Ratio and Mass Problem Solving

Practice Worksheet

I Do

Zoe wants to make a total of 180 bags of beads to sell at a fair.
She will make small bags and large bags where
number of small bags : number of large bags = 7 : 5

Each small bag will contain 65 grams of beads.
Each large bag will contain 145 grams of beads.

Zoe thinks she will need less than 17 kilograms of beads to fill 180 bags.

Is Zoe correct?
You must show how you get your answer.

(Total for Question is 4 marks)

We Do

Tom wants to make a total of 240 bags of sweets.
He will make small bags and large bags where
number of small bags : number of large bags = 5 : 3

Each small bag will contain 50 grams of sweets.
Each large bag will contain 120 grams of sweets.

Tom thinks he will need less than 19 kilograms of sweets in total.

Is Tom correct?
You must show how you get your answer.

(Total for Question is 4 marks)

Video walkthrough

You Do 1

Catherine packs a total of 150 boxes of spices.
She uses type A boxes and type B boxes where
number of type A : number of type B = 3 : 2

Each type A box contains 40 grams of spices.
Each type B box contains 90 grams of spices.

Catherine thinks the total mass of the spices used is less than 8.5 kilograms.

Is Catherine correct?
You must show how you get your answer.

(Total for Question is 4 marks)

You Do 2

John is preparing 360 packs of coffee beans.
He makes standard packs and deluxe packs where
number of standard packs : number of deluxe packs = 7 : 2

Each standard pack contains 80 grams of coffee beans.
Each deluxe pack contains 250 grams of coffee beans.

John claims he will need less than 43 kilograms of coffee beans.

Is John correct?
You must show how you get your answer.

(Total for Question is 4 marks)

You Do 3

Ryan fills a total of 200 bottles with bath salts.
He uses small bottles and large bottles in the ratio 1 : 3.

Each small bottle holds 150 grams of bath salts.
Each large bottle holds 400 grams of bath salts.

Ryan thinks he will need more than 68 kilograms of bath salts to fill all 200 bottles.

Is Ryan correct?
You must show how you get your answer.

(Total for Question is 4 marks)

Challenge 1

Sophie is making 300 bags of mixed nuts.
She makes small, medium, and large bags in the ratio 2 : 3 : 1.

Each small bag contains 30 grams of nuts.
Each medium bag contains 80 grams of nuts.
Each large bag contains 150 grams of nuts.

Sophie has exactly 25 kilograms of mixed nuts available.

Does she have enough nuts to make all 300 bags?
You must show all your working clearly.

(Total for Question is 5 marks)

Challenge 2

Paige makes small bags and large bags of glitter.
The ratio of the number of small bags to the number of large bags is 3 : 1.

Each small bag contains 45 grams of glitter.
Each large bag contains 120 grams of glitter.

The total mass of the glitter Paige uses for all the bags is exactly 12.75 kilograms.

Work out the total number of bags Paige makes.
Show clear algebraic working.

(Total for Question is 5 marks)

Extreme Challenge

Mark packs flour into bags of type A and bags of type B.

The ratio of the number of type A bags to the number of type B bags is 2 : 5.
The ratio of the mass of one type A bag to the mass of one type B bag is 3 : 4.

The mass of one type A bag is 60 grams.
The total mass of all the type B bags is 5.6 kilograms more than the total mass of all the type A bags.

Work out the total number of bags Mark packs.
You must show all your working clearly.

(Total for Question is 6 marks)

Answers & Worked Solutions

I Do
Total ratio parts $= 7 + 5 = 12$ parts.
180 bags $\div 12 = 15$ bags per part.
Number of small bags $= 7 \times 15 = 105$.
Number of large bags $= 5 \times 15 = 75$.
Mass of small bags $= 105 \times 65\text{g} = 6825\text{g}$.
Mass of large bags $= 75 \times 145\text{g} = 10875\text{g}$.
Total mass $= 6825 + 10875 = 17700\text{g}$.
Convert to kilograms: $17700 \div 1000 = 17.7$ kg.
17.7 kg is greater than 17 kg.
Conclusion: Zoe is incorrect.

We Do
Total ratio parts $= 5 + 3 = 8$ parts.
$240 \div 8 = 30$ bags per part.
Small bags $= 5 \times 30 = 150$.
Large bags $= 3 \times 30 = 90$.
Mass of small $= 150 \times 50 = 7500\text{g}$.
Mass of large $= 90 \times 120 = 10800\text{g}$.
Total mass $= 7500 + 10800 = 18300\text{g} = 18.3$ kg.
18.3 kg is less than 19 kg.
Conclusion: Tom is correct.

You Do 1
Total ratio parts $= 3 + 2 = 5$ parts.
$150 \div 5 = 30$ boxes per part.
Type A boxes $= 3 \times 30 = 90$.
Type B boxes $= 2 \times 30 = 60$.
Mass of A $= 90 \times 40 = 3600\text{g}$.
Mass of B $= 60 \times 90 = 5400\text{g}$.
Total mass $= 3600 + 5400 = 9000\text{g} = 9.0$ kg.
9.0 kg is not less than 8.5 kg.
Conclusion: Catherine is incorrect.

You Do 2
Total ratio parts $= 7 + 2 = 9$ parts.
$360 \div 9 = 40$ packs per part.
Standard packs $= 7 \times 40 = 280$.
Deluxe packs $= 2 \times 40 = 80$.
Mass of standard $= 280 \times 80 = 22400\text{g}$.
Mass of deluxe $= 80 \times 250 = 20000\text{g}$.
Total mass $= 22400 + 20000 = 42400\text{g} = 42.4$ kg.
42.4 kg is less than 43 kg.
Conclusion: John is correct.

You Do 3
Total ratio parts $= 1 + 3 = 4$ parts.
$200 \div 4 = 50$ bottles per part.
Small bottles $= 1 \times 50 = 50$.
Large bottles $= 3 \times 50 = 150$.
Mass of small $= 50 \times 150 = 7500$g.
Mass of large $= 150 \times 400 = 60000$g.
Total mass $= 7500 + 60000 = 67500$g $= 67.5$ kg.
67.5 kg is not more than 68 kg.
Conclusion: Ryan is incorrect.

Challenge 1
Total ratio parts $= 2 + 3 + 1 = 6$ parts.
$300 \div 6 = 50$ bags per part.
Small bags $= 2 \times 50 = 100$.
Medium bags $= 3 \times 50 = 150$.
Large bags $= 1 \times 50 = 50$.
Total mass $= (100 \times 30) + (150 \times 80) + (50 \times 150)$
Total mass $= 3000 + 12000 + 7500 = 22500$g $= 22.5$ kg.
22.5 kg is less than the 25 kg she has available.
Conclusion: Yes, Sophie has enough.

Challenge 2
Let the number of small bags be $3k$ and the number of large bags be k.
Mass of small bags $= 3k \times 45 = 135k$ grams.
Mass of large bags $= k \times 120 = 120k$ grams.
Total mass $= 135k + 120k = 255k$ grams.
We know the total mass is 12.75 kg $= 12750$ grams.
Set up the equation: $255k = 12750$
$k = 12750 \div 255 = 50$
The total number of bags is $3k + k = 4k$.
Total bags $= 4 \times 50 =$ **200**.

Extreme Challenge

1. Find the mass of one type B bag:
Ratio of mass A to mass B is $3 : 4$.
Since mass A = 60g, one part is $60 \div 3 = 20$g.
Mass B $= 4 \times 20 = 80$g.

2. Use algebra for the number of bags:
Let the number of type A bags be $2x$ and type B bags be $5x$.
Total mass of A bags $= 2x \times 60 = 120x$ grams.
Total mass of B bags $= 5x \times 80 = 400x$ grams.

3. Form an equation using the difference in mass:
The total mass of B bags is 5.6 kg (5600g) more than A bags.
$400x - 120x = 5600$
$280x = 5600$
$x = 5600 \div 280 = 20$

4. Find the total number of bags:
Total number of bags $= 2x + 5x = 7x$.
Total bags $= 7 \times 20 =$ **140**.