

NRICH MATHS CHALLENGE-Waste and Recycling

Rohan Savjani

Wilson's School (Year 7)

Question 1: How many plastic bottles does the family use each week on average?

- There are 4 people in this family
- Family produce 40kg of plastic waste each year
- Half the weight of the family's plastic waste is bottles (20kg)

20kg -plastic waste annually (not recycled)

20kg -plastic bottles annually (recycled)

15 million plastic bottles x 365 = 5,475 million plastic bottles
made each day in UK made each year in UK

275,000 tonnes x 1000 x 1000 = 275 billion grams (this is plastic to make bottles in UK annually)

Therefore, to calculate the weight of a plastic bottle is:
 $275 \text{ billion grams} \div 5,475 \text{ million plastic bottles} = 50.23\text{g (2.d.p)}$

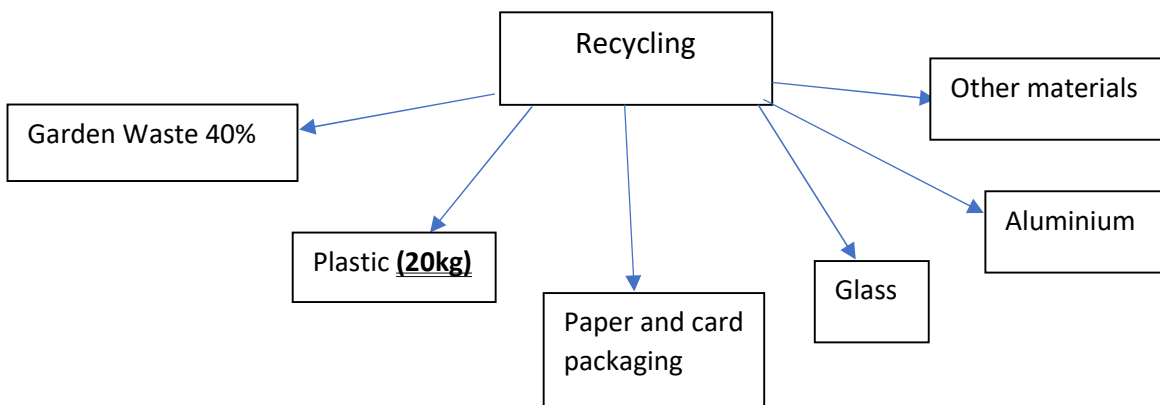
We know the family recycles 20kg of plastic bottles each year. So $20\text{kg} = 20,000\text{g}$

To calculate the weight of plastic bottles recycled in a week:
 $(20,000\text{g} \div 365) \times 7 = 383.56\text{g (2.d.p)}$

The number of bottles in a week = $383.56\text{g} \div 50.23\text{g} = 7.63$

Therefore, the family recycles 8 plastic bottles a week.

Question 2: How much of the family's recycling (in weight) is made up of other materials?



Glass: - recycle 90% of 10 items used per week

$$9 \times 300\text{g} \times 52 = \underline{\underline{140.4\text{kg}}}$$

Aluminium: – recycle 500g per week

$$0.5 \times 52 = \underline{\underline{26\text{kg}}}$$

Paper and card packaging:

- 10 million tonnes of paper and cardboard are used each year.
- About half of the paper and card produced in the UK is used to make packaging.
- Therefore 5 million tonnes (or 5 billion kg) of paper and card is used to make packaging each year.

Packaging per person = 5 billion kg ÷ 65 million people = 76.923kg
(annually)

Therefore for a family of 4 = 76.923kg x 4 = **307.69kg** (2.d.p)

- 45% of household waste is recycled. So this means 55% is not recycled.
- “Residual waste” means waste which is not recycled.
- Residual waste per person is 275kg per year. (55%)

Therefore, recycled waste is 45% and this is 225kg per person.

So, for the family of 4 recycled waste is **900kg** for the year.

Garden waste:- makes up 40% of the total weight of their recycled waste.

$$40\% \times 900\text{kg} = \underline{\underline{360\text{kg}}}$$

Other = 900 – (360+20+307.69+26+140.4)

Materials

Therefore, other materials recycled =45.91kg