# Observation Notes

## Strategies for Addition and Subtraction – Section C

### QUESTIONS

<table>
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<th>18. Counting On</th>
<th>OBSERVATIONS</th>
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| Place 9 green teddies on the table.  
  a) Please get four green teddies for me.  
  b) I have nine green teddies here. (Show the child the nine teddies, and then screen the nine teddies with the ice-cream lid). That's nine teddies hiding here and four teddies here (point to the groups).  
  c) Tell me how many teddies we have altogether . . . Please explain how you worked it out.  
  If incorrect answer, ask part (d).  
  d) (Remove the lid). Please tell me how many there are altogether.  |
| The reason for using teddies that all the same colour is that for some students colour is a distraction.  
  The strategy the student uses is important  
  Determine the strategy they used to solve the problem:  
  - Count on 9, 10, 11, 12, 13 or 4, 5, 6, 7, 8, 9,10, 11, 12, 13  
  - Known fact - use speed of response as an indicator  
  - Count all (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13) students may represent the 9 teddies that are hidden by head nodding or imagining the nine objects or may need the cover removed to reveal the 9 teddies and then count the real objects.  |

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<th>19. Counting Back</th>
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| For this question you need to listen to a story.  
  a) Imagine you have 8 little biscuits in your play lunch and you eat 3. How many do you have left? . . . How did you work that out?  
  If incorrect answer, ask part (b):  
  b) Could you use your fingers to help you to work it out? (It’s acceptable to repeat the question, but no further prompts should be given).  |
| To assist students to process the question read question at an appropriate pace, with pauses between important phrases.  
  Determine the strategy they used to solve the problem:  
  - Known fact use speed of response as an indicator  
  - Fact family (eg. 5 + 3 = 8)  
  - Count back all, in head (7, 6, 5 or 8, 7, 6, 5)  
  - Count back all, with fingers used to keep track only (7, 6, 5 or 8, 7, 6, 5)  
  - Modelling all (shows 8 fingers, then takes away 3)  |

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<thead>
<tr>
<th>20. Counting Down To / Counting Up From</th>
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<td>I have 12 strawberries and I eat 9. How many are left? . . . Please explain.</td>
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<td>The numbers involved in this problem encourage students to use a different more efficient strategy if it is in a student’s repertoire. This task often encourages students to consider 9 and what makes 12</td>
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### 21. Basic Strategies

I am going to ask you some questions. *Establish (if not known) what the child prefers* (e.g. do you say ‘4 plus 4’ or do you say ‘4 and 4’?) Please tell me the answer.

*Use clues such as speed of response to decide which strategy is used.*

- **a)** 4 + 4
- **b)** 2 + 19
- **c)** 4 + 6
- **d)** 27 + 10
- **e)** 10 - 7

- Determine the strategy they used to solve the problem
  - Known fact or fact family (e.g., 9 + 3 = 12)
  - Count down to (12, 11, 10, 9)
  - Count up from (9, 10, 11, 12)
  - Fingers used during ‘count down to’ or ‘count up from’ to keep track only
  - Count back all (12, 11, 10, 9, 8, 7, 6, 5, 4, 3)
  - Modelling all (shows 12 'things', then takes away 9 'things', leaving 3)

- **Note the language student uses for addition**
- **Looking for a variety of preferred strategies:**
  - Known facts
  - Doubles
  - Commutativity and count on (19, 20, 21)
  - Tens fact
  - Add 10 (27, 37)
  - Build to next 10 (to 30 then 7 more)
  - Fact family (e.g., 7 + 3 = 10)
- **Students must respond correctly to all questions and use at least 3 preferred strategies.**
- **Note that for some students all maybe known facts, this shows that they have developed skills as this basic level**

### 22. Derived Strategies

Here are some more questions. Please tell me the answers.

*Use clues such as speed of response to evaluate each strategy.*

- **a)** 12 – 6
- **b)** 7 + 8
- **c)** 19 – 15
- **d)** 16 + 5
- **e)** 36 + 9

- The questions in this task have been selected to encourage students to demonstrate a variety of preferred strategies to solve addition and subtraction problems. If necessary ask student to explain how they worked it out. The preferred strategies are
  - Known fact use speed of response as an indicator
  - Doubles (Double 6 is 12 so 12-6 is 6)
  - Near doubles or known fact (Double 7 is 14 so 7+8 is double 7 and - 1 more which is 15 or Double 8 is 16 so the answer is one less which is 15)
  - Fact family or known fact ( 9-5 is 4 so 19-15 is 4)
  - Build to next ten (16+5 is 16+4 to make 20 and then 1 more so the answer is 21)
  - Add 10 take 1 (36+9, 36 add 10 is 46 but we are only adding 9 so take 1 away so the answer is 45)
  - Build to next ten (36+9, 36 and 4 to 40 then 5 more makes 45)
- **Students must respond correctly to all questions and use at least 3 preferred strategies.**
23. Multi-digit Strategies

I am going to show you some questions. Tell me the answer. Show the white cards for the following questions

a) $68 + 32$
b) $25 + 99$
c) $100 - 68$

For the final two (d and e), read the questions (no cards provided).

d) half of 30
e) double 26

- Note that for some students all maybe known facts this shows that they have developed skills as this level so proceed to question 23.

- This task requires students to use a variety of mental computation strategies to solve multi-digit problems.
- Students need to explain their thinking, make notes about the way they solve the problem.
- Examples given by students may include the following:
  - $68 + 32$: 68 add 2 is 70 and another 30 is 100 or 60 and 30 is 90, 8 and 2 is 10 so 90 and 10 is 100
  - $25 + 99$: 99 is nearly 100, so I’ll make 99 into 100 by adding one, then add 25 which makes 125 but I have to take off the one that I added so it’s 124
  - $100 - 68$: What do I need to add to 68 to make 100? Add 2 makes 70, then add 30 to make 100 so the answer is 32.
  - Half of 30: Half of 20 is 10 and half of 10 is 5 so half of 30 is 15.
  - Double 26: I know double 25 is 50 so double 26 is the same as double 25 and double 1 which is 52. Or I double 20 and double 6 and then added 40 and 12 which is 52

- For some students written algorithms dominate their thinking about addition and subtraction so when presented with a problem to solve mentally they experience difficulty. This task requires students think flexibly about numbers and how numbers can be broken up and combined.

24. How Many Digits?

Show the blue card with $134 + 689$. Please read the card to me.
a) Is the answer to this more than 1000 or less than 1000?
b) Please explain.

Show the blue card with $1246 – 358$. Please read the card to me.
c) Is the answer to this more than 1000 or less than 1000?
d) Please explain.

- This type of task helps to show if the student can recognize what answers would be appropriate. It draws upon their understanding of how numbers are made up and their relationship to other numbers. This task highlights students understanding about how close numbers are to the decade and century number.
- It also requires students to look at and think about both numbers in the problems.
- Examples given by students may include the following
  - $134 + 689$: 689 near 700 anything less or a little over 300 added to this number will be less than 1000 so 134 + 689 is less than 1000
  - $1246 – 358$: Looking at the hundreds 1200 – 300 will be 900 so the answer is less than 1000 Or if I take away anymore than 246 from 1246 then the answer will be below 1000. 358 is more than 246 so the answer to 1246 – 358 is less than 1000
### 25. Estimating and Calculating Addition

*Show the yellow card with 347 + 589.*

a) Please read this to me.
b) Please estimate the answer to this *(If necessary, prompt: ‘what would the answer be “round about”?’)*

Can you work out the exact answer to this in your head? *(936)*  
If 'yes' (unlikely!), encourage the child to try to do so.  
If not successful (or if the response to the question in part (c) is 'no’), make the following request:  
Please use the paper to work it out **any way you like**.

- Some students are reluctant to estimate.  
- Answers within the range of 800 to 1000 are acceptable.  
- Asking the students to read the problem checks if they can read the number but also it helps to identify the process involved. Listen to the language that they use for addition e.g. *add plus and*  
- Examples given by students may include the following:  
  - 300 and 500 is 800 so it is more than 800. Or 350 and 600 is 950 so a bit less than 950  
  - If students cannot work it out in their head they may use pen and paper to work it out. They can use the pen and paper to work it out any way they like.  
  - e.g. 300 + 500 = 800/ 40 + 80 = 120/ 7 + 9 =16/ so it’s 920 + 16 = 936  
  - Students may choose to only write down what they cannot hold in their head.

### 26. Estimating and Calculating Subtraction

*Show the yellow card with 642 – 376.*

a) Please read this to me.
b) Please estimate the answer to this *(If necessary, prompt: ‘what would the answer be “round about”?’)*

c) Can you work out the exact answer to this in your head? *(266)*  
If 'yes' (unlikely!), encourage the child to try to do so. If not successful (or if the response to the previous question is 'no’), make the following request:  
Please use the paper to work it out **any way you like**.

- Some students are reluctant to estimate.  
- Subtraction is considerably more difficult than addition.  
- Asking the students to read the problem checks if they can read the number but also it helps to identify the process involved. Listen to the language that they use for subtraction e.g. *subtract, take away, minus*  
- Do they turn it into an addition problem and ask what do I need to add to 376 to make 642?  
- Examples given by students may include the following:  
  - 376 is near to 400, 400 to 642 is 242 so the answer is about 260  
  - Do they round both numbers to the nearest 100?  
  - 642 round to 600, 376 round to 400 so the answer is around 200  
  - Do they use front end rounding?  
  - 642 make that 700, 376 make than 400 so the answer is around 300  
  - Answers with the range of 200 to 300 are acceptable  
  - If students cannot work it out in their head they may use pen and paper to work it out. They can use the pen and paper to work it out any way they like.  
  - e.g. 376 add 24 makes 400/ 400 add 200 makes 600/ 600 add 42 makes 642/ so it’s 200 + 24 + 42 that’s 266  
  - Students may use an empty number line to help solve the problem