

“The information that is most valuable for teaching must focus on student thinking.”

Foster, D., & Poppers, A. (1999). Using Formative Assessment to Drive Learning. The Silicon Valley Mathematics Initiative: A Twelve-year Research and Development Project



# Reflecting on Practice: Using Formative Assessment to Inform Instruction

## Unit 2 Session 6



# Non-negotiable Key Strategies to Implement Formative Assessment

- *Goals / Learning Intentions / Success Criteria*
- *Engineering effective classroom discussions, activities, and learning tasks that elicit evidence of learning*



Question: If  $r=2$ , find the circumference of the circle

Answer:  $C=4\pi$

What do we know about the student's understanding?



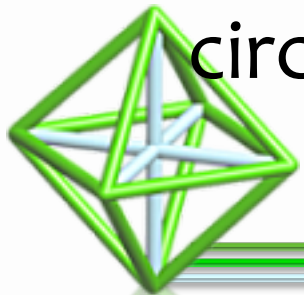
# Another question

Question: If  $r=2$ , find the circumference of the circle

Answer:  $C=4\pi$

Is this a better question?

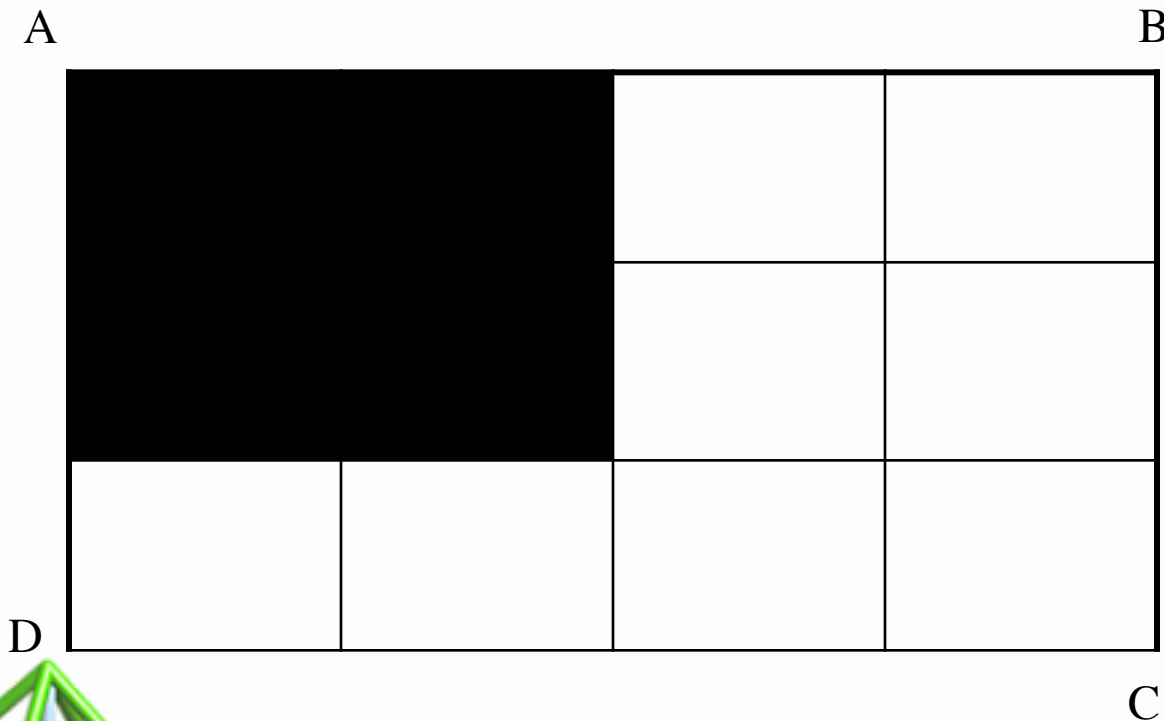
- Will the circumference and the area of a circle ever be the same? Why or why not?



“Tasks have to be justified in terms of the learning aims they serve and can work well only if opportunities for pupils to communicate their evolving understanding are built into the planning.” (Black & Wiliam, 1998, p.10)



In the figure below, what fraction of the rectangle ABCD is shaded?

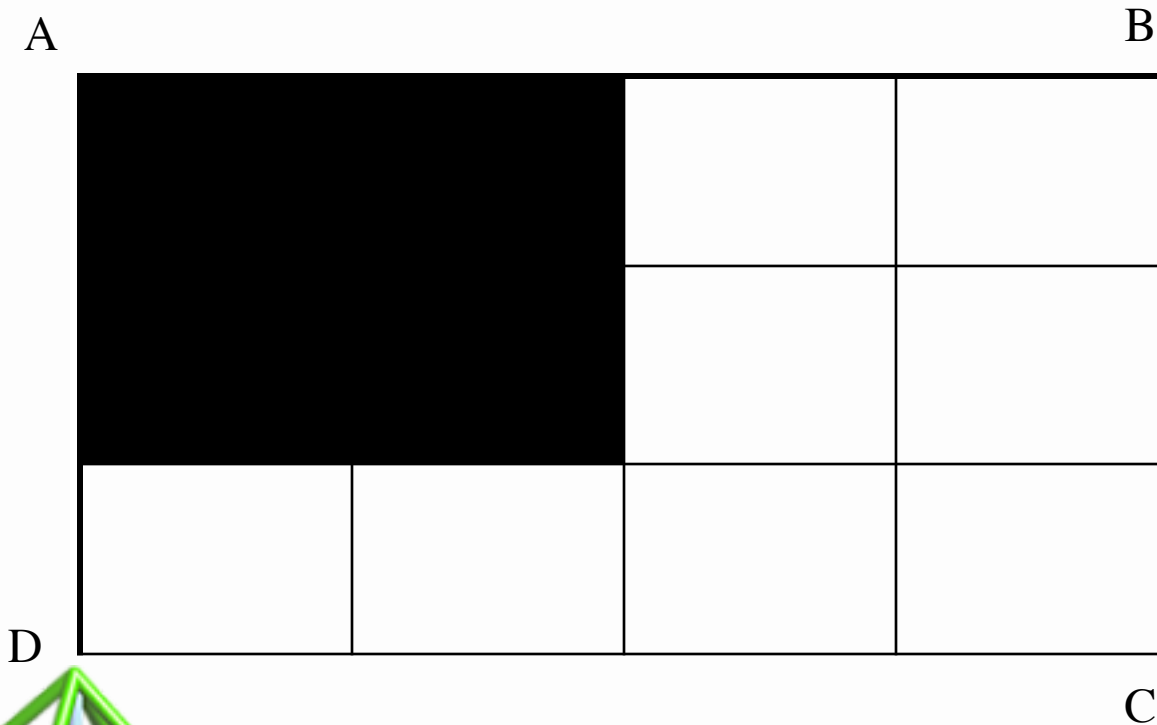


- a)  $1/6$
- b)  $1/5$
- c)  $1/4$
- d)  $1/3$
- e)  $1/2$





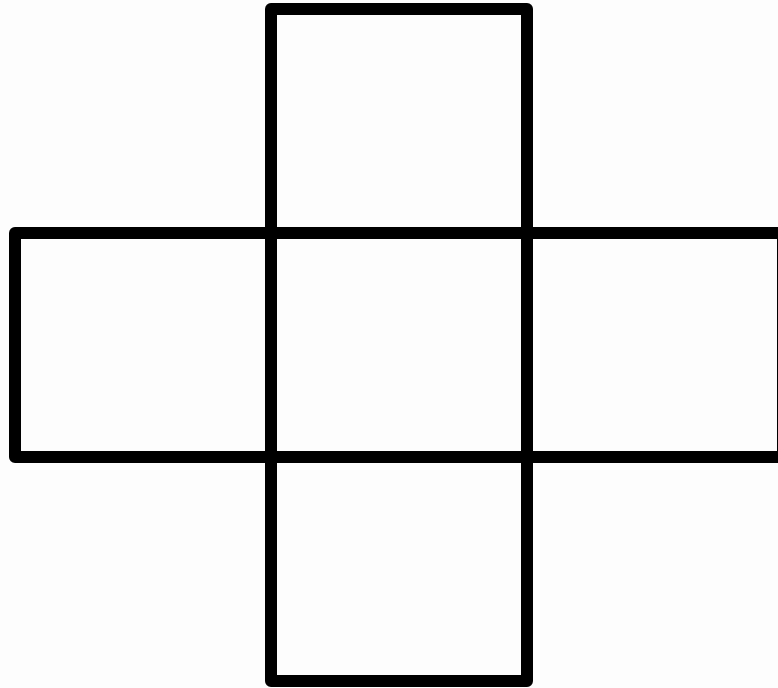
In the figure below, what fraction of the rectangle ABCD is shaded?



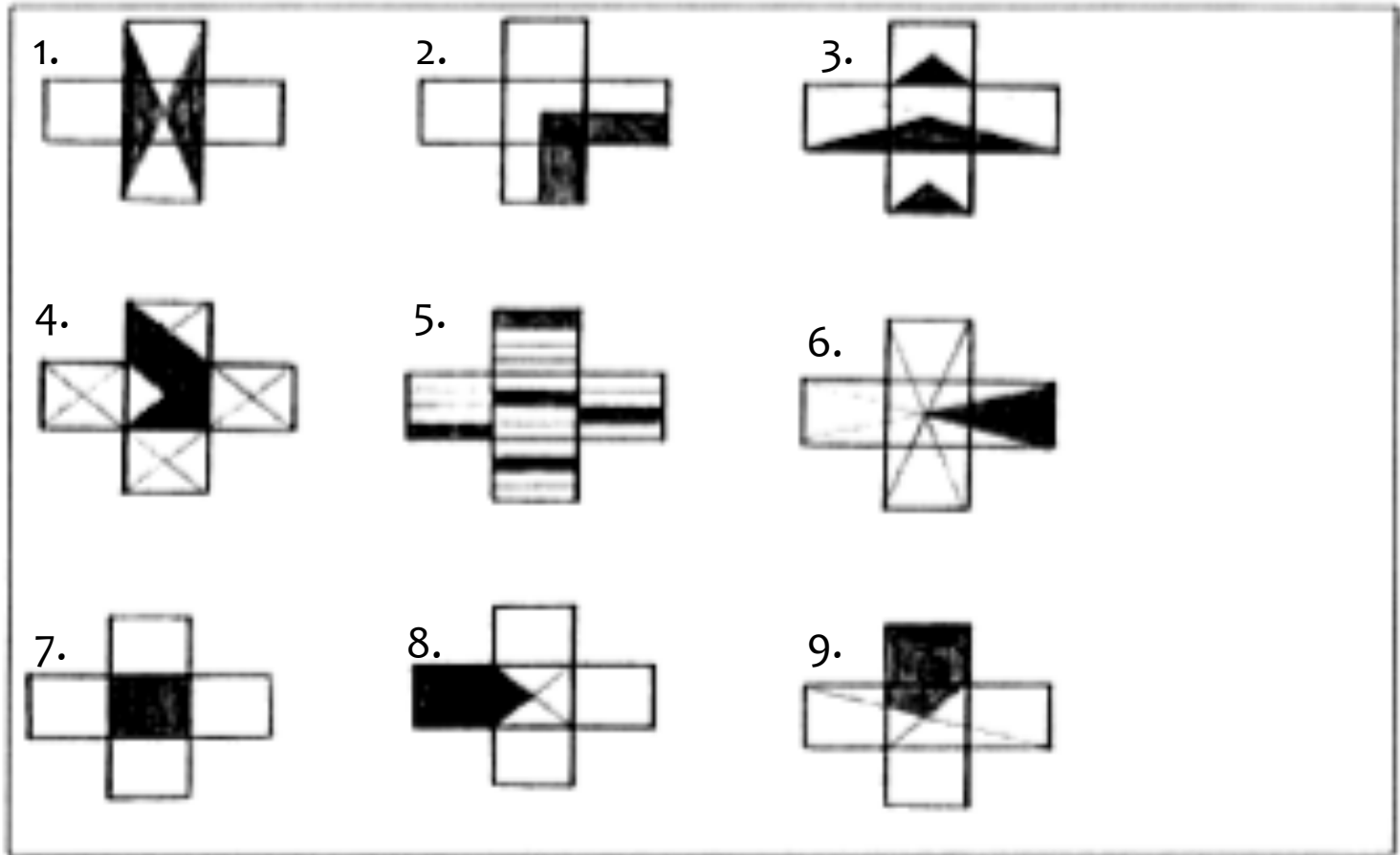
- a)  $1/6$  (5%)
- b)  $1/5$  (3%)
- c)  $1/4$  (24%)
- d)  $1/3^*$  (66%)
- e)  $1/2$  (2%)



Color  $\frac{1}{4}$  of the drawing.



In which is  $\frac{1}{4}$  of the shape shaded?



*In pairs, pick one solution that is correct and one that is incorrect. Be ready to talk about why.*



*How did this task elicit evidence of student thinking and understanding?*



# Dekker & Querrele

*Using submissions by students (real or imagined) can be used to focus the discussion and surface students' conceptions or misconceptions as well as introduce interesting mathematical solutions to discuss.*

*We'll call this method "Dekker & Querrele"-ing a task.*



“Tasks should be chosen so that there is an opportunity for error in reasoning or thinking that opens up an opportunity to discuss or explain – not just an error in the next step (lost a negative sign or multiplied incorrectly).”

Gail Burrill



# By yourself...

- Choose one of the tasks and find a solution.





# Now with a group...

- *Share your solution to your task with one or two others who did the same task.*
- *Write down a few ways that the task could elicit evidence of student thinking and understanding*

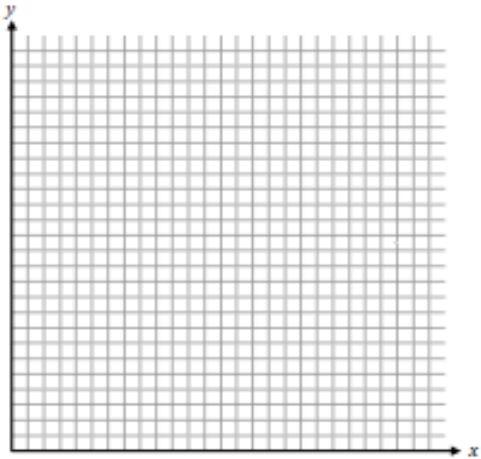


# Bungee Barbie

1. Complete the data table below.

NUMBER OF RUBBER BANDS ( $x$ )	JUMP DISTANCE IN CENTIMETERS ( $y$ )
2	
4	
6	
8	
10	
12	

2. Make a scatterplot of your data. Indicate the scale on each axis.



3. On the graph above, sketch a line of best fit.

4. What is the relationship between the number of rubber bands and jump distance?

5. What is the equation for your line of best fit? (You may wish to use a graphing calculator for this part of the lesson. Enter the rubber band data in  $L_1$ , and enter the jump distance data for  $L_2$ .)

6. What is the slope of your equation, and what does it represent in this context?

7. What is the  $y$ -intercept of your equation, and what does it represent in this context?

8. Based on your data, what would you predict is the maximum number of rubber bands so that Barbie could still safely jump from 400 cm?

Using your Line of Best Fit: \_\_\_\_\_

Using your Regression Equation: \_\_\_\_\_

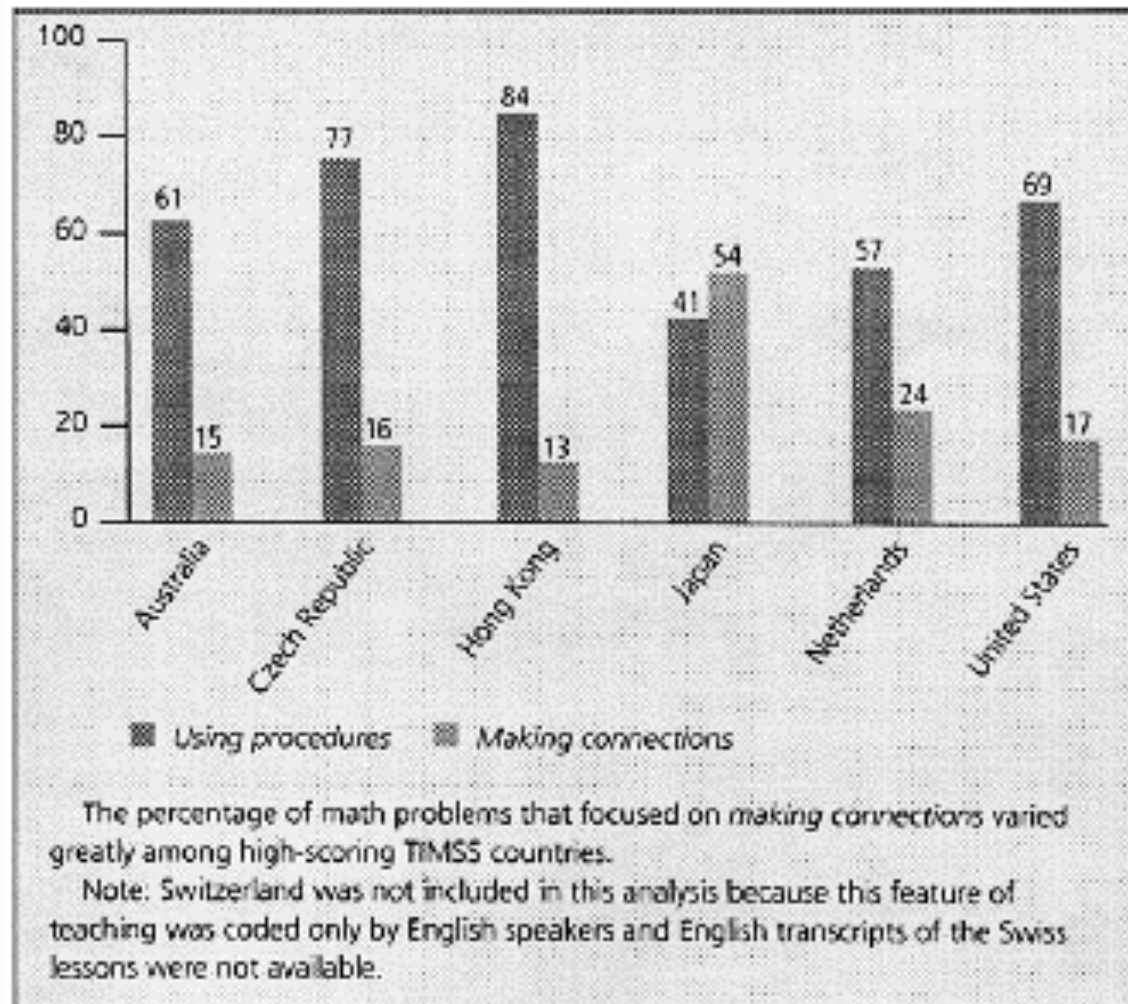
9. Are your predictions reliable? Justify your answer. Be sure to consider your methods of collecting, recording, and plotting data.

10. How do your predictions from Question 8 compare to the conjecture you made before doing the experiment? What prior knowledge did you have (or not have) that helped (or hindered) your ability to make a good conjecture?

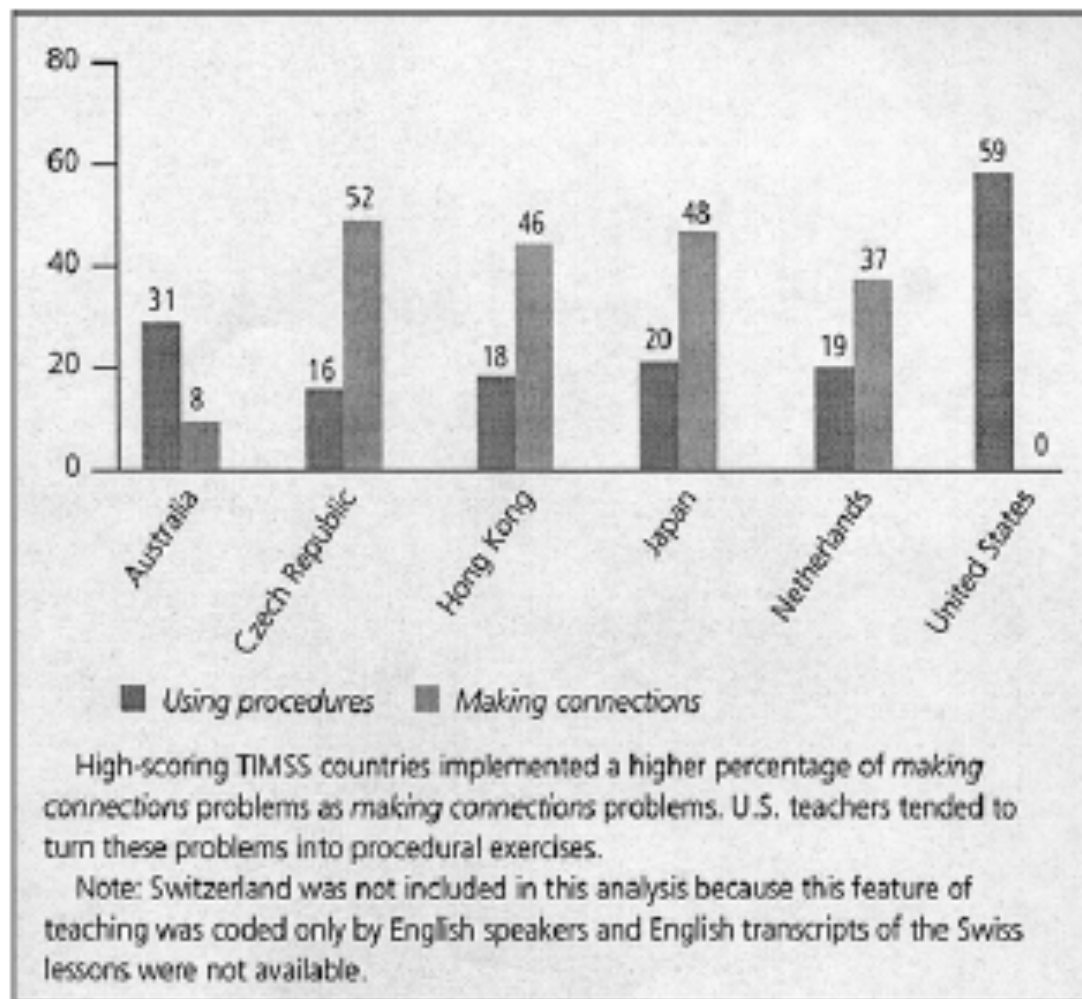
11. In what ways did you contribute to the group while working on this project?

12. Use the space below to list any additional comments.

# Types of math problems presented



# How teachers implemented making connections math problems



# Readings

- Hiebert, J., & Stigler, J. (2004). Improving Mathematics Teaching *Improving Achievement in Math and Science*, 64(5), 12-17.
- Sanchez, W. (2013). Open ended questions and the process standards. 107(3). *Mathematics Teacher*.



# References

- Dekker, T. & Querelle, N. (2002). Great assessment problems (*and how to solve them*). CATCH project [www.fi.uu.nl/catch](http://www.fi.uu.nl/catch)
- Hiebert, J., & Stigler, J. (2004). Improving Mathematics Teaching *Improving Achievement in Math and Science*, 64(5), 12-17.
- Illuminations. Bungee Barbie. National Council of Teachers of Mathematics <http://illuminations.nctm.org/Search.aspx?view=search&kw=barbie>
- Sanchez, W. (2013). Open ended questions and the process standards. 107(3). *Mathematics Teacher*.
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