

# Reasoning and Problem Solving

## Step 4: Negative Numbers

### National Curriculum Objectives:

Mathematics Year 6: (6N5) [Use negative numbers in context, and calculate intervals across zero](#)

Mathematics Year 6: (6N6) [Solve number and practical problems that involve 6N2 - 6N5](#)

### Differentiation:

Questions 1, 4 and 7 (Reasoning)

**Developing** Prove whether a statement about negative numbers is correct by providing an explanation. Using numbers up to and including -10.

**Expected** Prove whether a statement about negative numbers in context is correct by providing an explanation.

**Greater Depth** Prove whether a statement about negative numbers in context is correct by providing an explanation. Includes multi-step problems and use of halves as decimal numbers in contexts.

Questions 2, 5 and 8 (Problem Solving)

**Developing** Provide a one-digit number and answer within a targeted range.

**Expected** Provide a two-digit number and answer within a targeted range.

**Greater Depth** Provide a two-digit number and answer within a targeted range. Some use of halves as decimal numbers included.

Questions 3, 6 and 9 (Problem Solving)

**Developing** Choose from four digit cards to create calculations for a given negative number.

**Expected** Choose from five digit cards to create calculations for a given negative number.

**Greater Depth** Choose from five digit cards to create calculations for a given negative number. Use of halves as decimal numbers included.

More [Year 6 Place Value](#) resources.

Did you like this resource? Don't forget to [review](#) it on our website.

## Negative Numbers

1a. Jim is learning about negative numbers.

He says,



$$-5 + 4 = 9$$

Is Jim correct? Explain why.



R

## Negative Numbers

1b. Mai is learning about negative numbers.

She says,



$$-5 - 5 = 0$$

Is Mai correct? Explain why.



R

2a. Fill in the blanks using any 1-digit number so that each answer is between -1 and 3.

A.  $-1 + \square = \square$

B.  $-3 + \square = \square$

C.  $-8 + \square = \square$



PS

2b. Fill in the blanks using any 1-digit number so that each answer is between 0 and 5.

A.  $-7 + \square = \square$

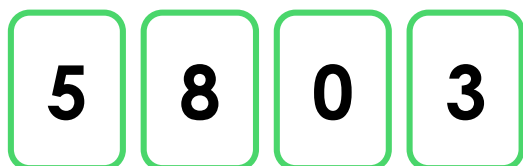
B.  $-2 + \square = \square$

C.  $-5 + \square = \square$



PS

3a. Use the digit cards to create a calculation which equals -5.



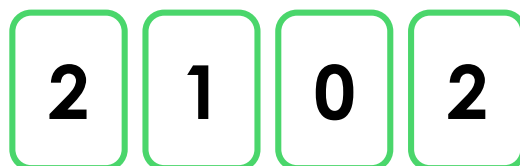
You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?



PS

3b. Use the digit cards to create a calculation which equals -8.



You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?

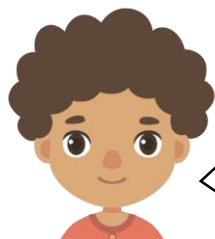


PS

## Negative Numbers

4a. Ken is learning about negative numbers.

He says,



The temperature outside is  $1^{\circ}\text{C}$ . If it changes by  $4^{\circ}\text{C}$ , it will either be  $5^{\circ}\text{C}$  or  $-5^{\circ}\text{C}$ .

Is Ken correct? Explain why.



R

## Negative Numbers

4b. Tia is learning about negative numbers.

She says,



If a mine cart is on level 2 and goes down 10 levels, it will be on the level -12.

Is Tia correct? Explain why.



R

5a. Fill in the blanks using any 2-digit number so that each answer is between 1 and 5.

A.  $-17 + \square = \square$

B.  $-13 + \square = \square$

C.  $-18 + \square = \square$



PS

5b. Fill in the blanks using any 2-digit number so that each answer is between 5 and 10.

A.  $-12 + \square = \square$

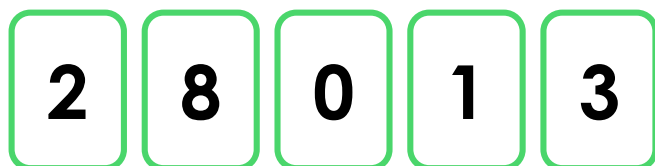
B.  $-20 + \square = \square$

C.  $-19 + \square = \square$



PS

6a. Use the digit cards to create a calculation which equals -18.



You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?



PS

6b. Use the digit cards to create a calculation which equals -16.



You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?



PS

## Negative Numbers

7a. Kevin is learning about negative numbers.

He says,



A worm is 3.5cm above ground level. If it digs down 8.5cm, and then wiggles back up 9cm, it will end up right back where it started.

Is Kevin correct? Explain why.



R

## Negative Numbers

7b. Sydney is learning about negative numbers.

She says,



The temperature in a fridge is  $4.5^{\circ}\text{C}$ . If it changes by  $4^{\circ}\text{C}$  and then by another  $3^{\circ}\text{C}$ , the answer will always be a 2-digit number with one decimal place.

Is Sydney correct? Explain why.



R

8a. Fill in the blanks using any 2-digit number so that each answer is between 5 and 10.

A.  $-19.5 + \square = \square$

B.  $-20.5 + \square = \square$

C.  $-22 + \square = \square$



PS

8b. Fill in the blanks using any 2-digit number so that each answer is between 8 and 12.

A.  $-17 + \square = \square$

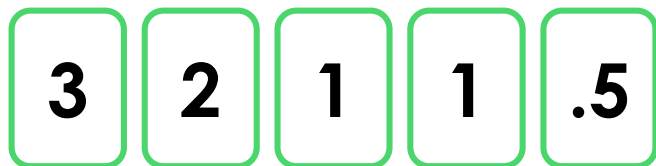
B.  $-9.5 + \square = \square$

C.  $-12.5 + \square = \square$



PS

9a. Use the digit cards to create a calculation which equals -8.5.



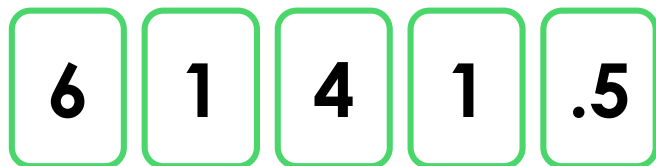
You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?



PS

9b. Use the digit cards to create a calculation which equals -20.5.



You can only use each digit card once per calculation, but do not need to use all of them.

Is there more than one possible answer?



PS

## Reasoning and Problem Solving

### Negative Numbers

#### Developing

1a. Jim is incorrect. He has added 4 to 5, not -5. The correct answer is -1.

2a. Various answers, for example:

A.  $-1 + 2 = 1$

B.  $-3 + 4 = 1$

C.  $-8 + 9 = 1$

3a.  $0 - 5$ ,  $3 - 8$  or  $-5 - 0$

#### Expected

4a. Ken is incorrect. Although he is correct by saying the temperature will be  $5^{\circ}\text{C}$  if it increases by  $4^{\circ}\text{C}$ , if it decreases by  $4^{\circ}\text{C}$ , it will be  $-3^{\circ}\text{C}$ , not  $-5^{\circ}\text{C}$ .  $1 - 4 = -3$

5a. Various answers, for example:

A.  $-17 + 19 = 2$

B.  $-13 + 16 = 3$

C.  $-18 + 20 = 2$

6a. Various answers, for example:

$0 - 18$ ,  $10 - 28$ ,  $-21 + 3$

#### Greater Depth

7a. Kevin is incorrect. The worm will end up 4cm above ground level, not 3.5cm. This is because  $3.5 - 8.5 + 9 = 4$ .

8a. Various answers, for example:

A.  $-19.5 + 29 = 9.5$

B.  $-20.5 + 26 = 5.5$

C.  $-22 + 28 = 6$

9a. Various answers, for example:

$3.5 - 12$ ,  $-11.5 + 3$ ,  $3 - 11.5$

## Reasoning and Problem Solving

### Negative Numbers

#### Developing

1b. Mai is incorrect. She is starting at -5 and adding 5, not subtracting it. The correct answer is -10.

2b. Various answers, for example:

A.  $-7 + 9 = 2$

B.  $-2 + 5 = 3$

C.  $-5 + 9 = 4$

3b.  $2 - 10$  or  $-10 + 2$

#### Expected

4b. Tia is incorrect. She has added the two numbers and put a negative symbol in front of the answer, rather than subtracting them. Her answer should be -8 because  $2 - 10 = -8$ .

5b. Various answers, for example:

A.  $-12 + 20 = 8$

B.  $-20 + 29 = 9$

C.  $-19 + 26 = 7$

6b. Various answers, for example:

$-15 - 1$ ,  $5 - 21$ ,  $-21 + 5$

#### Greater Depth

7b. Sydney is incorrect if the temperature decreases by these amounts. This is because  $4.5 + 4 + 3 = 11.5$ , but  $4.5 - 4 - 3 = -2.5$ .

8b. Various answers, for example:

A.  $-17 + 26 = 9$

B.  $-9.5 + 19 = 9.5$

C.  $-12.5 + 22 = 9.5$

9b. Various answers, for example:

$-14.5 - 6$ ,  $-16.5 - 4$ ,  $-16 - 4.5$