**Year 5 and 6 Bar Model Progression**

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|  | Model | Practical examples |
| **Additive reasoning**  Comparing problems | Dev has £2 more than Juan and together they have £3.50.  How much does each person have?   |  |  | | --- | --- | | Dev?  £3.50 | | | Juan? | £2 |  |  |  | | --- | --- | | Dev: 75p | + £2  £3.50 | | Juan: 75p | £2 |   £1.50   |  |  | | --- | --- | | Dev: 75p | + £2  £3.50 | | Juan: 75p | £2 |   £1.50 | IMG_0758.JPG  *Providing card strips and whiteboards allows children to explore problems.* |

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|  | Model | Practical examples |
| **Multiplicative Reasoning**  Multi-step part-whole, comparing and fractions problems | There are 5 people living in each of the 6 houses on Green Street. 3/5 of these people are children and the rest are adults.  How many adults live on Green Street?   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 5 |  |  |  |  |  | | ? | | | | | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | 30 | | | | | |  |  |  |  |  | | ? | | | IMG_0759.JPG  *Providing card strips and whiteboards, and encouraging children to cut up the strips as required promotes successful exploration.*  IMG_0760.JPG |
| Comparing problems | The sum of two numbers is 36. The larger number is 3 times the smaller number. What are the two numbers?   |  | | --- | | **36** | |  |  |  |  |  | | --- | | 9  **36** | | 9 | 9 | 9 | | **IMG_0761.JPG**  *Fraction tiles are good manipulatives to represent bar models (note: use face down).* |
| Lisa had 1750 stamps. Minah had 480 fewer stamps than Lisa. Lisa gave some stamps to Minah. Now Minah has 3 times as many stamps as Lisa. How many stamps did Minah have at first? How many stamps does Lisa have now?   |  | | --- | | L  **3,020** | |  |  |  | | Minah? | | |  |  |  | | --- | --- | | Lisa 1,750 | | | Minah? | 480 | | IMG_0762.JPG  *Fraction tiles allow children to easily rearrange the parts to represent number problems.* |
| There are 3/5 as many boys as girls. If there are 75 girls, how many boys are there?   |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  |  |  | | 75 | | | | | | IMG_0763.JPG |

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|  | Model | Practical examples |
| Ratio problems | Whole known, value of one part unknown  To make green paint, you need yellow and blue in the ratio of 1:2. How much yellow paint is needed to make 21 litres of green?   |  |  |  | | --- | --- | --- | | 21 | | | | Y? | B | B | | IMG_0765.JPG  *Cuisenaire rods are useful as unmarked representations of quantities.* |
| Whole known, value of one part known  To make green paint, you need yellow and blue in the ratio of 1:2. How much green paint can be made from 7 litres of yellow?   |  |  |  | | --- | --- | --- | | ? | | | | Y: 7 | B | B | | IMG_0765.JPG |
| Whole unknown, value of more than one part known  To make green paint, you need yellow and blue in the ratio of 1:2. How much green paint can be made from 14 litres of blue?   |  |  |  | | --- | --- | --- | | ? | | | | Y? | B | B | |  | 14 | | | IMG_0766.JPG  *Cuisenaire rods allow children to easily rearrange the parts to represent number problems.* |

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| Multi-step additive and multiplicative reasoning problems | A jacket costs 3 times as much as a pair of shoes. If the pair of shoes costs £56, what is the total cost of the jacket and the pair of shoes?  **£56**  **?**   |  | | --- | |  | |  |  |  | | J | | | | **IMG_0767.JPG** |
| Susan has 400 sheets of paper. She gives 5 sheets of paper to every student in a class. There are 62 students in the class. How many sheets of paper has she left?   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 62 |  |  |  |  | | ? | | | | |  |  |  | | --- | --- | | 400 | | | 310 |  | | IMG_0769.JPG  IMG_0768.JPG |
| Year 2 collect 65 books for the book drive. They put some of the books in boxes and have 25 books left to pack. Year 3 have 4 times as many books in boxes. There are none left to pack. How many books does Year 3 collect?   |  |  | | --- | --- | | 65 | | | ? | 25 |  |  | | --- | | 40 | |  |  |  |  | | IMG_0770.JPG  IMG_0771.JPG |

Example bar model problems (NCETM)

Year 5 Problems

1. Every day for 4 days Helen scored 7.5 in a test. On the fifth day she scored 8. What was her total score?
2. I cut 60cm from a 3.3m of string and shared the rest between 3 friends. How much string did they get each?
3. How many jugs of water with a capacity of 250ml could you fill with 20 litres of water?
4. All the children in the school are going on a residential trip to Osmington Bay. They will be divided into 6 equal groups. If there are 246 children in the school, how many will be in each group?
5. Robert calculated 25% of 600. What answer does he get?
6. Sam calculated 20% of £120. What answer does he get?
7. Rita worked out that one sixth of a number was 12. What number did she start with?

Year 6 Problems

1. Three quarters of a number is 54. What is the number?
2. Which is more: five ninths of 252 or four sevenths of 238?
3. There are 36 packets of biscuits. One half are chocolate, a ninth are digestive and a third are wafer biscuits. The rest are ginger nuts. How many packets are ginger nuts?
4. There is 20% off in a sale. How much would a tracksuit cost if the normal price was £44.50?
5. There is 20% off in a sale. The reduced price of a pair of jeans is £36. What was the original price?
6. At a dance there are 4 girls for every 3 boys. There are 63 children altogether. How many girls are there?
7. Seven in every nine packets of crisps in a box are salt & vinegar. The rest are plain. There are 63 packets of slat & vinegar. How many packets are plain?

KS3 Problems

1. Ralph posts 40 letters, some of which are first class, and some of which are second class. He posts four times as many second class as first. How many of each class of letter does he post?
2. A computer game was reduced on sale by 20% and it now costs £55. What was the original cost?
3. Sam bakes a variety of cookies. One third are peanut, half are raisin and the remaining 12 were oat. How many biscuits are baked?
4. Sally had a bag of marbles. She gave one third to Rebecca and then one quarter of the remaining marbles to John. Sally then had 24 marbles left. How many were in the bag to start with?

Appendix – Fractions, Decimals, & Percentages

   

 

 

 

 

 