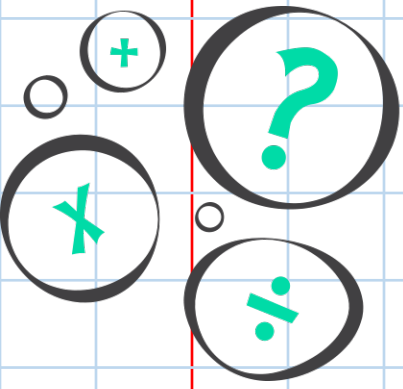
I can prove this is the answer by....

Name: _____



Reasoning Maths Hub

Year 6

Four Operations Reasoning Book

I noticed that....

This is always true because....

Find the missing numbers.

HTh	TTh	Th	H	T	O
			2	3	4
x				7	
+		6 1	1 1	7 2	0
3	1	2	3 2	8	0
3	1	2	5 1	5	0

Explain how you found them.

Spot and explain the mistake.

HTh	TTh	Th	H	T	O
		7	0	5	7
x			8	3	
+	2	1 1	0 1	7 2	1
5	6	0 4	5 5	6	0
5	8	1	6 1	3	1

Rosie uses these digit cards.

1	2	3	6	7

- She makes a 3-digit number and a 2-digit number;
- She multiplies them together;
- Her answer is even and starts with the digit 2.

What could the multiplication be?

Task 4: Four Operations - 6

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Leanna bought 28 boxes of 1,255 Christmas baubles.

Rosie bought 29 boxes of 1,245 Christmas baubles.

Who will have more? Prove it.

Reasoning Maths Hub

Task 5: Four Operations - 6

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Malachi was selling doughnuts in his bakery at 47 pence each. By the end of the day he managed to sell 519 doughnuts.

The total earnings were 5,709 pence.

Is he correct? Explain.

Reasoning Maths Hub

Task 1: Four Operations - 6

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number: Interpret Remainders as Whole Number Remainders, Fractions, or by Rounding as Appropriate for the Context

If a division calculation has a quotient 98 and a remainder $\frac{2}{5}$, then the quotient can be rounded to 98.

Prove it.

Reasoning Maths Hub

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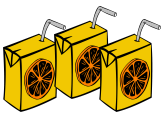
NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Esin is packing juice cartons for the October festival in her school.
She has 3,794 juices and 28 boxes to share them between.

How many cartons does she put in each box?



As a fraction, what part of the last box would be filled with the remaining cartons?

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Esin is calculating 2,548 ÷ 16.

I think the remainder will be $\frac{1}{4}$ written as a fraction.

Is she correct? How do you know?

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number: Interpret Remainders as Whole Number Remainders, Fractions, or by Rounding as Appropriate for the Context

Identify the odd one out.

9,628 ÷ 58 = ☐

7,322 ÷ 14 = ☐

6,324 ÷ 85 = ☐

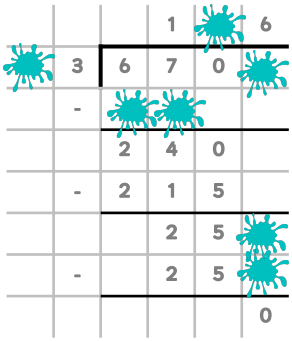
7,761 ÷ 39 = ☐

Explain your answer.

Task 5: Four Operations - 6

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Find the missing numbers.



Reasoning Maths Hub

Task 6: Four Operations - 6

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Leanna and Tia are making necklaces out of beads. They have 3,762 beads, and for one necklace they need 36 beads.

Leanna

We can make 104 necklaces.

We can make 105 necklaces.

Tia

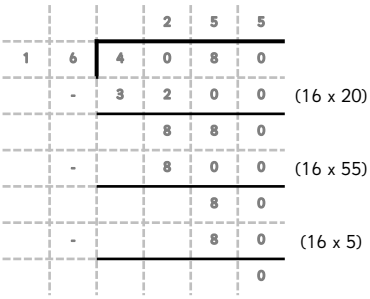
Who is correct?
How do you know?

Reasoning Maths Hub

Task 7: Four Operations - 6

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number: Interpret Remainders as Whole Number Remainders, Fractions, or by Rounding as Appropriate for the Context

Rosie has used long division to solve this problem.



Explain her mistake.

Reasoning Maths Hub

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NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Esin saved 8,034p

She wants to use all of her money to buy one of the pencils but she can't decide which colour pencil to buy. Which colour should she buy if she wants change? Explain how you know.

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

At the end of a successful business year, the restaurant manager decided to give a bonus of £6,815 to his employees.

How much money would they each receive to the nearest pound, if there are 28 employees?

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number Using the Formal Written Method of Short Division where Appropriate, Interpreting Remainders According to the Context

Here are two calculation cards.

A = 459 ÷ 17

B = 1,026 ÷ 19

What is the difference between B and A?

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number Using the Formal Written Method of Short Division where Appropriate, Interpreting Remainders According to the Context

Task 2: Four Operations - 6

Tia completes the following calculation.

		0	1	6	7	r	6
1	3	2	1	$^{8}8$	$^{10}7$		

Explain her mistake.
Calculate the correct answer.

Reasoning Maths Hub

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number Using the Formal Written Method of Short Division where Appropriate, Interpreting Remainders According to the Context

Task 3: Four Operations - 6

Complete these calculations using short division.

A. ____ x 23 = 1,817;

B. 648 ÷ ____ = 36;

C. 9,270 ÷ 45 = ____.

Which is odd one out? Explain why.

Reasoning Maths Hub

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number Using the Formal Written Method of Short Division where Appropriate, Interpreting Remainders According to the Context

Task 4: Four Operations - 6

Olive oil comes in tins of 87 litres each.
There are 8,961 litres of oil in a basement.

How many tins are in the basement?
Show your method.

Reasoning Maths Hub

Reasoning Maths Hub

Task 1: Four Operations - 6

NC Objective: Perform Mental Calculations, including with Mixed Operations and Large Numbers

I know that 125,000 ÷ 5,000 is the same as 25,000 ÷ 1,000, without working out the answer to either calculation.

Convince me.

Reasoning Maths Hub

Task 2: Four Operations - 6

NC Objective: Perform Mental Calculations, including with Mixed Operations and Large Numbers

Calculate:

1. 2,432 ÷ 64
2. 2,432 ÷ 32
3. 2,432 ÷ 16

What did you do each time?
What do you notice?

Reasoning Maths Hub

Task 3: Four Operations - 6

NC Objective: Perform Mental Calculations, including with Mixed Operations and Large Numbers

Prove it without calculating.

The result of **45 x 131 – 55** is a **multiple of 5**.

Reasoning Maths Hub

Task 4: Four Operations - 6

NC Objective: Perform Mental Calculations, including with Mixed Operations and Large Numbers

Leanna is trying to find the total of **6,817** and **6,783**.

We just need to double 6,800.

Is she correct? Explain.

Reasoning Maths Hub

Task 1: Four Operations - 6

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Esin is thinking of a number.

My number is multiple of 5 and 6 and has 100 as a factor. It is smaller than 1,000.

What could her number be?
Is there more than one option?

Reasoning Maths Hub

Task 2: Four Operations - 6

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Which is the odd one out?

39	104	52	650
130	26	29	

Explain how you know.

Reasoning Maths Hub

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Task 3: Four Operations - 6

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Two buses start running from the same station at 6 a.m.
Bus 1 starts every 25 minutes and
Bus 2 every 30 minutes.

How many times will these buses meet at the starting station by 7 p.m?

Reasoning Maths Hub

Task 4: Four Operations - 6

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Rosie and Tia are finding the lowest common multiple of 9 and 5.

Rosie

It is 45 because 9 x 5 = 45.

It is 14 because 9 + 5 = 14.

Tia

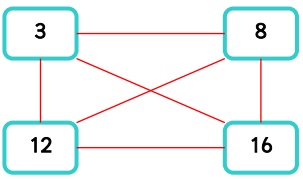
Who is correct? Explain.

Reasoning Maths Hub

Task 5: Four Operations - 6

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

The diagram shows four numbers linked by lines.



Which pairs of numbers have the same lowest common multiple?
Explain.

Reasoning Maths Hub

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

There are 225 children and 105 balls.
They are divided into equal groups, so each group receives the same number of balls.

How many groups were there and how many balls did each group receive?

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

There are 49 roses and 56 orchids.
How many identical bouquets can be made?

Esin

7

8

Leanna

Who is correct?
Explain how you know.

NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Use the clues to work out the number.

1. It is an odd number
2. It is not a prime number
3. It is less than 90
4. It is greater than 10
5. It is a factor of 84 and 252

Task 1: Four Operations - 6

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Work out which child has which calculation from the given answers.

72 ÷ 8 + 10

72 ÷ (8 + 10)

Malachi

My answer is 4.

My answer is 19.

Tia

Reasoning Maths Hub

Task 2: Four Operations - 6

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Zach uses the numbers 3, 5 and 9 to complete a calculation.
His answer is a multiple of 4 but not a multiple of 12.

☐ + ☐ x ☐

What is the answer to Zach's calculation?

Reasoning Maths Hub

Task 3: Four Operations - 6

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Leanna uses the numbers 3, 4, 5 and 8.

I made a 3-digit number and a 1-digit number. Then I multiplied them together and subtracted it from 5,000 and got an odd number.

What could the calculation be? Explain.

Reasoning Maths Hub

Reasoning Maths Hub

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Six notebooks cost 41p less than 13 pencils.
One pencil costs 83p.

How much does one notebook cost?
Explain your answer.

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Esin is completing the calculation:

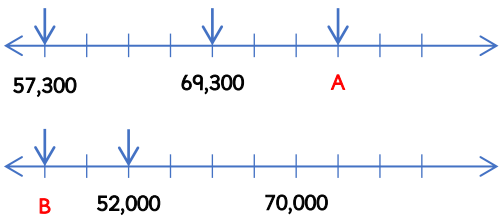
$3 + 33 \div 3 - 3 \times 3$

My answer is 3. I did 3 + 33 = 36, then 36 ÷ 3 = 12 and 3 x 3 = 9, so 12 – 9 = 3.

Is she correct? Explain.

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Find the difference between A and B.



Explain how you know.

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Spot the odd one out.

A – 3,953 = 547

C

13,228

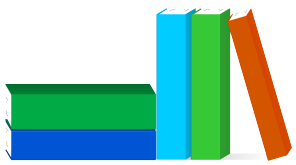
94,178

145,280 + 221,235 = 570,622 – **B**

Explain your answer.

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

The weight of books on the first shelf is 64,067g.
On the second shelf, the weight is 4,855g more.
On the third shelf, it is 14,230g less than on the first and the second shelves together.



The entire shelf can hold a maximum weight of 120,000g.
Can I add another book weighing 2,000g? Explain.

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

29,839 + 1,200 < 40,000 – ☐

What is the greatest whole number that can be used to make the sentence correct?

☐

Explain your answer.

Task 1: Four Operations - 6

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Add a set of brackets to make the following calculation correct.

$4 + 32 \times 112 - 15 \times 24 \div 40 = 4{,}023$

Explain where the brackets go and why.

Reasoning Maths Hub

Task 2: Four Operations - 6

NC Objective: Solve Problems Using Addition, Subtraction, Multiplication and Division

Rosie and Leanna are working out some subtraction number sentences.

Rosie

I am working out 87,364 – 85,354.

One of the numbers in my question is 960.

Leanna

Rosie's answer is triple Leanna's answer.

What could Leanna's question be?
Explain how you know.

Reasoning Maths Hub

Task 3: Four Operations - 6

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

$\mathbf{A} = 155{,}000 - \mathbf{C}$

$3 \times \mathbf{B} + \mathbf{B} = 7{,}900$

$23 \times 350 = \mathbf{C}$

Use this information to complete the following calculation and find the value of D.

$\mathbf{A} + 6 \times \mathbf{B} - 150{,}000 = 22 \times \mathbf{D}$

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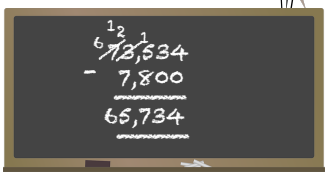
Reasoning Maths Hub

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Task 4: Four Operations - 6

In total there are 73,534 people at a concert of a famous music star.
There are 7,800 more women than men at the concert.
How many men are at the concert?

The answer is 65,734



Where has Tia gone wrong?

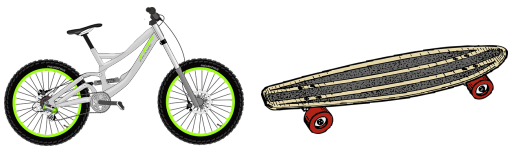
Reasoning Maths Hub

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Task 5: Four Operations - 6

One bicycle and one skateboard costs £365.

Five bicycles and one skateboard cost £1,341.



How much does a bicycle cost?
Show your working out.

Reasoning Maths Hub

NC Objective: Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Task 1: Four Operations - 6

Malachi and Zach are estimating the answer to 23,370 + 55,230.

Zach

The answer is about 70,000.

The answer is about 80,000.

Malachi

Who has given the better estimation?
Explain your reason.

Reasoning Maths Hub

Reasoning Maths Hub

Task 2: Four Operations - 6

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Tia has spilt paint on her homework.

– 7,452 = 8,321

In a rush, she estimates the number that has paint over it.
What number do you think she should write?
Explain your answer.

Reasoning Maths Hub

Task 3: Four Operations - 6

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Rosie

The answer to the calculation 21 x 88 is close to 2,000.

Esin

Convince me.

Reasoning Maths Hub

Task 4: Four Operations - 6

NC Objective: Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Leanna is working out **2,756 ÷ 26.**

2,756 is close to 2,600, so we can say that the answer rounded to the nearest hundred is 100.

Is she correct? Explain.

Reasoning Maths Hub

Reasoning Maths Hub

NC Objective: Multiply Multi-digit Numbers up to 4 Digits by a Two-digit Whole Number Using the Formal Written Method of Long Multiplication

Task 1: Answer:

HTh	TTh	Th	H	T	O
		5	2	3	4
x				7	5
+	2	6^{1}	1^{1}	7^{2}	0
3	61	6^{2}	3^{2}	8	0
3	9_{1}	2	5_{1}	5	0

Task 2: Answer: The digits in 83 are not placed in the correct place value column; some of the carried over numbers are not added correctly.

HTh	TTh	Th	H	T	O
		7	0	5	7
x				8	3
+	2	1^{1}	1^{1}	7^{2}	1
5	6	4^{4}	5^{5}	6	0
5	8	5	7^{1}	3	1

Task 3: Answer: E.g. 326 and 71.

Task: 4- Answer: Rosie will have more.
Rosie: 1,245 x 29 = 36,105;
Leanna: 1,255 x 28 = 35,140

Task 5: Answer: He is incorrect because he didn't use the place holder when he multiplied tens.

HTh	TTh	Th	H	T	O
			5	1	9
x				4	7
+		3	6	3	3
	2	0	7	6	0
	2	4	3	9	3

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number: Interpret Remainders as Whole Number Remainders, Fractions, or by Rounding as Appropriate for the Context

Task 1: Answer: The remainder $\frac{2}{5}$ is equal to $\frac{4}{10} = 0.4$, so the answer to the division is 98.4 and can be rounded to 98.

Task 2: Answer: 135 juices go in each box and 14 juices left over.
She needs 14 more juices to make another full pack (box), $\frac{1}{2}$ of the box would be filled with the remaining juices.

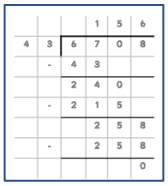
Task 3: Answer: Yes, she is correct. 2,548 ÷ 16 = 159 r 4.
The remainder interpreted as a fraction is $\frac{4}{16} = \frac{1}{4}$.

		0	1	5	9	r	4
1	6	2	5	$^{9}4$	$^{14}8$		

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number: Interpret Remainders as Whole Number Remainders, Fractions, or by Rounding as Appropriate for the Context

Task 4: Answer: 6,324 ÷ 85 has a remainder. 6,324 ÷ 85 = 74 r 34

Task 5: Answer:



Task 6: Answer: Leanna is correct.
3,762 ÷ 36 = 104 r 18 (18 beads left over)

Task 7: Answer: She should write 16 x 200 instead of 16 x 20 and 16 x 50 instead of 16 x 55.

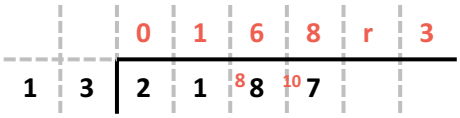
Task 8: Answer: Green: 8,034 ÷ 78 = 103; Red 8,034 ÷ 76 = 105 r 54 (54 pence change)
She should buy the red one if she wants change.

Task 9: Answer: 6,815 ÷ 28 = £ 243.3928... ≈ £243

NC Objective: Divide Numbers up to 4 Digits by a Two-Digit Whole Number Using the Formal Written Method of Short Division where Appropriate, Interpreting Remainders According to the Context

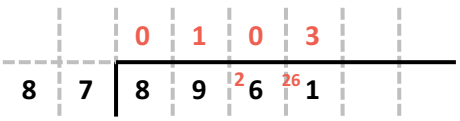
Task 1: Answer: A = 27; B = 54;
B – A = 54 – 27 = 27.

Task 2: Answer: She mistakenly thought that 13 goes into 107 seven times with a remainder of 6.



Task 3: Answer:
A. 79
B. 18
C. 206
A is the odd one out because it is the only one with prime factors.

Task 4: Answer: 103 tins of olive oil.



NC Objective: Perform Mental Calculations, including with Mixed Operations and Large Numbers

Task 1: Answer: If the dividend and divisor are divided by the same number, the quotient doesn't change.
125,000 ÷ 5 = 25,000
5,000 ÷ 5 = 1,000

Task 2: Answer: When dividing by half of the amount the answer is doubled.

Task 3: Answer: 45 is a multiple of 5, so 45 x 131 is a multiple of 5.
55 is a multiple of 5, so 45 x 131 – 55 is a multiple of 5.

Task 4: Answer: Yes, because 6,817 is 17 more than 6,800 and 6,783 is 17 less than 6,800.

NC Objective: NC Objective: Identify Common Factors, Common Multiples and Prime Numbers

Task 1: Answer: 300, 600 or 900.

Task 2: Answer: 29 is not a multiple of 13.

Task 3: Answer: The lowest common multiple of 25 and 30 is 150. There are 13 hours = 780 minutes from 6 a.m. to 7 p.m.
780 ÷ 150 = 5.2, so the buses will meet 5 times at the starting station by 7 p.m.

Task 4: Answer: Rosie is correct because 45 is the first multiple to appear in both the 9 and 5 times table.
Tia is incorect because you don't add the numbers to find a multiple.

1. Task 5: Answer:
3 and 16; 12 and 16. Their LCM is 48.
3 and 8; 8 and 12. Their LCM is 24.

Task 6: Answer: Common factors for 105 and 225 are: 1, 3, 5 and 15, so the possibilities are:
- 15 groups of 15 boys and each group gets 7 balls;
- 5 groups of 45 boys and each group gets 21 ball;
- 3 groups of 75 boys and each group gets 35 balls.

Task 7: Answer: Esin is correct. There will be 7 pieces of flower in each bouquet because 7 is a common factor of 49 and 56.

Task 8: Answer: 21

NC Objective: Use the Knowledge of the Order of Operations to Carry out Calculations Involving the Four Operations

Task 1: Answer:
Malachi: 4 = 72 ÷ (8 + 10)
Tia: 19 = 72 ÷ 8 + 10

Task 2: Answer: 5 + 3 x 9 = 32

Task 3: Answer:The result of the multiplication must be an odd number, so the possibilities are:
1. 5,000 - 5 x 483 = 5,000 – 2,415 = 2,585;
2. 5,000 – 5 x 843 = 5,000 – 4,215 = 785;
3. 5,000 – 3 x 485 = 5,000 – 1,455 = 3,545;
4. 5,000 – 3 x 845 = 5,000 – 2,535= 2,465.

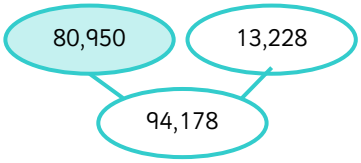
Task 4: Answer: (13 x 83 – 41) ÷ 6 = (1,079 – 41) ÷ 6 = 1,038 ÷ 6 = 173
One notebook costs 173p or £1.73.

Task 5: Answer: No, she is incorrect.
3 + (33 ÷ 3) – (3 x 3) = 3 + 11 – 9 = 5

NC Objective: Solve Addition and Subtraction Multi-step Problems in Context, Deciding which Operations and Methods to use and Why

Task 1: Answer: A = 78,300; B = 43,000;
A – B = 78,300 – 43,000 = 35,300

Task 2: Answer: A = 4,500; B = 204,107; C = 80,950
Multiple explanations e.g. B as it is the only number that is not a multiple of 10.



Task 3: Answer: 1st Shelf : 64,067g;
2nd Shelf: 64,067g + 4,855g = 68,922g;
3rd Shelf: 64,067g + 68,922g – 14,230g = 118,759g.

No, you cannot add another book weighing 2,000g.
118,759g + 2,000g = 120,759g.

Task 4: Answer: 29,839 + 1,200 = 31,039; One more is 31,040, so the number is 8,960.
40,000 – 8,960 = 31,040.

NC Objective: Solve Problems Using Addition, Subtraction, Multiplication and Division

Task 1: Answer:
Answer: (4 + 32) x 112 – 15 x 24 ÷ 40 = 4,023

Task 2: Answer: 960 – 290 or 1,630 – 960.

Task 3: Answer: A = 146,950; B = 1,975; C = 8,050; D = 400

Task 4: Answer: Tia has only subtracted the number of extra women from the total number of people. Once she has subtracted the number of extra women, this leaves an equal number of men and women. She then needs to divide this by 2 to find the number of men.

(73,534 – 7,800) ÷ 2 = 65,734 ÷ 2 = 32,867 men

Task 5: Answer: B: bicycle; S: skateboard.
B + B + B + B + B + S = 1,341
= 365
4 x B + 365 = 1,341
4 x B = 1,341 – 365 = 976
B = 976 ÷ 4 = **£244**

NC Objective: Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Task 1: Answer: Malachi did. Rounded to the nearest ten thousand, 23,370 rounds to 20,000, and 55,230 rounds to 60,000. Therefore, 20,000 + 60,000 = 80,000.

Task 2: Answer: Depends on how you are rounding. The most accurate way would be to round to the nearest 10
_____ - 7,450 = 8,320. She could write 15,770. The easiest way would be rounding to 1,000.

_____ - 7,000 = 8,000.
She could write 15,000.

Task 3: Answer: When we round 21 and 88 to the nearest ten, it will be 20 x 90 = 1,800.
1,800 is close to 2,000.

Task 4: Answer: Leanna is correct. 2,756 ÷ 26 = 106
106 rounded to the nearest hundred is 100.