

## Reasoning and Problem Solving Mental Calculations

### Developing

1a. Various answers, for example:

A.  $300 \times 7 = 2,100$ ,  $50 \times 7 = 350$ ,  $4 \times 7 = 28$   
and  $2,100 + 350 + 28 = 2,478$

B.  $280 \div 7 = 40$ ,  $7 \div 7 = 1$  and  $40 + 1 = 41$

2a. Harry is not correct because  $80 \times 4 = 320$  and  $320 \times 2 = 640$ .

3a. £2,000 is the odd one out because it does not match the calculation.  $\pounds 1,961 - \pounds 1,056$  is approximately £1,000.

### Expected

4a. Various answers, for example:

A.  $225 \times 10 = 2,250$  and  $2,250 - 225 = 2,025$ ;  $200 \times 9 = 1,800$ ,  $20 \times 9 = 180$  and  $5 \times 9 = 45$  then  $1,800 + 180 + 45 = 2,025$

B.  $4,000 \div 80 = 50$ ,  $800 \div 80 = 10$ ,  $80 \div 80 = 1$ ,  $50 + 10 + 1 = 61$ ;  $4,880 \div 10 = 488$ ,  $80 \div 10 = 8$  then  $400 \div 8 = 50$ ,  $80 \div 8 = 10$ ,  $8 \div 8 = 1$  and  $50 + 10 + 1 = 61$ .

5a. Joshua is correct because he has portioned the numbers correctly to multiply by 12. Steph has multiplied by 20.

6a. £7,000 is the odd one out because it is not the approximate answer to either of the calculations. A is approximately £7,500 and B is approximately £8,500.

### Greater Depth

7a. Various answers, for example:

A.  $9 \div 3 = 3$ ,  $400 \times 3 = 1,200$ ,  $30 \times 3 = 90$ ,  $8 \times 3 = 24$  and  $1,200 + 90 + 24 = 1,314$ .

B.  $600 \times 8 = 4,800$ ,  $8 \times 8 = 64$  and  $4,800 + 64 = 4,864$  then  $4,000 \div 4 = 1,000$ ,  $800 \div 4 = 200$ ,  $60 \div 4 = 15$ ,  $4 \div 4 = 1$  and  $1,000 + 200 + 15 + 1 = 1,216$ ;  $8 \div 4 = 2$ ,  $608 \times 2 = 1,216$ .

8a. Lila is not correct because  $215 \times 60 = 12,900$  and  $12,900 \div 3 = 4,300$ .

9a. £7,500 is the odd one out because it is not the approximate answer to either of the calculations. A is approximately £5,500 and B is approximately £6,600.

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### Developing

1b. Various answers, for example:

A.  $500 \times 6 = 3,000$ ,  $10 \times 6 = 60$ ,  $3 \times 6 = 18$   
and  $3,000 + 60 + 18 = 3,078$

B.  $240 \div 6 = 40$ ,  $6 \div 6 = 1$  and  $40 + 1 = 41$

2b. Sumiya is not correct because  $210 \times 2 = 420$ .

3b. £2,000 is the odd one out because it does not match the calculation.  $\pounds 1,126 + \pounds 1,878$  is approximately £3,000.

### Expected

4b. Various answers, for example:

A.  $423 \times 10 = 4,230$  and  $423 \times 2 = 846$  then  $4,230 + 846 = 5,076$ ;  $400 \times 12 = 4,800$  and  $20 \times 12 = 240$ ,  $3 \times 12 = 36$  then  $4,800 + 240 + 36 = 5,076$

B.  $4,200 \div 60 = 70$  and  $60 \div 60 = 1$  then  $70 + 1 = 71$ ;  $4,260 \div 10 = 426$  and  $60 \div 10 = 6$  then  $420 \div 6 = 70$ ,  $6 \div 6 = 1$  and  $70 + 1 = 71$ .

5b. Milly is correct because she has chosen the most efficient order to solve the calculation. Ivan has added 3,000 and 21,000 but this step is not needed.

6b. £4,500 is the odd one out because it is not the approximate answer to either of the calculations. A is approximately £3,000 and B is approximately £3,700.

### Greater Depth

7b. Various answers, for example:

A.  $400 \times 12 = 4,800$ ,  $3 \times 12 = 36$  and  $4,800 + 36 = 4,836$  then  $4,800 \div 6 = 800$  and  $36 \div 6 = 6$  then  $800 + 6 = 806$ ;

$12 \div 6 = 2$ ,  $403 \times 2 = 806$ .

B.  $316 \times 2 = 632$  and  $600 \div 2 = 300$ ,  $300 \div 2 = 150$  and  $150 \div 2 = 75$ ,  $32 \div 8 = 4$  then  $75 + 4 = 79$ ;  $8 \div 2 = 4$ ,  $300 \div 2 = 150$  and  $150 \div 4 = 75$ ,  $32 \div 8 = 4$  then  $75 + 4 = 79$ .

8b. Jason is not correct because  $105 \times 40 = 4,200$  and  $4,200 \div 70 = 60$ .

9b. £6,500 is the odd one out because it is not the approximate answer to either of the calculations. A is approximately £5,600 and B is approximately £7,100.