

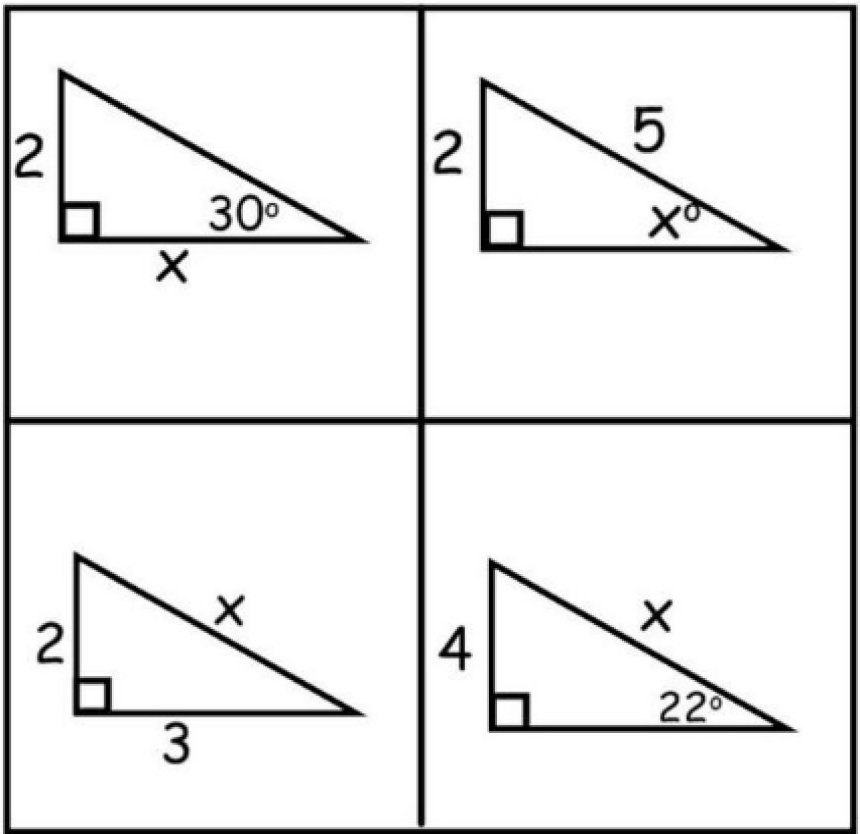
Which One Doesn't Belong?

9

16

25

43



<http://wodb.ca>

#SlowMath: Looking for Meaning Before the Task

How might we leverage technology to build procedural fluency from conceptual understanding? What if we encourage sketching to show connections? Come experience right triangle trig through the lens of the Slow Math Movement.

<http://bit.ly/slowmathtrig>

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I can recognize and provide opportunities for learners to use the Standards for Mathematical Practice.

I can use the Mathematics Teaching Practices to plan and enact lessons.

I can recognize the difference between using technology as a tool for calculating and as a tool for deepening student understanding of mathematical concepts.

NCTM *Principles to Actions*: Mathematics Teaching Practices

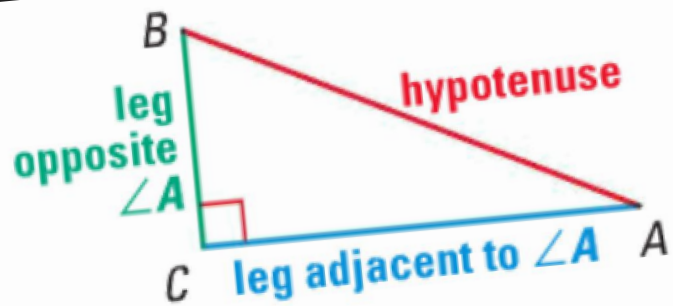
- ❑ Establish mathematics goals to focus learning.
- ❑ Implement tasks that promote reasoning and problem solving.
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- ❑ Facilitate meaningful mathematical discourse.
- ❑ Pose purposeful questions.
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G-SRT.C. Define trigonometric ratios and solve problems involving right triangles

6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
7. Explain and use the relationship between the sine and cosine of complementary angles.
8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.



$$\sin A = \frac{\text{length of leg opposite } \angle A}{\text{length of hypotenuse}} = \frac{BC}{AB}$$

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$$\tan A = \frac{\text{length of leg opposite } \angle A}{\text{length of leg adjacent to } \angle A} = \frac{BC}{AC}$$

Ask Don't Tell

Daniel Coyle

[The Talent Code](#)

Ask Don't Tell

SHOE/LACE

QUEEN/KING

SINGING/DANCING

TABLE/LAMP

W_LLET/CASH

S_AMESE/CAT

CINN_MON/RAISIN

L_ON/TIGER

Ask Don't Tell

- ❏ 300% better
- ❏ Deep practice

Daniel Coyle

[The Talent Code](#)

I notice ... I wonder ...



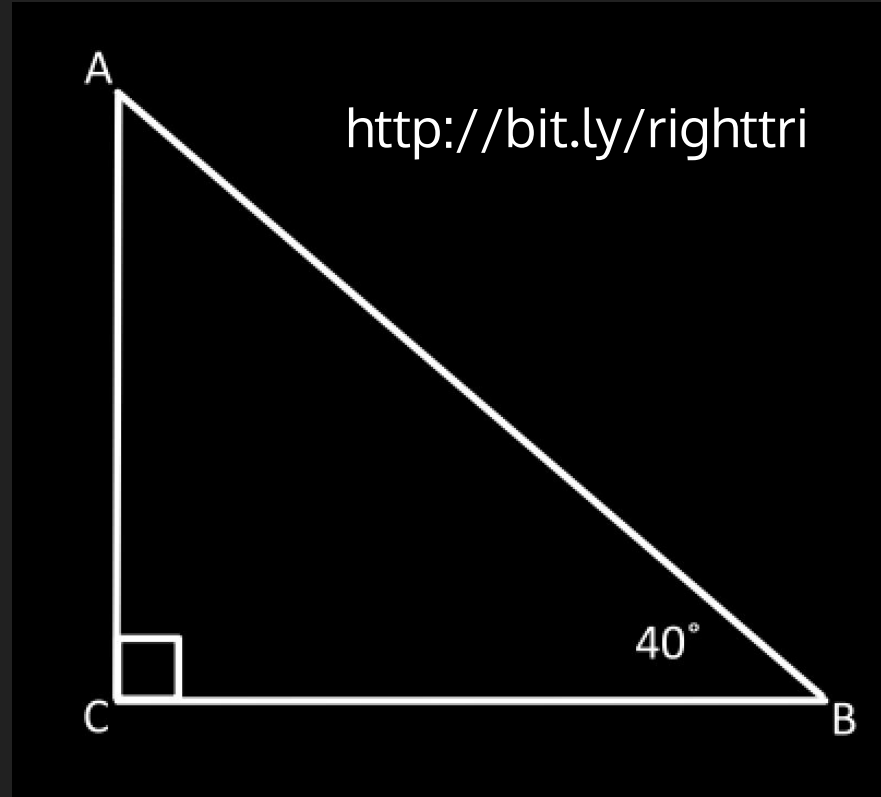
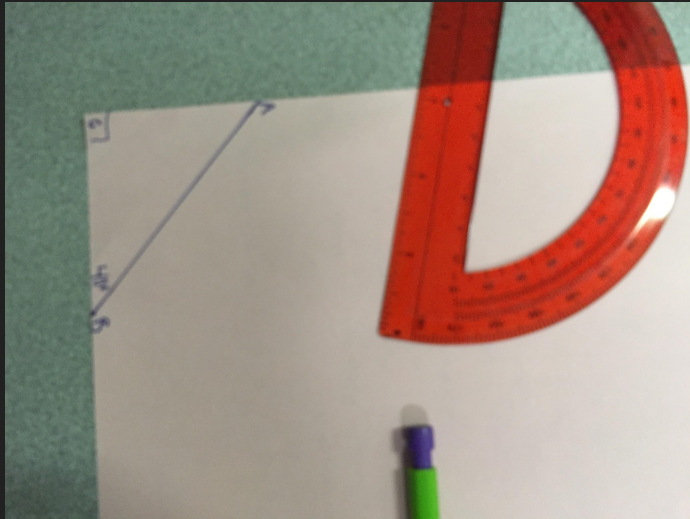
What would be useful to know?
What is reasonable to measure?



Boat on a River

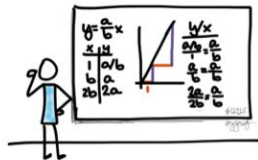


Draw a right triangle with a 40° angle.



I can look for and express regularity in repeated reasoning.

SMP - 8



Level 4:
I can attend to precision as I construct a viable argument to express regularity in repeated reasoning.



Level 3:
I can look for and express regularity in repeated reasoning.

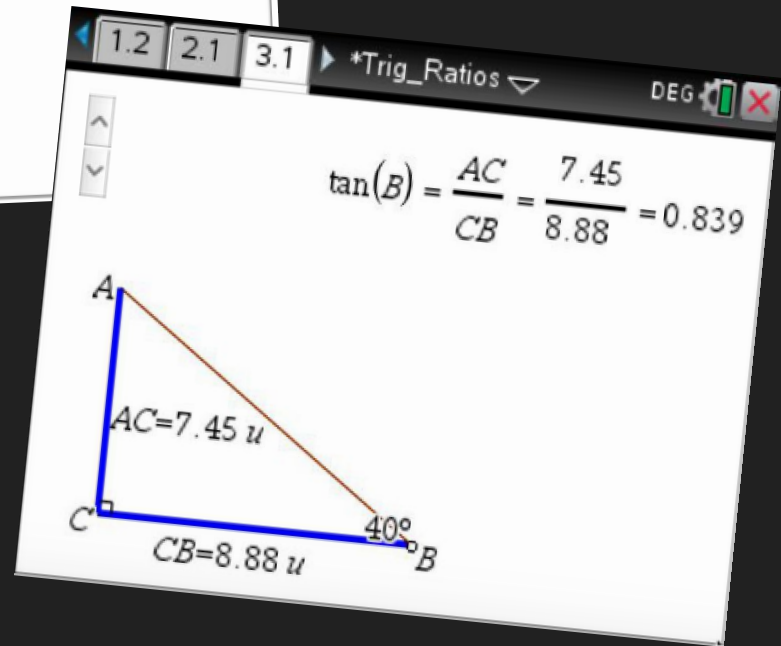
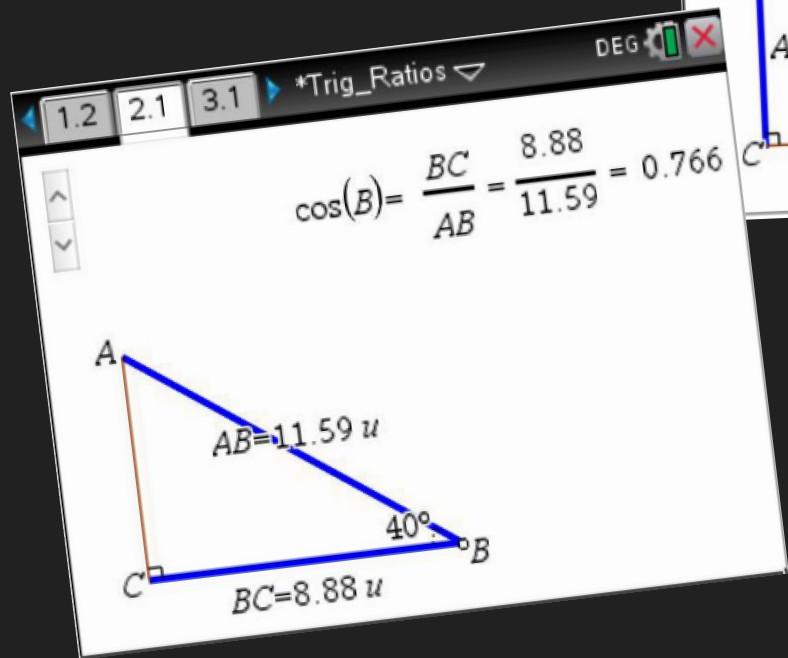
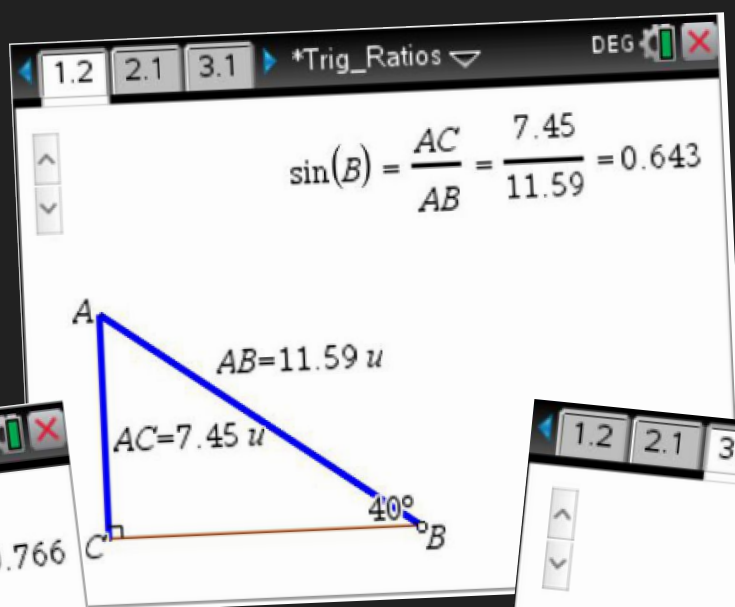


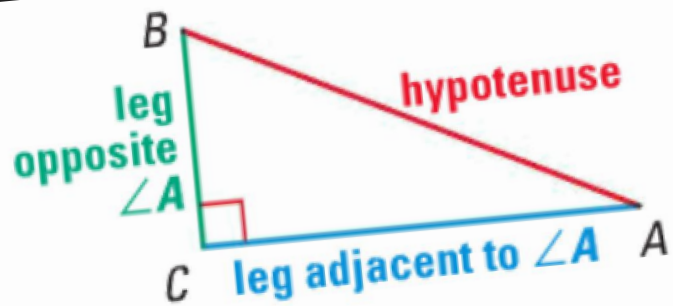
Level 2:
I can identify and describe patterns and regularities, and I can begin to develop generalizations.



Level 1:
I can notice and note what changes and what stays the same when performing calculations or interacting with geometric figures.



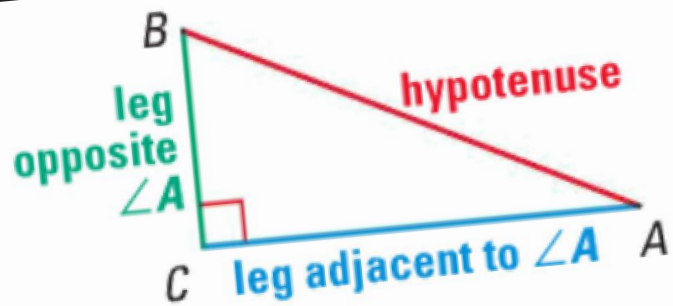




$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

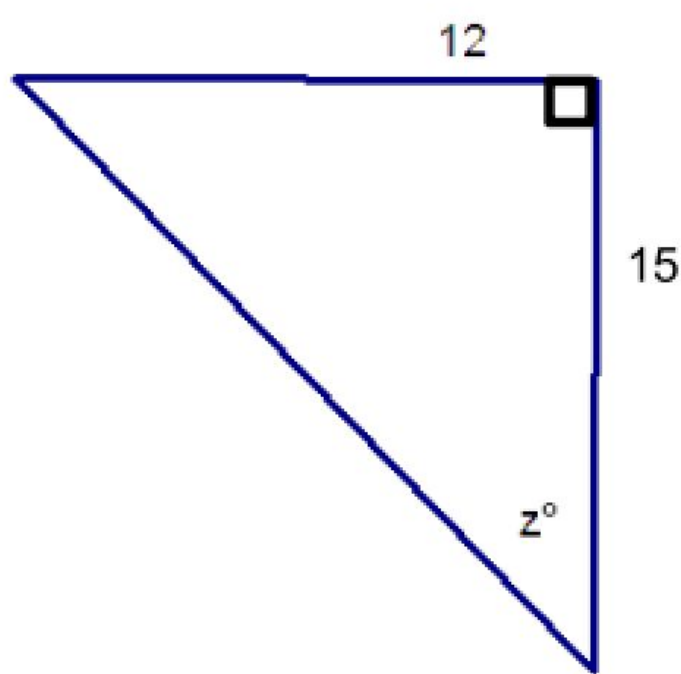
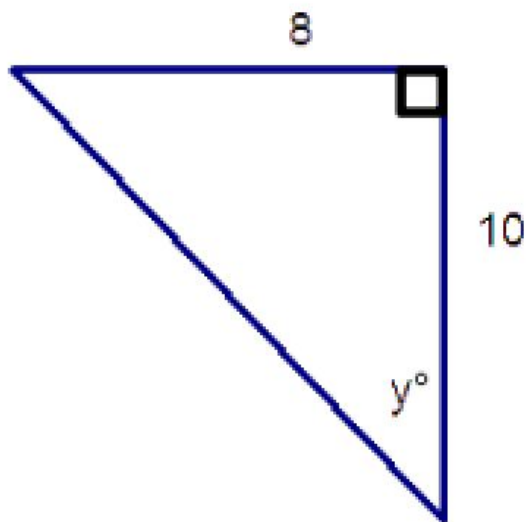
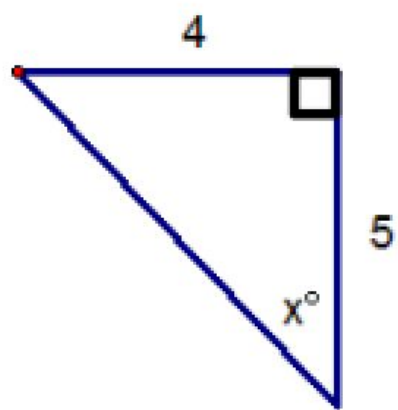
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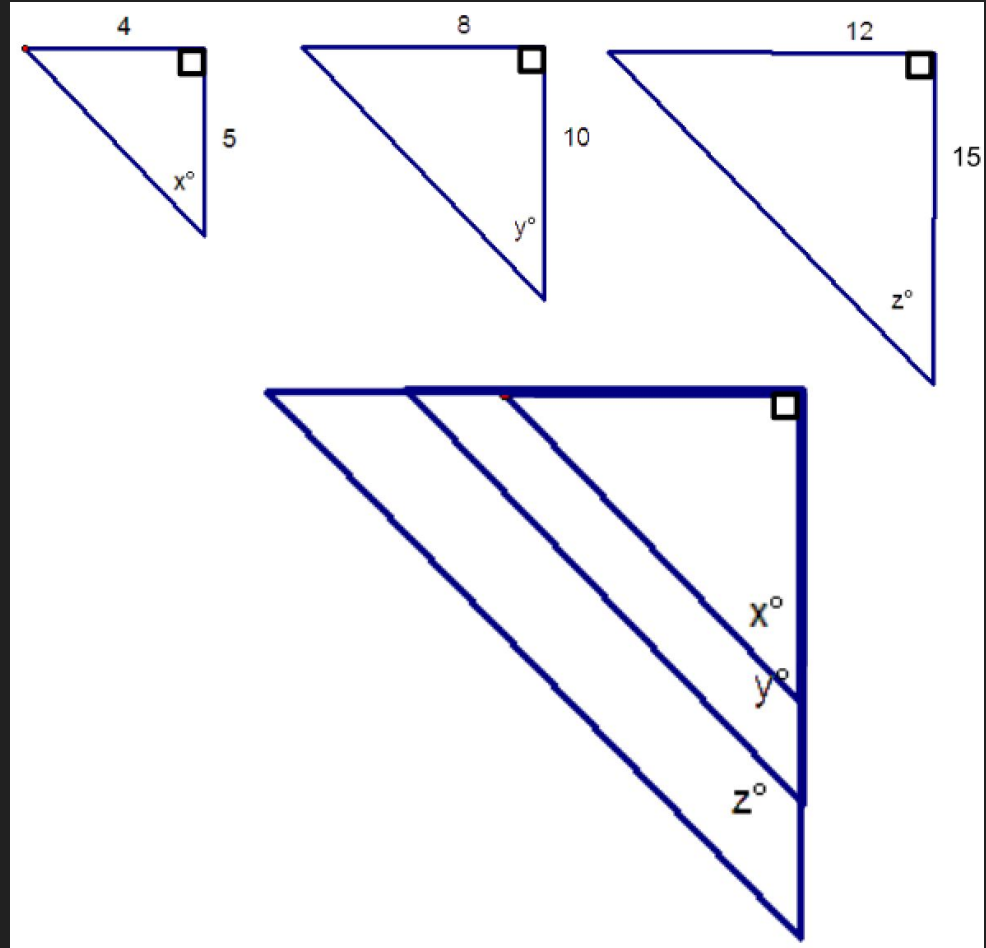
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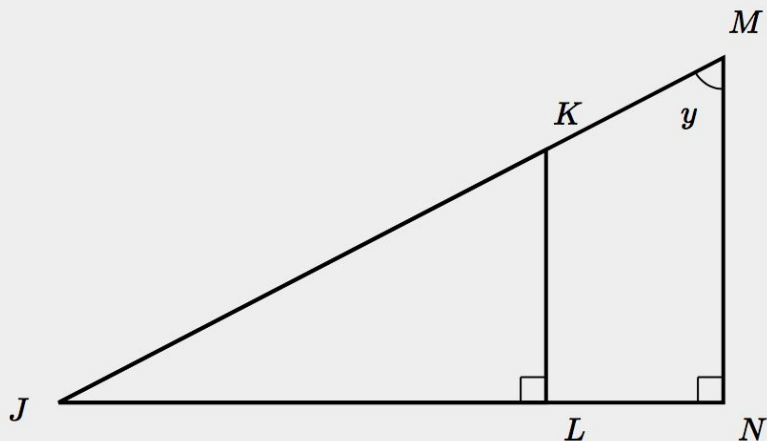
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- How are trigonometric ratios related to similarity?
- How are the side lengths of right triangles related to their angle measures?





Note: figure not drawn to scale

In the figure at left, JLK and JNM are both right triangles. Which of the following expressions must be equal to the length of line segment \overline{KL} ?

(A) $\sin(y) \cdot \frac{JK}{JL}$

(B) $\frac{1}{\cos(y)} \cdot \frac{JK}{JL}$

(C) $\tan(y) \cdot JL$

(D) $\frac{1}{\tan(y)} \cdot JL$

Does the boat make it under the bridge?

Boat on the River



Mathematics Teaching Practices

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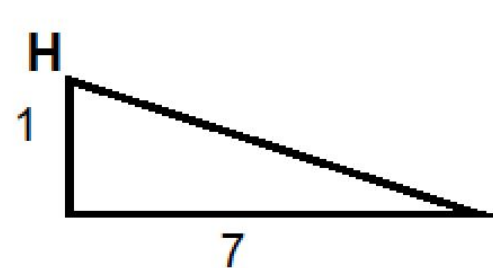
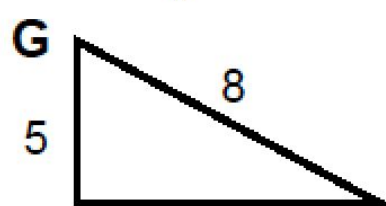
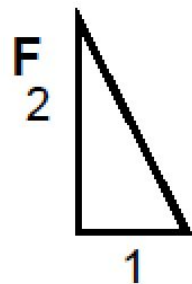
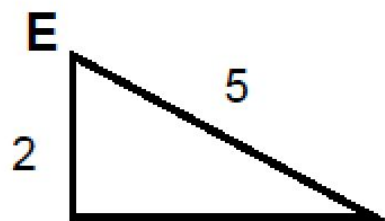
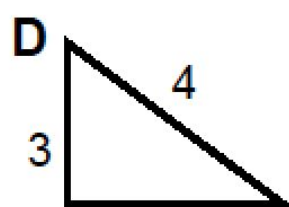
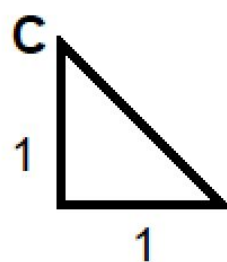
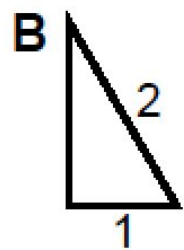
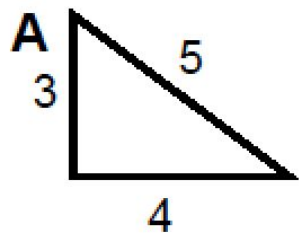
Sharing high-quality questions may be the most significant thing we can do to improve the quality of student learning.

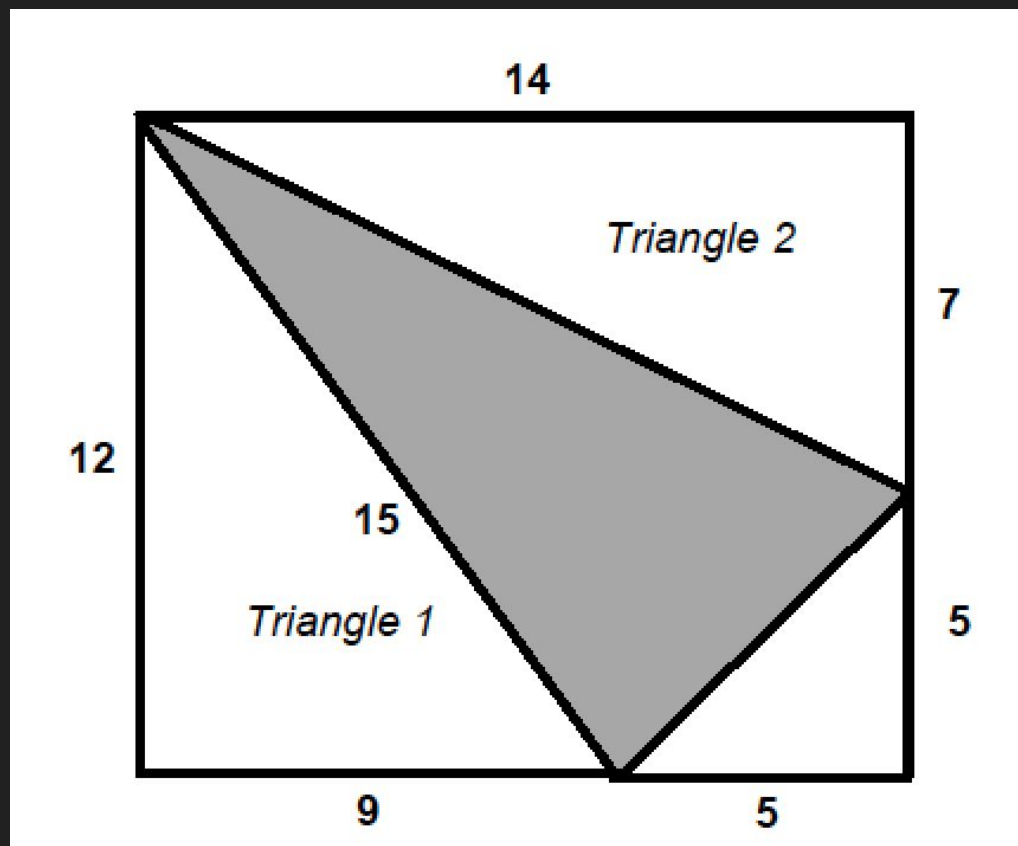
and that is their portability. Most lesson plans developed by other teachers to be of limited usefulness. However, high-quality questions seem to work across different schools, districts, states, cultures, and even languages. Indeed, sharing high-quality questions may be the most significant thing we can do to improve the quality of student learning.

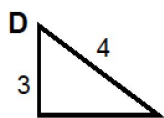
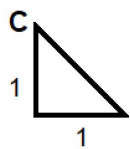
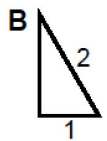
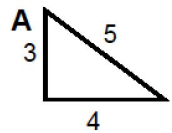
Conclusion

Years ago, David Ausubel (1968) argued that the most important factor influencing learning is what the learner already knows and that the job of the teacher is to ascertain this and to teach accordingly. Students' conceptions are not random aberrations but the results of sophisticated and creative attempts to make sense of their experiences. Within a

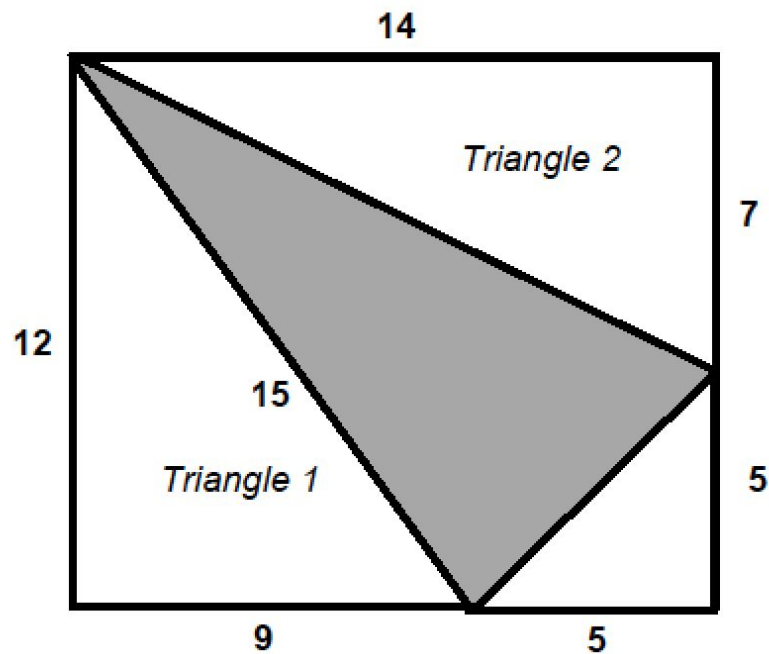
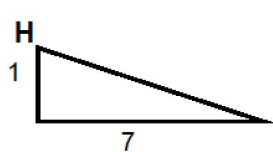
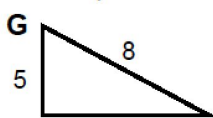
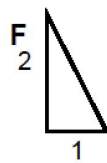
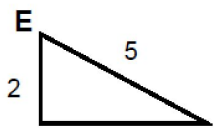
*Hopewell
triangles*







*Hopewell
triangles*



Show Your Work

Gough, 2014

Level 4

I can show more than one way to find a solution to the problem.

Level 3

I can describe or illustrate how I arrived at a solution in a way that the reader understands without talking to me.

Level 2

I can find a correct solution to the problem.

Level 1

I can ask questions to help me work toward a solution to the problem.

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