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

Name: _____

Reasoning Maths Hub

Year 6

Place Value Reasoning Book

I noticed that....

This is always true because....

Task 1: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Malachi ordered the following numbers from the smallest to the largest.

3,145,392	3,145,930	3,931,798	3,931,789

Spot and explain the mistake.

Reasoning Maths Hub

Task 2: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Zach solved the task by putting the missing digit into the empty field below.

Is he correct?

4,3 [8] 6,237 > 4,376, [1] 37

Is there more than one option?

Reasoning Maths Hub

Task 3: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Tiffany rolled a dice 8 times and got the following numbers:

1, 2, 2, 4, 5, 5, 6, 6

- What is the largest 7-digit number she can make?
- What is the smallest 7-digit number she can make?
- What would the result be if she subtracted the smallest from the largest number?

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Task 4: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Who is correct?

Mal

The number 7,442,075 is larger than 7,442,174.

5,010,268 < 5,009,368

Tia

Explain.

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Task 5: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Look at these numbers:

5,605,506 5,506,605 5,650,506
5,560,605 5,560,650

If you wrote them in order starting with the smallest to the largest, which one would be the third?

Reasoning Maths Hub

Task 6: Number and Place Value - 6

NC Objective: Order and Compare Numbers to 10,000,000

Find the covered number to make the rows of numbers in order from the largest to the smallest.

1	2	3	3	5	1	4
1	2	3	2	5		3
1	2	2	2	4	9	9
1	2		1	1	1	3

Is there more than one option? Explain.

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NC Objective: Order and Compare Numbers to 10,000,000

You must look at the lowest place value column first when ordering numbers.

Do you agree?

Can you give an example that proves that she is correct or incorrect?

NC Objective: Order and Compare Numbers to 10,000,000

Esin has ordered five numbers from the smallest to the greatest by only looking at the first four digits.

3,421,567 3,450,550 383,638 4,088,199 4,008,299

Is she correct? Explain.

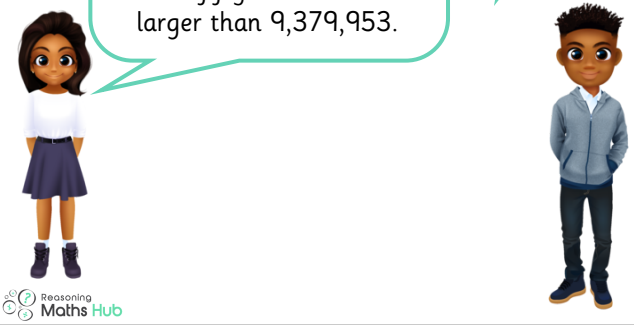
NC Objective: Order and Compare Numbers to 10,000,000

Tom and Sam are two millionaires.
This year, Tom had £6.07 millions of profit and Sam had six million, seventy-four hundred and fifty-nine pounds of profit.

Who earnt more?

Prove your answer.

NC Objective: Order and Compare Numbers to 10,000,000



NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Mike represents 2,340,070 and 2,304,070 in different ways.

M	HTh	TTh	Th	H	T	O
●●	●●		●●		●●●	

Is he correct? How do you know?

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Solve the clues to find the missing digits.

M	HTh	TTh	Th	H	T	O
1		3		8	3	

- The ones digit is a multiple of 3 and greater than 8;
- The thousands digit is double the ten-thousands digit,
- The hundred-thousands digit is > 4 but < 6.

Can you make your own?

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Leanna says:

When I add **30,000** to **1,558,230** my answer is **1,858,230**.

Explain her mistake.

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

True or False?

Three million, four hundred ninety-three thousand, three hundred twenty-one	3,493,321
3,000, 501 + 490,000 + 3,020	3,493,521
Three million, three hundred ninety-four thousand, three hundred twenty-one	3,394,351
Eight million, four hundred thirty-nine thousand, one	8,439,001
8,404,000 + 90,400 + 4,001	8,494,001

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

What number am I thinking of?

- The number has six digits and it's less than 300,000 but greater than 200,000.
- The tens digit is smaller than 4 but larger than 2.
- The ones digit is three times bigger than the tens digit.
- The number has forty-five thousands in it.
- The hundreds digit is the sum of the tens and thousands digit.

Can you make your own?

Task 6: Number and Place Value - 6

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Look at these numbers:

3,075,826

375,826

Do you see the difference? Explain it.

Reasoning Maths Hub

Task 7: Number and Place Value - 6

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

The digit 9 in the number 2,497,320 can be described as nine ten thousands and I know more ways it can be described.

Prove it.

Reasoning Maths Hub

Task 8: Number and Place Value - 6

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

True or False?

Esin has £ 3 576 780
Rosie has £ 5 576 770

Esin says that she has more money because she has 78 tens and Rosie has only 77 tens.

Reasoning Maths Hub

Task 9: Number and Place Value - 6

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Look at the number **7,832,142.**

Zach

Seven million, eight hundred and thirty-two, one hundred and forty-two.

Seven million, eight hundred and thirty-two thousand, one hundred and fourty-two.

Malachi

Who is correct? Explain.

Reasoning Maths Hub

Task 10: Number and Place Value - 6

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Find the missing digit if you know that it has three hundred and twenty thousands in it.

6, 3☐ 2, 423

Make your own version of this task.

Reasoning Maths Hub

Task 8: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Miss Appleberry has four cards. On each card is a number:

59,996	59,943	60,026	62,312

She gives one card to each pupil.


Rosie says, 'My number is 60,000 to the nearest 10,000


Malachi says, 'My number has exactly 600 hundreds in it.'


Tia says, 'My number is 59,900 to the nearest hundred.'


Leanna says, 'My number is 60,000 to the nearest 10.'

Can you work out which card each pupil had? Explain your choices.

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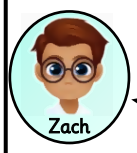
Task 2: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy



'Hey Esin, did you know that the population of Mexico City is 11 million to the nearest million and the population of New York is 11.2 million to the nearest hundred thousand?'

'Oh is that true? The population of New York must be bigger than the population of Mexico City because 11.2 million is bigger than 11 million.'

Do you agree with Esin?
Explain why.

Reasoning Maths Hub

Task 3: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Three pupils are asked to estimate the answer to the sum:

4243 + 1734


Zach says, 'To the nearest 1000, the answer will be 5900.'


Malachi says, 'To the nearest 50, the answer will be 6000.'


Tia says, 'To the nearest 100, the answer will be 5900.'

Do you agree with Zach, Malachi or Tia?

Explain your answer.

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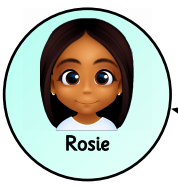
Task 4: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy



The total population of Shanghai is 26 million, to the nearest million.

To the nearest hundred thousand, the population is 26.3 million.

Estimate the total population of Shanghai using Rosie and Zach's facts.

Reasoning Maths Hub

Task 5: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Malachi

My number rounded to the nearest hundred is 3,263,500. Runded to the nearest thousand is 3,263,000. Rounded to the nearest ten-thousand is 3,260,000.

What could Malachi's number be?

Can you find all the possibilities?

Reasoning Maths Hub

Task 6: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Mr. Smith has thought of a number.

The pupils had the task to find out what the number was.

Mr. Smith says:

- My number has 4 millions
- Rounded to the nearest hundred thousand, the millions digit changes
- My number has 54 thousands in it
- The hundreds column, rounded to the nearest hundred and ten is 500

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

Reasoning Maths Hub

Task 7: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Spot and correct the mistakes.

To the nearest / Number	10	100	100,000
5,456,872	5,456,870	5,456,800	5,450,000
3,211,006	3,211,100	3,211,000	3,200,000
7,655,349	7,655,350	7,655,300	7,650,000
1,112,567	1,112,560	1,113,000	1,100,000

Explain how you knew what the mistakes were.

Reasoning Maths Hub

Task 8: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

My number is 7,580,000 when rounded to the nearest 10,000.

Rosie

My number is 7,590,000 when rounded to the nearest 1,000.

Leanna

What is the greatest possible difference between these two numbers?

Reasoning Maths Hub

Task 9: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Esin rounded **5,653,492** to the nearest **hundred-thousand** and wrote **6,700,000**.

Can you explain to Esin what mistake she has made?

Reasoning Maths Hub

Task 10: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

I know at least three pairs of seven-digit numbers, which when rounded to the nearest 1,000 become the same.

Prove it.

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Task 11: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Look at the numbers:

2,345,671 and 2,355,761

How can we round them to become the same?
Prove your answer.

Reasoning Maths Hub

Task 12: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

During July, the airport recorded an increase in the number of passengers.
The following data for the last 3 years, were published on the news:

2016: 2,486,002
2017: 2,199,480
2018: 2,504,210

Joe heard that in 2016 and 2018 there were about 2 million passengers.

Is that correct? Explain.

Reasoning Maths Hub

Task 13: Number and Place Value - 6

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Find the covered digits so that each number rounds to two hundred thousand when rounded to the nearest hundred-thousand.

6,[redacted]53,899

6,2[redacted]8,005

6,1[redacted]0,400

6,25[redacted],799

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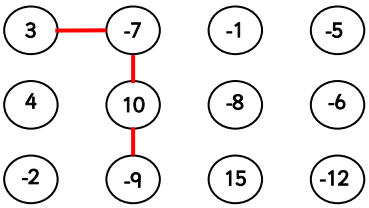
NC Objective: Solve Number and Practical Problems

Join any four numbers and find their total.
Joins can go up, down or sideways, but not diagonally.
The score shown is: **+3 - 7 + 10 – 9 = - 3**



Find the highest possible score.

NC Objective: Solve Number and Practical Problems

Esin needs help to solve the following problem.

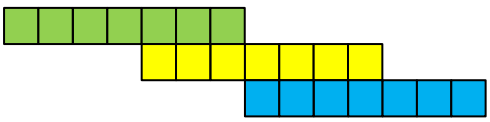
She has a 1- 6 dice.

If she rolls the dice once, what number should be face down so that she can make a sum of 18 from the remaining digits, using all the digits only once?

Can you help her? Explain.

NC Objective: Solve Number and Practical Problems

Using the numbers 0 - 9, arrange the numbers in the pattern below.



The rules are:
All the numbers must be used.
No two consecutive numbers are next to each other, horizontally, vertically or diagonally.

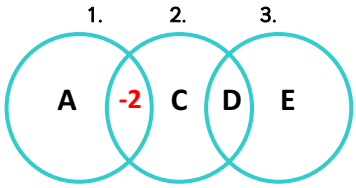
Is there more than one answer?

Task 4: Number and Place Value - 6

NC Objective: Solve Number and Practical Problems

-2, -6, 11, 20, 21

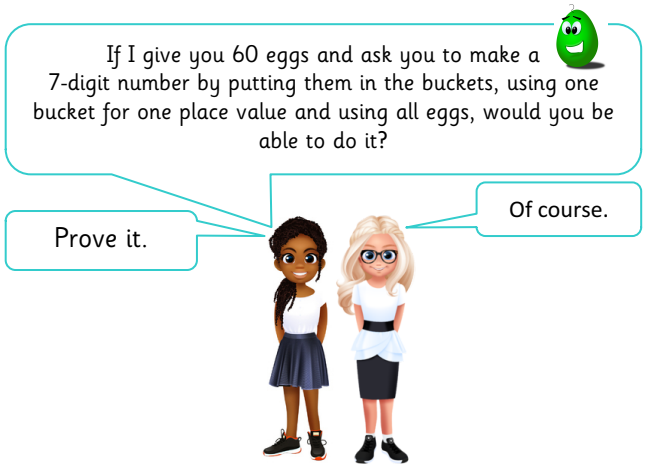
Use each of the numbers once.
Replace each letter by one of the numbers.
Arrange the numbers so that the sum in the previous circle is 7 more than in the next one.



Reasoning Maths Hub

Task 5: Number and Place Value - 6

NC Objective: Solve Number and Practical Problems



Reasoning Maths Hub

Task 1: Number and Place Value - 6

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

True or False?

- The temperature outside is -7 degrees, the temperature inside is 27 degrees. The difference is 20 degrees.
- 13 more than -4 is 9.
- Five less than negative eight is negative three.

Explain how you know.

Reasoning Maths Hub

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Rosie's starting balance was -£8. She spent some money and was £15 in debt.

She then spent a further £3.

Her new balance contains the same digits as the amount she spent.
True or False?

Reasoning Maths Hub

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Esin has a rule for a sequence of numbers.

Her rule is:

"The next number is the sum of two previous numbers."

☐ ☐ ☐ 0, 2, 2, 4, 6, 10, 16

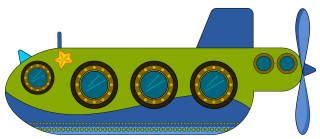
Find the three missing numbers.

Make your own sequence and rule.

Reasoning Maths Hub

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

The bottom of the sea is at a height of -1,654 m and the submarine is 350 m above the bottom of the sea.



At what height is the submarine?
Explain how you worked it out.

Reasoning Maths Hub

Task 5: Number and Place Value - 6

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

At 3 p.m. the temperature in Moscow, Russia, was - 4°C. By 2 a.m. it had dropped by 11°C, but by 9 a.m, the following morning it had risen by 7°C.

What is the temperature in Moscow now?
Explain how you know.

Reasoning Maths Hub

Task 6: Number and Place Value - 6

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Tia lives in Helsinki, Finland. The table below shows the temperature changes in Helsinki, over a two hour period.

Time	2 p.m. to 3 p.m.	3p.m. to 4. p.m
Change in temperature	+ 3°C	- 5°C

Tia notices the temperature at 4 p.m. is −11°C.

What was the temparature in Helsinki at 2 p.m?

Explain how you know.

Reasoning Maths Hub

Task 7: Number and Place Value - 6

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Put these statements in order so that the answers are from the smallest to the largest.

1. The difference between – 18 and – 4.
2. The number that is halfway between 35 and – 75.
3. The even number that is less than – 29 but larger than – 32.
4. Four more than negative three

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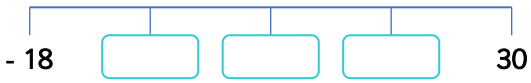
NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Find the missing numbers if the difference between consecutive numbers is the same.



Make your own version of this task.

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Zach

If I start counting from - 8 forwards in 5s, I will say 12.

The difference between - 7 and - 3 is 10.

Leanna

Six more than -2 is 8.

Malachi

Who has made a mistake?
How do you know?

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

I'm thinking of a number. I counted forwards by the difference between 7 and – 11 and got 4. What number am I thinking of?

Tia

Esin

0

What mistake has Esin made?
Explain how you know.

NC Objective: Order and Compare Numbers to 10,000,000

Task 1: Answer: 3,145,392 3,145,930 3,931,789 3,931,798
The last two are incorrect, 3,931,798 has more tens than 3,931,789 and is therefore larger.

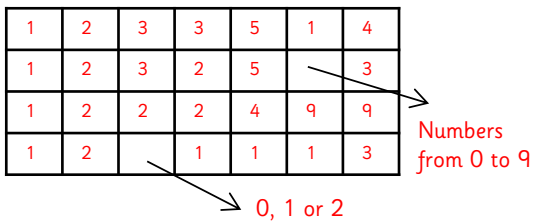
Task 2: Answer: 1,536,839

Task 3: Answer:
The largest 7-digit number: 6,655,422
The smallest 7-digit number: 1,224,556
6,655,422 - 1,224,556 = 5,430,866

Task: 4- Answer: Neither. Mal's answer: Look at the hundreds place. The first number has 0 and the second number has 1. Therefore the first number is smaller.
Tia's answer: Look at the ten-thousands place. The first number has 1 and it is larger than the second number that has 0.

Task 5: Answer: The numbers in order from smallest to largest are:
5,506,605 5,560,605 5,560,650 5,605,506 5,650,506
Therefore the third number would be 5,560,650.

Task 6: Answer: Yes, there is more than one option.



Task 7: Answer: She is incorrect. You must look at the highest place value column first when ordering numbers.
E.g. 9,343,576 > 8,343,576 because 9 is larger than 8 (look at the millions column).

Task 8: Answer: Esin is incorrect because one number has 6 digits and it isn't in the first place, and also the number 4,088,199 has 88 thousands and the last number has 8 thousands.

Task 9: Answer:
Tom: 6,070,000
Sam: 6,007,459
Tom earned more.

Task 10: Answer: We need to look at the numbers from the left to the right. The first number, 9,397,853 has 9 in the ten-thousand place and the second number 9,379,953 has 7 in that place.

NC Objective: Read and Write Numbers to 10,000,000 and Determine the Value

Task 1: The first diagram is incorrect- it should show 2,300,000 instead of 2,304,070.
2,300,000 + 40,070 = 2,340,070

Task 2: Answer: The first digit can be 8 or 9 in which case the second digit can be anything.
If the first digit is 7 then the second can be 0 or 1. If the first digit is less than 7 then he would be wrong.

Task 3: Answer:
Leanna needs to change the ten-thousands column – 1,588,230.

Task: 4- Answer: True, True, False, True, False

Task 5: Answer: 245,839

Task 6: Answer: Yes, the first number has less digits, and has 3 in the hundred thousands place. The second number has 0 in the hundred thousands place.

Task 7: Answer: 90 thousands, 900 hundreds, 9,000 tens or 90,000 ones.

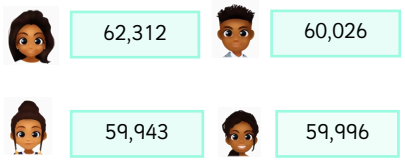
Task 8: Answer: False, because Rosie has 5 millions and Esin has only 3 millions.

Task 9: Neither. Zach has left out thousands after thirty-two and Malachi has spelt forty-two incorrectly.

Task 10: Answer: 2

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Task 1: Answer:



Task 2: Answer: Answer: No, because the cities have been rounded to a different point. Mexico City rounded to the nearest million would mean the population could be anything ranging from 10,500,000 to 11,499,999. For New York to be rounded to the nearest hundred thousand would mean the population could be anything ranging from 11,150,000 to 11,249,999. You must round to the same point to compare the populations.

NC Objective: Round Any Whole Number to a Required Degree of Accuracy

Task 3: Answer: Tia and Malachi are correct. Zach did not round to the nearest 1000 correctly.

Task 4: Answer: Using the facts given, any number ranging from 26,250,000 to 26,349,999 would round to 26 million and 26.3 million to the nearest hundred thousand.

Task 5: Answer: All numbers between 3,263,450 and 3,263,499.

Task 6: Answer: The number could be anything between 4,954,495 and 4,954,504.

Task 7: Answer:

To the nearest / Number	10	100	100,000
5,456,872	5,456,870	5,456,900	5,500,000
3,211,006	3,211,000	3,211,000	3,200,000
7,655,349	7,655,350	7,655,300	7,700,000
1,112,567	1,112,570	1,112,600	1,100,000

Task 8: Answer: The greatest possible difference is 15,499 because: 7,590,499 – 7,575,000 = 15,499

Task 9: Answer: She has rounded it to the nearest hundred-thousand correctly, but the millions column shouldn't be changed

Task 10: Answer:
3,423,587 and 3,424,129
8,788,141 and 8,787,955
1,425,896 and 1,425,850

Task 11: Answer: To the nearest million.

Task 12: Answer: It is incorrect. There were about 3,000,000 passengers in 2018.

Task 13: Answer:

6,[ ]53,899 — 1

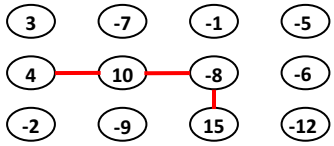
6,2[ ]8,005 — 0,1,2,3 or 4

6,1[ ]0,400 — 5,6,7,8 or 9

6,25[ ],799 — No digits because the hundred thousands and ten thousands digits are already there. This number will round up to three hundred-thousand.

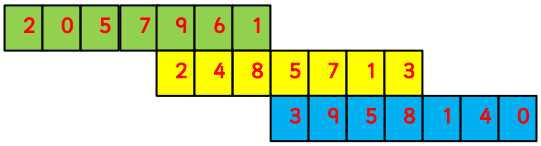
NC Objective: Solve Number and Practical Problems

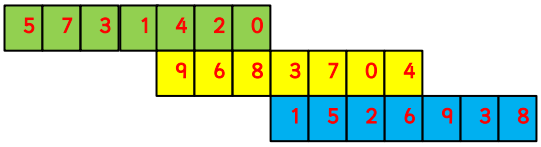
Task 1: Answer



Task 2: Answer: The total number of dots on the dice is 21. Of these dots 18 are showing, so the face with 3 dots is face down.

Task 3: Answer: Yes, there is more than one possible answer. E.g.





Task 4: Answer: A = 21, B = -2, C = 20, D = -6, E = 11

Task 5: Answer: The sum of digits is 60, so some of the possibilities are: 8,889,999; 8,799,999; 7,899,999; 6,999,999.

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Task 1: Answer: 1. statement: False. The difference is 34 degrees because it is 7 degrees from -7 to 0. Added to 27 totals 34;
2. statement: True;
3. statement: False. It is negative 13, because the steps are going further away from zero.

Task 2: Answer: It contains 1 digit that is the same. Rosie spent a further £7 to become £15 in debt. After spending another £3, her total spending adds up to £10. Her new balance is -£18. The common digit between £10 and -£18 is 1.

Task 3: Answer: 4, -2, 2, 0 , 2, 2, 4, 6, 10, 16

Task 4: Answer: -1,304 m

Task 5: Answer: - 8°C

Task 6: Answer: At 4 p.m the temperature is −11°C. At 3 p.m. it was 5°C warmer than at 4 p.m, so the temperature at 3 p.m. was −6°C. At 2 p.m. it was 3°C colder than at 2 p.m, therefore the temperature at 2 p.m. was −9°C.

NC Objective: Use Negative Numbers in Context and Calculate Intervals Across Zero

Task 7: Answer: **1.** -14; **2.** – 20; **3.** – 30; **4.** 1.
- 30, - 20, -14, 1

Task 8: Answer: - 6, 6, and 18

Task 9: Answer: Leanna and Malachi have made the mistakes.
The difference between – 7 and – 3 is -4.
Six more than – 2 is 4.

Task 10: Answer: She was wrong in finding the difference between 7 and – 11.The difference is not 4, but 18. So, counting from **– 14** by 18 we get 4.