ASCEND
SUMMER HOMEWORK
RISING 6TH GRADE

Dear Families,

In this packet, you will find reading, math, and science activities for your scholar to complete over the summer. These activities are meant to challenge your scholar's thinking, while also being fun and engaging. Please feel free to complete this work alongside your scholar, asking questions and taking part in conversation as you go. This will make the experience even richer!

Research shows that kids who read over the summer are much more prepared for the next school year than those who do not. **For this reason, in addition to our selected book, your scholar should read 2-3 other age-appropriate books over the summer**. Your scholar will be better off if they complete these chapters and activities over time throughout the summer—switching back and forth between reading, math, and science—than if they try cramming them into the last few days.

Thank you for supporting your scholar's learning. Together, we can push them to new heights!

Ascend Public Charter Schools

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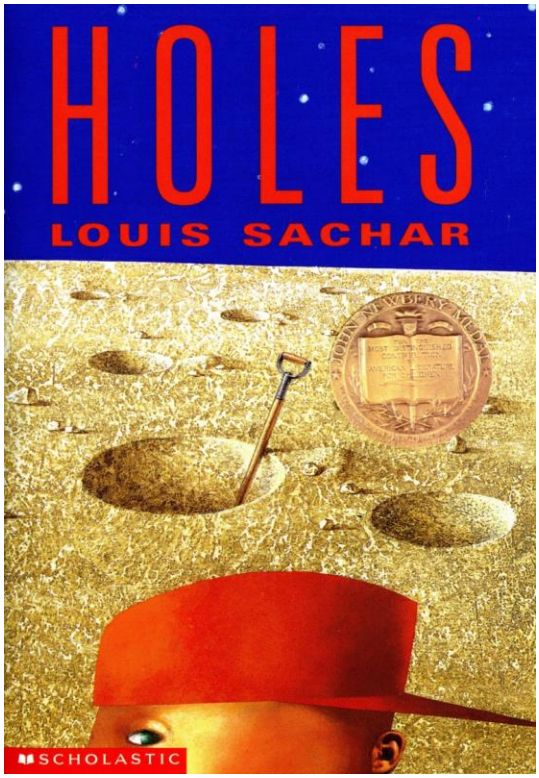
RISING 6TH GRADE ENGLISH



Holes by Louis Sachar

Name:_____

Parent Signature:_____

Directions:

As you read *Holes* by Louis Sachar, complete the questions and activities using the strategies you have been taught and the book. Submit this packet to your English teacher on the first day of school. Happy summer!

Chapters 1-5

In these first chapters, we learn about Stanley Yelnats and hear about a few other characters as well. Use the following table to collect information on the characters we've met or heard about so far.

Character	What do we learn about them?
Stanley Yelnats	
Stanley's father	
Stanley's great-grandfather	
Kissin' Kate Barlow	
Mr. Sir	
Mr. Pendanski	

Chapters 6-7

In chapter 6, Louis Sachar, the author of *Holes*, explains why Stanley ended up at Camp Green Lake. Reread these pages and then recount, in your own words, what Stanley did and what happened to him that led to him being sent to Camp Green Lake. Your response should be 4-6 sentences long and include some evidence from the story.

In chapter 7, Sachar chooses to flash back and forth between Stanley's experience digging holes at Camp Green Lake and Elya's experience with Myra Menke and Madame Zeroni. Why do you think the author chose to switch back and forth between these two parts of the story in the same chapter? You don't have to be right, but you have to explain your thinking carefully so your opinion is clear. Use 3-5 sentences.

Chapters 8-11

The **setting** refers to *when* and *where* a story takes place. We don't just want to understand what the setting is. We also want to know why it matters. To think about this, you can ask yourself, for example, how would this story be different if it were in a different time or place?

Describe the setting of Camp Green Lake. Try to be as specific as possible and feel free to refer back to the book to remind yourself of any details you need. Your response should be 3-5 sentences.

Why is the setting important to the story? How is it connected to the **plot** (what happens)? Provide two details from the story to support your response. Answer in 4-6 sentences.

Chapters 12-15

Read the following excerpt from page 71 of *Holes*.

> One thing was certain: They weren't just digging to "build character." They were definitely looking for something.
>
> And whatever they were looking for, they were looking in the wrong place.
>
> Stanley gazed out across the lake, toward the spot where he had been digging yesterday when he found the gold tube. He dug the hole into his memory.

The author of this book, Louis Sachar, ended this chapter this way on purpose because he knew it would make the reader want to know what might happen next. This choice by an author is called **foreshadowing**. Foreshadowing is when the author gives a hint or clue about what might come later in the story.

How is the excerpt above an example of foreshadowing? Use 4-6 sentences and provide two details from the story to support your response.

Chapters 16-19

Stanley received a letter from his parents and then wrote a letter to send back to them. However, in his letter, he doesn't tell them the truth about Camp Green Lake.

Why do you think Stanley decided to lie to his parents about what he is doing at camp? What motivates him to do this? Use 4-6 sentences and provide two details from the story to support your response.

Do you think Stanley is right to lie to his parents about what he is doing at Camp Green Lake? Answer in 2-4 sentences.

Chapter 20-23

Until this point, Zero has been almost entirely silent and very mysterious. What do you learn about Zero in chapter 22? Use 4-6 sentences and provide two details from the story to support your response.

Chapter 24-27

How did "Kissin' Kate Barlow" get her name? Review chapter 26 if you need a reminder. Use 4-6 sentences and provide two details from the story to support your response.

Chapters 28-30

What do you think is the real reason the boys are digging the holes at Camp Green Lake? Use 4-6 sentences and provide two details from the story to support your response.

Chapters 31-34

When we read stories, whether they are fictional or real, we want to consider what problems and challenges the characters face. We also want to pay attention to if and how the characters are able to solve their problems. In the first column of the table below, describe some of the main problems that Stanley faces (we've done three for you already ☺). In the second column, if the problem has been solved, either partially or all the way, describe how it was solved.

Problem/Challenge	Solution/Resolution
Stanley gets sent to Camp Green Lake.	
Stanley has no friends when he first arrives at Camp Green Lake.	
Stanley spills the sunflower seeds.	

Chapters 35-37

Figurative language is language that uses words or expressions with a meaning that is different from the *literal* interpretation. For example, instead of saying, "It was cold inside the store." You could say, "The store was a refrigerator inside." This doesn't mean that the store was *literally* a refrigerator. It is just a way of describing how cold it is.

Authors use figurative language all the time in order to make their writing more interesting and to get their points across.

On page 166, Louis Sachar writes:

> *When they reached flat ground, Stanley looked up to see the sun, a fiery ball balancing on top of Big Thumb. God was twirling a basketball.*

In 3-4 sentences, explain how this is an example of figurative language.

In 3-4 sentences, explain why you think Sachar chose to use figurative language here, instead of just saying, "Stanley saw the mountain and the sun."

Chapters 38-42

A **coincidence** is when two things strangely or remarkably happen at the same time or in the same place or way, but without reason or other logical connection. For example, if you and your friend run into each other in a big city, and you didn't plan it, that would be a coincidence. **Destiny** is a hidden power that people sometimes believe controls what will happen in the future.

On page 187, Stanley thinks to himself, "When the shoes first fell from the sky, he remembered thinking that destiny had struck him. Now, he thought so again. It was more than a coincidence. It had to be destiny."

Stanley believes it was destiny to be hit by the falling shoes. In your own words, describe the difference between coincidence and destiny. It might be helpful to provide some examples. Use 4-6 sentences.

Do you believe in destiny? Explain your answer in 2-4 sentences.

Chapters 43-44

When he hears Zero's stories, how does Stanley feel about his own family? Use 3-4 sentences and provide at least one detail from the story to support your response.

How do the stories make you feel? Why? 2-4 sentences.

Chapters 45-49

What do you learn about the Warden in this chapter? 2-4 sentences.

How has your opinion about the Warden changed from the beginning of the book? 2-4 sentences.

Sachar ends chapter 49 by writing, "…and for the first time in over a hundred years, a drop of rain fell into the empty lake." Why do you think Sachar chose to end Part II with these words? Use 3-5 sentences and provide at least one detail from the story to support your response.

Chapter 50

How has Stanley changed from the beginning to the end of the story? Use 4-6 sentences and provide at least two details from the story to support your response.

Book Report

Title: _____

Author: _____

Main Characters (list as many as you think are important):

_____

_____

_____

Setting (when and where the story takes place.) Note: You may want to list multiple settings:

_____

_____

_____

Plot Summary (you can't include every little detail, so think about the most important parts – the main problems, solutions, turning points, exciting action). Your summary should be 7-10 sentences long.

_____

_____

_____

_____

_____

_____

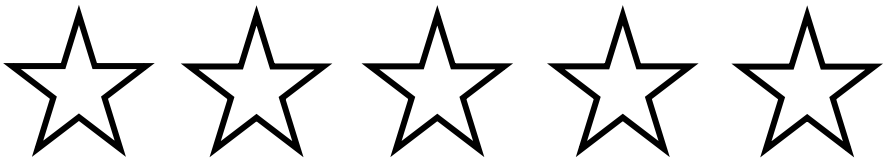
_____

_____

_____

_____

How many STARS would you give this book?



What was your favorite part about the story? Use 2-4 sentences. Be specific.

Would you recommend this book? _____

Why or why not?

RISING 6TH GRADE MATH

Name: _____

Have your child complete one page (one side), three times a week of the math packet. Please return this completed packet to your 6th grade teacher on the first day of school.

After your child has completed the math problems, if you feel like your child is still struggling on a certain concept and needs further practice, you can visit some of the websites listed on page 23.

Enjoy your summer!

Reminder - Practicing multiplication (up to 12) and division facts is VERY important!

I have checked the work completed:_____

Parent Signature

Here is what you are expected to know or be able to do:

1. Understand the meaning of division of whole numbers and how to check your answers through multiplication. Ex. 34 ÷ 5 = 6 r4, so 5 x 6 = 30 + 4 = 34.

2. Fluently multiply a multi-digit number by a two-digit number.

3. Divide up to a four-digit number by a two-digit number.

4. Understand a fraction as a statement of division. Ex. $2 \div 3 = \frac{2}{3}$

5. Multiply and divide 2 fractions.

6. Divide a fraction by a whole number and a whole number by a fraction.

7. Add and subtraction fractions using unlike denominators, using common denominators.

8. Multiply and divide by 10's, 100's and 1,000's using mental math.

9. Multiply up to 2-digits and decimals up to 2 digits.

10. Solve story problems with adding, subtracting, multiplying, dividing fractions and decimals.

11. Recognize the equivalence of 1 liter, 1,000 ml and 1,000 cm^3 and conversion between.

12. Understand volume; cubic centimeter (cm^3), cubic meter (m^3), cubic inches (in^3), cubic foot, (ft^3), and cubic yard (yd^3). Be able to compare one cubic inch to one cubic foot and one cubic centimeter to one cubic meter.

13. Convert measurements of length, weight, area, volume, and time within metric to metric and within standard measurement to standard measurement.

14. Read, interpret, and solve problems involving line graphs.

15. Construct line graphs from tables of data; including axis labels and scale.

Excellent websites for fun learning and reinforcement of math skills:

www.harcourtschool.com	Click the red box, select math, select HSPMath, select Michigan, click on the "5" ball or "6" ball for a challenge. Select a game.
www.aplusmath.com	Go under "Flashcards" or "Game Room" on the left side of the screen. They can practice adding, subtracting and multiplying. Very important to know the addition, subtraction and multiplication facts from memorization or within a couple seconds. There are also fun games to play!
www.mathisfun.com	Select games and pick a game to play.
www.aaamath.com	At the top pick "Fifth" or "Sixth" for a challenge. Choose any of the activities like multiplication then select "play" option toward the top of the screen. 20 Questions and Countdown games are good ones.
www.funbrain.com	Lots of fun games to choose from.

Other games and activities you can play:

• Take a deck of cards and remove the face cards (kings, queens, jacks). Aces are one. Divide the cards evenly among 2 players. Each player flips over a card. The first one to add the 2 numbers correctly the fastest wins the cards. After going through the pile of cards, the player with the most cards wins. You can do a multiplication version also.

6TH GRADE MATH BREAK PACKET

1. Find the products. This page should be completed in 3, no more than 4 minutes. Have someone time you. Any multiplication problem you do not know quickly, practice on flash cards

6	4	7	5	12	3	6	3	0	7	5	6	3	8
x2	x4	x2	x4	x0	x5	x3	x8	x8	x3	x5	x4	x9	x3
6	2	3	8	7	12	8	3	11	7	9	4	4	9
x5	x12	x6	x2	x5	x1	x4	x7	x4	x6	x2	x8	x6	x3
4	5	0	5	9	5	2	9	5	11	5	9	7	7
x7	x0	x3	x8	x4	x7	x1	x5	x6	x5	x9	x8	x7	x9
8	6	8	1	9	9	8	1	9	2	1	3	12	1
x8	x6	x7	x2	x6	x9	x6	x9	x1	x5	x1	x4	x3	x3
8	8	12	8	12	5	3	4	2	7	6	2	6	12
x0	x1	x4	x9	x0	x1	x2	x0	x2	x1	x8	x6	x7	x5
8	4	2	9	12	11	2	7	0	6	1	5	3	2
x5	x1	x8	x7	x8	x6	x9	x4	x2	x9	x0	x2	x3	x4
4	12	4	4	1	2	11	6	7	5	2	1	4	11
X9	x6	x2	x3	x4	x3	x7	x1	x8	x3	x7	x8	x5	x4

2. Find the quotients. This page should be completed in 3, no more than 4 minutes. Practice any problems you do not know instantly. Think of the multiplication fact family. The better you know your multiplication facts the easier division will be.

2)2	3)9	8)32	7)49	5)10	4)0	1)1	4)8	2)12	9)54	1)3	1)2	2)4
8)8	7)63	8)40	5)0	4)4	4)12	9)45	9)63	6)6	3)12	1)7	3)0	1)9
2)16	3)3	3)15	5)20	3)18	3)6	5)15	7)0	9)27	4)16	7)21	4)20	7)28
8)16	3)21	9)18	4)24	2)6	1)8	5)35	7)35	3)27	6)36	3)24	2)0	4)32
9)9	4)36	6)42	5)40	8)64	7)14	6)30	8)56	1)5	4)28	7)56	8)24	6)24

81 ÷ 9= _____	48 ÷ 6 = _____	18 ÷ 6 = _____	42 ÷ 7 = _____
10 ÷ 2 = _____	54 ÷ 6 =_____	36 ÷ 9 = _____	45 ÷ 5 = _____
72 ÷ 8 = _____	8 ÷ 2 =_____	72 ÷ 9 = _____	6 ÷ 1 =_____
25 ÷ 5 = _____	5 ÷ 5 = _____	18 ÷ 2 = _____	30 ÷ 5 =_____
12 ÷ 1 = _____	49 ÷ 7 = _____	21 ÷ 3 = _____	36 ÷ 6 = _____

Select the one best answer for each question.

3. Jennie was assigned this problem:

146
x25

She worked out the problem in this way:

146 x 2 = 292, and 146 x 5 = 730. Then she added 292 + 730. She knew that her answer was wrong because her answer seemed too small. What should she have done differently?

A. She should have multiplied 146 x 50 instead of 146 x 50.
B. She should have multiplied 146 x 20 instead of 146 x 2.
C. She should have multiplied 146 x 200 instead of 146 x 2.
D. She should have multiplied 140 x 2 instead of 146 x 2.

4. Find the product of 4,063 x 52? SHOW YOUR WORK.

5. Samantha has to read a book that is 525 pages long. She has 21 days to read the book. How many pages will she need to read each day to finish on time?

A. 21
B. 25
C. 546
D. 11,025

6. Andrew's family went on vacation driving across the United States. They traveled 515 miles every day for 17 days. How many miles did they travel in all?

A. 532
B. 4,120
C. 8,165
D. 8,755

7. Three classes of 25 students collected 8 cans of soup from each student. The cans were then to be divided between 4 charities. How many cans of soup went to each charity? *Show your work.*

8. Brent has a collection of 84 Bobble Head trophies he needs to box up for the move to his new home. He can fit 7 trophies into one box. How many boxes will Brent need? *Show your work.*

9. Kayla has 12 cousins. She received $15.00 from each cousin for her birthday. How much money did she receive in all?

A. $27
B. $120
C. $150
D. $180

10. The 5th grade is going on a trip to the state park. There are 1,012 students going. Each bus can hold 44 students. How many buses will they need? *Show your work.*

11. Find 1717 ÷ 17. *Show your work.*

A. 11
B. 101
C. 107
D. 1001

12. Solve 4806 ÷ 15. Show your work.

A. 32
B. 320 r 6
C. 320 r 4
D. 320

13. Solve 647 ÷ 21. Show your work.

A. 3 r 11
B. 3 r 21
C. 30 r 8
D. 30 r 17

14. Compare. Write < , >, or =.

1. $\frac{1}{2}$ ◯ $\frac{1}{4}$

2. $\frac{18}{3}$ ◯ $\frac{2}{3}$

3. $\frac{1}{2}$ ◯ $\frac{2}{5}$

4. $\frac{1}{5}$ ◯ $\frac{1}{10}$

5. $\frac{1}{4}$ ◯ $\frac{4}{12}$

6. $\frac{1}{2}$ ◯ $\frac{2}{7}$

15. Write each fraction in simplest form.

1. $\frac{8}{48}$

2. $\frac{18}{48}$

3. $\frac{12}{33}$

4. $\frac{4}{20}$

5. $\frac{3}{6}$

6. $\frac{14}{49}$

7. $\frac{12}{27}$

8. $\frac{5}{45}$

9. $\frac{6}{12}$

10. $\frac{10}{22}$

16. Write each improper fraction as a mixed number in simplest form.

1. $\frac{28}{11}$	2. $\frac{42}{8}$	3. $\frac{7}{2}$	4. $\frac{63}{10}$
5. $\frac{29}{7}$	6. $\frac{7}{5}$	7. $\frac{46}{12}$	8. $\frac{39}{9}$
9. $\frac{27}{4}$	10. $\frac{17}{3}$	11. $\frac{7}{6}$	12. $\frac{32}{11}$

17. Write each mixed number as an improper fraction in simplest form.

1. $1\frac{1}{3}$	2. $3\frac{4}{8}$	3. $5\frac{2}{11}$	4. $6\frac{1}{2}$
5. $2\frac{3}{10}$	6. $4\frac{11}{12}$	7. $6\frac{6}{9}$	8. $2\frac{6}{7}$
9. $3\frac{2}{5}$	10. $5\frac{3}{4}$	11. $4\frac{1}{6}$	12. $1\frac{2}{5}$

18. Find the sum. Write your answer in simplest form.

1. $2\frac{4}{7} + 5\frac{3}{7}$ = _____

2. $4\frac{1}{2} + 3\frac{1}{2}$ = _____

3. $5\frac{1}{6} + 4\frac{4}{6}$ = _____

4. $6\frac{1}{3} + 2\frac{1}{3}$ = _____

5. $3\frac{2}{5} + \frac{4}{5}$ = _____

6. $\frac{4}{9} + \frac{1}{2}$ = _____

7. $\frac{3}{7} + \frac{1}{2}$ = _____

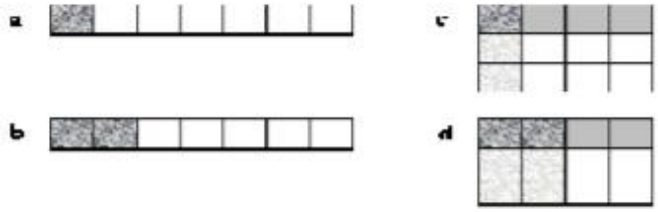
8. $\frac{1}{3} + \frac{1}{5}$ = _____

9. $\frac{2}{6} + \frac{2}{3}$ = _____

10. $\frac{3}{4} + \frac{10}{12}$ = _____

19. Which drawing would you use to find the product of these two fractions?

$$\frac{1}{4} \times \frac{1}{3} =$$



A. Drawing a
B. Drawing b
C. Drawing c
D. Drawing d

20. Solve this equation:

$$\frac{2}{3} \div 3 =$$

A. 2

B. 3

C. $\frac{2}{6}$

D. $\frac{2}{9}$

21. Model and solve the following:

$$\frac{1}{3} \div 4 =$$

A. $\frac{4}{3}$

B. $\frac{1}{7}$

C. $\frac{1}{12}$

D. 12

22. Model and solve the following equation:

$$2 \div \frac{1}{4} =$$

23. Mrs. Lovell's class is baking cookies. They need $3\frac{3}{5}$ pounds of sugar and $5\frac{1}{3}$ pounds of flour. When they mix the sugar and flour together, how many pounds will they have all together?

24. Solve.

$$\frac{7}{9} - \frac{3}{8}$$

25. Jill has ¾ of a yard of ribbon. Tammy has 4/7 of a yard. How much do they have together?

A. 7/11 of a yard
B. 40/28 of a yard
C. 1/3 of a yard
D. 37/28 of a yard

26. Paul had 3 7/8 cups of milk. He gave 1 ¾ cups of milk to his cat. How much milk did he have left? Show your work.

A. 2 cups
B. 2 1/8 cups
C. 2 4/4 cups
D. 1 7/8 cups

27. Nancy ate 1/3 of a pizza and Gabe ate ¼ of the pizza. How much of the whole pizza is left?

A. 7/12
B. 5/12
C. 2/7
D. 6/7

28. Choose the correct answer for this problem: $5/4 - 3/12 =$

A. 2/12
B. 12/12
C. 9/24
D. 2/48

29. Patty brought ½ of a cake to class, and Joe brought ¾ of a cake on the same day. How much cake did the class have altogether? Show your work.

A. ¼ cake
B. 1 cake
C. 4/6 cake
D. 1 ¼ cake

30. Don has $12.32 in his piggy bank. He collects and returns pop cans for $3.70. Approximately how much money does he have together? (Round the answer to the nearest whole dollar.)

A. $8
B. $15
C. $16
D. $17

31. Michelle earned $5.00 for every hour she babysat. Last week she babysat for 8 hours. She spent $12.00 of the money she earned. Which expression could be used to find how much money she had left?

A. $5.00 x 8 + $12.00
B. $5.00 + 8 - $12.00
C. $5.00 x 8 - $12.00
D. $5.00 x 8 ÷ $12.00

32. Ten fourth graders will each eat one – fourth of a pizza. How many pizzas need to be ordered for the ten students?

A. 2 pizzas
B. 3 pizzas
C. 4 pizzas
D. 5 pizzas

33. In the equation 1/3 + x = 5/12, what does x = ?

A. 4/9
B. 5/4
C. 1/12
D. 3/12

34. Solve for x:
11/12 – x = ¼

A. 10/12
B. 8/12
C. 10/8
D. 3/4

35. Solve for x: x + 1/3 = ¾

A. 2/1
B. 5/12
C. 4/7
D. 13/12

How much larger is one cubic foot than one cubic inch?

A. 3 times larger
B. 15 times larger
C. 144 times larger
D. 1728 times larger

Which of the following is NOT equivalent?

A. 1 ton = 2000 pounds
B. 1 mile = 5200 feet
C. 9 feet = 3 yards
D. 60 minutes = 3600 seconds

Sharon reads the juice bottle and finds that it contains 1.89 liters of juice. His cup only holds 240 milliliters so he wants to convert 1.89 liters to milliliters. The bottle contains how many milliliters?

A. 1.89 milliliters
B. 18.9 milliliters
C. 189 milliliters
D. 1890 milliliters

. Which is true?

A. 0.07 is ten times greater than 0.7
B. 0.070 is ten times greater than 0.007
C. 0.070 is equal to 0.0070
D. 0.07 is seven times greater than 0.70

Which of the following is a true statement?

A. 0.003 is 1/3 the value of 0.03
B. 0.003 is 3 times the value of 0.03
C. 0.003 is 1/10 the value of 0.03
D. 0.003 is 10 times the value of 0.03

701 - 35	68 - 27	100 - 37	63 - 47	35 -15	114 - 37	66 - 24

36.1 x 3.7	0.47 x 68	5.9 x 39	0.28 x 1.8	19 x 4.7	5.6 x 3.6	78 x .37

Philip solved the following problem incorrectly. Explain his mistake.

1659
x 21
1659
+3318
4977

Philip solved the following problem incorrectly. Explain his mistake.

1659
x 21
1659
+3318
4977

Use mental math to solve:

400 x 3 = _____ 60 x 60 = _____ 8,000 x 20 = _____

1600 ÷ 80 = _____ 250 ÷ 50 = _____ 12000 ÷ 400 = _____

113. Nancy and Gabe had a pizza with 12 pieces. Brent ate 1/3 of a pizza and Kayla ate ¼ of a pizza. How much of the whole pizza **is left?** Show your work.

_____

114. Show which is larger, smaller or equal using the less than symbol (<), the greater than symbol (>), or the equal sign (=).

1 in.^{3}_____ 1 ft.^{3}

1 cm.^{3}_____ 1 m.^{3}

2 ft.^{3}_____ 1 yd.^{3}

Do the following divisions. Then check your answer. Show your work. No calculators!

Check your work:

A. $1524 \div 6 =$ _____

$\underline{\quad x \quad 6}$
1524

B. $380 \div 10 =$ _____

$\underline{x \quad 10}$
380

C. $4235 \div 10 =$ _____

x_____

D. $4)\overline{769}$

x_____

E. $5)\overline{765}$

x_____

Any multiplication problem you do not know quickly please practice on flash cards.

4	5	3	5	9	5	7	9	5	11	6	9	7	7
x7	x0	x3	x8	x4	x7	x1	x5	x6	x5	x6	x8	x7	x9

2)16	3)3	3)15	5)20	3)18	3)6	5)15	7)56	9)27	4)16	7)21	4)20	7)28

6	4	7	5	12	3	6	3	0	7	5	6	3	8
x2	x4	x6	x4	x12	x5	x3	x8	x8	x3	x5	x4	x9	x4

72 ÷ 8 = _____ 8 ÷ 2 = _____ 72 ÷ 9 = _____ 6 ÷ 1 = _____

8)16	3)21	9)18	4)24	2)6	1)8	5)35	7)35	3)27	6)36	3)24	2)0	4)32

6	8	4	4	1	8	11	6	7	5	2	6	4	11
X9	x8	x9	x3	x4	x3	x7	x5	x8	x3	x7	x8	x5	x4

Coordinate System

Directions: Write the point that is located at each ordered pair.

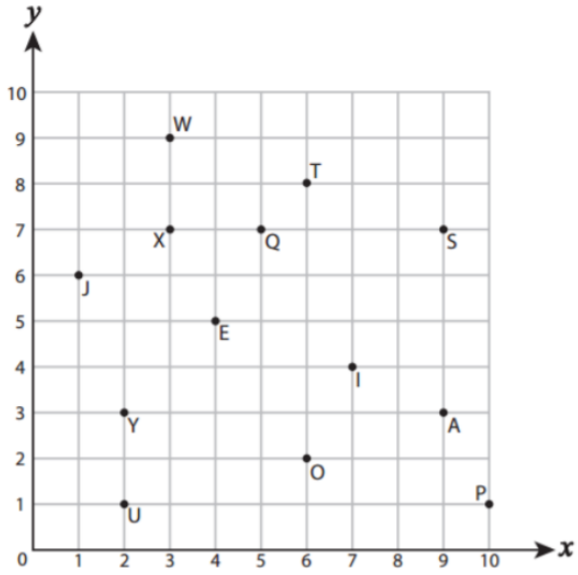
1) (6, 2) _____ 2) (6, 8) _____

3) (10, 1) _____ 4) (4, 5) _____

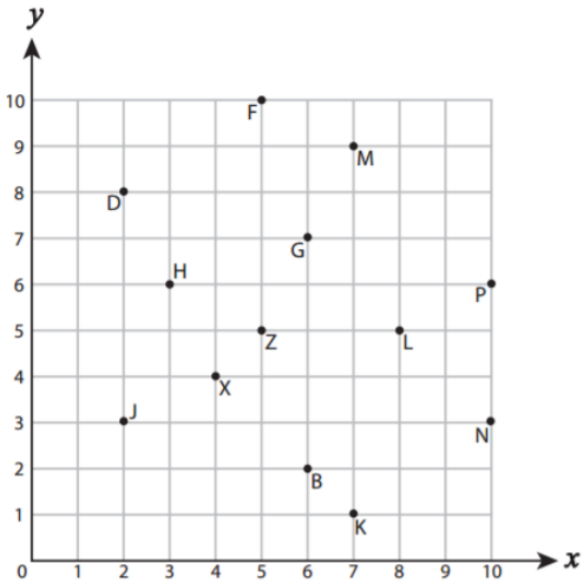
5) (9, 7) _____ 6) (2, 3) _____

7) (1, 6) _____ 8) (5, 7) _____

9) (2, 1) _____ 10) (7, 4) _____



Directions: *Write the ordered pair for each point.*



11) N (___ , ___) 12) X (___ , ___)

13) B (___ , ___) 14) L (___ , ___)

15) Z (___ , ___) 16) P (___ , ___)

17) D (___ , ___) 18) M (___ , ___)

19) J (___ , ___) 20) H (___ , ___)

Directions: *Simplify the following fractions.*

$\frac{4}{6} = \frac{2}{3}$	$\frac{2}{10} = \_\_$ $\quad \frac{21}{28} = \_\_$	$\frac{10}{15} = \_\_$ $\quad \frac{6}{18} = \_\_$
$\frac{4}{8} = \_\_$	$\frac{16}{20} = \_\_$ $\quad \frac{7}{14} = \_\_$	$\frac{6}{15} = \_\_$ $\quad \frac{12}{20} = \_\_$

Directions: *Solve the following problems. NO CALCULATOR! Put your answers in simplified form.*

1. $\frac{4}{7} + \frac{10}{21} =$ $\frac{12}{21} + \frac{10}{21} = \frac{22}{21} = 1\frac{1}{21}$	2. $\frac{8}{9} + \frac{1}{3} =$	3. $\frac{11}{6} + \frac{4}{9} =$
4. $\frac{6}{12} + \frac{12}{4} =$	5. $\frac{4}{5} - \frac{7}{10} =$	6. $\frac{8}{11} + \frac{12}{5} =$
7. $\frac{10}{3} - \frac{2}{12} =$	8. $\frac{11}{6} + \frac{1}{10} =$	9. $\frac{3}{5} - \frac{6}{11} =$

1. Oliver played 2 rounds of a trivia game and scored 982 points. If he gained the same number of points each round, how many points did he score per round?	2. Roger has 365 baseball cards in 5 binders. If each binder has the same number of cards, how many cards are in each binder?
3. Chloe had 472 video games. If she placed the games into 8 different stacks, how many games would be in each stack?	4. An ice machine had 480 ice cubes in it. If you were filling up 8 ice chests and each chest got the same number of cubes, how many ice cubes would each chest get?
5. Faye is making bead necklaces. She has 606 beads and is making 2 necklaces with each necklace using the same number of beads. How many beads will each necklace use?	6. There are 545 students in a school. If the school has 5 grades and each grade had the same number of students, how many students were in each grade?

1. $3 \times \frac{2}{9} =$	$4 \times \frac{3}{15} =$ 2.	$2 \times \frac{9}{19} =$ 3.
$6 \times \frac{3}{24} =$ 4.	$2 \times \frac{2}{5} =$ 5.	$1 \times \frac{5}{5} =$ 6.
$5 \times \frac{1}{7} =$ 7.	$10 \times \frac{1}{16} =$ 8.	9. $3 \times \frac{4}{9} =$
Example: $\frac{4}{5} \times \frac{2}{8} = ?$ multiply numerators, multiply denominators: $\frac{4 \times 2}{5 \times 8} = \frac{8}{40}$ (reduce) $= \frac{1}{5}$ (final answer)	$\frac{3}{6} \times \frac{3}{2} =$ 10.	11. $\frac{20}{40} \times \frac{2}{2} =$
$\frac{4}{7} \times \frac{5}{8} =$ 12.	$\frac{2}{6} \times \frac{6}{2} =$ 13.	$\frac{5}{10} \times \frac{2}{1} =$ 14.
$\frac{5}{25} \times \frac{4}{1} =$ 15.	$\frac{15}{17} \times \frac{6}{6} =$ 16.	$\frac{9}{9} \times \frac{1}{1} =$ 17.

Directions: *Simplify the following. Remember your PEMDAS rules!*

7 x (5 x 10 + 4) - 7 7 x (50 + 4) - 7 7 x 54 - 7 378 - 7 371	1. $(8 + 23 - 3) \div (13 - 6)$
2. $(15 - 3) \times (10 + 3) - 4$	3. $(16 + 4) + (11 + 15 \div 5)$
4. $(14 + 29 - 3) \div 20 - 2$	5. $(15 + 18 - 3) \div (15 \times 2)$
6. $(8 + 4) + (10 + 14 \div 7)$	7. $(12 + 22 - 2) + 16 - 2$

Directions: Solve each of the following problems. SHOW ALL WORK!

1. Ned bought 331 pieces of candy to give to 35 of his friends. If he wants to give each friend the same amount, how many pieces would he have left over?	2. An industrial machine can make 245 crayons a day. If each box of crayons has 20 crayons in it, how many full boxes does the machine make a day?
3. A box of computer paper has 1004 sheets left in it. If each printer in a computer lab needed 39 sheets how many printers would the box fill up?	4. Robin had 771 pennies. She wanted to place the pennies into 37 stacks, with the same amount in each stack. How many more pennies would she need so all the stacks would be equal?
5. A builder needed to buy 960 nails for his latest project. If the nails he needs come in boxes of 47, how many boxes will he need to buy?	6. Sarah received 541 dollars for her birthday. Later she found some toys that cost 15 dollars each. How much money would she have left if she bought as many as she could?

Directions: *Solve the following. NO CALCULATORS!! Show all work and simplify your answer!*

Reading a Line Graph

$1\frac{2}{5} + 3\frac{6}{7} = 5\frac{9}{35}$

$1\frac{2 \to 7}{5} + 3\frac{6 \to 27}{7}$ — Rewrite as improper fractions

$\frac{7}{5} \times 7 + \frac{27}{7} \times 5$ — Find least common denominator

$\frac{49}{35} + \frac{135}{35} = \frac{184}{35} = 5\frac{9}{35}$

1. $3\frac{1}{4} + 4\frac{1}{2} =$

2. $2\frac{5}{6} + 5\frac{4}{7} =$

3. $2\frac{3}{5} + 6\frac{1}{4} =$

4. $4\frac{2}{3} + 4\frac{1}{6} =$

5. $3\frac{1}{2} + 3\frac{1}{5} =$

6. $23\frac{1}{2} - 18\frac{1}{6} =$

7. $19\frac{1}{2} - 4\frac{4}{5} =$

Rising 6th Grade Science

Activities to do this summer to prepare for sixth grade:

1. Complete the Science Choice Board.
   - Choose 3 science activities from the choice board.
   - Put an X on the square to mark the activity as complete.
   - **Important Safety Note:** You must ask an adult's permission before using materials, conducting an investigation, or visiting any sites on the internet.
   - Remember:
     - You may substitute materials for other similar items that you have at home!
     - Some activities require internet access. If you do not have internet access or want to enjoy screen-free time, you can choose from the other exciting activities!
     - Have fun!

2. Read a book about science

Science Books

Look for these great books about science at your local library through e-book access, or try ReadWorks! ReadWorks offers richly illustrated eBooks and a read aloud feature to support readers at all levels. You'll finda quick tutorial video about using eBooks at https://about.readworks.org/parents_remote.html

Or, if possible, look for these great books about science at your local library!

Titles	Author	Topic
Astrophysicist and Space Advocate Neil deGrasse Tyson	Marne Ventura	Have you ever stared into the night sky, full of stars and planets? As a kid, Neil deGrasse Tyson was star-struck when he first visited a planetarium.The universe was calling him. Now he is a famous astrophysicist with a TV show and over 1 million twitter followers. Follow his path from fascinated kid to popular space expert.
Electrical Wizard: How Nikola Tesla Lit Up the World	Oliver Dominguez	Learn all about Tesla who contributed to the field of electricity and technology.
What Color Is My World?: The Lost History of African-American Inventors	Kareem Abdul-Jabbar	Did you know that James West invented the microphone in your cell phone? That Fred Jones invented the refrigerated truck that makes supermarkets possible? Or that Dr. Percy Julian synthesized cortisone from soy, easing untold people's pain? These are just some of the black inventors and innovators scoring big points in this dynamic look at several unsung heroes who shared a desire to improve people's lives. Learn more in this book by basketball legend Kareem Abdul-Jabbar

Virtual trips

Summer is a great time to explore science in the city. Consider taking a virtual trip to these exciting sites!

Place	Website	What to do
Brooklyn Botanic Gardens	https://www.bbg.org/	Visit the Brooklyn Botanic Gardens website for activities, games, recipes, and crafts your scholar can do at home.
Prospect Park Zoo (or any zoo!)	https://prospectparkzoo.com/	Have your scholar take notes on animals and their structures.

Rising Sixth Grade Science Choice Board

Note: Activities marked ** are included in this packet.

Listen to a science podcast from Brains On. "Brains On!" features talks with food scientists and snake handlers, and much more. Link: https://www.brainson.org/	Build a Plant Cell Model** Extra resource: Use the interactive plant cell model at Cells Alive to help you match the cell structures to their functions. Link: https://www.cellsalive.com/	Visit the American Museum of Natural History's Ology site to learn more about many science topics. Link: https://www.amnh.org/explore/ology
Design Challenge: Design and build your own phone stand.** Use the printed directions** or this Science Buddies link: https://www.sciencebuddies.org/stem-activities/build-a-cell-phone-stand	Predicting Weather activity**	**Upcycle Project:** Old T-shirts can be given new life by turning them into a reusable shopping bag! **
Seafloor Spreading Model activity**	Chemical or Physical Change activity**	Create a comic strip that explains why some species of animals are endangered and what can be done to protect endangered species. Learn more: https://www.dkfindout.com/us/ http://www.animalplanet.com/wild-animals/endangered-species/ https://www.worldanimalfoundation.com/

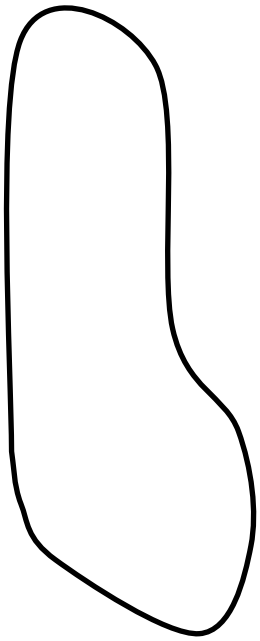
Name:_____ Date:_____

Plant Cell

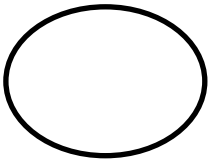
Student Directions

- Color the organelle, name tag and function tag all the same color.
  - For example: color nucleus, nucleus name tag and nucleus function tag blue; color chloroplast, chloroplast name tag and chloroplast function tag green, etc.
- Cut and paste the organelles to make a cell.
- Cut out the name and function tags. Match them up and then paste around the cell.
- Draw arrows from the tags to the organelle they describe.

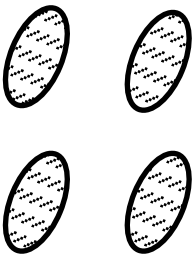
Vacuole



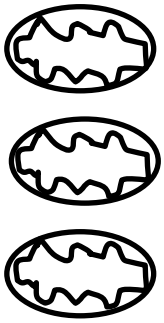
Nucleus



Chloroplast

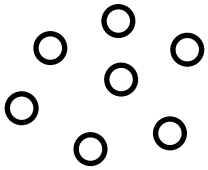


Mitochondria



Endoplasmic Reticulum

Ribosome



Golgi Body

---

controls what enters and leaves the cell

transports materials in the cell

command center, directs the cell's activities

fluid that fills the cell

receives, packages and distributes materials

protects and supports the cell

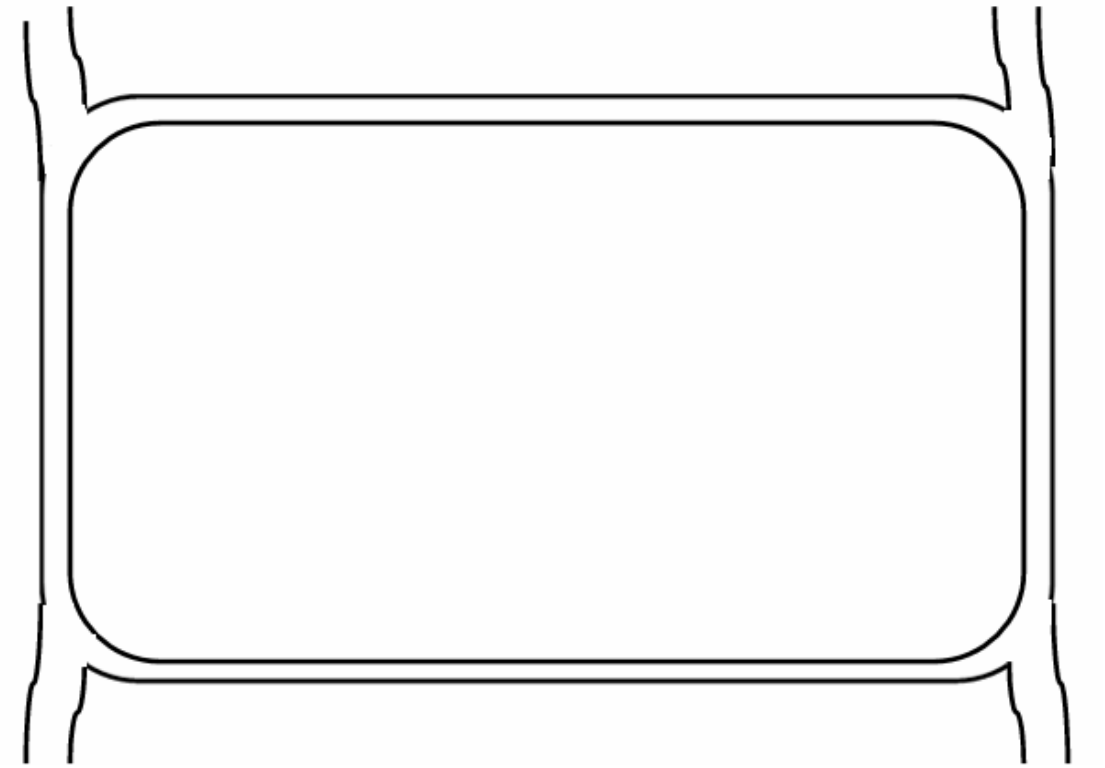
converts energy to food for the cell

builds proteins for cell functions

storage area for the cell

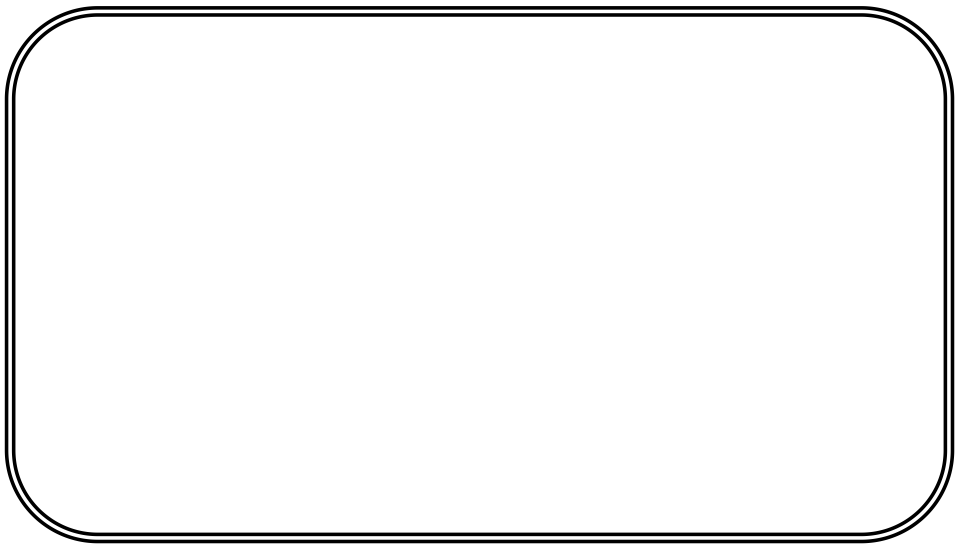
powerhouse of the cell, produces energy

Cell Wall



Cell Membrane

Cytoplasm



What's the Matter?

Vocabulary	
matter	quantitative
mass	qualitative
physical properties	chemical properties
property	

Matter is anything that takes up space and has mass. **Mass** is the *stuff* that matter is made of, or the amount of particles in a substance or object. Matter has physical and chemical properties and can undergo physical and chemical changes.

What are some examples of matter? Well, just look around you and everything you see, touch, smell, and breathe are examples of matter.

What is a **property**?

A property describes how an object looks, feels, or acts. Properties can be physical or chemical. Properties can also be quantitative or qualitative. A **qualitative** property of matter is observed and generally can't be measured with a numerical result. A **quantitative** property of matter is one that can be measured numerically, such as height, length, or weight.

What are examples of **physical properties**?

Physical properties can be observed. Examples of physical properties can be color, weight, volume, size, shape, density, boiling point, or freezing point.

What are examples of **chemical properties**?

A chemical property is usually one that can only be seen when a substance undergoes a chemical change. These properties cannot be observed by touching or looking. Chemical properties become apparent when the structure of the substance is altered chemically.

An example of this would be adding baking soda and vinegar and watching it bubble and give off a gas. The bubbling is an indicator that the properties of the two initial ingredients have recombined to form a new substance or substances.

substance AB +substance CD → new substance AD + new substance BC

A simple equation of what happens when you add baking soda to vinegar:

baking soda (solid) + vinegar (liquid) → carbon dioxide (gas) + water (liquid)

What is a **chemical change**?

A **chemical change** is a change that results in a new substance (or substances) being formed. The important word to remember is ***new***. A chemical change involves the making or breaking of bonds between atoms. A chemical change makes a new substance that wasn't there before.

What are examples of chemical changes?

Some examples of chemical changes are nails rusting over time, batter turning into a cake in the oven, wood or paper burning to ashes, the digestion of food, and the baking soda and vinegar example above.

What is a **physical change**?

A **physical change** is a change in a state of matter. For example, when ice melts, the H_2O molecule is going from a solid (ice) state to a liquid (water) state of matter. The actual molecule or the arrangement of the atoms has not changed—just its state of matter. A physical change can also be a change in appearance of matter. For example, a piece of paper is made of paper molecules, and when you tear the piece of paper in half, both halves are still made of paper molecules. The atoms and molecules that make up the substance are not physically changed.

Physical or Chemical Change?

Put a check to indicate whether you think the item is a physical change or a chemical change.

	Physical Change	Chemical Change
1. ice melting		
2. cutting a pineapple into pieces		
3. adding vinegar to baking soda		
4. a piece of rusting metal		
5. a campfire		
6. crumbling a piece of paper		
7. sour milk		
8. shattering a drinking glass		
9. dissolving sugar in water		
10. burning paper		
11. boiling water		
12. burning a match		

Try This Experiment

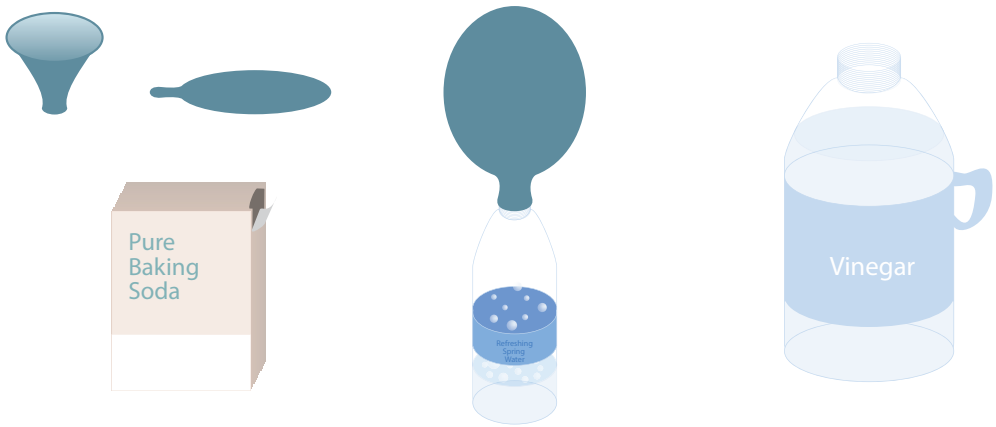
How do you know that a gas is produced as a result of mixing baking soda and vinegar?

Materials

- ¼ cup (56 grams) of baking soda
- ¼ cup (60 milliliters) of vinegar
- 1 small, empty water bottle
- 1 balloon
- 1 funnel

Procedure

1. Stretch the balloon out before using it.
2. Using the funnel, fill the balloon with the baking soda.
3. Pour the vinegar into the empty water bottle.
4. Attach the opening of the balloon to the mouth of the water bottle—be careful not to get any baking soda into the bottle.
5. Count to three and lift up the part of the balloon that contains the baking soda so that the baking soda falls into the bottle.



Questions

1. What are the physical properties of the baking soda?

2. What are the physical properties of the vinegar?

3. What happened inside the water bottle when you added the baking soda to the vinegar? What did you see in the bottle?

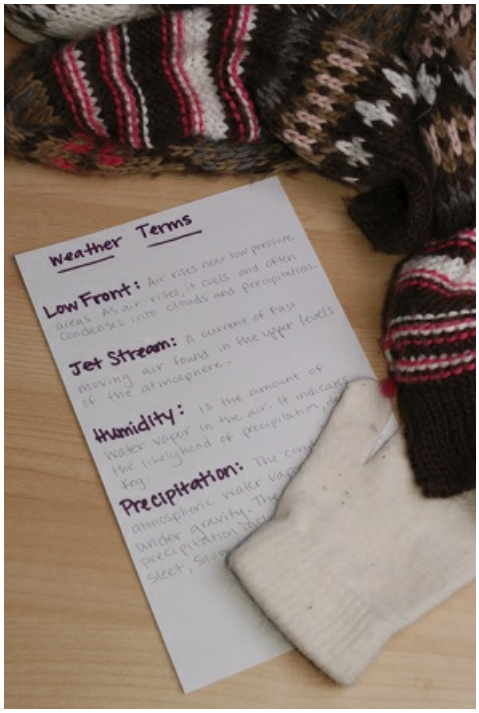
4. Did anything happen to the balloon? If so, what do you think caused it?

5. What type of change occurred inside the bottle when you added the baking soda to the vinegar?

6. Fill in the definitions in the vocabulary box below.

Vocabulary	
matter	
mass	
property	
qualitative	
quantitative	
physical change	
chemical change	

Predict the Weather



Do you have to pull your child away from the T.V. to get him to complete his homework? With this activity, you can let him watch T.V. and do his science homework at the same time!

This activity is to be done over the course of several days.

What You Need:

- Paper
- Pen/marker
- TV

What You Do:

Day 1

Begin by watching one segment of the weather forecast together. Just listen. When the segment is complete, ask your child to write down the terms that the meteorologist used that he recognized. Ask him to write a brief definition for each term or to look up the meanings in their textbooks. Talk about each term together. Examples include low front, jet stream, humidity, and precipitation.

Day 2-Day 3

Create a chart that looks something like the following:

	Predict Humidity	Actual Humidity	Predict Temp.	Actual Temp.	Predict Precip.	Actual Precip.
Tuesday						
Wednesday						
Thursday						
Friday						

Have your child make two charts, one for you and one for him. Your categories may vary based on the specific atmospheric properties your child is learning in his class. After you have created your chart, watch the weather forecast again. While watching, record the data given during the program.

Day 4-Day 5

Using the chart you created during Day 2 and Day 3, make a prediction for each category. Then watch the weather forecast and record the actual readings given by the meteorologist. How close did your predictions come to the real readings? Compare your predictions to the ones your child made to see who is the ultimate weather bug!

This activity can be continued for as many days as you like. Make a game out of it! See how accurate you can be in predicting the forecast or evaluating who can come the closest to the actual atmospheric readings. You'll be learning important terms while spending some time together, even if it's in front of the T.V.!

Author: Liza Jenkins

Intro: No-Sew 10 Minute T-Shirt Tote

Did you know that about 100 billion plastic bags are used annually in the US alone and only about 2% of them are recycled?

It's a scary statistic but we can all do small things to help our earth! Using reusable bags or totes is a very easy way to do your part. It is a great alternative to buying reusable bags or taking merchandise home in plastic bags from stores and much more fashionable! They are durable and will last a long time.

Everyone at some time or another has probably had an old t-shirt that they didn't need or like anymore. Instead of tossing it make it into a reusable tote in about 10 minutes.

All you will need is an old t-shirt and a pair of scissors.

Step 1: Cut Sleeves Off of Shirt

You can use a short or long sleeved t-shirt. It won't matter because you will be cutting the sleeves off anyway. Lay your t-shirt out on a flat work surface. Using a pair of scissors, carefully cut the sleeves off of the shirt.

Step 2: Cut Neck Out of Shirt

You can use a large bowl and draw around it on your fabric to get a nice rounded scoop shape or just eyeball it and cut the scoop. I just eyeballed it.

Step 3: Cut Slits and Tie Knots

At the bottom of the shirt cut slits about every inch through both layers (length will depend on the size of the shirt so you will have to make the call) long enough that youwill be able to tie them twice. Remember the shirt will stretch with weight so try to make sure your tote isn't going to hang to your feet with filled with goodies!

Keep the slits lined up and starting with one end tie the aligning front and back pieces together. Tie together in double knots until you have done the entire row. If you don't want the knots to show you can tie them on the inside for a less fringed look.

Step 4: Tie Decorative Handles

This step is optional. Cut small strips of extra fabric and tie small knots on the tops of the handles for a more decorative look. The tote is finished and ready to use!

Seafloor Spreading Model

You grow, plants grow, and yes—rocks grow too! They just grow very slowly.

The earth is made up of different rocky plates, kind of like a big jigsaw puzzle. Together, all of this rocky jigsaw puzzle is called the **lithosphere**. **Plate tectonics** is the study of these rocky tectonic plates and how they move and change. Plates move around in different ways. Sometimes they push together at a **convergent boundary**. At these boundaries, volcanoes and mountains form as two chunks of rock push together. At **transform boundaries**, the plates slide past each other. Sometimes the sliding isn't very smooth, and earthquakes happen. At **divergent boundaries** like **mid-ocean ridges**, the plates move away from each other and new rock oozes up from underneath, adding to the sea floor.

In this experiment, you're going to model what happens when the ocean floor spreads.

Problem: Create a model of the spreading sea floor.

Materials

- Cardboard cylindrical container
- White 8 ½ x 11 in. piece of paper
- Ruler
- Colored pencils
- Pencil
- Tape
- Scissors

Procedure

1. Take a cardboard, cylinder-shaped container (such as a Quaker Oats container) and cut a vertical slit about 3 ½ inches long and ¼ inch wide down the side. The slit is your mid-ocean ridge, the place where the plates are moving away from each other.
2. Cut a piece of white paper in half lengthwise.
3. On each piece of paper, measure two inches in from the end and fold the paper so that there is a section on each end to hold onto.
4. Measure inward another two inches from the fold, and color in that two-inch wide strip.
5. Continue to measure in two-inch segments, coloring every other section.
6. Place the unfolded ends of the paper into the slit in the container. Holding them by the folds, pull the pieces of paper out again. If you imagine that the slit is the midocean ridge where the plates are moving away from each other, the paper is the new liquid rock coming out from the ridge. The first bit of paper to come out is the oldest rock, and the last section of paper to come out is the youngest. Imagine that your paper goes on forever. Soon, the first bit you took out of the hole will be far away from the midocean ridge. Of course, "soon" in geological time is a very long time in human terms!
7. Take your pieces of paper and tape the ends that aren't folded to the pencil.
8. Put the pencil inside of the container and pull the ends of the pieces of paper up through the slit.
9. Twist the pencil one way, and the papers will move out and away from each other. This is what happens at a divergent plate boundary on the mid-ocean ridges.
10. Twist the pencil the other way, and the papers will move in and toward each other. This is what happens at a convergent plate boundary. Imagine what would happen if those papers had bumps on them. They'd get all bunched together at the hole, and create mountains.

Why?

How does seafloor spreading work? Imagine that you're baking a really delicious chocolate cake. After some time in the oven, the top of the crust begins to crack and the pieces of the cake's top move away from each other. Unfortunately, you've made the batter a little too wet, and the cake underneath is not yet cooked. As the top pieces of the cake crack and move away from each other, the gooey underside of the cake moves up into the crack, pushing the pieces of the cake's top crust away from each other.

The hard crust of the cake is the lithosphere. Underneath the hard part of the earth is the**asthenosphere**, the gooey liquid rock that sits underneath the hard outer crust. Sea floor spreading happens at places where plates are moving away from each other and where the liquid rock from the asthenosphere can come up to the lithosphere. In the places where the plates are moving apart, **magma** (liquid rock) moves up into the cracks and solidifies, making a new ocean floor, just like cake batter would ooze up through the cracks.

One intriguing thing about the rock that comes from seafloor spreading is that it shows the history of the Earth. For example, every million years the Earth's magnetic poles tend to reverse 4 or 5 times. South becomes north and north becomes south. The rocks on the seafloor show the history of the magnetic changes in the earth. They are magnetized according to wherever the pole was at the time the rock formed and cooled on the sea floor. This allows scientists to understand the magnetic history of the earth and the history of these rocks. You illustrated this magnetic shift when you colored in every other two-inch section.

Design a Cell Phone Stand

ACTIVE TIME
45 minutes to 1 hour

TOTAL PROJECT TIME
45 minutes to 1 hour

KEY CONCEPTS
Engineering design process, prototype, iterate

Introduction

Why buy it when you can build it? That is the attitude you will need for this project. You have probably seen cell phone holders or stands around the house or in a car. They might seem like a very simple object, but they are a great way to learn about the engineering design process. In this project, you will design and build your own working phone stand.

Credits

Ben Finio, PhD, Science Buddies

This activity is not appropriate for use as a science fair project. Good science fair projects have a stronger focus on controlling variables, taking accurate measurements, and analyzing data. To find a science fair project that is just right for you, browse our library of over 1,200 Science Fair Project Ideas (http://www.sciencebuddies.org/science-fair-projects/science-projects) or use the Topic Selection Wizard (http://www.sciencebuddies.org/science-fair-projects/topic-selection-wizard/background-info) to get a personalized project recommendation.

Materials

Since this is an engineering design project, there is no exact list of materials you need to use. Here are some suggestions to get you started:

- Cell phone or tablet. If you do not have a real phone available, you can make a substitute phone (see Prep Work (http://www.sciencebuddies.org/account/login-popup?t=AQVI3XOyau6YNjchrtv4U4Vft96nfAZCoUbMGDpZYdGM-q-F_QBTP--OseJ9FkjXGrkr9Dx7AZplcnQ3JtRUo2jERtdnLC_j0LFjFRM9QwfgoFEdlZ6J4qLrejWDv-aOAAaOxVDilAziClTtbjJFg02fYjTcZvlNONrY_HK1CuQok04S4TUyvQGZUt6WMwKvG02qUEdlqEWi9oZeg09GjQUy) section).
- Structural materials, like corrugated cardboard or wooden craft sticks
- Tape or glue
- Other assorted office/craft supplies like rubber bands, paper clips, binder clips, pipe cleaners, etc.

Prep Work

If you do not have a real phone available, you can make a substitute phone and design a holder for it. First, cut out a rectangular piece of corrugated cardboard about the same size as a smartphone. To make it heavier, tape a rectangular grid of coins to one side of the cardboard. It should now be about the same size and weight as a real phone.

Procedure

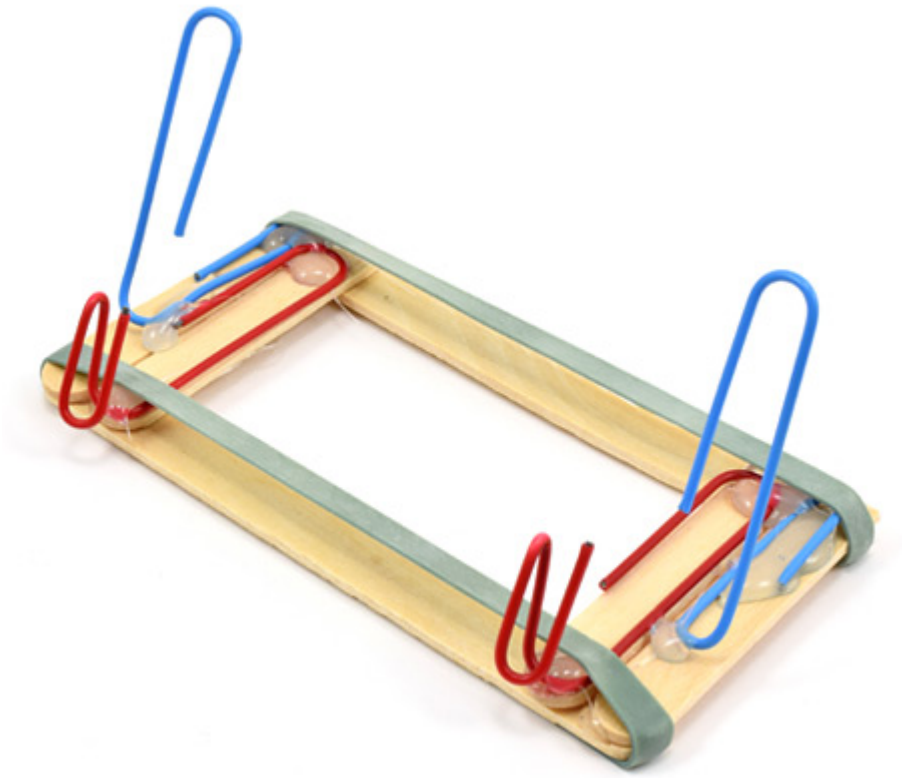
1. Before you can start to design something, you will have to define exactly what problem you are trying to solve. For example, "I need to be able to see my phone's screen to use GPS while I am driving," or "I want to prop up my tablet to watch a movie without having to hold it." The best solutions to these different problems probably will not be the same. Figure out exactly what problem you are trying to solve before you continue. In other words, why do you need a phone stand? How will you use it?
2. Do some background research. If you have internet access, look around online at designs for different types of cell phone stands.

Are there different kinds? How are they different? Do they all serve the same purpose?

3. Specify requirements for your phone stand. These requirements will depend on how you plan to use the stand. For example, do you need it to work for devices of different sizes, or just one? Do you want the angle of the phone to be adjustable? Do you need to make sure certain buttons or ports on the phone remain accessible? Do you need to be able to type or push buttons on the screen without knocking it over?
4. Brainstorm some designs for your phone stand. Make sketches of them on paper and write down the materials you would need to build them. Try to come up with at least three different designs, then think about how they would meet your requirements. Your designs do *not* have to look like the example in this project; you can do something totally different!

Which one do you think will meet the requirements the best?

5. Build a prototype of your best design. You might need to start adjusting your design at this point! For example, maybe the parts do not fit together like you thought they would. If you run into problems when building your prototype, it is OK to modify the design, or even switch to a completely different design if you realize it will not work as intended. This picture shows a prototype made from wooden craft sticks, rubber bands, and paper clips, held together with glue. The craft sticks provide the frame, the paper clips hold up the phone, and the rubber bands provided added friction to prevent the stand from sliding around.



6. Test your prototype! Try using it yourself or giving it to someone else to try out, and go through various real-world usage scenarios. For example, can you plug in the phone's charging cable? If you push on the screen, does it fall over? You could even try dropping the stand (take out the phone first!) to see if it breaks.

Does your prototype meet all of your requirements?

7. If not, then it is back to the drawing board—time to iterate and make changes to your design. Keep iterating until your phone stand meets all your requirements.

Cleanup

Any cleanup steps after the activity is done.

What Happened?

Did your phone stand work perfectly on the first try? You might have thought you had a perfect design on paper, and then been surprised to find out it did not work as intended. Maybe there was not enough friction between your stand and the table, so it slid around too easily. Maybe it was too narrow and fell over when you put the phone in, or maybe the materials you used were not stiff enough and sagged under the weight of the phone. There are plenty of things that could have gone wrong—but that is why you built a prototype and tested it first! That gave you a chance to make changes to your design to make sure it met all your requirements.

Engineers do the same thing—you would not want to design a product, start selling it, and *then* find out it does not work properly. That could result in your company losing a lot of money, or worst case, result in people getting seriously injured or killed (e.g. for products like cars, or electrical appliances that could catch fire). Engineers almost always build and test prototypes before launching a final product. Now that you are familiar with the engineering design process, what will you design next?

Digging Deeper

Look around you. You are probably surrounded by tons of everyday objects, like your cell phone stand, that do not seem very "scientific." Desks, chairs, lamps, doors, pencil holders, etc. However, many of these objects were probably designed by engineers, who had to figure out things like what materials to make them out of, how much weight they would need to support, and how to manufacture them. If the engineers do their jobs well, you might never notice. But you would certainly notice if the chair you were sitting in fell apart or the light switch did not work!

Engineers design things using the engineering design process, which is different from the scientific method. The exact steps of this process may vary a bit depending on who you ask, but they generally go something like this:

- Define the problem
- Do background research
- Specify requirements
- Brainstorm solutions
- Build a prototype
- Test the prototype
- Iterate

What does "iterate" mean? It means you might do some of the steps more than once! Things rarely work perfectly on the first try. You might *think* you have the perfect design for something, then test it and find out it does not work at all—so it is back to the drawing board! That is probably what you experienced with your cell phone stand.

For Further Exploration

- Even if your phone stand meets all your initial requirements, you can still try to improve it. For example, can you make a stand with equivalent performance using fewer materials? In the real world, this would save on manufacturing costs.

Additional Resources

Project Guide

- The Engineering Design Process (http://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-process-steps)

If you like this activity, you might enjoy exploring these related careers:

Commercial & Industrial Designer (http://www.sciencebuddies.org/science-engineering-careers/engineering/commercial-industrial-designer)

Career Profile

(http://www.sciencebuddies.org/science-engineering-careers/engineering/commercial-industrial-designer)

Have you always loved art? Do you have a good eye for beauty, balance, and form? How would you like to see your designs show up in toy stores? Or in a sporting goods store? Or at a car dealer? Commercial and industrial designers create the shape and form of every type of manufactured good that you can think of—from toys, sporting goods, and medical equipment to high technology products, furniture, toothbrushes, and toasters. They design the form of new products that are as beautiful and… Read more (http://www.sciencebuddies.org/science-engineering-careers/engineering/commercial-industrial-designer)

Mechanical Engineer (http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineer)

Career Profile

(http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineer)

Mechanical engineers are part of your everyday life, designing the spoon you used to eat your breakfast, your breakfast's packaging, the flip-top cap on your toothpaste tube, the zipper on your jacket, the car, bike, or bus you took to school, the chair you sat in, the door handle you grasped and the hinges it opened on, and the ballpoint pen you used to take your test. Virtually every object that you see around you has passed through the hands of a mechanical engineer. Consequently, their… Read more (http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineer)

CAD Technician (http://www.sciencebuddies.org/science-engineering-careers/engineering/cad-technician)

Career Profile

(http://www.sciencebuddies.org/science-engineering-careers/engineering/cad-technician)

CAD (computer-aided design) technicians combine art and engineering to prepare the technical drawings and plans from which everything in the world is made—from toys to toasters, houses to hoses, satellites to sewer systems. CAD technicians are essential to the design and construction of everything you see around you. Read more (http://www.sciencebuddies.org/science-engineering-careers/engineering/cad-technician)

Mechanical Engineering Technician (http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineering-technician)

Career Profile

(http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineering-technician)

You use mechanical devices every day—to zip and snap your clothing, open doors, refrigerate and cook your food, get clean water, heat your home, play music, surf the Internet, travel around, and even to brush your teeth. Virtually every object that you see around has been mechanically engineered or designed at some point, requiring the skills of mechanical engineering technicians to create drawings of the product, or to build and test models of the product to find the best design. Read more (http://www.sciencebuddies.org/science-engineering-careers/engineering/mechanical-engineering-technician)

Rising 6th Grade Social Studies

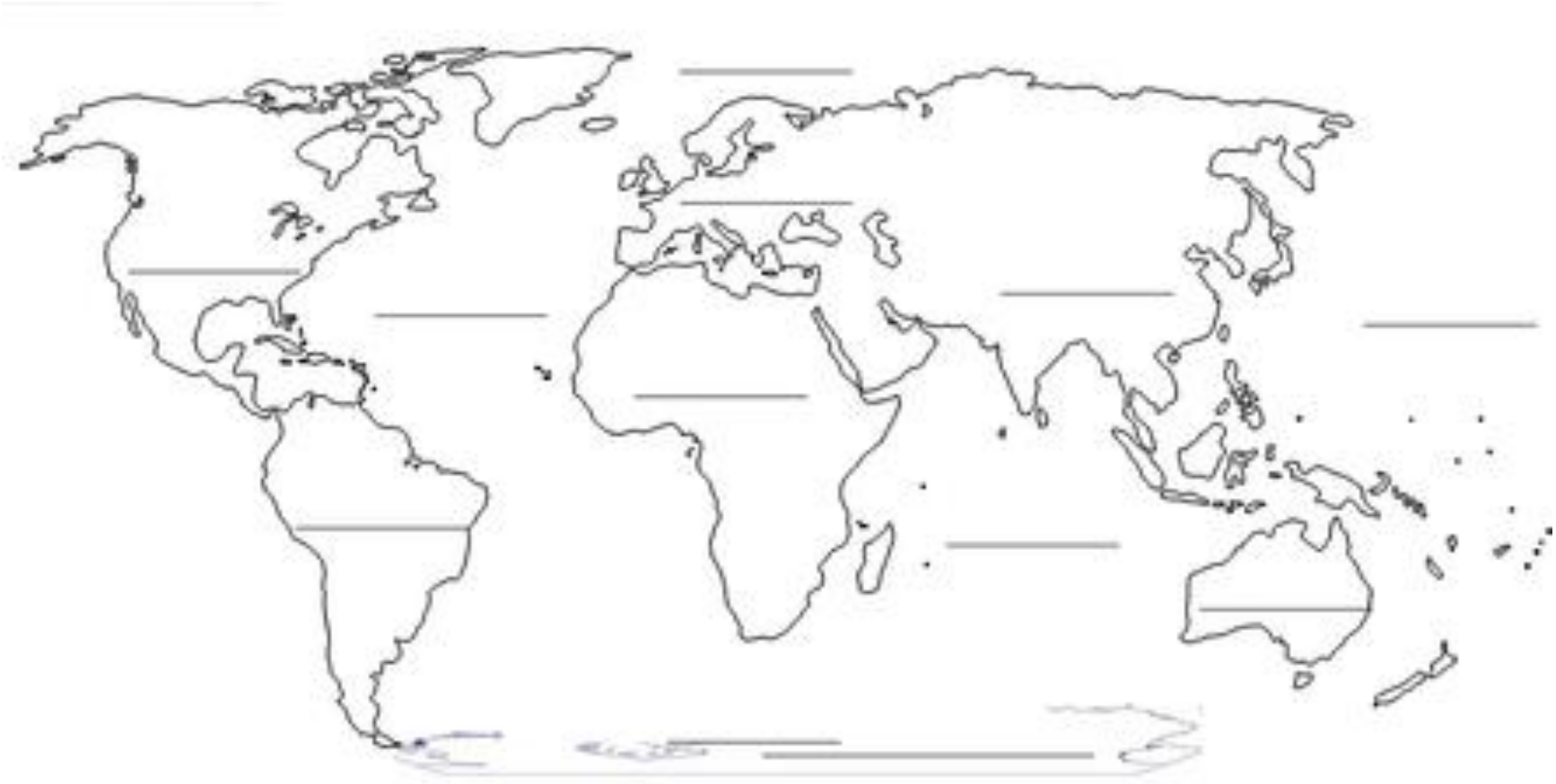
Welcome to 6th Grade! To prepare for 6th grade Social Studies, please complete parts 1 and 2 below. Completing these steps will make class easier and more fun. Each of these steps will prepare you to succeed in the first unit of the year! Some choices require internet access. If you do not have internet access or want to enjoy screen-free time, you can choose from the other options!

<table>
<tr><td colspan="2">Part 1—Geography: Please complete steps A, B, <u>or</u>, C below. Completing these steps will make class easier and more fun. Each of these steps will prepare you to succeed in the first unit of the year!</td></tr>
<tr><td>A. Geography: Open a web browser. Google search for “Seterra World Continents and Oceans - Map Quiz Game.” Complete the map quiz until you memorize where all the continents and oceans are.

OR</td><td>What is the fastest time you can complete the quiz? Try to get 100% in less than a minute!</td></tr>
<tr><td>B. Geography: Open a web browser. Search for “Seterra World Physical Features - Map Quiz Game.” Complete the map quiz until you memorize locations important deserts, rivers, oceans, mountains, and other physical features of the earth.

OR</td><td>What is the fastest time you can complete the quiz? Try to get 100% in less than 2 minutes!</td></tr>
</table>

C. Geography: Fill out the world map below by correctly labeling each Ocean and each Continent. A word bank has been provided for you.	



Continents: Africa, Europe, Asia, South America, North America, Antarctica, Australia/Oceania

Oceans: Pacific, Atlantic, Indian, Southern, Arctic

Bonus: Label where the Sahara Desert is.

<table>
<tr><td colspan="2">Part 2—History: Please complete steps A or B below. Completing these steps will make class easier and more fun. Each of these steps will prepare you to succeed in the first unit of the year!</td></tr>
<tr><td rowspan="2">A. Watch: Go to YouTube. Search for “Kingdom of Kush - History Of Africa with Zeinab Badawi.” Watch this documentary, then answer the questions to the right. (Look up “Kingdom of Kush - History Of Africa with Zeinab Badawi” on YouTube.)
OR
Complete step B</td><td>Why was the Kingdom of Kush important?</td></tr>
<tr><td>How was the kingdom of Kush similar to Ancient Egypt? How was it different?</td></tr>
</table>

B. **Read** the text pasted below, then answer questions 1-3 to the right.	**1. How did the Nile River help the Egyptian people?** **2. What was the government like in Ancient Egypt?** **3. Were any women powerful in Ancient Egypt? Give an example.**

Chapter 4

ANCIENT AFRICA

3100 BCE–32 BCE

EGYPT

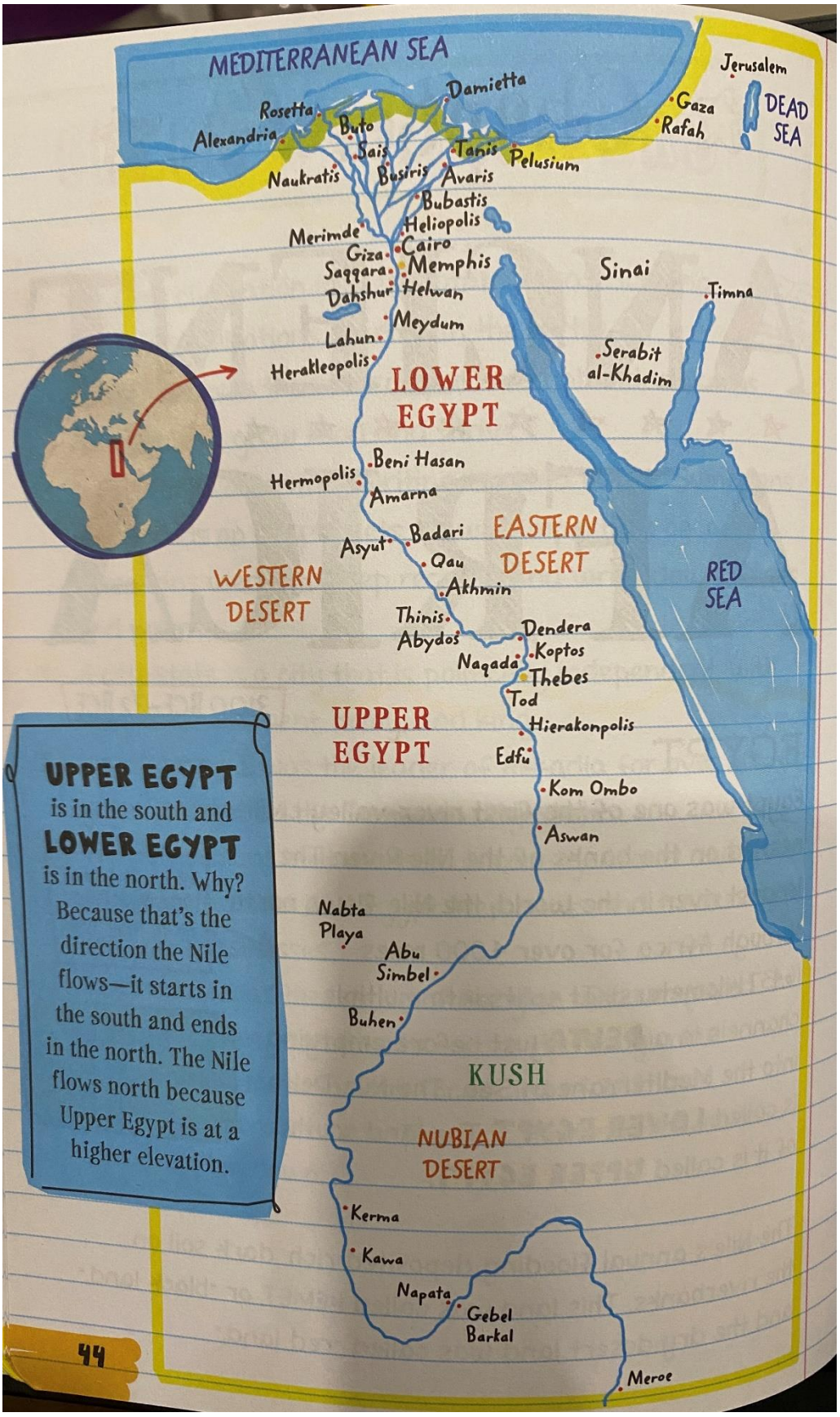
Egypt was one of the first river-valley civilizations, nestled on the banks of the Nile River. The longest river in the world, the Nile flows north through Africa for over 4,000 miles (6,437 kilometers). It splits into multiple channels in a **DELTA** just before emptying into the Mediterranean Sea. The Nile Delta is called **LOWER EGYPT**. The land south of it is called **UPPER EGYPT**.

ABOUT THE SAME DISTANCE AS FROM NEW YORK TO ALASKA

DELTA
plain at the mouth of a river

The Nile's annual flooding deposited rich, dark soil on the riverbanks. This land was called **KEMET**, or "black land," and the dry desert land was called "red land."

43


MEDITERRANEAN SEA
Damietta
Rosetta
Alexandria
Buto
Sais
Tanis
Pelusium
Naukratis
Busiris
Avaris
Bubastis
Heliopolis
Merimde
Cairo
Giza
Saqqara
Memphis
Dahshur
Helwan
Meydum
Lahun
Herakleopolis
LOWER EGYPT
Hermopolis
Beni Hasan
Amarna
Asyut
Badari
EASTERN DESERT
Qau
Akhmin
WESTERN DESERT
Thinis
Abydos
Dendera
Koptos
Naqada
Thebes
Tod
UPPER EGYPT
Hierakonpolis
Edfu
Kom Ombo
Aswan
Nabta Playa
Abu Simbel
Buhen
KUSH
NUBIAN DESERT
Kerma
Kawa
Napata
Gebel Barkal
Meroe
Jerusalem
Gaza
Rafah
DEAD SEA
Sinai
Timna
Serabit al-Khadim
RED SEA
UPPER EGYPT is in the south and LOWER EGYPT is in the north. Why? Because that's the direction the Nile flows—it starts in the south and ends in the north. The Nile flows north because Upper Egypt is at a higher elevation.
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The Kemet was perfect for farming, leading to a surplus of food and a well-fed people. The regular flooding led to accurate recording of the calendar—dates, times, and numbers. The Nile was also perfect for transportation and communication. HAPI, the Egyptian god of the Nile, was praised highly by the people, along with AMON-RE (the king of the gods), ISIS (the goddess of healing, motherhood, and many other things), and Isis's husband, OSIRIS (the god of the afterworld). The Egyptians had hundreds of gods, including many female gods.

The Egyptians (and the cyclically flooding river) are responsible for our 365-days-a-year calendar.

Egyptian Rule

Egypt was ruled by 31 different **DYNASTIES** over about 3,000 years, divided into three periods:

THE OLD KINGDOM

THE MIDDLE KINGDOM

THE NEW KINGDOM

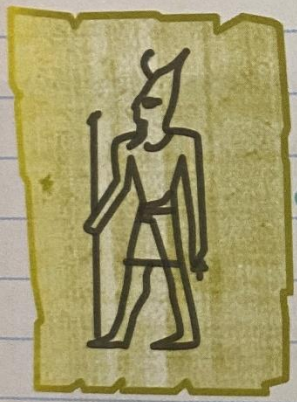
DYNASTY
succession of rulers from the same family

A **PHARAOH** ruled Egypt with absolute power. Whatever the pharaoh decided was law. Pharaohs had so much power they were considered gods.

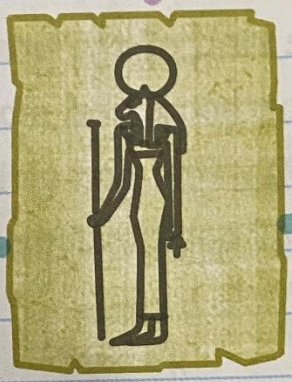
PHARAOH
the title given to ancient Egyptian kings

EGYPTIAN GOD FAMILY TREE

(ONE OF THEM)



ATUM

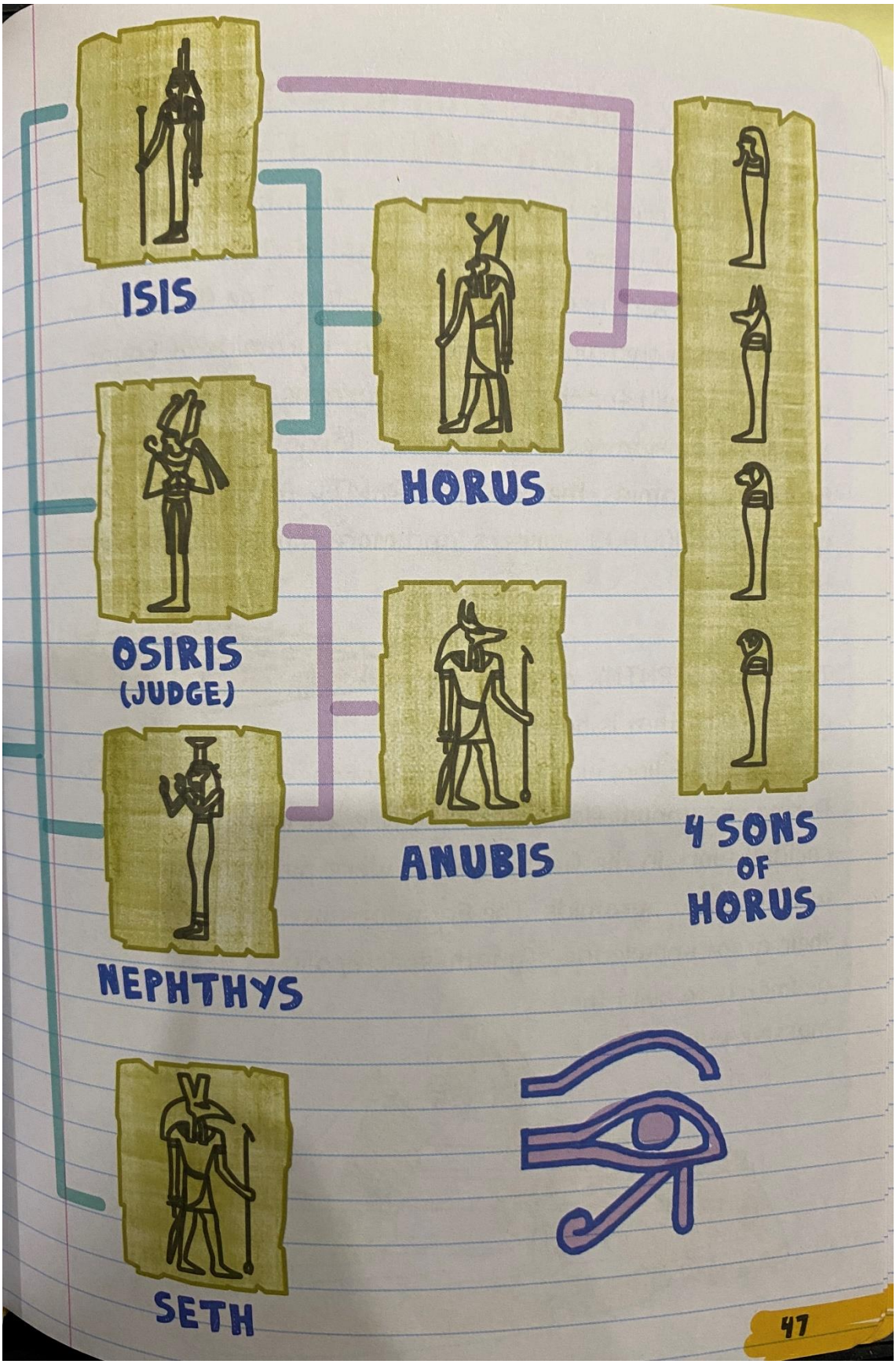


TEFNUT

GED

SHU

NUT

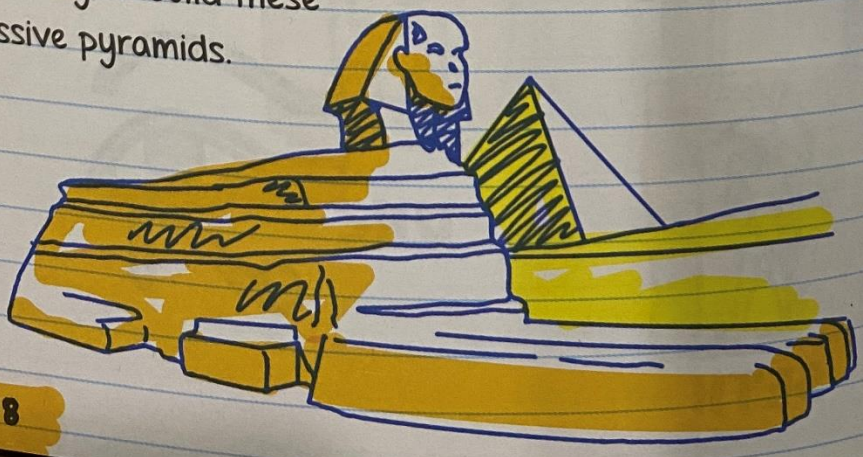

ISIS
HORUS
OSIRIS
(JUDGE)
ANUBIS
4 SONS
OF
HORUS
NEPHTHYS
SETH
47

The Old Kingdom (2700 BCE–2200 BCE) and Middle Kingdom (2100 BCE–1800 BCE)

KING MENES created the first united Egyptian dynasty when he joined Upper and Lower Egypt. He built his capital city of MEMPHIS near modern-day Cairo. The Old Kingdom also saw the construction of the great pyramids of Egypt, which were built for the burial of pharaohs and their families. Historians estimate that the largest of the over 30 Egyptian pyramids, the GREAT PYRAMID AT GIZA, took 20 years, up to 100,000 workers, and more than 2 million stones to build.

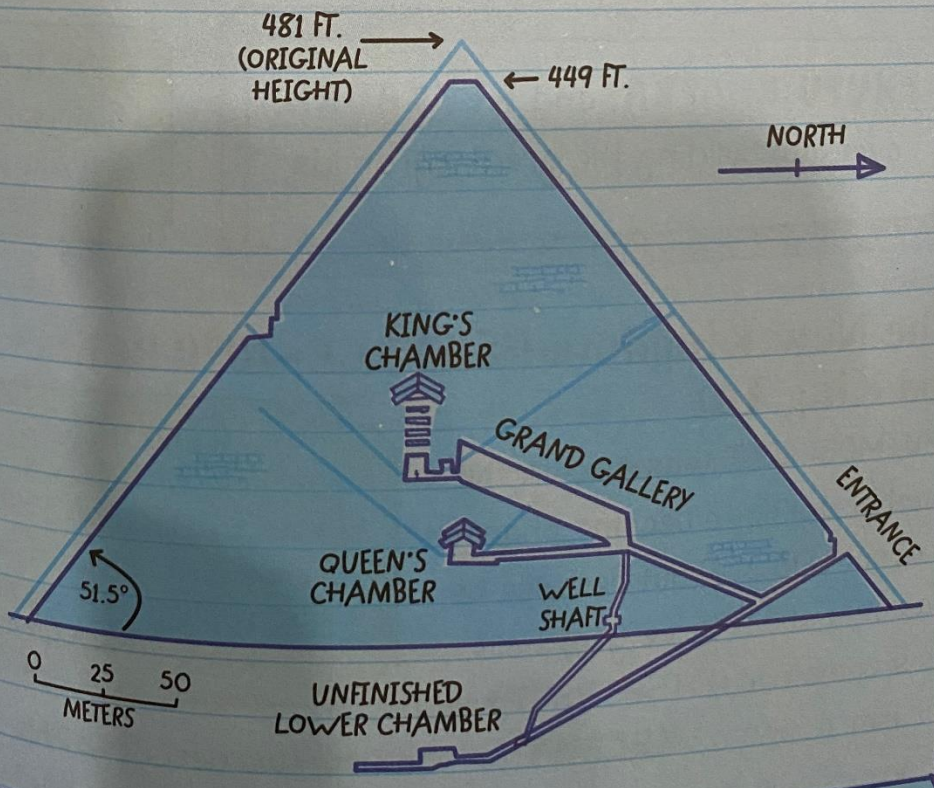
The GREAT SPHINX, a giant statue that is half man and half lion, was built to protect the GREAT PYRAMID. During the annual flooding of the Nile, farmers couldn't work in the fields, so they were put to work building pyramids. The Egyptians used their great knowledge of math, specifically geometry, to build these massive pyramids.

THERE IS SOME EVIDENCE THAT THESE FARMERS AND WORKERS WERE SLAVES.



The massive pyramids in Egypt obviously took a lot of time and hard work to build. Most historians believe that workers pushed stones across the sand on sleds or rolled them on logs to accomplish the construction. Ramps made from packed earth and sand were constructed at the base of the pyramid to allow workers to keep moving up as the pyramids grew taller and taller.

THE GREAT PYRAMID AT GIZA



The Middle Kingdom was a stable period of expansion. KUSH, or Nubia, an area south of Egypt, was conquered. Pharaohs provided aid for public projects, such as draining swampland and digging canals.

Some famous pharaohs of the Old Kingdom were:

DJOSER: had the first pyramid built for him by his **VIZIER**/architect/doctor **IMHOTEP**

KHUFU, KHAFRA, and MENKAURA: oversaw building the great pyramids

VIZIER
a high-ranking official or counselor

The New Kingdom (1500 BCE–1070 BCE) and King Tut

REGENT
an adult who rules in the place of a ruler who is a child and inherited a kingdom too young, a ruler who is absent, or a ruler who is disabled

THUTMOSE III was next in the royal bloodline to become pharaoh in about 1473 BCE, but because he was only about three years old, his stepmother HATSHEPSUT ruled for him, acting as **REGENT** for the first two decades of his reign. Once he finally took power, Egypt entered the era of the NEW KINGDOM.

Hatshepsut was a mostly peaceful leader who encouraged trade with cities in other parts of Africa, such as Punt on the east coast. This exchange introduced ivory and incense to Egypt. When it was Thutmose III's turn to rule, he led an army of 20,000 to extend Egypt's control into Syria and Palestine.

One of the most famous Egyptian pharaohs to people today, **KING TUTANKHAMEN**, or **KING TUT**, was crowned at nine years old and ruled from approximately 1333 to 1323 BCE. King Tut only lived until he was nineteen. He was buried in a tomb containing over 5,000 expensive objects, which were meant to accompany him into the afterlife. King Tut's body was **MUMMIFIED**, which means that it was preserved; Egyptians believed the soul could continue its life after death, but that it needed the body as a sort of home base. They buried mummies deep below the desert where the cool temperature would help preserve them. The Egyptians gained extensive knowledge of human anatomy and surgery from the process of mummification.

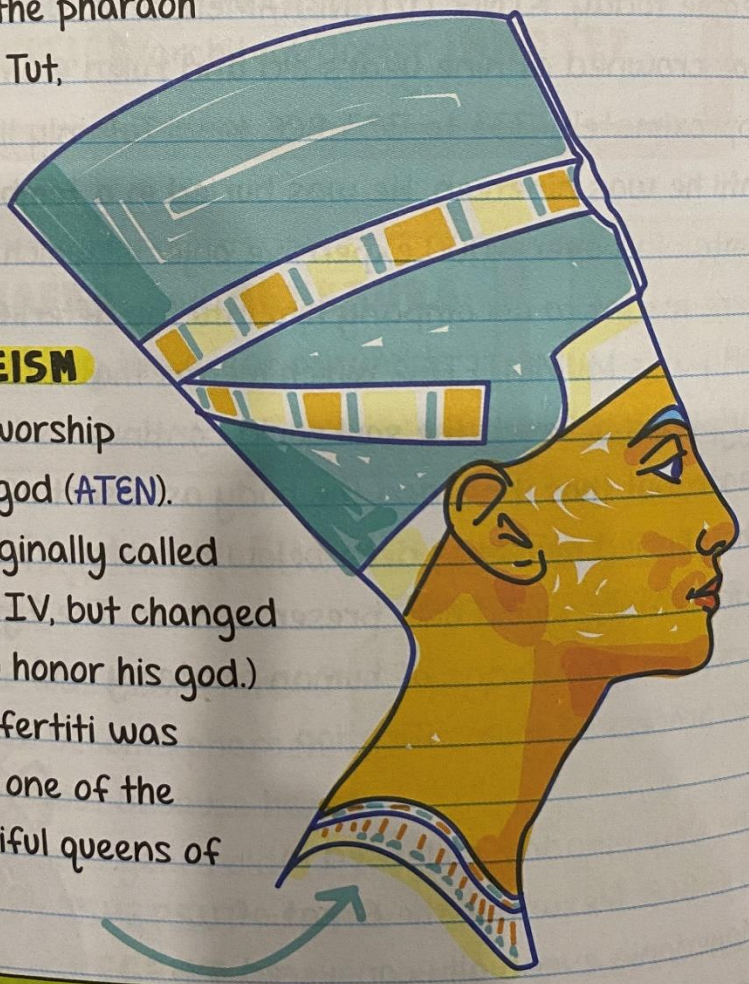
The New Kingdom collapsed in 1070 BCE. Alexander the Great of Macedonia eventually conquered Egypt in about 332 BCE. In 51 BCE, **QUEEN CLEOPATRA VII** would be the

last Macedonian ruler. She waged war with factions of the Roman Empire. After her, Egypt would not be independent again for nearly 2,000 years.

Some other famous pharaohs of the New Kingdom:

AKHENATEN and **NEFERTITI**:

Akhenaten, the pharaoh before King Tut, tried to replace the Egyptian gods with **MONOTHEISM** and focus worship on the sun god (ATEN). (He was originally called Amenhotep IV, but changed his name to honor his god.) His wife Nefertiti was considered one of the most beautiful queens of Egypt.



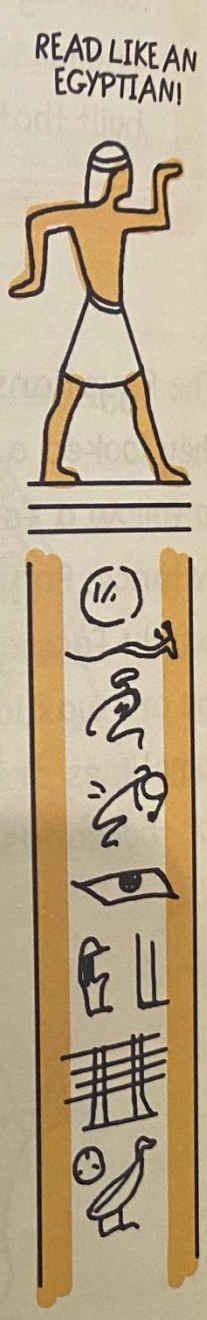
MONOTHEISM
belief in one god

RAMSES THE GREAT: reigned for 66 years (1279–1213 BCE), was known as a great warrior, and signed the world's first peace treaty (with his enemies the Hittites). He also had many monuments built that can still be seen today.

The Egyptians created beautiful illustrations, but often they looked a lot alike. Artists and sculptors were expected to follow a formula, not come up with original ideas. For instance, Egyptians are often pictured in a half-profile pose (partly facing forward, partly facing to the side). So while the art was lovely and consistent, and although artists sometimes drew fun sketches, they did not use a new style for thousands of years.

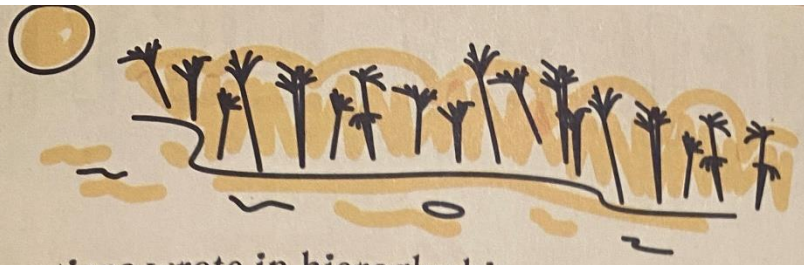
HIEROGLYPHICS

The Egyptians invented **HIEROGLYPHICS**, picture-like symbols used for writing. Hieroglyphics were complicated—to write a word you might have to spell it out **AND** add an extra picture to show what it meant. Only members of the upper and middle classes of society were trained as scribes. A simplified version of hieroglyphics, **HIERATIC SCRIPT**, was used for everyday business.



PAPYRUS

Although they first wrote on clay tablets, the Egyptians later invented **PAPYRUS**, a type of paper made from the papyrus plant. Papyrus most likely no longer grows in Egypt, but historians are pretty sure that it would have been a common plant along the Nile River in ancient times. Papyrus plants like to grow near marshy riverbanks because they need a lot of water. The Nile River Valley would have been ideal.

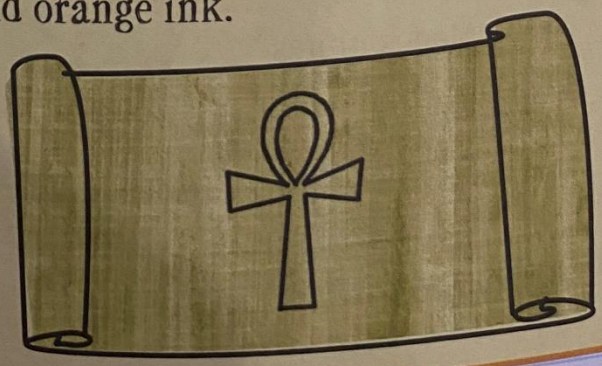


Egyptians wrote in hieroglyphics on papyrus in order to communicate across their empire and keep records of their history and achievements. The oldest papyrus scroll has been linked to the reign of Pharaoh Khufu, who ruled between 2575 and 2465 BCE.

PAPER LIKE WE USE TODAY WAS INVENTED BY THE CHINESE AND INTRODUCED TO THE MIDDLE EAST DURING THE 800s CE.

Papyrus was also popular in ancient Greece, Rome, and various Arabic regions.

Historians study papyrus documents that have survived many thousands of years. The sheets were formed by laying strips of papyrus stalks first diagonally and then horizontally. The damp layers were then pressed together and left to dry. Papyrus was normally made into rolls and stuck together with a paste. Egyptians wrote hieroglyphics mostly in black or red ink, but a skilled painter would also use white, blue, green, yellow, and orange ink.

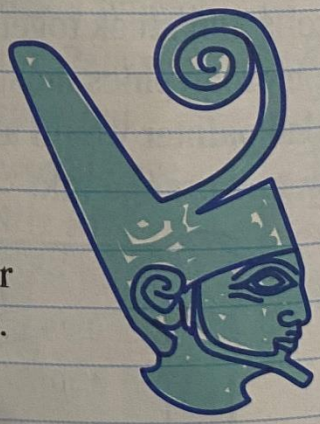


ANCIENT EGYPT

3300-3200 BCE:
Egyptians develop hieroglyphics to communicate through writing.

Around 2575-2465 BCE:
Egyptians build the great pyramids and the Sphinx.

Before 2700 BCE:
King Menes unites the Upper and Lower Egyptian Kingdoms.



TIMELINE

ANCIENT EGYPTIAN CAT MEME

332 BCE:

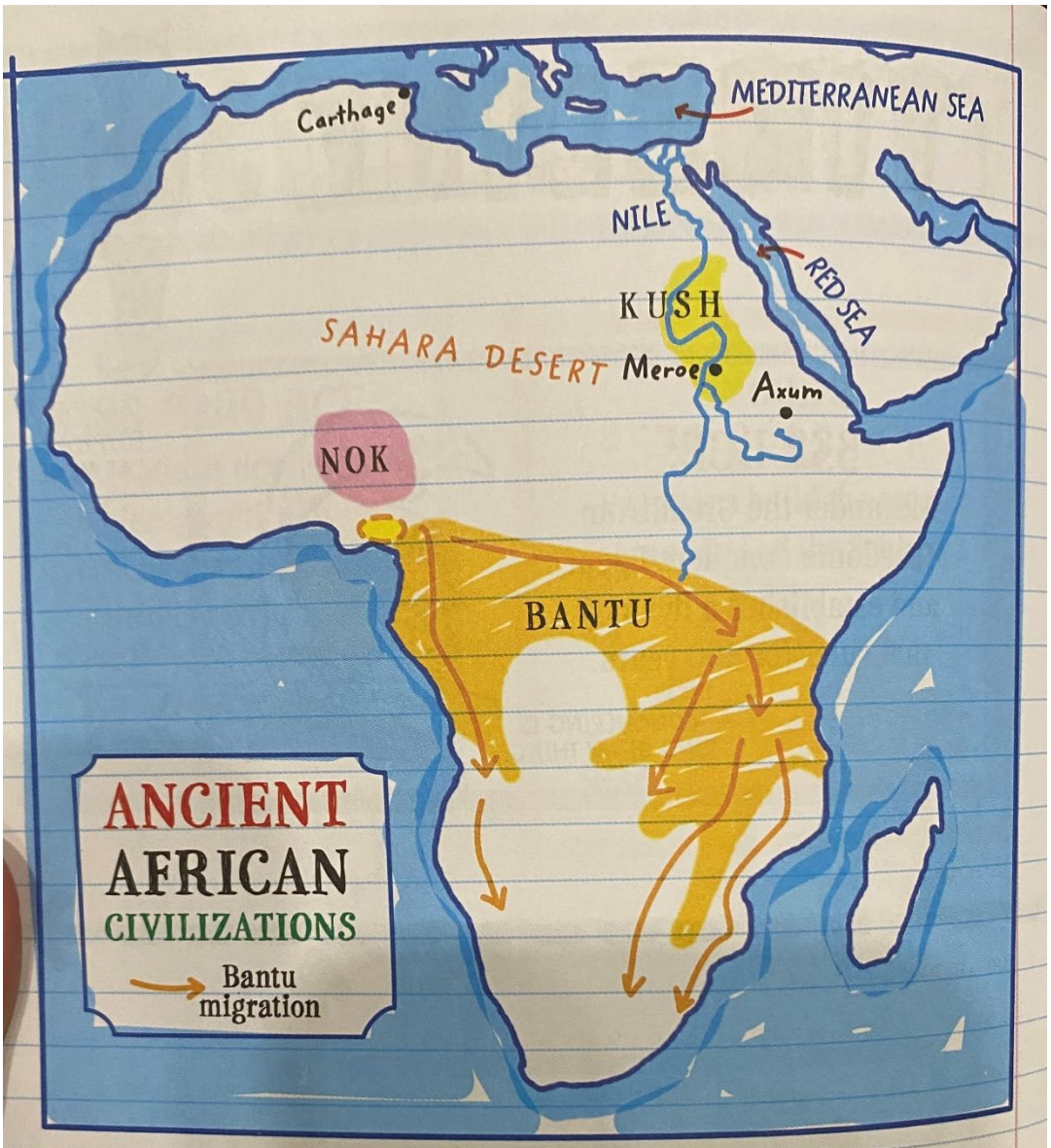
Alexander the Great from Macedonia conquers Egypt and establishes a dynasty that rules for 300 years.

CONQUERING IS KIND OF MY THING.

30 BCE:

Egypt falls to the Roman Empire after Queen Cleopatra dies.

Insert



The BANTU

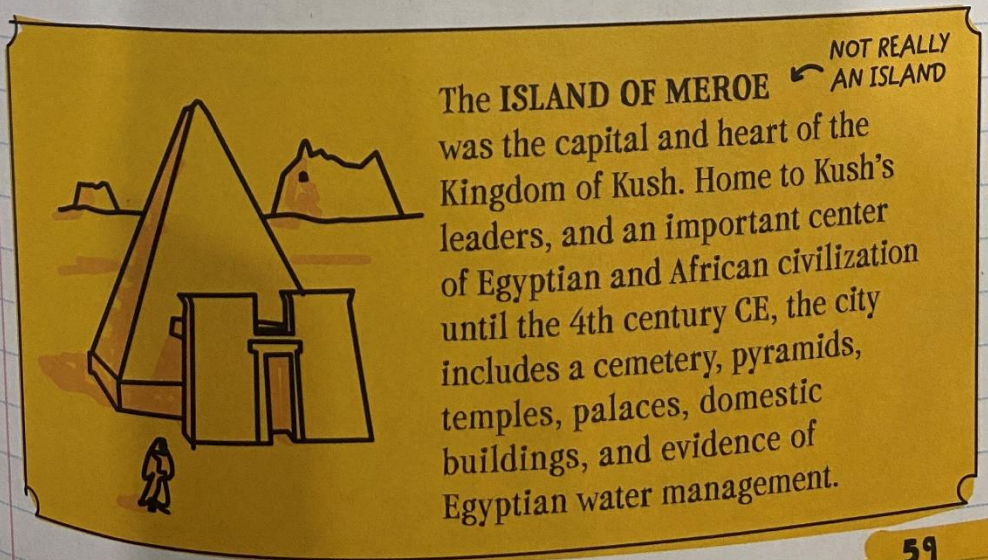
In approximately 1500 BCE, **BANTU MIGRATION** began. For 2,000 years, large numbers of Bantu-speaking people from West Africa moved slowly toward the south and east of the continent.

Like many early civilizations, the Bantu were fishermen and farmers. Each generation moved farther than the last to

find more fertile land and better grazing for their animals. The villages were composed of clans that at times would move into already inhabited areas to share cultures and crops (yams, for example). The Bantu brought metalworking techniques with them, and iron tools and weapons. If their new neighbors weren't welcoming, the Bantu would put these weapons to use.

The KINGDOM of KUSH

The KINGDOM OF KUSH was at its most powerful between around 2000 BCE to 1500 BCE. Also called Nubia, it was an African civilization located on the Nile River south of Egypt. At first it was under Egyptian rule. Its major city was Meroe, which was the main residence of the rulers. The Kushites were farmers turned traders. They made iron weapons and tools, and they traded ivory, gold, ebony, and slaves to India, Arabia, and the Roman Empire.



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Home End