

The **SPOT THE MISTAKE Inclusion and Home Learning Guide** is part of a Learning Pack downloadable from the AIMING HIGH website

<https://aiminghigh.aimssec.ac.za/?s=spot+the+mistake>

It provides related activities for home learning for all ages, and learning stages from pre-school to school-leaving, together with guidance for home-learning and also for inclusion in school lessons, all on the **Common Theme LEARNING FROM MISTAKES** Guidance for school lessons is given in the separate Notes for Teachers documents. Choose what seems suitable for the age or attainment level of your learners.

SPOT THE MISTAKE

Here are some calculations.

There are some mistakes and also some correct methods and correct answers.

Find the mistakes and write out the correct calculation using that method.

Explain how and why the methods that get the correct answers work.

SPOT THE MISTAKE												
How do these methods work?												
Find the mistake and put it right.												
$\begin{array}{r} 79 \\ \times 8 \\ \hline 642 \end{array}$	<table border="1"> <thead> <tr> <th>x</th> <th>70</th> <th>9</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>560</td> <td>72</td> <td>632</td> </tr> </tbody> </table>	x	70	9	TOTAL	8	560	72	632	$632 \div 8 =$ $80 \times 7 + 8 \times 9 \div 8 = 79$		
x	70	9	TOTAL									
8	560	72	632									
$8 \overline{)6372}$ $\begin{array}{r} 79 \\ 8 \times 79 = 632 \\ \hline 79 \end{array}$												

SPOT THE MISTAKE															
How do these methods work?															
Find the mistake and put it right.															
$\begin{array}{r} 239 \\ \times 7 \\ \hline 1673 \end{array}$	<table border="1"> <thead> <tr> <th>x</th> <th>200</th> <th>30</th> <th>9</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>1400</td> <td>210</td> <td>63</td> <td>1673</td> </tr> </tbody> </table>	x	200	30	9	TOTAL	7	1400	210	63	1673	$1673 \div 7 =$ $200 \times 7 + 30 \times 7 + 9 \times 7 \div 7$ $= 200 + 30 + 9$ $= 239$			
x	200	30	9	TOTAL											
7	1400	210	63	1673											
$7 \overline{)162763}$ $\begin{array}{r} 238 \\ 7 \times 238 = 1666 \\ \hline 613 \end{array}$															

SPOT THE MISTAKE												
How do these methods work?												
Find the mistake and put it right.												
$\begin{array}{r} 29 \\ \times 51 \\ \hline 145 \\ 290 \\ \hline 435 \end{array}$	<table border="1"> <thead> <tr> <th>x</th> <th>20</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>1000</td> <td>450</td> </tr> <tr> <td>1</td> <td>20</td> <td>9</td> </tr> </tbody> </table>	x	20	9	50	1000	450	1	20	9	29×51 $= 1000 + 450 + 20 + 9$ $= 1479$	
x	20	9										
50	1000	450										
1	20	9										
29×51 $= 30 \times 51 - 51$ $= 1530 - 51$ $= 1479$	29×51 $= 29 \times 50 + 29$ $= 145 \times 100 + 29$ $= 1450 + 29$ $= 1479$											

HELP

If you are stuck with the SPOT THE MISTAKE task the do the following.

- Do the calculations using any method you choose, and then check your calculation using a calculator.
- If you got it wrong look for your own mistake. If you can't find it, ask for help.
- If you get the calculation correct then have a go at spotting the mistakes in the example.

NEXT

SPOT THE MISTAKE					
How do these methods work? Find the mistake and put it right.					
$\begin{array}{r} 129 \\ \times 34 \\ \hline 486 \\ 3870 \\ \hline 4356 \end{array}$	$\times$	100	20	9	TOTAL
	30	3000	600	270	3870
	4	400	80	36	516
	129×34 $= 3870 + 516$ $= 4386$				

SPOT THE MISTAKE					
How do these methods work? Find the mistake and put it right.					
$\begin{array}{r} 129 \\ \times 512 \\ \hline 258 \\ 1290 \\ 64500 \\ \hline 65948 \end{array}$	$\times$	100	20	9	TOTAL
	500	50000	10000	4500	64500
	10	1000	200	90	1290
	2	200	40	18	258
129×512 $= 64500 + 1290 + 258$ $= 66048$					

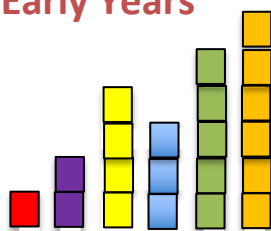
Make up your own written calculation, and then write it out with a deliberate mistake for your partner to spot and correct.

INCLUSION AND HOMELEARNING GUIDE

THEME: LEARNING FROM MISTAKES

*We need to prepare young people for the job market; however existing knowledge and skills have limited value **unless** they can be applied in new ways to solve today's complex problems and to improve the quality of life for all. Calculations are done by computers, but people still need to have 'number sense' that enables them to estimate answers and deduce that their methods are wrong if they get unlikely answers. These 'Spot the Mistake' questions are given here because most countries require learners to be able to carry out multiplication and division calculations in order to pass school exams.*

Early Years



These towers should be in order of height but there is a mistake.

Draw the pattern, correct the mistake, and continue the pattern by drawing bigger towers.

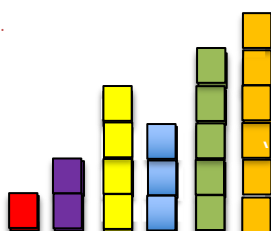
If you have building blocks, make some towers of heights 1 to 10 and put them in ascending order.

Put the following muddled lists of numbers in order:

1, 2, 3, 4, 5, 7, 6, 8, 9, 10

1, 9, 3, 4, 5, 6, 7, 8, 2, 10, 11, 15, 12, 13, 14, 16, 17, 18, 19, 20

Lower Primary



These towers should be in order of height but there is a mistake. Copy the pattern, correct the mistake, and draw some taller towers to continue the pattern.

If you have building blocks make some towers for 1 to 10 and put them in ascending order.

Put the following muddled lists of numbers in order:

1, 2, 3, 4, 5, 7, 6, 8, 9, 10

1, 9, 3, 4, 5, 6, 7, 8, 2, 10, 11, 15, 12, 13, 14, 16, 17, 18, 19, 20

Here are some lists in descending order. The first one is correct but the others are muddled. Put them in order.

20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

20, 19, 18, 17, 16, 15, 13, 12, 11, 10, 9, 8, 7, 6, 5, 14, 4, 3, 2, 1

20, 19, 17, 18, 16, 15, 14, 13, 12, 11, 6, 10, 9, 8, 7, 5, 4, 3, 2, 1

Create your own muddled list and exchange it with a partner. Spot the mistakes and correct the mistakes in your partner's list.

Lesson starter for a mixed-age group

Play the 'Spot the Mistakes' game. You need at least 2 learners but this game works best if the learners work in pairs and compete against other pairs so they can talk about the puzzle with a partner and help each other. Learners engage with different methods and find out how and why the methods work. They have to investigate and compare different methods for themselves which usually gives them a better understanding than simply listening to an explanation from the teacher.

Spot the Mistakes is a good teaching strategy, useful as a diagnostic assessment to discover how much the learner knows and understands.

SPOT THE MISTAKES PUZZLE 1

<https://aiminghigh.aimssec.ac.za/years-4-7-spot-the-mistake/>

How do these methods work? Spot the mistakes and put them right.

79 x 8 642	<table><tr><th>x</th><th>70</th><th>9</th><th>TOTAL</th></tr><tr><td>8</td><td>560</td><td>72</td><td>632</td></tr></table>	x	70	9	TOTAL	8	560	72	632
x	70	9	TOTAL						
8	560	72	632						
8 632 79	$632 \div 8 =$ $80 \times 7 + 8 \times 9 \div 8 = 79$								

239 x 7 1673	<table><tr><th>x</th><th>200</th><th>30</th><th>9</th><th>TOTAL</th></tr><tr><td>7</td><td>1400</td><td>210</td><td>63</td><td>1673</td></tr></table>	x	200	30	9	TOTAL	7	1400	210	63	1673
x	200	30	9	TOTAL							
7	1400	210	63	1673							
7 1673 238	$1673 \div 7$ $= 200 \times 7 + 30 \times 7 + 9 \times 7 \div 7$ $= 200 + 30 + 9$ $= 239$										

Spot the Mistakes Game

Give out copies of one of these four puzzles or write the puzzle on the board. The first player (or pair) to complete the puzzle wins a point but only if they can explain to everyone else how the methods work, what the mistakes are, and how to put them right.

Learners at home do not need to be the same age to play the game. Just arrange for older learners to work with a young learner as a partner.

If one learner is working alone then he or she can try to spot the mistakes and solve the puzzle and explain to you what they have done.

If they don't identify all the mistakes, another player can score a point by spotting and explaining the mistake that was left out.

SPOT THE MISTAKES PUZZLE 2

<https://aiminghigh.aimssec.ac.za/years-4-7-spot-the-mistake/>

SPOT THE MISTAKE

How do these methods work?
Find the mistake and put it right.

239 x7 1673	<table><tr><th>x</th><th>200</th><th>30</th><th>9</th><th>TOTAL</th></tr><tr><td>7</td><td>1400</td><td>210</td><td>63</td><td>1673</td></tr></table>	x	200	30	9	TOTAL	7	1400	210	63	1673
x	200	30	9	TOTAL							
7	1400	210	63	1673							
7 1673 238	$1673 \div 7$ $= \frac{200 \times 7 + 30 \times 7 + 9 \times 7}{7} \div 7$ $= 200 + 30 + 9$ $= 239$										

SPOT THE MISTAKES PUZZLE 3

<https://aiminghigh.aimssec.ac.za/years-4-7-spot-the-mistake/>

SPOT THE MISTAKE

How do these methods work?
Find the mistake and put it right.

29 x51 145 290 435	x 20 9 50 1000 450 1 20 9	
	29 × 51 = 1000 + 450 + 20 + 9 = 1479	
	29 × 51 = 30 × 51 - 51 = 1530 - 51 = 1479	29 × 51 = 29 × 50 + 29 = 145 × 100 + 29 = 1450 + 29 = 1479

SPOT THE MISTAKES PUZZLE 4

<https://aiminghigh.aimssec.ac.za/years-4-7-spot-the-mistake/>

SPOT THE MISTAKE

How do these methods work?
Find the mistake and put it right.

129 x34 486 <u>3870</u> 4356	x	100	20	9	TOTAL
	30	3000	600	270	3870
	4	400	80	36	516
	129 × 34 = 3870 + 516 = 4386				

Upper Primary and Lower Secondary Years 4 – 10

You could use the puzzles one at a time, on different occasions. If you are home-schooling a mixed-age group you could make a game out of solving the puzzles as described for Lower Primary.

Alternatively, you could make a copy of the worksheet on page 1 for your learners and have them working in small groups to find the mistakes and explain the methods. Observe them working and ask them questions to guide their learning. See the Key Questions below.



Puzzle 2 shows that multiplication and division are inverse operations like putting on socks and shoes (socks first then shoes) and, to reverse or undo the process, taking them off (shoes first then socks).

Why do this activity?

Learners need practice in doing routine calculations and this activity gives them the necessary practice in an unusual way. More importantly, it encourages learners to think for themselves. It is often helpful to allow learners to work in pairs so that they can talk about the methods and exchange ideas. They will probably do the calculation to find out the correct answer if they don't spot the mistake straight away. They are also reminded how the working can be set out.

Also they have to understand the reasons for the working and not just the steps in the calculation process. They will gain a better understanding of multiplication and division by thinking about different methods of calculation and why the different methods work.

Learning objectives

In doing this activity students will have an opportunity to:

- practise doing routine calculations and to check calculations;
- deepen their understanding of multiplication and division.

Generic competences

In doing this activity students will have an opportunity to:

- apply knowledge and skills;
- gain number sense, and the ability to estimate answers to calculations, so that they can spot answers given by a calculator or computer that are obviously wrong. This is an important skill because, when rubbish is keyed into an automatic processor, rubbish has come out.

Upper Secondary Years 11 – 13 QUICK CHECKS TO TRY

Understanding and estimating calculations is for humans. Doing quick accurate calculations is for calculators and computers.

Being able to make a good estimate of a calculation helps you to spot errors in answers that arise from failing to use the calculator or computer correctly.

Question 1. How good are you at estimation of calculations?

$\frac{167.98 \times 1.37}{37.6}$ is roughly $\frac{170 \times 1}{40}$ which is obviously $\frac{17}{4} = 4.25$.

The actual value is 6.12 ... If we had made a mistake and entered 13.7 into the calculator we would have got an answer 61.2 which is so far from 4.25 that we would have spotted that we had probably made a mistake.

Try this with

$$\frac{214.35 \times 13.7 \times 1234}{37.6 \times 337}$$

Question 2. Now explain why the following is wrong without doing the calculation:

$$21 + 35 + 22 - 71 + 44 + 101 - 204 + 179 = 130.$$

Hint: Is the left hand side odd or even? Correct the mistake.

Question 3.

3a. It is suggested that $(3x + 5y)(4x - y) = 12x^2 + 18xy - 5y^2$

If this is correct, it must be correct for $x = y = 1$. Is it correct for $x = y = 1$?

You can check more complicated algebraic identities by substituting particular values of the variables.

3b. Is $(7x + 3)(2 - x) = -7x^2 + 12x + 5$? Is this true when $x = 1$? Is it true when $x = 0$?

This shows that you can stop checking when you have found a value that shows the statement is false.

SPOT THE MISTAKE - SOLUTIONS

SPOT THE MISTAKE
How do these methods work?
Find the mistake and put it right.

$\begin{array}{r} 79 \\ \times 8 \\ \hline 642 \end{array}$	<table border="1"> <tr> <th>x</th> <th>70</th> <th>9</th> <th>TOTAL</th> </tr> <tr> <td>8</td> <td>560</td> <td>72</td> <td>632</td> </tr> </table>	x	70	9	TOTAL	8	560	72	632
x	70	9	TOTAL						
8	560	72	632						
$\begin{array}{r} 8 \overline{) 6372} \\ 79 \end{array}$	$632 \div 8 =$ $80 \times 7 + 8 \times 9 \div 8 = 79$								

YEAR 4 2 digit by 1 digit multiplication

The correct answer is 632. The mistake is $8 \times 7 + 7$ is 64 where it should be 63. Otherwise this is correct. It shows that multiplication and division are inverse operations.

SPOT THE MISTAKE
How do these methods work?
Find the mistake and put it right.

$\begin{array}{r} 239 \\ \times 7 \\ \hline 1673 \end{array}$	<table border="1"> <tr> <th>x</th> <th>200</th> <th>30</th> <th>9</th> <th>TOTAL</th> </tr> <tr> <td>7</td> <td>1400</td> <td>210</td> <td>63</td> <td>1673</td> </tr> </table>	x	200	30	9	TOTAL	7	1400	210	63	1673
x	200	30	9	TOTAL							
7	1400	210	63	1673							
$7 \overline{) 162763}$ $\begin{array}{r} 238 \\ \hline \end{array}$	$1673 \div 7 =$ $= \frac{200 \times 7 + 30 \times 7 + 9 \times 7}{7} \div 7$ $= 200 + 30 + 9$ $= 239$										

YEAR 4 3 digit by 1 digit multiplication

The correct answer is 1673. The mistake is giving 63 divided by 7 to be 8 when $7 \times 9 = 63$.

SPOT THE MISTAKE
How do these methods work?
Find the mistake and put it right.

$\begin{array}{r} 29 \\ \times 51 \\ \hline 145 \\ 290 \\ \hline 435 \end{array}$	<table border="1"> <tr> <th>x</th> <th>20</th> <th>9</th> </tr> <tr> <td>50</td> <td>1000</td> <td>450</td> </tr> <tr> <td>1</td> <td>20</td> <td>9</td> </tr> </table>	x	20	9	50	1000	450	1	20	9
x	20	9								
50	1000	450								
1	20	9								
29×51 $= 30 \times 51 - 51$ $= 1530 - 51$ $= 1479$	29×51 $= 1000 + 450 + 20 + 9$ $= 1479$ 29×51 $= 29 \times 50 + 29$ $= 1450 + 29$ $= 1479$									

YEAR 5 2 digit by 2 digit multiplication

The answer here is 1479 and there are 2 mistakes. In the column method 145 should be 1450 (29×5) and the 290 should be 29 (29×1). In the calculation that $29 \times 50 = 14.5 \times 100$ the decimal point has been omitted but the product is correct on the line below.

SPOT THE MISTAKE
How do these methods work?
Find the mistake and put it right.

$\begin{array}{r} 129 \\ \times 34 \\ \hline 486 \\ 3870 \\ \hline 4356 \end{array}$	<table border="1"> <tr> <th>x</th> <th>100</th> <th>20</th> <th>9</th> <th>TOTAL</th> </tr> <tr> <td>30</td> <td>3000</td> <td>600</td> <td>270</td> <td>3870</td> </tr> <tr> <td>4</td> <td>400</td> <td>80</td> <td>36</td> <td>516</td> </tr> </table>	x	100	20	9	TOTAL	30	3000	600	270	3870	4	400	80	36	516
x	100	20	9	TOTAL												
30	3000	600	270	3870												
4	400	80	36	516												
129×34 $= 3870 + 516$ $= 4386$																

YEAR 6 3 digit by 2 digit multiplication

The answer here is 4386 and there is one mistake. In the column multiplication 486 (129×4) should be 516 and the total below should be 4386.

SPOT THE MISTAKE
How do these methods work?
Find the mistake and put it right.

$$\begin{array}{r}
 129 \\
 \times 512 \\
 \hline
 258 \\
 1290 \\
 64500 \\
 \hline
 65948
 \end{array}$$

×	100	20	9	TOTAL
500	50000	10000	4500	64500
10	1000	200	90	1290
2	200	40	18	258

129×512
 $= 64500 + 1290 + 258$
 $= 66048$

YEAR 6 3 digit by 3 digit multiplication

The answer here is 66048 and this time the mistake is in the addition in the column multiplication. The numbers 258, 1290 and 64500 are correct but the 1 is not carried over from the tens to the hundreds column in the addition.

Diagnostic Assessment

This quiz introduces a different method. The learners may not have seen the method before or may not remember it. After your group has done the other examples, use the quiz to help the learners to figure out how the method works and to explain it.

Show your learners the question and say:
“Put up 1 finger if you think the answer is A, 2 fingers for B, 3 for C and 4 fingers for D”.

$37 \times 42 = 1554$

What number goes in place of the *?
How does this work?

The * should be:
A. 28 B. 2 C. 12 D. 14

1. Notice how the learners respond. Ask them to explain why they gave their answers and **DO NOT** say whether the answers are right or wrong but simply thank the learner for giving the answer.
2. It is important for learners to explain the reason for their answer otherwise many learners will just make a guess. Try to ensure that learners listen to each other and try to decide if their first answer was right or wrong.
3. Ask the learners again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.

B. is the correct answer.
Reading the thousands, hundreds, tens and units diagonally gives
 $1000 + (4 \times 100) + (15 \times 10) + 4 = 1554$

Common Misconceptions

A. The learner knows $7 \times 4 = 28$ goes in this quarter but does not understand that this triangle should have the hundreds value.

C. The learner may have multiplied 3×4 without understanding the process or relevance of place value.

D. Learner may have multiplied 7×2 without understanding the process or relevance of place value.

<https://diagnosticquestions.com>

Follow up

Ask the learners to make up their own written calculation, and then write it out with a deliberate mistake for someone else to spot and correct.

Target Multiplication <https://aiminghigh.aimssec.ac.za/years-4-7-target-multiplication/>

And other ‘Target’ activities.

Two by Two Puzzle <https://aiminghigh.aimssec.ac.za/years-4-7-two-by-two-puzzle/>

Magic Numbers <https://aiminghigh.aimssec.ac.za/years-5-9-magic-numbers/>