

**Stage 3 ★****Mixed Selection 1 - Solutions****1. Kate's date**

The total mass of the original five dates was $5 \times 50\text{g} = 250\text{g}$.

The total mass of the four remaining dates was $4 \times 40\text{g} = 160\text{g}$.

Therefore the mass of the date that Kate ate was $250\text{g} - 160\text{g} = 90\text{g}$.

2. Rugby and ballet

The average mass of all 15 people is $(425 + 10 \times 40)/15 = 55\text{kg}$.

3. Ladybird football team

There are six members of the squad, and the average number of spots is 12. The formula for the average number of spots is:

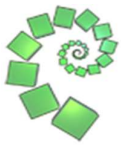
$$\text{Average Spots} = \frac{\text{Total Spots}}{\text{Number of Ladybirds}}$$

Therefore, the total number of spots is:

$$\text{Average Spots} \times \text{Number of Ladybirds} = 12 \times 6 = 72$$

The other ladybirds have a total of $2 + 10 + 14 + 18 + 24 = 68$ spots, so the pine ladybird has $72 - 68 = 4$ spots.

These problems are adapted from UKMT (ukmt.org.uk) and SEAMC (seamc.asia) problems.

**4. Mean balance**

If ■ is less than 6, then adding another ■ to the set would make the mean smaller.

If ■ is more than 6, then adding another ■ to the set would make the mean larger.

But adding another ■ to the set does not change the mean, so ■ must be exactly 6.

So the mean of the set of numbers 8, 4, 5, 4, ●, 6 and 6 is 6.

That means that $(8 + 4 + 5 + 4 + \bullet + 6 + 6) \div 7 = 6$,
so $8 + 4 + 5 + 4 + \bullet + 6 + 6 = 42$,
so $33 + \bullet = 42$, so $\bullet = 9$.

So $\bullet = 9$ and ■ = 6.

5. Choose the mean

For the mode to be 9, at least 2 of the numbers must be 9s.

The median and the mean are both smaller than 9, so the other numbers must be smaller than 9.

The median will be halfway between 9 and the next largest number, so if the median is 8, then the next largest number must be 7.

Then 9, 9, 7 and the fourth number must have a mean of 7, so, since there are 4 of them, they must have a total of $7 \times 4 = 28$. So the fourth number is 3.

These problems are adapted from UKMT (ukmt.org.uk) and SEAMC (seamc.asia) problems.