

## 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  $9 + 6$ ?**  
If the student was unable to solve  $9 + 6$  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  $28 + 7$ ?**  
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) **A farmer has 45 sheep and sells 8 of them. How many sheep does he have 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 62 spaces in a carpark. 27 spaces are empty. How many spaces have cars in them?**  
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) **Jenna has 403 sausages for the school gala. She sells 87 of them in the first hour. How many sausages does she have left?**  
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) **Marama and Joe buy two pizzas. Marama eats  $\frac{2}{3}$  of a pizza while her friend Joe eats  $\frac{5}{6}$  of a pizza. How much pizza is left over?**  
Regardless of the student's answer, proceed to question (7).
- (7) **In the high jump, Lara can jump 1.36 metres. The school high jump record is 2.1 metres. How much higher is the school record?**  
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.
- (8) **On Monday,  $\frac{1}{3}$  of the students in a class left to go to cross-country, and  $\frac{3}{5}$  of the students left to go swimming. What fraction of the students left the class?**  
If the student gets questions (8) correct using part-whole strategies, rate him/her at stage 8 for addition and subtraction. Otherwise rate the student at stage 7.

Stage & Behavioural Indicator	
<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.
<b>8</b>	<b>Advanced Proportional Part-Whole Thinking</b> The student is able to use mental strategies to solve addition or subtraction problems with decimals and fractions.

## Multiplication and Division

- (9) Rohan has 7 five-dollar notes in his wallet. How much money does Rohan have altogether?  
If the student was unable to solve  $7 \times 5$  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 (10) and (11).
- (10) What is  $3 \times 40$ ?  
Screen the answer to  $3 \times 20$  until student responds correctly.  
So, if  $3 \times 40 = 120$ , what is  $3 \times 39$ ?  
If the student answers correctly using a part-whole strategy, proceed to (11).
- (11) What is  $6 \times 7$ ?  
Screen the answer to  $6 \times 7$  until student responds correctly.  
So, if  $6 \times 7 = 42$ , what is  $6 \times 14$ ?  
If the student does not derive the answers to both (10) and (11), rate him/her at stage 5. If she/he does derive the answers to (10) and (11) proceed to questions (12) and (13).
- (12) It takes 28 bricks to make 1 row of a wall. How many bricks are in 6 rows?  
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 (13).
- (13) In each packet of bulbs sold in a hardware shop there are 3 bulbs. How many packets can be filled with 84 bulbs?  
If the student correctly solves both (12) and (13) using two or more different part/whole strategies rate the student at stage 7 and proceed to questions (14) and (15). Otherwise, rate the student at stage 6.
- (14) When Sue-Anne walks, her pace is 0.75 metres long. She walks 120 metres. How many paces does she take?  
Regardless of the student's answer, proceed to question (15).
- (15) James has  $\frac{3}{4}$  of a block of chocolate. He eats  $\frac{2}{3}$  of this. What fraction of the **whole block** has he eaten?  
If the student correctly solves both (14) and (15) using two different part/whole strategies, rate the student at stage 8. Otherwise, rate the student at stage 7.

<b>Stage &amp; Behavioural Indicator</b>	
<b>2-3</b>	<b>Count From One</b> The student solves multiplication problems by counting all of the objects.
<b>4</b>	<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.
<b>5</b>	<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 $5 \times 8$ : $5 + 5 = 10$ , $10 + 10 + 10 + 10 = 40$ .

<b>6</b>	<b>Advanced Additive Part-Whole</b> The student solves multiplication problems by deriving from known multiplication facts, for example, $3 \times 20 = 60$ so $3 \times 18 = 60 - (3 \times 2) = 54$ .
<b>7</b>	<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.
<b>8</b>	<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

- (16) This cake has been cut into thirds. Here are eighteen jellybeans to spread out evenly on top of the cake. If 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 (17).
- (17) What is  $\frac{3}{8}$  of 32?  
If the student cannot solve the question correctly rate them at stage 5. Otherwise proceed to (18).
- (18) 12 is  $\frac{3}{4}$  of a number. What is the number?  
If the student cannot answer the question correctly rate them at stage 6. Otherwise proceed to question (19).
- (19) In a box of chocolates, 24 are dark chocolate and 16 white chocolate. What percentage of the chocolates are dark chocolate?  
If the student cannot solve the problem correctly rate them at stage 7. Otherwise, proceed to question (20).
- (20) It takes 9 cups of flour to make 12 bread sticks. How many cups of flour does it take to make 28 bread sticks?  
If the student correctly solves both (19) and (20) using two or more different part/whole strategies rate the student at stage 8. Otherwise, proceed to question 21.
- (21) A computer technician charges \$60 an hour, plus GST. GST is  $12\frac{1}{2}\%$  of the total bill. If the technician comes for 2 hours, how much will he charge in total?  
If the student correctly solves two of questions (19) to (21) using two or more different part/whole strategies rate the student at stage 8. Otherwise, rate the student at stage 7.

<b>Stage &amp; Behavioural Indicator</b>	
<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, $\square = 18$ . The student understands the relationship between decimal numbers and tenths and hundredths, for example, 5.89456 contains 589 hundredths.
<b>8</b>	<b>Advanced Proportional Part-Whole</b> The student uses at least two different strategies to solve problems that involve equivalence with and between fractions, ratios and proportions.