ELEMENT 2.4

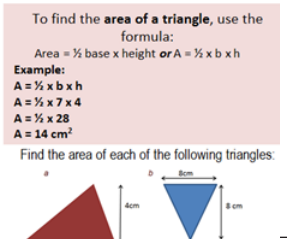
Domain 2 - Create Safe Conditions for Rigorous Mathematics Learning

Element 2.4 - Challenge students to achieve high standards with appropriate support

The following suggestions for practice are extracts from the 'Transforming Tasks' module on the Leading Learning resource:

Strategy From Tell to Ask

Technique **Socratic questioning:** Have students work backwards by providing the outcome first.

Level	Before	After
Primary	Multiplying by decimals is easy, just follow these two steps: 1. First, multiply the numbers normally, ignoring the decimal points. 2. Then, count the total number of decimal places in both numbers, and put that many decimal places in the answer.	Using a calculator, work out answers to questions a, b, c and d Discuss: 1. What do you notice about the solutions to these questions? Are the solutions larger, or smaller, than the value being multiplied by 0.5. Is that surprising? Will that always be the case? Could you test that out? 2. Why do you think that x 0.5 might be like finding half of the amount? 3. What do you think will happen if you multiply by 0.25? What makes you think that? How could you test that idea? 4. Do some more thinking about multiplying by decimals by asking your own 'what if?' questions 5. What ideas do you have now about multiplying by decimals? Do other people think the same or differently to you at the moment? 6. Look at the first questions that you tried (a, b, c, d). How do the questions (e, f, g, h) relate to them? What connections can you see between the answers to these two sets of questions? Use your observations to think of a way to make multiplying by decimals easier. Does your idea work if there are two decimal places in the question Eg 6 x 0.05? a. 6 x 0.5 b. 3 x 0.5 c. 8 x 0.5 d. 5 x 0.5 e. 6 x 5 f. 3 x 5 g. 8 x 5 h. 5 x 5
Secondary	Area of a Triangle: To find the area of a triangle, use the formula: 	 **What do you notice about these three shapes?** Which triangle do you think covers most/least of the area of the rectangle? Why do you think that? How sure do you feel at the moment? Look at the first picture - How much of the rectangle do you think the tirangle covers? What led you to that belief? How could you check that out/convince me? How much of the rectangle area do you think the triangles in the other two pictures cover? How could you check your thinking out/convince yourself /convince me? Would it help if you could cut the pictures up and move pieces around? Try that if you think it will help you. How does the area of the triangle relate to the area of the rectangle in these three pictures? Would that always be the case with triangles? How could you check that thinking out? Examples of Socratic questions can be found online: http://courses.cs.vt.edu/cs2104/Summer2014/Notes/SocraticQ.pdf

How do you think the technique Socratic questioning might support *Element 2.4 - Challenge students to achieve high standards with appropriate support?*

There are many ways to articulate this relationship. One response to this question has been provided on the next page.

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How does the technique Socratic questioning support *Element 2.4 - Challenge students to achieve high standards with appropriate support?*

Carefully constructed Socratic questions that support students to look for, and establish connections, support the development of conceptual understanding. 'Conceptual understanding frequently results in students having less to learn because they can see deeper similarities between superficially unrelated situations'. (Adding It Up, 2001) This deeper understanding supports learners to achieve high standards. The 'before' tasks provide students with a method to use. Students are not challenged to engage in considering how/why the method works, nor are they challenged to connect that 'learning' to other topic areas. The 'after' tasks use Socratic questioning to support students to explore and identify connections to prior knowledge (as in the decimals question) and/or intuition (as in the triangle area question).

Using Socratic questioning to support students to establish connections, supports them to develop conceptual understanding, and in this way it supports learners to achieve high standards.