

Math Practice 6: Attend to Precision (Facilitation Guide)

Presenter:

Intended Use

This facilitation guide is intended to be used by educators when viewing the voice-over recording of Math Practice 6: Attend to Precision. State Support Team staff, Educational Service Center consultants, districts, and schools are encouraged to use this resource as part of a professional learning series that covers all 8 of the Standards for Mathematical Practice.

Viewing the Math Practice series can be done in any order. While viewing the series is encouraged in groups, it can also be done individually. To get the full benefit of the professional development series, educators should engage in the tasks and participate in local discussions on Mathematical Practice. Therefore, viewing the professional learning series in small groups is encouraged over individuals watching it in isolation.

Reproducing the Facilitation Guide

If you would like to make copies of any portion of this facilitation guide or accompanying PowerPoint presentation, please credit the Ohio Department of Education and Workforce.

During Facilitation: Discussion Questions

For each discussion question(s), pause the recording and facilitate a group discussion.

DISCUSSION QUESTION

PowerPoint Slide 15: In-person Discussion or Virtual Waterfall Chat

- *Live Session Participants:* Engage in local discussions using the question, “What comes to your mind when you think about MP 6: Attend to Precision? “
- *Virtual Presentation Participants:* Allow time for individual reflection and writing. Have participants enter their response to the question. “What comes to your mind when you think about MP 6: Attend to Precision?”, in a waterfall chat. Provide time for the attendees to read through and discuss responses from the waterfall chat prior to moving on.

DISCUSSION QUESTIONS

PowerPoint Slides 18-32: Breakout Room Discussions

Complete the problems on slides 18-32 that align to the grade level(s) or course(s) you teach.

DISCUSSION QUESTIONS

PowerPoint Slide 18: Kindergartners – Grade 2 Tasks

- Continue counting on to 100 starting at 57.
- How many acorns are there? How do you know?
- Show me 9 buttons. (*When given a collection of more than 9 buttons as manipulatives*)
- True or False? Identify the true expressions.

$$1 + 5 = 6 \quad 5 - 1 = 6 \quad 6 = 6 \quad 6 = 6 \quad 5 = 11 - 6$$
$$6 = 5 + 1 \quad 5 + 1 = 4 + 2 \quad 6 + 2 = 9 \quad 6 = 1 - 5$$

DISCUSSION QUESTIONS

PowerPoint Slide 19: Kindergartners – Grade 2 Tasks

- How many dots do you see? How do you see them?
- Solve using mental math.

Kindergarten	Grade 1	Grade 2	Grade 3
$2 + 2$	$7 + 7$	$50 + 50$	$128 + 34$
$2 + 3$	$7 + 6$	$49 + 49$	$119 + 36$
$3 + 3$	$7 + 8$	$48 + 49$	$56 + 129$
$3 + 4$	$8 + 8$	$48 + 48$	$126 + 49$
		$49 + 51$	

DISCUSSION QUESTIONS

PowerPoint Slide 20: Kindergartners – Grade 2 Tasks

- How many dots do you see? How do you see them?

DISCUSSION QUESTIONS

PowerPoint Slide 22: Grades 3-5 Task

- Mrs. Frances drew a picture on the board.



- Then she asked her students what fraction it represents.
 - Emily said that the picture represents $\frac{2}{6}$. Label the picture to show how Emily's answer can be correct.
 - Raj said that the picture represents $\frac{2}{3}$. Label the picture to show how Raj's answer can be correct.
 - Alejandra said that the picture represents $\frac{2}{5}$. Label the picture to show how Alejandra's answer can be correct.

DISCUSSION QUESTIONS

PowerPoint Slide 23: Grades 3-5 Tasks

- A slab of soap on one pan of a scale balances $\frac{3}{4}$ of a slab of soap and a $\frac{3}{4}$ pound weight on the other pan. How much does the full slab of soap weigh?
 - $6 \times 4 = \underline{\quad} \times 3$

- Write an expression that records the calculations described below, but do not evaluate.
 - Add 2 and 4 and multiply the sum by 3. Next, add 5 to that product and then double the result.

DISCUSSION QUESTIONS

PowerPoint Slide 24: Grades 3-5 Tasks

- Which of these models represents $\frac{1}{4}$ of the whole? How do you know?
- Where should $\frac{5}{8}$ and $\frac{5}{6}$ be placed on the number line? How do you know?

DISCUSSION QUESTIONS

PowerPoint Slide 25: Grades 6-8 Tasks

- Ocean water freezes at about $-2\frac{1}{2}$ C. Fresh water freezes at 0°C. Antifreeze, a liquid used in the radiators of cars, freezes at -64 C.
- Imagine that the temperature has dropped to the freezing point for ocean water. How many degrees more must the temperature drop for the antifreeze to turn solid?

DISCUSSION QUESTIONS

PowerPoint Slide 26: Grades 6-8 Tasks

- What is the percentage equivalent of the fraction ____? How do you know? How can you use what we already know to solve the next problem?

A.	B.	C.
$\frac{1}{2} = \underline{\quad} ?$	$\frac{1}{5} = \underline{\quad} ?$	$\frac{1}{2} = \underline{\quad} ?$
$\frac{1}{4} = \underline{\quad} ?$	$\frac{2}{5} = \underline{\quad} ?$	$\frac{1}{4} = \underline{\quad} ?$
$\frac{3}{4} = \underline{\quad} ?$	$\frac{4}{5} = \underline{\quad} ?$	$\frac{1}{8} = \underline{\quad} ?$
$\frac{4}{4} = \underline{\quad} ?$	$\frac{3}{5} = \underline{\quad} ?$	$\frac{3}{8} = \underline{\quad} ?$

DISCUSSION QUESTIONS

PowerPoint Slide 27: Grades 6-8 Tasks

- Make up a set of eight numbers that simultaneously satisfy these constraints:
 - Mean: 10
 - Median: 9
 - Mode: 7
 - Range: 15

DISCUSSION QUESTIONS

PowerPoint Slide 28: Grades 6-8 Tasks

- How would you order these numbers from least to greatest? How do you know?

A. 10% , $\frac{1}{4}$, 0.1 , 20%

D. 0.75 , $\frac{5}{6}$, $\frac{2}{3}$, 60%

B. 25% , $\frac{1}{3}$, 0.5 , 36%

E. 67% , $\frac{3}{4}$, 0.7 , $\frac{3}{5}$

C. 0.7 , $\frac{3}{4}$, 60% , 0.52

F. $\frac{4}{5}$, 0.7 , 75% , $\frac{7}{8}$

- Identify the missing values in the table below.

Time in Car (hr.)	Distance (mi.)
0.75	36
1.5	
3	
4.5	
1	
	108

DISCUSSION QUESTIONS

PowerPoint Slides 29: Grades 9-12 Tasks

- Solve.

$$(3 \cdot 3)^2$$

$$(2^2)^3$$

$$(2^3)^2$$

$$(a^4)^3$$

$$(a^6)^2$$

$$(3^a)^3$$

$$(3^2)^b$$

$$(x^a)^b$$

$$(2a^2)^3$$

$$(-3ab^{10})^2$$

DISCUSSION QUESTIONS

PowerPoint Slides 30: Grades 9-12 Tasks

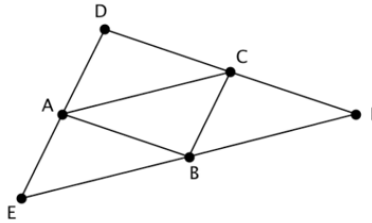
- Graph the following equations.
 - $y = x^2$
 - $y = |x|$
 - $y = (x - 250)^2$
 - $y = |x| - 750$
 - $y = |x + 3000| - 1200$

- $y = (x - 120)^2 + 425$
- What do you notice about the relationships between the different graphs?
- What do you wonder about the relationships between the graphs?

DISCUSSION QUESTIONS

PowerPoint Slides 31: Grades 9- 12 Tasks

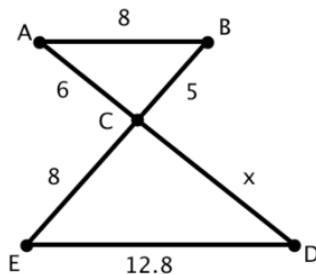
Figure 1: Given three non-collinear points, A , B , and C , as vertices, students found that they could form a parallelogram by placing the fourth vertex in any one of the example three positions, points, D , E , and F . Students noticed that A , B , and C seems to be midpoints of the sides of the newly formed $\triangle DEF$. How would you prove their conjecture?



DISCUSSION QUESTIONS

PowerPoint Slides 32: Grades 9- 12 Tasks

Figure 2: In the figure below, the two triangles are similar and points A , C , and D are collinear and points E , C , and B are collinear. What is the length of the side CD ?



DISCUSSION QUESTIONS

PowerPoint Slides 33: Breakout Room Discussions Debrief

- What do you notice in the tasks in your grade band?
- What do you wonder about the tasks in your grade band?
- What commonalities are evident across the tasks?
- What are the differences across the tasks?
- Where in the task are there opportunities for students to show their understanding of MP 6?

DISCUSSION QUESTIONS

PowerPoint Slide 36: Accuracy vs. Precision Video

- Before you view the video, discuss whether it is better to be accurate or precise. Defend your reasoning.
- After you view the video, how has your opinion of whether it is better to be accurate or precise changed?

DISCUSSION QUESTIONS

PowerPoint Slides 40-44: Breakout Room Discussions

Review the MP progression document for MP 6: Attend to Precision.

- What do you think Math Practice 6: *Attend to Precision* means or looks like at your grade level/course?
- How does student demonstration of MP 6: Attend to Precision progress across the grade bands?

Resource Links

Ohio Department of Education Documents

- [Standards for Mathematical Practice](#)
- [Kindergarten-Grade 5](#)
- [Grades 6-8](#)
- [High School](#)

University of Arizona Progressions

- [Standards for Mathematical Practice: Commentary and Elaborations for K-5](#)
- [Standards for Mathematical Practice: Commentary and Elaborations for 6-8](#)

Other National Resources

- [Inside Mathematics](#)
- [Illustrative Mathematics](#)
- [Math Practices](#)
- [Robert Kaplinsky: Math CCSS Math Practices Readable](#)

References

- Harris, P. W., & Imm, K. L. (2017). *Algebra Problem Strings*. Dubuque, IA: Kendall Hunt.
- Illustrative Mathematics. (2014, February 12). Standards for Mathematical Practice: Commentary and Elaborations for K–5. Tucson, AZ.
- Illustrative Mathematics. (2014, May 6). Standards for Mathematical Practice: Commentary and Elaborations for 6–8. Tucson, AZ.
- Koestler, C., Felton-Koestler, M. D., Bieda, K., & Otten, S. (2013). *Connecting the NCTM process standards and the CCSSM Practices*. Reston, VA: The National Council of Teachers of Mathematics.
- O'Connell, S., & SanGiovanni, J. (2013). *Putting the practices into action: Implementing the common core standards for mathematical practice, K-8*. Portsmouth, NH: Heinemann.
- Parrish, S. (2014). *Number talks: Helping children build mental math and computation strategies, grades K-5*. Sausalito, CA: Math Solutions.
- Parrish, S., & Dominick, A. (2016). *Number talks: Fractions, decimals, and percentages*. Sausalito, CA: Math Solutions.

Conversation Notes: