Reflecting on Practice: Worthwhile Tasks

Worthwhile Tasks

- Focused on important mathematics; clear mathematical **goal**
- Provide opportunities for **discussion**
- Provoke thinking and reasoning about the mathematics; high level of **cognitive demand**
- Engage students in **mathematical practices** and/or **process standards**
- Create a space in which students "**wonder, notice,** are **curious**"

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

- A: $C=4\pi$

Another question

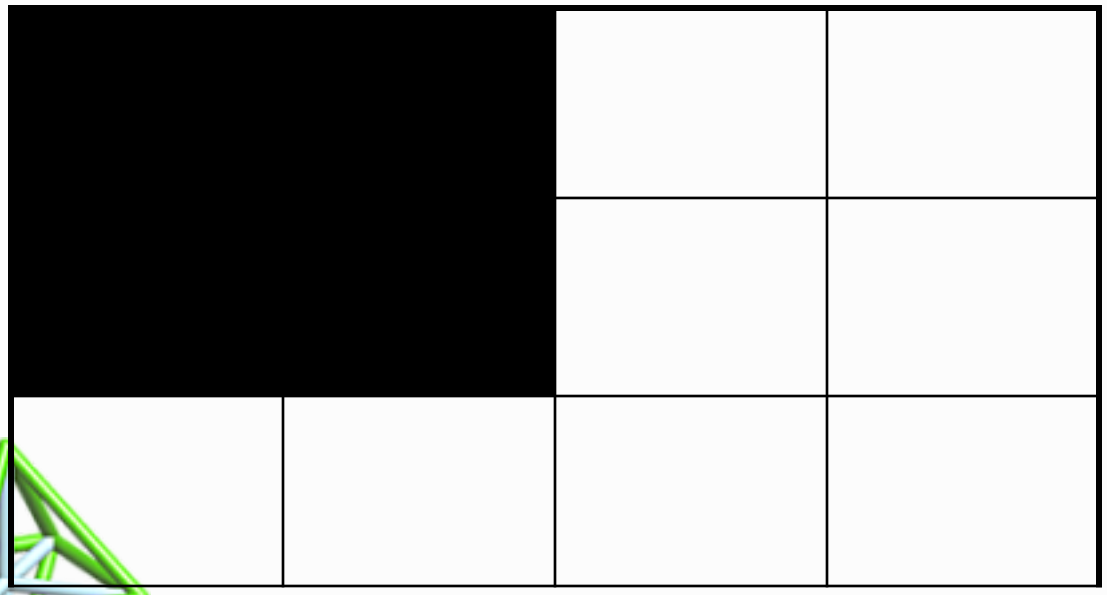
Question: If r=2, find the circumference of the circle

- A: $C=4\pi$

Is this a better question?

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

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



a) 1/6

b) 1/5

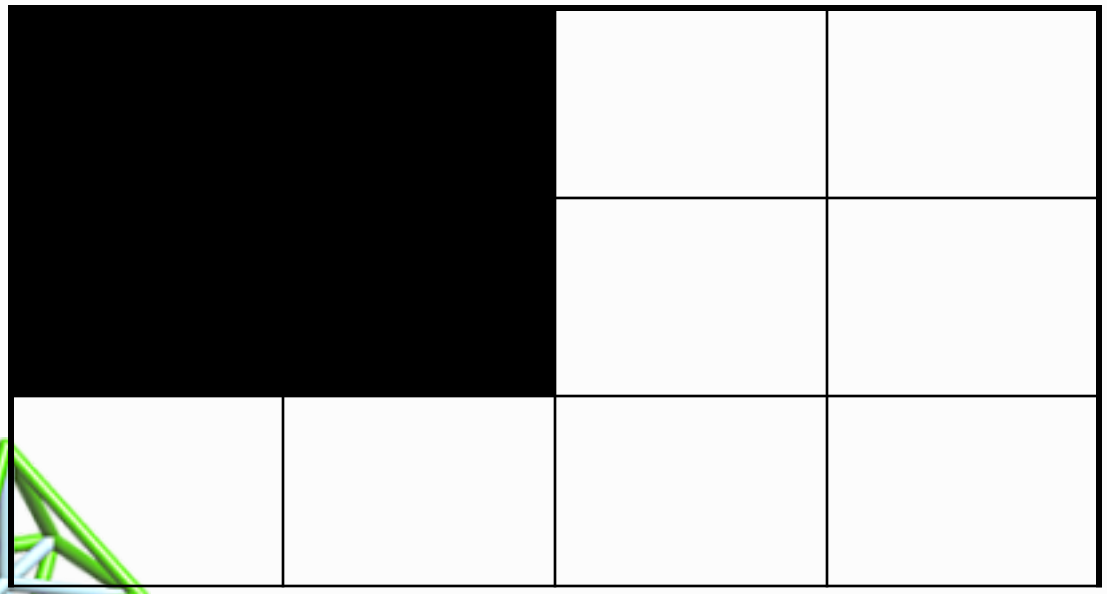
c) 1/4

d) 1/3

e) 1/2

NCES, Grade 8, 1996

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



a) 1/6 (5%)

b) 1/5 (3%)

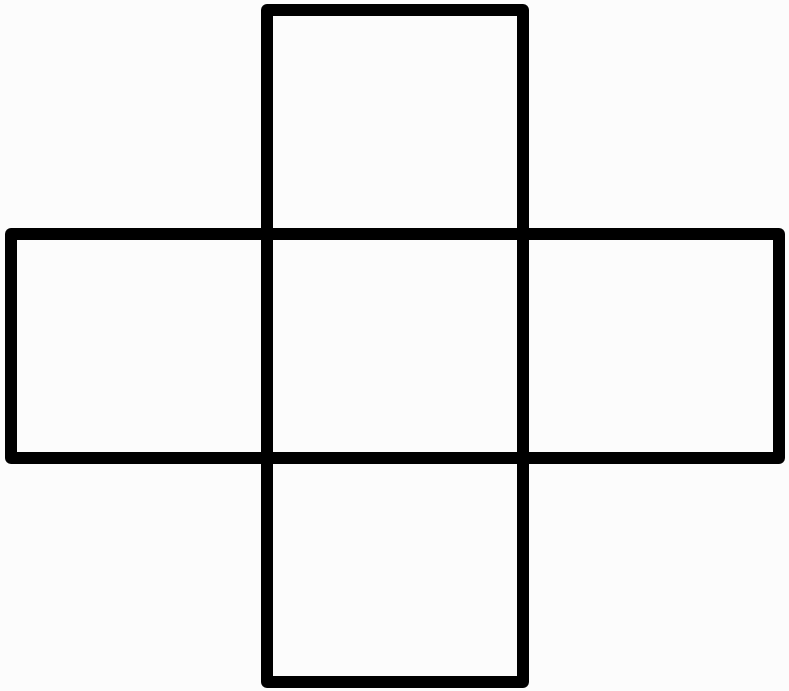
c) 1/4 (24%)

d) 1/3* (66%)

e) 1/2 (2%)

NCES, Grade 8, 1996

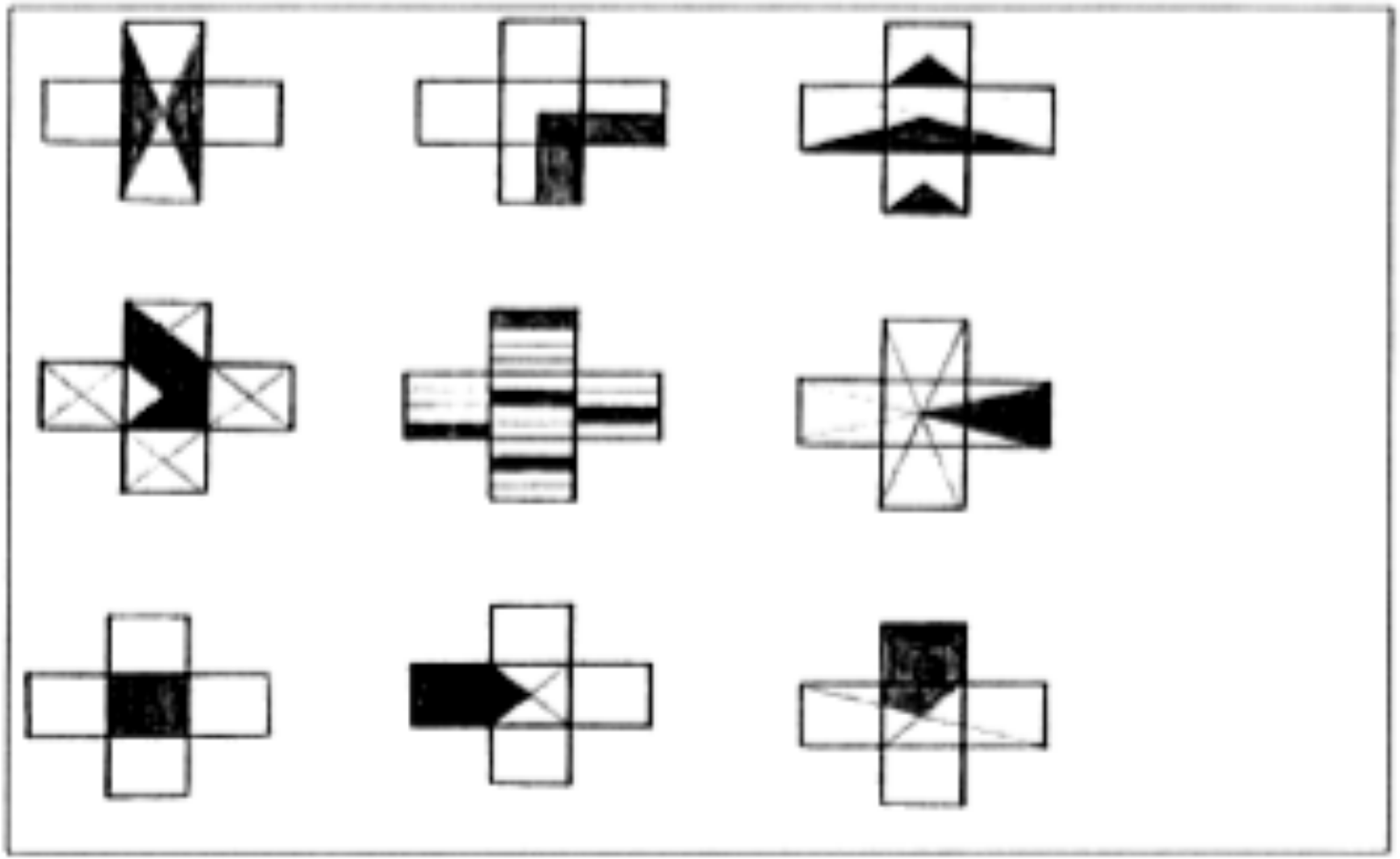
Color ¼ of the drawing.



Another approach to ¼

(Dekker & Querrelle)

In which is ¼ of the shape shaded?



Dekker & Querelle, 2002

What did you like or not like about this task in terms of promoting discussion and eliciting student understanding?

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).

- Choose one of the problems and find a solution

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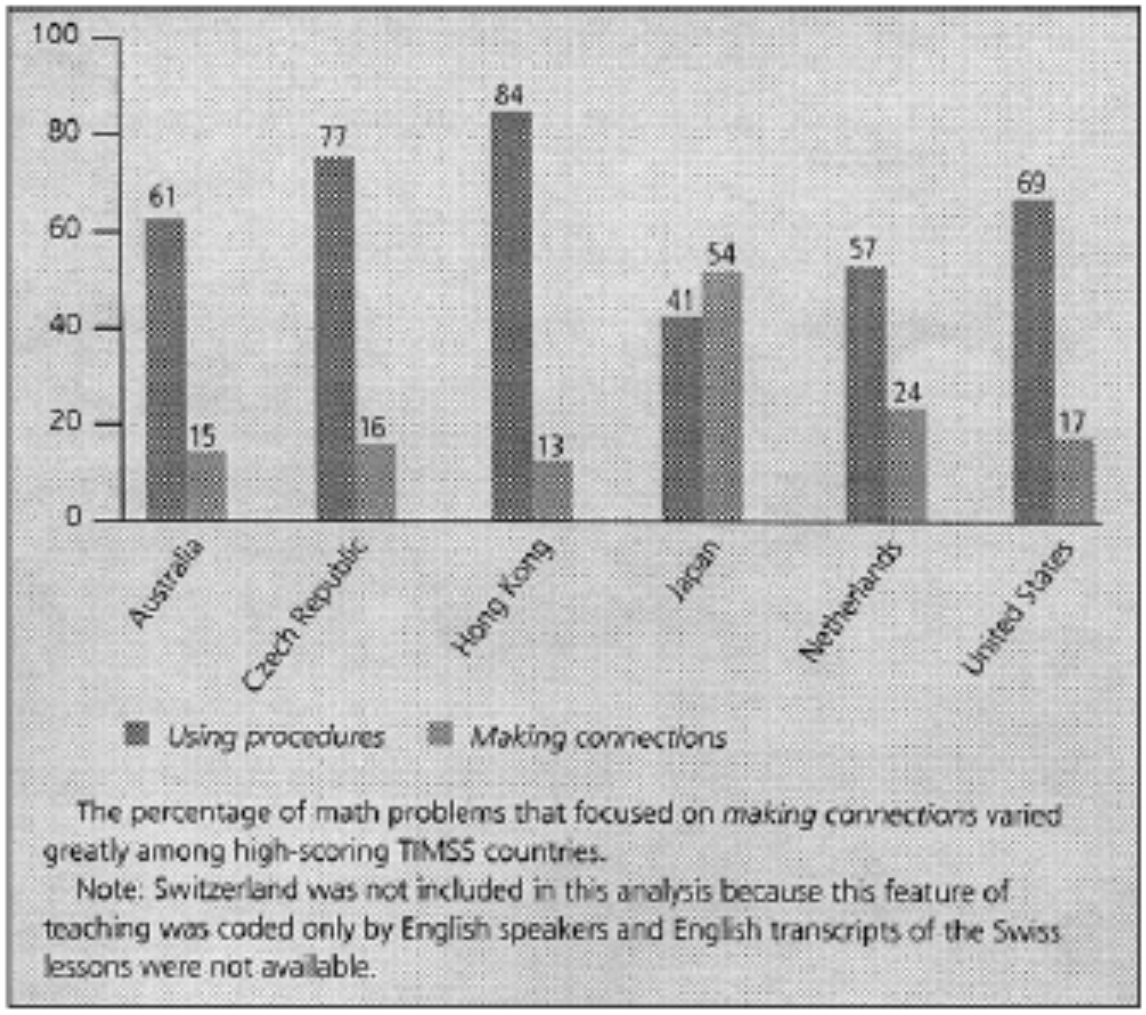
- Share your solution with one or two others that did the same task
- Write down a few ways that the task could promote discussion and elicit evidence of student thinking and understanding

Sorting – Given 16 different systems of equations, arrange them into groups. Create at least two different set of groupings based on shared characteristics of the systems.

$5x + y = 9$ $10x - 7y = -18$	$3x - 2y = 2$ $y = -10 - x$	$6x-2y=7$ $3x-y=5$	$-14 = -20y - 7$ $10y + 4 = 2x$
$y = x^2 + 4x + 3$ $y = 2x + 6$	$2x-3y=6$ $6x-18=9y$	$8x + y = -1$ $-3x + y = -5$	$x - y = 11$ $2x + y = 19$
$x^2 + y^2-4=0$ $2y^2+x+2=0$	$x^2 + y^2=25$ $x - y=5$	$-4x -2y = -12$ $4x + 8y = -24$	$3 + 2x - y = 0$ $-3 -7y = 10x$
$x^2+y^2-16x+39=0$ $x^2- y^2-9=0$	$-7x + y = -19$ $-2x + 3y = -1$	$x=3y-5$ $y=2x+4$	$2x-y=3$ $y-3=3x$

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).

Types of math problems presented

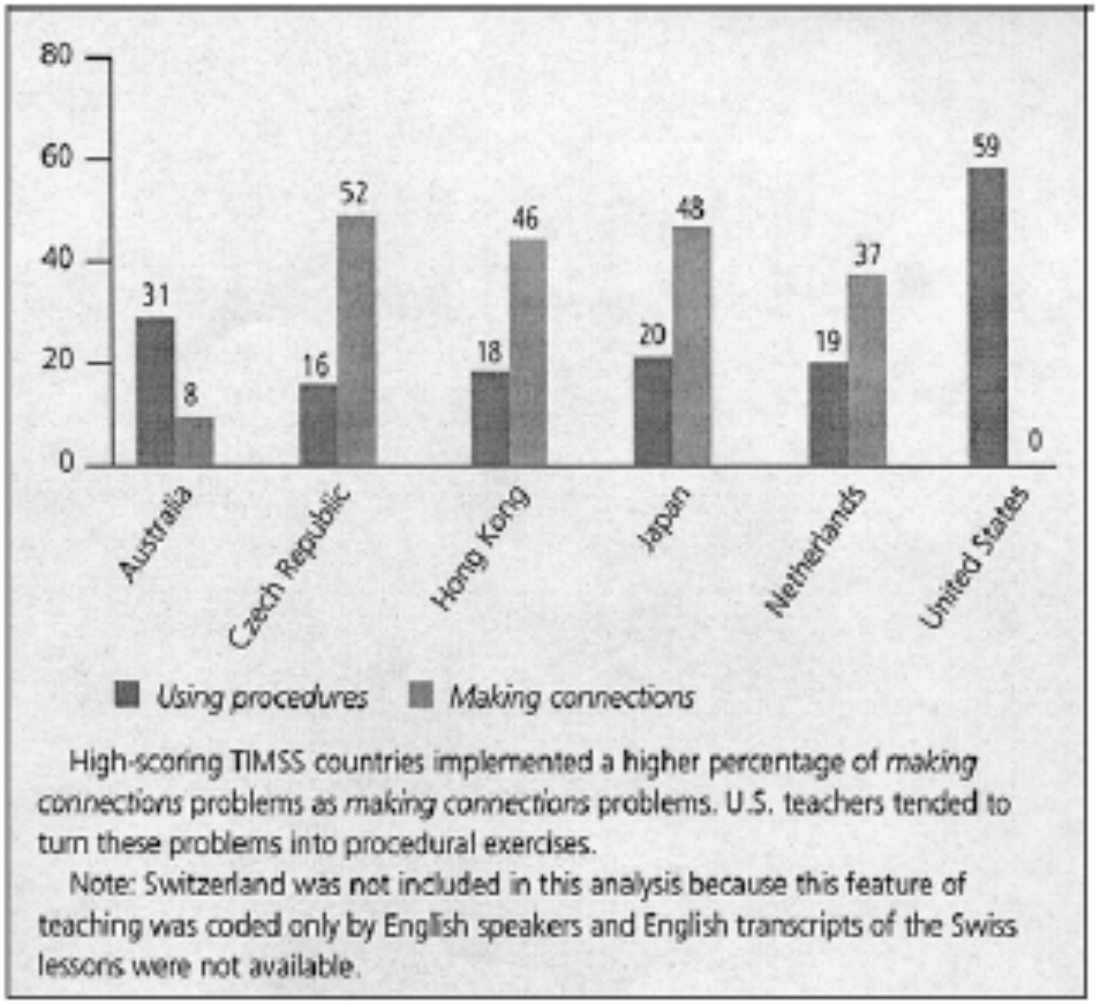


The percentage of math problems that focused on *making connections* varied greatly among high-scoring TIMSS countries.

Note: Switzerland was not included in this analysis because this feature of teaching was coded only by English speakers and English transcripts of the Swiss lessons were not available.

Hiebert & Stigler, 2004

How teachers implemented making connections math problems



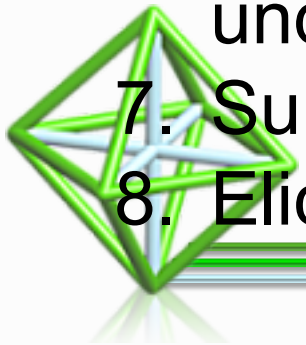
High-scoring TIMSS countries implemented a higher percentage of *making connections* problems as *making connections* problems. U.S. teachers tended to turn these problems into procedural exercises.

Note: Switzerland was not included in this analysis because this feature of teaching was coded only by English speakers and English transcripts of the Swiss lessons were not available.

Hiebert & Stigler, 2004

*Mathematics Teaching Practices: Effective **teachers***

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning and problem solving.
3. Use and connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning math.
8. Elicit and use evidence of student thinking.



(NCTM, 2014)

Take a few minutes to reflect using the prompts:

- What is one message from this session that you would want to bring back to another teacher? How would you make it meaningful and accessible for them (when they haven't been here with you)?

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
- Hiebert, J., & Stigler, J. (2004). Improving Mathematics Teaching *Improving Achievement in Math and Science,* 64(5), 12-17.
- National Council of Teachers of Mathematics. (2014). Principles to Actions: Ensuring mathematical success for all students. Reston VA: The Council
- Sanchez, W. (2013). Open ended questions and the process standards. 107(3). *Mathematics Teacher*.