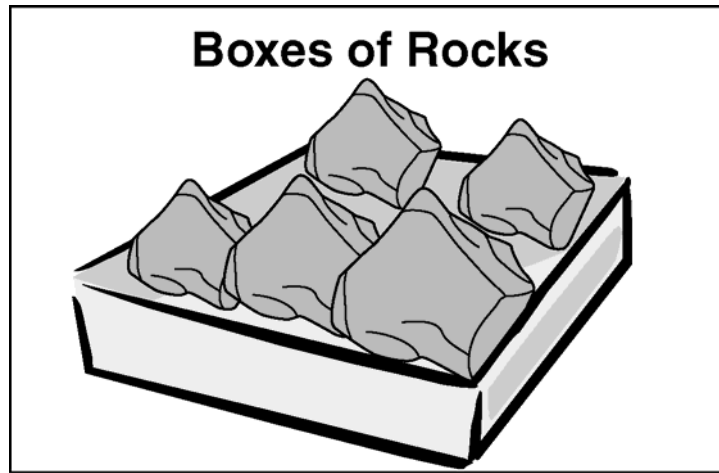


SITES-M Mathematics Challenge



Level: Kindergarten

Standard: Number and Operations

Learning Target: Focus on System of Tens

Grade Level Expectations

- GLE 0006.2.1** Count objects in a set and use numbers, including written numerals to 25.
- GLE 0006.2.2** Create, represent and recognize a set with a given number of objects.

Checks for Understanding

- 0006.2.10** Recognize 6 through 10 as “five and some ones.”

SITES-M Mathematics Challenge
 Grade K–Focus on System of Tens
 Boxes of Rocks

The purpose of the Mathematics Challenges is to provide opportunities for students to develop and demonstrate understanding of important mathematical concepts and standards. Each Challenge includes a set of tasks that require higher-order thinking skills. Because these types of tasks may be new for students and they will have varying levels of understanding, the student responses will vary. The Challenges and guiding questions were designed to help teachers plan their implementation and elicit, analyze, and act on evidence of student understanding.

You will be able to choose which Mathematics Challenge Packet to implement each month, according to the learning needs of your students and your teaching context. Each packet contains all the materials necessary to implement the Mathematics Challenge including a grade-appropriate Challenge, the Mathematics Challenge Meeting Protocol, and the Guiding Questions for Analyzing Student Responses to Mathematics Challenges.

For each Challenge, you will complete a six step process of planning, implementation, and analysis and reflection.

The Mathematics Challenge Process

Stage	Step	Task
Planning	Step 1.	Review the Mathematics Challenge Meeting Protocol
	Step 2.	Review and solve the Mathematics Challenge prior to your Professional Learning Community (PLC) meeting. Think about your responses to the guiding questions on the Meeting Protocol
	Step 3.	Hold your PLC meeting and discuss your responses to the Guiding Questions on the Meeting Protocol
Implementation	Step 4.	Implement the Mathematics Challenge with your class
Analysis and Reflection	Step 5.	For your own planning and documentation, respond to the Guiding Questions on the Analyzing Student Responses Protocol
	Step 6.	To help us improve the Challenges and to provide recommendations for teachers implementing them in future years, complete the Mathematics Challenge Feedback Log and provide copies of all student work to the Assessment Coordinator

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens
Boxes of Rocks

Mathematics Challenge Meeting Protocol

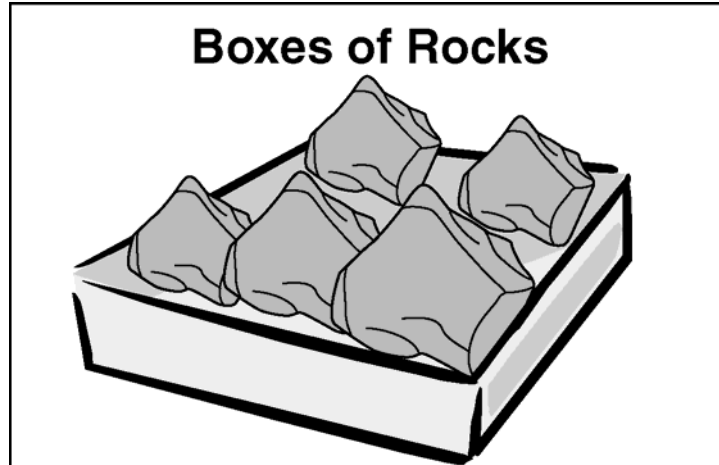
Each month, your Professional Learning Community will meet to discuss the implementation of one Mathematics Challenge. In preparation for your monthly meeting, please print and review this month’s Mathematics Challenge, solve all tasks within the Challenge, and think about the guiding questions below. These questions will be used to facilitate a group discussion regarding the implementation of the upcoming Mathematics Challenge.

Guiding Questions for Implementing the Mathematics Challenges

1. What is the title of the Challenge that you will use this month?
2. What skills or standards is this Challenge measuring?
3. Where does this Challenge fit within your curriculum? Within which unit?
4. At what point during the unit will you administer this Challenge (e.g., At the beginning of a unit to determine what students do or do not know, at the end of a unit to assess what students have or have not learned, in the middle of a unit to determine where to go next instructionally)?
5. How will your students complete this Challenge (e.g., individually, one-on-one, in small groups, as a class)? Why?
6. Are there any prerequisite skills, common misunderstandings, or vocabulary needs that you will have to address? What are they?
7. What difficulties do you anticipate your students will have with the Challenge? How will you address them?
8. Are these skills and difficulties different for special needs students, ELL students, etc.? How? Will you do anything different for these students? What?
9. How will you evaluate student responses (e.g., grade responses with the provided rubric, scan responses to identify common mistakes/misconceptions, have students evaluate one another’s responses, have students evaluate their own response)?
10. What will student responses to this Challenge tell you about student understanding?
11. How might you use this evidence of student understanding to adapt your teaching and learning?
12. What other materials, resources, or support might you need? Where can you get them?
13. How can your colleagues assist you in the analysis of student understanding?
14. What other questions or concerns do you have about this Mathematics Challenge?

After you have implemented the challenge with your class, be sure to respond to the Guiding Questions on the Analyzing Student Responses Protocol.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens



Standard: Number and Operations

Learning Target: Focus on System of Tens

Claims:

Students should understand and be able to explain or demonstrate how to:

- ✓ Count objects in a set and use numbers, including written numerals to 25;
- ✓ Create, represent, and recognize a set with a given number of objects;
- ✓ Recognize 6 through 10 as “five and some ones.”

Task Preparation:

Each student will need copies of the Student Response Sheet and a pencil.

If a student is unable to respond in writing, a scribe may be appointed or verbal answers may be accepted, but these responses will need to be documented for scoring.

Stimulus Cards (Drawing or Word Description):

None

Manipulatives/Supplies:

Pencils

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Cues/Directions:

Distribute student response sheets. If a student is unable to respond in writing, a scribe may be appointed or verbal answers may be accepted, but these responses will need to be documented for scoring. Students should be directed to look carefully at each figure. Allow students time to answer.

Nathan picked up some rocks. They are shown in the box below.

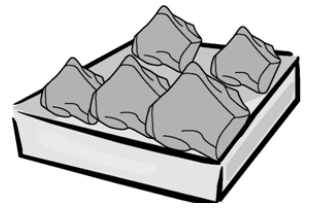
- 1. Say: Count the rocks in the box. How many rocks are there?**
(Teacher's Note: Have students write the correct number in the box.)
Sometimes putting things in groups makes it easier to count. There are 5 rocks inside the circle. How many rocks are outside the circle?
(Teacher's Note: Have students write the correct number in the box.)
How many rocks are there in all? (Teacher's Note: Have students write the correct number in the box.)
- 2. Here is a new box of rocks. How many rocks are inside the circle?**
(Teacher's Note: Have students write the correct number in the box.)
How many rocks are outside the circle? (Teacher's Note: Have students write the correct number in the box.) How many rocks are there in all? (Teacher's Note: Have students write the correct number in the box.)
- 3. Draw 8 rocks in the box above so that 5 of the rocks are inside the circle. (Teacher's Note: Have students draw the correct number of rocks in the box. Students can use circles or squares to represent rocks) How many rocks did you put outside the circle? (Teacher's Note: Have students write the correct number in the box.) Check each box below that also has 8 rocks inside. (Teacher's Note: Have students check the boxes next to the correct pictures.)**
- 4. Lyndi picked up 14 rocks. She put 10 of the rocks in a group to make the rocks easier to count. Finish the drawing so that there are 14 rocks in all. (Teacher's Note: Have students draw the correct number of rocks in the box. Students can use circles or squares to represent rocks) How did you know how many rocks to draw? (Teacher's Note: Have students fill in the text box.)**
- 5. Tanesha has 23 rocks. How many groups of ten does she have? (Teacher's Note: Have students write the correct number in the box.) Draw a picture of 23 rocks in groups of ten and ones. (Teacher's Note: Have students draw the correct number of rocks in the box. Students can use circles or squares to represent rocks)**

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

- 6. Ali has his rocks in groups. He has 2 groups of ten. He has 4 ones. How many rocks does he have altogether? (Teacher’s Note: Have students write the correct number in the box.) How do you know? (Teacher’s Note: Have students fill in the text box.)**

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens



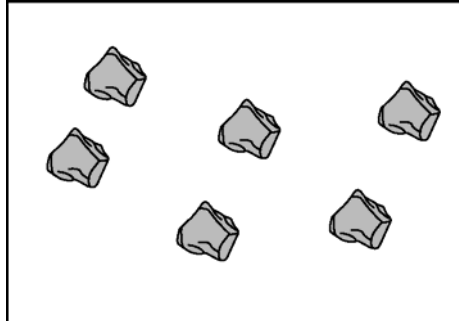
Student Response Sheet

Boxes of Rocks

Name: _____

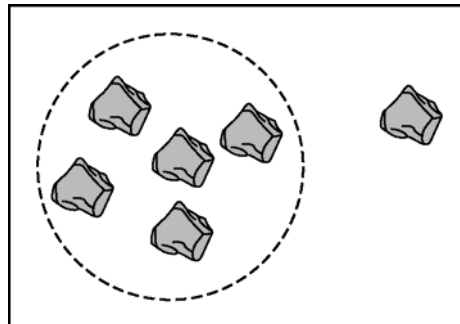
Date: _____

Nathan picked up some rocks. They are shown in the box below.



1. Count the rocks in the box. How many rocks are there?

a. Sometimes putting things in groups makes it easier to count. There are 5 rocks inside the circle.

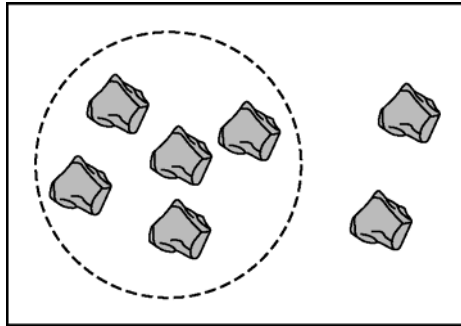


How many rocks are outside the circle?

How many rocks are there in all?

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

2. Here is a new box of rocks.

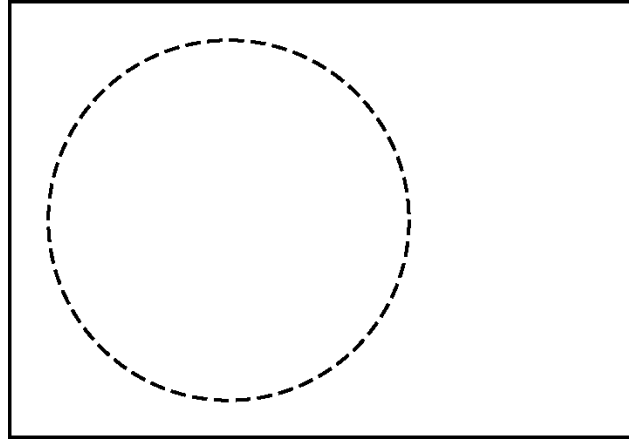


How many rocks are inside the circle?

How many rocks are outside the circle?

How many rocks are there in all?

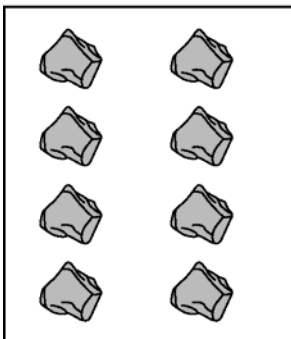
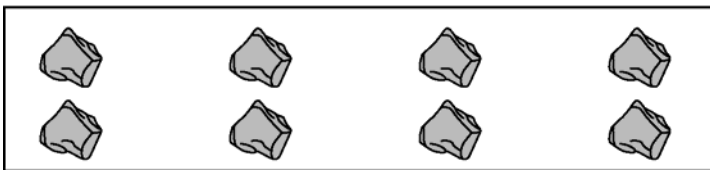
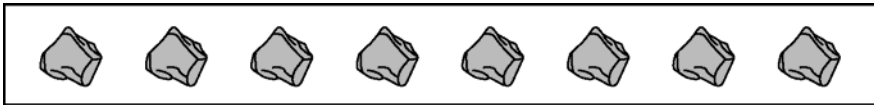
SITES-M Mathematics Challenge
Grade K–Focus on System of Tens



3. Draw 8 rocks in the box above so that 5 of the rocks are inside the circle.

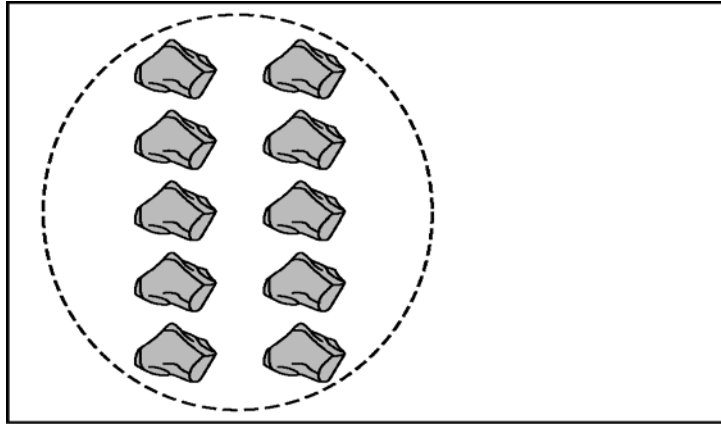
How many rocks did you put outside the circle?

- a. Check each box below that also has 8 rocks inside.



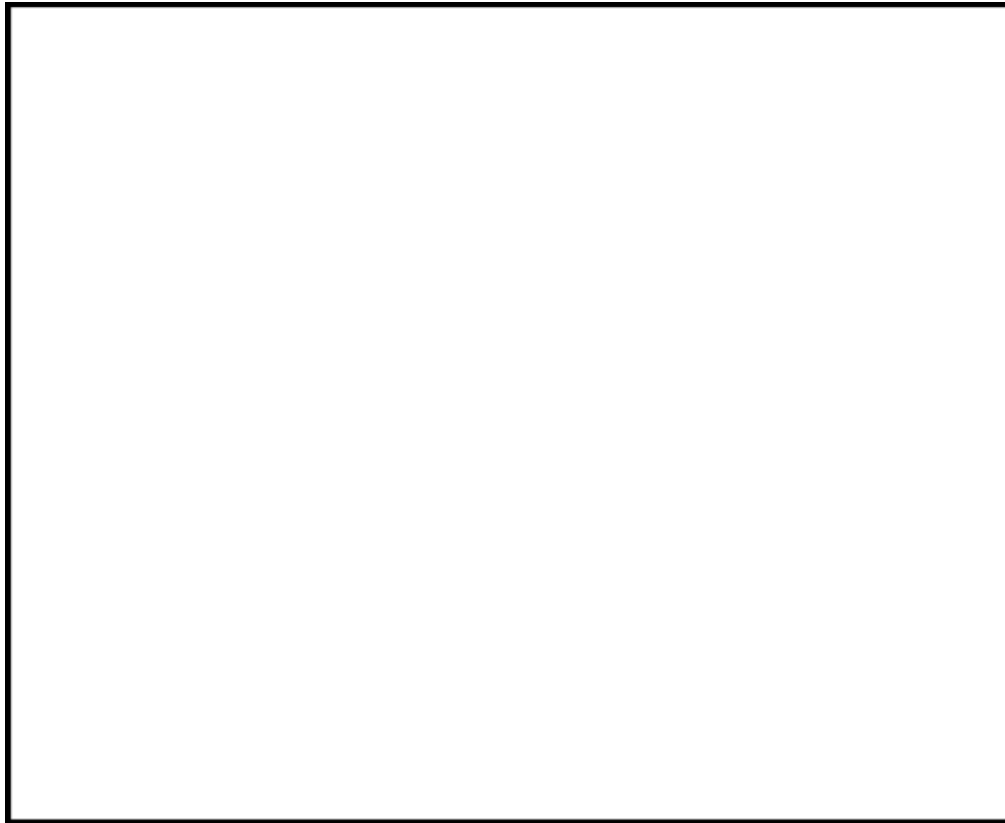
SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

4. Lyndi picked up 14 rocks. She put 10 of the rocks in a group to make the rocks easier to count.



Finish the drawing so that there are 14 rocks in all.

How did you know how many rocks to draw?



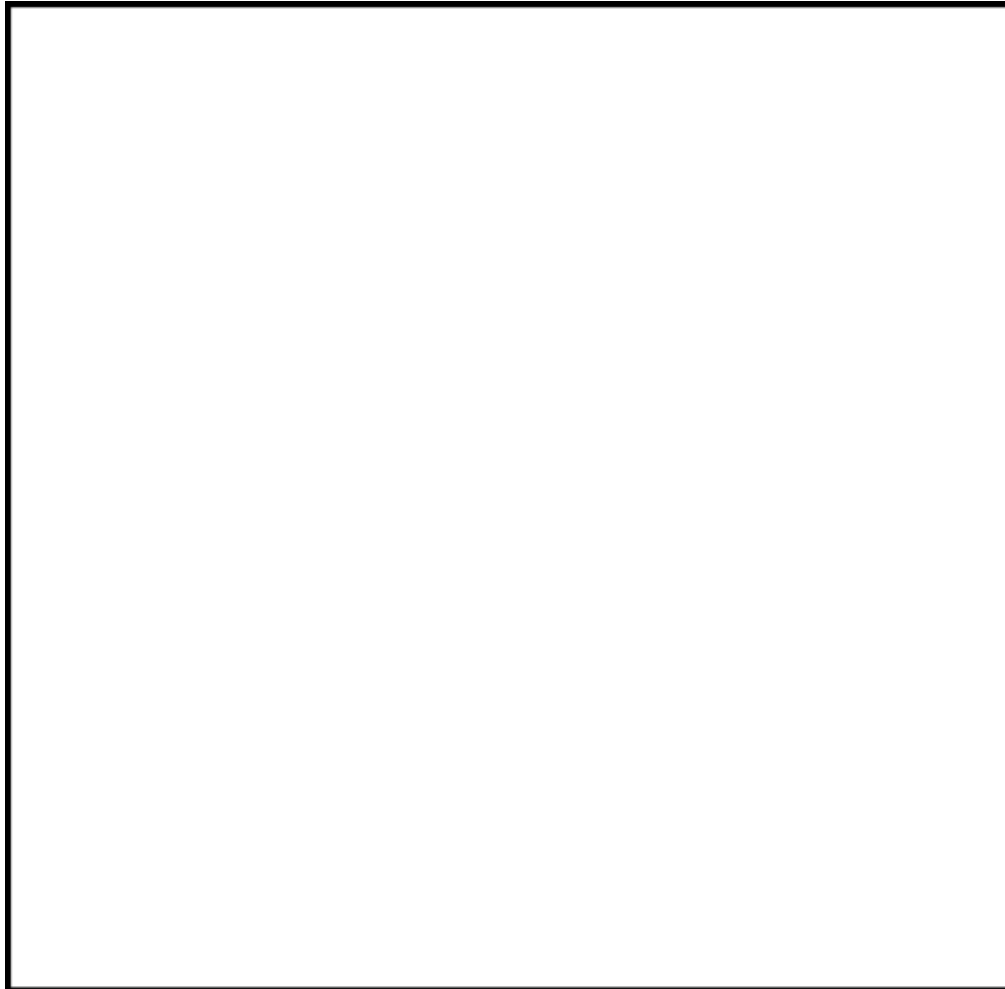
SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

5. Tanesha has 23 rocks.

How many groups of ten does she have?

How many ones does she have?

Draw a picture of 23 rocks in groups of ten and ones.

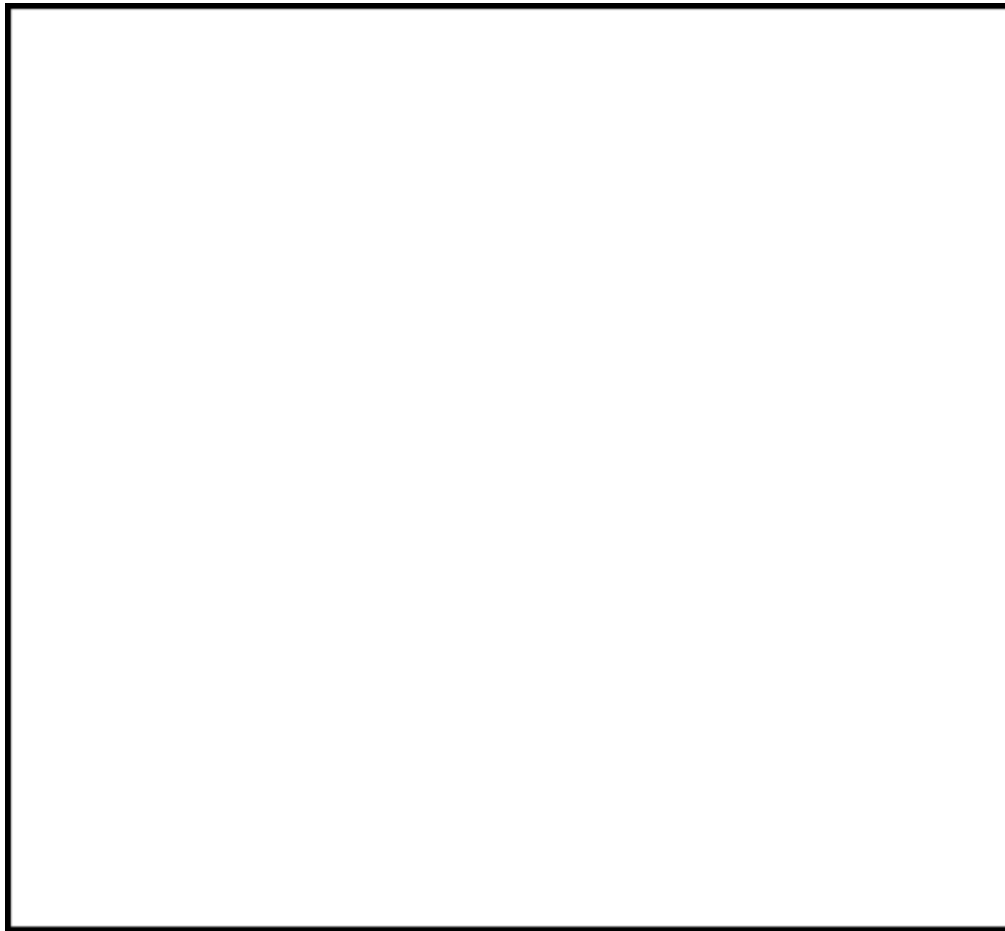


SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

6. Ali has his rocks in groups. He has 2 groups of ten. He has 4 ones.

How many rocks does he have altogether?

How do you know?



SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Learning and Teaching Considerations

Task 1:

- A) Be sure that students understand that counting tells how many things are in a set.
- B) Be sure that students understand that when counting a set of objects, the last word in the counting sequence names the quantity for that set.
- C) If a student says or writes, “I just know,” prompt him or her by saying something like “I’m glad you know, but it’s important in math to be able to explain your answers so other people can understand what you’re thinking.”
- D) If a student says or writes, “I don’t know,” say something positive like “Let’s start with what you do know about this problem.” Students often know more than they think or say, and encouraging them to vocalize or write about that knowledge is all they need.

Task 2:

- A) Students may use fingers, objects, or pencil marks to count the rocks.
- B) The teacher can encourage students to use manipulatives, such as unifix cubes, to explore groups of five.
- C) Be sure that students are able to connect a standard list of counting words (in order) in a one-to-one manner with the items in the set being counted. Each item must get one and only one count.

Task 3:

- A) Students may begin to think about groups of five things as a unit.
- B) Students may draw five things inside of the circle and three things outside of the circle.
- C) Students may have the misconception that there are more rocks in the first box (because the box is longer).

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Task 4:

- A) Students may begin to think about groups of ten things as a unit.
- B) Students may use a counting method, an addition method, or a subtraction method.

Task 5:

- A) Students may represent 20 by drawing two groups of ten, four groups of five, or twenty individual rocks.
- B) Students may have the misconception that 2 represents two rocks rather than twenty rocks.
- C) Students may answer by creating their own pictures, or by using words, numbers or symbols (such as the addition symbol). The teacher can also encourage them to use manipulatives, such as unifix cubes or base ten blocks.

Task 6:

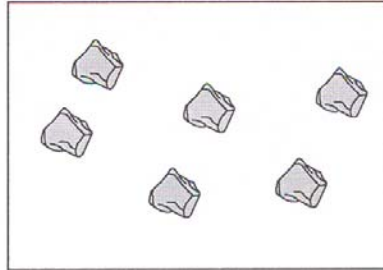
- A) Students may draw two groups of ten and four ones.
- B) Students may have the misconception that two groups of ten is asking for two rocks rather than twenty rocks.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Name: ANSWER KEY

Date: _____

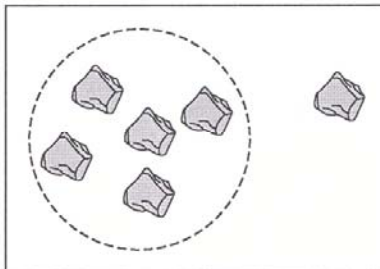
Nathan picked up some rocks. They are shown in the box below.



1. Count the rocks in the box. How many rocks are there?

6

a. Sometimes putting things in groups makes it easier to count. There are 5 rocks inside the circle.



How many rocks are outside the circle?

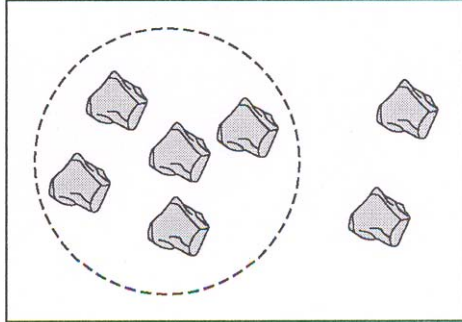
1

How many rocks are there in all?

6

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

2. Here is a new box of rocks.



How many rocks are inside the circle?

5

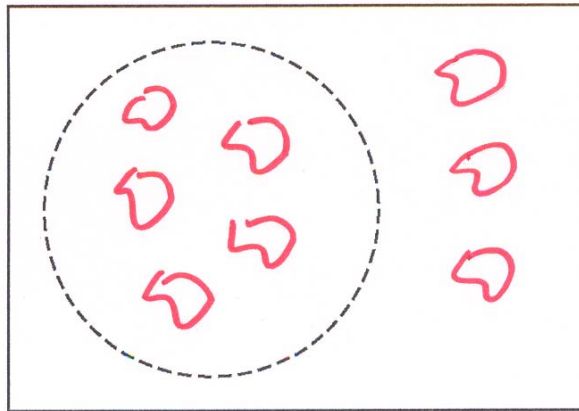
How many rocks are outside the circle?

2

How many rocks are there in all?

7

SITES-M Mathematics Challenge
 Grade K–Focus on System of Tens

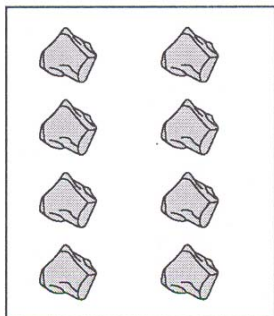
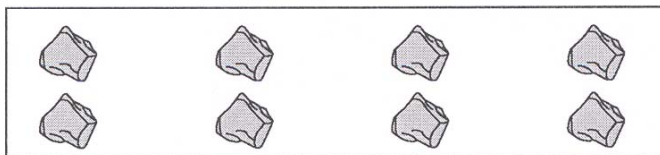
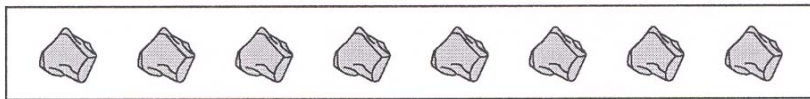


3. Draw 8 rocks in the box above so that 5 of the rocks are inside the circle.

How many rocks did you put outside the circle?

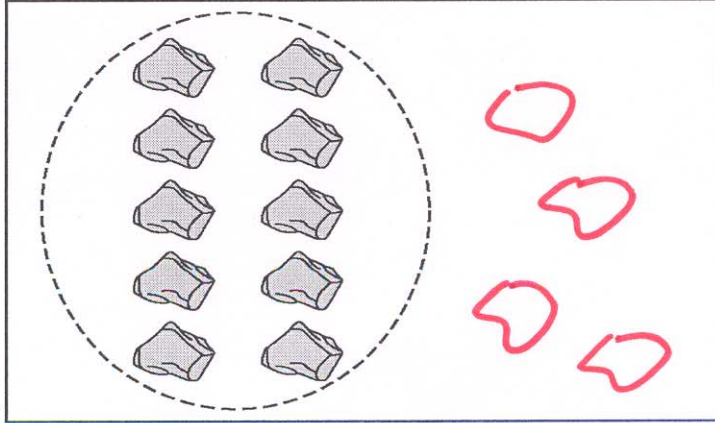
3

a. Check each box below that also has 8 rocks inside.



SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

4. Lyndi picked up 14 rocks. She put 10 of the rocks in a group to make the rocks easier to count.



Finish the drawing so that there are 14 rocks in all.

How did you know how many rocks to draw?

RESPONSE SHOULD
ADDRESS THAT 4 MORE
ROCKS ARE NEEDED TO
HAVE 14.

$$10 + 4 = 14$$

OR

$$14 - 10 = 4$$

NOTE: STUDENT DOES NOT
NEED TO WRITE AN EQUATION.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

5. Tanesha has 23 rocks.

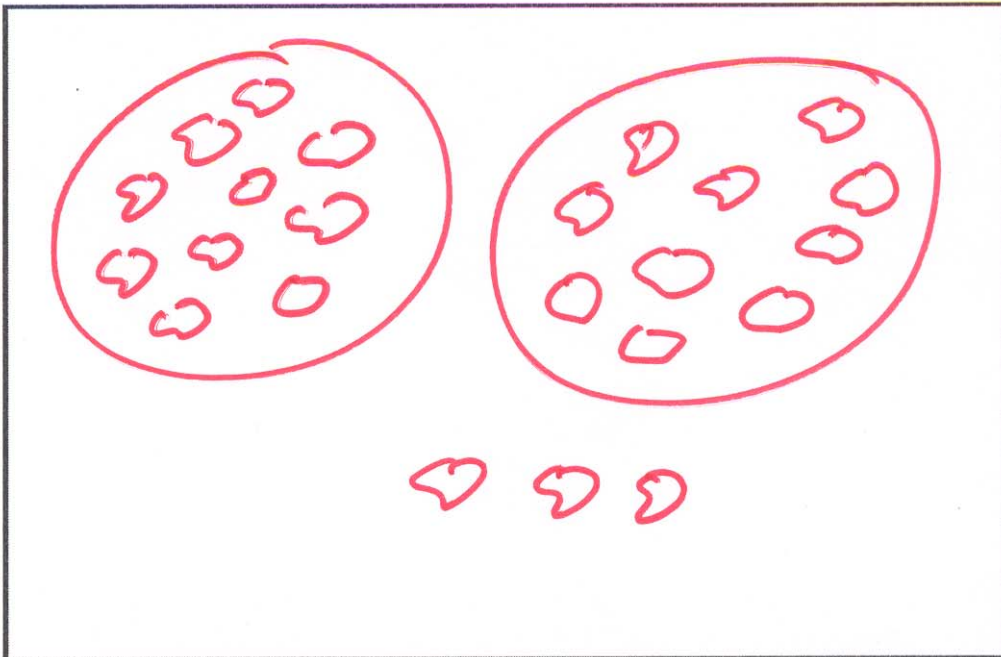
How many groups of ten does she have?

2

How many ones does she have?

3

Draw a picture of 23 rocks in groups of ten and ones.



ANY TYPE OF DRAWING IN WHICH THERE IS 2 GROUPS OF 10 PLUS 3 IS FINE.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

6. Ali has his rocks in groups. He has 2 groups of ten. He has 4 ones.

How many rocks does he have altogether?

24

How do you know?

1 GROUP OF 10 IS 10
ANOTHER GROUP OF 10
IS ANOTHER 10 + THAT
MAKES 20. AND 20
PLUS 4 GIVES 24.

STUDENT MAY EXPLAIN WITH
A PICTURE.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens
Rubric

CATEGORY	4	3	2	1
Mathematical concepts	Response shows complete understanding of the mathematical concepts used to solve the problem(s).	Response shows substantial understanding of the mathematical concepts used to solve the problem(s).	Response shows some understanding of the mathematical concepts needed to solve the problem(s).	Response shows very limited understanding of the underlying concepts needed to solve the problem(s), OR the response is not written.
	<p>Response shows evidence in ALL of the following tasks.</p> <p>Task 1. Student answers 6. In part (a) student is able to say that there is 1 rock outside of the circle for a total of 6 rocks in the box.</p> <p>Task 2. Student answers that there are 5 rocks in the circle, 2 rocks out of the circle, and 7 rocks in all.</p> <p>Task 3. Student is able to draw 5 things inside of the circle and 3 things outside of the circle. Student answers there are 3 rocks outside of the circle. In part (a) student indicates that all boxes contain 8 rocks.</p> <p>Task 4. Student draws 4 rocks outside of the circle and explains why he or she drew 4 rocks.</p> <p>Task 5. Student answers that there a 2 groups of 10 and 3 ones. Student draws a picture that shows 2 groupings of 10 things along with an extra 3 things not grouped.</p> <p>Task 6. Student answers 24 and explains reason for answer.</p>	Response shows evidence in only 5 of the tasks described in category 4.	Response shows evidence in only 3 or 4 of the tasks described in category 4.	Response shows evidence in 2 or fewer of the tasks described in category 4.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens
Rubric

CATEGORY	4	3	2	1
Strategy and procedures	Student typically uses an efficient and effective strategy to solve the problem(s).	Student typically uses an effective strategy to solve the problem(s).	Student sometimes uses an effective strategy to solve the problem(s), but not consistently.	Student rarely uses an effective strategy to solve the problem(s).
	Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet. Evidence of counting in ALL 6 tasks indicates a level 4.	Response shows evidence in only 5 of the tasks described in category 4.	Response shows evidence in only 3 or 4 of the tasks described in category 4	Response shows evidence in 2 or fewer of the tasks described in category 4.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens
Rubric

CATEGORY	4	3	2	1
Explanation and communication	Explanation is detailed and clear; uses appropriate terminology and/or notation.	Explanation is clear; uses some appropriate terminology and/or notation.	Explanation is a little difficult to understand, but includes critical components; shows little use of appropriate terminology and/or notation.	Explanation is difficult to understand, is missing several components, and does not use or include appropriate terminology and/or notation.
	Response shows evidence in each of the following tasks. Task 4. Student explains that 4 more rocks are needed to have a total of 14. Explanation can include a counting method, an addition method, or a subtraction method. Task 6. Student explains that 2 groups of 10 things will give 20 and $20 + 4$ is 24. Explanation includes a reference to grouping by 10.	Response shows evidence in each of the tasks, but may lack detail in explanation, such as an explanation that does not reference grouping in either task.	Response shows evidence in only 1 explanation as described in category 4.	Response shows no evidence of explanations.

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens
Rubric

CATEGORY	4	3	2	1
Mathematical accuracy	All or almost all of the steps and solutions have no mathematical errors.	Most of the steps and solutions have no mathematical errors.	Some of the steps and solutions have no mathematical errors.	Few of the steps and solutions have no mathematical errors.
	<p>Student provides correct answers for ALL of the following tasks.</p> <p>Task 1. Student answers 6, 1, and 6, as shown on answer sheet.</p> <p>Task 2. Student answers 5, 2, and 7, as shown on answer sheet.</p> <p>Task 3. Student answers 3 and checks all boxes, as shown on answer sheet.</p> <p>Task 4. Student draws 4 things (rocks) outside of the circle.</p> <p>Task 5. Student answers 2 and 3, as shown on answer sheet.</p> <p>Task 6. Student answers 24.</p>	<p>Student provides correct answers for only 5 of the tasks described in category 4.</p>	<p>Student provides correct answers for only 3 or 4 of the tasks described in category 4.</p>	<p>Student provides correct answers for 2 or fewer of the tasks described in category 4.</p>

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Scoring notes checklist

Task	Check Yes	Category
Task 1		
Student answers 6. In part (a) student is able to say that there is 1 rock outside of the circle for a total of 6 rocks in the box.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student answers 6, 1, and 6, as shown on answer sheet.		Accuracy
Task 2		
Student answers that there are 5 rocks in the circle, 2 rocks out of the circle, and 7 rocks in all.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student answers 5, 2, and 7, as shown on answer sheet.		Accuracy
Task 3		
Student is able to draw 5 things inside of the circle and 3 things outside of the circle. Student answers there are 3 rocks outside of the circle. In part (a) student indicates that all boxes contain 8 rocks.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student answers 3 and checks all boxes, as shown on answer sheet.		Accuracy
Task 4		
Student draws 4 rocks outside of the circle and explains why he or she drew 4 rocks.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student explains that 4 more rocks are needed to have a total of 14. Explanation can include a counting method, an addition method, or a subtraction method.		Explanation
Student draws 4 things (rocks) outside of the circle.		Accuracy

SITES-M Mathematics Challenge
Grade K–Focus on System of Tens

Task 5		
Student answers that there are 2 groups of 10 and 3 ones. Student draws a picture that shows 2 groupings of 10 things along with an extra 3 things not grouped.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student answers 2 and 3, as shown on answer sheet.		Accuracy
Task 6		
Student answers 24 and explains reason for answer.		Concept
Evidence of strategy is most likely observed through teacher observation of student counting rocks in all tasks. Teacher should note such evidence on student response sheet.		Strategy
Student explains that 2 groups of 10 things will give 20 and $20 + 4$ is 24. Explanation includes a reference to grouping by 10.		Explanation
Student answers 24.		Accuracy

