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 x 5

D

PS

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

320 x 3

D

PS

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



Sinead: I did 5 x 2 = 10, then x my answer by 100. My answer is 1,000.



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

Who is correct? Explain how you know.

D

R

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



Ben: I did 25 x 3 = 75, then x 10. My answer is 750.



Isabel: I did 25 x 3 then 25 x 0 and added them together. My answer is 75.

Who is correct? Explain how you know.

D

R

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

D

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

D

R

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Reasoning and Problem Solving – Mental Calculations

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

225 x 9

E PS

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

420 x 11

E PS

5a. Steph and Sheldon are solving the calculation 125 x 4 x 12.



Sheldon: I did 125 x 4 = 500, then 500 x 10, then added 1,000. My answer is 6,000.



Steph: I did 125 x 4 = 500 ,then I x by 10, then by 2. My answer is 10,000.

Who is correct? Explain how you know.

E R

5b. Hannah and Lucas are solving the calculation 108 x 5 x 15.



Hannah: I did 108 x 10, then ÷ 2 = 540. Then 540 x 10, then x 5. My answer is 27,000.



Lucas: 108 x 10, then ÷ 2 = 540. Then 540 x 10 and 540 x 5 and added both to get 8,100.

Who is correct? Explain how you know.

E R

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

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

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

a 20 + 40 + 30

b 20 + 38 + 35

E 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

E R

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Reasoning and Problem Solving – Mental Calculations

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

1,025 x 5 x 12

PS

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

1,200 x 10 x11

PS

8a. Sean and Alice are solving the calculation 225 x 4 x 12.



Sean: I did 225 x 2 x 2. Then I multiplied by 10, then by 2. My answer is 18,000.



Alice: 225 x 4 = 900 then 900 x 10 added to 900 x 2. My answer is 10,800.

Who is correct? Explain how you know.

R

8b. Josh and Chuan are solving the calculation 450 x 8 x 25.



Josh: I did 8 x 25 = 200, then 450 x 2 x 100. My answer is 90,000.



Chuan: I doubled 450 three times, then 3,600 x 20 = 72,000, then x 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

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Reasoning and Problem Solving – Mental Calculations

1a. Various answers, for example: 125 x 10 ÷ 2; 125 + 125 + 125 + 125 + 125; (100 x 5) + (20 x 5) + (5 x 5).
1b. Various answers, for example: 320 x 2 + 320; 320 + 320 + 320; (300 x 3) + (20 x 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 2 then multiplied by 10.
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. B is rounded down and taken 99p off each price.
3b. A because the numbers are rounded to the nearest £1. B is rounded to the nearest £5.

Expected

4a. Various answers, for example: 225 x 10 – 225; (200 x 9) + (20 x 9) + (5 x 9); (2 x 225) + (2 x 225) + (2 x 225) + (2 x 225) + 225
4b. Various answers, for example: 420 x 10 + 420; (400 x 11) + (20 x 11); (420 x 5 x 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. A is rounded to the nearest £10.
6b. B because the numbers are rounded to the nearest £1. A is rounded to the nearest £10.

Greater Depth

7a. Various answers, for example: 1,025 x 10 x 6; 1,025 x 5 = 5,125, (5,125 x 10) + (5,125 x 2); (1,000 x 5 x 12) + (20 x 5 x 12) + (5 x 5 x 12)
7b. Various answers, for example: 1,200 x 10 x 10 + 12,000; (10 x 11) x 1,200; 12 x 11 x 10 x 100
8a. Alice is correct. Sean multiplied his answer by 20 not 12 as he x 10 then x 2.
8b. Josh is correct. Chuan multiplied by 100 as he did x 20 then x 5 instead of multiplying his original answer by 5 then adding them together.
9a. A because the numbers are rounded to the nearest £1. B is rounded to the nearest £10.
9b. B because the numbers are rounded to the nearest £1. A s rounded to the nearest £10.

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