

## Operational Strategy Questions

The questions that the interviewer reads out loud are in bold. Comments for the interviewer appear in plain type. All strategy questions are written down. Show students the questions as they are being read.

### Addition and Subtraction

- (1) **What is  $8 + 5$ ?**  
If the student was unable to solve  $8 + 5$  correctly or used a 'counting from 1 strategy' rate them at stage 0 – 3. If the student solves the question using a part-whole strategy proceed to (3). If the student solves the question by counting on or if the student obviously recalls it as basic fact proceed to (2) as this may provoke part-whole thinking.
- (2) **What is  $29 + 7$ ?**  
If the student solves (2) by counting on rate them at stage 4. If the student solves (2) using a part-whole strategy proceed to (3).
- (3) **You have 37 lollies and you eat 9 of them. How many have you got left?**  
If the student used any part-whole strategies for either (1) or (2), but counted back to solve (3), rate her/him at stage 5. If the student used a part-whole strategy on (3) proceed to (4).
- (4) **There are 53 people on the bus. 26 people get off. How many people are left on the bus?**  
If the student fails to solve this question correctly rate the student at stage 5. If the student successfully solves the problem by imaging a standard written method, ask 'Can you do that in a different way?' and if she/he is unable to provide an alternative strategy, ask them to explain how the written method works. Regardless, proceed to (5).
- (5) **Sandra has 394 stamps. She gets another 79 stamps from her brother. How many stamps does she have then?**  
If the student gets both of questions (4) and (5) correct using part/whole strategies proceed to (6). Otherwise rate the student at stage 5.
- (6) **Marija has a 5.3 metre length of fabric. She uses 2.89 metres of it to make a tracksuit. How much fabric has she got left?**  
Regardless of the student's answer, proceed to question (7).
- (7) **Harry and Sally buy two pizzas. Harry eats  $\frac{3}{4}$  of a pizza while his friend Sally eats  $\frac{7}{8}$  of a pizza. How much pizza is left over?**  
If the student gets both questions (6) and (7) correct using part-whole strategies, rate him/her at stage 7 for addition and subtraction. Otherwise rate the student at stage 6.

<b>Stage &amp; Behavioural Indicator</b>	
<b>0-3</b>	<b>Counting All</b> The student counts from one to solve addition problems.
<b>4</b>	<b>Advanced Counting</b> The student's the most advanced strategy is counting-on, or counting-back.
<b>5</b>	<b>Early Additive Part-Whole Thinking</b> The student shows any Part-Whole strategy to solve addition or subtraction problems mentally by reasoning the answer from basic facts and/or place value knowledge.
<b>6</b>	<b>Advanced Additive Part-Whole Thinking</b> The student is able to use at least <i>two different</i> mental strategies to solve addition or subtraction problems with multi-digit numbers.
<b>7</b>	<b>Advanced Multiplicative Part-Whole Thinking</b> The student is able to use at least <i>two different</i> mental strategies to solve addition or subtraction problems with decimals and simple fractions.

## Multiplication and Division

- (8) Rohan has 8 five-dollar notes in his wallet. How much money does Rohan have altogether?  
If the student was unable to solve  $8 \times 5$  correctly or used a 'counting from 1 strategy' rate them at stage 2 – 3. If the student solves the question by skip-counting, rate her/him as stage 4. If the student uses an additive strategy or knows the basic fact, proceed to (9) and (10).
- (9) What is  $3 \times 20$ ?  
Screen the answer to  $3 \times 20$  until student responds correctly.  
So, if  $3 \times 20 = 60$ , what is  $3 \times 18$ ?  
If the student answers correctly using a part-whole strategy, proceed to (10).
- (10) What is  $5 \times 8$ ?  
Screen the answer to  $5 \times 8$  until student responds correctly.  
So, if  $5 \times 8 = 40$ , what is  $5 \times 16$ ?  
If the student does not derive the answers to both (9) and (10), rate him/her at stage 5. If she/he does derive the answers to (9) and (10) proceed to questions (11) and (12).
- (11) There are 6 baskets. There are 24 muffins in each basket. How many muffins are there altogether?  
Where the student images a written algorithm no assumption can be made about their stage. Question the student about their understanding of the processes involved in the algorithm and what other strategies they could use to solve the given problem. If the student fails to solve this problem correctly using a part-whole strategy rate the student at stage 6. Otherwise, proceed to question (12).
- (12) At the car factory they need 4 wheels to make each car. How many cars can they make with 72 wheels?  
If the student correctly solves both (11) and (12) using two or more different part/whole strategies rate the student at stage 7 and proceed to questions (13) and (14). Otherwise, rate the student at stage 6.
- (13) Ivan has 2.4 kilograms of mince. Each pattie takes 0.15 kilograms of mince. How many patties can Ivan make?  
Regardless of the student's answer, proceed to question (14).
- (14) Each day on a life raft 26 litres of water is shared equally among the 8 survivors. How many litres of water does each person get each day?  
If the student correctly solves both (13) and (14) using two different part/whole strategies, rate the student at stage 8. Otherwise, rate the student at stage 7.

Stage & Behavioural Indicator	
2-3	<b>Count From One</b> The student solves multiplication problems by counting all of the objects.
4	<b>Advanced Counting</b> The student solves multiplication problems by skip counting where he/she has a known sequence or by using a combination of skip counting and counting in ones, for example, 5, 10, 15, 20.
5	<b>Early Additive Part-Whole</b> The student solves multiplication problems by forming the factors where they have a known multiplication fact or using repeated addition, eg, for $5 \times 8$ : $5 + 5 = 10$ , $10 + 10 + 10 + 10 = 40$ .
6	<b>Advanced Additive Part-Whole</b> The student solves multiplication problems by deriving from known multiplication facts, for example, $3 \times 20 = 60$ so $3 \times 18 = 60 - (3 \times 2) = 54$ .
7	<b>Advanced Multiplicative Part-Whole</b> The student is able to use at least <i>two different</i> mental strategies to solve multiplication and division problems with whole numbers.
8	<b>Advanced Proportional Part-Whole</b> The student is able to use at least <i>two different</i> mental strategies to solve multiplication and division problems with decimals and fractions.

## Proportions and Ratios

- (15) This cake has been cut into thirds. Here are twelve jellybeans to spread out evenly on top of the cake. You eat one third of the cake. How many jellybeans do you eat?  
If the student cannot solve the problem mentally, allow them to manipulate the beans. Rate them at stage 1 or stage 2 - 4 as appropriate. If the student solves the problem mentally proceed to (16).
- (16) What is  $\frac{3}{4}$  of 28.  
If the student cannot solve the question correctly rate them at stage 5. Otherwise proceed to (17).
- (17) 12 is  $\frac{2}{3}$  of a number. What is the number?  
If the student cannot answer the question correctly rate them at stage 6. Otherwise proceed to question (18).
- (18) There are 21 boys and 14 girls in Ana's class. What percentage of Ana's class are boys?  
If the student cannot solve the problem correctly rate them at stage 7. Otherwise, proceed to question (19).
- (19) It takes 10 balls of wool to make 15 beanies. How many balls of wool does it take to make 6 beanies?  
If the student correctly solves both (18) and (19) using two or more different part/whole strategies rate the student at stage 8. Otherwise, rate the student at stage 7.

Stage & Behavioural Indicator	
<b>1</b>	<b>Unequal Sharing</b> The student is unable to find a fraction of a number by sharing of the objects into equal subsets.
<b>2-4</b>	<b>Equal Sharing</b> The student finds a fraction of a number by sharing the objects into equal subsets.
<b>5</b>	<b>Early Additive Part-Whole</b> The student finds a unit fraction of a number mentally using trial and improvement with addition facts, e.g. $\frac{1}{3}$ of 12 as $4 + 4 + 4 = 12$ .
<b>6</b>	<b>Advanced Additive Part-Whole</b> The student finds a fraction of a number mentally using a combination of addition facts and multiplication, e.g. $\frac{3}{4}$ of 28 as: $\frac{1}{4}$ of 20 = 5 so $\frac{1}{4}$ of 24 = 6 so $\frac{1}{4}$ of 28 = 7, $3 \times 7 = 21$ ; or $\frac{1}{2}$ of 28 is 14, $\frac{1}{2}$ of 14 is 7, $14 + 7 = 21$ .
<b>7</b>	<b>Advanced Multiplicative Part-Whole</b> The student finds a fraction of a number using division and multiplication, for example, $\frac{2}{3} \times \square = 12$ so, $\frac{1}{3} \times \square = 6$ so, $\square = 6 \times 3 = 18$ , or $1\frac{1}{2} \times 12 = \square$ so, $\square = 18$ .
<b>8</b>	<b>Advanced Proportional Part-Whole</b> The student uses at least <i>two different</i> strategies to solve problems that involve equivalence with and between fractions, ratios and proportions.

## Knowledge Questions

These questions are asked of the whole class. Students write their answers on a supplied sheet. Questions (1) to (49) are all written on cards with instructions on each card.

### Forwards and Backwards Number Word Sequence

- (1) What number is one more than 89?      (2) What number is one less than 50?  
 (3) What number is one more than 499?      (4) What number is one less than 840?  
 (5) What number is one more than 30099?      (6) What number is one less than 24000?  
 (7) What number is one more than 989 999?      (8) What number is one less than 603 000?

Stage & Behavioural Indicator	
<b>2-3</b>	<b>Emergent</b> The student cannot produce the number just before and after a given number in the range 1 to 100 <i>without dropping back</i> .
<b>4</b>	<b>FNWS and BNWS up to 100</b> The student can produce the number just before and after a given number in the range 1 to 100 <i>without dropping back</i> .
<b>5</b>	<b>FNWS and BNWS up to 1000</b> The student can produce the number before and after a given number in the range 1 to 1000.
<b>6</b>	<b>FNWS and BNWS up to 1 000 000</b> The student can produce the number before and after a given number in the range 1 to 1 000 000.

## Fractional Numbers

- (9) Write one half as a fraction.
- (10) Write one sixth as a fraction.
- (11) Write one third as a fraction.
- (12) Write one quarter as a fraction.
- (13) Which of these fractions is the smallest?  $\frac{1}{3}$      $\frac{1}{5}$      $\frac{1}{4}$      $\frac{1}{2}$      $\frac{1}{6}$
- (14) Which of these fractions is the largest?  $\frac{1}{3}$      $\frac{1}{5}$      $\frac{1}{4}$      $\frac{1}{2}$      $\frac{1}{6}$
- (15) Which of these numbers is the same as eight sixths?  
 $\frac{6}{8}$      $1\frac{2}{6}$     1     $\frac{2}{14}$
- (16) Which of these fractions is the same as two thirds?  
 $\frac{2}{6}$      $\frac{6}{8}$      $\frac{8}{12}$      $\frac{9}{12}$      $\frac{3}{9}$
- (17) Which of these fractions is the same as three quarters?  
 $\frac{2}{6}$      $\frac{6}{8}$      $\frac{8}{12}$      $\frac{9}{12}$      $\frac{3}{9}$
- (18) Which of these fractions is the smallest?  $\frac{2}{5}$      $\frac{3}{10}$      $\frac{5}{16}$
- (19) Which of these fractions is the largest?  $\frac{2}{3}$      $\frac{5}{9}$      $\frac{7}{10}$

Stage & Behavioural Indicator	
2-3	<b>Unit Fractions Not Recognised</b> The student cannot write symbols for unit fractions.
4	<b>Fractions Recognised</b> The student can write unit fraction symbols, e.g. student can write $\frac{1}{3}$ for one third, $\frac{1}{4}$ for one quarter.
5	<b>Ordered Unit Fractions</b> The student can compare unit fractions e.g. $\frac{1}{3} > \frac{1}{4}$ .
6	<b>Co-ordinated Numerators and Denominators</b> Describes the size fractions with reference to both the numerator and denominator, e.g. the fraction $\frac{8}{6}$ is one whole and two-sixths.
7	<b>Equivalent Fractions</b> Names equivalent fractions, e.g. $\frac{2}{3} = \frac{8}{12}$ , $\frac{3}{4} = \frac{6}{8}$ .
8	<b>Ordered Fractions</b> Orders fractions with unlike denominators and numerators, e.g. $\frac{3}{10} < \frac{5}{16} < \frac{2}{5}$

## Place Value

- (20) A CD player costs \$80. How many \$10 notes do you need to pay for it?
- (21) Which of these numbers is the largest? 488, 620, 602, 448
- (22) Which of these numbers is the smallest? 488, 620, 602, 448
- (23) Which of these numbers is the largest? 4650, 5046, 5406, 4506
- (24) Which of these numbers is the smallest? 4650, 5046, 5406, 4506
- (25) A radio costs \$270. How many \$10 notes do you need to pay for it?
- (26) You have this amount of money (\$26 700) in \$100 notes. How many notes do you have?
- (27) Which of these numbers is the largest? 352 097, 90 325, 79 532, 297 320
- (28) Which of these numbers is the smallest? 352 097, 90 325, 79 532, 297 320
- (29) What number is three tenths less than 2?
- (30) Which of these numbers is the largest? 0.76, 0.657, 0.7
- (31) Which of these numbers is the smallest? 0.478, 0.8, 0.39
- (32) In this number (78.912) the 7 is in the tens column. What number is in the tenths column?
- (33) Write a number that lies between 7.59 and 7.6.
- (34) What is 137.5% as a decimal?

<b>Stage &amp; Behavioural Indicator</b>	
<b>2-3</b>	<b>One as a Unit</b> The student find the total number of objects in collections by counting all of the objects by one. He/she does not use ten as a counting object.
<b>4</b>	<b>Ten as a Counting Unit</b> The student uses ten as a counting unit, knows the tens in numbers to 100, for example, six tens are sixty and recognises the place value of digits in whole numbers to 999.
<b>5</b>	<b>Tens in Numbers to 1 000</b> The student knows how many tens are in numbers to 1000 and orders numbers to 10 000.
<b>6</b>	<b>Tens, Hundreds and Thousands in Any Whole Number</b> The student knows how many tens and hundreds are in any whole numbers, orders any set of whole numbers, and recognises that ten tenths make one.
<b>7</b>	<b>Tenths in Decimals/Ordered Decimals</b> The student knows how to order decimals to three places, for example 0.39, 0.478, 0.8.
<b>8</b>	<b>Decimal Conversions</b> The student knows how many tenths, hundredths, and thousandths are in decimals, and can identify decimals between others. The student names a percentage as a decimal and vice versa, for example, 137.5% as 1.375.

## Basic Facts

Say questions (35) to (49) out loud. Say them clearly and slowly. There are no cards to show students for these questions.

- (35) 2 plus 3 equals                      (36) 5 plus 4 equals                      (37) 6 plus what equals 10  
 (38) 9 plus 9 equals                      (39) 10 plus 4 equals                      (40) 7 plus 10 equals  
 (41) 8 plus 6 equals                      (42) 6 plus 9 equals                      (43) 5 times 7 equals  
 (44) 17 minus 9 equals                      (45) 6 times 7 equals                      (46) 8 times 4 equals  
 (47) 56 divided by 7 equals                      (48) 63 divided by 9 equals  
 (49) Name all of the factors of 81                      (50) Two cubed equals  
 (51) What is the highest common factor of 40 and 64?  
 (52) What is the least common multiple of 12 and 18?  
 (53) What is  $\frac{3}{8}$  as a decimal?

Stage & Behavioural Indicator	
<b>0-1</b>	<b>Non-grouping with Five</b> The student is unable to recall instantly groupings within five and within ten.
<b>2-3</b>	<b>Within and with Five, within Ten</b> The student instantly recalls groupings within, and with five, for example, nine is five and four, and groupings to ten, for example, 10 is three and seven.
<b>4</b>	<b>Addition with Tens and Doubles</b> The student recalls doubles to 20, and "teen" facts, for example $14 = 10 + 4$ .
<b>5</b>	<b>Addition Facts</b> The student recalls the basic addition facts, and the multiplication facts for 2,5, and 10.
<b>6</b>	<b>Subtraction and Multiplication Facts</b> The student recalls the basic subtraction and multiplication facts.
<b>7</b>	<b>Division Facts</b> The student recalls the basic division facts, and names all the factors of numbers up to 100.
<b>8</b>	<b>Facts for Proportional Thinking</b> The student recalls a range of facts related to fractions, decimals, percentages, powers, factors, multiples and primes.