Grade 3 Early Assessment - Teacher Resource

The following versions of this document are available:

- Google Doc: Grade 3 Early Assessment - Teacher Resource (most accessible version)
- PDF: Grade 3 Early Assessment - Teacher Resource (most portable version)

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Front Matter

This assessment includes 10 items from three CT topics (5 Decomposition items; 2 Repetition items; 3 Sequencing items). One item (#10) uses images of the Scratch interface and/or Scratch blocks.

Each item has an exemplar response(s) and a scoring guide and/or rubric included (and when applicable, other information to help with interpreting student responses). The scoring guidance and rubrics were developed by our project to assist in coding and interpreting student responses, and are explicitly focused on using student responses to make inferences about the relevant knowledge, skills, and abilities that we identified from the learning trajectories and built into our item design process. As such, other end users of these assessment instruments may choose to adapt the scoring guidance and/or rubrics to match their purposes and students.

Three of these items (#5, #9, and #10) have associated rubrics. Note that **Item #5 has two rubrics that are used together to evaluate student responses**. The need for two distinct rubrics for each item was a decision we made during coding student responses, to make it easier to code and to attempt to separate the influence of mathematical knowledge/performance from computational thinking. Further details on these rubrics are provided in the items' details.

Items

#01

Meta-data

- Item code: DC.05.a
- Trajectory: Decomposition

Item

In Problems 1 and 2, circle True or False.
1) A computer program cannot be broken down into smaller parts.

- **True**
- **False**

Exemplar response(s)

False

Scoring Guidance

- True=0
- False= 1

Rubric(s)

None

#02

Meta-data

- Item code: S.06.b
- Trajectory: Sequencing

Item

2) When creating a computer script in Scratch, you must select from a limited set of blocks.

- **True**
- **False**

Exemplar response(s)

True

Scoring Guidance

- True=1
- False= 0

Rubric(s)

None

#03

Meta-data

- Item code: DC.03.b
- Trajectory: Decomposition

Item

3) Decomposing a problem means breaking it down into smaller problems. Why should you decompose a problem? CIRCLE ALL CORRECT ANSWERS.

A. Sometimes it is easier for me to solve several smaller problems than one big problem.
B. I know I will find the correct answer.
C. It is the last step in solving a problem.
D. Sometimes it is faster to solve several smaller problems

Exemplar response(s)

Answer: A & D

Scoring Guidance

- Choice is exactly "A,D"=1
- Any other choice(s)= 0

Rubric(s)

None

#04

Meta-data

- Item code: DC.02.a
- Trajectory: Decomposition

Item

4) Write one or more addition number sentences that mean the same as the multiplication number sentence:

5 x 4 = 20

Addition Number Sentences:

Exemplar response(s)

Answers will vary. Sample answers:

Example 1:

1. 4 + 4 = 8
2. 8 + 4 = 12
3. 12 + 4 = 16
4. 16 + 4 = 20

Example 2:

1. 5 + 5 = 10
2. 5 + 5 = 10
3. 10 + 10 = 20

Example 3:

5+5+5+5=20

Example 4:

4+4+4+4+4=20

Example 5:
5+5=10+5=15+5=20

Example 6:
4+4=8+4=12+4=16+4=20

Scoring Guidance

- Correct number sentence(s) (as listed in exemplar responses) = 1
- Incorrect/incomplete sentence(s) = 0

Rubric(s)

None

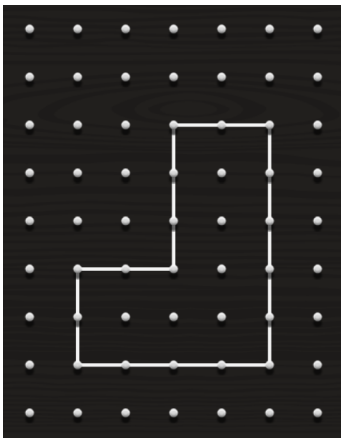
#05

Meta-data

- Item code: DC.06.c
- Trajectory: Decomposition

Item

5) Pretend you want to find the area of the shape outlined in white.



This problem requires multiple steps. Break down the problems into steps. Describe your steps:

Exemplar response(s)

Student answers will vary, they should list different steps in solving the problem.

1. Divide the shape into a square and a rectangle.
2. Find the length of one side of the square.
3. Find the area of the square.
4. Find the length of each side of the rectangle.

5. Find the area of the rectangle.
6. Add the areas of the square and the rectangle.

An alternate answer with fewer steps could be:

1. Find the area of the 2 x 2 square
2. Find the area of the 5 x 2 rectangle
3. Add the areas of the square and the rectangle

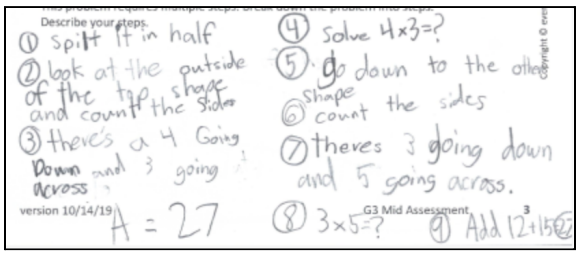
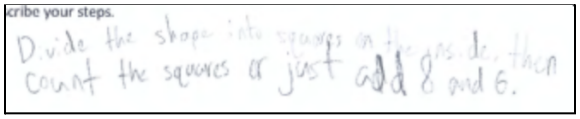
Scoring Guidance

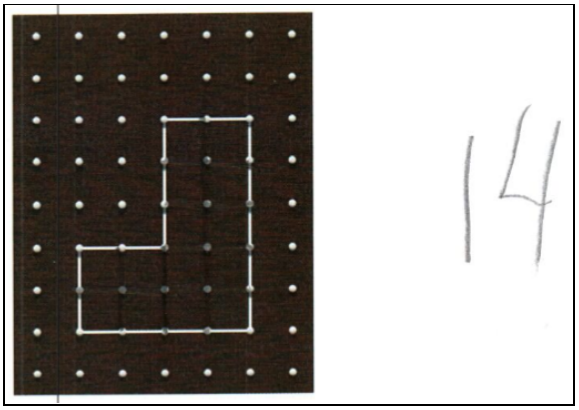
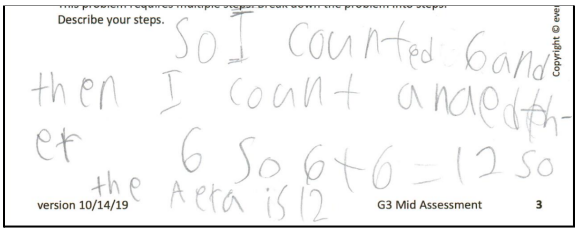
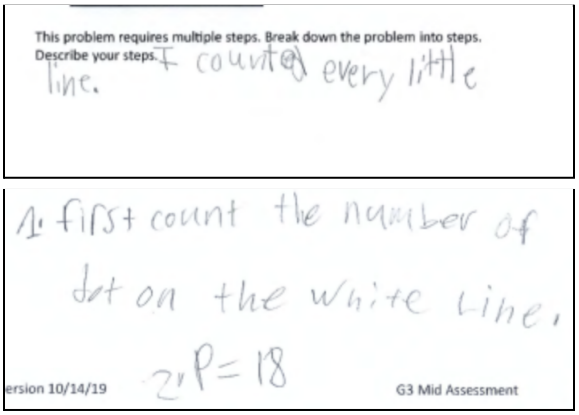
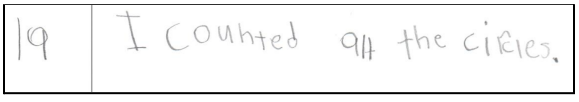
See Rubric

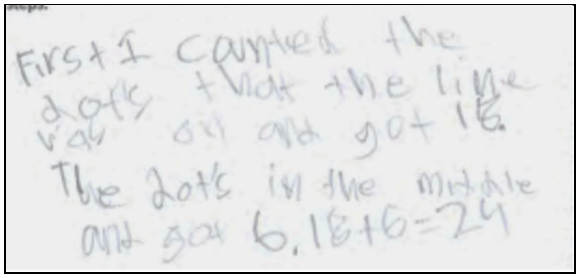
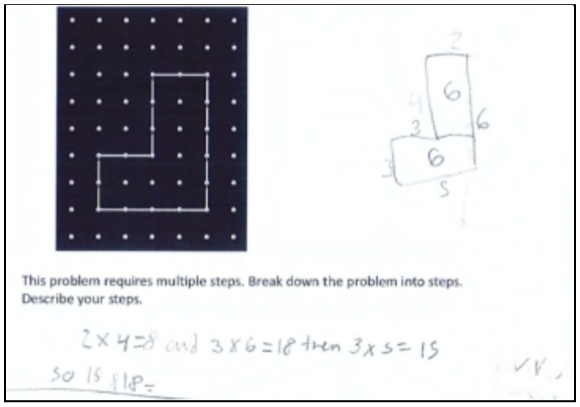
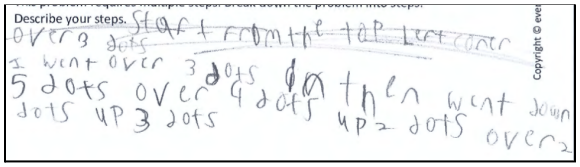
Rubric(s)

This item has two rubrics to aid in the process of making sense of students' responses. In our research, we found that many students attempted to solve for perimeter rather than area. As a result, we found that scoring the students' decomposition approach was easier if we first used Rubric A to classify the type of problem solving approach the student was engaged in, and then use Rubric B to assess whether they were able to describe a process of breaking the problem down into smaller parts, solve those smaller parts, and use those smaller parts to build back up to a whole. This decomposition rubric (Rubric B) is therefore general, in order to handle both students' area-based or perimeter-based approaches.

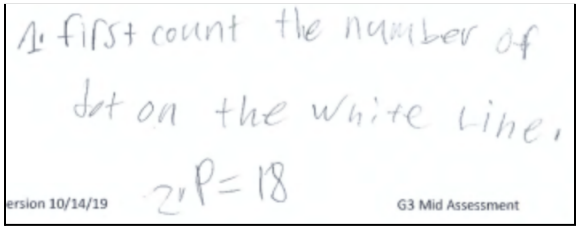
Rubric A (Math-focus) is used to classify students' problem solving approach. This is done by identifying whether they were using an area-based approach (as required by the item) or a perimeter-based approach (which many students did, seemingly confusing area and perimeter), and then determining whether their approach would lead to an accurate measure (Level 4 or Level 2), or would lead to an incorrect measure (Level 3 or Level 1) when executed. Students' unclassifiable, incorrect, and/or hybrid approaches are assigned Level 0.

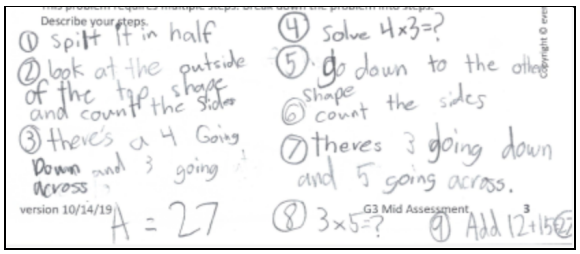
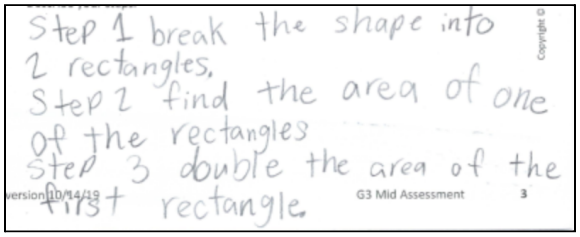
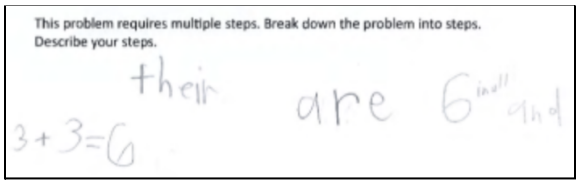
Rubric A (Math-focus)		
Score	Description	Example Student Responses
4	Area-type algorithm/approach which would produce an accurate measure of area if executed*	 

		 14 ● Note regarding this student response: Although it's faint, the student has drawn lines to subdivide the figure into 14 squares. Those individual squares, when summed, equals '14' as written by the student to the right of the drawing.
3	Area-type approach, but one that would produce an inaccurate measure of area if executed (e.g., calculates area of 2 rectangles but multiplies them, instead of adding; leaves out a portion of the compound shape when calculating area)	 Describe your steps. So I counted 6 and then I count another 6 so 6+6=12 so the Aera is 12 version 10/14/19 G3 Mid Assessment 3
2	Perimeter-type algorithm/approach which would produce an accurate measure of area if executed*	 This problem requires multiple steps. Break down the problem into steps. Describe your steps. I counted every little line. 1. first count the number of dot on the white line. 2. P=18 ersion 10/14/19 G3 Mid Assessment
1	Perimeter-type approach, but one that would produce an inaccurate measure of area if executed (e.g., doesn't include all sides when calculating perimeter)	 19 I counted all the cirles.

0	Neither (or unclear) (i.e., it's unclear what student is doing AND/OR not calculating Area or Perimeter)	   ● Note regarding this student response: This example does not indicate the student is doing anything more than tracing the outline

*This level does not require that the student actually executes the algorithm (e.g., students don't necessarily need to solve for area and show their work).

Rubric B (CT-focus)		
Score	Description	Example Student Responses
2	Builds back up, using smaller parts	

		
1	Breaks problem down into smaller parts	
0	No indication of decomposition approach	

#06

Meta-data

- Item code: DC.08.a
- Trajectory: Decomposition

Item

6) Decomposing means breaking something down into parts. Decompose the number 10. List at least three ways you can add numbers to get to 10.

Exemplar response(s)

Answers will vary. Sample answers:

- 2 + 8 = 10
- 3 + 7 = 10
- 5 + 5 = 10

Scoring Guidance

- 0 correct ways=0; 1 correct way=1; 2 correct ways=2; 3 correct ways=3
- If students provide mathematically equivalent expressions for different ways, that's okay and we count as different (e.g., "1 + 9" and "9 + 1" are 2 correct ways)
- Solution using 0 (e.g., "0 + 10") is considered a correct way

- After scoring DC.08.a using the above criteria, score DC.08.a.zero = ‘1’ if student uses “0 + 10 = 10”, ‘0’ if not

Rubric(s)

None

#07

Meta-data

- Item code: S.04.b
- Trajectory: Sequencing

Item

7) Aisha has 8 toys that she wants to carry from the kitchen to her room. She can carry 1, 2, or 3 toys at once. One way to carry the toys is listed below. Write two other ways that Aisha can carry the 8 toys to her room.

Example

- Carry 3 toys to room
- Carry 2 toys to room
- Carry 3 toys to room

One way:

Another way:

Exemplar response(s)

One way

*Students can provide any combination such that when summed they equal 8, e.g.,

Example 1

- Carry 3 toys to room
- Carry 3 toys to room
- Carry 2 toys to room

Example 2

- Carry 3 toys to room
- Carry 2 toys to room
- Carry 2 toys to room
- Carry 1 toy to room

Another way

*Students can provide any combination such that when summed they equal 8, e.g.,

Example 1

- Carry 3 toys to room
- Carry 3 toys to room
- Carry 2 toys to room

Example 2

- Carry 3 toys to room

- Carry 2 toys to room
- Carry 2 toys to room
- Carry 1 toy to room

Scoring Guidance

- 2 correct ways=1
- Incorrect way(s)/only 1 way=0
- Must provide 2 correct ways of moving toys to score as 1
- If S provides > 2 ways, and some are incorrect, you can ignore the incorrect ways and count/give credit to the correct ways

Rubric(s)

None

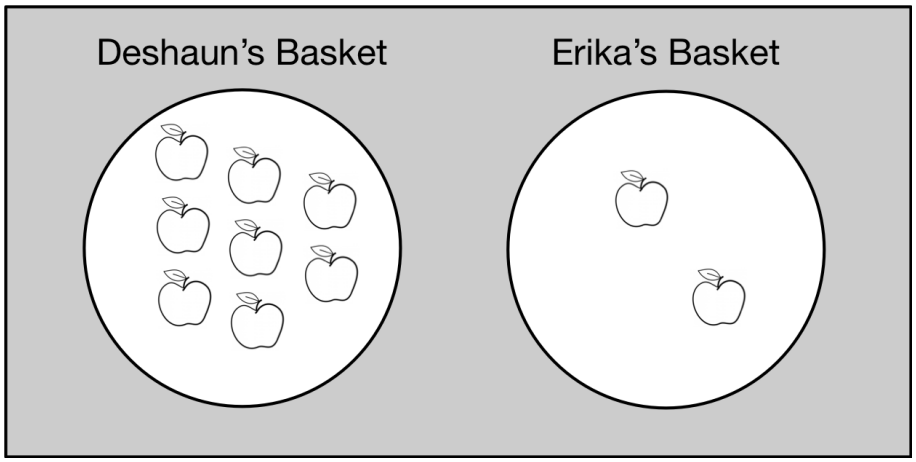
#08

Meta-data

- Item code: R.05.a
- Trajectory: Repetition

Item

8) Deshaun's basket has 8 apples and Erika's basket has 2 apples.



Instructions:
Repeat 4 times:

- Take 1 apple from Deshaun's basket and put it on the table
- Take 1 apple from the table and put in Erika's basket

If you follow these instructions, how many apples will be in Erika's basket?

Exemplar response(s)

6

Scoring Guidance

- "6"=1
- Any other answer=0

Rubric(s)

None

#09

Meta-data

- Item code: R.01.a
- Trajectory: Repetition

Item

9) Andre has 9 cookies that he wants to give away to 3 friends.
He wants to give each friend an equal number of whole cookies.
Write instructions for giving the cookies to the 3 friends.
Use the instruction “repeat 3 times” at least once.

Exemplar response(s)

Example 1:

Repeat 3 times:

a. Give first friend 1 cookie
b. Give second friend 1 cookie
c. Give third friend 1 cookie

Example 2:

Repeat 3 times:

a. Give first friend 1 cookie

Repeat 3 times:

a. Give second friend 1 cookie

Repeat 3 times:

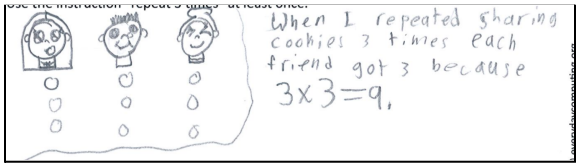
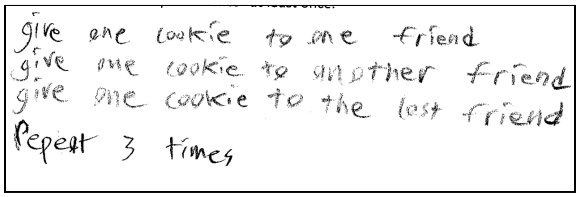
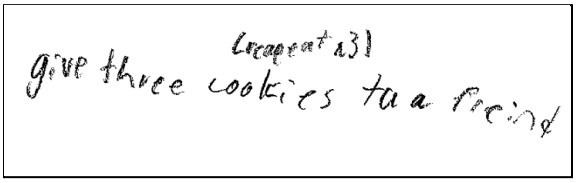
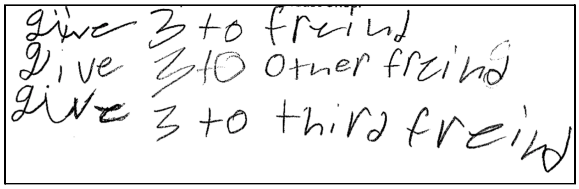
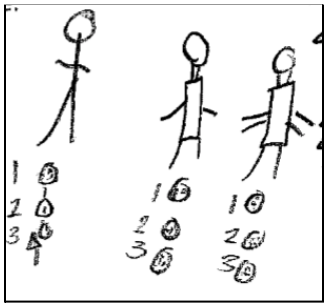
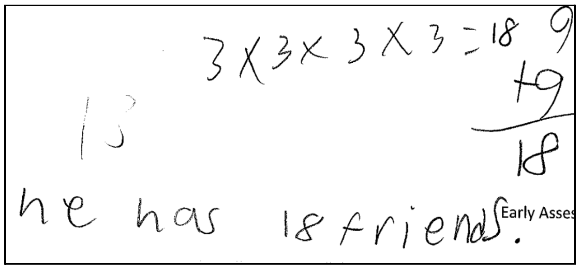
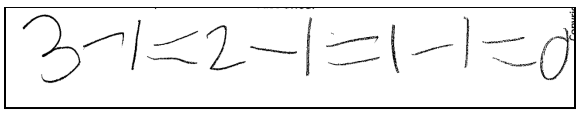
a. Give third friend 1 cookie

Scoring Guidance

See Rubric

Rubric(s)

This rubric allows partial credit to allow for student responses that seem to demonstrate some understanding of using repetition in their instructions, but their specific instructions would not achieve the intended outcome.

	Description	Example
2	Instructions use the command “repeat 3 times” and produces the intended outcome*. (Can include “repeat 3 times” instruction either before or after the command(s) to be repeated.)	 
1	Shows understanding of repetition to get desired result through word explanation or drawings, but instructions won’t produce the intended outcome*.	
0	Incorrect use of repetition concept, or no demonstration of repetition concept to achieve the intended outcome*.	   

* Responses which include drawings must demonstrate repetition to achieve the intended outcome

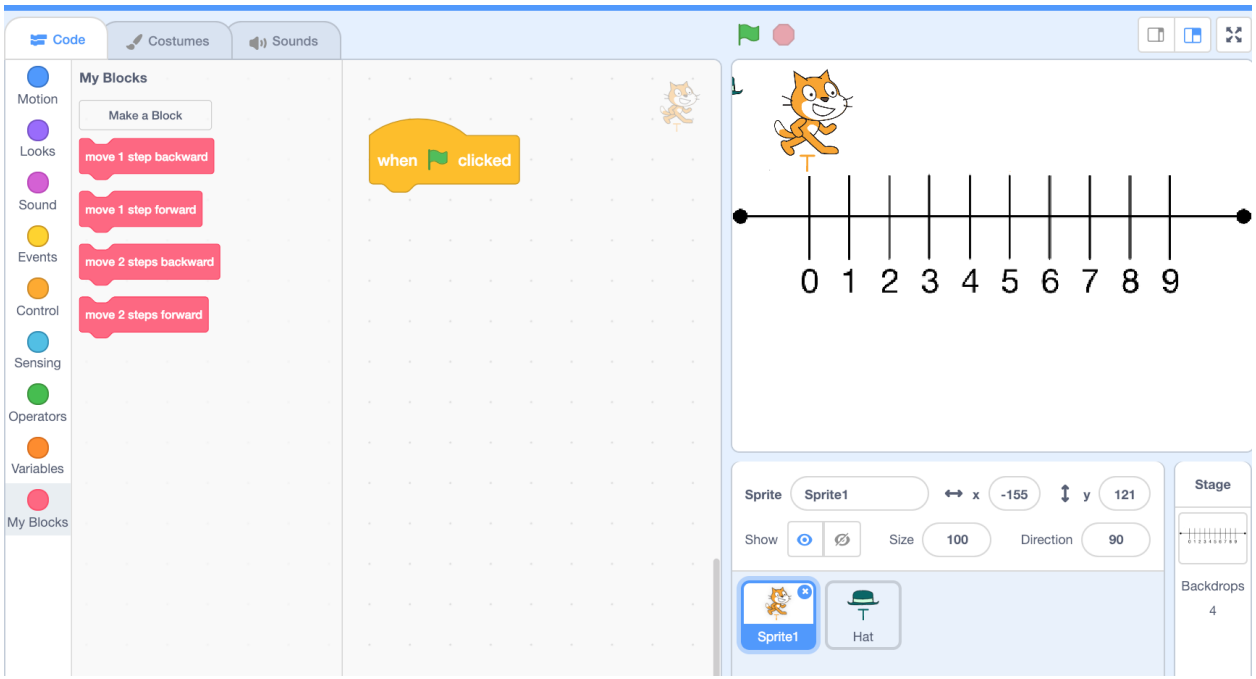
#10

Meta-data

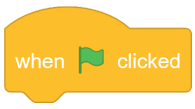
- Item code: S.01.a
- Trajectory: Sequencing

Item

10) Create 2 different scripts (sets of instructions) to move the cat so that he stops at 5 on the number line. **Use only the blocks shown above.**



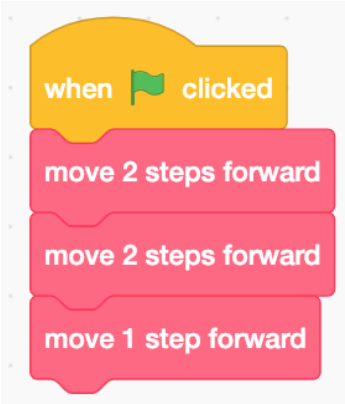
Script A



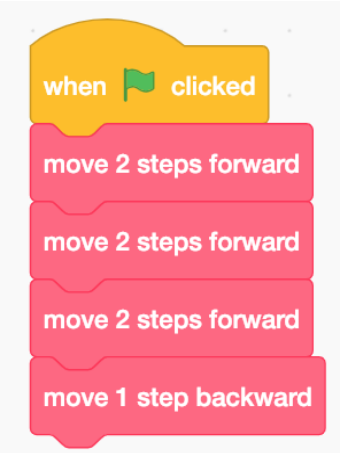
Script B

Exemplar response(s)

Script A



Script B



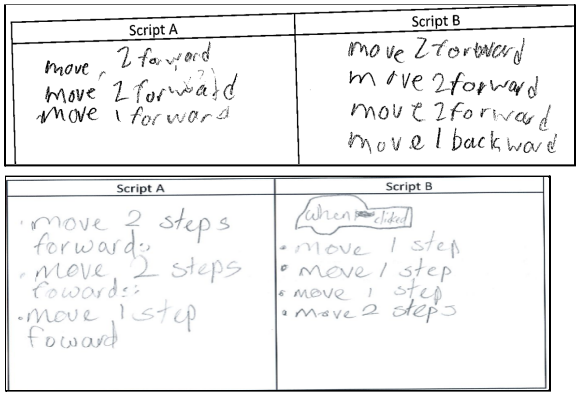
Note: Any combination of forward and backward steps is acceptable as long as the cat stops at 5.

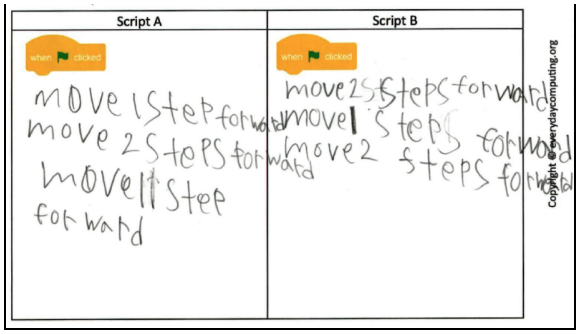
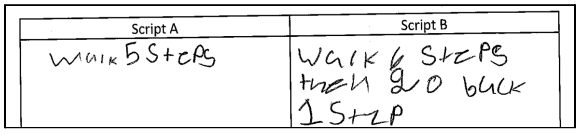
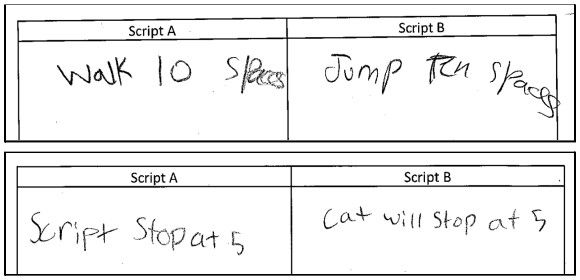
Scoring Guidance

See Rubric

Rubric(s)

This rubric focuses on two important features of this item that relate back to this item's design principles: (1) did the students use the given blocks to achieve the intended outcome and (2) did the students show two different code blocks that would both produce the same intended outcome? The rubric creates different levels of performance based upon those two features.

Score	Description	Example
3	Provides 2 correct ways to get to 5 using the **given*** blocks	

2	Provides 1 way to get to 5 with the **given*** blocks [Clarification: The students' 2nd way might be correct (but using not given blocks), or might be incorrect (using either given or not given blocks) or might be blank.]	
1	Provides 2 correct ways to get to 5 using blocks that are **not given***	
0	Shows incorrect block usage (cat will not reach Step 5), or provides only 1 way to get to 5 with blocks that are **not given***	

Note. "Given block" means that the student is constrained to using commands that move the cat either 1 or 2 steps, in either a forward or backward direction.

- ***Given blocks** define a limited number of steps and directions. Valid options are 1 step backward; 1 step forward; 2 steps backward; 2 steps forward.
- ***Non-given blocks** would be other blocks (e.g., "repeat 5 times") or blocks that do not use the defined number and direction (e.g., "move 5 steps forward").