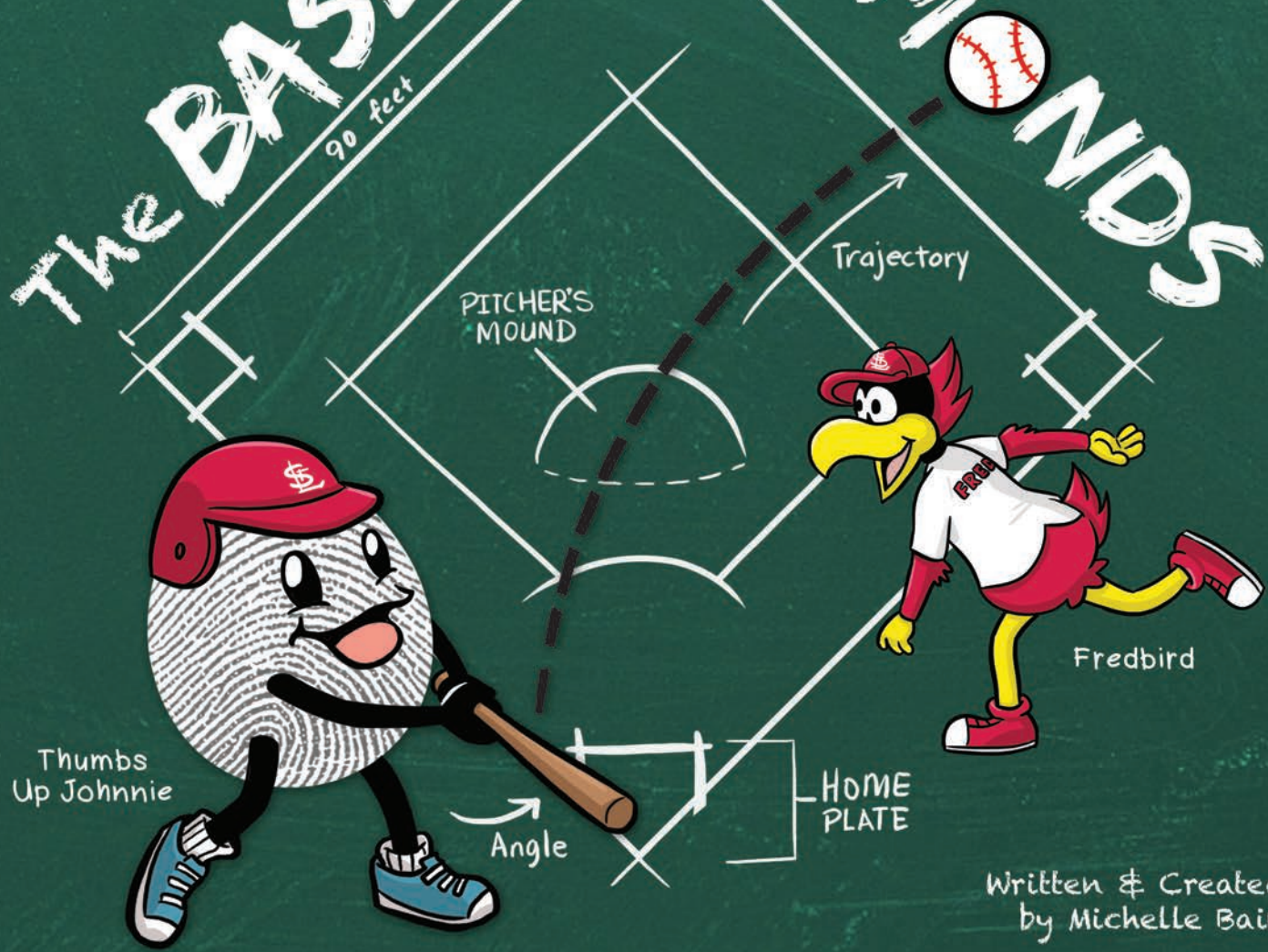


THE BASES of DIAMONDS



Thumbs
Up Johnnie

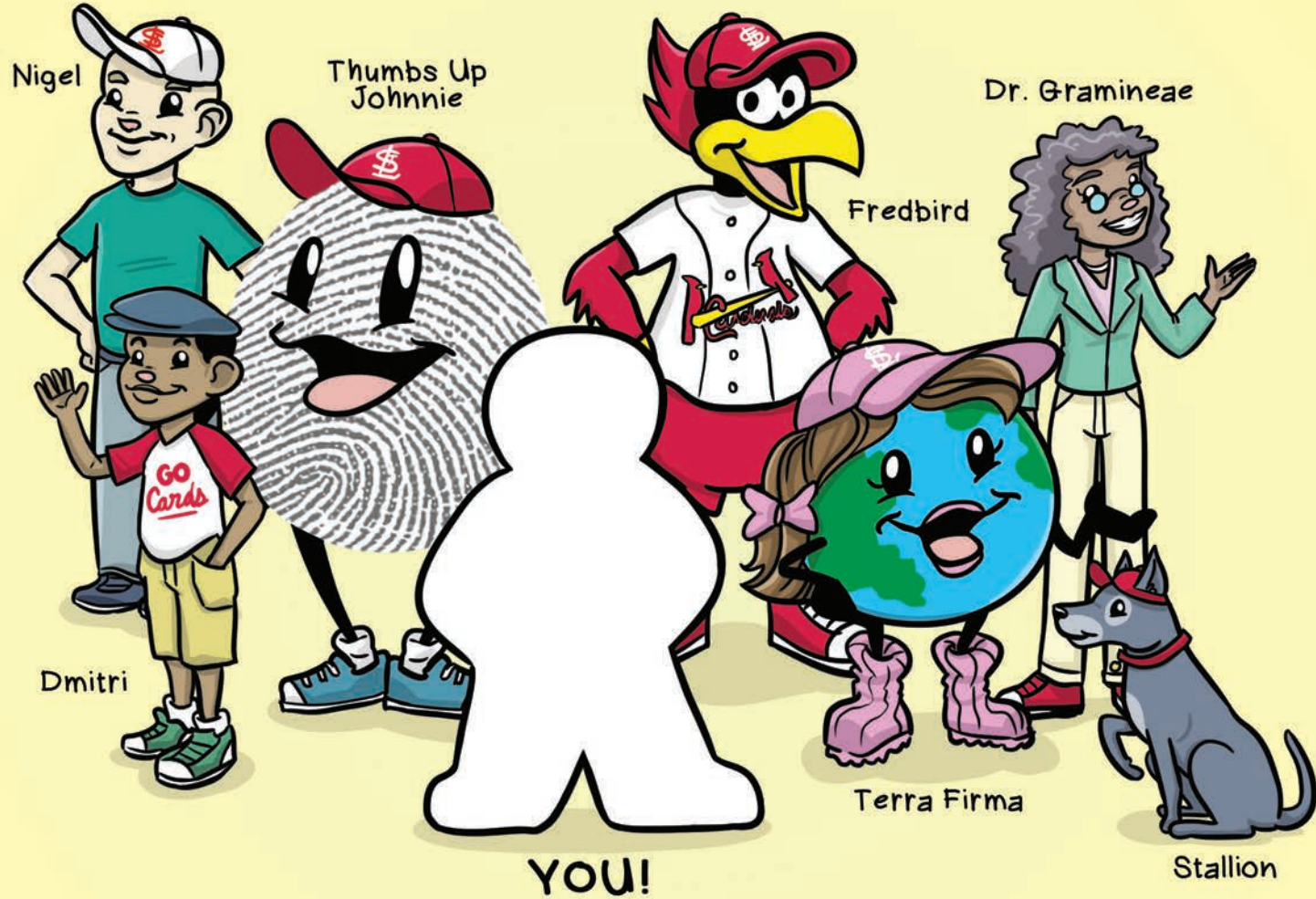
Fredbird

Written & Created
by Michelle Bain

Illustrated
by Fox Smith



DRAW YOURSELF AS PART OF...



THE *Cardinals* GROUNDS CREW!

On a cold winter day, Thumbs Up Johnnie and his friends Fredbird, Dmitri and their pup Stallion couldn't wait for the Cardinals' Opening Day at Busch Stadium. It was only 77 days away!



Time flew by. Before they knew it, Opening Day was just around the corner! Thumbs Up Johnnie, Fredbird and Terra Firma volunteered to help the grounds crew team. Nigel "the Computator" and Dr. Gramineae, or Dr. Gram, had a plan to get the field in "batter up" shape!

Nigel

OPENING DAY FIELD TO DO'S!

Dr. Gramineae (Dr. Gram)

- | | |
|----------------------------------|--------------------------------|
| <input type="checkbox"/> hedge | <input type="checkbox"/> tamp |
| <input type="checkbox"/> drag | <input type="checkbox"/> grate |
| <input type="checkbox"/> water | <input type="checkbox"/> rake |
| <input type="checkbox"/> trim | <input type="checkbox"/> tarp |
| <input type="checkbox"/> seed | <input type="checkbox"/> clay |
| <input type="checkbox"/> mow | |
| <input type="checkbox"/> line | |
| <input type="checkbox"/> measure | |

to VOLUNTEER (verb): to help by spending your free time working or doing a task without being paid

GRAMINEAE (gram-in-A-ee): a large family of grasses, collectively called **grass**.

2 COMPUTATOR (noun): a person who is good at computing or calculations.

GEOMETRY of the FIELD

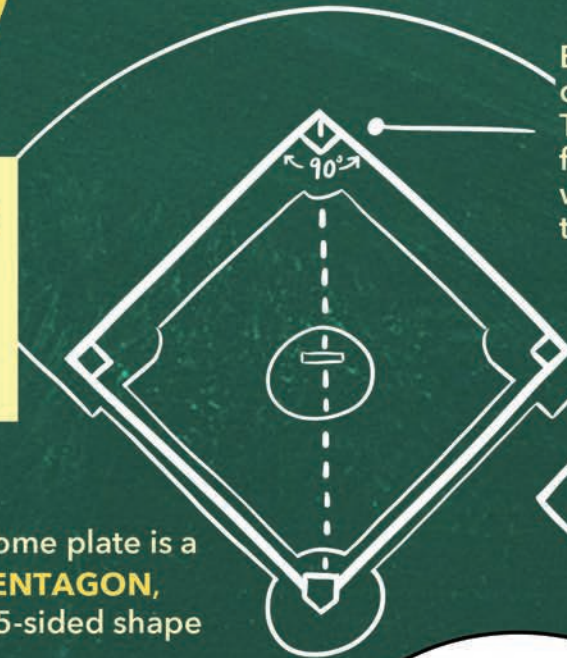
Dr. Gram was an expert on baseball fields, from home plate to the outfield wall. She explained to the volunteers that the game of baseball and the field was full of science and math with cool measurements, shapes, angles and facts.



A baseball is a **SPHERE**, a round shape where every point on its surface is the same distance to its center.

GEOMETRY:

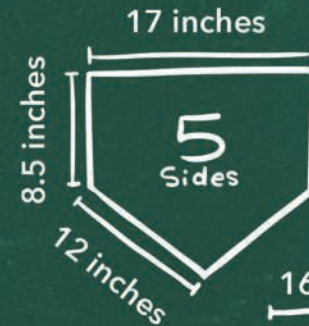
a type of math that works with the shape, size and position of figures in space.



Each corner of the baseball diamond is **90 degrees**. That means if you were to fold it in half either way, it would form two triangles that are the same.



Infield is a **DIAMOND**, a 4-sided shape similar to a square but flipped on its side



Home plate is a **PENTAGON**, a 5-sided shape



First, second and third base are **SQUARES**

Wow! I can't believe how much goes into the field to make it "fair play" for everyone traveling from field to field!

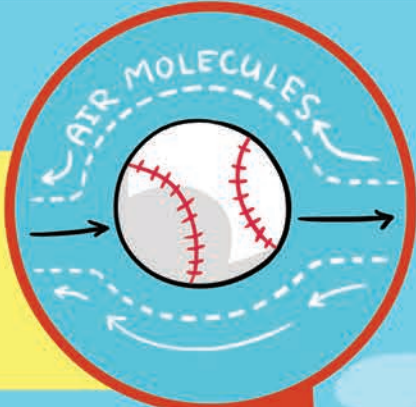


THE SCIENCE OF THE GAME

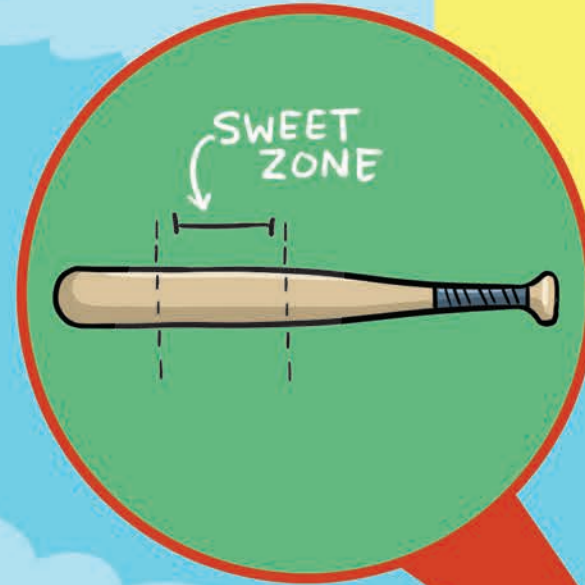


Terra Firma and Nigel explained that science was everywhere in baseball, from the ball flying through the air when it's pitched, to the player swinging the bat, to the trajectory of a home run!

As a baseball flies through the air, it pushes air molecules out of the way. They pass along the side of the ball, then come together again behind it, creating **drag** that slows the ball as it travels toward the batter.



SPEED (verb):
to move very fast.



The **Sweet Zone** on a bat is the area that hits the ball the fastest, makes the smallest amount of sting in the batter's hands and transfers the most energy from the batter's swing into the ball when hit.



About 70 baseballs are used during a typical game.



The **trajectory** is the path that the baseball follows as it flies through the air.



All ABOUT the INFIELD

Nigel "the Computator" was in charge of measuring the baseball field for Opening Day. He explained to the volunteers that he uses diagrams and measuring tape to make sure the lines on the field are accurate and follow baseball's rules.

DID YOU KNOW?



A foot measurement was once measured by actual people's feet.

Second base is the most often stolen base.

ACCURATE (adjective): to be exact and correct in every detail.

90 feet

60 feet and 6 inches

Stallion

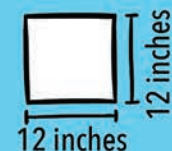


EVOLUTION of the BASES

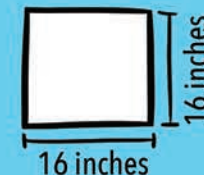


First, second and third base are shaped like a square and made of rubber. While they used to be a little smaller, they are now 16 by 16-inch squares.

1849-1900



NOW



The other bases are squares, but why is home plate shaped differently?

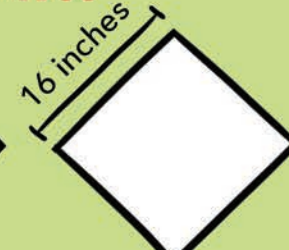
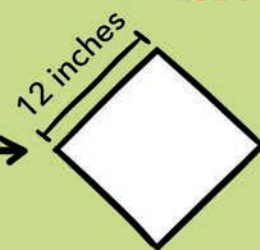
That's a great question, Dmirti! When people first played, anything round could be home plate. This shape makes the edges of the strike zone easier to see for the pitchers and umpires.



Before 1899



1899-1900



NOW



In 1900-1901 Robert Keating introduced the pentagon shape to help make home plate more visible, and required that the plate be made of rubber.

EVOLUTION (noun): the gradual change of something from one form into another.

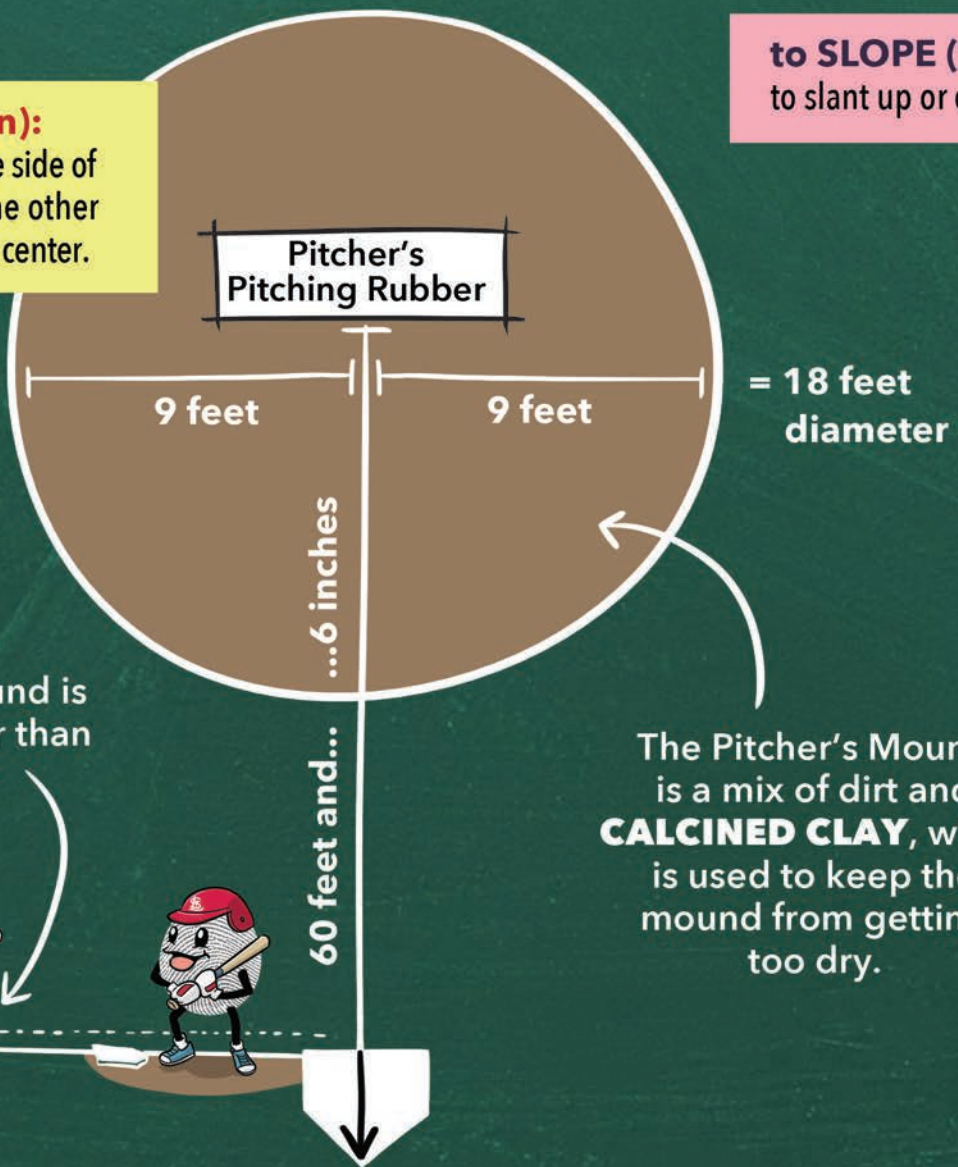
The name "Home Plate" came from the 1800s when a plate or dish was used for the base!

A PICTURE OF THE PITCHER'S MOUND

Dr. Gram and Nigel made a diagram of the Pitcher's Circle to make sure the measurements and the mound were at the perfect level. The volunteers filled in the dirt and added Calcined Clay to keep the moisture in the mound.

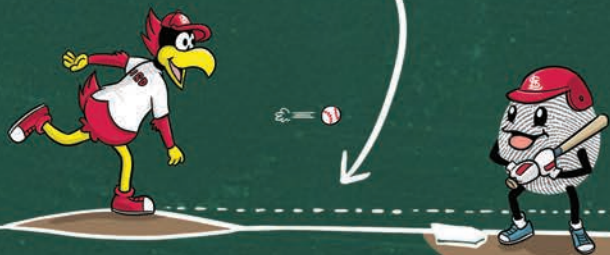
DIAMETER (noun):

a straight line from one side of a circle or sphere to the other that passes through its center.



to **SLOPE** (verb):
to slant up or down.

The Pitching Mound is **10 inches** higher than Home Plate



The Pitcher's Mound is a mix of dirt and **CALCINED CLAY**, which is used to keep the mound from getting too dry.

HOMETOWN NUMBERS

FIRST GAME AT THE CURRENT BUSCH STADIUM WAS **April 10, 2006**

The Cardinals have won more than **9,900** games and **11** World Series Championships

BUSCH STADIUM CAN SEAT **46,000** PEOPLE

Opening Day was just a few days away and everyone on the grounds crew team had a very important job. They had to use teamwork to get the field in perfect shape!

GAME DAY PREP

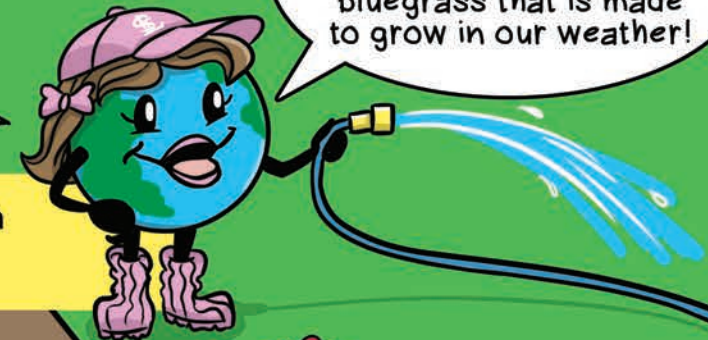
MOWING to keep the grass trimmed and clean so the players can run easily on it. Sometimes designs are mowed into the outfield!



TAMPING to pack dirt and clay down around the plate and bases.



I have to make sure to water the infield and the outfield. It is a special Kentucky bluegrass that is made to grow in our weather!

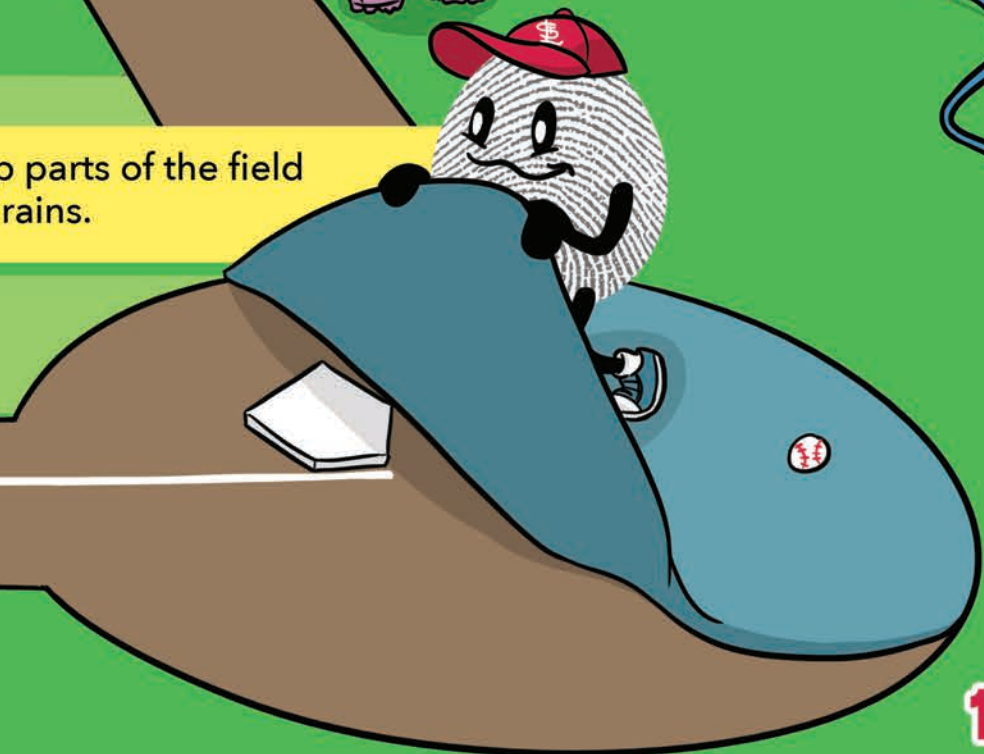


WATERING to keep the grass on the field green and healthy.

LINE CHALKING to draw the lines on the baseball diamond that separate fair territory from foul territory.



TARP to keep parts of the field dry in case it rains.



MEASURING to make sure the field is accurate and measured to baseball's rules.

After all their hard work on the baseball field, the Cardinals Grounds Crew decided it was time to “catch” some playing time! Fredbird walked onto the pitcher’s mound, looked around at his friends and said, “Well, batter up... the field sure looks like a home run from here!”



Fill in the letters to spell the word of the shape.



P _ _ T A _ O _



D _ _ M O _ _



_ Q _ _ R _

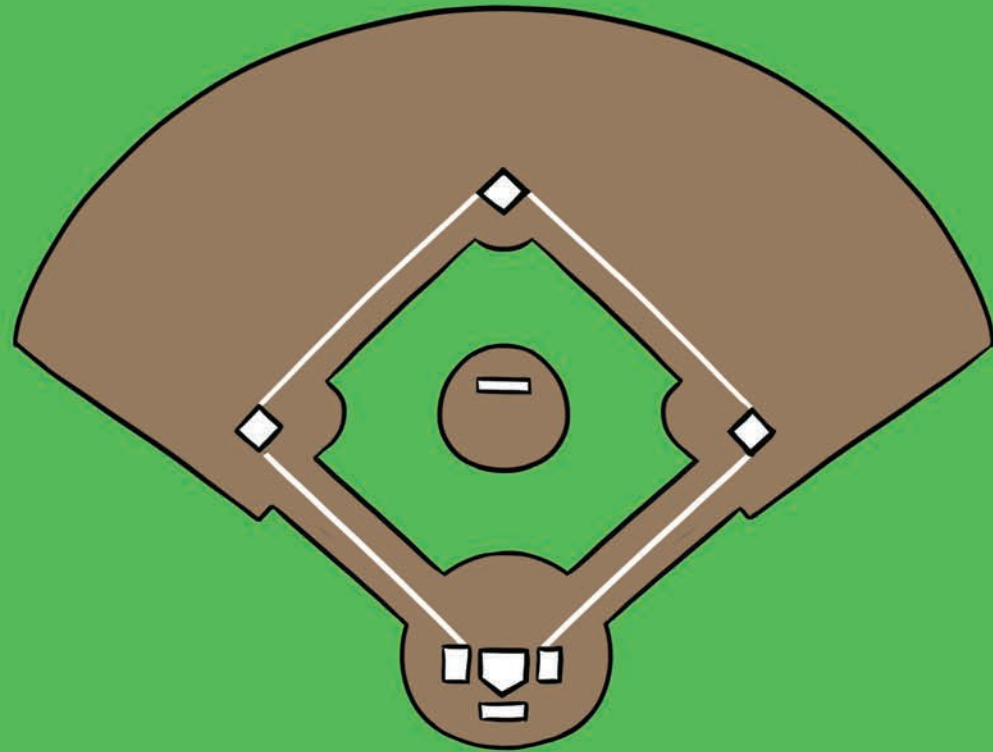


Help Stallion find all of the Baseballs throughout the book! Go back and count how many baseballs you can find.

I found _____ baseballs!

DESIGN THE OUTFIELD!

Draw what you and your friends would mow into the field.



WORD FIND

Circle the words below in the puzzle.

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

- BASEBALL
- EVOLUTION
- GEOMETRY
- MOUND
- STADIUM
- TAMP
- TRAJECTORY
- VOLUNTEER



Draw a **trajectory** line from Johnnie's bat to each baseball he hit! 15

ALL ABOUT ME!

My name is _____.

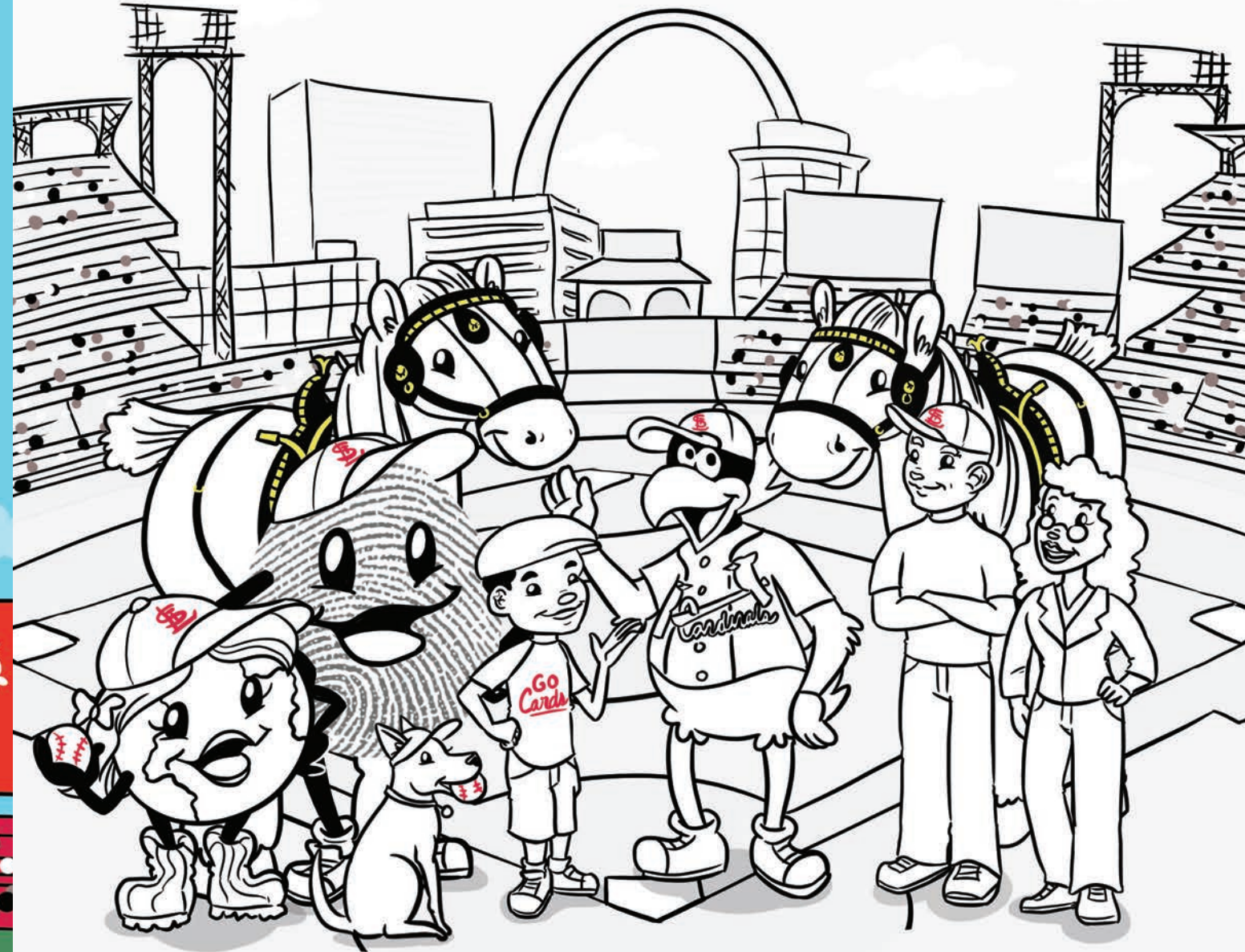
I am _____ years old.

My favorite thing about baseball is...

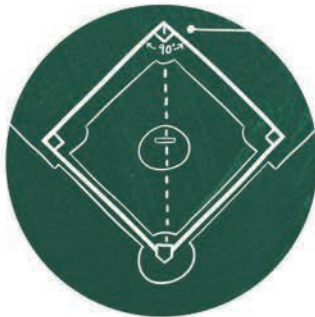
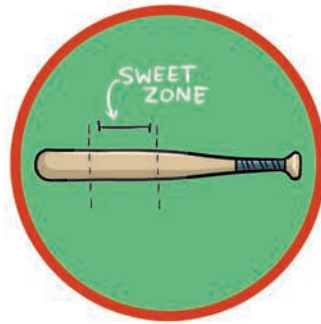
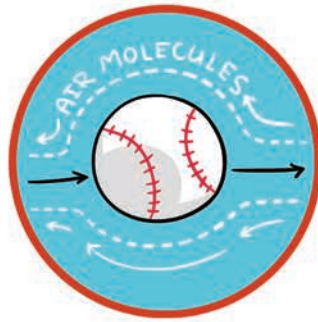
DRAW YOURSELF HITTING A HOME RUN!



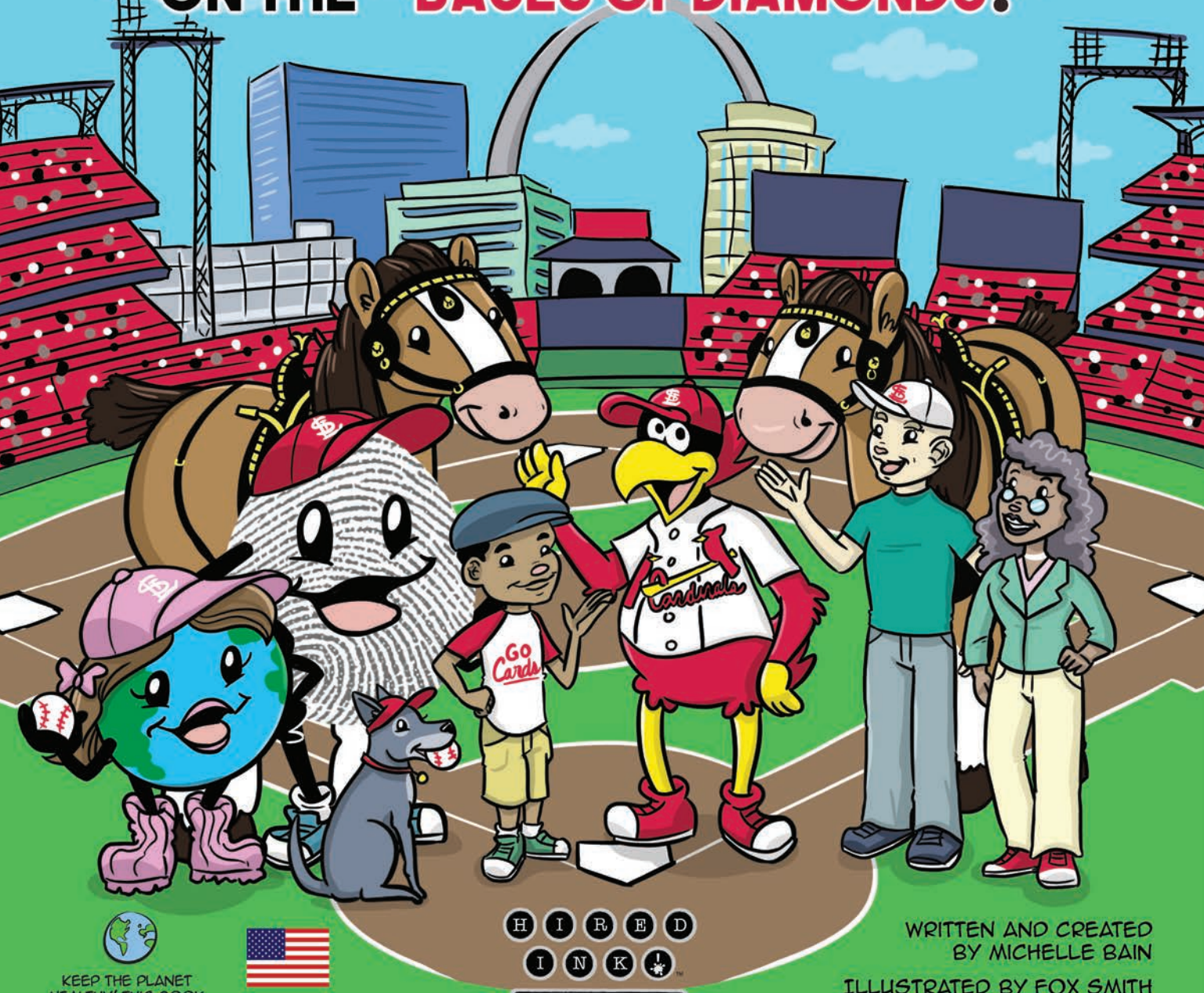
COLOR THE *Cardinals* GROUNDS CREW ON OPENING DAY!



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LET'S PLAY BALL... ON THE "BASES OF DIAMONDS!"



KEEP THE PLANET
HEALTHY! THIS BOOK
WAS PRINTED ON
RECYCLED PAPER!



MADE IN
THE USA

H I R E D
I N K

compose • create • curate

HIREDINK.COM

WRITTEN AND CREATED
BY MICHELLE BAIN

ILLUSTRATED BY FOX SMITH

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