

# Impact of Teacher Professional Development Program on Student Achievement in China - Supplemental Material

## Math Knowledge for Teaching Test of Teachers Form A

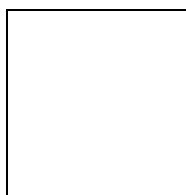
A VERY important reminder

**\*\* Surveys MUST include LMT/SII copyright information \*\***

Steps to creating a survey (see example survey for guidance):

1. Decide on the scale(s) you will use in your study.
2. If you are administering multiple scales, combine the items from the scale forms into one single document.
3. Create a cover page.
4. Include a page with LMT/SII copyright information.
5. Depending on your human subjects requirements, you may decide to use a passive consent letter.
6. Include an “instructions” page.
7. You may choose to include a set of demographic questions in your survey in addition to the LMT knowledge items. If you decide to do this, we recommend creating a separate section for the demographic questions.
8. Renumber items. Currently all items have the same item number we used in our original research. This provides a means for accessing item level technical information from our technical reports. Once you have compiled your items into your survey form you will need to renumber all items sequentially.
9. End the form with a brief thank you note and information about how participants can reach you if they have questions.
10. Make sure all pages are numbered and footers are as you like them.
11. Check your final form multiple times to make sure you did not drop or change any items in the cutting and pasting process.
12. We recommend you convert your final word survey to a PDF document to preserve your final formatting.

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## INSTRUCTIONS

- Answer questions by circling your choice, e.g.

1. During a unit on functions, Ms. Lopez asks her students to write journal entries on exponential growth. Which of the following journal entries illustrate exponential growth? (For each item below, circle EXPONENTIAL, NOT EXPONENTIAL or I'M NOT SURE.)

	Exponential	Not exponential	I'm not sure
a) An example of exponential growth would be if you got a 1% raise each year.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
b) An example of exponential growth would be if a car increases in speed by 10 miles per hour every second.	<input type="radio"/> 1	<input checked="" type="radio"/> 2	<input type="radio"/> 3
c) Exponential growth is when the y-axis increases faster than the x-axis. For example, if each time the x-coordinate goes up by 2, the y-coordinate goes up by 3.	<input checked="" type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3

- In completing this questionnaire, you should not spend more than 1-2 minutes on any question. Imagine you are responding to real classroom situations, and select the answer that most closely matches what you would do, say, or answer at that moment.
- Your responses are voluntary and confidential. If you come to a question you do not wish to answer, simply skip it. We hope that you will answer as many questions as possible.

28. It was Sally's birthday. Mr. Siegel and Sally made up a math problem for the class:

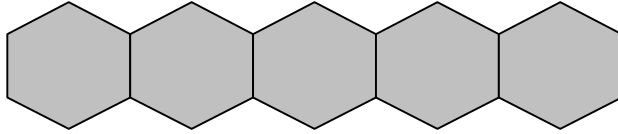
Sally is exactly twice as old as her brother. When will she be twice as old as him again?

The class generated the following ideas. Which of the following statements would you accept as correct? (Mark ONE answer.)

- a) It will happen every two years.
- b) It depends on Sally's age.
- c) It will happen when she is twice as old as she is now.
- d) It will never happen again.

29. Ms. Jones was preparing to use the following task with her students:

If you lined up 100 hexagons in a row this way,  
what would the perimeter be?



She knew how she would do it, but she wanted to anticipate what some of her students would come up with. Which of the following would work to find the correct answer? (Mark YES, NO, or I'M NOT SURE for each solution.)

	Yes	No	I'm not sure
a) $4 \times 100 + 2$	1	2	3
b) $(6 \times 100) - 2 \times 99$	1	2	3
c) $4 \times 98 + 2 \times 5$	1	2	3
d) $6 \times 100$	1	2	3

30. Mr. Alder's students have been learning how to write equations to represent mathematical relationships. Last night, he assigned the following problem:

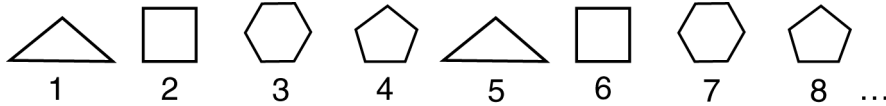
A one-pound bag contains 50 percent more tan M&Ms than green ones. Write a mathematical statement that represents the relationship between the tan ( $t$ ) and green ( $g$ ) M&Ms, using  $t$  and  $g$  to represent the number of tan and green M&Ms.

He gets the following responses to the problem. Which responses represent the relationship appropriately? (Mark YES, NO or I'M NOT SURE for each response.)

	Yes	No	I'm not sure
a) $1.5t = g$	1	2	3
b) $.50t = g$	1	2	3
c) $.5g = t$	1	2	3
d) $g + \boxed{\phantom{00}}g = t$	1	2	3

31. Ms. Bourlin's new textbook has the following challenge problem:

Look at the repeating pattern below. What shape would be 83<sup>rd</sup> in the sequence?



The new textbook does not include an answer to this problem, and Ms. Bourlin wants to make sure she knows it before she begins working on it with her class. What shape would be the 83<sup>rd</sup> in this sequence? (Mark ONE answer.)

- a) triangle
- b) square
- c) hexagon
- d) pentagon

32. Mrs. Teva asked her students to write a formula for the perimeter of the rectangle pictured below. She was surprised by all the different answers students came up with. Which answer should she not accept as correct? (Mark ONE answer.)



- a)  $P = 2w + 2l$
- b)  $P = 2lw$
- c)  $P = 2(l + w)$
- d)  $P = l + w + l + w$

33. Mr. Jones used the following problem to develop his students' ability to write formulas to describe patterns:

A row of squares can be made from toothpicks as follows:



Write a formula to represent the number of toothpicks for any number of squares. Use  $t$  for the number of toothpicks and  $s$  for the number of squares.

Which of the following formulas represents the number of toothpicks ( $t$ ) for a given number of squares ( $s$ )? (Mark ONE answer.)

- a)  $t = 4s$
- b)  $t = 3s + 4$
- c)  $t = 4s - (s - 2)$
- d)  $t = 2s + (s + 1)$



# Math Knowledge for Teaching Test of Teachers Form B

## INSTRUCTIONS

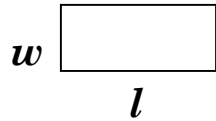
- Answer questions by circling your choice, e.g.

1. During a unit on functions, Ms. Lopez asks her students to write journal entries on exponential growth. Which of the following journal entries illustrate exponential growth? (For each item below, circle EXPONENTIAL, NOT EXPONENTIAL or I'M NOT SURE.)

	Exponential	Not exponential	I'm not sure
a) An example of exponential growth would be if you got a 1% raise each year.	<input checked="" type="radio"/> 1	2	3
b) An example of exponential growth would be if a car increases in speed by 10 miles per hour every second.	1	<input checked="" type="radio"/> 2	3
c) Exponential growth is when the y-axis increases faster than the x-axis. For example, if each time the x-coordinate goes up by 2, the y-coordinate goes up by 3.	<input checked="" type="radio"/> 1	2	3

- In completing this questionnaire, you should not spend more than 1-2 minutes on any question. Imagine you are responding to real classroom situations, and select the answer that most closely matches what you would do, say, or answer at that moment.
- Your responses are voluntary and confidential. If you come to a question you do not wish to answer, simply skip it. We hope that you will answer as many questions as possible.

30. Mrs. Teva asked her students to write a formula for the perimeter of the rectangle pictured below. She was surprised by all the different answers students came up with. Which answer should she NOT accept as correct? (Mark ONE answer.)



- a)  $P = 2w + 2l$
- b)  $P = 2lw$
- c)  $P = 2(l + w)$
- d)  $P = l + w + l + w$

31. Mrs. Martin's students are creating input-output machines that add four to each number entered. Her students produce the machines shown below. Which student's work correctly shows a +4 machine? (Mark ONE answer.)

a.

In	Out
0	4
1	8
2	12

b.

In	Out
1	5
3	6
5	7

c.

In	Out
2	6
1	5
7	11

d.

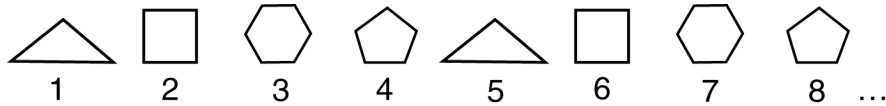
In	Out
4	0
6	2
8	4

32. Ms. Yolanta had her students cut rectangles out of paper to investigate area and perimeter. She posed the question: "If I start with a rectangle and make a new rectangle by doubling its length and halving its width, how does the area change?" Students volunteered many ideas. Which of their ideas about the area of the rectangles is true? (Mark ONE answer.)

- a) The area always changes.
- b) The area always stays the same.
- c) The area sometimes changes.
- d) It's not possible to tell from this information.

33. Ms. Bourlin's new textbook has the following challenge problem:

Look at the repeating pattern below. What shape would be 83<sup>rd</sup> in the sequence?



The new textbook does not include an answer to this problem, and Ms. Bourlin wants to make sure she knows it before she begins working on it with her class. What shape would be the 83<sup>rd</sup> in this sequence? (Mark ONE answer.)

- a) triangle
- b) square
- c) hexagon
- d) pentagon

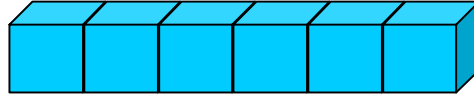
34. Ms. Hernandez's class was looking at the following table one day. She asked her students to think of a general rule that would help them find  $x$  for any given  $n$ , without having to continue the table.

$n$	$x$
1	1
2	3
3	5
4	7

Her students produced the following statements. Which are correct? (Mark YES, NO, or I'M NOT SURE for each response.)

	Yes	No	I'm not sure
a) To find a specific term, you must first know the term before it.	1	2	3
<hr/>			
b) To find a specific term, double the number of the term ( $n$ ) and add 1.	1	2	3
<hr/>			
c) To find a specific term, double the number of the previous term and add 1.	1	2	3
<hr/>			
d) To find a specific term, double the number of the term ( $n$ ) and subtract 1.	1	2	3
<hr/>			

35. Ms. Williams asked her students to develop a rule to predict the number of cube faces exposed (including the bottom) when they are placed together in a train of cubes of any length. Her students produced the answers below. Which one(s) should she accept as correct? (Mark YES, NO, or I'M NOT SURE for each.)



	Yes	No	I'm not sure
a) number of cubes $\times 4 + 2$	1	2	3
b) number of cubes $\times 6$	1	2	3
c) number of cubes $\times 6 + 2$	1	2	3
d) number of cubes $\times 4$	1	2	3

36. Mr. Jones used the following problem to develop his students' ability to write formulas to describe patterns:

A row of squares can be made from toothpicks as follows:



Write a formula to represent the number of toothpicks for any number of squares. Use  $t$  for the number of toothpicks and  $s$  for the number of squares.

Which of the following formulas represents the number of toothpicks ( $t$ ) for a given number of squares ( $s$ )? (Mark ONE answer.)

- a)  $t = 4s$
- b)  $t = 3s + 4$
- c)  $t = 4s - (s - 2)$
- d)  $t = 2s + (s + 1)$

# Math Knowledge for Teaching Test of Teachers Form C

## INSTRUCTIONS

- Answer questions by circling your choice, e.g.

1. During a unit on functions, Ms. Lopez asks her students to write journal entries on exponential growth. Which of the following journal entries illustrate exponential growth? (For each item below, circle EXPONENTIAL, NOT EXPONENTIAL or I'M NOT SURE.)

	Exponential	Not exponential	I'm not sure
a) An example of exponential growth would be if you got a 1% raise each year.	①	2	3
b) An example of exponential growth would be if a car increases in speed by 10 miles per hour every second.	1	②	3
c) Exponential growth is when the y-axis increases faster than the x-axis. For example, if each time the x-coordinate goes up by 2, the y-coordinate goes up by 3.	①	2	3

- In completing this questionnaire, you should not spend more than 1-2 minutes on any question. Imagine you are responding to real classroom situations, and select the answer that most closely matches what you would do, say, or answer at that moment.
- Your responses are voluntary and confidential. If you come to a question you do not wish to answer, simply skip it. We hope that you will answer as many questions as possible.



30. Mr. Jones decided to use a series of toothpick problems to work on patterns with his students. He started with this one:

A row of squares can be made from toothpicks as follows:



How many toothpicks would be needed to create a similar row of 37 squares?

To check himself, he tried it out. Which answer should he have gotten? (Mark ONE answer.)

- a) 112
- b) 113
- c) 148
- d) None of the above
- e) I'm not sure.

31. Students in Ms. Prendergast's class are studying equations. She asks them to write equations with  $x$  and  $y$ , such that if  $x = 7$ , then  $y = 4$ . Her students come up with a variety of answers. Which answer should she accept as correct? (Mark ONE answer.)

a)  $x + y = 4$

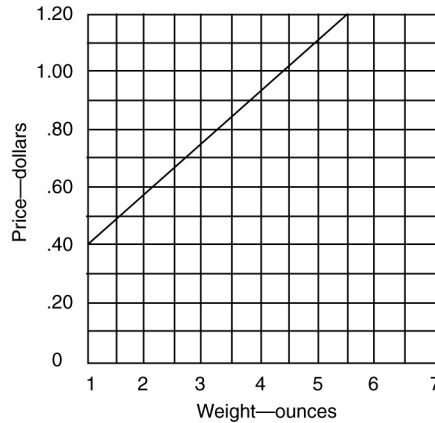
b)  $x - y = 4$

c)  $x + y = 11$

d)  $x - y = 11$

e) I'm not sure.

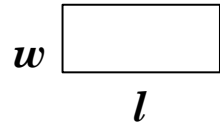
32. Mr. Santiago tells his class that you can buy candy by the ounce at the movie theater. He shows them the graph below involving weight and price and asks them to interpret it:



The students work in small groups on what this graph represents. As Mr. Santiago walks around the room listening to students talking and working, he hears students making interesting conclusions from the graph. Which of the following are correct conclusions from the graph? (Mark YES, NO, or I'M NOT SURE for each.)

	Yes	No	I'm not sure
a) As weight increases, price increases.	1	2	3
b) 4 ounces of candy costs twice as much as 2 ounces of candy.	1	2	3
c) For any price there is at most one weight.	1	2	3
d) Something that weighs 1 ounce costs 50 cents.	1	2	3

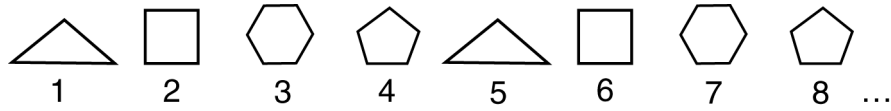
33. Mrs. Teva asked her students to write a formula for the perimeter of the rectangle pictured below. She was surprised by all the different answers students came up with. Which answer should she not accept as correct? (Mark ONE answer.)



- a)  $P = 2w + 2l$
- b)  $P = 2lw$
- c)  $P = 2(l + w)$
- d)  $P = l + w + l + w$

34. Ms. Bourlin's new textbook has the following challenge problem:

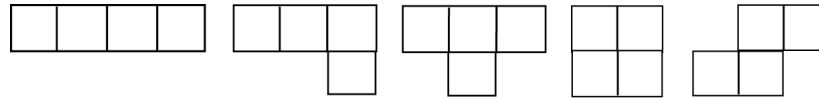
Look at the repeating pattern below. What shape would be 83<sup>rd</sup> in the sequence?



The new textbook does not include an answer to this problem, and Ms. Bourlin wants to make sure she knows it before she begins working on it with her class. What shape would be the 83<sup>rd</sup> in this sequence? (Mark ONE answer.)

- a) triangle
- b) square
- c) hexagon
- d) pentagon

35. Ms. Taylor learned about problems with tetrominoes at a workshop, and she thought they seemed useful for work with area and perimeter. Tetrominoes are sets of four squares attached edge to edge, just as dominoes are sets of two squares attached edge to edge. Here are some tetrominoes:



She then saw that her new book had some problems with different configurations of “ominoes.” She asked her class to find the smallest possible perimeter of a “9-omino” (made from 9 squares) and was surprised at the range of answers she got. Which answer should she accept as correct? (Mark ONE answer.)

- a) 9
- b) 12
- c) 18
- d) 20
- e) I'm not sure.

36. Mr. Jones used the following problem to develop his students' ability to write formulas to describe patterns:

A row of squares can be made from toothpicks as follows:



Write a formula to represent the number of toothpicks for any number of squares. Use  $t$  for the number of toothpicks and  $s$  for the number of squares.

Which of the following formulas represents the number of toothpicks ( $t$ ) for a given number of squares ( $s$ )? (Mark ONE answer.)

- a)  $t = 4s$
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- c)  $t = 4s - (s - 2)$
- d)  $t = 2s + (s + 1)$