

K - 8

Worksheets

6th Grade

January 2011

NUMBER REPRESENTATIONS

A fraction, a decimal, and a percent are three ways to represent a number.

$$\frac{1}{4} = 0.25 = 25\% \quad \frac{3}{5} = 0.6 = 60\%$$

To rename a fraction as a decimal, divide the numerator by the denominator.

$$\frac{7}{20} = 0.35$$

$$\begin{array}{r} 0.35 \\ 20 \overline{)7.00} \\ \underline{60} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

Rename each fraction as a decimal.

1. $\frac{4}{5} =$ _____	2. $\frac{1}{8} =$ _____	3. $\frac{13}{20} =$ _____
4. $\frac{7}{8} =$ _____	5. $\frac{3}{4} =$ _____	6. $\frac{5}{16} =$ _____
7. $\frac{3}{8} =$ _____	8. $\frac{19}{20} =$ _____	9. $\frac{6}{25} =$ _____
10. $\frac{11}{20} =$ _____	11. $\frac{7}{25} =$ _____	12. $\frac{5}{8} =$ _____

To rename a decimal as a percent, move the decimal point two places to the right.

$$0.87 = 87\% \quad 0.5 = 50\% \quad 3.12 = 312\%$$

Rename each decimal as a percent.

13. $0.24 =$ _____	14. $0.73 =$ _____	15. $0.9 =$ _____
16. $1.25 =$ _____	17. $0.642 =$ _____	18. $2.9 =$ _____
19. $3.05 =$ _____	20. $0.001 =$ _____	21. $7 =$ _____
22. $0.01 =$ _____	23. $12.5 =$ _____	24. $5.8 =$ _____

RATIONAL NUMBERS

Equivalent fractions are two names for the same amount.

You can find an equivalent fraction by multiplying the numerator and denominator of the original fraction by the same number.

$$\frac{3}{7} = \frac{3 \times 4}{7 \times 4} = \frac{12}{28}$$

Fill in the blank to name an equivalent fraction.

1. $\frac{8}{9} = \frac{\quad}{81}$	2. $\frac{4}{5} = \frac{20}{\quad}$	3. $\frac{3}{10} = \frac{\quad}{30}$
4. $\frac{11}{15} = \frac{\quad}{60}$	5. $\frac{5}{8} = \frac{40}{\quad}$	6. $\frac{2}{7} = \frac{4}{\quad}$
7. $\frac{17}{26} = \frac{51}{\quad}$	8. $\frac{23}{75} = \frac{\quad}{225}$	9. $\frac{11}{99} = \frac{\quad}{990}$
10. $\frac{13}{21} = \frac{\quad}{84}$	11. $\frac{17}{36} = \frac{51}{\quad}$	12. $\frac{27}{94} = \frac{\quad}{376}$

You can also find an equivalent fraction by dividing the numerator and denominator of the original fraction by the same amount.

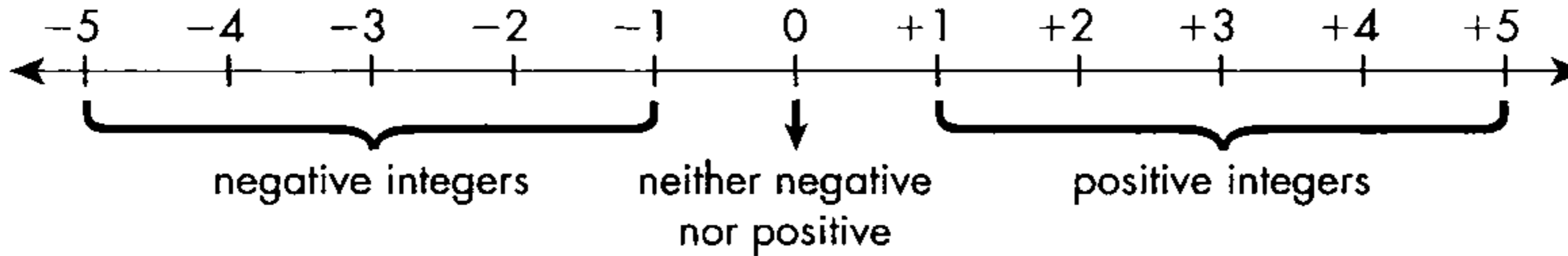
$$\frac{15}{18} = \frac{15 \div 3}{18 \div 3} = \frac{5}{6}$$

Fill in the blank to name an equivalent fraction.

13. $\frac{50}{75} = \frac{2}{\quad}$	14. $\frac{96}{132} = \frac{\quad}{11}$	15. $\frac{36}{108} = \frac{4}{\quad}$
16. $\frac{30}{78} = \frac{5}{\quad}$	17. $\frac{48}{80} = \frac{\quad}{5}$	18. $\frac{34}{51} = \frac{\quad}{3}$
19. $\frac{205}{315} = \frac{\quad}{63}$	20. $\frac{416}{440} = \frac{52}{\quad}$	21. $\frac{153}{171} = \frac{\quad}{57}$
22. $\frac{140}{525} = \frac{4}{\quad}$	23. $\frac{220}{420} = \frac{\quad}{21}$	24. $\frac{129}{183} = \frac{43}{\quad}$

ROLE OF INTEGERS

Integers are whole numbers and their opposites. A number line shows both positive and negative integers.



You can use an integer to represent a situation. Positive integers show an increase or gain, or a location above or to the right. Negative integers show a decrease or loss, or a location below or to the left.

Represent each situation with an integer.

1. Kevin lost 8 pounds. _____	2. An elevator rose 6 floors. _____	3. A plant grew 5 cm. _____
4. A football team lost 9 yards. _____	5. The temperature dropped 2 degrees. _____	6. A location is 3 miles above sea level. _____
7. Max deposited \$14 in his account. _____	8. Dinner cost Marci \$9. _____	9. Six students transferred out of the school. _____
10. There are fourteen hours before the start of a game. _____	11. Eleven people boarded a bus. _____	12. Beth saved \$27. _____
13. A diver swims 12 feet below the water's surface. _____	14. The top of a building is 32 feet above the sidewalk. _____	15. The bottom of a mine shaft is 18 feet below the ground. _____
16. A gain in altitude of 500 feet _____	17. Randy withdrew \$35 from his account. _____	18. The low temperature for the day was 23 degrees below zero. _____

Name _____

Date _____

SOLVING PROBLEMS USING NUMBER THEORY

Arthur has 108 stamps. Can he place an equal number of stamps on each page of a 9-page album?

You can use divisibility rules to answer the question.

Divisibility Rules for Integers

A number is divisible by 2 if the last digit is an even number.

A number is divisible by 3 if the sum of its digits is divisible by 3.

A number is divisible by 4 if the last two digits form a number that is divisible by 4.

A number is divisible by 5 if the last digit is 0 or 5.

A number is divisible by 6 if it is divisible by 2 and 3.

A number is divisible by 9 if the sum of its digits is divisible by 9.

A number is divisible by 10 if the last digit is 0.

1. How many stamps does Arthur have? _____

2. What is the sum of these digits? _____

Since 9 is divisible by 9, 108 is also divisible by 9. Arthur can place an equal number of stamps on each page of the album.

Use the divisibility rules to answer each question.

3. A donut machine made 285 donuts. Can the donuts be divided evenly into boxes that hold a half dozen each? Explain.

4. A printer made 688 copies of a flyer. Can an equal number of the copies be placed in each of four boxes? Explain.

5. Zack and two friends shared the cost of a gift for their coach. If the gift cost \$29.25, will the three boys contribute equal amounts? Explain.

6. Sheri has 5 days to finish reading a book. She has 78 pages left to read. Can Sheri read an equal number of pages each day and complete her reading? Explain.

CHALLENGE

Name two three-digit numbers that are divisible by 3 but not by 9.

Converting Numbers Chart

	Base 2 Number	Base 10 Number
1	1010	
2	1110001	
3	100001	
4	1010111	
5	1001	
6	10001	
7	1010101	
8	100010001	
9	1001001	
10	1101101	
11	11100111	
12	10011001	
13	11011	
14	11000	
15	1000001	
16	1010111	
17		19
18		16
19		52
20		24
21		35
22		42
23		5
24		26
25		14
26		23
27		9
28		72
29		83
30		60
31		40
32		28

NUMBER REPRESENTATIONS

Scientific notation is a useful way of representing numbers, especially a very great number, a very low number, or a number very close to zero. A number expressed this way is shown as a product of two numbers.

The first number is greater than or equal to 1 but less than 10.

The second number is a power of 10.

Standard Form \longrightarrow 67,400,000 = 6.74×10^7 \longleftarrow Scientific Notation

To express a whole number in scientific notation, place a decimal point at the end of the number.

Then move the decimal point to form a number greater than or equal to 1 but less than 10. This is the first number in the scientific notation.

The second number in the scientific notation is a power of 10 with an exponent that equals the number of places you moved the decimal point to the left.

$7,800,000,000 = 7.8 \times 10^9$

Express each number in scientific notation.

1. 9,480,000 = _____	2. 5,100,000,000 = _____
3. 88,000 = _____	4. 670,000,000 = _____
5. 700,000 = _____	6. 104,000,000,000 = _____
7. 9,200,000 = _____	8. 130,000 = _____
9. 24,000,000,000 = _____	10. 650,000 = _____
11. 109,000,000 = _____	12. 30,100,000 = _____

Challenge

Name the least and greatest whole number values for N that will make this inequality true.

$4.5 \times 10^6 < N < 7.8 \times 10^6$

RATIONAL NUMBERS

1. Last season, Derek batted 24 times and had 14 hits. What was Derek's batting average for last season?

To find a batting average, first divide the number of hits by the number of times at bat.

2. What is $14 \div 24$? _____
3. Now round the quotient to the thousandths place to find Derek's batting average.

Fill in each player's batting average to complete the chart. Remember to round your answer to the nearest thousandth.

Player	At Bats	Hits	Batting Average
Tiko	36	14	4. _____
Max	40	19	5. _____
Ron	38	15	6. _____
Carlos	20	7	7. _____
Eli	42	24	8. _____
Zack	40	12	9. _____
Ben	35	10	10. _____
John	28	9	11. _____
Ray	31	6	12. _____
Juan	39	17	13. _____
Royce	42	18	14. _____
Willie	37	19	15. _____

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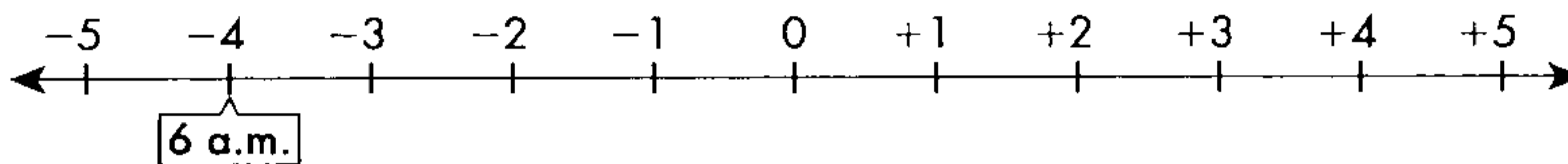
Challenge

Guy's batting average is 0.680. If he had 25 at bats, how many times did Guy get a hit?

ROLE OF INTEGERS

At 6 a.m. the temperature was four degrees below zero. At noon, the temperature had increased by 7 degrees. What was the temperature at noon?

You can use a number line to add or subtract integers.

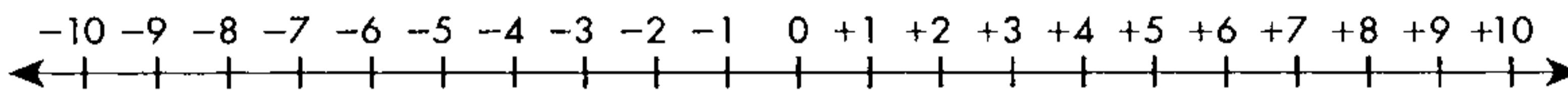


1. Which way should you move on a number line to show an increase or gain?

2. Which integer is 7 spaces to the right of -4 ? _____

3. What was the temperature at noon?

A football team lost 5 yards on the first play of the game. On the second play, the team lost another 3 yards. On the third play, the team gained 2 yards. If the team began at its 9 yard line, aiming to advance toward greater numbers, where was the ball placed after the third play?



4. Make a mark on the number line that represents where the team started. How will you move to show what happened after the first play?

5. Make a mark that represents where the team started the second play. How will you show what happened after the second play?

6. Make a mark that represents where the team started the third play. How will you show what happened after the third play?

7. Make a mark that represents where the team ended the series. Where was the ball placed after the third play?

SOLVING PROBLEMS USING NUMBER THEORY

A florist has 42 roses and 70 carnations. She wants to use all the flowers in arrangements that have the same number of roses in each and the same number of carnations in each. What is the greatest number of arrangements she can make?

She has to divide both groups into the same number of equal groups. You need to find the greatest common divisor – which is the greatest common factor – to answer the question. The greatest common factor (GCF) is the greatest factor common to two or more numbers.

1. List all the factors of 42. _____
2. List all the factors of 70. _____
3. What is the greatest factor contained in both lists? _____
4. What is the greatest number of arrangements the florist can make? _____
5. How many roses and how many carnations will each arrangement contain?

Solve.

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>6. Dawn has a 108-inch length of gold ribbon and a 90-inch length of silver ribbon. She wants to cut the ribbons into pieces of equal length, without wasting any ribbon. What is the greatest length for the pieces she can cut from each ribbon? _____</p> | <p>7. Eighty-four seventh graders and sixty-three eighth graders will attend a summer camp. The director wants to divide the seventh graders equally among the same cabins in which eight graders will also be equally divided. If the cabins hold up to 25 children, what is the lowest number of cabins he can use? _____</p> |
| <p>8. Risha has 52 red beads and 78 white beads. She wants to make bracelets each with the same number of red beads and each also with an equal number of white beads. What is the greatest number of bracelets Risha can make? How many red beads will each bracelet contain? How many white beads?</p> <p>_____</p> <p>_____</p> | <p>9. Brian has 132 pennies and 165 nickels. He wants to put the coins in containers with the same number of pennies in each and also with an equal number of nickels in each one. If he does not want more than 100 coins per container, what is the lowest number of containers Brian can use? How many pennies will be in each container? How many nickels?</p> <p>_____</p> <p>_____</p> |

EXPONENTS AND SCIENTIFIC NOTATION

You can write products using exponents. In an expression with an exponent, the base is the number that is used some number of times in a multiplication. An **exponent** shows how many times the base is used in the multiplication.

$$3^4 = 3 \times 3 \times 3 \times 3 = 81$$

Exponent

Base

Write each product using exponents.

1. $5 \times 5 \times 5$ _____	2. $7 \times 7 \times 7 \times 7 \times 7$ _____	3. $8 \times 8 \times 8$ _____
4. $10 \times 10 \times 10 \times 10$ _____	5. $12 \times 12 \times 12 \times 12 \times 12$ _____	6. 13×13 _____

Write in standard form.

7. 4^2 _____	8. 7^2 _____	9. 2^3 _____	10. 10^2 _____
11. 2^5 _____	12. 3^2 _____	13. 10^5 _____	14. 1^6 _____
15. 12^2 _____	16. 5^3 _____	17. 2^4 _____	18. 6^3 _____
19. 8^3 _____	20. 11^2 _____	21. 4^4 _____	22. 10^6 _____
23. 1^4 _____	24. 5^2 _____	25. 9^3 _____	26. 2^6 _____
27. 3^4 _____	28. 8^2 _____	29. 12^3 _____	30. 9^4 _____
31. 11^3 _____	32. 7^4 _____	33. 2^8 _____	34. 5^6 _____

CHALLENGE

Which is greater 3^5 or 5^3 ? Explain your answer.

Name _____

Date _____

EXPONENTS AND SCIENTIFIC NOTATION

Scientific notation is a useful way of representing numbers, especially a very great number, a very low number, or a number very close to zero. A number expressed this way is shown as a product of two numbers. The first number is greater than or equal to 1 but less than 10. The second number is a power of 10.

Standard Form \longrightarrow 29,830,000 = 2.983×10^7 \longleftarrow Scientific Notation

To express a whole number in scientific notation, place a decimal point at the end of the number. Then move the decimal point to form a number greater than or equal to 1 but less than 10. This is the first number in the expression using scientific notation. The second number is a power of 10 with an exponent that equals the number of places you moved the decimal point to the left.

$$530,000,000 = 5.3 \times 10^8$$

Express each number in scientific notation.

1. 630,000 _____	2. 7,000,000 _____	3. 410,000,000 _____
4. 10,430,000,000 _____	5. 87,000 _____	6. 9,200,000,000 _____
7. 27,000 _____	8. 300,000,000,000 _____	9. 741,000,000 _____
10. 1,080,000,000 _____	11. 5,430,000 _____	12. 12,000,000 _____
13. 813,000,000 _____	14. 2,345,000,000 _____	15. 67,000,000,000 _____

Express each number in standard form.

16. 7.5×10^3 _____	17. 9.036×10^5 _____	18. 1.082×10^2 _____
19. 5.6×10^6 _____	20. 3.1×10^7 _____	21. 8.005×10^4 _____

Name _____

Date _____

NUMERATION SYSTEMS

A **numeral** is a symbol used to represent a number. In the Roman numeral system, seven letters are used to represent numbers.

Roman Numeral	Numerical Value
I	1
V	5
X	10
L	50
C	100
D	500
M	1,000

This system uses addition and subtraction, indicated by relative positions, rather than place value, to represent numbers.

Addition is shown by placing one to three symbols with a lesser value **AFTER** a symbol with a greater value.

$$VII = 5 + 1 + 1 = 7$$

$$DCCC = 500 + 100 + 100 + 100 = 800$$

Subtraction is shown by placing a single symbol with a lesser value **BEFORE** a symbol with a greater value.

$$XL = 50 - 10 = 40$$

$$CM = 1,000 - 100 = 900$$

Give the numerical value of each Roman numeral.

1. MMV _____

2. IX _____

3. XXVIII _____

4. CLII _____

5. CMIX _____

6. DCXXX _____

7. CCLVI _____

8. CDXC _____

Express each numerical value as a Roman numeral.

9. 317 _____

10. 2,201 _____

11. 555 _____

12. 940 _____

13. 689 _____

14. 3,800 _____

15. 746 _____








16. 1,375 _____

Name _____

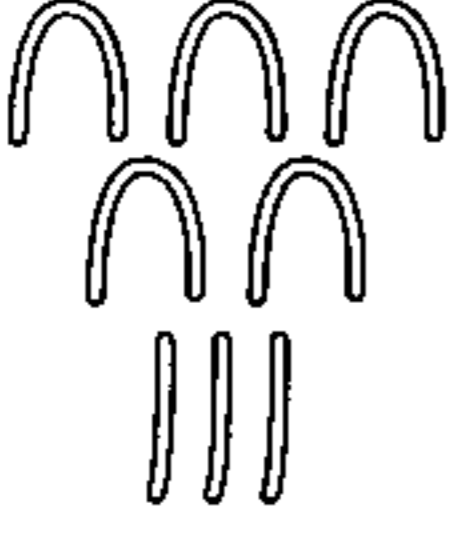



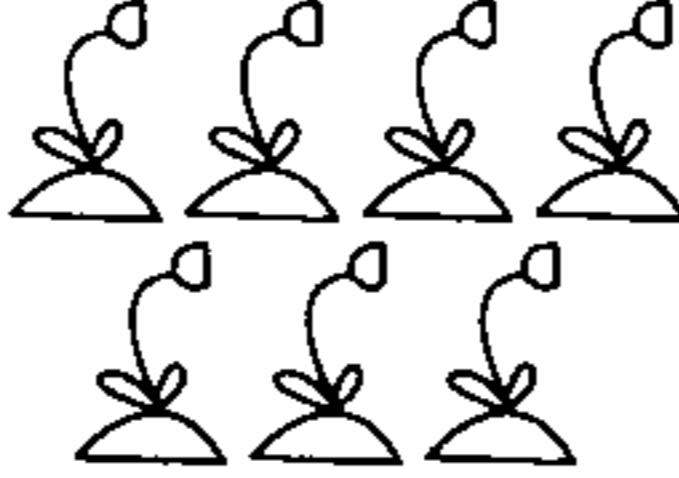

Date _____

NUMERATION SYSTEMS

The Egyptian numeration system used symbols to represent numbers.
The symbols were arranged vertically and were written from greatest to least.

Egyptian Symbol	Numerical Value
 (Staff)	1
 (Heel Bone)	10
 (Coil of Rope)	100
 (Lotus Flower)	1,000
 (Pointing Finger)	10,000
 (Tadpole)	100,000
 (Astonished Man)	1,000,000

Give the numerical value for each set of Egyptian symbols.

1.  _____	2.  _____	3.  _____
4.  _____	5.  _____	6.  _____

Draw or describe the Egyptian symbols used to express each number.

7. 25,000 _____	8. 3,000,400 _____
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Name _____

Date _____

RATIO, PROPORTION AND PERCENT

A **ratio** is a comparison of two numbers.

In a group of 20 soccer players, 14 players are wearing blue shorts.
Write a ratio of players wearing blue shorts to total players.

You can express this ratio in three ways.

14 to 20 14 : 20 $\frac{14}{20}$

You can simplify this ratio by dividing both parts by a common factor.

$$\frac{14 \div 2}{20 \div 2} = \frac{7}{10}$$

Write each ratio in simplest form.

A middle school band has 72 members. Sixteen members are sixth graders.

1. Write a ratio of sixth grade members to band members who are not in the sixth grade.

2. Write a ratio of members who are not in the sixth grade to total band members.

Of the first 50 customers who bought items in a supermarket, 18 spent less than \$20.

3. Write a ratio of customers who spent less than \$20 to customers who spent more than \$20.

4. Write a ratio of customers who spent more than \$20 to total customers.

A school cafeteria sold 65 cartons of milk and 105 bottles of water during the lunch periods.

5. Write a ratio of milk cartons to water bottles sold.

6. Write a ratio of milk cartons to total beverages sold.

There are 16 white cars and 9 blue cars parked in a lot filled with 96 cars.

7. Write a ratio of white cars to total cars parked in the lot.

8. Write a ratio of cars in the lot that are either white or blue to cars in the lot that are neither white nor blue.

Name _____

Date _____

RATIO, PROPORTION AND PERCENT

A **percent** is a ratio that compares a number to 100.

$$9\% = 9 : 100 \text{ or } \frac{9}{100}$$

To rename a ratio as a percent, write the ratio in fraction form. Then write an equivalent fraction for the ratio with a denominator of 100. Then place a percent sign (%) after the numerator of this equivalent fraction and drop the denominator to form the percent.

$$3 : 20 = \frac{3 \times 5}{20 \times 5} = \frac{15}{100} = 15\%$$

Express each ratio as a percent.

1. 13 : 100 _____	2. 27 : 50 _____	3. 9 : 10 _____	4. 83 : 100 _____
5. 6 : 20 _____	6. 4 : 5 _____	7. 11 : 50 _____	8. 6 : 25 _____
9. 3 : 4 _____	10. 55 : 100 _____	11. 40 : 200 _____	12. 51 : 300 _____
13. 3 : 5 _____	14. 7 : 20 _____	15. 9 : 25 _____	16. 17 : 50 _____
17. 9 : 20 _____	18. 3 : 25 _____	19. 39 : 50 _____	20. 4.7 : 25 _____
21. 7 : 25 _____	22. 19 : 50 _____	23. 17 : 20 _____	24. 36 : 400 _____
25. 37 : 100 _____	26. 23 : 25 _____	27. 5.2 : 25 _____	28. 3.2 : 50 _____

Challenge

Of the first 1,000 books borrowed during the new year, 129 were biographies. What percent of the total were biographies?

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 1
Pretest

Directions: Answer the following questions in the space provided.

1. How does the sun produce the tremendous energy it releases every second?

2. Define these terms.
 - a. solar eclipse
 - b. lunar eclipse
 - c. rotation
 - d. revolution

3. Why isn't the Earth cratered like the moon and Mercury?

4. Venus has the highest surface temperature of all the planets. Why?

5. What is the solar wind?

6. What is a light-year?

7. What is plate tectonics?

8. What are some unusual characteristics of Mars?

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 2
Program Quiz

1. How are the four inner planets similar to one another?
2. Why does nuclear fusion hold promise as an energy source?
3. When we look into the night sky we are actually looking into the past. How do you explain this?
4. There are few meteor craters on the Earth, while the moon is heavily cratered. The Earth is a larger target than the moon and therefore should have been hit by many more meteorites over time. Why do you think the Earth has fewer craters than the moon?
5. Why are Mercury and the Earth's moon so cratered?

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 3
Vocabulary

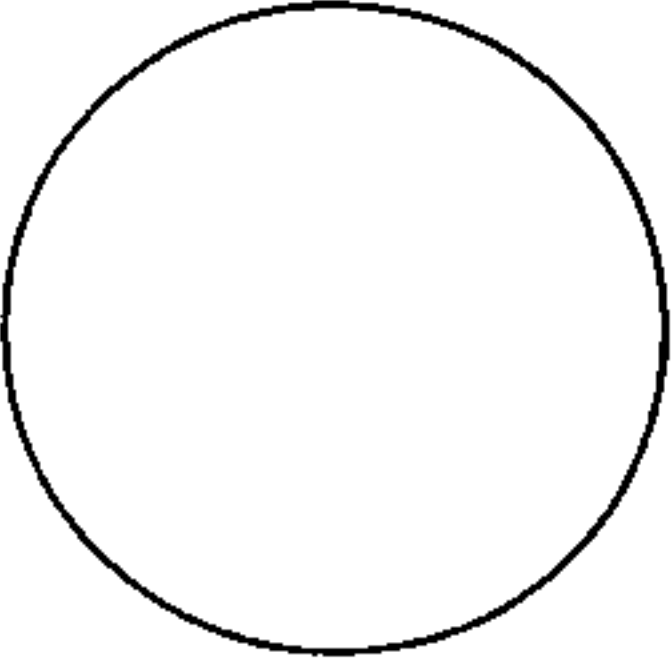
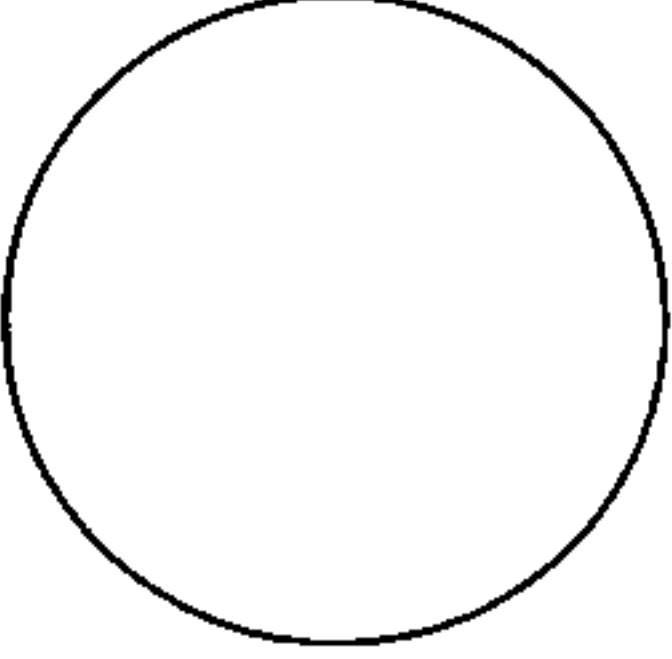
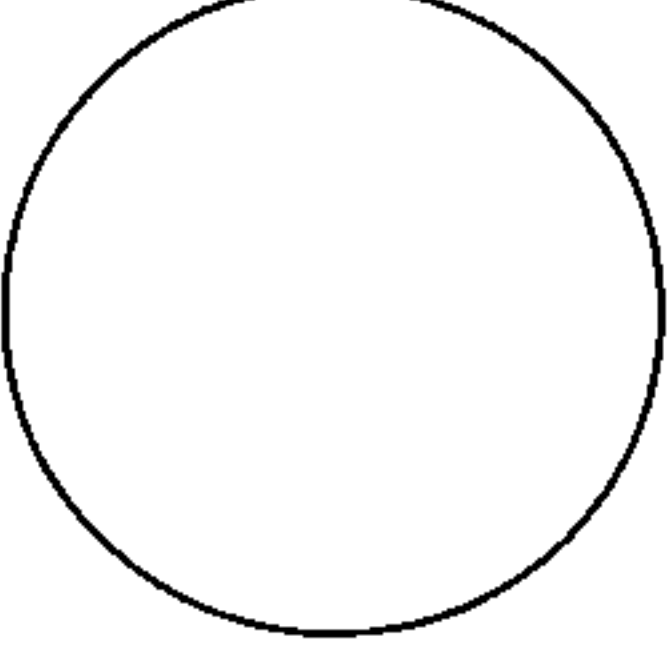
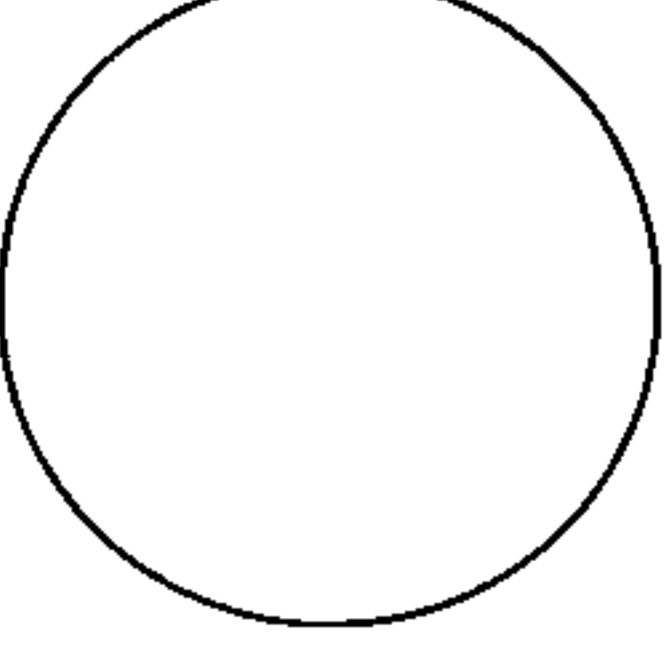
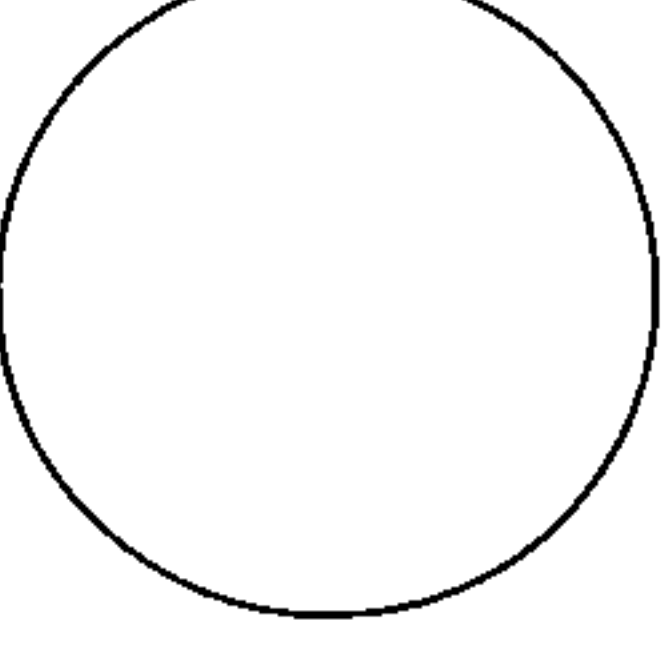
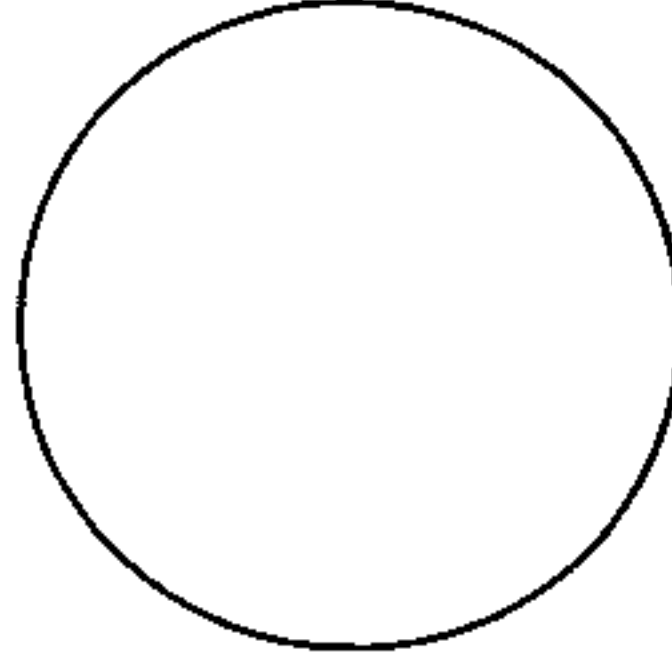
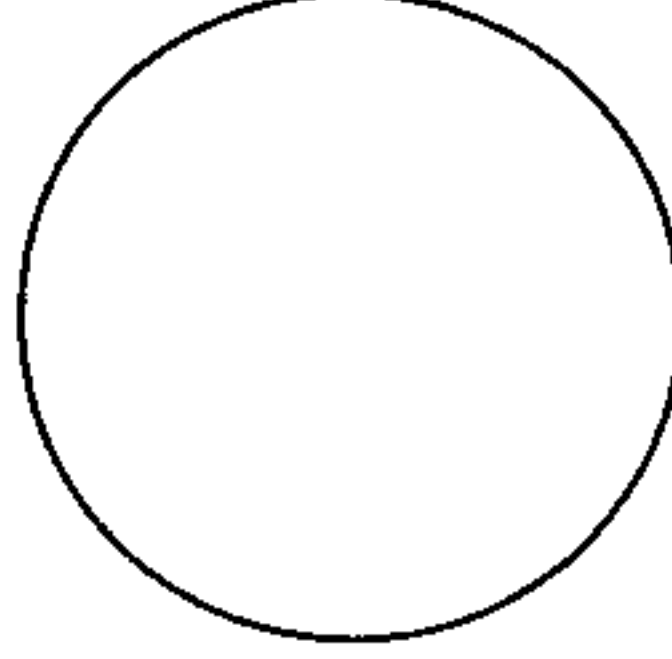
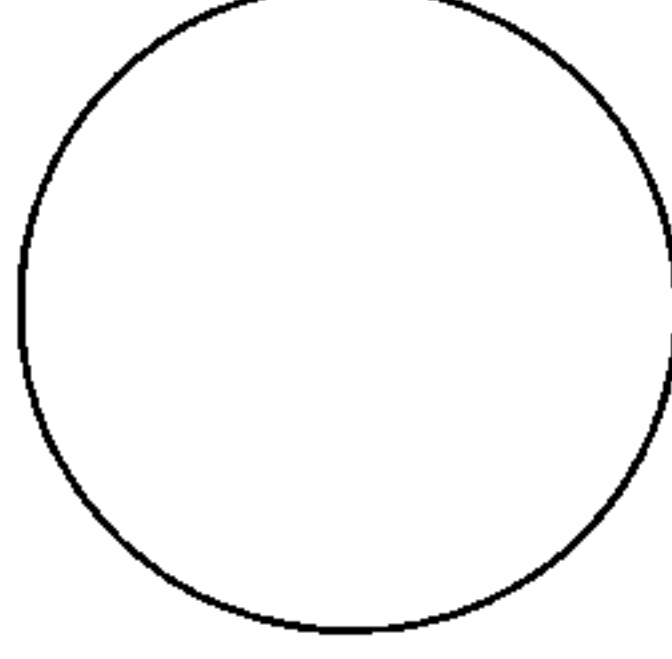
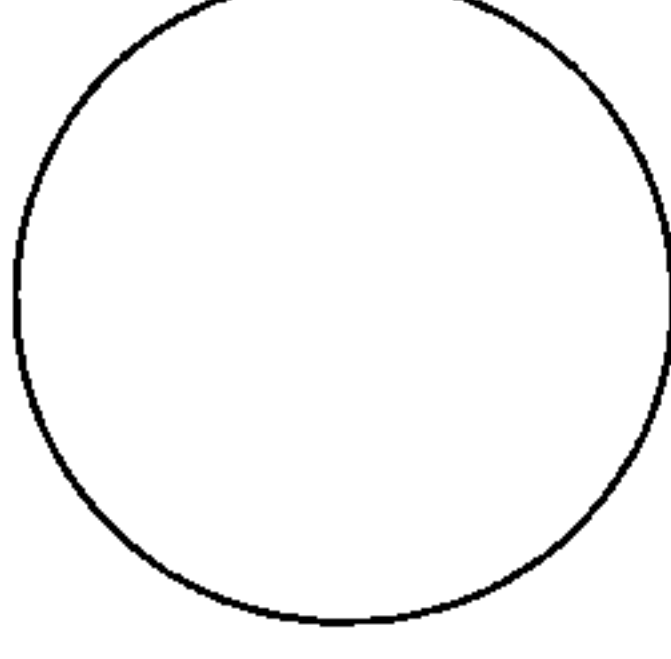
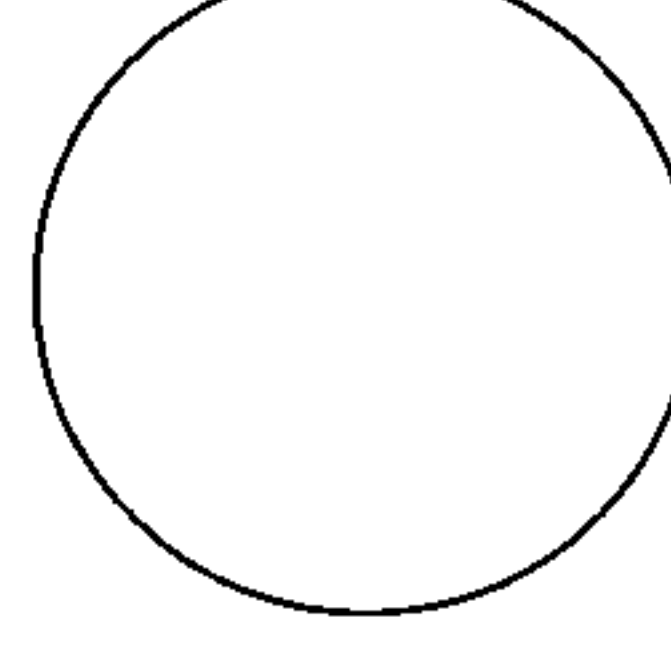
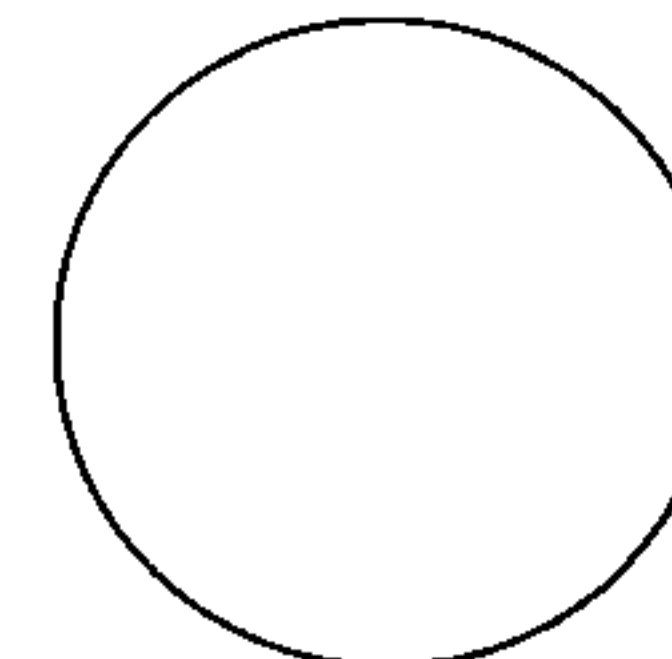
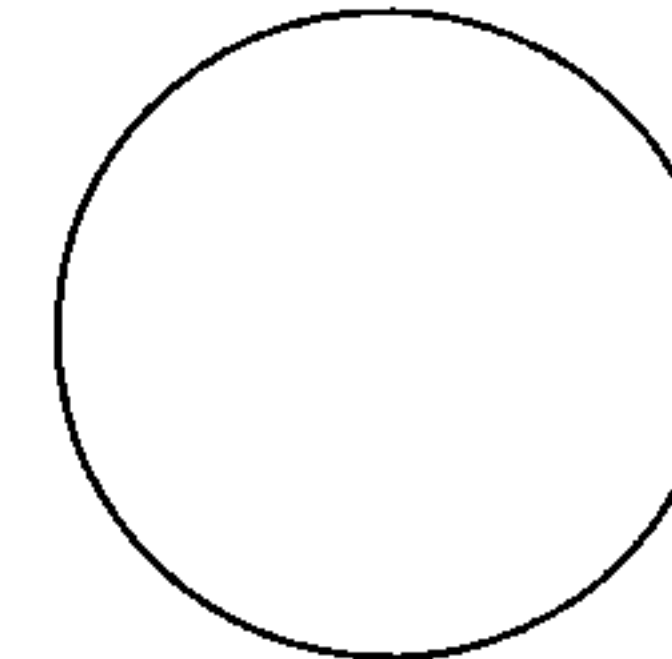
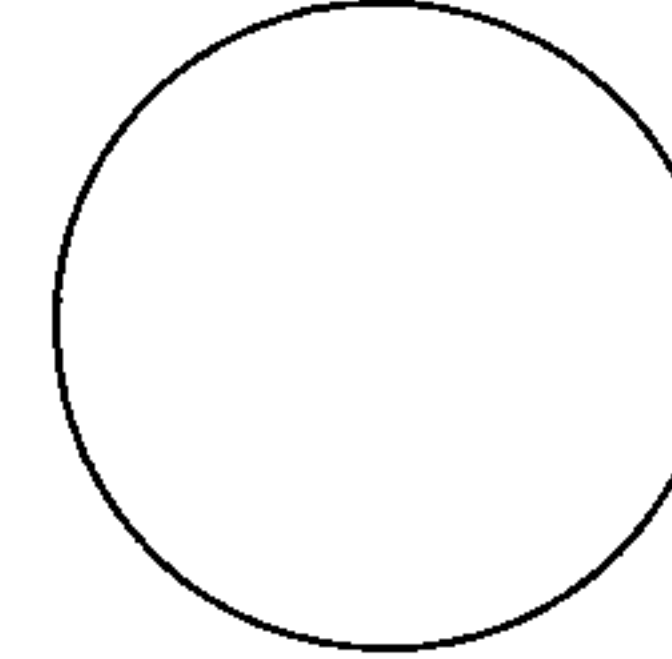
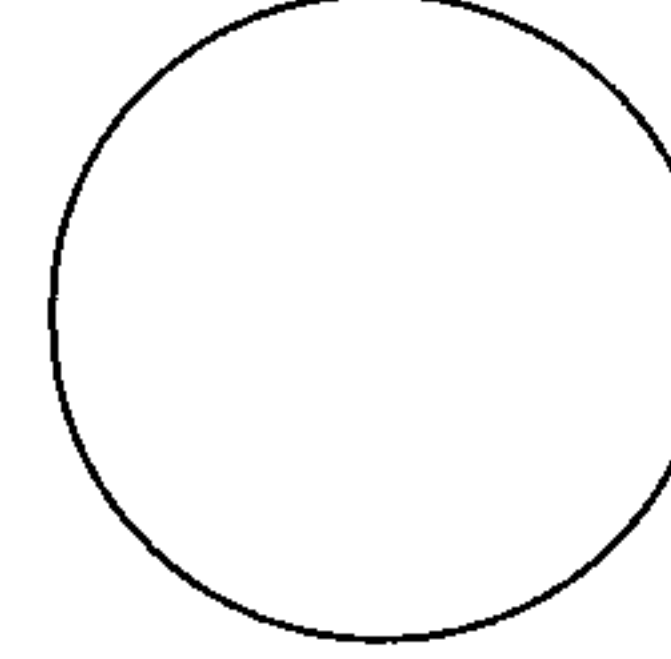
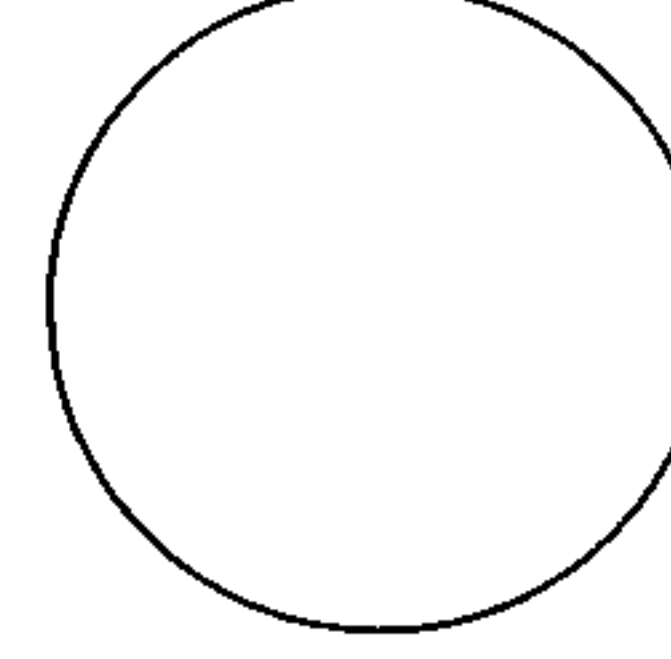
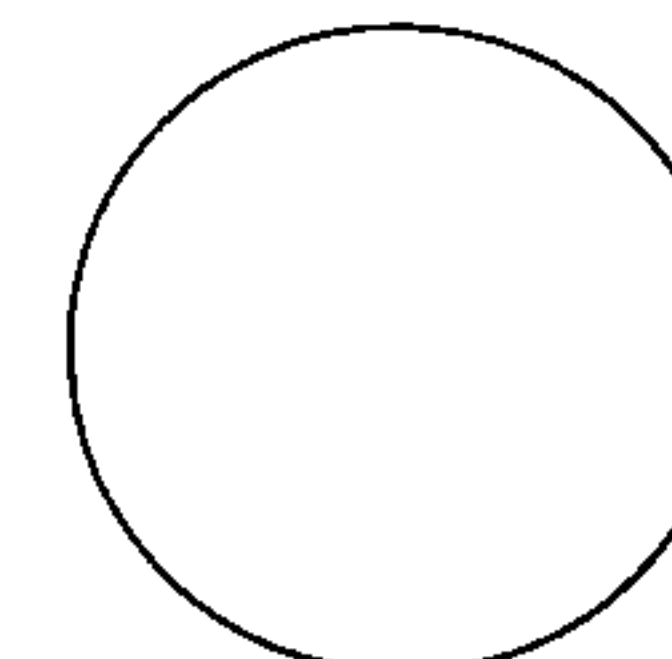
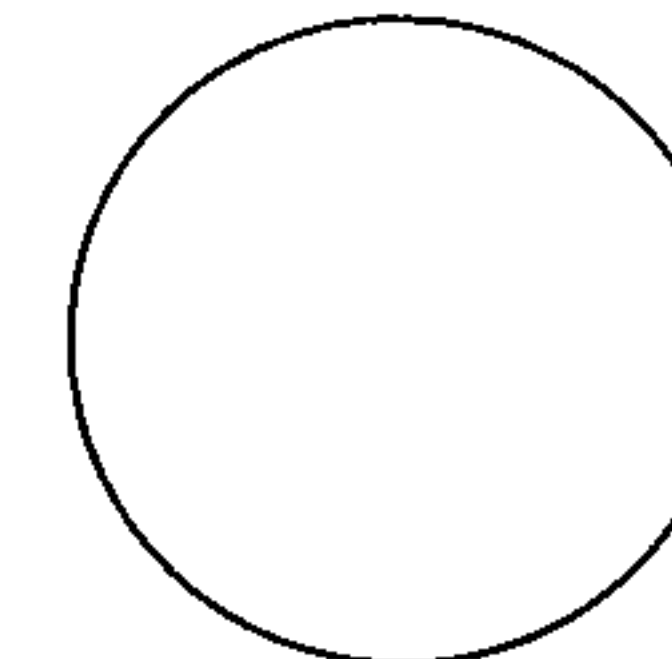
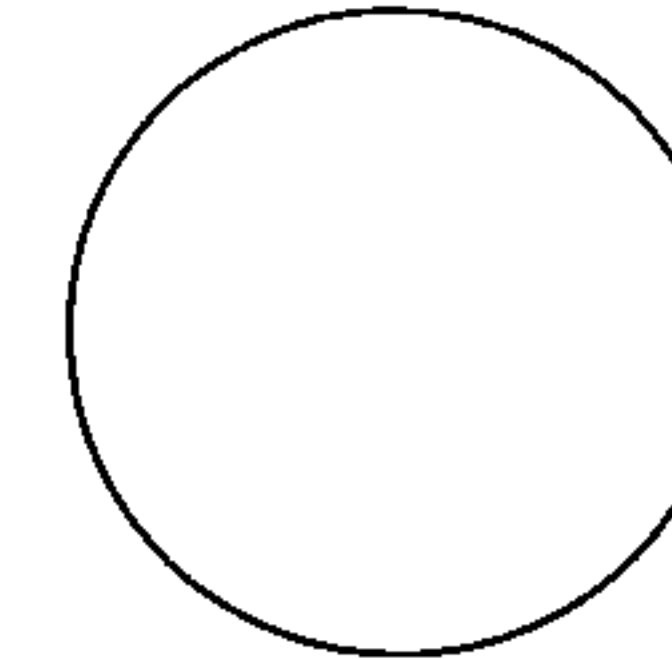
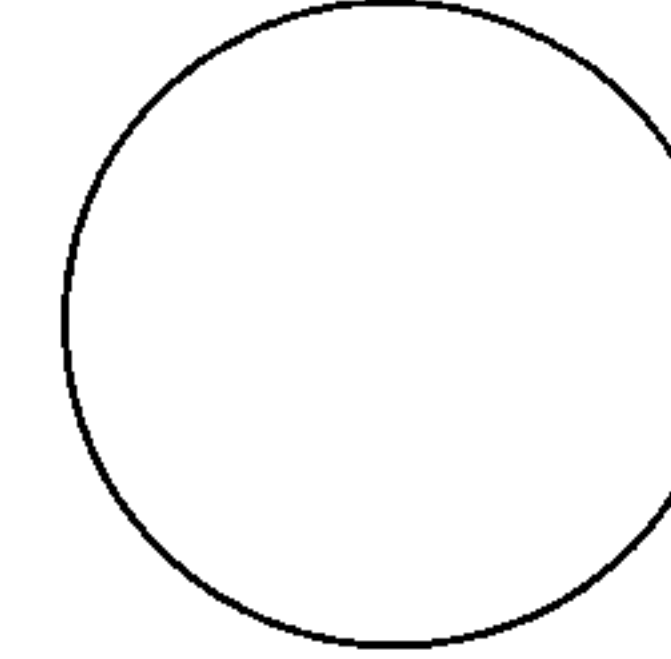
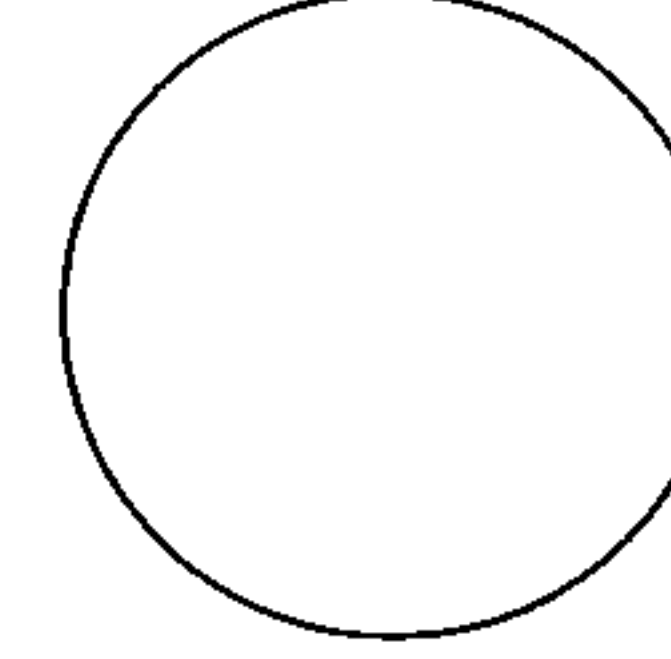
Directions: Pick the definition in column II that best matches the word in column I. Write the definition's letter on the blank line.

- I**
1. light-year _____
 2. sunspots _____
 3. solar wind _____
 4. terrestrial _____
 5. solar eclipse _____
 6. lunar eclipse _____
 7. nuclear fusion _____
 8. rotation _____
 9. revolution _____
 10. photon _____

- II**
- a. A light particle
 - b. Hydrogen atoms combine to make helium atoms
 - c. Earthlike
 - d. Dark blotches on the surface of the sun
 - e. The shadow of the Earth moves across the surface of the moon
 - f. The moon's shadow strikes the Earth's surface
 - g. A measure of distance used by astronomers
 - h. To move around a source of gravity such as a star or planet
 - i. Electronically charged particles that spray out from the sun causing problems with radio transmissions and power failures on Earth
 - j. To spin or turn on an axis

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 11
Phases of the Moon

Name _____

Date _____	Date _____	Date _____	Date _____	Date _____
				
Date _____	Date _____	Date _____	Date _____	Date _____
				
Date _____	Date _____	Date _____	Date _____	Date _____
				
Date _____	Date _____	Date _____	Date _____	Date _____
				

Directions: Your teacher will give you two copies of this sheet. Observe the phases of the moon. In each circle below indicate what the moon looks like by drawing the portion of the moon that is lighted. Record the date as well as your sketch showing what the moon looks like. If there are cloudy nights just record that conditions weren't good. At what point do things seem to be repeating?

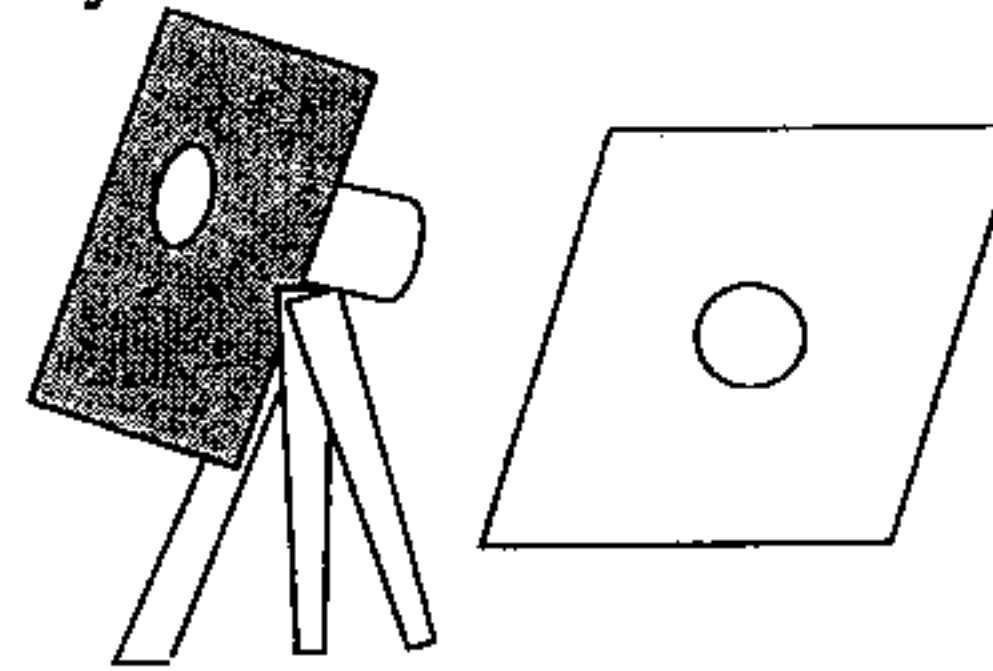
Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 7
Viewing the Sun

Never look directly at the sun because doing so can damage your eyes.

Purpose To make a sun projector.

Materials two sheets of white poster board
 a pair of binoculars
 scissors
 tracing paper
 tape



Procedures

1. Measure the diameter of one of the front lenses on the binoculars. Mark a circle that size in the center of a sheet of poster board and cut out that circle with the scissors.
2. Tape the poster board to the binoculars with one lens directed through the center hole.
3. Secure the binoculars and poster board to a chair or camera tripod to keep it steady.
4. Without looking at the sun, aim the binoculars in the sun's direction. Take the other poster board and prop it up so that an image of the sun falls on the board. Use the binocular focus ring to bring the image into focus. Then secure the second poster board so that it will remain steady.
5. Tape tracing paper on this second poster board so that the image of the sun falls on the tracing paper. Use a pen or pencil to outline the sun and to mark any sunspots that are present. A sunspot is a dark blotchy area on the surface of the sun.
6. You can view these sunspots moving as the sun rotates. Use a second piece of tracing paper the next day and repeat step #5.

Observations

1. Compare the two pieces of tracing paper. Can you find the same sunspots in new locations?
2. Do all the sunspots seem to move at the same speed?

Conclusion

The sun has no solid surface. It is made up of gases. Sunspots move with the rotation of the sun. What can you tell about the way the sun's surface behaves as it rotates?

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 8
The Seasons on Earth

Purpose To demonstrate that Earth experiences seasonal changes due to the tilt of its axis.

Materials large Styrofoam ball
 flashlight
 pencil
 rubber band

Procedures

1. Push the pencil through the Styrofoam ball to act as the Earth's axis. The axis is an imaginary line that goes through the north and south poles. It is the point around which the Earth spins.
2. Place the rubber band around the Styrofoam ball to indicate the location of the equator.
3. Standing with the flashlight level with the equator, turn the flashlight on and shine it at the ball. Hold the flashlight about one foot from the ball.
4. Make observations with the axis (pencil) vertical, facing straight up.
5. Now tilt the axis about 23 degrees away from the flashlight. Make observations.
6. As the Earth goes around the sun its axis always points the same way. So six months later when the Earth is on the other side of the sun the axis is tilted towards the sun. Set that up. Tilt the axis toward the sun. Make observations.

Observations

1. When the axis is tilted away from the sun how do the rays from the flashlight strike the surface of the ball?
2. Are there areas that seem to be getting more light than others?
3. Are there places where the light doesn't shine?
4. When the axis is tilted toward the sun how do the rays from the flashlight strike the surface of the ball?
5. What season would the Northern Hemisphere (the half of the Earth above the equator) experience when the axis is tilted toward the sun?
6. What season would the Southern Hemisphere experience?

Conclusion

The reason that Earth has seasons is not because sometimes it is closer to the sun than other times. It has seasons because _____.

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 4
Mass – Gravity – Weight

- Mass – The amount of matter in an object
- Gravity – All objects have gravity. Gravity is the pull towards the center of an object. The greater an object's mass, the stronger is its gravitational attraction.
- Weight – The measure of an object's gravitational attraction

Not all planets in our solar system have the same mass, so the weight of an object would be different on each planet or moon.

Directions: Use the table at the bottom of the page to find your weight on other planets. Multiply your Earth weight by the fraction or mixed numeral shown on the chart.

Example: If you weigh 60 pounds on Earth, you would weigh 10 pounds on the moon.

$$1/6 \times 60 \text{ pounds} = 10 \text{ pounds}$$

1. What would you weigh on Mars? _____
2. What would you weigh on Jupiter? _____
3. The nine planets in our solar system revolve around the sun because it has the greatest _____ and, therefore, the strongest _____ attraction.

Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto	Sun
2/5	9/10	1/6	2/5	2½	11/10	4/5	11/5	1/100	28

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 5
A Light-Year

Distances are so great in space that a special unit of measurement is used. It is called a light-year. This sounds like a measurement of time, but it is actually a unit used to measure distance. By definition a light-year is the distance that light travels in one year. To calculate the distance of one light-year, determine the number of seconds in a year and multiply that number times the speed of light. Light is the fastest thing we know of, as it travels at an incredible 186,000 miles (300,000 kilometers) per second.

Your job is to calculate the value of one light-year.

Calculate the number of seconds in one year.

Calculate the number of miles or kilometers in a light-year by multiplying the number of seconds in a year by 186,000 miles or 300,000 km.

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 6
Spacesuits



During a space walk astronauts and cosmonauts must wear a protective spacesuit. What are the hazards these individuals face?

How do spacesuits provide protection? What spacesuit features keep the wearer alive?

Name _____

EXPLORING SPACE
The Sun and Inner Planets
Mercury, Venus, Earth, and Mars
Blackline Master 12
"... One Small Step for Man ..."



In 1969 Neil Armstrong became the first human to set foot on the moon. As he left the landing pad of the lunar lander, he said, "That's one small step for man, one giant leap for mankind."

Directions: Answer the following questions in the space provided.

1. What did Neil Armstrong mean when he said those famous words?
2. The footprints left by the twelve astronauts who walked on the moon are there today as if they were made yesterday. Why?
3. If you were the first person to set foot on the surface of Mars, what would you say to immortalize the moment?

LIVING IN ANCIENT GREECE**Pre-Test**

Directions: Answer the following questions True or False:

- _____ 1. The civilization of ancient Greece was at its peak nearly 1000 years ago.
- _____ 2. The ancient Greeks had no written language but still produced a very successful civilization.
- _____ 3. For most of its history, ancient Greece was not a politically unified country.
- _____ 4. Olives and sheep were important sources of food in ancient Greece.
- _____ 5. The ancient Greeks believed that one all-powerful god created human beings, ruled over their lives, and decided when they would die.

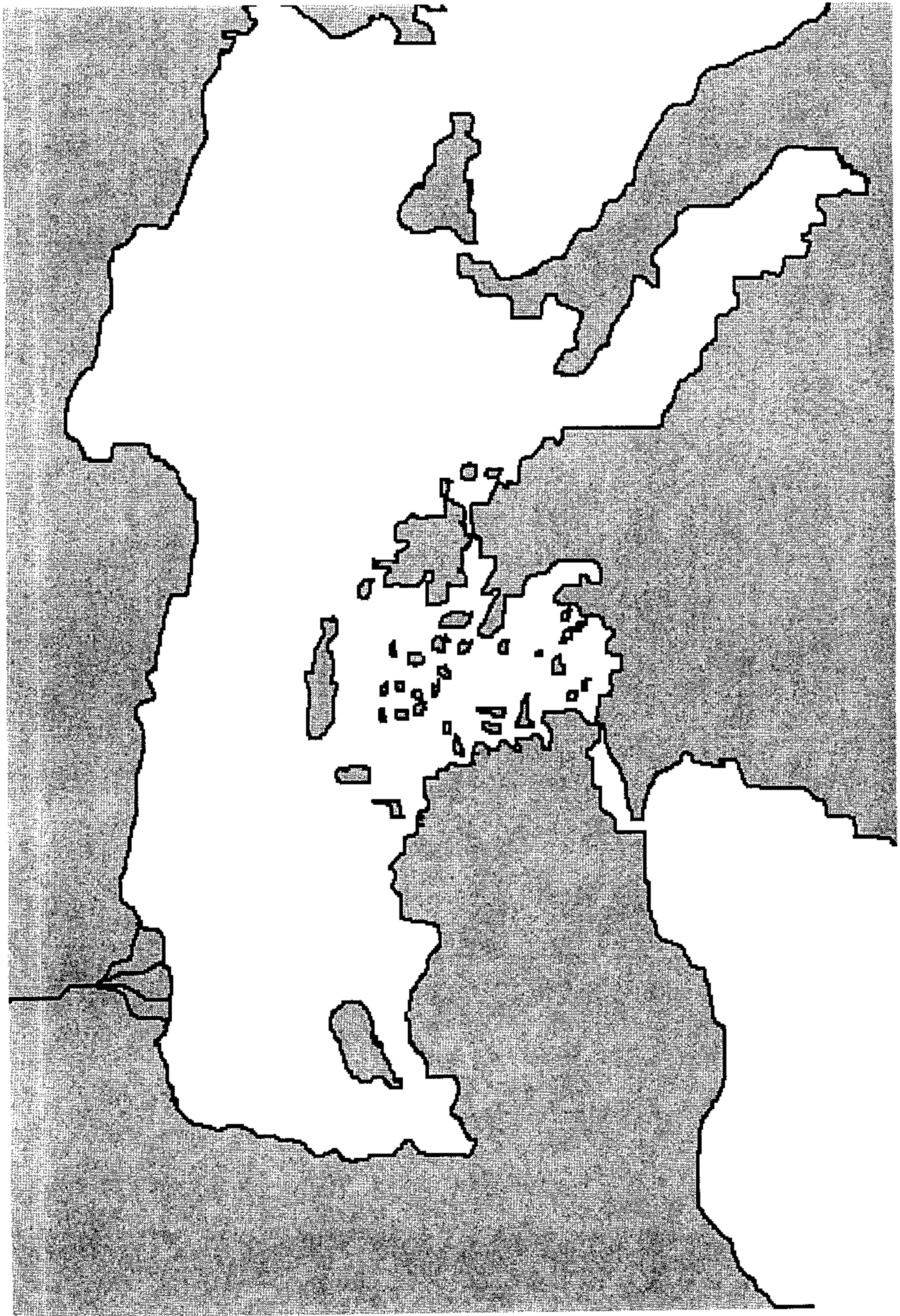
LIVING IN ANCIENT GREECE**Video Quiz**

1. TRUE OR FALSE? Zeus was the god of the sea. _____
2. TRUE OR FALSE? Greek theaters were temples to the god Poseidon. _____
3. TRUE OR FALSE? The Olympian gods were from Mount Olympus. _____
4. TRUE OR FALSE? Dionysus was the god of wine and pleasure. _____
5. TRUE OR FALSE? Only men acted in ancient Greek plays. _____
6. TRUE OR FALSE? Oracles were women who spoke for the gods. _____
7. TRUE OR FALSE? Athena's temple was called the Parthenon. _____
8. TRUE OR FALSE? The world's first democracy began in Corinth. _____
9. TRUE OR FALSE? Centaurs were half-man and half-horse. _____
10. TRUE OR FALSE? The word acropolis means "high city." _____

LIVING IN ANCIENT GREECE**MAP EXCERISE**

Directions : Locate the following places on the map found on Blackline Master 9:

- Albania (modern country)
- Athens (modern city, ancient city-state)
- Sparta (ancient city-state)
- Corinth (ancient city-state)
- Delphi (ancient sacred town)
- Black Sea
- Olympia (ancient sacred town)
- Rome (modern city, capital of the Roman Empire)
- Macedonia (modern country)
- Bulgaria (modern country)
- Turkey (modern country)
- Syria (modern country)
- Cyprus (island ruled by Greece and Turkey)
- Crete (the largest Greek island)
- Istanbul (modern city)
- Sicily (Italian island and site of Greek colonies)

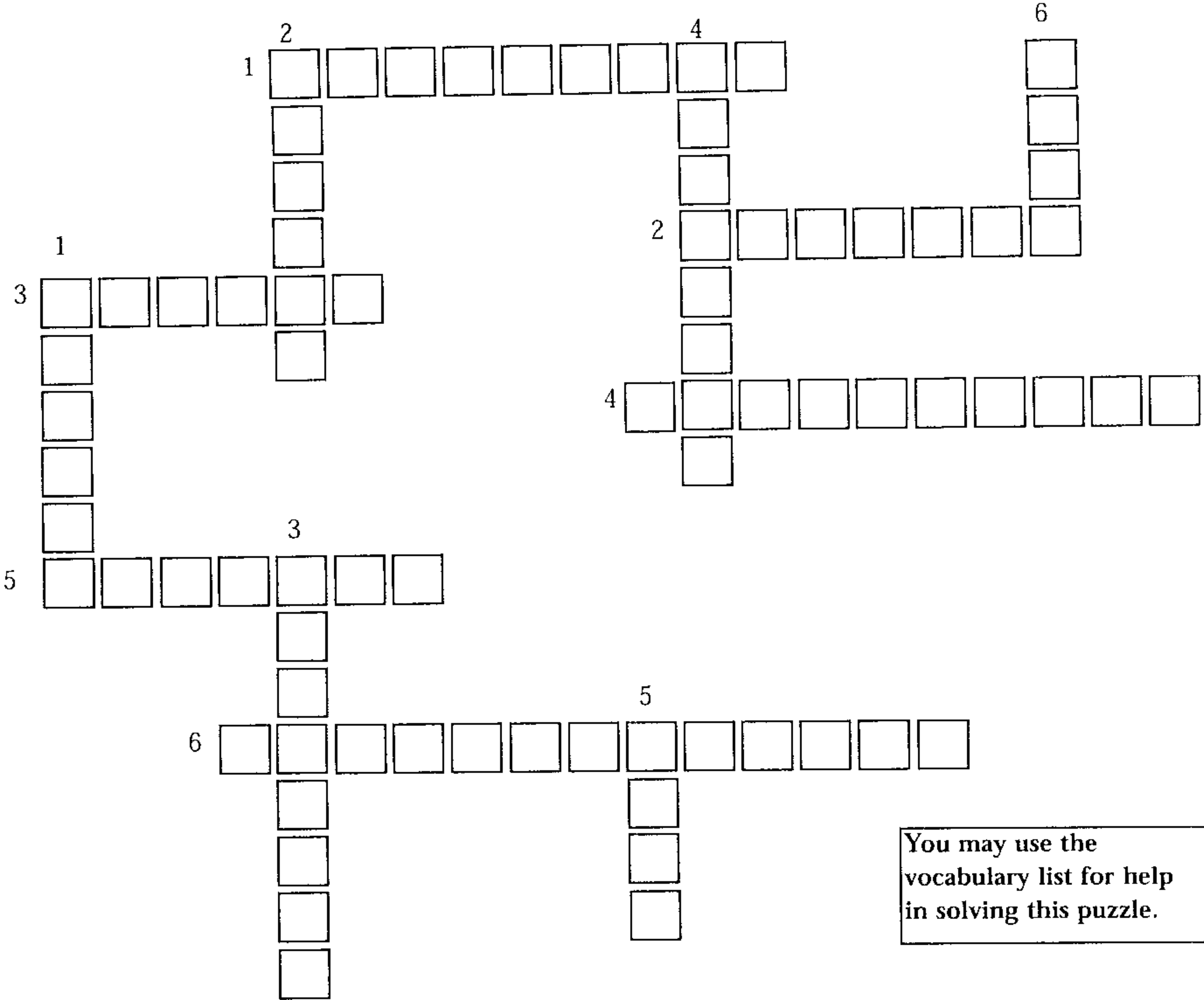


LIVING IN ANCIENT GREECE

Name _____

LIVING IN ANCIENT GREECE

Crossword Puzzle



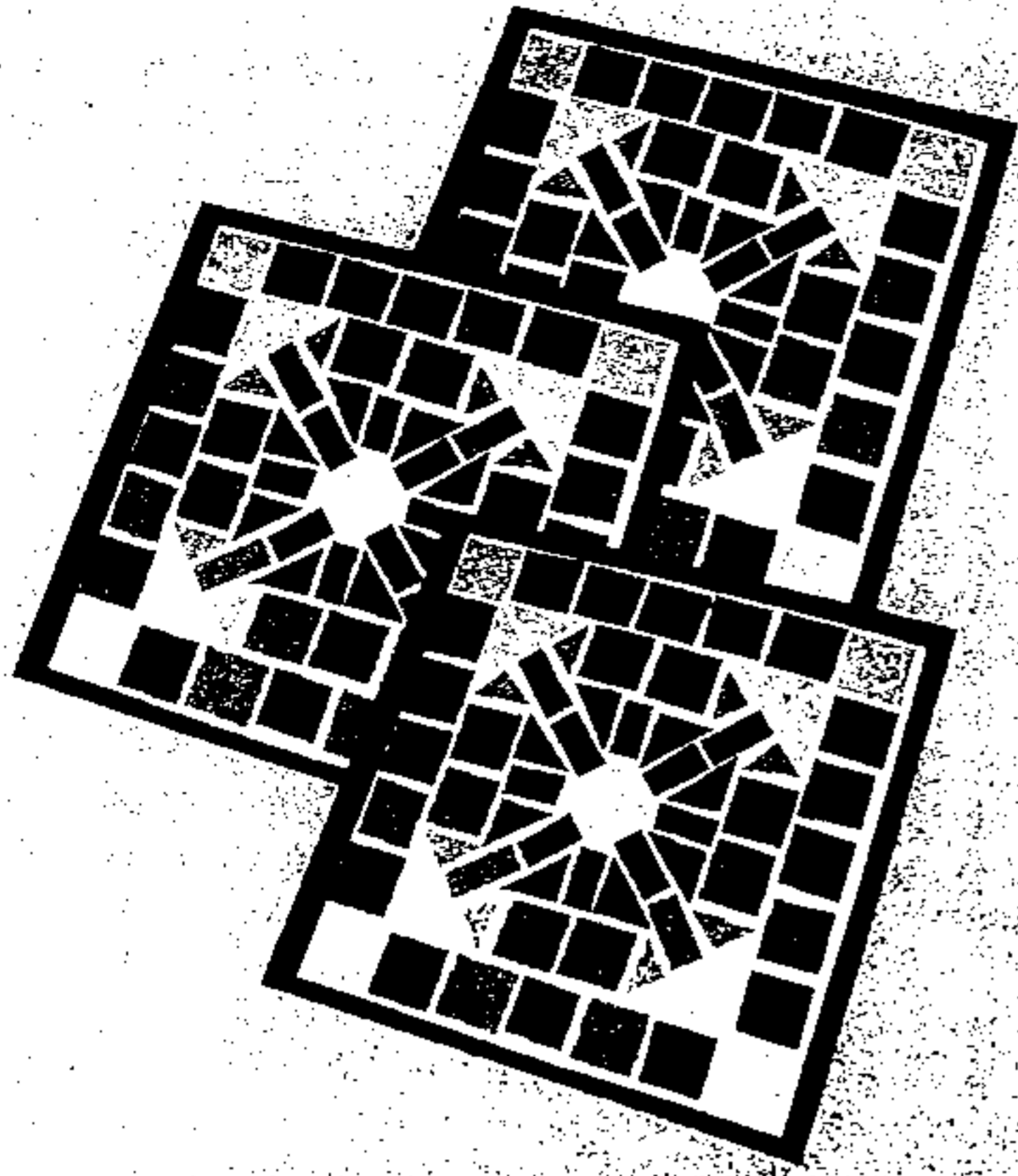
You may use the vocabulary list for help in solving this puzzle.

ACROSS

1. The highest part of a Greek city was its _____.
2. The festival of Zeus was celebrated every four years at the town of _____ and was famous all across Greece for its athletic contests.
3. The Parthenon was a temple to the goddess _____.
4. In ancient Greece, animals were killed as _____ to the gods.
5. Mount _____ was believed to be the home of many of ancient Greece's greatest gods and goddesses.
6. The civilization of ancient Greece developed near the shores of the _____ Sea.

DOWN

1. _____ was the ancient Greek god of the sun.
2. The world's first democracy developed in the city-state of _____.
3. _____ was the ancient Greek god of the sea.
4. The Greeks thought their gods were _____; that is, that they would never die.
5. Forces from the Italian city of _____ conquered Greece and adopted many Greek ways, which they then spread across western Europe.
6. The wife of Zeus and protector of families was called _____.



MATERIALS

- 1" (2.5 cm) squares of paper in assorted colors
- 8" x 8" (20 x 20 cm) white construction paper
- 9" x 12" (23 x 30.5 cm) colored construction paper
- writing paper, cut into a strip of 5 lines
- pencil
- scissors
- glue

MOSAIC TILES

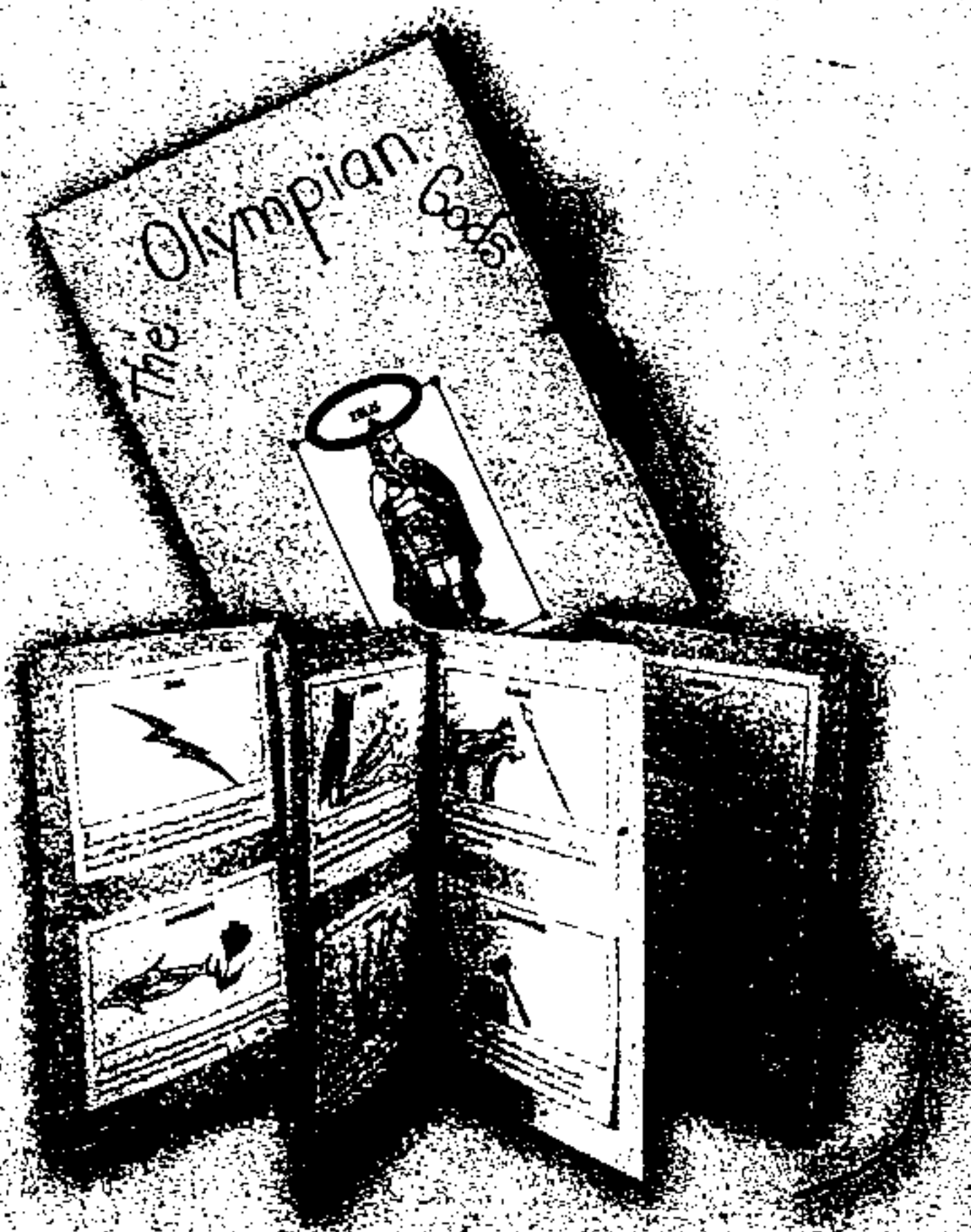
Mosaic is an art form in which small pieces of cut stone or glass are embedded in plaster.

Mosaic tiles were used by the ancient Greeks to make the floors of important rooms in their houses. The andron was the room in which men entertained their guests. Mosaic tile floors were often found there.

Students design and create their own mosaic tile "floors."

STEPS TO FOLLOW

1. Discuss the art form of mosaic and the fact that it originated in ancient Greece. Share pictures of mosaics from reference books, and bring in actual mosaics if possible.
2. Pass out the white construction paper squares. Tell students that this is their plain floor tile.
3. Direct students to use the colored squares to make a mosaic pattern on the plain floor tile. Tell them to leave small, equal spaces between the colored pieces to resemble the look of mortar. Encourage them to cut the colored squares into rectangles and triangles to make a more complicated pattern.
4. After they are happy with the pattern, have them glue the mosaic pieces into place.
5. After the mosaic tile is dry, have students glue the mosaic tile to the larger piece of construction paper.
6. You may want to have them create a decorative border around the completed floor tile for added interest.
7. Write the definition of *mosaic* on the board. Direct students to copy the definition on writing paper, and then glue it to the back of the tile.



MATERIALS

- three 9" x 12" (23 x 30.5 cm) sheets of colored construction paper
- pages 47–49, reproduced for each student
- transparent tape
- scissors
- glue
- crayons, marking pens, or colored pencils
- two 18" (45.5 cm) pieces of ribbon or yarn
- writing paper
- pencil
- hole punch

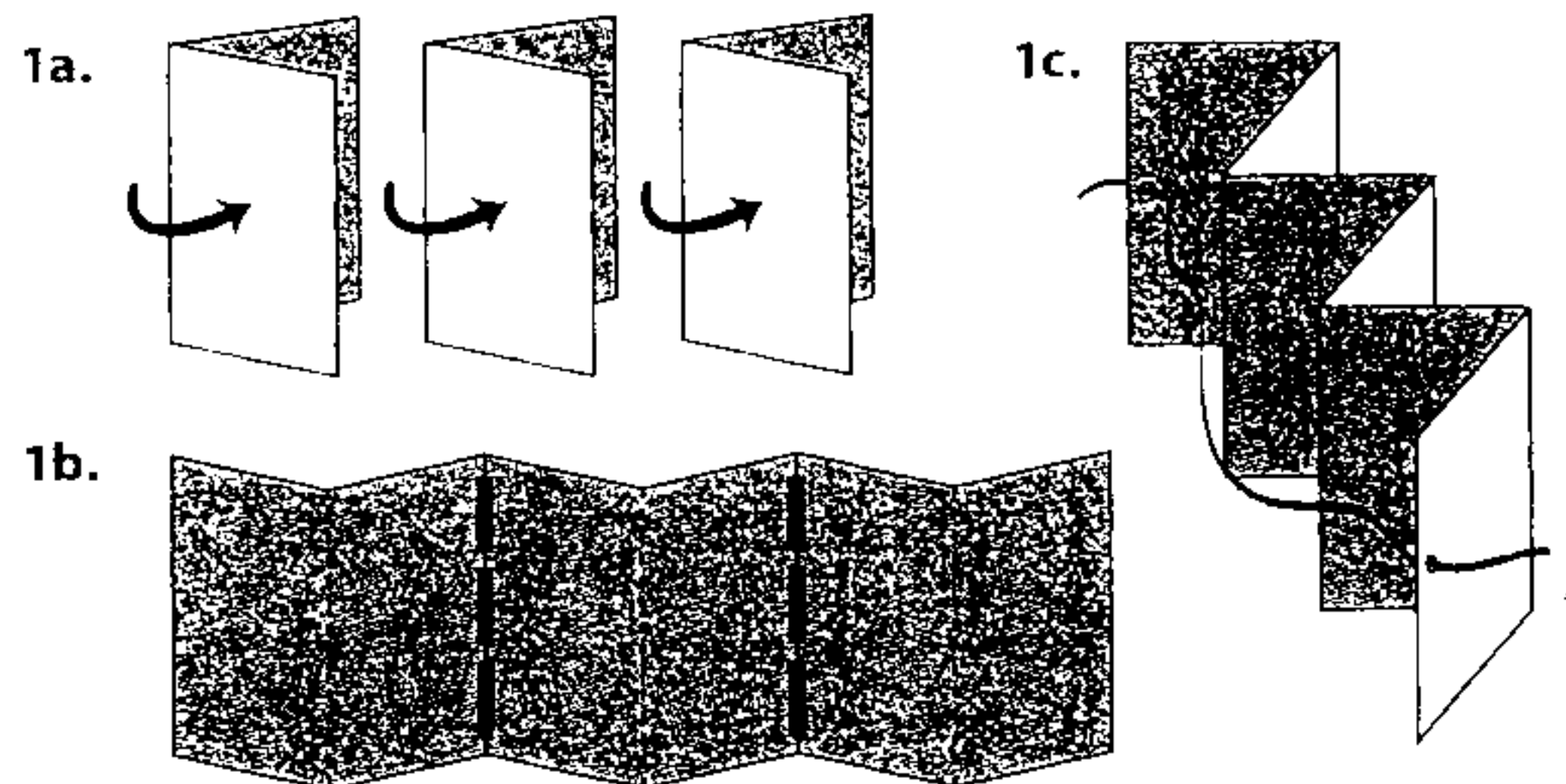
A BOOK OF OLYMPIAN GODS

The main gods and goddesses, the Olympians, had symbols that represented their roles in life. For example, the symbol of the chief god Zeus was a thunderbolt, which he threw at people to punish them. Statues of Zeus showed him with a thunderbolt in his hand to symbolize his strength and power.

Students draw the sacred symbols for the Olympians in accordion books.

STEPS TO FOLLOW

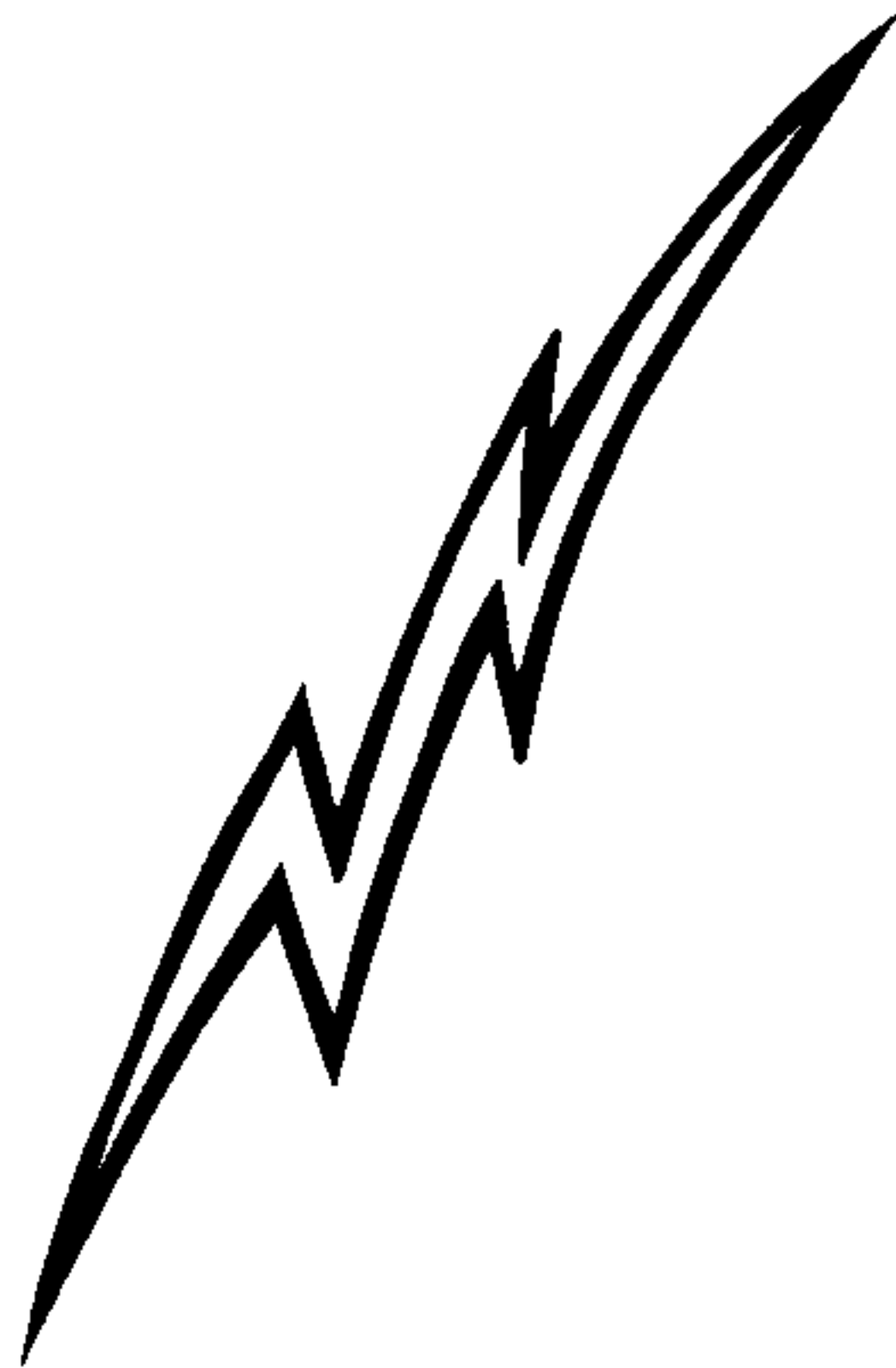
1. Have the students follow these instructions to make the accordion book:
 - a. Fold the three pieces of construction paper in half and tape them together.
 - b. Refold the sheets accordion style.
 - c. Punch one hole in the front and back outer edges.



2. Distribute pages 47–49 to students and read together about the 12 gods and goddesses.
3. Direct students to draw and color one or more symbols for each of gods using the information given. Students may need to look up the meaning of some terms.
4. Instruct students to cut the pages apart and glue them into the accordion book, two to a page, beginning on the second page.
5. Have students use the front page for the cover. The students should include the title "The Olympian Gods" and a picture.
6. Students then thread the ribbon through the holes and tie.



ZEUS



Zeus was the king of all the gods. He lived on Mount Olympus. Zeus controlled the sky and weather and his family of gods. Zeus was fair, but if angered he threw thunderbolts at evildoers.

HERA

Hera was the wife of Zeus and queen of the sky. She was the goddess of all women, mothers, and marriage. Hera had three symbols: the cow, a pomegranate, and a peacock.

ATHENA

Athena (also spelled Athene) was goddess of wisdom, law, and war. She was also the protector of cities. The city of Athens was named after her. Her symbols were the owl and the olive tree.

APOLLO & ARTEMIS

Apollo and Artemis were twins. Apollo was the god of the Sun, light, truth, music, archery, and healing. His symbols were the lyre (a musical instrument) and the laurel tree. Artemis was the goddess of the hunt and the Moon. She protected young girls and wild animals. Her symbols were the bow and arrow, deer, dogs, and the cypress tree.

THE OLYMPIAN GODS



HERMES

Hermes was the messenger of the gods. He reported events on Earth to the gods. Hermes wore a winged hat and winged shoes, and carried a staff.

APHRODITE

Aphrodite was the goddess of love and beauty. She inspired love and protected people that were in love. Her symbols were doves, roses, sparrows, dolphins, and rams.

POSEIDON

Poseidon was the god of the sea and all water. He controlled storms, sea monsters, and earthquakes. Poseidon could protect or destroy ships. His symbols were a trident, dolphins, and horses.

HADES

Hades was the god of the dead and the Underworld. He was a dark and gloomy god. Hades carried a scepter and was protected by his dogs.

HESTIA

Hestia was the goddess of the hearth and home. She protected people's homes from evil. Every family had a shrine dedicated to her. She is often shown sitting in front of a wood fire.

DEMETER

Demeter was the goddess of the earth, plants, and harvests. She protected the crops in the fields. Her daughter, Persephone, helped Demeter. Her symbol was a sheaf of wheat or barley.

ARES

Ares was the god of war. He was brave, angry, and terrible. Ares protected the soldiers on the fields. His symbols were a burning torch, a spear, dogs, and vultures.

HEPHAESTUS

Hephaestus was the god of fire and armor. He protected craftsmen and metalsmiths while they worked on bronze weapons and tools. His symbols were a hammer and an anvil.