PROPORTIONALITY & SIMILAR FIGURES
WORKSHOP 2: IN PRACTICE

Agenda for Two-Hour Workshop

25 minutes   *Workshop Facilitator/Site Leader*
Review and Discuss

Review the two extension lessons from Workshop 1: Proportionality &
Similar Figures — Discovery. Discuss the following questions:
• What is scale factor?
• How do you find scale factor given two similar figures?
• Do at least some of The Carly Problem (page 27) using scale factor.
  Compare solutions to the sample student work (page 32).

60 minutes   *Whole Group*
View Workshop 2: Proportionality & Similar Figures — In Practice

While watching the program, consider the following focus questions:
• Why is a scoring guide helpful for assessing student work?
• When should a scoring guide be given to students?
• How can scoring guides be used to strengthen your own content
  knowledge?
• What makes a good problem or task?
• What sources have you used to create good problems for your students?

25 minutes   *Small Groups or with a Partner*
Do and Discuss

Using a generic scoring guide, first sort the student work (page 32) into
two piles, "meets standards" and "does not meet standards." Then rank
the work from strongest to weakest. Discuss rankings. What evidence does
the student give that he or she understands the concept of scale factor
and proportionality? Focus on disagreements. How do your rankings com-
pare with those of the Learner Teachers?

10 minutes   *Workshop Facilitator/Site Leader*
Homework Assignment

• Review materials on creating good problems or tasks (page 163).
• Use the "Creating a Problem or Task" template and develop a new prob-
  lem stem for the topic of Proportionality & Similar Figures.
• Review the Why This Topic Matters section (page 37).
• Use your journal to reflect on the focus questions from this workshop.
  What will you do now to continue deepening your content knowledge
  about Proportionality & Similar Figures? How will you continue to improve
  your teaching methods? What is your personal action plan?

PROPORTIONALITY & SIMILAR FIGURES
WORKSHOP 2: IN PRACTICE

Agenda for Four-Hour Workshop

15 minutes   *Workshop Facilitator/Site Leader*
Review and Discuss

Review the two extension lessons from Workshop 1. Discuss the following
questions:
• What is scale factor?
• How do you find scale factor given two similar figures?
• Do at least some of The Carly Problem (page 27) using scale factor.
  Compare solutions to the sample student work (page 32).

15 minutes   *Whole Group*
View Segment 1: Classroom Reflections

While watching Segment 1, consider the following focus questions:
• Is using scale factor to solve proportions a new idea for you?
• Are there any benefits to teaching proportionality using scale factors
  rather than the traditional crossmultiply-and-divide method?
• What are the mathematical connections between scale factor and other
  number concepts (fractions, percent, etc.) that middle school students study?
• Like the Learner Teachers, think through how one finds time to teach
  lessons like these — lessons that may be deeper and more complex than
  those you previously have been expected to teach. What can you give
  up? How can you cover multiple concepts in the same lesson? Does it
  seem to you — as it did to the Learner Teachers — that this kind of
  teaching actually could save you time? Why or why not?
• The Learner Teachers provided some tips that helped them with the les-
  son. Which, if any, seemed useful to you? Did you think of other tips
  that could be useful?

15 minutes   *Whole Group*
Discuss

Discuss Segment 1, focusing on the above questions.

30 minutes   *Whole Group*
View Segment 2: Using a Scoring Guide

While watching Segment 2, consider the following focus questions:
• Why is a scoring guide helpful for assessing student work?
• When should a scoring guide be given to students?
• How can scoring guides be used to strengthen your own content knowledge?

30 minutes   *Small Groups or with a Partner*
Review and Discuss

Review material on scoring guides (page 158). Using a generic scoring guide
(page 162), first sort the student work into two piles, "meets standards" and
"does not meet standards." Then rank the work from strongest to weakest.

BEFORE WATCHING THIS PROGRAM ...

▸ Make sure to watch the
  first program on this topic
  (Workshop 1: Proportionality
  & Similar Figures —
  Discovery).

▸ Do the lessons from
  Workshop 1 on your own
  or with colleagues.

▸ If time permits, use one or
  more of the lessons from
  Workshop 1 with at least
  one of your classes.

▸ Have the following materi-
  als available to each viewer:
  • The two extension les-
    sons from Workshop 1
    (Enlarging a Picture and
    Scaling Up and The
    Carly Problem, page 24)
  • Sample student work
    (page 32)
  • Background materials
    on scoring guides
    (page 158)
  • Background materials
    on creating good prob-
    lems or tasks (page 163).

20 minutes   *Whole Group*
Discuss

Discuss rankings. Focus on disagreements. What evidence does the student give that he or she understands the concept of scale factor and proportionality? How do your rankings compare with those of the Learner Teachers? What do you think about using calculators to solve problems like these?

30 minutes   *Whole Group*
View Segment 3: Creating a Good "Problem Stem"

While watching Segment 3, consider the following focus questions:
• What makes a good problem or task?
• What sources have you used to create good problems for your students?

30 minutes   *Small Groups or with a Partner*
Review and Discuss

Review material on creating good problems or tasks (page 163). Create your own problem stem (the starting point for a meaty problem, one that has lots of good math and will engage students).

20 minutes   *Whole Group*
Discuss

Discuss the problem stems:
• Are they are rich enough that they can be solved in different ways?
• Are they accessible to all kinds of learners in your classrooms?
• Do they cover essential math concepts about Proportionality & Similar Figures? It's not enough to create an engaging lesson. Your lesson also needs to allow students to do rigorous math.

25 minutes   *Whole Group*
Final Reflections

View the last segment of Workshop 2. Share your own final reflections. Use these focus questions as a starting point:
• Can all students do this kind of work?
• Do performance tasks like these help engage some students who traditionally have been hard to reach?
• What's your action plan for using this learning and building on it?

10 minutes   *Workshop Facilitator/Site Leader*
Homework Assignment

• Continue developing a new problem stem or strengthen the stems that the Learner Teachers created. Share with your colleagues and revise, based on the feedback.
• Review the Why This Topic Matters section (page 37). Add your own suggestions to the ideas for making this topic more relevant.
• Use your journal to reflect on the focus questions from this workshop. What will you do now to continue deepening your content knowledge about Proportionality & Similar Figures? How will you continue to improve your teaching methods? What is your personal action plan?

DO YOU HAVE A NETWORK?

Note that in Workshop 2, Master Teacher Jan Robinson discussed how she drastically revised her teaching practice, giving up the stand-and-deliver style of instruction in favor of more engaging, hands-on instruction. She did this first with her hardest-to-reach students and then expanded it to all her classes.

Making this transition required two things: a personal willingness to improve practice and the proximity of colleagues and teammates who were willing to help through coaching, peer mentoring and regular discussions. You may want to use or create your own local network of school and district colleagues. You also can make use of The Missing Link online network **(www.learner.org/ channel/workshops/ missinglink),** a discussion forum where you can share ideas, get feedback and learn about how your colleagues around the country are using these lessons.

PROPORTIONALITY & SIMILAR FIGURES
ADDITIONAL NOTES

Recommendations

• We use the score to rate an individual piece of work, not to assign a level of ability to a student. A particular piece of work might merit only a "2," but that doesn't mean the student is a "2." Indeed, our job as teachers is to help all students meet high standards and develop their understanding of important mathematical concepts.

• Don't forget: The primary purpose of the scoring exercise in this workshop is to decide which work meets standards and which doesn't. Ranking all the papers is fine if it helps clarify your thinking about this issue, but is not, itself, the main goal.

• "Meets the standard" in this segment means "meets the standard set for this task." A student likely will have to successfully complete multiple tasks before "meeting the standard" for understanding the key concept(s) of Proportionality & Similar Figures.

• Don't be fooled by pretty presentations; make sure each piece of student work demonstrates an understanding of the fundamental math concepts.

• Don't overdo the emphasis on written communications. In many cases, the writing is needed to support the drawings and explain the student's problem-solving process. But if the work and problem-solving strategies are self-explanatory, that's fine.

• Teachers have found it useful to post the sample analytic scoring guides used in this program (see pages 160 and 161) in their classrooms as a good reference point for students.

Focus: TIMSS

Spend some time reflecting on and discussing how the findings from the Third International Mathematics and Science Study (TIMSS) are impacting your classroom practice and professional development. Are you teaching fewer topics in more depth? Use Shannon's observations between Segments 2 and 3 in Workshop 2 as a starting point for your reflections and discussions.

The Missing Link Web site connects you to all the background materials on the TIMSS research, as well as to examples of how other districts are using the findings. Go to **www.learner.org/channel/workshops/ missinglink.**

Teach and Discuss

By far, the best way to strengthen your practice is to teach these lessons in your own classrooms, just as the Learner Teachers did. If you can't teach the lessons during the eight-week series, teach them sometime during the school year. Then reflect on your experience, preferably with a group of colleagues.

Analyze work from your own students.

• How did your students' work samples compare with the samples from this program?

• How would you clarify your Launch or strengthen your Summarize to help your students understand your mathematical expectations?

• Does the process of deciding which scoring guide to use help you clarify exactly what math you expect your students to learn in each lesson?

Share insights and advice with others in The Missing Link network:
www.learner.org/channel/workshops/missinglink — select the "Teacher Talk" section.

C

My clues to the first picture (the one with Eleanor Rosevelt) is that:

• She is under 7 feet tall because she is shorter in the picture.

With the picture to the right of the last one I determined that she was 5.4 feet tall. Here's how:

Procedure →

• The dog in the picture is 2½ cm.
• We know in real life the dog is 3 feet tall
• So 2½cm = 3 feet in real life
    in the pic

• Now I measured Carly in the picture and she was 4½cm. So $4½ cm \div 2½ = 1.8.$

  • 1.8 is the scale factor from Carly's height in the pic to the height of the dog.

  • Now the equation:
        $1.8 \times 3 = 5.4 \text{ feet}$

  • So for this picture she is 5.4 feet tall in real life

I determined the height of Carly in the picture where she is standing beside a tree. I figured her height there was 4.58⅓ feet.

Here's how:

• I measured the dog in length.

WAY
19.7647

E

picture 1 (Eleanor R.): if in actuallity
the statue is 7 feet (84 inches) tall and in the
picture it's 4.25 inches tall you
divide 84 in. by 4.25 in. to find the scale
factor wich equals 19.7647. so if carly's
height in the picture is 3.375 inches you would
multiply that by the scale factor to equal
her actual height wich is 66.7058 inches.

Picture 2 (Roosevelt dog): if in actuallity
the dog is 3 feet tall (36 in.) and in the
picture it is 1 inch tall you divide 36 by
1 to equal the scale factor wich is 36. so
if carly in the picture is 1.875 inches tall
you would multiply that by the scale factor
to get her real height wich is 67.5 inches.

Picture 3 (Picture w/tree): If the picture is 11 inches
tall in real life and it is .28125 inches
tall in the picture you divide 11 by .28125
to get your scale factor wich is 39.111.
so if carly is 1.625 inches in the picture
you multiply that by the scale factor to
get the answer wich is 63.555 inches

Carly's Hight

Pictur 1. The Statue in Inches is about 4 3/8
- and Carly's is about 3 3/8 in the Picture.
- In real life she is 3.9 ft
- and the Statue is 7 ft
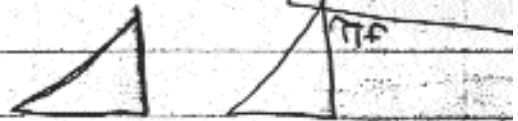
1. elinor is 11 cm and Carly is 8,5 cm
The scale factor is .63. Carly is
5 feet 3 inches.

2. The dog is 3,5 cm. Carly is 5 cm
The scale factor is 1,2 Carly
is 5 feet 7 inches

3. The paper is 0,7cm Carly is 4 cm
The scale factor is ~~XXXX~~ Carly is
5 foot 3 inches

4. The paper is ,5 cm Carly is 4,5
cm. The scale factor is 5,5.
Carly is 5 feet 4 inches

5. I think she is 5 feet 3 inches
because that was the answer for
2 pictures

eleanor Roosevelt's statue is 7 ft. 7 × 12 nches = 84 in.
her picture is 4.25 in.
84 ÷ 4.25 = 19.76
carly's picture is 3.375 in.
.3.375 × 19.76 =
(66.69 in)
66.69 ÷ 12 =
(5.5575 ft.)

The picture's picture is .28 in. It is actually 11 in.
11 ÷ .28 = 39.286
carly's picture is 1.625 in.
1.625 × 39.286 =
(63.83975 in.)
63.83975 ÷ 12 =
(5.319 ft.)

1.0625 in. 32(36in). ÷ 1.0625 = 33.88
Carly's picture is 1.875 in.
1.875 × 33.88 = (65.6425)
(in)

④ The picture is 11 in. In the picture, it is .25 in.
11 ÷ .25 = 44
Carly's picture is 1.75 in
1.75 × 44 = (77 in)
77 ÷ 12 = (6.4167 ft)

Final answer =
she can't be 77 in. (#4) because it seems too off & is probably un-accurate. (she's leaning in the picture)
It can't be #1 or #3 becc her feet are cut off the most accurate is #2. Her height is 5.47 ft. or 65.6425 in.