

Lesson 3 – Fact Families and Inverse Operations

Starter

- 1) 30% of 40 =
- 2) 15% of 50 =
- 3) 2% of 300 =
- 4) 18% of 60 =
- 5) ___% of 40 = 6

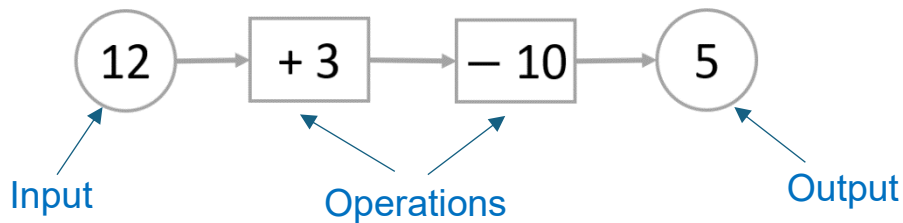
Starter Answers

- 1) 12 2) 7.5 3) 6 4) 10.8 5) 15%

Inverse Operations

Consider the calculation $12 + 3 - 10 = 5$

We can use a **function machine** to display this calculation as follows:



If we started at 5 and **worked backwards** through this function machine, what operations do you think we would have to do to get back to 12?

The inverse operation of -10 is +10, so we would do $5 + 10 = 15$

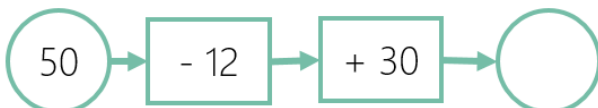
The inverse operation of +3 is -3, so we would then do $15 - 3 = 12$

You can see that we have worked backwards through each step from right to left using the **inverse** of each operation.

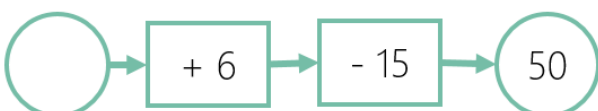
Example 1

Fill in the blanks in these function machines

1)



2)



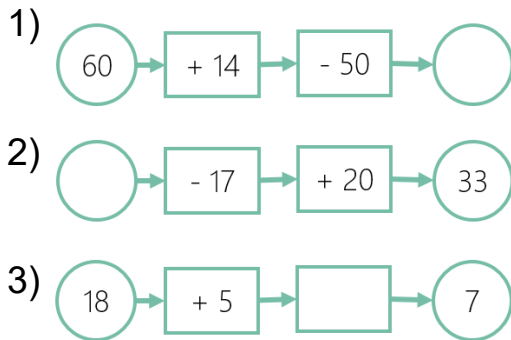
Answers

- 1) $50 - 12 = 38$
 $38 + 30 = 68$
Answer = 68

- 2) We work from right to left, using the inverse of each operation.
 $50 + 15 = 65$
 $65 - 6 = 59$ answer = 59

Your go

Fill in the blanks in these function machines.



Answers

1) $60 + 14 = 74$
 $74 - 50 = 24$
Answer = 24

2) $33 - 20 = 13$
 $13 + 17 = 30$
Answer = 30

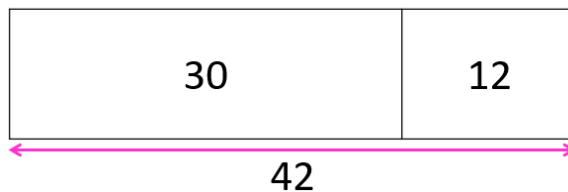
3) $18 + 5 = 23$
 $23 - 16 = 7$
Answer = 16

Fact Families

We will now use the idea of inverse operations to look at **fact families**.

Example 2

The bar model below is showing the calculation $30 + 12 = 42$



Can you write down three other calculations that this diagram could be showing?

$12 + 30 = 42$ (addition is commutative)

$42 - 30 = 12$ (the inverse operation of $+30$ is -30)

$42 - 12 = 30$ (the inverse operation of $+12$ is -12)

Your go

Write down the four facts for each bar model.



Answers

1) $40 + 8 = 48$
 $8 + 40 = 48$
 $48 - 8 = 40$
 $48 - 40 = 8$

2) $0.2 + 1.1 = 1.3$
 $1.1 + 0.2 = 1.3$
 $1.3 - 0.2 = 1.1$
 $1.3 - 1.1 = 0.2$

3) $x + 5 = 12$
 $5 + x = 12$
 $12 - 5 = x$
 $12 - x = 5$