

## Teaching Mental Strategies

Knowing basic number facts well is the foundation to lots of other mathematics. One set of skills which students can build onto their knowledge of the four operations' basic facts is mental strategies.

This eBook contains exercises on a variety of useful mental strategies which, if students develop them well, will allow for further development.

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### **Multiplication**

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For example,  $\times 100$ : move every digit 2 places to the left, then fill in trailing zeros as place holders if necessary.

$$64 \times 100 = 6400$$

$$15.8 \times 1000 = 15\,800$$

*Note:* it is not recommended to talk of "adding zeroes", since this is not an accurate description of the process. It also ceases to work if the number being multiplied has a decimal point. Rather, help students to see that when a number is multiplied by a power of ten, the digits are

shifted the appropriate number of places to the left. If required, zeroes are placed in right-hand places.

### **Dividing by Powers of Ten**

Dividing by 10, 100, or 1000 is likewise a powerful and very useful skill. Once they understand the process, students should be

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locations, keeping the decimal point fixed between the ones and tenths places.

### **Doubling**

Many mathematical processes involve some use of doubling; for example, when calculating an equivalent fraction, doubling a numerator and denominator is often required.


Teach students to look at the number being doubled and work out if regrouping is



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required, then hold the various digits in memory before combining them in the result. If there is regrouping of ones, they should start by doubling the ones digit. For example:

Double 46: notice that double 6 goes over ten, so there will be an extra ten in the answer.

$$\begin{aligned}\text{Double 46} &= \text{double 4 tens} + \text{double 6 ones} \\ &= 8 \text{ tens} + 12 \text{ ones} \\ &= 92\end{aligned}$$

For example:

$$\begin{aligned}7 + 6 + 1 + 4 + 3 &= 7 + 3 + 6 + 4 + 1 \\ &= 10 + 10 + 1 \\ &= 21\end{aligned}$$

### **Adding Near 100**

When adding numbers near 100, a “compensation” method can often be used.

For example:

$$\begin{aligned}98 + 43 &= 100 + 43 - 2 \\ &= 143 - 2 \\ &= 141\end{aligned}$$

### **Halving**

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$$\begin{aligned}&\text{ones} \\ &= 3 \text{ tens} + 8 \text{ ones} \\ &= 38\end{aligned}$$

### **Adding “Nice” Numbers**

When mentally adding a set of numbers, proficient thinkers will look for numbers which add easily together. These pairs will usually be two numbers whose sum is 10 or 100.

### **Subtracting Near 100**

Just as when adding near 100, with these questions students should think about subtracting 100, and compensating for the difference.

For example:

$$\begin{aligned}374 - 99 &= 372 - 100 + 1 \\ &= 274 + 1 \\ &= 275\end{aligned}$$

### ***Multiplying by 50 & 25***

Multiplying by 50 and 25 is quite easy to do, seeing that they are one half and one fourth or quarter of 100, respectively.

Multiplying by 50 can be done by multiplying by 100 then halving the result, or in the opposite order, halve the other number first, then multiply by 100. Similarly, multiplying by 25 involves quartering and multiplying by 100.

For example:

$$64 \times 25 = 64 \div 4 \times 25 \times 4$$

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Students should be familiar with their basic number facts, and have a good understanding of tenths and hundredths before commencing these questions.



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