



ChIPs assessments

Child Indicators of Performance
in mathematics

Number



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Early Childhood Mathematics Group

These activities are intended to enable educators to gather assessment information about key aspects of children's mathematical learning within informal and meaningful contexts, either individually or alongside their peers. The assessments are based on current research about key predictors of later maths achievement e.g. Coolen et al. (2021) and Cahoon, Gilmore & Simms (2021). Together, they enable practitioners to monitor children's progress. They can be adapted to fit within routines, games, continuous provision or story contexts. They might also be presented by a toy character needing help or making mistakes. You will probably need to use them in several contexts, depending on children's responses, in order to be sure about their understanding. The mathematics section of [Birth to 5 Matters](#) and [Development Matters](#) provide guidance on planning to develop children's learning for each aspect. These assessments can provide evidence for a 'best fit' assessment of the *Number* and *Numerical patterns* ELGs, as they cover verbal number patterns, subitising and visual patterns, a deep understanding of counting and numbers to 10, number comparison and number composition, including bonds to 5.

There are two columns. Column 1 describes the assessment activity. It is important to choose numbers that are appropriate for the individual child so we suggest that you start where you think the child can reveal their current understanding and stop when it begins to feel difficult. It is important that the child enjoys the activity and it is meaningful for them. Phrasing can be adapted to suit the individual child and can be supplemented or replaced by signs, gestures and pictures as needed. Column 2 is for you to note what the child does or says. This column includes some prompts for what to look for. Speech is in *italics*. There are videos showing the assessment in action with some children's interesting responses. These can also be used for professional development and discussion with colleagues. Throughout, there are some elements in **red font**: these are too challenging for most children at this age, so only a few children will be able to do these. They are included just in case they are needed for an individual child.

Resources

- 5 identical objects for subitising (e.g. large counters stuck on card) with cloth, dishes or folded card 'tent' for covering
- 10 gems, pennies, conkers or other small objects (container optional) **20/40 for older children**
- one teddy bear
- numerals: wooden, plastic, on large pebbles or cards to 10, **20, 30**
- 10 identical toy animals (small enough to go in a 'tent') **20/40 for older children**
- card folded to make a tent

Name:

Date of Birth:

Setting:

Date of Assessment:

<p>Number assessment</p> <p>Choose numbers appropriate for the individual child - start where you think the child can reveal their current understanding and stop when it gets difficult. Feel free to adapt phrasing sensitively to suit the child. We do not expect many children to do the activities in red font.</p>	<p>Notes/ observations</p> <p>Look out for...</p> <p>Note exactly what the child does or says.</p>
<p>Familiar numbers</p> <p><i>Remind me how old are you?</i></p> <p><i>Can you show me on your fingers?</i></p>	<p>E.g. <i>3 and a half</i></p> <p>Confident showing 3 or 4 fingers (e.g. Eva who is learning English)</p>

Subitising – objects (instantly saying the number without counting)

Reveal a number of identical objects e.g. same coloured counters under cloths or bowls, or counters stuck on cards.

Start with 1, 2 or 3 objects.

Get ready, I am going to show you the hidden things just for a second and I would like you to tell me how many there are, really fast.

Show for 2 seconds - think 'one mississippi, two mississippi.'

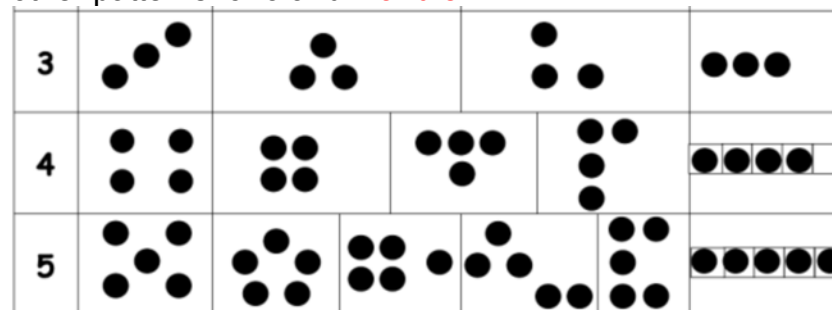
4/3/5 objects -

start with arrangements as on a dice, then vary

Conceptual Subitising (recognising the number as made up of smaller numbers within it)

Highlight which arrangements children can subitise (instantly recognise without counting):

- dice patterns
- other patterns for 3 and 4 and 5?



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Record any comments the child makes, e.g. *It's 3 - I saw 2 and 1*, indicating they saw smaller numbers within the number.

Subitising - fingers

Show 1- 5 fingers on one hand in random order for 2 seconds

I am going to show you some fingers very quickly. Can you tell me really fast how many you see?

Conceptual Subitising

Recognising numbers:



- made up of “5 and a bit” using fingers. E.g. show 8 with 5 fingers on one hand and 3 in the other.)
- doubles with the same number of fingers on each hand.



Highlight which numbers of fingers the children can subitise:

Fingers	1	2	3	4	5
5 and a bit	6	7	8	9	10
Doubles	2	4	6	8	10

Record any comments the child makes. E.g. *5 and 2 ... that's 7.*

<p>Counting aloud <i>Count as high as you can.</i> <i>(Stop at 120)</i></p> <p><i>Count backwards from 5 / 10 / 20.</i></p>	<p>Write last number said in a correct counting sequence. Note missed numbers, errors and mispronunciations, self-corrections, hesitations, e.g.11-teen, 12, 14, 16-19</p>														
<p>Counting objects (cardinal principle - knowing the last number tells you how many there are)</p> <p>Use jewels or other objects in a heap or pot, with a teddy bear</p> <p><i>Can you give the bear 2 jewels? 3? 5? 9? 13 jewels? 18? 33?</i></p>	<p>Highlight which numbers they give successfully</p> <table border="1" data-bbox="1039 679 2065 756"> <tr> <td>2</td> <td>3</td> <td>5</td> <td>9</td> <td>13</td> <td>18</td> <td>33</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Note: subitising, irregular number sequence, lining up, difficulties tagging one to one</p> <p><i>Do they count in twos?</i></p>	2	3	5	9	13	18	33							
2	3	5	9	13	18	33									

Understanding number symbols (cardinality)

Bear and pennies (or gems) with wooden or plastic numerals or cards

Give the bear 3 pennies. Then 4, 6, 8,
 12, 16, 21...

Spread out all the numerals to 10, 20, 30

*The bear has this many pennies.
 Can you show him the number to go with them?*

Highlight which numerals they identify (to match the number they said)

3	4	6	8	12	16	21

If not, note the number chosen and any apparent reason e.g. confusing 6 and 9.

Do they count along to find the numeral?

If they do not count the objects accurately, note errors or difficulties

<p>Comparing numbers: ordinality Only ask the children who can recognise numerals in the range and who have experience of ordering numbers.</p> <p>Give numeral cards 0-5, mixed up. <i>Can you put these numbers in a line from the smallest to the largest?</i> Gesture left to right. Prompt starting at 0 if needed.</p> <p>Remove the previous cards. Then give the numerals 6-10, mixed up. <i>Can you put these numbers in a line from smallest to the largest?</i></p> <p>Then give three numbers (e.g. 4, 9, 7), two or three apart, mixed up. <i>Can you put these numbers in a line from smallest to the largest?</i></p>	Note any numerals they find difficult to recognise, e.g. 6 and 9	
	0-5	
	6-10	Do children have to count aloud from 1 or can they put the 6 down straight away?
	3 numerals out of order	
	Placing numbers: 4 between 0 and 5 5 between 0 and 10	Do children: - place 4 nearer to 5? - place 5 halfway between 0 and 10?
	11-20	
	placing 18 between 10 & 20	Do they put it near 20? Or just somewhere after 10?

Relative position

Put down 0 and 5 with a large gap between and ask the child to place 4: *Where should 4 go?*

Prompt: *Does it go closer to 0 or 5?*

Repeat with placing 5 between 0 and 10: *Where does 5 go?*

Give them the numerals 11-20.

Can you continue putting these numbers in order?

Put down 10 & 20 and ask them to place 18. *Where does 18 go?*

Number composition - How many altogether?

Use a folded card 'tent'/cave' and same coloured bears/dinosaurs

Here are 3, 5, 11, 29 toys going into the tent.

(Hide toys in tent so not visible)

How many toys are there inside?

Now one more goes into the tent.

How many altogether?

How do you know?

Now 2, 3, 4, 10 more go into the tent...

Adding & subtracting... with reasons counting, visualisation

Highlight if they say the right number of toys in the tent and one more (+1) or the number 'altogether'?

3	+1	+2	+4	+10
5	+1	+2	+4	+10
11	+1	+2	+4	+10
29	+1	+2	+4	+10

Note how you think they did this? E.g. seemed to visualise toys in the tent; used fingers; 'just knew'.

How many are left?

Highlight if they say the right number of toys in the tent and one removed (-)

Here are 3, 8, 14, 40 toys in the tent. How many toys are there inside?

Now one comes out.

How many are still in the tent?

Now 2, 3, 4, 10 come out of the tent...

1)
 or the number left?

3	-1	-2	-3		
8	-1	-2	-3	-4	
14	-1	-2	-3	-4	-10
40	-1	-2	-3	-4	-10

Note how you think they worked it out E.g. *seemed to visualise toys in the tent; used fingers; 'just knew'*.

Additional comments and notes:

References

Cahoon, A., Gilmore, C. & Simms, V. (2021). Developmental pathways of early numerical skills during the preschool to school transition. *Learning and Instruction*, 75, 101484. <https://doi.org/10.1016/j.learninstruc.2021.101484>

Coolen, I., Merkley, R., Ansari, D., Dove, E., Dowker, A., Mills, A., Murphy, V., von Spreckelsen, M. & Scerif, G. (2021). Domain-general and domain-specific influences on emerging numerical cognition: Contrasting uni-and bidirectional prediction models. *Cognition*, 215, 104816. <https://doi.org/10.1016/j.cognition.2021.104816>