



Problem Posing Pro-Forma :use of videos

Assumption

A numerical or maths problem has multiple solutions or none, it is framed as an open-ended question. There is no clear path to the answer – students cannot easily use a formula. Within the problem students are often given too much information or not enough

1. Activity Name: Rods and marbles - <https://m.youtube.com/watch?v=AiPMZ9dbfA0>

Rods and marbles

Donna is making squares out of rods and marbles.

Can you continue the pattern?

If Donna has 100 rods and 100 marbles, how many squares can she make?

2. Expected duration of activity: 30 minutes – 1 hour
3. What EQF level is the activity (approximately)? EQF levels 1-4
4. What is the topic? Patterns leading into algebraic functions
5. What are the Learning Outcomes? Recognise patterns in the contexts of shape, space and number leading to making generalisations and at higher levels find the nth term
6. Prerequisite/prior knowledge assumed? Students may be aware of the need to work systematically and to record their work in an effective way, however; these ideas may be taught through this activity. All students should be able to describe patterns in different contexts and should have a basic knowledge of number. At the higher levels, some understanding of graphs would be expected.
7. In what ways does the problem, or the way the problem is delivered to the students:



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- encourage critical way of investigating and thinking? After watching the video, students will investigate patterns using manipulatives, paper and pens, or some form of technology such as GeoGebra.
 - encourage analysis? Students should be encouraged to analyse the relationship between the shapes and the number of rods and marbles.
 - allow students to be creative? Students should be encouraged to use different approaches to recording their observations such as manipulatives, drawing diagrams, tables, and graphs. Students may also stick to linear arrangements of squares or may be encouraged to explore different shapes such as triangles or cubes.
 - allow independent learning? Students may work individually although group work would be preferable to encourage discussion and reflection.
 - allow for co-operative learning? Working in groups encourages students to share their ideas, articulate their reasoning and to ask questions of one another.
 - allow students time to think? Students should be given sufficient time for the activity so that students are able to explore the problem without a time pressure and hence allow for deeper learning.
 - have a relevant or interesting context? Manipulatives should be used at all levels to engage students and allow for deeper understanding of the problem
 - allow for multiple ways of solving or investigating the challenge? Students should be encouraged to explore the problem through manipulatives, tables, drawings, graphs, GeoGebra, Excel or other spreadsheet application.
8. Resources or materials required? Video, magnetic rods and marbles or other such manipulatives, paper, graph paper, GeoGebra, Excel or other spreadsheet application.
9. What technology is required in the delivery of the problem? An internet connected computer with data projector and screen. Alternatively, the video link may be sent to each student to view on own device. Where internet is an issue the video should be downloaded and then may be embedded in PowerPoint or other presentation software.
10. What technology might potentially be required in the solving of the problem? The problem does not require any technology to solve, however; where students wish to use GeoGebra, Excel or other spreadsheet programme this may be of benefit.
11. Suggestions for delivery



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- a. Play the first 30 seconds of the video to the students. Encourage the students to continue the pattern using manipulatives. How might they record their findings? Encourage students to be creative in recording their findings.

As the students continue the pattern, is there any relationship between the shapes and the number of rods and marbles? Encourage all students to make generalisations and test them.

- b. Play the final part of the video. Encourage all students to solve through creative methods. For higher level students, the n th term should be encouraged.
- c. Extension – students should be encouraged to investigate different arrangements of the manipulatives such as triangles and cubes.

Other possibilities include:

