

## Problem-solving & reasoning lesson planner

<b>Strand:</b>	<b>PSR Level:</b>
<b>Short title:</b>	<b>DOK Level:</b>
<b>Learning opportunity:</b>	
Key focus: (key mathematical skill or concepts)	
Key problem-solving strategies: (highlight relevant strategies)	
<i>Guess and check</i>	<i>Work backwards</i>
<i>Model it</i>	<i>Use logical reasoning</i>
<i>Communicating mathematical ideas</i>	<i>Select the correct strategy</i>
<i>Look for a pattern</i>	<i>Make a list or table</i>
<b>Preparation:</b>	
1. Groupings to be used: (highlight relevant grouping)	
<i>Independent work</i>	<i>Pair work</i>
<i>Small groups</i>	<i>Whole class</i>
Grouping notes:	
2. Resources that may be required:	
<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>•</li> </ul>	
3. Strategies/methods that might be used:	
(It is helpful to consider these ahead of time, so you know what to look for and the kinds of effective strategies to scaffold students into using.)	
4. Possible misconceptions that may arise:	
5. Students who may require extra support:	

Names	Possible issues	Potential intervention

Students who may require extension:

Names	Extension ideas

## Introduction:

**How will you motivate the students to want to solve this problem?**

**How will you ensure that all students are aware of the problem to be solved?**

Helpful example questions to ask students:

- What predictions can you make?
- What do you know cannot be solutions?
- What's the largest answer possible and what's the smallest?
- How are you going to approach this? What's the game plan?
- What are some of the challenges you can foresee?
- Why is this problem worth solving?

## Independent thinking time (5 minutes):

Once you are sure that the students know what problem is being solved and can explain where some of the clues are, ask the students to spend 5 minutes thinking independently. They should have a way of recording ideas or questions during this time.

Teacher's role:

Roam around and take note of the kinds of strategies emerging, any misconceptions surfacing or any students who appear to be 'stuck' and unable to make a start.

## Tackling the problem:

It is recommended that the groups used are ones that the students are familiar with and that there is a culture of collaboration, active listening and clear communication. Although students will record their own ideas and solutions on the device they are using, it is important that they have the opportunity to work with others to develop their problem-solving and communication skills. Students who are more confident in solving the task should be encouraged to clearly explain and model their thinking to others.

## Teacher's role:

- Work with children who are unable to make a start. Discuss the problem and help them to formulate their thinking, for example by using concrete materials if needed.
- Roam the classroom or use the live space to gauge how well the students are working through the problem.
- Use prompting questions to support students who have missed key information or who are using an unsuitable or inefficient method.

## Helpful example questions to ask students:

(Ask subject-specific scaffolding questions where appropriate. Resist the temptation to give answers.)

- What do you already know so far? What else do you need to know?
- How can you find out?
- What ideas have you discussed already? What were the strengths and weaknesses of those ideas?
- What are the big ideas here?
- Will your method always work? How can you prove that?
- What evidence do you have to support your ideas?
- Is your method the best/most efficient way?
- How could you explain your method to someone younger?

Note the different approaches that students are taking as this will help in the sharing section of the lesson.

## Notes and observations:

## Classroom sharing and discussion:

- Ask students/groups to share their solution and explain their thinking to the class or to write down and share 2 important ideas or questions (this allows the opportunity for all students to share even if they didn't arrive at a solution).
- Encourage students to identify strategies that others used that they would like to try and use in the future.
- As students share, have other students repeat back what they hear and ask relevant questions.

## Teacher's role:

- Encourage connections to be drawn between the different strategies that are used, particularly if some are more efficient than others.
- Ensure that mistakes are valued and seen as learning experiences for all.
- Ask probing questions of the class, for example:
  - Think back to before the lesson to some of the predictions you made and challenges you had. How did these play out? Did everything happen as you expected?
  - How could you tackle this problem differently if you had then chance to do it again?
  - What have you learned that you didn't know before about these concepts?
  - Has anybody else presented a strategy or method that you would like to try? Why?

## Notes and observations:

## Reflections:

Have the students reflect in their small groups or on their own and consider what they learned from the task, what they did well and any strategies they might want to try with similar questions in the future. Remind the students that they can leave comments or questions for the teacher within Mathletics.

## Student's reflections:

### What worked well:

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### What I would do differently next time:

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## Teacher's reflections:

### What worked well:

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### What I would do differently next time:

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