Reasoning and Problem Solving
Step 1: Add and Subtract Integers

National Curriculum Objectives:

Mathematics Year 6: (6C8) Solve problems involving addition, subtraction, multiplication and division

Differentiation:

Questions 1, 4 and 7 (Problem Solving)
Developing Investigate which two 5-digit numbers could have been added or subtracted in order to reach a given number.
Expected Investigate which two 6-digit numbers (within a set of parameters) could have been added or subtracted in order to reach a given number.
Greater Depth Investigate which 6-digit and 7-digit numbers (within a set of parameters) could have been added or subtracted in order to reach a given number.

Questions 2, 5 and 8 (Problem Solving)
Developing Mixture of subtraction and addition calculations using 4- or 5-digit with three missing numbers.
Expected Mixture of subtraction and addition calculations using 5- or 6-digit numbers with three missing numbers.
Greater Depth Mixture of subtraction and addition calculations using 6- or 7-digit numbers with three missing numbers.

Questions 3, 6 and 9 (Reasoning)
Developing Character describes a set of operations carried out to reach a particular number and declares the starting number (involving 4 or 5-digit numbers). Using the inverse and a range of addition and subtraction methods, determine if the statement is correct or not. Explain the answer.
Expected Character describes a set of operations carried out to reach a particular number and declares the starting number (involving 5 or 6-digit numbers). Using the inverse and a range of addition and subtraction methods, determine if the statement is correct or not. Explain the answer.
Greater Depth Character describes a set of operations carried out to reach a particular number and declares the starting number (involving 6 or 7-digit numbers). Using the inverse and a range of addition and subtraction methods, determine if the statement is correct or not. Explain the answer.

Reasoning and Problem Solving – Add and Subtract Integers

1a. The answer to an addition calculation using two 5-digit numbers is 65,871. What could the calculation be?

D PS

1b. The answer to a subtraction calculation using two 5-digit numbers is 37,824. What could the calculation be?

D PS

2a. Use the numbers below to fill in the blanks so the calculations are correct.

6,984	+		=	10,996
+ 13,802			−	
20,786	−		=	8,153

4,012 | 12,633 | 2,843

D PS

2b. Use the numbers below to fill in the blanks so the calculations are correct.

22,876	+		=	25,921
+			−	
32,230	−	12,650	=	19,580

6,341 | 9,354 | 3,045

D PS

3a. Michael chooses a number between 5,000 and 10,000. He adds 23,154 and then subtracts 4,850. His answer is 25,804.

My starting number is 7,500.

Is Michael correct? How do you know?

D R

3b. Jonathan chooses a number between 8,000 and 13,000. He subtracts 1,127 and then adds 16,354. His answer is 24,483.

My starting number is 9,356.

Is Jonathan correct. How do you know?

D R

Reasoning and Problem Solving – Add and Subtract Integers

4a. The answer to an addition calculation using two 6-digit numbers is 456,782. For one one of the numbers, the thousands and hundreds digits are even. What could the calculation be?

E PS

4b. The answer to a subtraction calculation using two 6-digit numbers is 130,509. For one of the numbers, the tens and ten thousands digits are odd. What could the calculation be?

E PS

5a. Use the numbers below to fill in the blanks so the calculations are correct.

365,412	+	24,607	=	
+			−	213,054
642,187	−		=	176,965

465,222 390,019 276,775

E PS

5b. Use the numbers below to fill in the blanks so the calculations are correct.

	+	782,332	=	
+	632,858		−	212,362
680,760	−		=	617,872

62,888 47,902 830,234

E PS

6a. Trevor chooses a number between 20,000 and 30,000. He adds 4,709 and then subtracts 17,834. His answer is 9,429.

My starting number is 22,554.

Is Trevor correct? How do you know?

E R

6b. Jazmin chooses a number between 15,000 and 20,000. She subtracts 2,498 and then adds 56,812. Her answer is 71,914.

My starting number is 18,600.

Is Jazmin correct. How do you know?

E R

Reasoning and Problem Solving – Add and Subtract Integers

7a. The answer to an addition calculation using one 6-digit number and one 7-digit number is 5,098,365. The 6-digit number has only even digits. What could the calculation be?

GD PS

7b. The answer to a subtraction calculation using one 6-digit number and one 7-digit number is 6,366,801. The 6-digit number has only odd digits. What could the calculation be?

GD PS

8a. Use the numbers below to fill in the blanks so the calculations are correct.

897,576	+	305,813	=	
+			−	56,228
	−	5,484,673	=	1,147,161

1,203,389 6,631,834 5,734,258

GD PS

8b. Use the numbers below to fill in the blanks so the calculations are correct.

	+	250,743	=	1,254,742
+			−	9,635
7,843,412	−		=	1,245,107

6,598,305 1,003,999 6,839,413

GD PS

9a. Darren chooses a number between 60,000 and 63,000. He adds 2,785,933 and then subtracts 345,785. His answer is 2,501,433.

My starting number is 62,285.

Is Darren correct? How do you know?

GD R

9b. Lily chooses a number between 150,000 and 200,000. She subtracts 20,982 and then adds 5,082,769. Her answer is 5,260,132.

My starting number is 198,345.

Is Lily correct. How do you know?

GD R

Reasoning and Problem Solving – Add and Subtract Integers

Developing

1a. Any addition calculation where the answer totals 65,871

Possible answers: 23,012 + 42,859 = 65,871; 54,963 + 10,908 = 65,871

1b. Any subtraction calculation where the answer totals 37,824

Possible answers: 56,427 – 18,603 = 37,824; 60,674 – 22,850 = 37,824

2a.

6,984	+	4,012	=	10,996		
+ 13,802			–	2,843		
20,786	–	12,633	=	8,153		

2b.

22,876	+	3,045	=	25,921		
+ 9,354			–	6,341		
32,230	–	12,650	=	19,580		

3a. Michael is correct because 7,500 + 23,154 = 30,654 and 30,654 – 4,850 = 25,804.

3b. Jonathan is incorrect because 9,356 – 1,127 = 8,229 and 8,229 + 16,354 = 24,583 which is not 24,483.

Expected

4a. Any addition calculation where the answer totals 456,782 and the thousands and hundreds digits are even for one of the numbers chosen

Possible answers: 164,295 + 292,487 = 456,782; 202,836 + 253,946 = 456,782

4b. Any subtraction calculation where the answer totals 130,509 and the tens and ten thousands digits are odd for one of the numbers chosen

Possible answers: 446,727 – 316,218 = 130,509; 687,881 – 557,372 = 130,509

5a.

365,412	+	24,607	=	390,019		
+ 276,775			–	213,054		
642,187	–	465,222	=	176,965		

5b.

47,902	+	782,332	=	830,234		
+ 632,858			–	212,362		
680,760	–	62,888	=	617,872		

6a. Trevor is correct because 22,554 + 4,709 = 27,263 and 27,263 – 17,834 = 9,429.

6b. Jazmin is incorrect because 18,600 – 2,498 = 16,102 and 16,102 + 56,812 = 72,914 which is not 71,914.

Reasoning and Problem Solving – Add and Subtract Integers

Greater Depth

7a. Any addition calculation where the answer totals 5,098,365 and where the 6-digit number has all even digits.

Possible answers: 486,024 + 4,612,341 = 5,098,365; 202,864 + 4,895,501 = 5,098,365

7b. Any subtraction calculation where the answer totals 6,366,801 and where the 6-digit number has all odd digits.

Possible answers: 6,500,532 – 133,731= 6,366,801; 7,340,796 – 973,995 = 6,366,801

8a.

897,576	+	305,813	=	1,203,389				
+ 5,734,258			–	56,228				
6,631,834	–	5,484,673	=	1,147,161				

8b.

1,003,999	+	250,743	=	1,254,742				
+ 6,839,413			–	9,635				
7,843,412	–	6,598,305	=	1,245,107				

9a. Darren is incorrect because 62,285 + 2,785,933 = 2,848,218 and 2,848,218 – 345,785 = 2,502,433 which is not 2,501,433.

9b. Lily is correct because 198,354 – 20,982 = 177,363 and 177,363 + 5,082,769 = 5,260,132.