Understanding Part-Part-Whole

Before solving missing number equations students need to:

- Understand addition and subtraction.

- Understand how to represent addition and subtraction using part-part-whole.

- Use these understandings to write addition and subtraction equations where the unknown is in the typical place to the right of the equals symbol.
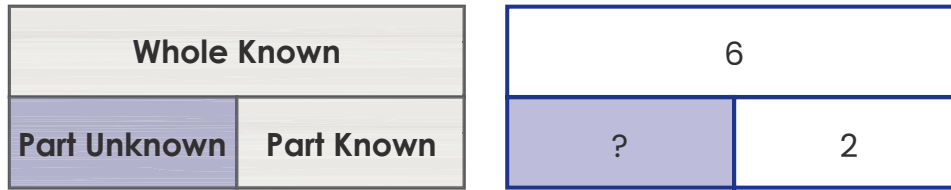
Addition

| Part Known | + | Part Known | = | Whole Unknown | | 4 + 2 = ? |

Subtraction

| Whole Known | – | Part Known | = | Part Unknown | | 6 - 4 = ? |

Addition: Part Unknown

Whole Known	
Part Unknown	Part Known

6	
?	2

To solve missing number addition equations where the part is unknown students can either:

(i) Use addition.

| ? | + 2 = 6

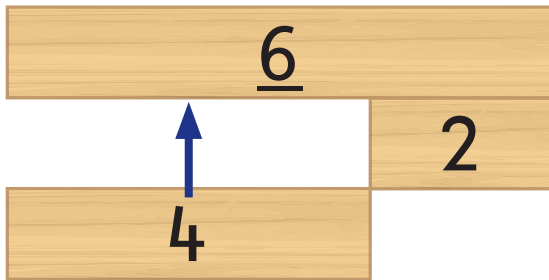Think, *"What joins with 2 to make 6?"*

Part Unknown	+	**Part Known**	=	**Whole Known**

Think, *"What joins with* this part to make the whole?"

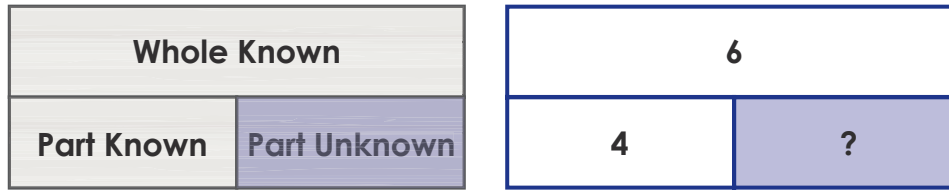Bond blocks can be used to support the calculation and check solutions.

(ii) Rearrange the equation, using part-part-whole to make a subtraction equation where the unknown is in the answer position.

| ? | + 2 = 6 $\longrightarrow$ 6 - 2 = | ? |

Whole Known	-	**Part Known**	=	**Part Unknown**

The same process applies if the missing number is in the other part.

Whole Known	
Part Known	**Part Unknown**

6	
4	?

To solve missing number addition equations where the part is unknown students can either:

(i) Use addition.

$4 + \boxed{?} = 6$

Think, "*What joins with* 4 to make 6?"

Part Known	+	Part Unknown	=	Whole Known

Think, "*What joins with* this part to make the whole?"

Bond blocks can be used to support the calculation and check solutions.

6	
4	↑
	2
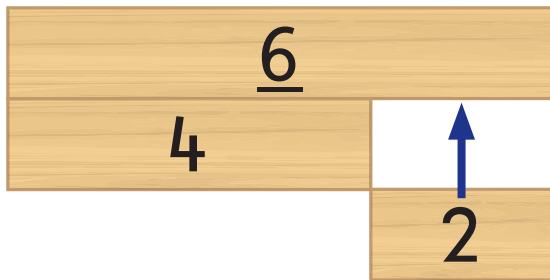
(ii) Rearranging the equation, using part-part-whole to make a subtraction equation where the unknown is in the answer position.

$4 + \boxed{?} = 6$ ➝ $6 - 4 = \boxed{?}$

Whole Known	-	Part Known	=	Part Unknown

Subtraction: Part Unknown

Whole Known	
Part Unknown	Part Known

6	
?	4

To solve missing number subtraction equations where the part is unknown students can either:

(i) Use addition.

$6 - \boxed{?} = 4$

Think, *"What joins with 4 to make 6?"*
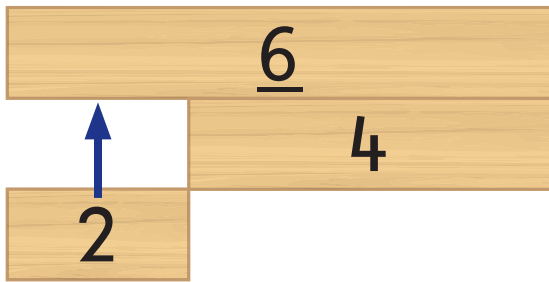
Part Known	+	Part Unknown	=	Whole Known

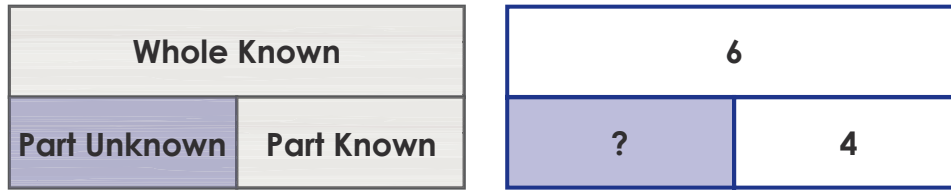Think, *"What joins with* this part to make the whole?"

6

4

2

(ii) Rearrange the equation, using part-part-whole to make a subtraction equation where the unknown is in the answer position.

$6 - \boxed{?} = 4 \longrightarrow 6 - 4 = \boxed{?}$

Whole Known	-	Part Known	=	Part Unknown

Subtraction: Whole Unknown

Whole Unknown	
Part Known	**Part Known**

?	
2	4

To solve missing number subtraction equations where the whole is unknown students can either:

(i) Use addition.

$$\boxed{?} - 2 = 4$$

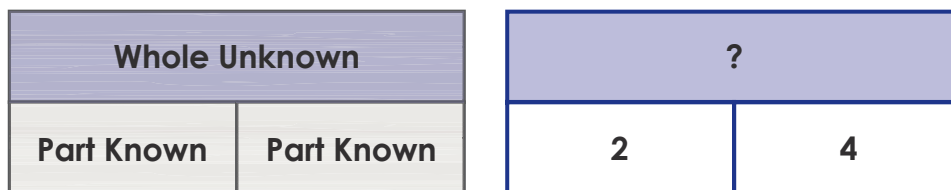Think, *"Join the parts using addition to make the whole."*

Whole Unknown	-	Part Known	=	Part Known

Bond Blocks can be used to support the calculation and check solutions.

6

4	2
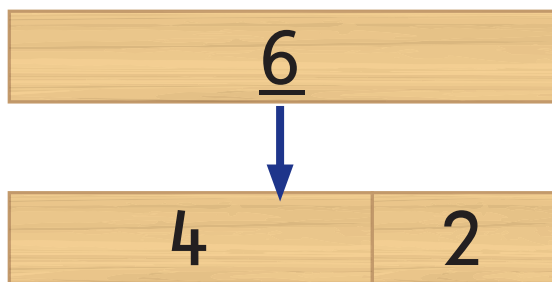
(ii) Rearrange the equation, using part-part-whole, to make an addition equation where the unknown is in the answer position.

$$\boxed{?} - 2 = 4 \longrightarrow 4 + 2 = \boxed{?}$$

Part Known	+	Part Known	=	Whole Unknown

A Progression to Solve Missing Number Equations

Each of the strategies outlined to solve missing number equation have been based on this progression.

Concrete   **Representational**   **Abstract**

$$6$$
$$4 \qquad 2$$

Bond Blocks manipulated to represent numbers, addition and subtraction.

6	
2	4

Diagrammatic representation using part-part-whole.

$$\boxed{?} - 4 = 2$$
$$\text{so} \quad 4 + 2 = \boxed{?}$$

Calculation using numbers and symbols.

Bond Blocks support students to move toward calculating with numbers and symbols.

If students are experiencing difficulty backtrack one step. If they demonstrate understanding, help them to move forward one step using the concrete-representational-abstract progression.