Exemplars

Title: Ladybugs and Crickets
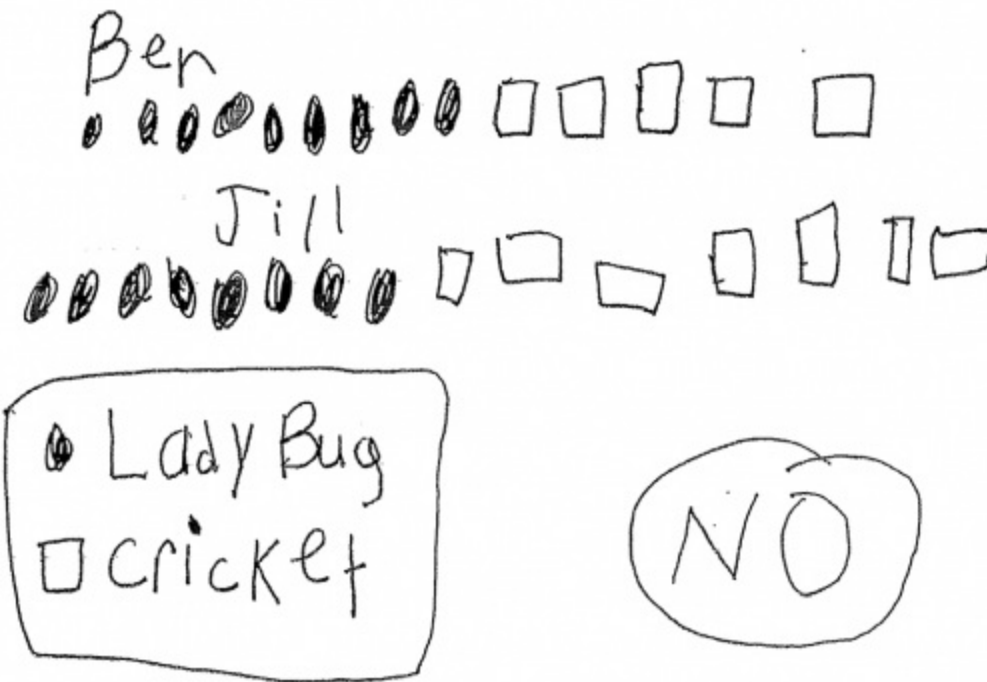
Achievement Level: Novice 1

Criteria and Performance Level	Rationales
Problem Solving *Apprentice*	The student's strategy of diagramming the ladybugs and crickets Ben and Jill have in their jars works to solve part of the task. The student's answer, "NO," is not correct because it is based on comparing nine ladybugs to eight ladybugs and not the total number of insects in each jar.
Reasoning & Proof *Apprentice*	The student shows some correct reasoning of the underlying concepts of the task. The student diagrams the correct number of ladybugs and crickets in each jar. The student does not demonstrate understanding that a comparison of the total of insects per jar has to be considered.
Communication *Novice*	The student does not use any mathematical language to communicate their reasoning and proof.
Connections *Novice*	The student does not make a mathematically relevant observation about their solution.
Representation *Practitioner*	The student's diagram is appropriate to the task and accurate. A key defines the ladybugs and crickets and the total numbers of insects in each jar is correct.

Exemplars

Achievement Level: Novice 1

P/S	R/P	Com	Con	Rep	A/Level
A	A	N	N	P	N

Ben

Jill

Lady Bug
cricket

NO

9

"Dad was wrong because Ben
has 9 ladybugs in his jar but Jill
only has 8 lady bugs in her jar."
(reread problem)
"Dad is wrong. 9 ladybugs is not
the same as 8 ladybugs."

AZ

Title: Ladybugs and Crickets

Achievement Level: Apprentice 1

Criteria and Performance Level	Rationales
Problem Solving *Apprentice*	The student's strategy of diagramming the ladybugs and crickets Ben and Jill have in their jars would work to solve the task. The student omits one cricket from Jill's jar, which leads to an incorrect answer, "Yes."
Reasoning & Proof *Practitioner*	The student shows correct reasoning of the underlying concepts of the task. The student understands that a total number of insects in each jar needs to be determined and the two totals compared to determine if Dad is correct. Omitting one cricket from Jill's jar is considered a careless error and not a flaw in the student's reasoning.
Communication *Practitioner*	The student correctly uses the mathematical terms *diagram*, *key*, *more than*.
Connections *Practitioner*	The student makes the mathematically relevant observation, "I know Ben has one more ladybug than Jill because he has nine ladybugs and she has eight ladybugs."
Representation *Apprentice*	The student's diagram is appropriate to the task but is not accurate. The seventh cricket is missing from Jill's jar. A key defines the ladybugs, crickets, and jars.

Achievement Level: Apprentice 1

P/S	R/P	Com	Con	Rep	A/Level
A	P	P	P	A	A

My diagram

Key

L ladybug
C cricket
○ jar

Yes

Ben

L L L L
L L L L L
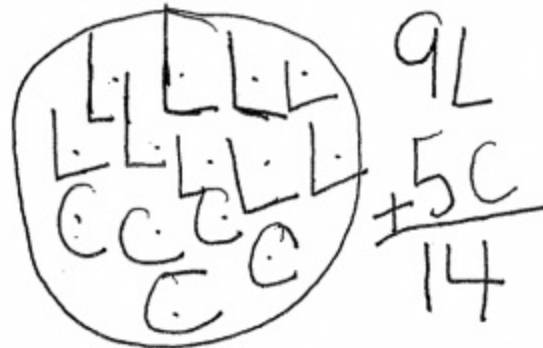C C C C
C C

9L
+5C
14

Jill

8L
+ 6C
14

L L L L L
L L L L C
C C C C

"I used my 10 frame of 9 and my ten frame of 5. I gave 1 to 9 to get 10 so 10 and 4 is 14. I used my ten frame of 8 and ten frame of 6. I gave 2 to 8 to get 10. I did 10 and 4 and got 14."

AZ

"I know Ben has 1 more ladybug then Jill because he has 9 ladybugs and she has 8 ladybugs."

AZ

Title: Ladybugs and Crickets

Achievement Level: Practitioner 1

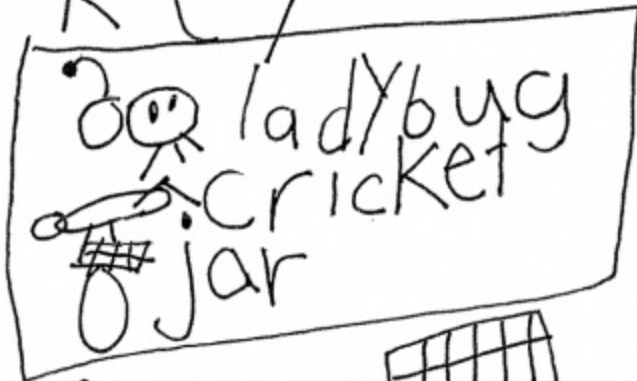| Criteria and Performance Level	Rationales
Problem Solving *Practitioner*	The student's strategy of diagramming the ladybugs and crickets Ben and Jill have in their jars, finding the total number of insects per jar, and comparing the totals to see if Dad is correct, works to solve the task. The student's answer, "A: no," is correct.
Reasoning & Proof *Practitioner*	The student shows correct reasoning of the underlying concepts of the task. The student understands that a total number of insects in each jar needs to be determined and the two totals compared to determine if Dad is correct.
Communication *Practitioner*	The student correctly uses the mathematical terms *diagram*, *key*, *more than*.
Connections *Practitioner*	The student makes the mathematically relevant observations, "Jill has one more bug than Ben," and, "14 + 15, 10 + 10 + 9 = 29 bugs in all."
Representation *Practitioner*	The student's diagram is appropriate to the task and accurate. A key defines the ladybugs, crickets, and jars. Each jar contains the correct number of each insect.

Achievement Level: Practitioner 1

My diagram

key

ladybug
cricket
jar

Ben

"Jill has 1 more bug than Ben.
Bugs are insects."

AZ

Jill

1 more

"I get 9 lady bugs and
5 crickets. I did 5 + 5
+ 4 and got 14."

AZ

$$5+5+4=$$

$$14$$

$$14+15$$

$$10+10+9=$$

29 bugs in all

A:
no

$$5+5+5=15$$

"I did 5 + 5 + 5 and got 15.
8 has 5. 7 has 5 and
3 + 2 is 8 so add three 5's
to get 15."

AZ

Title: Ladybugs and Crickets

Achievement Level: Practitioner 2

| Criteria and Performance Level	Rationales
Problem Solving *Practitioner*	The student's strategy of using a number line to indicate the ladybugs and crickets Ben and Jill have in their jars, finding the total number of insects per jar, and comparing the totals to see if Dad is correct, works to solve the task. The student's answer, "A-no," is correct.
Reasoning & Proof *Practitioner*	The student shows correct reasoning of the underlying concepts of the task. The student understands that a total number of insects in each jar needs to be determined and the two totals compared to determine if Dad is correct.
Communication *Practitioner*	The student correctly uses the mathematical term *amount* from the task. The student also correctly uses the terms *number line*, *more*.
Connections *Practitioner*	The student makes the mathematically relevant observations, "They don't have the same amount of each bug," "Ben has more ladybugs," "Jill has more crickets," and, "Jill has 1 more bug."
Representation *Practitioner*	The student's number line is appropriate to the task and accurate. All necessary labels are indicated and the student's "jumps" are correct.

Achievement Level: Practitioner 2

P/S	R/P	Com	Con	Rep	A/Level
P	P	P	P	P	P

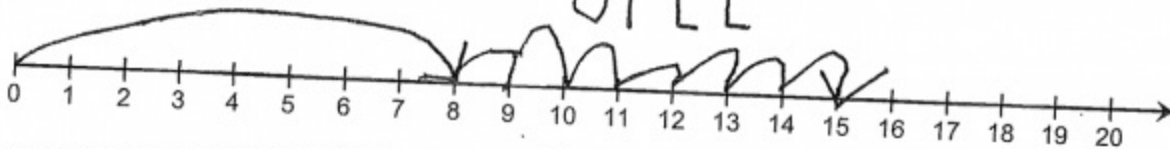Is Dad correct?
Do a number line.

Ben
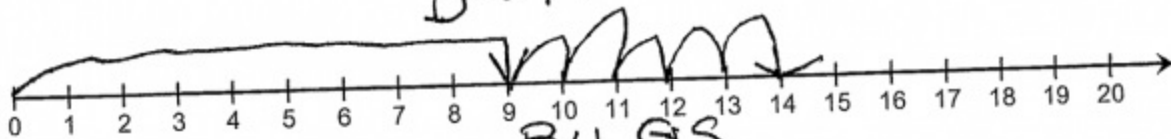
BUGS

"I did 9 ladybugs. I did 5 crickets."

AZ

JiLL

"I did 8 ladybugs and 7 crickets."

AZ

BUGS

"They don't have the same amount of each bug. Ben has more ladybugs. Jill has more crickets."

AZ

A-no BUG Jill has 1 more

Exemplars

Title: Ladybugs and Crickets

Achievement Level: Expert 1

Criteria and Performance Level	Rationales
Problem Solving *Expert*	The student's strategy of using a diagram to indicate the ladybugs and crickets Ben and Jill have in their jars, finding the total number of insects per jar, and comparing the totals to see if Dad is correct, works to solve the task. The student's answer, "Dad is rong," is correct. The student verifies that their answer is correct by using a new strategy of a tally chart. The student also applies the rules for addition with even and odd numbers.
Reasoning & Proof *Expert*	The student shows correct reasoning of the underlying concepts of the task. The student understands that a total number of insects in each jar needs to be determined and the two totals compared to determine if Dad is correct. The student uses a tally chart to verify that their answer is correct and also applies the addition rules using odd and even numbers.
Communication *Expert*	The student correctly uses the mathematical terms *key, diagram, more than, less than, more, tally, chart, odd, even, rules, addend, sum*. The student correctly uses the notation "O + O = E" and "E + O = O" and defines the O (odd) and E (even) in the scribing.

|	
Connections *Expert*	The student makes the mathematically relevant Practitioner observations, "I see that Ben has one more ladybug than Jill," "I see that Ben has two less crickets than Jill," and, "I see Jill has one more insect in her jar." The student makes the Expert connection by using a tally chart to verify that the student's answer is correct. The student states, "I used the same key for the ladybug and crickets. I got fourteen and fifteen again so I am correct. I proved it didn't I!" The student uses the odd and even rules. $9 + 5 = 14$, $O + O = E$, $8 + 7 = 15$, $E + O = O$. The student states, "I did O for Odd and E for Even. If you know them you know the answer is no."
Representation *Expert*	The student's diagram is appropriate and accurate. All necessary labels are included. The student's tally chart is appropriate and accurate. All necessary labels are included and supported by the student's text. The student compares their tally chart to their diagram to verify that their answer is correct.

Achievement Level: Expert 1

Hey
ladybug
cricket

Do a diagram

Ben

$9 + 5 = 14$

$5 + 4 + 5$

$10 + 4$

Dad
Is rong
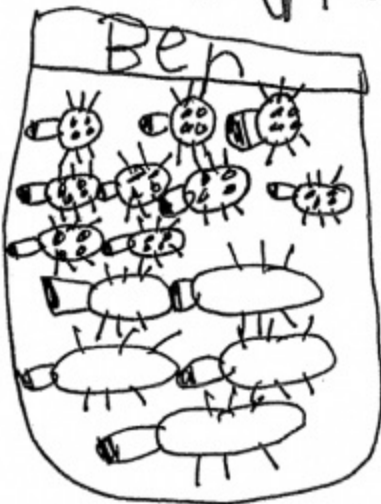
Jill

$8 + 7 = 15$

$5 + 3$ $5 + 2$

$10 + 5$

"I see that Ben has 1 more ladybug than Jill. I see that Ben has 2 less crickets than Jill. I see Jill has 1 more insect in her jar. I can make a tally for a new way. This is a chart."
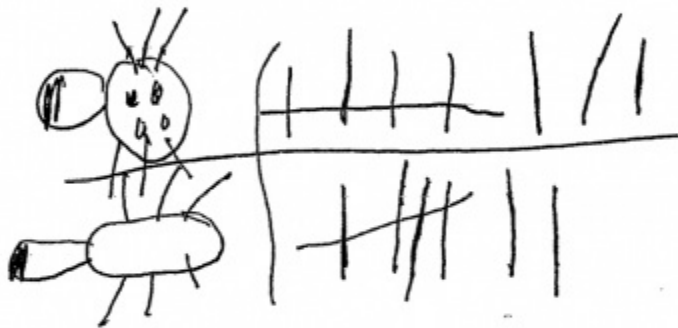
AZ

Bens Jar

$$5+5+4=14$$

Jills Jar

$$5+5+5=15$$

"I used the same key for the ladybugs and crickets. I got 14 and 15 again so I am correct. I proved it, didn't I?!"
AZ

"I see one more thing I will show you to odd and even rules we learned."
AZ

"Can you write addend here and sum here for me?" (pointed correctly)

"I did O for odd and E for even. If you know them you know the answer is no."
AZ

"addend"
AZ

"addend"
AZ

$$9+5=14$$
"addend"
AZ

$$8+7=15$$
"sum"
AZ

"sum"
AZ

"addend"
AZ $$O+O=E$$
"sum"
AZ

$$E+O=O$$
AZ