favorite digits

The study of numbers, shapes, and symbols is **mathematics**. Mathematics began with counting. At first, people made notches on a stick or tally marks on the ground to help them remember **numbers**. Later on, they developed ways of writing numbers using signs or symbols called **numerals**. The numeral for writing the number one is "1". A **digit** is another word for numeral. The ten digits - 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 - can be used to create all numbers.

Look carefully at the front book cover. Illustrator Irving Toddy painted digits on the Gila monster. Design a Gila monster with your favorite digits.



Drivers on Route 66 would travel through 8 states on their journey from Chicago, Illinois to Los Angeles, California.

STATE	MILEAGE
Illinois	295
Missouri	302
Kansas	15
Oklahoma	408
Texas	195
New Mexico	535
Arizona	400
California	332

Use this information to create a bar graph. Put the STATES across the bottom and the MILEAGE along the side. Each square should equal 50 miles. Round your mileage numbers to the nearest "ten" to make it easier to graph. Missouri with 302 miles would round to 300. Color in six squares to equal 300 miles ($6 \times 50 = 300$) in the Missouri bar. *HINT:* If the number is not exactly 50, color in the fraction of the bar that best represents the number.



Calling All Spelunkers!

Spelunkers enjoy exploring and studying caves. One of Arizona's newest state parks is Kartchner Caverns located near Benson in southeastern Arizona. Visitors can explore these magnificent caves by taking guided tours of the Big Room or the Rotunda/Throne Room. Other park highlights include the Discovery Center, Hummingbird Garden, picnic areas, and hiking trails. The Arizona State Park system celebrates its 50th anniversary in 2007.

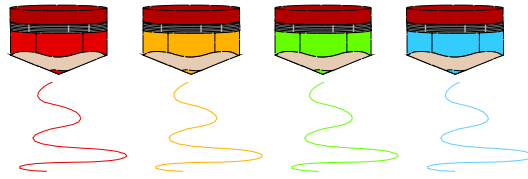
Take a virtual tour of the caves and then design a poster for Kartchner Caverns to encourage visitors to discover this park.

www.explorethecaverns.com/cave.html

Create a Cave and How Do Bats Do That? lesson plans are available online and a curriculum guide (CD ROM format) is available through the Outreach Education Coordinator of the Arizona State Parks.

www.explorethecaverns.com/education.html

Write a Rock Art Story



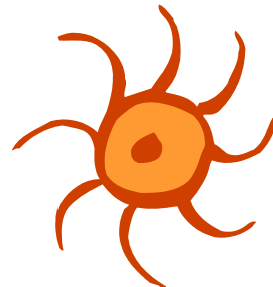
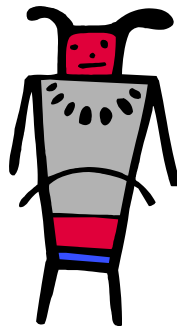
Today writers use words to tell stories, but the prehistoric people used pictures or symbols painted on and carved into rocks. Pictographs and petroglyphs can be found throughout Arizona and the Southwest. American Indian symbols are hundreds of years old and difficult to interpret because their meanings may change from tribe to tribe and from one region to another. These resources will help students decode Indian rock art.

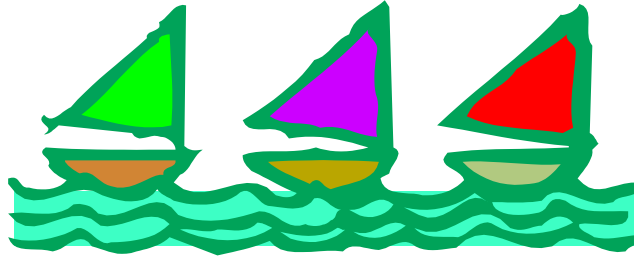
Before You Came This Way by Byrd Baylor
Easy Field Guide to Rock Art Symbols of the Southwest by Rick Harris
Easy Field Guide to Southwestern Petroglyphs by Elizabeth C. Welsh
If Rocks Could Talk by Jane Bush
Native American Rock Art: Messages from the Past by Yvette LaPierre
Stories in Stone: Rock Art Pictures by Early Americans by Caroline Arnold

www.desertusa.com - *Ancient Rock Art Still a Mystery*
www.nps.gov/pefo - For Teachers - *Messages on Stone*
www.petroglyphs.us

Students can write their own rock art story using the ancient Indian symbols or create modern symbols that represent their world today.

Crumple brown paper (lunch bags work well), smooth it out and stain it with a thick mixture of instant coffee. Let dry overnight. Using yucca brushes made by fraying the tips of the yucca leaf (or a regular brush), paint the symbols in a cluster or a panel. On a separate paper, write the story using words. See if classmates can decipher the rock art stories and match them to the written stories.





Lake Havasu Fun

Survey and Graph

Sailboat? Houseboat? Ski boat? Which is your favorite type of boat? Survey 25 students to find the type of boat that is their favorite. Use the data you collected to make a bar graph showing your results. Make sure you label your graph and make it colorful.

Sailboat

Houseboat

Ski boat



Desert Digits Answer Key

Butterfly Math answers

1 pair or 2 antennae, 9 pair or 18 legs, 4 pair or 8 wings, 3 pair or 6 legs, 3 pair or 6 antennae, 2 pair or 4 wings

Number Writing answers

$$21 = 20 + 1$$

$$135 = 100 + 30 + 5$$

$$277 = 200 + 70 + 7$$

$$798,200 = 700,000 + 90,000 + 8000 + 200$$

Skip Counting answers

1. Pattern: add 10 60
2. Pattern: add 5 30
3. Pattern: add 3 24
4. Pattern: add 4 41
5. Pattern: add 1 then 2 17

Colorado River measurements go metric! Answers

Length = 445.97 kilometers

Average width = 91.5 meters

Average depth = 12.2 meters

Greatest depth = 25.9 meters

Average velocity = 6.76 kilometers per hour

Spanish Words answers

1. D 2. G 3. F 4. B 5. I 6. H 7. A 8. E
9. C

Weather Predictions answers

	Payson	Mt. Lemmon	Mt. Graham
	Elevation 5,000 ft.	8,800 ft.	10,720 ft.
JANUARY			
Average high temp.	50	34	26
Average low temp	25	9	1
JULY			
Average high temp	90	74	66
Average low temp.	65	49	41

Arizona Animals - Who am I? answers

1. C 2. G 3. D 4. F 5. B 6. E 7. A