

Reasoning and Problem Solving

Step 14: Mental Calculations

National Curriculum Objectives:

Mathematics Year 6: (6C6) [Perform mental calculations, including with mixed operations and large numbers](#)

Differentiation:

Questions 1, 4 and 7 (Problem Solving)

Developing Give examples of different strategies to mentally calculate numbers to 1,000.

Expected Give examples of different strategies to mentally calculate numbers to 10,000.

Greater Depth Give examples of different strategies to mentally calculate numbers to 100,000, including decimal numbers.

Questions 2, 5 and 8 (Reasoning)

Developing Identify the correct mental calculation method used when solving a problem including whole numbers up to 1,000.

Expected Identify the correct mental calculation method used when solving a multi-step problem including whole numbers up to 10,000.

Greater Depth Identify the correct mental calculation method used when solving a multi-step problem including whole numbers up to 100,000, including decimal numbers.

Questions 3, 6 and 9 (Reasoning)

Developing Determine which example of rounding and estimating is most appropriate (involves rounding money up to £20).

Expected Determine which example of rounding and estimating is most appropriate (involves rounding money up to £100).

Greater Depth Determine which example of rounding and estimating is most appropriate (involves rounding money up to £1,000).

[More resources](#) which follow the same small steps as White Rose.

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Reasoning and Problem Solving – Mental Calculations

1a. Give 2 different ways of mentally calculating the following:

$$125 \times 5$$



PS

1b. Give 2 different ways of mentally calculating the following:

$$320 \times 3$$



PS

2a. Sinead and Gabriel are solving the calculation 50×20 .

I did $5 \times 2 = 10$, then x my answer by 100. My answer is 1,000.



Sinead



Gabriel

I did 50×2 then 50×10 , then I added my answers together. My answer is 600.



R

2b. Ben and Isabel are solving the calculation 25×30 .

I did $25 \times 3 = 75$, then x 10. My answer is 750.



Ben



Isabel

I did 25×3 then 25×0 and added them together. My answer is 75.



R

Who is correct? Explain how you know.

Who is correct? Explain how you know.

3a. Josh is estimating the cost of 3 items.

Magazine = £4.99, Football = £10.99, Sweets = £3.99

Which calculation would give him the best estimation? Explain why.

a $4 + 5 + 11$

b $4 + 10 + 3$



R

3b. Kelly is estimating the cost of 3 items.

Book = £7.99, Notepad = £5.99, Pencil case = £4.99

Which calculation would give her the best estimation? Explain why.

a $8 + 6 + 5$

b $10 + 5 + 5$



R

Reasoning and Problem Solving – Mental Calculations

4a. Give 3 different ways of mentally calculating the following:

$$225 \times 9$$



PS

4b. Give 3 different ways of mentally calculating the following:

$$420 \times 11$$



PS

5a. Steph and Sheldon are solving the calculation $125 \times 4 \times 12$.

I did $125 \times 4 = 500$, then 500×10 , then added 1,000. My answer is 6,000.



Sheldon



Steph

I did $125 \times 4 = 500$, then I \times by 10, then by 2. My answer is 10,000.

Who is correct? Explain how you know.



R

5b. Hannah and Lucas are solving the calculation $108 \times 5 \times 15$.

I did 108×10 , then $\div 2 = 540$. Then 540×10 , then $\times 5$. My answer is 27,000.



Hannah



Lucas

108×10 , then $\div 2 = 540$. Then 540×10 and 540×5 and added both to get 8,100.

Who is correct? Explain how you know.



R

6a. Hafsa is estimating the cost of 3 items.

Game = £19.99, Headset = £37.99,
Controller = £34.99

Which calculation would give him the best estimation? Explain why.

a $20 + 40 + 30$

b $20 + 38 + 35$



R

6b. Chuan is estimating the cost of 3 items.

Jeans = £36.99, Shoes = £29.99,
Shirt = £24.99

Which calculation would give him the best estimation? Explain why.

a $40 + 30 + 20$

b $37 + 30 + 25$



R

Reasoning and Problem Solving – Mental Calculations

7a. Give 3 different ways of mentally calculating the following:

$$1,025 \times 5 \times 12$$



PS

7b. Give 3 different ways of mentally calculating the following:

$$1,200 \times 10 \times 11$$



PS

8a. Steph and Sheldon are solving the calculation $225 \times 4 \times 12$.

I did $225 \times 2 \times 2$. Then I multiplied by 10, then by 2. My answer is 18,000.



Sean



Alice

$225 \times 4 = 900$ then 900×10 added to 900×2 . My answer is 10,800.

Who is correct? Explain how you know.



R

8b. Josh and Chuan are solving the calculation $450 \times 8 \times 25$.

I did $8 \times 25 = 200$, then $450 \times 2 \times 100$. My answer is 90,000.



Josh



Chuan

I doubled 450 three times, then $3,600 \times 20 = 72,000$, then $\times 5$. My answer is 360,000.

Who is correct? Explain how you know.



R

9a. Ben is estimating the cost of 3 items.

Games Console = £259.99,
Game = £29.99, Controller = £54.99

Which calculation would give him the best estimation? Explain why.

a $260 + 30 + 55$

b $260 + 30 + 50$



R

9b. Isabel is estimating the cost of 3 items.

DVD Player = £56.99, TV = £429.99, HDMI Cable = £14.99

Which calculation would give him the best estimation? Explain why.

a $60 + 430 + 10$

b $57 + 430 + 15$



R

Reasoning and Problem Solving – Mental Calculations

- 1a. Various answers, for example: $125 \times 10 \div 2$; $125 + 125 + 125 + 125 + 125$; $100 \times 5 + 20 \times 5 + 5 \times 5$.
- 1b. Various answers, for example: $320 \times 2 + 320$; $320 + 320 + 320$; $300 \times 3 + 20 \times 3$
- 2a. Sinead is correct. Gabriel multiplied by 12 because he did 10 lots of 50 and then 2 lots of 50. He should have multiplied 50 by 10 then multiplied by 2.
- 2b. Ben is correct. Isabel partitioned her multiplier but she multiplied by 0 instead of 10.
- 3a. A because the numbers are rounded to the nearest £1 so will be the closest answer. B has rounded down and taken 99p off each price.
- 3b. A because the numbers are rounded to the nearest £1. B has rounded to the nearest £5.

Expected

- 4a. Various answers, for example: $225 \times 10 - 225$; $200 \times 9 + 20 \times 9 + 5 \times 9$; $2 \times 225 + 2 \times 225 + 2 \times 225 + 2 \times 225 + 225$
- 4b. Various answers, for example: $420 \times 10 + 420$; $400 \times 11 + 20 \times 11$; $420 \times 5 \times 2 + 420$
- 5a. Sheldon is correct. Steph didn't multiply by 12, she multiplied by 20. She should have multiplied the answer by 10 then the original answer by 2 and added them together.
- 5b. Lucas is correct. Hannah didn't multiply by 15, she multiplied by 50. She should have multiplied the answer by 10 then the original answer by 5 and added together.
- 6a. B because the numbers are rounded to the nearest £1. B has rounded to the nearest £10.
- 6b. B because the numbers are rounded to the nearest £1. B has rounded to the nearest £10.

Greater Depth

- 7a. Various answers, for example: $1,025 \times 10 \times 6$; $1,025 \times 5 = 5,125$, $(5,125 \times 10) + (5,125 \times 2)$; $(1,000 \times 5 \times 12) + (20 \times 5 \times 12) + (5 \times 5 \times 12)$
- 7b. Various answers, for example: $1,200 \times 10 \times 10 + 12,000$; $(10 \times 11) \times 1,200$; $12 \times 11 \times 10 \times 100$
- 8a. Alice is correct. Sean multiplied his answer by 20 not 12 as he $\times 10$ then $\times 2$.
- 8b. Josh is correct. Chuan multiplied by 100 as he did $\times 20$ then $\times 5$ instead of multiplying his original answer by 5 then adding them together.
- 9a. A because the numbers are rounded to the nearest £1 and his answer will only be 3p more. B has rounded to the nearest £10 but will be almost £5 less.
- 9b. B because she has rounded to the nearest £1. A has rounded to the nearest £10.