Assessment: Mathematical Modelling: A kitten for free?

Assessment task

Use mathematical modelling to solve financial and other practical problems involving percentages and rational numbers. Students will formulate and solve the problem, justifying their choices.

Guidance:

Assessing student understanding of mathematical modelling can be carried out effectively by setting practical problems that require students to apply mathematical concepts, procedures or structures to find a solution and communicate these findings.

The assessment of student understanding for this task may include solutions calculating:

- food intake per day/week/month/year
- ongoing cost of providing food, kitty litter, flea and worming treatments, vet bills
- one-off costs such as bowls, cat toys, scratching post, kitty litter tray
- annual costs such as council registration and vet bills (injections, tablets)
- time required to care for the kitten (cleaning food bowls, changing kitty litter, playing with the kitten).

Provide students with this task to be completed individually. Time can be given initially to clarify the scenario. Present the slide to introduce the scenario: Emily comes home from school and says her friend is giving away a kitten for free. Her parents say that it would cost too much to keep, so Emily goes about proving it won't cost that much. Do not use this time to model or teach any mathematical skills or concepts; rather, allow students to articulate any wonderings they may have aloud. If a student asks if they need to calculate the cost of … [insert idea] respond with 'Is this a cost Emily and her family would need to properly care for the kitten?' Do not directly encourage or disregard any responses from students. The idea is that they articulate the possibilities that may arise in the care of a cat.

Assess how a student approaches the task by noting if they:

- understand the context and can identify the mathematical problem
- use a strategy to approach problem-solving
- apply mathematical concepts required to model a solution to the task
- evaluate the effectiveness of their approach in finding a solution
- communicate the solution to others, justifying their process.

Note whether students include non-monetary costs such as time taken to complete tasks such as cleaning, playing and grooming. Note, too, that students will need to calculate these 'costs' as a percentage of their own time and multiply to find the daily/weekly/monthly/annual cost if included.

To complete the task, provide ample time for students to research identified costs (for example, council registration fees, if included) or allow for estimation.

Mathematical Modelling: A kitten for free?

Emily comes home from school and says her friend is giving away a kitten for free. Her parents say that it would cost too much to keep, so Emily goes about proving it won't cost that much.

Image by Pexels from Pixabay

Task: How would you work out this problem?

1. What 'costs' will Emily need to think about to care for the kitten?
List all your ideas.

2. What maths might she use to work out the costs?

3. How would you present the costs so it is easy for Emily's parents to understand?

4. How much would it cost to keep a kitten as a pet?

5. How might Emily reduce some of the costs for caring for a kitten?

6. Will Emily be able to convince her parents that it does not cost too much to keep the kitten as a pet? Justify your thinking using your calculations as evidence.