MATHEMATICS ASSESSMENT INTERVIEW

Incorporating

Early Numeracy Research Project Assessment Interview November 2001
Doug Clarke, Jill Cheeseman, Ann Gervasoni, Donna Gronn, Marj Horne,
Andrea McDonough, Pam Montgomery, and Anne Roche (Australian Catholic University), Peter
Sullivan (La Trobe University), Barbara Clarke and Glenn Rowley (Monash University)

Ballarat CEO Tasks for Fractions and Decimals November 2002
Ann Gervasoni (Australian Catholic University), Carmel Godfrey, Ginny Gook,
Maria Kempton and Mick Sully (Catholic Education Office Ballarat)

Counting and Place Value Domains Refinement Tasks 2006
Ann Gervasoni (Australian Catholic University)

Number Domains Refinement Tasks 2009
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Number Domains Revision 2011
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MATHEMATICS ASSESSMENT INTERVIEW
ENRP Numeracy Interview November 2001/2006 + CEO Ballarat Extension Interview 2003
+ Number Domain Refinement 2011

Equipment Checklist

Counting:
- Small ice cream container of small plastic teddy bears (approximately 100)
- Plastic cup (fitting 22-29 teddies)
- Prep detour set: a collection of 40 teddies of mixed colours (plus a separated set with 4 yellow teddies, 5 red teddies, 3 green teddies, and 8 blue teddies), six pink dot flashcards including the blank card, small pink cards with digits 0 - 9, five plastic cups, nine straws, four white or yellow candles (2 cm diameter), of lengths 5 cm, 10 cm, 15 cm and 20 cm (not tapered candles).
- Small, sealed plastic bag with collection of coins in it (1 x $1; 1 x 50 cents; 3 x 20 cents; 5 x 10 cents; 5 x 5 cents: total $2.85)
- White cards with 2/3, 0.3

Place Value:
- Large “basic” calculator
- Purple cards with digits 0 - 9
- Green, blue, yellow, pink and orange card sets
- Icy pole sticks (including eight bundles of ten and twenty loose icy pole sticks)
- “36” card
- Number lines: 2-digit (mauve) and 3-digit (white)
- White number cards with “592”, “408”, “2791” and “3027”
- Pink chart with Australian capital city populations
- Orange page of number lines
- White cards with 0.3, 0.28, blank, 2/3 and 2/5.

Addition & Subtraction:
- Ice cream lid
- White, blue and yellow addition and subtraction problem cards
- Scrap paper and pencil for student work
- White cards with 0.3 and 0.28
- White cards with 1/3, 2/5, 3/2, 4/6, 1/2, 2/3

Multiplication & Division:
- Four empty matchboxes
- Picture of four “teddy mats”
- 5 unifix (all the same colour)
- Transparent, plastic tennis ball container with three tennis balls inside it
- Red cards with dots (and thick, different-coloured cover card)
- White multiplication and division problem cards
- Mauve orchard problem card
- White card with 0.4
Time:
- Children’s own hand-drawn clocks (ideally, collected prior to the interview)
- Moveable clock
- June calendar card
- Green clock showing digital time
- Green excerpt from TV guide
- Blank analogue and digital clock faces

Length:
- 25 cm wooden skewer (blunted)
- 30 cm piece of string
- 20 cm plastic drinking straw
- 8 large (5 cm) paper clips
- 30 cm ruler
- Long, “straightened out” party streamers around 180 cm, plus several exactly 93 cm long
- Pen for streamer task

Mass:
- A collection of seven objects (a piece of foam, a rock, two plastic containers [short & fat and long & thin], a ball of string, a tin of tomatoes, and a 1 kg weight (see below)) in a shoe box
- 20 gram weight (2 x 20c pieces stuck together with masking tape)
- A 1 kg weight or an object which weighs 1 kg (labelled 1 kg)
- Small film canister filled with water (to weigh 40 g)
- A set of balance scales
- At least eight ten-gram weights

- Salters’ Slimmers kitchen scales (0 - 240 g)
- 120 g object
- 1 kg of brown rice in a plastic container
- Small scoop

Space (Shape & Visualisation):
- Collection of eight small, mauve shapes on card (square, rectangle, circle, triangles)
- Dark blue page folded in half with part of a light pink triangle pasted inside the fold, revealing an isosceles triangle
- Blue page with nine possible triangles
- Three purple “triad” cards
- Green, shaded puzzle card with blank square on it
- White page with pictures of main design and other shapes
- Kindergarten squares (one for teacher and one per child)
SECTION A: COUNTING

Equipment: container of teddies, small plastic cup (which will hold approx. 22-29 teddies), small, sealed plastic bag with collection of coins in it (1 x $1; 1 x 50 cents; 3 x 20 cents; 5 x 10 cents; 5 x 5 cents: total $2.85). White cards with 2/3 and 0.3.

1) Teddy Task
Show the child the teddies and get the cup. Please take a big scoop of teddies. If necessary say …Please put a few more teddies in to fill up the cup (will need at least 20).

a) Hold them in front of you. . . . Tell me how many teddies you think are in the cup.
b) Please check to find out. (If the child takes the teddies out of the cup one by one say … Please tip the teddies out to check).
c) How many teddies are there?
d) Please put one teddy back into the container. How many teddies are on the table now?

(IF THE CHILD IS A PREP OR HAD DIFFICULTY COUNTING THE TEDDIES OR WAS NOT ABLE TO ANSWER (d) CORRECTLY, MOVE TO THE PREP DETOUR ON THE NEXT PAGE NOW. OTHERWISE CONTINUE ON.)

2) Counting Forwards, Backwards, and Breaking the Sequence
Please count for me this time (by ones) without the teddies. Start counting from . . . I’ll tell you when to stop.

a) 1 . . . 32  (remember to record any errors in the sequence)
b) 53 . . . 62 (remember to record any errors in the sequence)
c) 84 . . . 113 (remember to record any errors in the sequence)
d) Count backwards from 24. I’ll tell you when to stop (24, 23, . . ., 10).
(If child hesitates, say “like 24, [pause] 23, . . .”)
ed) Count backwards from 10. I’ll tell you when to stop. (If child hesitates, say “like 10, [pause] 9, . . .”)

Only ask Q2e if Q2a or Q2d are incorrect

(IF Q2a, Q2b, Q2c and Q2d are incorrect)
e) Count backwards from 10. I’ll tell you when to stop. (If child hesitates, say “like 10, [pause] 9, . . .”)

If ☺☺ ☺☺ in Q2a, Q2b, Q2c and Q2d ➔ Q3 otherwise ➔ Place Value Q8

3) More and Less Tasks
a) Tell me the number that is one more than 56.
b) Tell me the number that is one less than 56.

4) Counting from 0 by 10s, 5s, and 2s
a, b, c) Count by 10s for me (then 5s, 2s) as far as you can go. (Stop child after 110, 45 and 30, respectively).
d) Tell me the number that is 5 more than 35.
e) Tell me the number that is 10 less than 70.
5) Counting from $x$ by 10s and 5s
   a) Start at 23 and count by 10s (stop the child after 103).  ☀️ ⇒ Q8 Place Value
   b) Start at 24 and count by 5s (stop the child after 44).  ☀️ ⇒ Q8 Place Value

6) Counting from $x$ by a single digit number
   a) Start at 11 and count by 3s (stop the child after 35).  ☀️ ⇒ Q8 Place Value
   b) Start at 20 and count by 7s (stop the child after 55).  ☀️ ⇒ Q8 Place Value

7) Counting Money
   Tip out the collection of money onto the table.
   a) Please count the money for me (no recording allowed for this task).  ☀️ ⇒ Q8 Place Value
   b) What did you find?  ☀️ ⇒ Q8 Place Value
   c) How much more money would you need to have $5? (any counting method yielding the correct answer is fine)

Reading and counting fractions
7.1  (a) Show the $\frac{2}{3}$ card to the child
     Please read this number. (two-thirds)  ☀️ ⇒ Q8 Place Value
     *If the child says 2 out of 3 ask, is there another way to say that?*
     (b) Start at this number and count by thirds (stop the child at two & one-third). ☀️ ⇒ Q 7.2
     (c) If the child said ‘seven-thirds’, ask
         Can you say seven-thirds another way? (two and one-third)

Reading and counting decimal fractions
7.2  (a) Show the child the card 0.3
     Please read this number. (three tenths)  ☀️ ⇒ Q 7.2 (e)
     (b) If the child says ‘zero point three’ or ‘point three’, ask
         Can you say zero point three another way? (3/10)  ☀️ ⇒ Q8 Place Value
     (c) Start at this number and count by three tenths (stop the child at 1 & 5 tenths – or fifteen tenths or 1½). ☀️ ⇒ Place Value
     (d) If the child says fifteen-tenths, ask
         Can you say fifteen-tenths another way? (one and five-tenths / one and one-half)

⇒ Section B: Place Value
DETOUR FOR CHILDREN BEGINNING SCHOOL
(also recommended for Grade 1s and 2s who had difficulty counting the collection in Q1)
(CONSERVATION OF NUMBER; ONE TO ONE CORRESPONDENCE; MORE/LESS; PATTERN RECOGNITION; ORDINAL NUMBER; LANGUAGE OF LOCATION; SUBITISING; SIMPLE COUNTING, NUMBER ONE MORE AND ONE LESS)

Equipment: a collection of 40 teddies of mixed colours in a container (plus a separated set of 20 with 4 yellow teddies, 5 red teddies, 3 green teddies, and 8 blue teddies), six pink dot flashcards including the blank card, small pink cards with digits 0-9, five plastic cups, nine straws, four candles (all 2 cm in diameter; 5 cm, 10 cm, 15 cm and 20 cm in length).

P1) Simpler Counting Tasks / More or Less / Conservation
Place a pile of the separated 20 teddies in front of the child in a scattered pattern, made up of exactly 4 yellow teddies, 5 red teddies, 3 green teddies, and 8 blue ones.

a) Please put the yellow teddies together.

b) How many yellow teddies are there?

Put a group of 3 green teddies together near the 4 yellow teddies (giving two different small groups).

c) Are there more green teddies or more yellow teddies?

Push the yellow and green teddies aside.

d) Please get five blue teddies . . .

e) Now put them in a line. (If the child has already put them in a line, say... “Now push them together”). . . . Tell me how many blue teddies there are.

P2) Location / Pattern / Ordinal Number
a) Please put out a yellow teddy. . . . Now put a blue one beside it. . . . Now put a green one behind the blue teddy. . . . Now put the green teddy in front of the blue teddy. . . .

Now watch what I do with the teddies.
Make a pattern with the teddies (G, Y, B, B, G, Y, B, B) in front of the child.

b) I’ve made a pattern with the teddies. Please say the colours for me as I point.

Hand the container of teddies to the child.

c) Please make the same pattern.

d) (If the child’s pattern is a correct copy, point to it. If not, point to your pattern.) Please make the pattern go on a bit more.

e) How did you decide what came next in the pattern each time?

f) Point to the green teddy in 1st position. The green one is the 1st teddy in my pattern. You point to the 3rd one. What colour is the 3rd teddy? You point to the 5th teddy. What colour is the 5th teddy?
P3) Subitising / Matching Numerals to Quantities / Ordering / One to One Correspondence / Part-part-whole

a) I’m going to show you some cards quite quickly. Tell me how many dots you see. Show each pink flashcard for 2 seconds only, in the following order and orientation:

Now put the dot cards all down in the order shown above. Spread out the pink 0 – 9 cards randomly, face up, in front of the child, between the child and the dot cards.

b) Find the number to match the dots. (If the child seems puzzled that there are more numeral cards than sets of dots, explain that “you won’t need to use all the numbers”)

Remove the dot cards and the zero card. Shuffle the numeral cards and spread them out, face up randomly on the table.

c) Please put the number cards in order from smallest to largest. If the child is successful, hand across the zero card.

d) Where would this one go?

e) Please show me 6 fingers. . . . (if correct . . . Can you show me 6 fingers another way? Another way?)

f) What number is one more than 4? (if successful . . . one more than 10? if successful . . . one more than 15?)

g) What number is one less than 3? (if successful . . . one less than 12? if successful . . . one less than 20?)

Place 5 cups out in a line. Hand the child 9 straws.

h) Please put one straw in each cup.

Spread out three candles (20 cm, 5 cm, and 10 cm in that order from left to right).

i) Please put these candles in order from smallest to largest (biggest). . . Please point to the largest (biggest). . . Please point to the smallest.

(If successful, add in the 15 cm candle. This time, place the candles like this: 10 cm, 20 cm, 5 cm, and 15 cm, in that order from left to right.

j) Now put these candles in order from smallest to largest (biggest). . . Please point to the largest (biggest). . . Please point to the smallest.

Go to Question 2a (for all children)
SECTION B: PLACE VALUE

Equipment: teddies, green number cards, purple cards with digits 0 to 9, calculator, blue, yellow, pink and orange card sets, white 36 card, icy pole sticks (including eight bundles of ten and twenty loose icy pole sticks), mauve 2-digit number line, white 3-digit number line, white cards with 592, 408, 2791 & 3027 respectively, pink chart with Australian city populations, orange page of number lines. White cards with 0.3, 0.28, blank, 2/3 and 2/5.

8) Reading Numerals
Show the child number cards (green). Discontinue at first difficulty.

a) Read these numbers: 3, 8, 36, 83, 18, 147, 407, 1847.

If the child has difficulty with any of 3, 8, 36, 83 or 18, spread out the mauve cards with digits 0 to 9 face down on the table.

b) Pick a card and tell me the number you have taken.

After moving through the whole set, point to the “7” card.

c) Get me this many teddies.

Any trouble with 1-digit numbers in Q8: 😐 ➔ Q10

9a) Calculator Tasks – Writing Numerals
(Hand the child the calculator). Have you used a calculator before? Please turn it on.

Type these numbers on the calculator (7, 47, 60, 15, 724, 105, 2469, 6023)
(Ask the child to clear the calculator between numbers. Stop and move to 9b when the child is not successful.)

9b) Calculator Tasks – Reading Numerals
STEP 1: Pick any number from 2 to 9, and type it on the calculator. Read the number. (Don’t clear the calculator.)
STEP 2: Type in a different number from 2 to 9 (thus forming a 2-digit number). Read the number.
STEP 3: Type in a different number again from 2 to 9 (giving a 3-digit number). Read the number.
[Continue to limit of correct answers: STEP 4, STEP 5, etc.]

10) Ordering Task
Based on the child’s success in Q8 & Q9, select the 1-, 2-, 3-, or 4-digit set of cards—Pick the number of digits for which the child has been completely successful to that point.

[Move up or down through the card sets depending upon success, e.g., success with 2-digits, go to 3; if unsuccessful with 2, go back to 1-digit cards, etc. If child has had earlier difficulty with reading 1-digit numbers, there is little point in continuing the ordering task.]

Place the cards spread out on the table. Do not read the numbers aloud.

a) 1 digit set (blue: 2, 5, 9)
b) 2 digit set (yellow: 19, 36, 74)
c) 3 digit set (pink: 97, 156, 403, 813)
d) 4-digit set (orange: 3569, 3659, 3956)

Here are some numbers. Order these numbers from smallest to largest. . . Please point to the largest. . . Please point to the smallest. (The children do not need to read the numbers, only point to them.)

© in Q10a (1-digit) or Q10b (2-digit) ➔ Q18 Addition & Subtraction

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11) Bundling Tasks – Interpreting 2-Digit Numbers
Ask the child to unpack the icy pole sticks.

Here are some icy pole sticks in bundles of ten. (Offer the chance to check a bundle if it seems appropriate). Here are some more loose ones.

Show white card for 36.

a) Get me this many (icy pole) sticks.

(If the child starts to count all in ones, interrupt and ask them if they can do it a quicker way with the bundles. If they can’t, 😃 ➔ Q18 Addition & Subtraction)

Tell me how you worked that out. 😃 ➔ Q18 Addition & Subtraction

b) Please put one bundle back. How many sticks are there now?

How did you know that? 😃 ➔ Q18 Addition & Subtraction

12) 2-Digit Number Line – Interpreting 2-Digit Numbers
Show the child the mauve 2-digit number line card.

Look at this number line. Please tell me the largest number. (100)

Point to the little mark. What number would go here? (50 – acceptable number range is 45-55)

Please explain. 😃 ➔ Q18 Addition & Subtraction

13a) 3-Digit Number Line – Interpreting 3-Digit Numbers
Show the child the white 3-digit number line card.

Look at this number line. Please tell me the largest number. (200)

Point to the little mark. What number would go here? (150 – acceptable number range is 130-170)

Please explain.

13b) Some More – Interpreting 3-Digit Numbers
Show the child the white 592 card. Pause for a couple of seconds for the child to look at the number.

Tell me the number that is ten more than this number (602). 😃 ➔ Q18 Addition & Subtraction

13c) Some Less – Interpreting 3-Digit Numbers
Show the child the white 408 card. Pause for a couple of seconds for the child to look at the number.

Tell me the number that is 10 less than this number (398).

Only continue on now if the child has had complete success on all tasks involving 1, 2, 3, and 4 digit numbers in Q8-Q13. Otherwise, go to Q18 Addition & Subtraction

14) Ten More – Interpreting 4-Digit Numbers
Show the child the white 2791 card. Pause for a couple of seconds for the child to look at the number.

Tell me the number that is ten more than this number (2801). 😃 ➔ Q18 Addition & Subtraction

15) One Hundred Less – Interpreting 4-Digit Numbers
Show the child the white 3027 card. Pause for a couple of seconds for the child to look at the number.

Tell me the number that is 100 less than this number (2927). 😃 ➔ Q18 Addition & Subtraction
16) Sorting the Capital Cities
Show the child the pink chart with population figures.

Here is a list of Australia’s capital cities (point to the names of the cities). . . . These numbers show how many people live in each city.

[at any stage]:  ☺ ➔ Q18 Addition & Subtraction

a) (point to the word Darwin) How many people live in Darwin?

b) (point to the word Canberra) How many people live in Canberra?

c) (point to the word Adelaide) How many people live in Adelaide?

d) Please point to the city that has the third largest number of people.

e) How did you work that out?

17) Interpreting the Number Line
Show the child the orange page of number lines. Point to the first one, pointing to the relevant numbers as you read the question.

[at any stage]:  ☺ ➔ Q18 Addition & Subtraction

a) The numbers on this line go from zero to 100. . . . (pointing to the little mark) Round about what number would this be? (acceptable range: 55 to 75).

b) The numbers on this line go from zero to 2000. . . . (pointing to the little mark) Round about what number would this be? (acceptable range: 400 to 600).

c) The numbers on this line go from 39 to 172. . . . (pointing to the little mark) Round about what number would this be? (acceptable range: 65 to 95).

d) The numbers on this line go from zero to one million. . . . (pointing to the little mark) Round about what number would this be? (acceptable range: 700 000 to 800 000).

Writing numerals – Larger Numbers and Fractions
17.1  (a) Please write this number: one million and twenty-four.
      (b) Write this number: two fifths
      (c) Write this number: twenty eight hundredths as a decimal

Ordering decimal fractions
17.2  (a) Show the cards 0.3 and 0.28
      Please point to the larger number.
      How do you know it is larger?  ☺ ➔ Q18 Addition & Subtraction

      (b) Place a blank card between 0.28 and 0.3 . Point to the blank card.
      Think of a number between these two numbers. What could the number be?

Ordering and interpreting fractions
17.3  (a) Show the cards two-thirds and two-fifths.
      Point to the larger number (two-thirds). Please explain.

      (b) Point to 2/3.
      Draw a picture to show what this number means. Please explain.
18) Counting On
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.

☺ ☺ ☺ ☺

Q19

If the child does not say 13, please go to part (d)


d) (Remove the lid). Please tell me how many there are altogether.

19) Counting Back
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?

☺ ☺ ☺ ☺

Q20

part (b)

b) Could you use your fingers to help you to work it out? (it’s fine to repeat the question, but no further prompts please).

☺ ☺ ☺ ☺

Q27 Multiplication & Division

20) Counting Down To / Counting Up From
I have 12 strawberries and I eat 9. How many are left? . . . Please explain.

or not using a highlighted strategy in Q 20: Q27 Multiplication & Division

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. (Please write answers on the record sheet, whether correct or incorrect.)

Use clues such as speed of response, or ask “how did you work that out”, to evaluate each strategy.

[at any stage]: ☺ ➔ 21(e) then ➔ Q27 Multiplication & Division

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

Five ☺ and at least three highlighted strategies: ➔ Q22.
Otherwise: ➔ Q27 Multiplication & Division

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22) Derived Strategies

Here are some more questions. Please tell me the answers. 
*Use clues such as speed of response, or ask “how did you work that out”, to evaluate each strategy.*

[at any stage]: ☺ ☺ ☺ ☺ ☺  \( Q27 \text{ Multiplication \\& Division} \)

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

Five ☺ and at least three highlighted strategies:  \( Q23. \)
Otherwise:  \( Q27 \text{ Multiplication \\& Division} \)

23) Multi-Digit Strategies

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

[at any stage]: ☺ ☺ ☺ ☺ ☺  \( Q27 \text{ Multiplication \\& Division} \)

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

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. ☺ ☺ ☺ ☺ ☺  \( Q27 \text{ Multiplication \\& Division} \)

*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. ☺ ☺ ☺ ☺ ☺  \( Q27 \text{ Multiplication \\& Division} \)
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’?”)

No estimate or one outside the range 800-1000 ➔ Q27 Multiplication & Division

c) Can you work out the exact answer to this in your head? (936)
If “yes”, 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 pencil and paper to work it out any way you like. ☺ ➔ Q27 Multiplication & Division

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?”)

No estimate or one outside the range 200-300 ➔ Q27 Multiplication & Division

c) Can you work out the exact answer to this in your head? (266)
If “yes”, 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 pencil and paper to work it out any way you like.

Adding decimal fractions
26.1 Place the following cards on the table in this order: 0.28 and 0.3
Add these numbers. What did you find?

Adding fractions
26.2 Place the following cards on the table in this arrangement

\[
\begin{array}{ccc}
1/3 & 2/5 & 3/2 \\
4/6 & 1/2 & 2/3
\end{array}
\]

Point to two numbers that add to make one.
Please explain how you worked this out. ☺ ➔ Q27 Multiplication & Division

Estimating with fractions
26.3 Place the following cards on the table in this order: 2/3 and 1/2
When you add these numbers, is the answer more than one or less than one?
Please explain.

Subtracting fractions
26.4 Place the following cards on the table: 4/6 and 1/3
What’s the difference between these two numbers? (If the child does not subtract, say Can you subtract these numbers?)
Please explain.

➔ Section D: Multiplication & Division
SECTION D: STRATEGIES FOR MULTIPLICATION AND DIVISION

Equipment: four empty matchboxes (“teddy cars”), orange page with “teddy mats”, twelve teddies of the same colour, bar of 5 unifix (all the same colour), plastic transparent container with three tennis balls inside it, red card with dots, cover card for dots, white cards with $5 \times 3$ and $12 \div 4$, pink story problem cards – washing windows and stamps, mauve orchard problem, scrap paper and pencil, white card with 0.4

27) Teddy Cars – (Modelling Multiplication)
Put four matchboxes in a line.
Here are four teddy cars. Please put two teddies in each car.

a) How many teddies is that altogether?

b) Tell me how you worked that out.

c) If the child appears to be counting all, ask:
Could you do that another way, without counting them one by one?

28) Teddies on the Mats – (Modelling Division)
Show the child the orange picture of four “teddy mats”. Put out 12 teddies of the same colour.
Here are four teddy mats. Here are 12 teddies. You are going to put the teddies on the mats (pause) so that there are the same number of teddies on each mat (pause).

a) How many teddies will you put on each mat?

Please check?
If the child starts to share by ones, ask:
Could you do that another way, without going one by one?

What did you find?

b) If incorrect ask:
Can you put the same number of teddies on each mat?

29) Unifix Train – (Partial Modelling ‘times as many’ Multiplication)
Show the bar of 5 unifix and say, ‘I’ve made a train 5 unifix long. Imagine that you make a train that is 3 times as long as mine.’

a) How many unifix will you need?

b) Tell me how you worked it out?

c) If the child appears to be counting all, ask: Could you do it another way without counting them one by one?

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30) Tennis Balls Task – (Partial Modelling ‘groups of’ Multiplication)

Put out 1 packet of 3 tennis balls.
Here is a packet of tennis balls.
a) How many balls would there be in four packets?
b) Tell me how you worked that out.
c) If the child appears to be counting all, ask:
Could you do that another way, without counting them one by one?

31) Dots Array Task – (Partial Modelling Multiplication, arrays)

Here is a page of dots. Show red card (4 x 5) for an instant, in the orientation shown here. I’m going to hide some.
Cover the bottom 4 x 3 section, and the bottom half of the 3 dots above it.
a) How many dots are there altogether on the whole page?
b) How did you work that out?

(If the child appears to be counting all, ask:)
Could you do that a faster way, without counting them one by one?

32a) Biscuits on a tray – (Abstracting Division - Quotition)

Here is a story. I put 20 biscuits on an oven tray (pause). I put 4 biscuits in each row on the tray (pause). How many rows of biscuits were there?
Please explain how you worked it out.

If the child seems unsure of how to approach the task ask, ‘What do you think this story is asking you?’ Repeat the question, if necessary.

32b) Number of legs – (Abstracting Multiplication)

Ants have 6 legs. I caught 3 ants.
a) How many legs is that altogether?
Please explain how you worked it out
If the child appears to be counting all, ask:
b) Is there a quicker way you can work it out? Please explain, or show me.

32c) At the Movies – (Abstracting Division - Partition)

Here comes another story. 15 children are sitting in rows at the movies. . . . The children are sitting in three equal rows. How many children are in each row? . . . How did you work that out?
33a) Interpreting Multiplication

Show the white card 5 × 3

a) Read this card to me. [Record what the child says and note it for the next question (e.g., “5 times 3” or “5 threes” or “5 groups of / lots of 3”)]
b) Please show me what this looks like as a drawing on a piece of paper.
c) Please explain what you have drawn.

33b) Multiplication Problems – (Basic, derived and intuitive strategies for multiplication)

Using the same language the child used in the previous question (e.g., “5 times 3” or “5 threes” or “5 groups of / lots of 3”), read these problems one at a time.  [at any stage]: 😊 → Q38 E: Time

a) 3 × 10
b) 2 × 7
c) 10 × 7
d) 3 × 50
e) 4 × 30
f) 5 × 7

33c) Cost of Stickers – (Basic, derived and intuitive strategies for multiplication: money)

Listen to this story. One packet of stickers costs 50 cents.
a) How much would 6 packets cost?
b) Please explain how you worked it out.

If the child is successful, ask:
c) There are 8 stickers in each packet. How many stickers are there in 6 packets?

If the child appears to be skip counting, ask:
Is there a quicker way without skip counting by 6s or 8s?

😊 in 33a or 33c, or non preferred strategy in 33c → Q38 Section E: Time

34a) Interpreting Division

Paper and pencil for drawing. Show the white card 12 ÷ 4.

a) Read this card to me.  [Record what the child says and note it for the next question (e.g., “12 divided by 4” or “12, how many 4s?” or “how many 4s in 12?”)]
b) Please show me what this looks like as a drawing.
c) Please explain what you have drawn.

34b) Division Problems – (Basic, derived and intuitive strategies for division)

Using the same language the child used in the previous question (e.g., “12 divided by 4” or “12, how many 4s?” or “how many 4s in 12?”), read these problems one at a time.  [at any stage]: 😊 → Q38 Section E: Time

a) 16 ÷ 2
b) 60 ÷ 10
c) 80 ÷ 4
d) 24 ÷ 3
e) 35 ÷ 5
f) 35 ÷ 7

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34c) Washing windows – (Basic, derived and intuitive strategies for division)

Place pink window washing card in front of student. Listen to this story.

a) I washed 8 windows in 48 minutes. It took the same time to wash each window. How long did it take me to wash one window?

If you can, please work out the answer in your head.

Please explain your thinking to me.

If the child appears to be skip counting, ask:

Is there a quicker way without skip counting by 8s?

If the child cannot answer mentally or is incorrect make the following request:

Please use the pencil and paper to work it out any way you like.

in Q34a or Q34c, or non preferred strategy in 34c ⇒ Q38 Section E: Time
Otherwise continue on to Q35a, Q35b and Q35c.

35a) Off to the Circus – (Extending and applying division: remainders)

97 people are going to the circus. 20 people can ride in each bus. How many buses will be needed to get all 97 people to the circus?

How did you work that out?

35b) Stamp Collection – (Extending and applying multiplication: ‘times as many’)

Place pink stamp card in front of student and pose the following problem:

a) Jamie collected 18 stamps. Simone collected 5 times as many stamps. How many stamps does Simone have?

Please explain how you worked it out.

If the child appears to be skip counting, ask:

Is there a quicker way without skip counting by 5s or 18s?

If the child cannot answer mentally or is incorrect make the following request:

b) Please use the paper to work it out any way you like.

35c) Rows of Trees in an Orchard – (Extending and applying division: larger numbers)

Place the mauve card in front of the student and read the problem.

a) A farmer planted 98 trees in rows. 14 trees were planted in each row. How many rows of trees were there?

If you can, please work out the answer in your head.

Explain your thinking to me.

If the child appears to be skip counting, ask:

Is there a quicker way without skip counting by 14s?

If the child cannot answer mentally or is incorrect make the following request:

b) Please use the paper to work it out any way you like.

in Q35a, Q35b or Q35c, or non preferred strategies in Q35b or Q35c ⇒ Q38 Section E: Time
36a) Sharing pizza – (Extending and applying division: fractions)

Read the following problem to the child.

a) Four friends ate three pizzas. They all ate the same amount. How much pizza did each person eat? Please explain.

If the child cannot answer mentally or is incorrect make the following request:

b) Please use the paper to work it out any way you like.

36b) Relay – (Extending and applying multiplication: decimal fractions)

Place the 0.4 km card on the table.

a) Fifteen children each ran this far in a relay. Point to the card. How far did they run in total? Please explain.

If the child cannot answer mentally or is incorrect make the following request:

b) Please use the paper to work it out any way you like.

37) Half as Many – (Extending and applying multiplication: ‘times as many’ fractions)

There are nine children playing a game.

a) There are half as many girls as there are boys. How many girls and how many boys are playing the game?

If the child needs a prompt ask:

Would you like to use pen and paper to work it out?

If student is incorrect or unsure ask:

b) If there are twice as many boys as girls, how many girls and how many boys are playing the game?

→ Section E: Time
SECTION E: TIME

Equipment: Children’s own hand-drawn clocks, moveable yellow clock, yellow June calendar card, digital clock showing 12:51, excerpt from TV guide, blank digital and analogue clockfaces.

Prior to the interview, children need to be asked in class to simply “draw a clock”. If they choose to draw a digital clock, please ask them to then draw an analogue one. They then bring these clocks to the interview.

38) My Clock
Depending upon the kinds of information shown in the child’s drawing of the clock, ask questions like the following:
Tell me about your clock.
What are clocks for?
What are the numbers on your clock? (if relevant)
How do the numbers work?
What time does your clock show?
Tell me what you do at this time.

39) Telling the Time
Tell me what time these clocks show? (use the yellow clock faces)

[at any stage]: ☑ → Q40 Section F: Length

a) 2:00
b) 9:30
c) 2:20

40) The Days and the Months
a) Tell me the days of the week (or “some days” if the child hesitates).
b) Tell me the months of the year (or “some months” if the child hesitates).

☑ for (a) or (b) → Q40 Section F: Length

c) Tell me what day comes before Friday. ☑ → Q40 Section F: Length
d) Tell me what month comes before April. ☑ → Q40 Section F: Length

Only continue given complete success in Q39 & Q40 otherwise: ☑ → Q40 Section F: Length

41) Calendar Tasks
Show the child the yellow calendar card for June [at any stage]: ☑ → Q40 Section F: Length

a) Find the 18th of June.
b) Tell me what day of the week that is.
c) Show me the last day in June.
d) Tell me what month comes after June.
e) What day of the week will the first of July be?
42) Duration Tasks

Show the child the green page with the diagram of the digital clock showing 12:51.
a) You put a pizza in the oven when the clock shows 12:51. You take the pizza out after 13 minutes. What is the time then?

If the child answers “13.04”, ask the next question.
b) Is there another name for that time?

Not saying 1:04  ➔ Q40 Section F: Length

43) TV Guide

Show the child the green excerpt from the TV guide.
This is taken from a TV paper, showing what’s on the TV. (Point to the word “Movie”). Please work out how long the movie goes (1:45).

➔ Q40 Section F: Length

44) Linking Digital and Analogue Time

Show the child the green, blank clockfaces (digital and analogue). Establish that these are two kinds of clocks that the child has seen before. Give the child a pen.

Point to the words above the clock.
Please show me what this time would look like on each clock: “8 minutes to 5”.

If it is not clear from the child’s drawing whether the small hand is pointing to before 5, ask the child “where is the little hand pointing to?”.
Similarly, if it is hard to distinguish between the small hand and the big hand, ask the child which is which.

➔ Section F: Length
SECTION F: LENGTH MEASUREMENT

Equipment: 25 cm skewer (blunted), 30 cm piece of string, 20 cm plastic drinking straw, 8 large (5cm) paper clips, 30 cm ruler, long strips of straightened streamers around 180 cm each, several streamers, exactly 93 cm long; subtle marks on the table indicating lengths of 75 cm and 125 cm, without labels; pen within reach of the child.

45) The String and the Stick
Drop the string (ensuring it is curled) and the skewer onto the table.

a) By just looking (without touching), which is longer: the string or the stick?

b) How could you check? (touching is fine now)

c) So, . . . , which is longer? 🤔 ➔ Q49 Section G: Mass

46) The Straw and the Paper Clips
Get the straw and show the child the paper clips.
Here are some paper clips. Here is a straw.

a) Measure how long the straw is with the paper clips. . . . (If child hesitates) Use the paper clips to measure the straw.

b) What did you find? (no prompting) … “4¼”, “4 and a bit” acceptable, “4 and a half” not acceptable. If correct number is given (e.g., 4), but no units, ask “4 what?” 😊 ➔ Q49 Section G: Mass

47) Using the Ruler
Here is a ruler. (Give the ruler to the child in her/his hand.)
Here is a straw (20 cm).
a) Please measure the straw with the ruler.

b) What did you find? (If correct number is given (20) but no units, ask “20 what?” 😊 ➔ Q49 Section G: Mass
48) Tearing the Streamer

Without referring to it, place a pen on the table in front of the child. Give the child a long piece of reasonably straight streamer (around 180 cm).

Here is a piece of streamer.

a) Please tear off a piece that you believe is around one metre long.

   [Teacher measures the actual length of the torn-off piece between interviews]

   **Clearly outside the range of 75 cm to 125 cm ➔ Q49 Section G: Mass**

Hand the child the prepared 93 cm streamer and the ruler.

b) I tried to tear off a one metre piece. Please measure how long my streamer is (allow the child to use the pen to mark the streamer if necessary, without prompting). . . . What did you find?

c) How far out was I? (If child is unclear, ask “how far off a metre was I?”)

   ➔ Section G: Mass
SECTION G: MASS MEASUREMENT

Equipment: tub of at least 20 teddies, 20 gram weight (2 x 20c pieces stuck together with masking tape), a collection of seven objects (a piece of foam, a rock, two plastic containers [short & fat and long & thin], a ball of string, a 1 kg mass or an object which weighs 1 kg [labelled 1 kg], and a tin of tomatoes in a shoe box, a set of balance scales, small film canister filled with water, at least eight ten-gram weights, a set of Salters’ Slimmers kitchen scales, 120 g object, 1 kg of brown rice, small scoop.

49) What Do You Notice?

Please take these things out of the box, and put them on the table.
a) What do you notice about them?

b) Which things are heavy and which things are light?

Push all items aside, except for the two yoghurt containers.
c) Take these two plastic containers (place one container in each hand for the child to feel). Which do you think is heavier?

d) How could you check?

e) Do you know about balances? (allow some time for the child to become familiar with the balance) Use the balance to see which container is heavier.

f) Were you right? How did you know?

Clearly unsure of concepts or about how the balance works: 😐 ➔ Q54 Section H: Shape

50) Teddies and Coins

Place the balance and the tub of teddies in front of the child. Show the two 20 cent coins wrapped together, and place in the child’s hand. How many teddies weigh the same as this? (If the child estimates without using the balance, ask “please use the balance to find out how many teddies weigh the same as this”)

What did you find out?

😊 ➔ Q54 Section H: Shape
51) One Kilogram
Here is a 1 kilogram weight. I am going to put it in your hand. (Please do so). Here is a tin of tomatoes for your other hand. (Place the object in the child’s other hand.)

a) Do you think the tin of tomatoes is more than 1 kilogram or less than 1 kilogram weight?

b) Can you check? . . . What did you find?

52) Using Standard Units
a) Here is a container. Here are some 10 gram weights. Measure the weight of this container with these 10 g weights.

b) What did you find? (To be judged as correct answer including units, the child must say “40 grams” as part of their response. If they say “4” ask “four what?”, but even “four 10 gram weights” is not sufficient. We are looking for “40 grams”.)

53) Using Kitchen Scales
Place the kitchen scales and the 120 g object on the table.
Have you seen scales like these before?

a) Please use the scales to weigh this object. . . . What did you find?

If the child gives a number only (without units), ask, e.g., “120 what?”

b) Please use the scales and the scoop to measure out 135 grams of rice.

c) How do you know it is 135 grams?

d) How many more grams of rice would you need to have one kilogram? (865 g)
SECTION H: PROPERTIES OF SHAPE

Equipment: Collection of eight small shapes cut from mauve card (square, rectangle, circle, triangles); blue page with nine possible triangles.

54) Sorting Shapes
Tip out the collection of mauve shapes on the table. Spread them out with any border lines underneath.

a) Please sort these shapes into groups. (If unclear, say “please sort out these shapes”)

Please try not to use the mathematical names of any shapes until they have been used by the child first.

b) How did you decide where to put each shape? . . .
(Pointing to each group in turn) Tell me about this group. . . . Is there anything else about the shapes in this group?

(If it seems appropriate, ask the child to sort again, and once again ask for an explanation of how they did it.)

c) Can you tell me the names of any of the shapes, apart from the ones you’ve told me already?

If the child has made no use of the word “triangle” in Q54  Q56 Section I: Visualisation

55) Choosing Triangles
Place the blue A4 sheet with the variety of shapes on the table.

a) Please point to the shapes one at a time that are triangles.

b) How do you decide whether a shape is a triangle or not? . . . . Is there anything else you want to tell me?

Only ask part (c) if the child correctly identified all the triangles in parts (a) and (b).
These should be 1, 4, 6, 8, 9.

c) Can you explain how you knew “number 2” wasn’t a triangle. . . . What about “number 3?”

Go to Section I: Visualisation
SECTION I: VISUALISATION

Equipment: Six of the eight small shapes cut from mauve card from Section H (square and circle are not needed); dark blue page folded in half with part of a light pink triangle pasted inside the fold, thus revealing an isosceles triangle; blue page with nine possible triangles; three mauve “triad” cards; green shaded puzzle card with blank square on it; white page with pictures of main design and other shapes; kindergarten squares of paper (one for teacher and one for each child)

56) Shapes in the Environment
Ensure that there are visible rectangular objects (in different orientations) in the room (e.g., door, window, table, board).
Place the rectangle on the table, in front of the child, turned like this:
Please discourage the child from moving the rectangle in any way.

a) Look around the room. Can you see something that is the same shape?
If the chosen object is oriented the same way as the cutout rectangle, ask the child “are there any more like this?” (we are seeing whether the child can recognise rectangles oriented other ways from the one they have been given). Ask for up to four examples unless the child nominates a reoriented rectangle sooner.

57) Peeking Over
Close your eyes for a moment while I get the next task organised. . . . Ensure that the hidden part of the pink shape cannot be seen through the folded blue page.)

Now open your eyes.
Hold the folded blue piece of paper with the partially-hidden, pink shape in front of the child.

a) I have a pink shape that is peeking over this piece of paper.
We can only see part of the pink shape.
. . . Place the paper down on the table. . . . What do you think the shape might be?

b) Show me with your finger how that pink shape “goes” underneath. (If necessary for understanding, ask can you draw around the outside of the shape with your finger?)

c) Could it be a different shape? Show me with your finger?
Continue to ask the question in part (c), until no further answers are forthcoming.

[Don’t open up the fold to show the shape]

If unable to correctly “trace” any unseen shape in Q57 → End the interview

58) Triads
Show the child the purple Card 1. (Our notes here assume that the shapes in each triad are “A”, “B” and “C” respectively.)

a) Which two of these are most alike? . . . Why? . . . Is there anything else you can tell me about these two shapes?
   If the child appears to have no idea, ask how A and B are alike, and then B and C

b) If A and B are chosen, ask how B and C are alike? . . . Why?
   If B and C are chosen, ask how A and B are alike? . . . Why?

If the child uses the term “wider”, ask the child to talk about what is meant.
Repeat parts a) and b) for Cards 2 and 3.
59) Puzzle

Take the square and the circle aside from the mauve shapes from Q54. Place the green card with the shading on the table. Place the six remaining mauve shapes beside the green card mixed up.

This is like a jigsaw puzzle. I have this card with a square on it. . . . I’m wondering (without moving any pieces yet) if you can find three pieces that you think would fit together like a puzzle to cover the square exactly. Please point to them if you think you know.

If the child suggests three correct pieces, push the others to one side, and ask them to try and show how they fit. If not, end the interview.

60) Design

Show the child the white page with the design on it.

a) (Pointing to the small pieces on the page) Which piece is not part of the design? This may take a little while.

(If some time passes without comment or action) Would you like to tell me what you are thinking?

b) (Once the child has decided which piece is not part of the design) Explain how you know.

Incorrect choice or explanation → End the interview

61) Rearrange the Square

Take one kindergarten square. Give the other one to the child.

Here is a piece of paper. Please fold it like this.

Fold the paper in half, with a small crease at the half-way point, while the child does the same with the other square. Take the child’s piece of paper.

Watch while I draw a line.

Use a ruler to draw a line from the midpoint to the top right-hand corner:

(Pointing to the ruled line) Imagine I cut along this line with scissors. I now have a little piece and a big piece. Make any sorts of shapes in your mind by joining the two pieces together. . . .

[Please note that we are discouraging shapes that involve one piece on top of the other]

For each new shape:

a) Trace around the outside of the new shape with your finger, and I’ll try and draw it.

b) (If needed for clarification) Describe what you can make.

Can you make anything else? (repeat for up to a total of four shapes)

End the interview.