

A Case for a New Phone

Purpose:

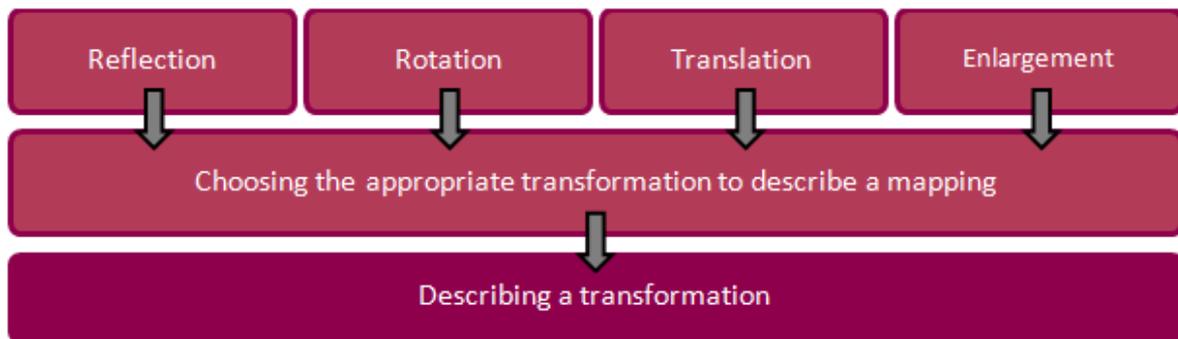
The purpose of this activity is to engage the student in using a description of transformations to solve a problem.

Achievement Objectives:

GM3-6: Describe the transformations (reflection, rotation, translation, or enlargement) that have mapped one object onto another.

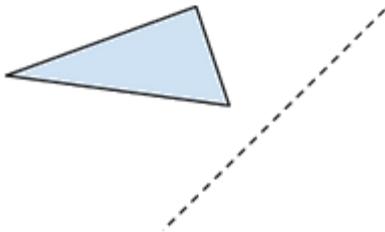
Description of mathematics:

The background knowledge and skills that should be established before and/or during this activity are outlined in the diagram below:



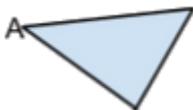
Reflection

Reflect the triangle in the mirror line



Rotation

Rotate the triangle 90° anticlockwise about the vertex marked A.



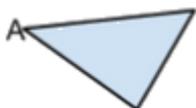
Translation

Translate the triangle left 2 cm and up 1 cm.



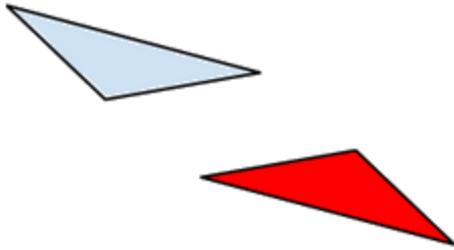
Enlargement

Enlarge the triangle by scale factor 2, about the centre of enlargement, A.



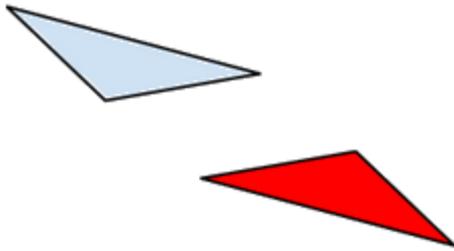
Choosing the appropriate transformation to describe a mapping

What type of transformation will map the red triangle onto the blue?



Describing a transformation

Describe the transformation that will map the red triangle onto the blue?



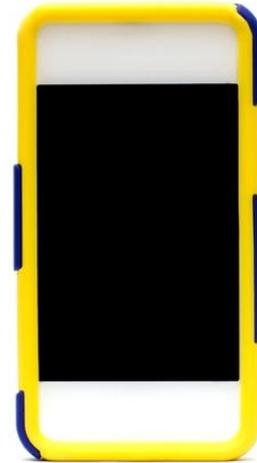
This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

Ian made a case for his old iPhone 4 on a 3D printer. The case has dimensions 116 mm high by 58 mm wide.

Now that he has a new iPhone 6, he needs a case that is 139 mm by 70 mm.

If he wants to print the same case, but to fit his new phone, describe the transformation(s) Ian will need to tell the printer in order to make a case that fits his new phone.

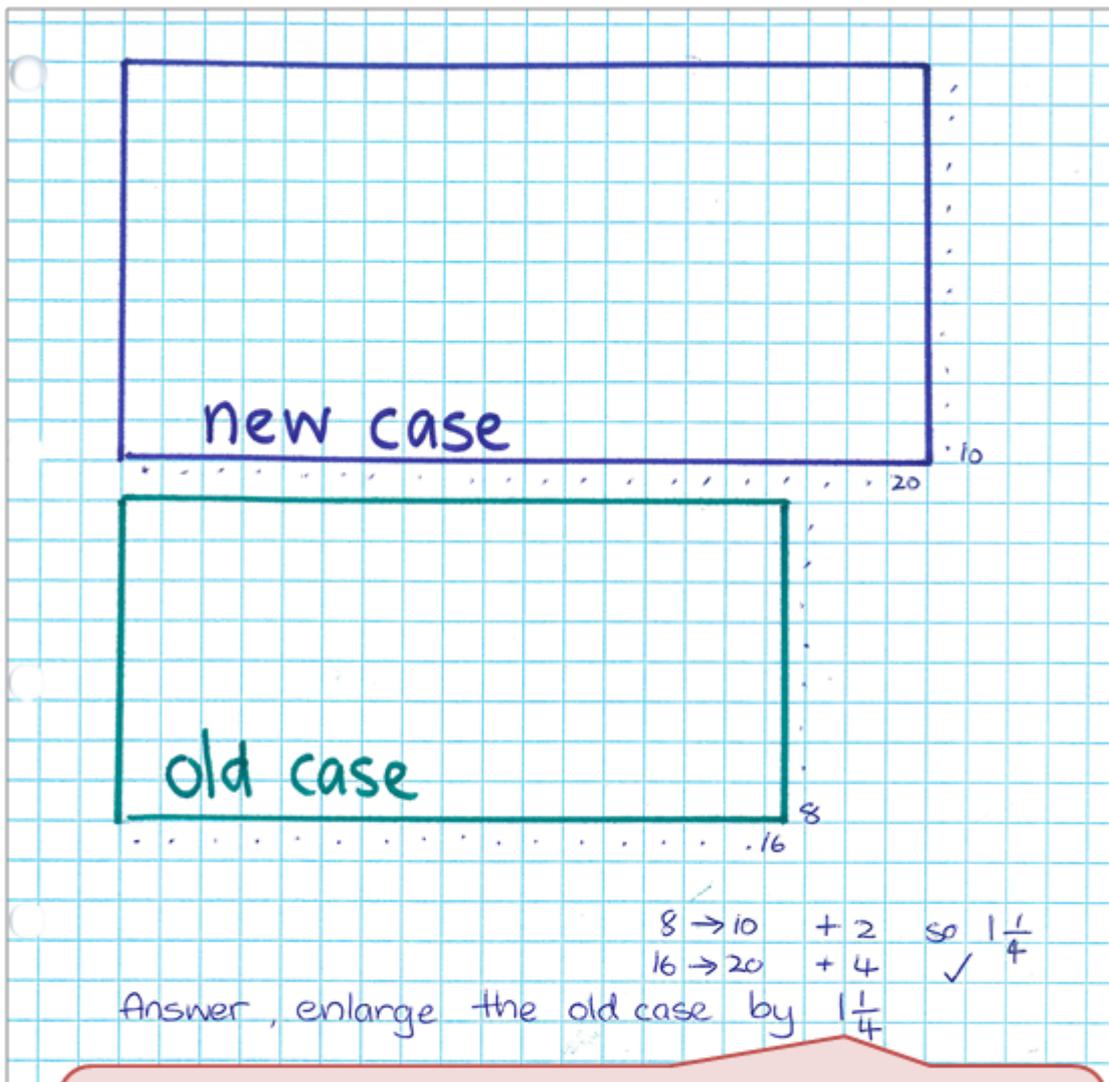


The arithmetic approach

The student is able to describe, with appropriate quantities, the transformation needed to complete a given task.

Prompts from the teacher could be:

1. Draw the old and new cases to scale.
2. What is different about the new case?
3. What type of transformation do you think is required to produce the new case?
4. What is the difference between the old and new case? (ie if a side length is longer or shorter - how much longer or shorter is it now?)
5. Give full instructions that allow the transformation from the old case to the new.



T: How did you get this scale factor of $1\frac{1}{4}$?

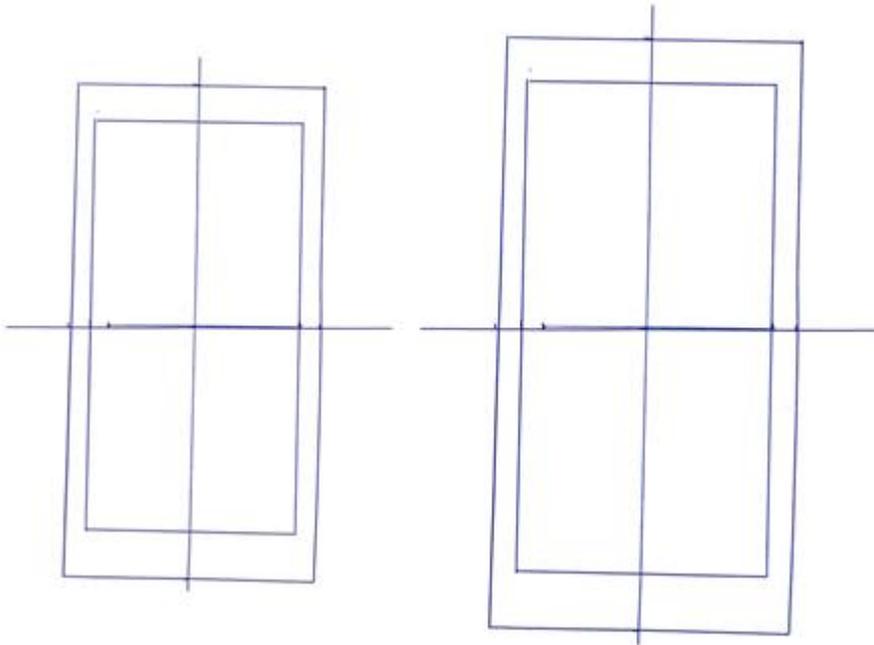
S: Well I looked at how many squares the 6 case is more than the 4 and that gave me nice numbers. When I counted them up I saw that four lots of the difference went into the iPhone 4 case. So it's a quarter more than one whole.

The conceptual approach

The student is able to give the transformation needed to complete a given task.

Prompts from the teacher could be:

1. Draw the old and new cases to scale.
2. What is different about the new case?
3. What type of transformation do you think is required to produce the new case?
4. Try to map the old case onto the new case (cutting out, photocopying and other methods for trial might be useful)
5. Give full instructions that allow the transformation from the old case to the new.



enlargement more than 100%
less than 150%
try 110, 120, 130, 140 on photocopier
yep, 120 worked so
need enlargement 120%

T: Tell me about how you got this scale factor of 120%?

S: I drew the smaller case the exact right size, and then I used the photocopier to enlarge it. I tried 110%, 120%, 130% and 140%, and the 120% enlargement was the right size for the new phone.