Applying and Problem-Solving

Shape and space

Pet Shelter

This task could be put into a story or context depending on the other topics in the classroom – e.g. we are going to design a house for Teddy. It is not confined to pets but could tie into a variety of topics and can also be adapted to a variety of topics - houses and homes, pets, toys, then and now, nursery rhymes, stories (e.g. Goldilocks and the Three Bears' house, Little Red Riding Hood's house) etc. This work would be done in pairs or small groups to promote mathematical discussion.

Progression Continua

Element	**d** **The Learner**	**e** **The Learner**	**f** **The learner**	**g** **The learner**
Applying and problem solving	Selects materials to represent shapes. Solves tasks and problems involving regular shapes [2-D and 3-D shapes].	Combines and partitions 2-D shapes.	Solves problems requiring the greatest or least number of 2-D shapes needed to compose a larger 2-D shape in a variety of ways. Solves tasks and problems involving technology/virtually-based tools.	Designs and makes accurate models of 2-D and 3-D shapes using a variety of materials (collections of models could be developed in consideration of common properties).

National Council for Curriculum and Assessment (2022, p. 63)

Teaching Sequence

Concrete Stage

What shapes do we need to design our pet shelter?

- The children have a limited range of shapes and are only allowed to use these shapes to build their pet home.
- This could form an initial task where children have to problem solve with size and shapes – e.g. the roof would have to be large enough, the windows cannot be larger than the house etc.

Pictorial Stage

Draw our shapes for our pet home.

- Children draw what they have designed.

Abstract stage

Using your programmable device, work with a partner to draw a square.

Now can you draw other shapes – a rectangle, a triangle etc?

Are there other shapes we could add to your home? What would we need to consider? What will improve if we add these shapes?

- Using a programmable device to copy our design.
- Children use whatever device is available – this can be a physical device or an app on their tablet computer etc.

Grading Rubric

Element	d The Learner	e The Learner	f The learner	g The learner
Applying and problem solving	Through trial and error some attempt is made to move the device in a straight line. The learner adapts their learning to fix errors such as moving too far or in the wrong direction.	The learner builds on the first step to appreciate that when they have discovered how far to move and how much to turn, they will then attempt to move the same number of steps in a different direction.	Understands that the shape can be drawn by repeating steps. Can programme using the same number of steps and turns using language such as 'full turn'. Copies what they have done 4 times.	Sees patterns in the shape and is able to use 'repeat'. Can programme the device using more complex steps such as turn 90 degrees right and use repeat.
Reasoning	Makes simple predictions of what they think might happen.	Recognises simple patterns and decides what comes next giving reasons for their predictions.	Explains their thinking and explains how estimations were used. Relates their thinking to what they know about the properties of the shape.	Revises their way of working and considers alternative ways of using this knowledge – e.g. so if you do a repeat for a square, how might you programme for a rectangle.
Communicating	Uses informal language to discuss the problem – we should do this because… Can use mathematical language such as *towards, forwards, more, longer, shorter etc.*	Explores through discussion how the task might be solved and considers different options.	Able to discuss the properties of the shape and what this might mean to the activity (e.g. a square has 4 sides all equal so we should be programming the same number of spaces each time we turn).	Uses a wider variety of mathematical language and terms to solve the problem (e.g. understands that the square has a right angle which is 90 degrees).