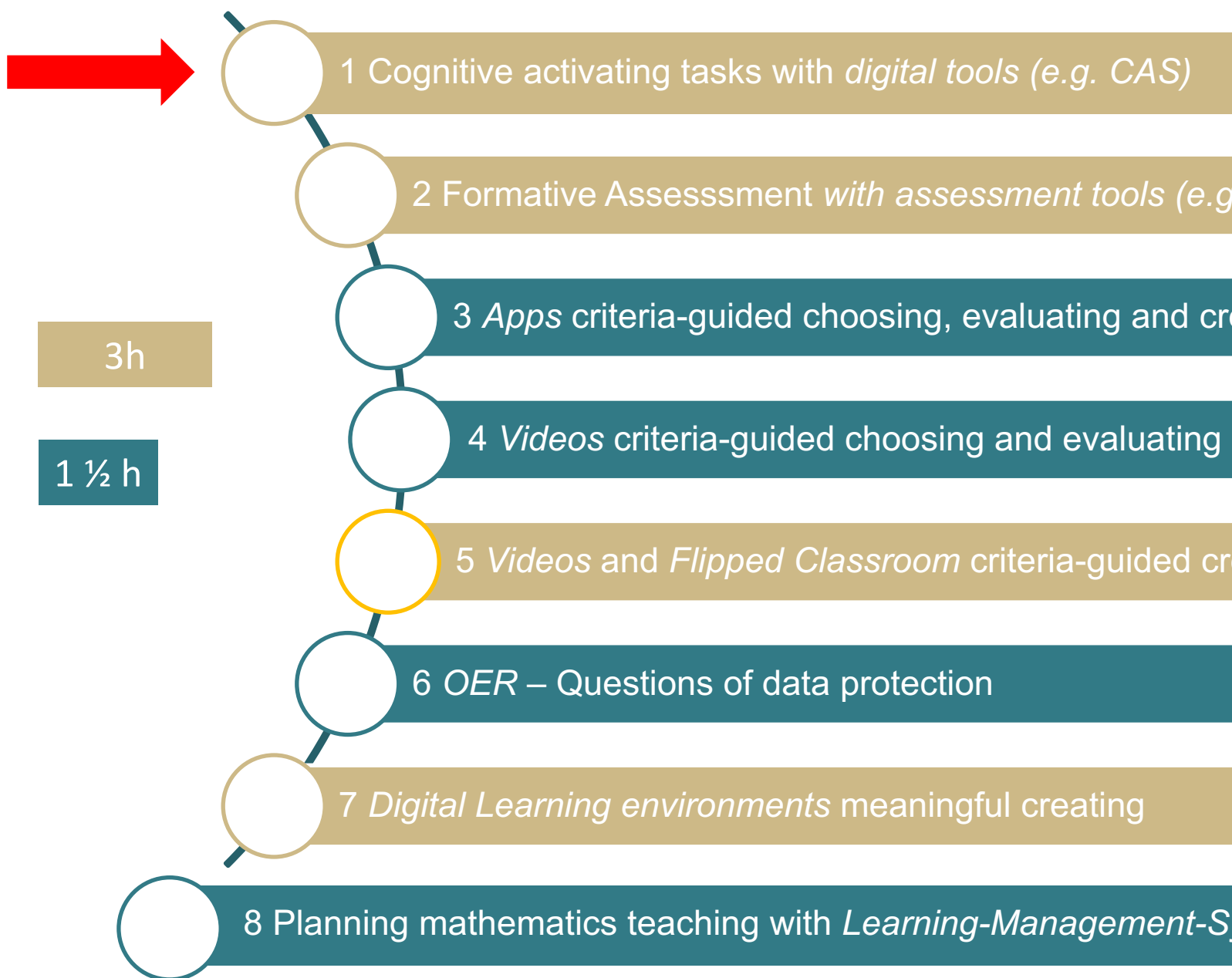
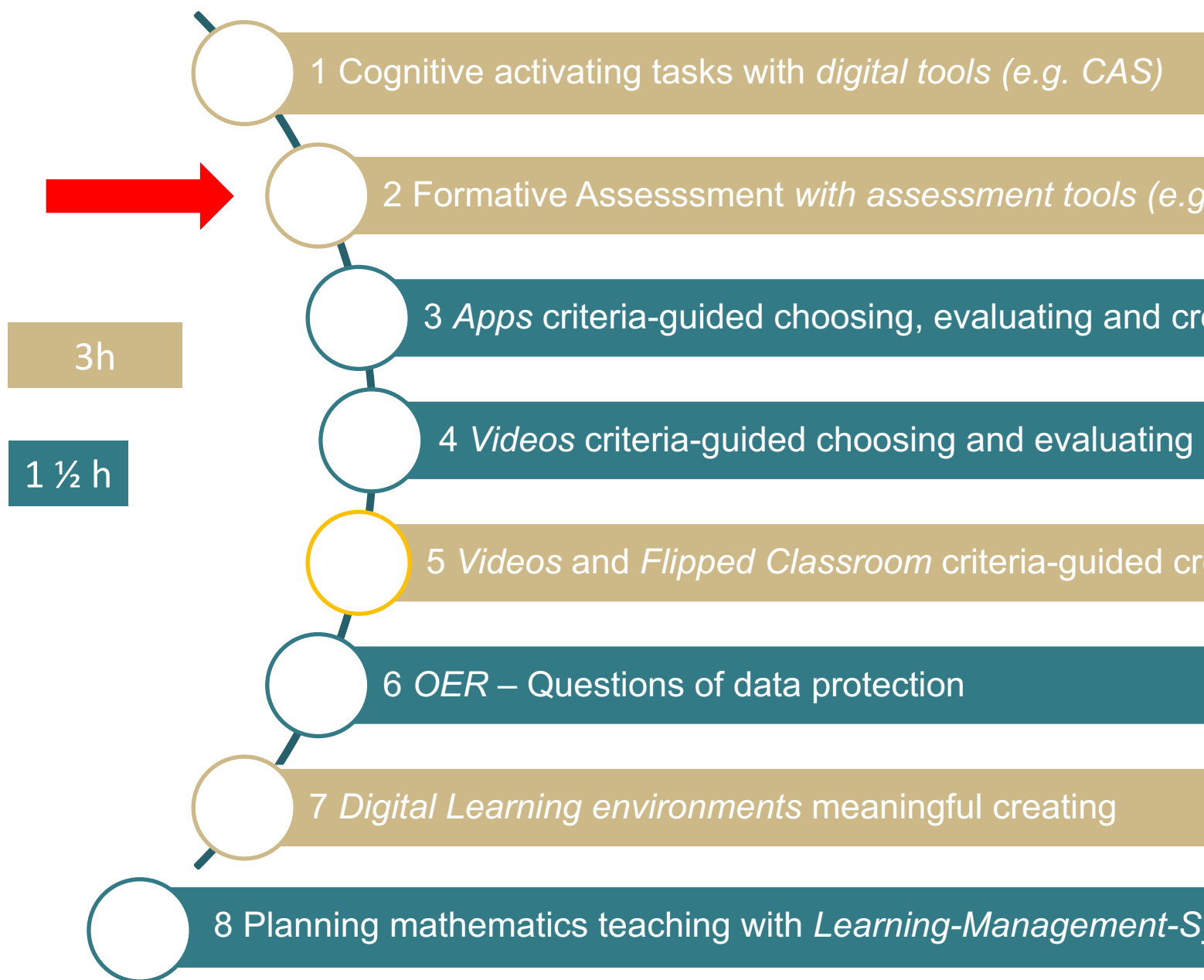


# New Program: Digital Media for cognitive activation

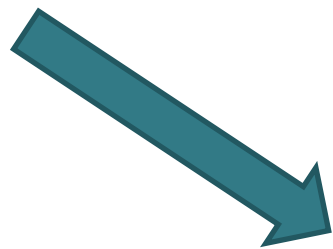


# New Program: Digital Media for cognitive activation



## SMART – a digital formative assessment tool

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The Challenge is to take knowledge out of the classroom and make it available to teachers inside their classrooms.

## What is SMART?



Origin: University of Melbourne (Kaye Stacey et al.)  
currently adapted for German-speaking countries and traditions  
Research: 12 years and more than 500.000 students  
130 SMART-Tests for grades 5 – 9

Over 130 comprehension-oriented tests covering  
content areas and 65 individual topics

**Numbers**

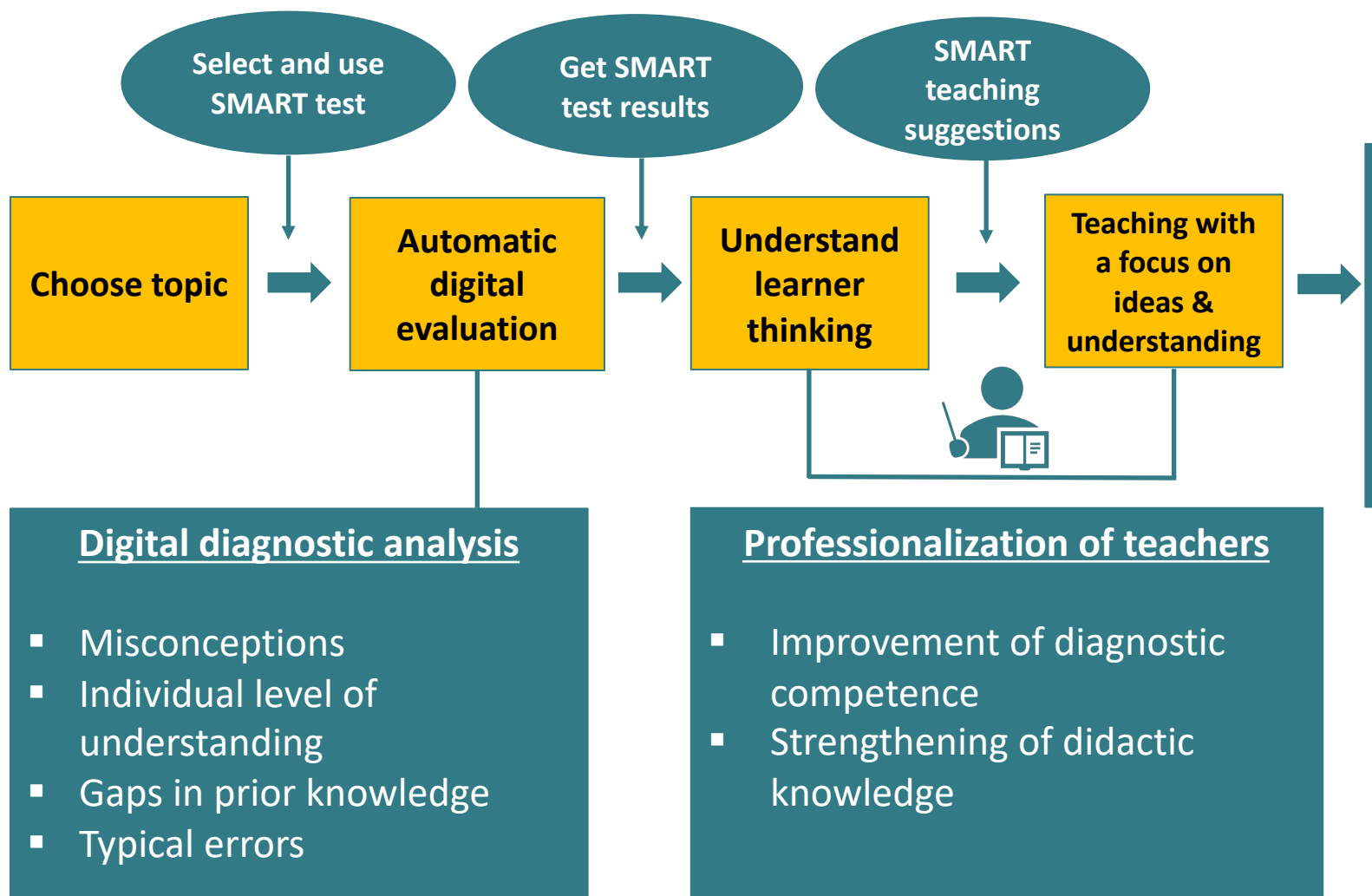
**Geometry**

**Algebra**

**Stochastics and  
probability**

**Measurements**

# The SMART concept – digital formative assessment



# SMART test example: Values for letters

Type in the answer for these two questions.

$d = 4$  and  $e = 5$   
so  $d + e =$

$d = 4$  and  $f = 6$   
so  $d + f =$

Some students had to write values of  $c$  and  $d$  to make an equation true.

Mark the work of each student.

$c + d = 7$   
Sam wrote  $c = 3$  and  $d = 4$ . This is

$c + d = 7$   
Sara wrote  $c = 2$  and  $d = 5$ . This is

$c + d = 7$   
Sall wrote  $c = 6$  and  $d = 1$ . This is

$c + d = 9$   
Song wrote  $c = 5$  and  $d = 6$ . This is

$c + d = 9$   
Sol wrote  $c = 4$  and  $d = 5$ . This is

$c + e = 8$   
Simon wrote  $c = 3$  and  $e = 5$ . This is

$c + e = 8$   
Sid wrote  $c = 10$  and  $e = 2$ . This is

$c + e = 8$   
Sofie wrote  $c = 4$  and  $e = 4$ . This is

Some students had to find some values of  $x$  to make this equation true:  
 $x + x + x = 12$

Mark the work of each student.

Mary wrote  $x = 2$ ,  $x = 5$  and  $x = 5$ . This is

Millie wrote  $x = 9$ ,  $x = 2$  and  $x = 1$ . This is

Mandy wrote  $x = 4$ . This is

Molly wrote  $x = 4$ ,  $x = 4$  and  $x = 4$ . This is

Some students had to give some values of  $x$  and  $y$  to make this equation true:  
 $x + y = 16$

Mark the work of each student.

John wrote  $x = 6$  and  $y = 10$ . This is

Jack wrote  $x = 8$  and  $y = 8$ . This is

James wrote  $x = 9$  and  $y = 7$ . This is

Right  
Wrong

# SMART test example: Values for letters

## ► Developmental stages

**Stage 1:** These students know that letters can stand for numbers and are able to correctly substitute into very simple algebraic expressions, but they believe that the **values** that letters take are in some way **related to their place in the alphabet**.

**Stage 2:** These students interpret an algebraic letter only as a number holder for a number in a number sentence, so they believe that the **letter to have several values** in one expression.

**Stage 3:** These students appreciate that each time a part of an equation is used in an equation it stands for the same number, but they over-generalise to “**different letters must be different numbers**”.

**Stage 4:** These students know that in one algebra question a letter must stand for only one number and that different letters must stand for the same number.

Type in the answer for these two questions.

$d = 4$  and  $e = 5$   
so  $d + e =$

$d = 4$  and  $f = 6$   
so  $d + f =$

Some students had to write values of  $c$  and  $d$  to make an equation true.

Mark the work of each student.

$c + d = 7$ Sam wrote $c = 3$ and $d = 4$ . This is <input type="text"/>	$c + d = 7$ Sara wrote $c = 2$ and $d = 5$ . This is <input type="text"/>
$c + d = 7$ Sali wrote $c = 6$ and $d = 1$ . This is <input type="text"/>	$c + d = 9$ Song wrote $c = 5$ and $d = 6$ . This is <input type="text"/>
$c + d = 9$ Sol wrote $c = 4$ and $d = 5$ . This is <input type="text"/>	$c + e = 8$ Simon wrote $c = 3$ and $e = 5$ . This is <input type="text"/>
$c + e = 8$ Sid wrote $c = 10$ and $e = 2$ . This is <input type="text"/>	$c + e = 8$ Sofie wrote $c = 4$ and $e = 4$ . This is <input type="text"/>

Some students had to find some values of  $x$  to make this equation true:  
 $x + x + x = 12$

Mark the work of each student.

Mary wrote  $x = 2$ ,  $x = 5$  and  $x = 5$ . This is

Millie wrote  $x = 9$ ,  $x = 2$  and  $x = 1$ . This is

Mandy wrote  $x = 4$ . This is

Molly wrote  $x = 4$ ,  $x = 4$  and  $x = 4$ . This is

Some students had to give some values of  $x$  and  $y$  to make this equation true:  
 $x + y = 16$

Mark the work of each student.

John wrote  $x = 6$  and  $y = 10$ . This is

Jack wrote  $x = 8$  and  $y = 8$ . This is

James wrote  $x = 9$  and  $y = 7$ . This is

# SMART test example: Values for letters

## ► Misconceptions and common errors

**A:** Students often give a letter a **value related to it in the alphabet**, such as  $b = 2$ .

**C:** Students believe that the values of **consecutive letters** be **consecutive numbers**.

**O:** Students believe that if one **letter is before another** in the alphabet, its value must be **smaller**.

**R:** When the same letter is used more than once in an expression, these students recognise that it has the same value but **state this value separately for each occurrence**.

Type in the answer for these two questions.

$d = 4$  and  $e = 5$   
so  $d + e =$

$d = 4$  and  $f = 6$   
so  $d + f =$

---

Some students had to write values of  $c$  and  $d$  to make an equation true.  
Mark the work of each student.

$c + d = 7$   
Sam wrote  $c = 3$  and  $d = 4$ . This is

$c + d = 7$   
Sara wrote  $c = 2$  and  $d = 5$ . This is

$c + d = 7$   
Sali wrote  $c = 6$  and  $d = 1$ . This is

$c + d = 9$   
Song wrote  $c = 5$  and  $d = 6$ . This is

$c + d = 9$   
Sol wrote  $c = 4$  and  $d = 5$ . This is

$c + e = 8$   
Simon wrote  $c = 3$  and  $e = 5$ . This is

$c + e = 8$   
Sid wrote  $c = 10$  and  $e = 2$ . This is

$c + e = 8$   
Sofie wrote  $c = 4$  and  $e = 4$ . This is

Some students had to find some values of  $x$  to make this equation true:  
 $x + x + x = 12$

Mark the work of each student.

Mary wrote  $x = 2$ ,  $x = 5$  and  $x = 5$ . This is

Millie wrote  $x = 9$ ,  $x = 2$  and  $x = 1$ . This is

Mandy wrote  $x = 4$ . This is

Molly wrote  $x = 4$ ,  $x = 4$  and  $x = 4$ . This is

Some students had to give some values of  $x$  and  $y$  to make this equation true:  
 $x + y = 16$

Mark the work of each student.

John wrote  $x = 6$  and  $y = 10$ . This is

Jack wrote  $x = 8$  and  $y = 8$ . This is

James wrote  $x = 9$  and  $y = 7$ . This is



# SMART test example: Values for letters

## ► Misconceptions and common errors

Type in the answer for these two questions.

$d = 4$  and  $e = 5$   
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$d = 4$  and  $f = 6$   
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---

Some students had to write values of  $c$  and  $d$  to make an equation true.

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$c + d = 7$ Sam wrote $c = 3$ and $d = 4$ . This is <input type="text"/>	$c + d = 7$ Sara wrote $c = 2$ and $d = 5$ . This is <input type="text"/>
$c + d = 7$ Sall wrote $c = 6$ and $d = 1$ . This is <input type="text"/>	$c + d = 9$ Song wrote $c = 5$ and $d = 6$ . This is <input type="text"/>
$c + d = 9$ Sol wrote $c = 4$ and $d = 5$ . This is <input type="text"/>	$c + e = 8$ Simon wrote $c = 3$ and $e = 5$ . This is <input type="text"/>
$c + e = 8$ Sid wrote $c = 10$ and $e = 2$ . This is <input type="text"/>	$c + e = 8$ Sofie wrote $c = 4$ and $e = 4$ . This is <input checked="" type="text"/>

Right  
Wrong

**A:** Students often give a letter a value based on its place in the alphabet, such as

**C:** Students believe that the value of consecutive letters must be consecutive numbers.

**O:** Students believe that if one letter is used in the alphabet, its value must be smaller.

**R:** When the same letter is used more than once in an expression, these students do not recognise that it has the same value each time. This value is used separately for each occurrence.