



# Materials and Maths Challenge

## KS3/4

### Algebra

Bonnie has recycled 27 more cans than Jackie, and Jackie has recycled 11 more cans than Freddie. If Bonnie has recycled 56 cans, write and solve an equation to find how many cans Jackie and Freddie have recycled each.



### Multiplication and Division

If you produce around 455kg of waste every year. What would the average waste be for the whole of Devon be assuming a population size of 802,375 people?

What is the average waste produced per household (in kg) if the total waste in Devon is 364,714 tonnes and there are 380,000 households?

### Volumes

Raphael drives a standard-sized recycling truck. The dimensions of the base of the truck are length 4.5 metres, width 2.4 metres, and height 1.8 metres. What is the volume of the recycling truck?



### Fractions

The class collected  $9\frac{5}{7}$  kilograms of glass bottles and  $6\frac{1}{2}$  kilograms of aluminium cans. How many kilograms of glass and aluminium did the class collect in all?



### Percentages

Market prices for materials such as glass, plastic and metals are going up. Currently prices are estimated as £67 for 10cm of glass, £100 for 100g of plastic, £400 for 50g metals

a) How much does it cost to make a phone currently?

If prices of each material are increasing by 5%

c) How much will it cost to make a mobile phone after the increase in material prices?

Extension: What is the cost of each material after the increase in material prices?





# Answers

## KS3/4

### Algebra

$$x = 56 - 27 \quad \text{or} \quad x + 27 = 56$$

$$x = 29$$

$$\text{Jackie} = 29$$

$$29 - 11 = 18$$

$$\text{Freddie} = 18$$



### Multiplication

$$455\text{kg} \times 802,375 = 365,080,625 \text{ kg or } 365080.625 \text{ tonnes}$$

$$364,714 \text{ tonnes} = 364,714,000 \text{ kg}$$
$$364,714,000 / 380,000 = 956.77 \text{ kg (2dp) or } 960\text{kg}$$



### Volumes

$$4.5 \times 2.4 \times 1.8 =$$

$$19.44 \text{ m}^3$$



### Fractions

$$\frac{68}{7} + \frac{13}{2} = \frac{227}{14} = 16\frac{3}{14}$$

$$\text{glass: } 68/7 = 9.71\text{kg (2dp)}$$

$$\text{cans: } 6.5 \text{ kg}$$

$$16.21 \text{ kg (2dp)}$$



### Percentages

a) £67 for 10cm of glass, £100 for 100g of plastic, £400 for 50g

b) £595.35  
(using 35.175 for glass instead of rounding up)

c) glass: £35.18  
plastic: £52.50  
metal: £210

