

HOW I TEACH CONGRUENCY

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This 'How I Teach' presentation demonstrates how the topic Congruency is taught with the integration of Transformation Geometry and Measurement. The pace dictated by CAPS has challenged me to find ways to integrate different topics to develop a sense of continuity for learners.

INTRODUCTION

Engaging CAPS for the first time in 2014 has been a challenging experience. I find that the sequencing of the content and the concepts is fragmented and could result in there being no integration between content strands. The pace is fast and learners do not always manage to grasp the concepts in the given time. Being faced with the idea of not finishing the term's content, I had to look for innovative strategies to help me complete everything without disadvantaging the learners. Without undermining CAPS in any way, I became more conscious of the need to link mathematical concepts. I experienced success with linking Congruency and Similarity to Transformation Geometry and Measurement. The response of learners to this method was most encouraging.

RATIONALE

In Grade 7, under the topic Transformation Geometry, learners had to recognise, describe and perform translations, reflections and rotations and also draw enlargements and reductions of geometric figures (Senior Phase Mathematics Curriculum and Assessment Policy Statement, 2011, page 29). Translations, reflections and rotations preserve size and shape of polygons while orientation changes. This is a powerful way to illustrate that congruency pertains to the preservation of every part of a polygon even though its orientation might change. Enlargements and reductions relate to the concept of Similarity. By using this integrated method, various other mathematical knowledge and skills are also incorporated:

- Properties of 2-D shapes
- measurement (protractor, ruler)

Ten hours is allocated to the topic, which translates into 10 lessons. However, part of the topic is devoted to the solution of problems. I set aside 5 lessons for teaching Congruency and Similarity.

CONTENT

Learners are challenged to move from exploration and observation to accurate measurement and conclusion. They also shift from using scale drawings to interpreting drawings that are not drawn to scale. This is important, because they will be confronted with drawings that are not drawn to scale when they engage with problem solving.

Day 1

I experienced some difficulties with my first activity, which involved dotty paper and drawing congruent shapes that were transformed. The fact that the learners had difficulties with the construction there of, impacted on achieving the outcomes around congruency. I had also made some assumptions regarding learners' ability to use dotty paper appropriately. Many were not focused on using the measurements to ensure that the sides of their second shape measured exactly the same as the first. The lesson was diverted to cover the purpose of using dotty paper or other grids. This focused learners on the importance of accuracy when comparing geometric shapes.

Day 2

Learners were provided with sets of geometric shapes on coloured paper. Their task was to cut out the sets of shapes so that they had three of each in different colours. They had to create columns where they pasted each shape as a reflection, translation and rotation respectively. There was a focus on measuring the *distance* from the axis of each vertex, particularly for the reflection. Learners had to label each vertex of the translated shape appropriately.

Day 3

This lesson started with a consolidation of the concept of congruency. Learners were handed a worksheet with sets of congruent polygons in different orientations. They needed to use their maths sets to measure sides and angles, and to add the conventional indicators for equal lengths and angles. Based on their measurements, they needed to conclude which shapes were congruent, by equating equal sides and angles for the pairs of shapes. This activity gave learners practice with the conventions of recording statements when solving problems.

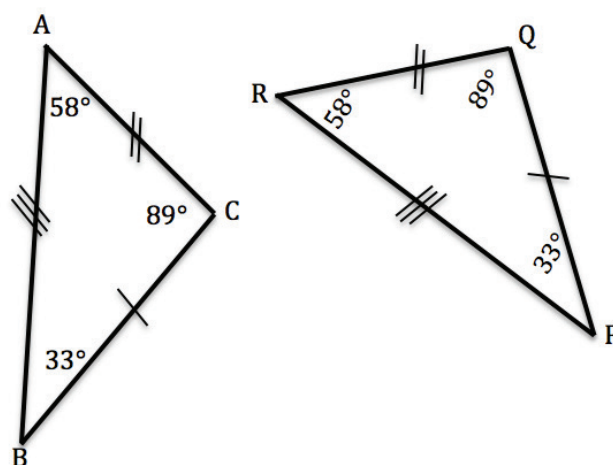
The worksheet also included some similar shapes. The lesson concluded with a discussion on shapes that *looked* the same, but did not fulfill all the requirements of congruency.

Day 4

The focus shifted to similarity. There was limited time for learners to engage with the concept enlargement and reduction, so I showed them how to produce an enlarged or reduced polygon from the original. In our class discussion we concluded that in similar shapes the corresponding angles are equal, but the sides are not. Learners were then handed a worksheet where they had to measure sides of similar shapes. They were led to the conclusion that the sides of similar shapes are in proportion.

Day 5

This lesson was spent on consolidation of the properties of congruency and similarity, and the difference between the two. Learners were handed a worksheet where they had to identify whether sets of triangles and quadrilaterals were congruent or similar. For the first time they worked with sketches that were not drawn to scale, and had to rely on the markings and measurements on the shapes. This is an example:



Learners had to write sets of equations to conclude that $\triangle ABC \cong \triangle RPQ$

CONCLUSION

This methodology of integrating various strands, takes careful planning. The oversights in my first lesson forced me to think very hard about how I would integrate the other content strands effectively. In the end, learners responded well to the set of lessons and I am confident that they understand the properties of, and difference between similarity and congruence. The next five lessons were devoted to using the properties of similarity and congruence to solve problems.

An advantage of integrating different topics when teaching a particular topic, is that learners grow to accept that no mathematical concept stands in isolation. In Term 3 when we cover Transformation Geometry, the properties of Similarity and Congruency will be revisited.

REFERENCES

Department of Basic Education, 2011. National Curriculum Statement; Curriculum and Assessment Policy Statement., Mathematics, Grade 7 – 9. Department of Basic Education, Pretoria.

Schools Development Unit, 2012. Solutions for all Grade 7. Macmillan, Pretoria.
