Reach for the stars

This is Rubbish!

is disgusting!

"It was fun, although disgusting to sort the rubbish!"

During the Reach for the Stars activity in National Literacy and Numeracy Week 2013, thousands of students and their teachers explored the mathematics of the rubbish collected in their classrooms and schools. We gave you a quick look at the results in our mini-report. Here are the rest.

Sorting rubbish

Almost three-quarters (73.6%) of the classrooms sorted their rubbish into different bins but only just over a third (36.6%) of the schoolyard rubbish was sorted. Does that seem reasonable? What do you think you could do about the situation?

Quite a large proportion of schools (9.9%) selected 'other'. Some had no outdoor bins, and a number of schools said that they were 'rubbish free' or 'nude food' schools — no packaging at all!

How much did we collect?

One early years' class said there were "many — too many to count".

There were some very high numbers in the amount of items collected. Some classes combined their information into one submission and others collected rubbish over a number of days.

What else do you notice about the values?

Category	Range of number of items	Mean
Plastic	0–545	52.8
Paper & cardboard	0–673	54.8
Food	0–568	29.8
Metal	0–85	4.3
Wood	0–266	5.9
Other	0–1044	17.0

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We calculated the mean (or average) number of values in each category. Rank them in order. Is the order what you would expect?

The 'other' category had an extreme upper value (or outlier) of 1044. The next highest value was 148. Do you think that it might be an error? If so, should it be excluded from the data set?

Tricky data

This year much of the data collected was categorical rather than numerical: the responses recorded were mostly words not numbers. And in turn, that meant that we had to group the words into our own categories before we could create a report of the results.

So what items did you find difficult to categorise? There were lots of them!

The major difficulties occurred with items which were:

- made of more than one material
  (e.g. juice popper containers "are they plastic or cardboard?", mixed packaging chip packets made of alfoil and plastic", laminated paper)

- tainted with food
  (e.g. yoghurt cups with yoghurt still inside, recycling materials that had food waste on them "not to be thrown in the recycling bin - paper bag that had grease and sauce on it")

- unusual
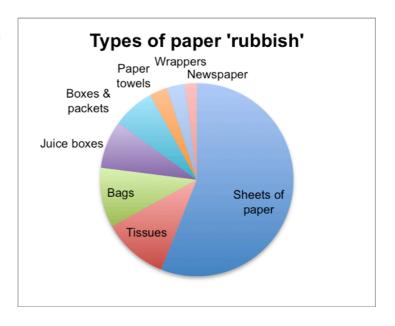 (e.g. a marble, foam, a sock, a calculator)

Lots of classes said that they didn't know how to categorise tissues ("wood or paper?") or pencil shavings ("it was made with wood and plastic") or foil ("children didn't think that metal could bend").

Paper trail

How much of our paper rubbish do you think could be reused or recycled?

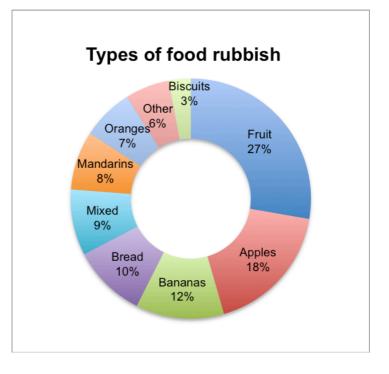Approximately what proportion of the rubbish was sheets of paper? Paper towels? Tissues?

This pie graph does not have any percentages, unlike the graph about the types of plastic rubbish which appeared in the mini-results. Is it easier or harder to read? In this situation, how important is it to know the proportions accurately?

Types of paper 'rubbish'

Food for thought

Some schools used their food scraps as additional chook food or for their worm farms or into the general garden compost.
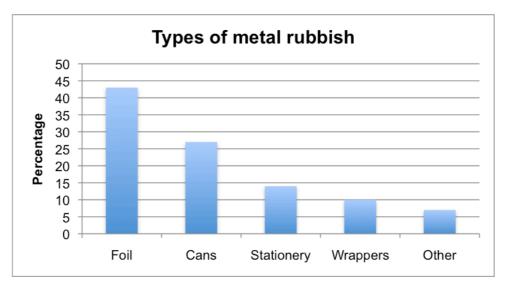
What main sort of food group was found in the bins? Why do you think that occurred? Do you think that there would be any difference between the types of food rubbish found in the different States and Territories?

Types of food rubbish

Biscuits 3%
Other 6%
Oranges 7%
Mandarins 8%
Mixed 9%
Bread 10%
Bananas 12%
Apples 18%
Fruit 27%

Heavy metal

We categorised this data into five groups.

- Foil, which included containers as well
- Cans, which included aluminium cans, tuna tins and metal lids
- Stationery, which included paper clips, pins, staples etc
- Wrappers
- Other (e.g. broken zip, bobby pins, nails, wire)

Types of metal rubbish

Which of these types of metal rubbish is recyclable?

Would you have used the same groupings? What difference would it make to the interpretation of the data?

Other rubbish

We have not analysed the data from 'Wood' and 'Other' categories. Maybe you could do it and let us know your results.

Comparisons

Here is a list of the top ten rubbish items collected by Clean Up Australia volunteers in 2012.

1. Cigarette butts
2. Alcoholic beverage bottles
3. PET drink containers
4. Bottle caps and lids
5. Glass pieces
6. Alcoholic beverage cans
7. Chip and confectionary packets
8. Other plastic
9. Soft drink cans
10. Foil wrappers

How does this differ from the rubbish collected in your school or classroom?

The Rubbish Report[1] has lots of interesting information. There are also heaps of activity ideas on the National Literacy and Numeracy Week[2] website.
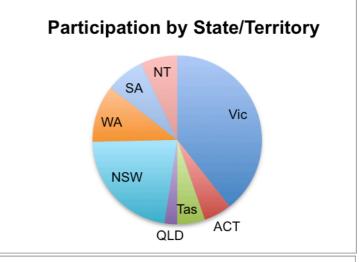
Who participated?

This graph shows the participation of the States and Territories based on the number of students. Rank the participation from highest to lowest. Is this a helpful graph? What might make it more useful? Are the participation rates what you might expect given the populations of the States and Territories?
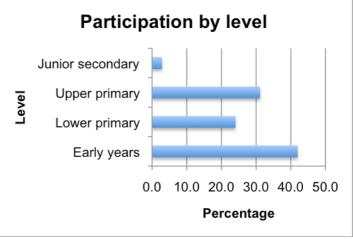
Classes were categorised as Early years (Year 2 or below), Lower primary (Years 3–4), Upper Primary (Years 5–6/7) and Junior secondary (Years 7/8 and above).

Which level participated the most? Approximately what percentage was this?

One level was not very highly represented. Which one was it? Can you think of a possible reason?
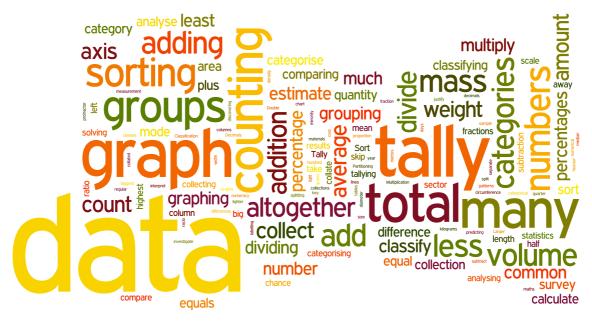

Participation by State/Territory

Participation by level

[1] http://www.cleanup.org.au/au/RubbishReport2/rubbish-report2010.html
[2] http://www.literacyandnumeracy.gov.au/numeracy

Talking mathematically

Here are two word clouds about the key mathematical words that came out of classroom discussions. One was made from the Early years data and one from Upper primary data. Can you tell which is which?[3] What is your reasoning?

The more times a word is mentioned, the bigger the word appears in the cloud. What are the five biggest (and therefore most used) words in each of the clouds? Did you use those words in your classroom discussions?

**"The preps said that it was so fun and awesome.
We liked glueing the rubbish onto the graph.
It was great! It was the best day!"**

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[3] The first is the upper primary and the second the early years.