Tasty maths

Objectives

The purpose of this project was to promote the pupils' creativity at the same time as developing their mathematical problem−solving skills. In particular, the teacher wanted to give the pupils an opportunity to:

- solve a demanding problem by exploring connections in mathematics across different contexts
- explore a range of ideas and try out different theories
- use units of measurement to calculate, estimate, measure and solve a problem.

The relevant framework objectives for mathematics are:

- solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT (key objective)
- solve increasingly demanding problems and evaluate solutions; explore connections in mathematics across a range of contexts
- use units of measurement to calculate, estimate, measure and solve problems in a variety of contexts.

Activity description

Big purple sweets proved an effective carrot for encouraging the pupils in this class to develop their problem−solving skills.

The teacher wanted her pupils to use what they had learnt about mass, area, volume and enlargement to solve a problem. However, she was keen to find a stimulating context for them to do this, rather than just using a textbook approach.

Inspiration came as she watched a TV advertisement for new purple sweets that, it was claimed, were four times bigger than before. As she wondered whether this was actually true, it struck her that here was a perfect opportunity for pupils to use their knowledge in an innovative, interesting way. She went out, bought packets of the big purple sweets and their smaller cousins, and planned an activity to last two 40−minute lessons and homework.

The sight of chocolate in the classroom immediately grabbed the pupils' attention. The teacher held up examples of the two sweets and sparked a lively debate by asking, 'Have you all seen the advert on TV? Is the big one really four times bigger,

or is it just a clever way of getting people to buy the product?'

She then asked the class to get into pairs and brainstorm for five minutes how they could prove or disprove the claim. Limiting the time in this way forced the pupils to work quickly and created a real buzz. As they worked, the teacher walked around the room challenging some of the pupils about their ideas and helping them to see the problem from different perspectives.

The teacher then brought the class back together to share their ideas on how to prove or disprove the claim. The pairs discussed the different approaches, chose one that they wanted to try and planned what they were going to do (including the equipment they needed). Most were sceptical about the claim and were looking forward to proving their point of view.

The next lesson began with the excitement of each pair being given their own sweets, with strict instructions not to unwrap them! The teacher unwrapped one sweet of each type so that pupils could compare the wrappers and count the number of nuts inside.

While the pupils tried out different theories, the teacher questioned them to help develop their thinking. Mass figured highly, with many pupils weighing the sweets and making comparisons. Some based their calculations on the number of nuts inside. Some tried dropping the sweets in water to see how much was displaced. Others measured the length, width and height of the sweets and the length of the curved back and sides.

Once pupils started testing theories, they did not stop at one. The teacher encouraged them to keep trying new approaches and to take forward other people's ideas. Soon different pairs were sharing information and working hard together.

Sarah noted that the dimensions of the big sweet were about 1.6 times as long as the small sweet. Her partner, Rachel, recalled that volume is calculated by multiplying the dimensions of length, width and height. Together they realised that multiplying 1.6 x 1.6 x 1.6 would give them the increased volume of the sweet. As the result was approximately 4, they realised that they had 'proved' that the advertisement's claim was true. This idea spread at a phenomenal rate around the room.

Towards the end of the lesson the teacher asked the pupils to record their results on the board and to talk about the methods they had used. Some of the pupils were able to explain their reasoning clearly and persuade convincingly. At the end of the discussion the class concluded that the advert was true. The lesson finished with the pupils eating the sweets, much to their delight!

The teacher let the pupils choose how to write up the work. They chose a variety of styles, including diagrams, words and calculations.

Commentary

Creativity

The success of this project depended on its stimulating starting point. As one pupil commented, 'I wish maths was always this tasty!'. The pupils were enthusiastic about the activity from the outset and, as a result, thought about the problem and tested theories in a much more creative way than usual. Many of the pupils made connections between their mathematical knowledge and the practical problem they faced. Almost all of the pupils enjoyed the hands−on activity of trying out different ideas and exploring alternatives.

The teacher's view: The teacher felt that this activity achieved all of its objectives. 'I loved these lessons and was delighted that the pupils responded so positively. They seized the opportunity to explore different approaches. They were also able to make connections between the theory they had learnt and a real−life problem. Through the work they achieved a better understanding of the topic.

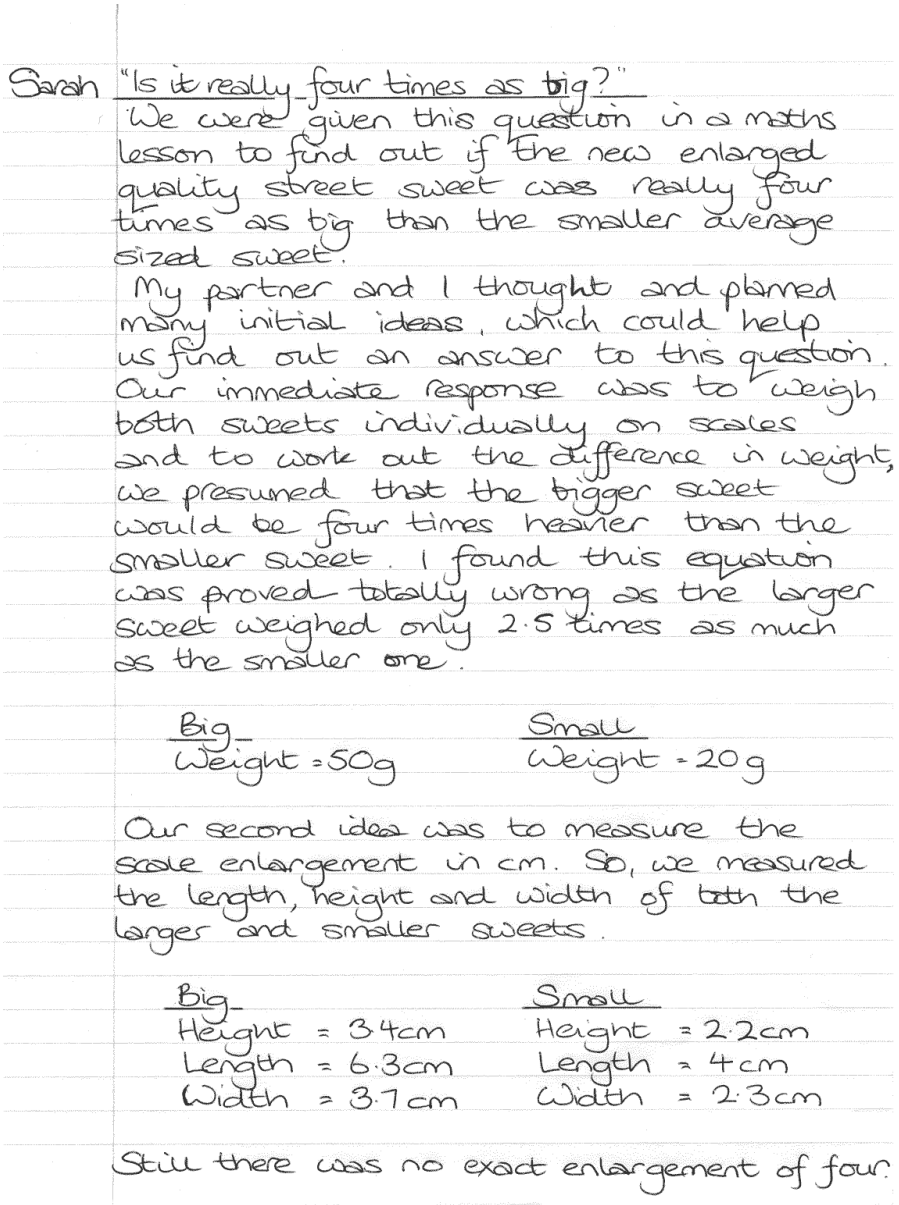
'The pupils gained a great deal from taking part in discussions. They listened to each other's points of view, worked together and developed their communication skills. By the end of the project they were able to explain their thinking not only verbally, but also in diagrams and sketches. It was super to see them listening to each other and asking questions for clarification.

'Sarah and Rachel showed particularly creative thinking in the way they tackled the problem. They explored alternatives and chose a variety of strategies to test the advertisement's claim. They made connections with mathematics that they had already learnt, refining and extending this until they generated a solution to the problem. They were also able to communicate their work clearly.

'I feel that we can all teach directly from a text (whether it be books, sheets or OHP transparencies). Occasional hands−on experiences are fun, useful, practical and a great way to foster creativity. This work reminded me of the importance of offering pupils a balanced and varied diet of lessons. It gave me an incentive to reassess my other lessons and to try to give them a slightly different slant. It reminded me that varying my teaching style can produce really interesting results.'

Items of work

Sarah's explanation of how they tested the advertisement's claim (page 1)



Sarah "Is it really four times as big?"

We were given this question in a maths lesson to find out if the new enlarged quality street sweet was really four times as big than the smaller average sized sweet.

My partner and I thought and planned many initial ideas, which could help us find out an answer to this question. Our immediate response was to weigh both sweets individually on scales and to work out the difference in weight, we presumed that the bigger sweet would be four times heavier than the smaller sweet. I found this equation was proved totally wrong as the larger sweet weighed only 2.5 times as much as the smaller one.

Big	Small
Weight = 50g	Weight = 20g

Our second idea was to measure the scale enlargement in cm. So, we measured the length, height and width of both the larger and smaller sweets.

Big	Small
Height = 3.4cm	Height = 2.2cm
Length = 6.3cm	Length = 4cm
Width = 3.7cm	Width = 2.3cm

Still there was no exact enlargement of four

Sarah's explanation (page 2)

Rachel and I were beginning to think that the sweet was not four times as big and that we had proved the television ad wrong. Although there was another way of finding out an answer to this question. This was to find out the volume. Taking the previous measurements of the two sweets, we did some calculations. We compared the big sweets measurements to the little sweets measurements and found they were about 1·6 times bigger.

Small			Big
Height	= 2·2cm →	× 1·6 →	3·4cm
Length	= 4cm →	× 1·6 →	6·3cm
Width	= 2·3cm →	× 1·6 →	3·7cm

If the length is 1·6 times bigger, the volume will be 1.6^3 times bigger and 1.6^3 is approximately 4. This proved the ad correct, the larger sweet was four times as big in volume.

There was only one more way to find out if the sweets really were four times as big. This fortunate way was to eat them! When eating the chocolates, we discovered that the sweets contained different amounts of hazelnuts.

3, 3, 5, 4, 4, 4, 3, 3

The average is four so it is four times as big there as well.

About this entry

Subject:	mathematics
Year:	9
Key stage:	3
NC programme of study:	Ma2p1a, Ma2p1c, Ma2p1j, Ma3p1c

Framework for teaching mathematics − objectives:

- Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT.