



## Observation map Math Assessment Reasoning Strategies |Multiplication

### Questions

### answer observations

4x3

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Doesn't know or guesses   |
| <input type="checkbox"/> | Counts to three 4 times or to four 3 times out loud or on fingers                       |
| <input type="checkbox"/> | Uses repeated addition $3+3=6$ $6+3=9$ , $9+3=12$                                       |
| <input type="checkbox"/> | Uses a double strategy 4 times is double-double. So double 3 = 6 and double 6 =12       |
| <input type="checkbox"/> | Uses a known fact to reason a new fact: I know $3 \times 3=9$ so one more 3 is $9+3=12$ |
| <input type="checkbox"/> | Skip counts 3, 6, 9, 12 or 4, 8,12  |
| <input type="checkbox"/> | Knows it  |

Additional observations:

6x8

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Doesn't know or guesses   |
| <input type="checkbox"/> | Counts to 8 six times or to 6 eight times out loud or on fingers and gets 48                                |
| <input type="checkbox"/> | Uses repeated addition $8+8=16$ $16+8=24$ , $24+8=32$ $32+8=40$ $40+8=48$                                   |
| <input type="checkbox"/> | Skip counts 8, 16, 24 ....48  |
| <input type="checkbox"/> | Uses a known fact to reason a new fact: I know $5 \times 8=40$ so $6 \times 8$ is one more 8, $40 + 8 = 48$ |
| <input type="checkbox"/> | Explains 8 times means double double double, says double 6 = 12, double 12 = 24 and double 24 = 48          |
| <input type="checkbox"/> | Uses "half and double" $8 \times 6$ or $4 \times 12$ or $4 \times 10=40$ , $4 \times 2=8$ together 48       |
| <input type="checkbox"/> | Knows it  |

Additional observations:



## Questions

## answer observations

9x18

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Doesn't know, does not even guess when asked to do so  |
| <input type="checkbox"/> | Guesses between 100-149, ask why do you think that and write a comment which scaffolding is needed to correct the guess  |
| <input type="checkbox"/> | Rounds 9 to 10 and 18 to 20 and guesses a number between 150-200, ask to guess a bit more precisely and write a comment which scaffolding is needed to guess more accurately |
| <input type="checkbox"/> | Needs to write out the column algorithm, makes a mistake. Write a comment which scaffolding the student needs to be able to correct the answer                               |
| <input type="checkbox"/> | Needs to write out the column algorithm and gets 162   |
| <input type="checkbox"/> | Imagines column algorithm with regrouping and gets 162   |
| <input type="checkbox"/> | Uses place value to split 18 in tens and ones and multiplies separately $9 \times 10 = 90$ , $9 \times 8 = 72$ , $90 + 72 = 162$   |
| <input type="checkbox"/> | Uses compensation: $9 \times$ a number is $10 \times$ the number - $1 \times$ the number: $10 \times 18 = 180$ , $180 - 18 = 162$  |
| <input type="checkbox"/> | Uses compensation: $18 \times$ a number is $20 \times$ the number - $2 \times$ the number: $9 \times 20 = 180$ , $2 \times 9 = 18$ , $180 - 18 = 162$                        |

Additional observations:



## Questions

## answer observations

40x250

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Doesn't know, guesses less than 1,000 or more than 100,000  |
| <input type="checkbox"/> | Guesses more than 1,000   |
| <input type="checkbox"/> | Can only do it on paper, writes out all zeros   |
| <input type="checkbox"/> | Imagines the column algorithm   |
| <input type="checkbox"/> | Uses place value to split 250 in 200 and 50, $4 \times 200 = 800$ so $40 \times 200 = 8,000$ and $4 \times 50 = 200$ so $40 \times 50 = 2,000$ together <b>10,000</b> |
| <input type="checkbox"/> | Can use place value and benchmarks: $4 \times 25 = 100$ so $40 \times 25 = 1000$ so $40 \times 250 = 10,000$  |
| <input type="checkbox"/> | Can use place value and benchmarks: $4 \times 250 = 1000$ so $40 \times 250 = 10,000$   |
| <input type="checkbox"/> | Uses place value and the half and double strategy: half of 40 = 20 and double 250 = 500, makes $20 \times 500$ , and $2 \times 500 = 1000$ , $20 \times 500 = 10,000$ |

Additional observations:



## Questions

## answer observations

123x3

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Can't do it or guesses 126 (adds instead of multiplies), alert the student and ask again  |
| <input type="checkbox"/> | Thinks the answer is 323 (only multiplies the 100) write a comment which scaffolding the learner needs to be able to get the correct answer                     |
| <input type="checkbox"/> | Can only do it on paper and correctly gets 369  |
| <input type="checkbox"/> | Imagines the column algorithm and correctly gets 369  |
| <input type="checkbox"/> | Uses place value strategy and separates hundreds, tens and ones: $3 \times 100 = 300$ , $3 \times 20 = 60$ , and $3 \times 3 = 9$ and adds $300 + 60 + 9 = 369$ |
| <input type="checkbox"/> | Can do it mentally in one go and correctly gets 369   |

Additional observations:



## Questions

Estimate  $29 \times 31$

### answer observations

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Can't do it or guesses 60 (adds instead of multiplies) alert the student and ask again   |
| <input type="checkbox"/> | Rounds $30 \times 30 = 90$ due to place value error. Write a comment which scaffolding the student needs to be able to correct the answer          |
| <input type="checkbox"/> | Doesn't round to estimate, can only do it on paper by actual calculation then rounds 899 to 900 (because the question was estimate)                |
| <input type="checkbox"/> | Doesn't round to estimate, imagines the column algorithm for the actual calculation and then rounds 899 to 900 (because the question was estimate) |
| <input type="checkbox"/> | Knows to round for estimation, rounds 29 to 30 and 31 to 30, $30 \times 30 = 900$  |

Additional observations:



## Observation map Math Assessment Reasoning Strategies |Division

### Questions

### answer observations

8÷2

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Can't do it, guesses  |
| <input type="checkbox"/> | Holds up 8 fingers with 4 fingers on each hand and says 4             |
| <input type="checkbox"/> | Counts 1, 2, 3, 4, 5, 6, 7, 8 loud or on fingers and says "4"         |
| <input type="checkbox"/> | Uses a double strategy: I know double 4=8 so half of 8 or $8\div 2=4$ |
| <input type="checkbox"/> | Skipcounts by 2 out loud or on fingers, says: 2, 4, 6, 8 so 4         |
| <input type="checkbox"/> | Knows it  |

Additional observations:

24÷4

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Can't do it, guesses   |
| <input type="checkbox"/> | Counts all 24 in groups of 4: 1-4, 5-8, 9-12, 13-16, 17-20, 21-24 and says 6                                 |
| <input type="checkbox"/> | Skip counts up by 4 to 24 and says 6   |
| <input type="checkbox"/> | Uses multiples of 5: split 24 in 20. There are 5 groups of 4 in 20 and 24 is one more 4, so $5+1=6$          |
| <input type="checkbox"/> | Uses multiplication facts and connection between multiplication and division: $6\times 4=24$ so $24\div 4=6$ |
| <input type="checkbox"/> | Knows it   |

Additional observations:



## Questions

## answer observations

$70 \div 2$

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Can't do it, guesses   |
| <input type="checkbox"/> | Estimates 30 or 40. Write a comment which scaffolding the student needs to be able to correct the answer |
| <input type="checkbox"/> | Can only do it on paper using partial long division (Big Seven method)                                   |
| <input type="checkbox"/> | Can only do it on paper using traditional long division  |
| <input type="checkbox"/> | Imagines the column division and says 35   |
| <input type="checkbox"/> | Uses partitioning $70=60+10$ half of 60 is 30, half of 10 is 5, together 35                              |
| <input type="checkbox"/> | Uses partitioning $70=50+20$ , half of 50 is 25, half of 20 is 10, together 35                           |
| <input type="checkbox"/> | Knows it is 35 but can't explain how it is done  |

Additional observations:



## Questions

## answer observations

75÷5

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | Can't do it, guesses   |
| <input type="checkbox"/> | Skipcounts up by 5, makes tally marks or counts on fingers, answer 15                    |
| <input type="checkbox"/> | Can only do it on paper using partial long division (Big Seven method)                   |
| <input type="checkbox"/> | Can only do it on paper using traditional long division                                  |
| <input type="checkbox"/> | Splits 75 according to place value: $70 : 5 = 14$ , $5 : 5 = 1$ total answer 15          |
| <input type="checkbox"/> | Splits 75 in 50 and 25: 10 fives in 50 and 5 fives in 25, so total $10+5=15$ fives in 75 |
| <input type="checkbox"/> | Knows it is 15 but can't explain how it is done  |

Additional observations:

91÷7

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Can't do it or guesses  |
| <input type="checkbox"/> | Skip counts up by 7, makes tally marks or counts on fingers, answer 13  |
| <input type="checkbox"/> | Reasoning it must be more than 10 because $10 \times 7 = 70$ or 10 sevens in 70. Write a comment which scaffolding the student needs to be able to correct the answer |
| <input type="checkbox"/> | Can only do it on paper using partial long division (Big Seven method)  |
| <input type="checkbox"/> | Can only do it on paper using traditional long division   |
| <input type="checkbox"/> | Imagines the long division algorithm: 7 divides into 9 1x, $9-7=2$ , bring down the 1 to get $21 \div 7 = 3$ so $10+3=13$   |
| <input type="checkbox"/> | Uses multiplication and place value: $10 \times 7 = 70$ , 91 is 21 more, that is 3 sevens, so $10+3=13$   |

Additional observations:





## Questions

## answer observations

588÷6

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Can't do it, guesses below 90 or more than 100  |
| <input type="checkbox"/> | Uses place value knowledge to guess between 90 and 100 by using $9 \times 6 = 54$ and $90 \times 6 = 540$ so answer must be more than 90. $100 \times 6 = 600$ that is more than 588 so the answer is less than 100, but does not know the answer. Write a comment which scaffolding the student needs to be able to correct the answer |
| <input type="checkbox"/> | Can only do it on paper using partial long division (Big Seven method) to get 98  |
| <input type="checkbox"/> | Can only do it on paper using traditional long division to get 98   |
| <input type="checkbox"/> | Imagines column algorithm: 6 divides into 58 9 times, $58 - 54 = 4$ bring down the 8 to get 48, 6 divides into 48 8 times so 98   |
| <input type="checkbox"/> | Multiplies up: $9 \times 6 = 54$ so $90 \times 6 = 540$ , 588 is 48 more, that is 8 sixes more, answer $90 + 8 = 98$  |
| <input type="checkbox"/> | Uses place value and compatible numbers $54 : 6 = 9$ so $540 : 6 = 90$ . 588 is 48 more so another 8 sixes, the answer is $90 + 8 = 98$   |
| <input type="checkbox"/> | Rounds 588 to 600 and divides by 6 = 100, then compensates for the real number 588 which is 12 or two sixes less, so answer is 98   |
| <input type="checkbox"/> | Uses a benchmark number $100 \times 6 = 600$ , 588 is 12 less than 600, so answer $100 - 2 = 98$  |

Additional observations:



## Questions

## answer observations

Estimate  $763 \div 24$

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | Can't do it, guesses without explanation.   |
| <input type="checkbox"/> | Rounds to tens and answers $760 \div 20$ but the guess is less than 35 or more than 40  |
| <input type="checkbox"/> | Rounds to tens and answers $760 \div 20$ and the guess is 35 through 40   |
| <input type="checkbox"/> | Rounds to hundreds and tens and estimates $800 \div 20$ but the guess is less than 35 or more than 40   |
| <input type="checkbox"/> | Rounds to hundreds and tens and estimates $800 \div 20$ but the guess is 35 through 39  |
| <input type="checkbox"/> | Rounds to hundreds and tens and estimates $800 \div 20$ and the guess is 40   |
| <input type="checkbox"/> | Uses 25 as a benchmark and knows there are four 25's in a 100, but gets to an estimate of less than 25 or more than 30  |
| <input type="checkbox"/> | Uses 25 as a benchmark and knows there are four 25's in a 100, so $7 \times 4 = 28$ in 700 and gets to an estimate of 25 through 30                             |
| <input type="checkbox"/> | Uses 25 as a benchmark and knows there are four 25's in a 100, so $7 \times 4 = 28$ in 700 and adds the two 25's that are in the 63 and estimates $28 + 2 = 30$ |