BOWLAND MATHS
Assessment Tasks

Soft Drinks

Task description

Pupils compare two sets of data with different sample sizes and consider how a testing procedure could be improved.

Suitability National Curriculum levels 5 to 6

Time 30 minutes to 1 hour

Resources Ruler, pencil, calculator and 1 cm squared paper

Key Processes involved

- **Representing**: Understand why the tests were unfair and find a way to compare the data.
- **Analysing**: Calculate to make comparisons possible.
- **Interpreting and evaluating**: Explain how their results show that teenagers do not like the drink, but that adults do; suggest ways to make future tests fairer.
- **Communicating**: Show clearly what they have done and explain their ideas well.

Teacher guidance

Check that pupils understand the context, for example with questions such as:

- *What does it mean 'to defend your conclusion'?*
- *What does 'reliable' mean when we are talking about statistics?*
- *Show all your working so that the Pop Soda Company can understand your thinking.*

Pupils can tackle this task in different ways, but they might be expected to:

- *produce comparable statistics from the two sets of data,*
- *understand the shortcomings of the tests and suggest improvements*

Soft Drinks

The Pop Soda Company has developed a new soft drink called Fruity, a cool drink with a fruity taste. The company expects it to be very popular with teenagers.

They plan to launch an advertising campaign just before the summer, but first they carry out two sets of taste tests to see if Fruity is liked by the target group. Each test is done in a testing booth and customers taste and compare Fruity with SoFruit, another brand of the Pop Soda Company.

Customer preferences are recorded. These are the fact sheets of the two tests.

Fruity - Test #1	
Location of booth:	Secondary School
Day and date:	Monday, April 3
Time:	9:00 – 9:30
Weather:	Fair, 19°C
Number of people in test:	21
Number preferring Fruity:	9
Number preferring Sofruit:	2
No preference	10

Fruity - Test #2	
Location of booth:	Business Center
Day and date:	Friday, April 7
Time:	11:00 - 12:00
Weather	Rainy, 23° C
Number of people in test:	146
Number preferring Fruity:	100
Number preferring Sofruit:	40
No preference	6

Based on these two tests, the marketing department concludes that teenagers do not like Fruity, but that adults do.

1. How can the marketing department defend its conclusion?

   They showed the results to the company director and he said:
   'This test isn't reliable. Do the tests again to get a more reliable result.'

2. Advise the marketing division how to set up new tests to get more reliable results.

Assessment guidance

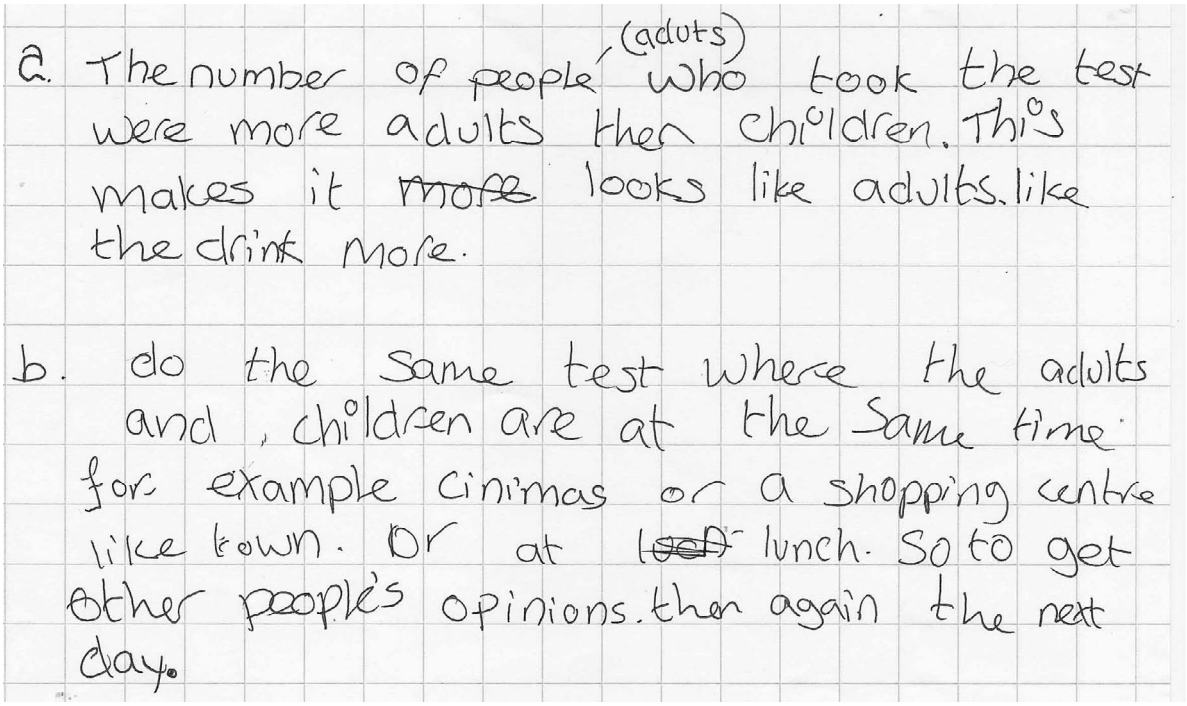
Progression in Key Processes

PROGRESSION

Representing	Analysing	Interpreting and evaluating	Communicating
Choice of method for comparing the two sets of data	Analysis of the data and quality of reasoning	Improvements suggested for the testing process	Clarity and completeness of communication
Uses a simplistic method or makes no attempt to compare the data. Pupils A and B	Uses simple statements to compare the data. Pupil A	Gives a few ideas for improvements. Pupil A	Communicates the work adequately, but with gaps and/or omissions. Pupil A
	Explains why the data cannot be compared. Pupil B	Has some reasoned ideas for how the tests could be improved	Communicates the work clearly and the reasoning can be followed.
Compares the two sets of data. Pupil C	The data is used to defend the conclusion. Pupil C	Has well argued ideas about improvements needed. Pupils B and C	Communicates the work clearly and the reasoning may be easily followed easily. Pupils B and C
Uses the data to make correct numeric comparisons. Pupil D	The data is used correctly to defend the conclusion. Pupil D	Gives good advice, for conducting future tests, which covers all the shortfalls of the previous tests. Pupil D	Explains the work clearly and considers other possibilities. Pupil D

Sample responses

Pupil A


a. The number of people (adults) who took the test were more adults then children. This makes it ~~more~~ looks like adults like the drink more.

b. do the same test where the adults and children are at the same time for example cinimas or a shopping centre like town. Or at ~~lunch~~ lunch. So to get other people's opinions. then again the next day.

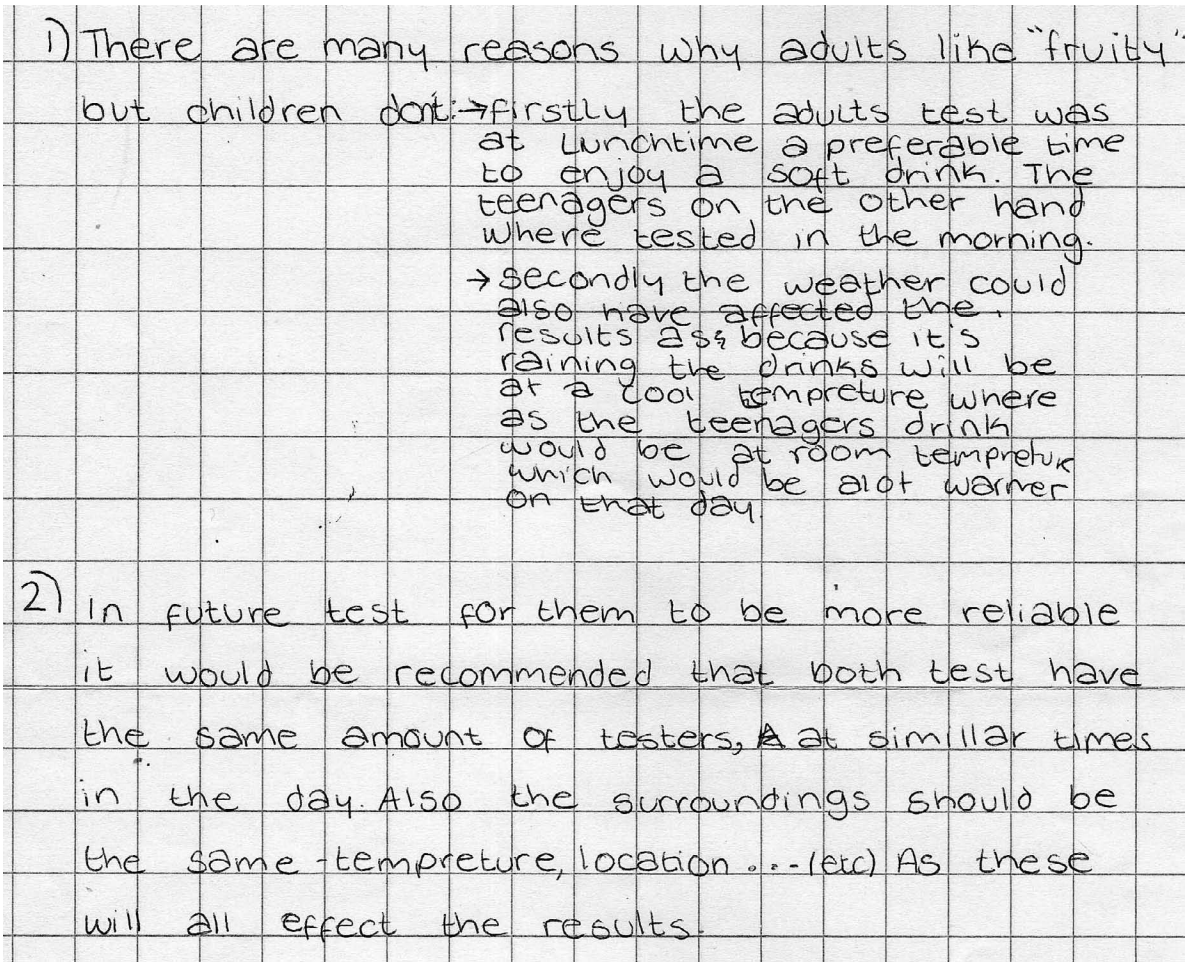
Comments

Pupil A realizes that more adults have done the test but does nothing to help make a proper comparison. She suggests testing adults and children at the same time and place but not that the same number of each be tested.

Probing questions and feedback

- *You point out that there are more adults than children, so is there a way you could compare the results? For example, can you use ratios or percentages?*
- *Are there any other ways they could make the next test better?*

Pupil B


1) There are many reasons why adults like "fruity" but children don't. → firstly the adults test was at lunchtime a preferable time to enjoy a soft drink. The teenagers on the other hand where tested in the morning.
→ secondly the weather could also have affected the results ass because it's raining the drinks will be at a cool tempreture where as the teenagers drink would be at room temprehure which would be alot warmer on that day.

2) In future test for them to be more reliable it would be recommended that both test have the same amount of testers, ~~&~~ at simillar times in the day. Also the surroundings should be the same - tempreture, location ... (etc) As these will all effect the results.

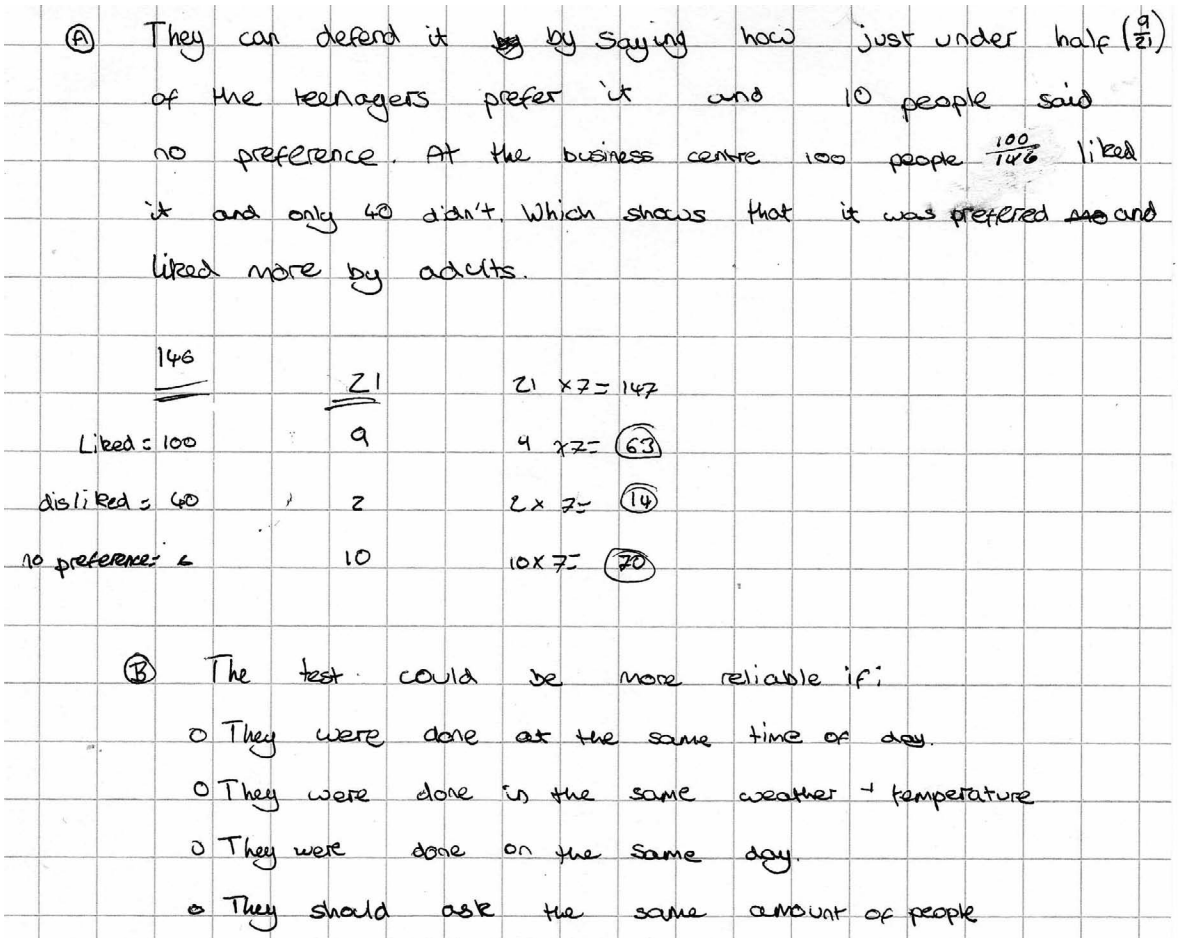
Comments

Pupil B understands why the tests are not reliable and explains the results but without comparing the data. He gives good recommendations for improving the reliability of future tests.

Probing questions and feedback

- *Can you find a way of comparing the number of people who prefer 'Fruity' in the two groups?*
- *Could you use ratios or percentages?*

Pupil C



(A) They can defend it ~~by~~ by saying how just under half ($\frac{9}{21}$) of the teenagers prefer it and 10 people said no preference. At the business centre 100 people $\frac{100}{146}$ liked it and only 40 didn't. Which shows that it was preferred ~~and~~ and liked more by adults.

	146	21	21 × 7 = 147
Liked :	100	9	9 × 7 = (63)
disliked :	40	2	2 × 7 = (14)
no preference :		10	10 × 7 = (70)

(B) The test could be more reliable if:

- They were done at the same time of day.
- They were done in the same weather + temperature
- They were done on the same day.
- They should ask the same amount of people

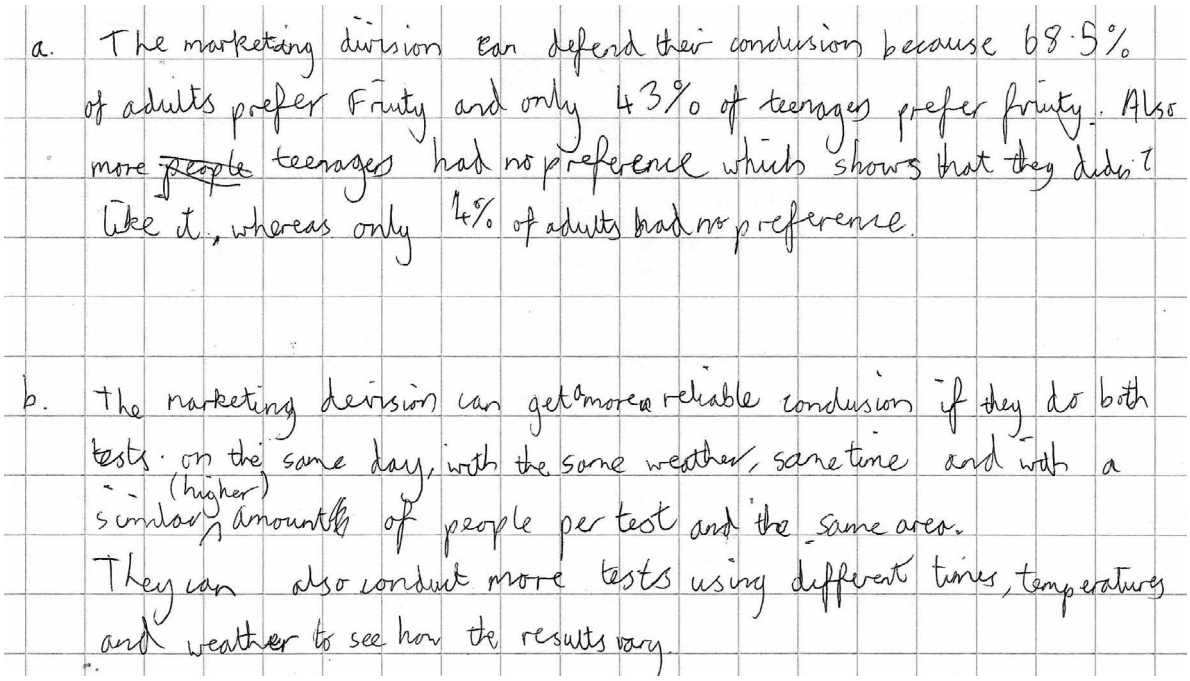
Comments

Pupil C has used an approximate method to compare the data but did not explain clearly what he is doing. He has given a good list of improvements for future tests.

Probing questions and feedback

- *Please explain why you multiplied by 7? Now can you write that down?*
- *Your comparison is approximate, so can you find a way of giving an exact comparison?*
- *You make good suggestions for improving the tests*

Pupil D



a. The marketing division can defend their conclusion because 68.5% of adults prefer Fruity and only 43% of teenagers prefer fruity. Also more ~~people~~ teenagers had no preference which shows that they didn't like it, whereas only 4% of adults had no preference.

b. The marketing division can get more reliable conclusion if they do both tests on the same day, with the same weather, same time and with a similar (higher) amount of people per test and the same area. They can also conduct more tests using different times, temperatures and weather to see how the results vary.

Comments

Pupil D has calculated the percentages from the data so was able to give direct comparisons. In part b he has not only covered all the shortfalls in the tests but has gone on to suggest that more tests be carried out under different conditions.

Probing questions and feedback

- *Do you think your work would be easier to follow if you had shown the calculations you used?*
- *In part b, it would have been easier to see the (good) improvements you suggest if you had put them in a list rather than a long sentence*
- *Could you write a list of instructions to the people who will conduct the next tests to explain when, where and with what sample size you suggest they should use for the survey?*