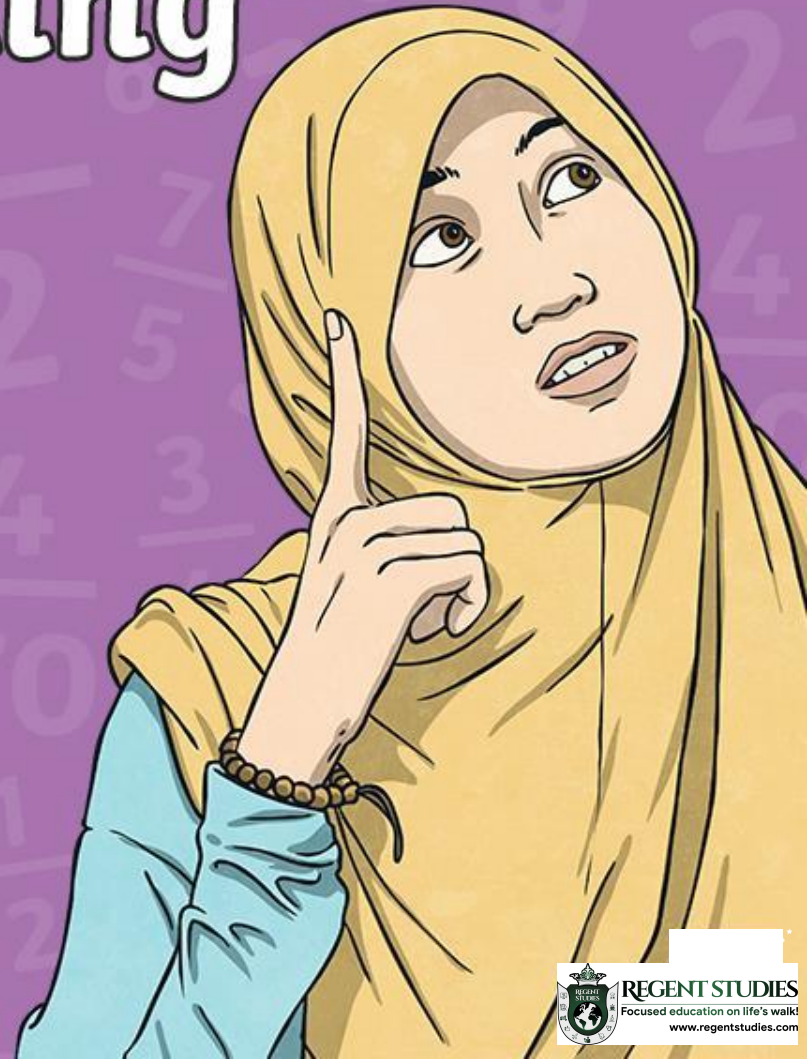
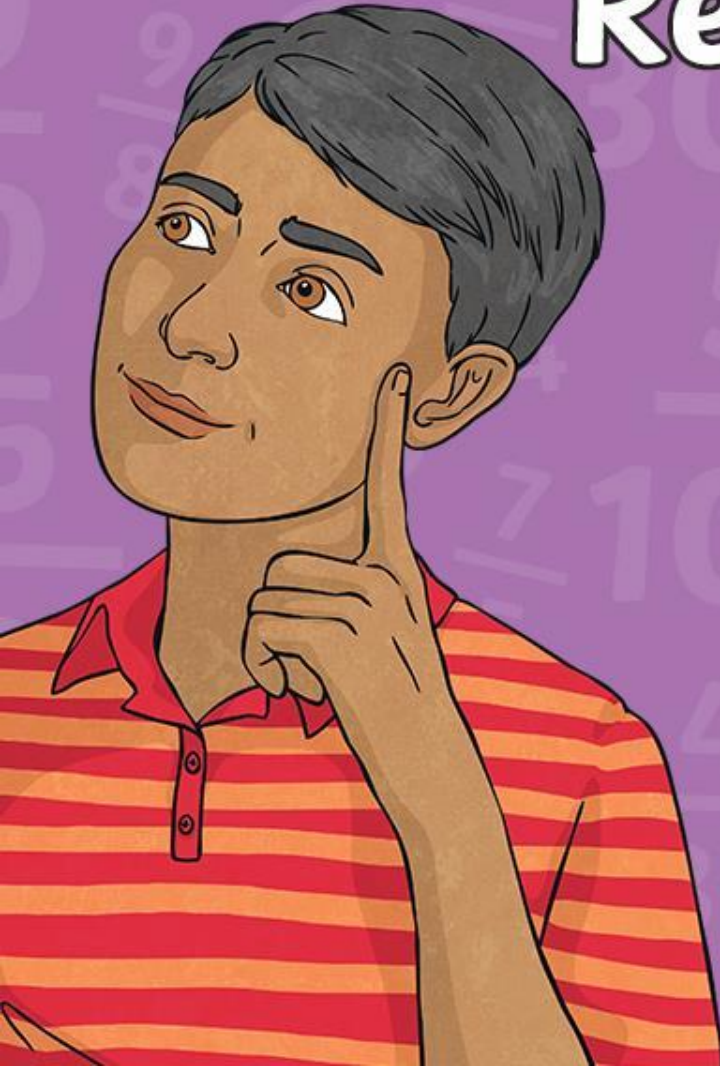




# Mathematics

## Number and Algebra

# Decimal Place Value Reasoning



# Aim

- To solve multiplying and dividing decimals by powers of 10 reasoning questions.

# Success Criteria

- I can break down complex decimal power of 10 problems into smaller steps.
- I can use mathematical language to explain solutions to decimal problems.
- I can use inverse operations by multiplying or dividing by 10, 100 and 1000 to solve a mystery number.

# Guided Maths Question 1

Read this reasoning question carefully.

Number these calculations in **order** from **smallest (1)** to **largest (6)**

$3 + 0.5 + 0.02 + 0.006$

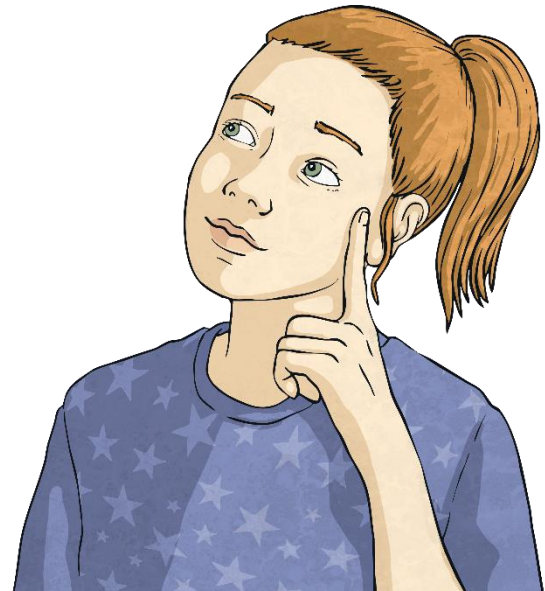
$351 \div 10$

$0.353 \times 10$

$3502 \div 1000$

$350.26 \div 10$

$35 + 0.1 + 0.09 + 0.009$



Let's **highlight** the important information and key vocabulary to show we understand the question.

# Guided Maths Question 1

Next, let's think about what we already know in order to help us answer the question correctly.



I know that when we divide a number by 10, 100, or 1000, we move the digits of the number to the right.

Number these calculations in **order** from **smallest (1)** to **largest (6)**

$3 + 0.5 + 0.02 + 0.006$

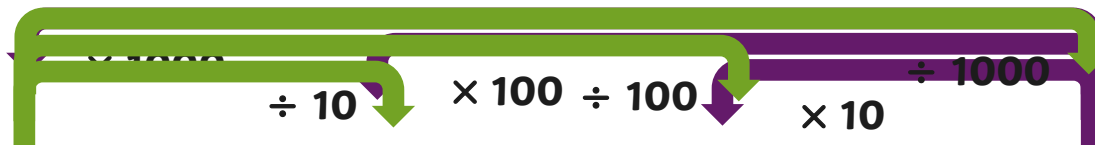
$351 \div 10$

$0.353 \times 10$

$3502 \div 1000$

$350.26 \div 10$

$35 + 0.1 + 0.09 + 0.009$



Ones	Tenths	Hundredths	Thousandths
	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
●	0.1	0.01	0.001



# Guided Maths Question 1

Now we are ready to **apply our learning** to solve the question.



Three of the answers are decimal numbers of 35; I can compare the tenths and hundredths digit to order them.

$$3 + 0.5 + 0.02 + 0.006 = 3.526$$

$$351 \div 10 = 35.1$$

$$0.353 \times 10 = 3.53$$

$$3502 \div 1000 = 3.502$$

$$350.26 \div 10 = 35.026$$

$$35 + 0.1 + 0.09 + 0.009 = 35.199$$

Number these calculations in **order** from **smallest (1)** to **largest (6)**

$$3 + 0.5 + 0.02 + 0.006$$

$$351 \div 10$$

$$0.353 \times 10$$

$$3502 \div 1000$$

$$350.26 \div 10$$

$$35 + 0.1 + 0.09 + 0.009$$

$$3.5\underline{2}6$$

$$35.\underline{1}$$

$$3.5\underline{3}$$

$$3.5\underline{0}2$$

$$35.\underline{0}26$$

$$35.\underline{1}99$$

# Guided Maths Question 1

Finally, let's check our answer.

Number these calculations in order from smallest (1) to largest (6)

$3 + 0.5 + 0.02 + 0.006$

2

$351 \div 10$

5

$0.353 \times 10$

3

$3502 \div 1000$

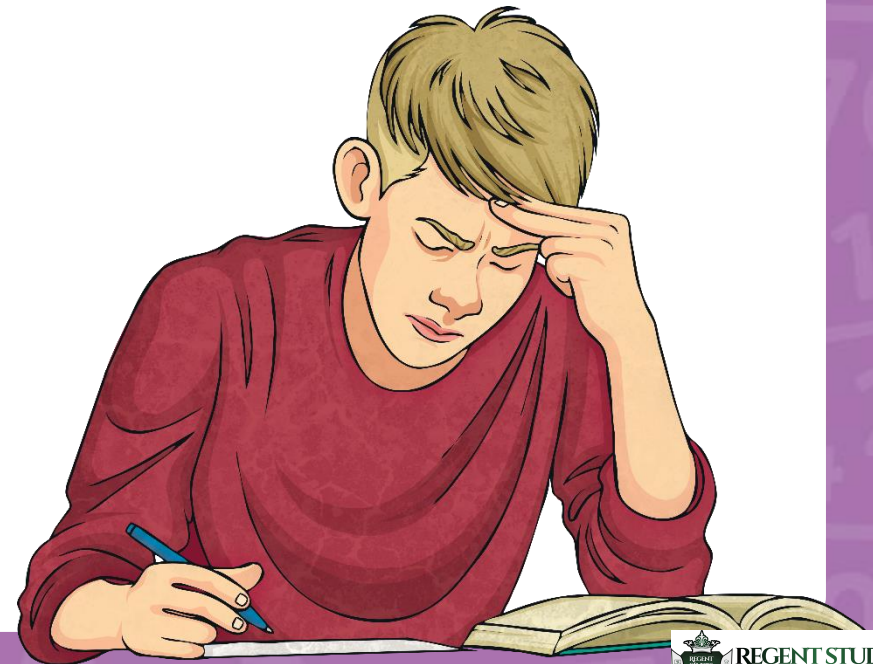
1

$350.26 \div 10$

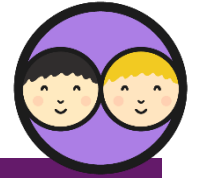
4

$35 + 0.1 + 0.09 + 0.009$

6



# Partner Maths Question 1



Working with a partner, use your reasoning skills to answer this question.

Number these calculations in **order** from **smallest (1)** to **largest (6)**

$542 \div 10$

5

$= 54.2$

$5 + 0.4 + 0.05 + 0.005$

2

$= 5.455$

$5403 \div 1000$

1

$= 5.403$

$0.556 \times 10$

3

$= 5.56$

$541.78 \div 10$

4

$= 54.178$

$54 + 0.2 + 0.08 + 0.008$

6

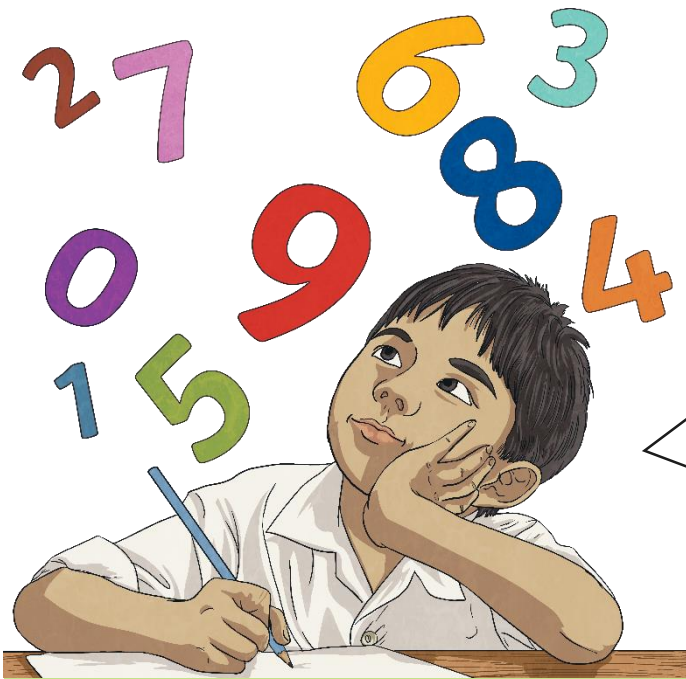
$= 54.288$

Show Answer



# Guided Maths Question 2

Read this reasoning question carefully.



I'm thinking of a number. I multiply it by 10 and then multiply by 10 again. I then multiply by 3 and then divide by 100. My answer is 23.4. What number did I start with?

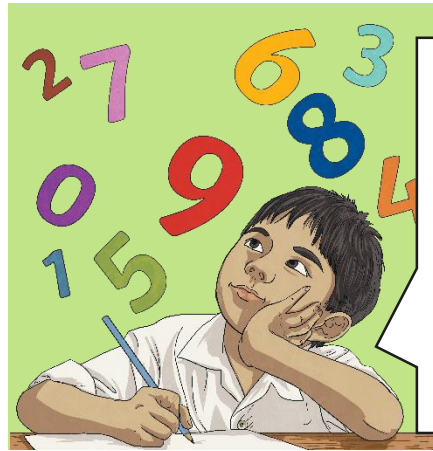
Let's highlight the important information and key vocabulary to show we understand the question.

# Guided Maths Question 2

Next, let's think about what we **already know** in order to help us answer the question correctly.



I know that if I work backwards through the calculation using **inverse operations** I can find the starting number.



I'm thinking of a number. I multiply it by 10 and then multiply by 10 again. I then multiply by 3 and then divide by 100. My answer is 23.4. What number did I start with?

?	$\times 10$	$\times 10$	$\times 3$	$\div 100$	=	23.4
---	-------------	-------------	------------	------------	---	------

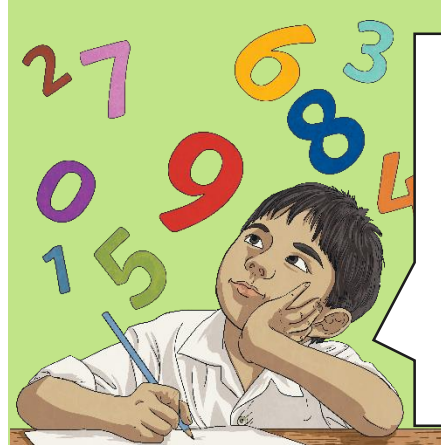
23.4	$\times 100$	$\div 3$	$\div 10$	$\div 10$	=	?
------	--------------	----------	-----------	-----------	---	---

# Guided Maths Question 2

Now we are ready to **apply our learning** to solve the question.



Finally, I can calculate  
 $0.078 \times 100$ .



I'm thinking of a number. I multiply it by 10 and then multiply by 10 again. I then multiply by 3 and then divide by 100. My answer is 23.4. What number did I start with?

$$23.4 \times 100 \div 3 \div 10 \div 10 = ?$$

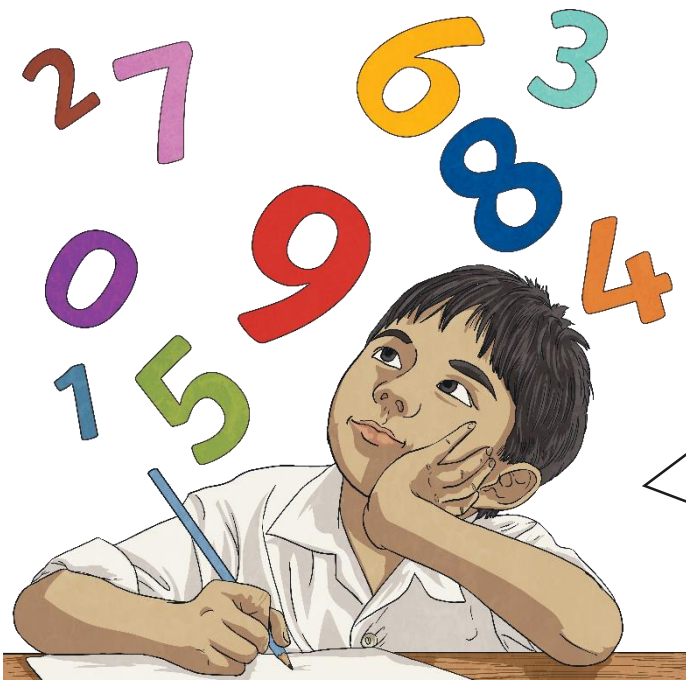
$$23.4 \times 100 = 2340$$

$$2340 \div 3 = 780$$

$$780 \div 100 = 7.8$$

# Guided Maths Question 2

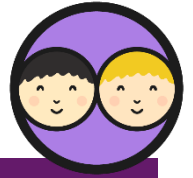
Finally, let's **check our answer** with the information and key vocabulary in the question.



I'm thinking of a number. I multiply it by 10 and then multiply by 10 again. I then multiply by 3 and then divide by 100. My answer is 23.4. What number did I start with?

The starting number is 7.8

# Partner Maths Question 2



Working with a partner, use your reasoning skills to answer this question.

*Remember, these are multi-calculation missing number problems. This means that each calculation is done as a separate step instead of following the rules of BODMAS.*



I'm thinking of a number. I divide it by 100 and then multiply by 10. I then add 7. My answer is 13.53. What number did I start with?

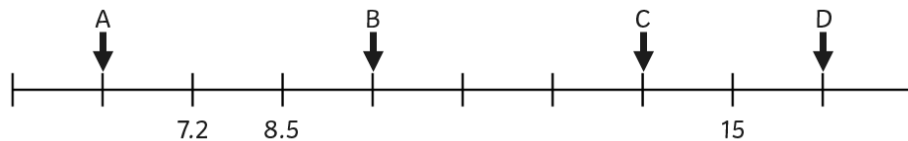
$$\begin{aligned}13.53 - 7 &= 6.53 \\6.53 \div 10 &= 0.653 \\0.653 \times 100 &= \mathbf{65.3}\end{aligned}$$

**Show Answer**

# Guided Maths Question 3

Read this reasoning question carefully.

Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 9.8
- b) The number located at point A is less than 6.
- c) Point C is located at the number 13.5
- d) The difference between point C and D is 2.6

Let's highlight the important information and key vocabulary to show we understand the question.



# Guided Maths Question 3

Next, let's think about what we **already know** in order to help us answer the question correctly.



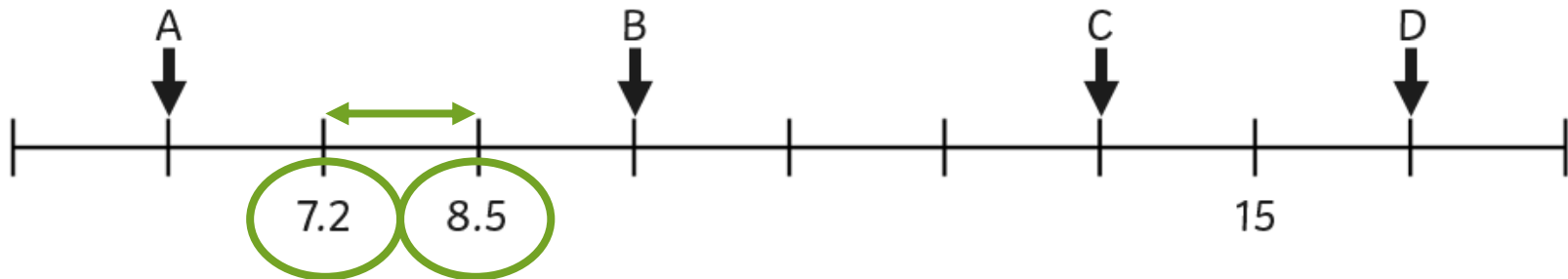
Finding the difference between these adjacent points will give me the incremental value of the number line.

Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 9.8
- b) The number located at point A is less than 6.
- c) Point C is located at the number 13.5
- d) The difference between point C and D is 2.6



# Guided Maths Question 3

Now we are ready to **apply our learning** to solve the question.



I can now say if each statement is true or false.

Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 9.8
- b) The number located at point A is less than 6.
- c) Point C is located at the number 13.5
- d) The difference between point C and D is 2.6

True

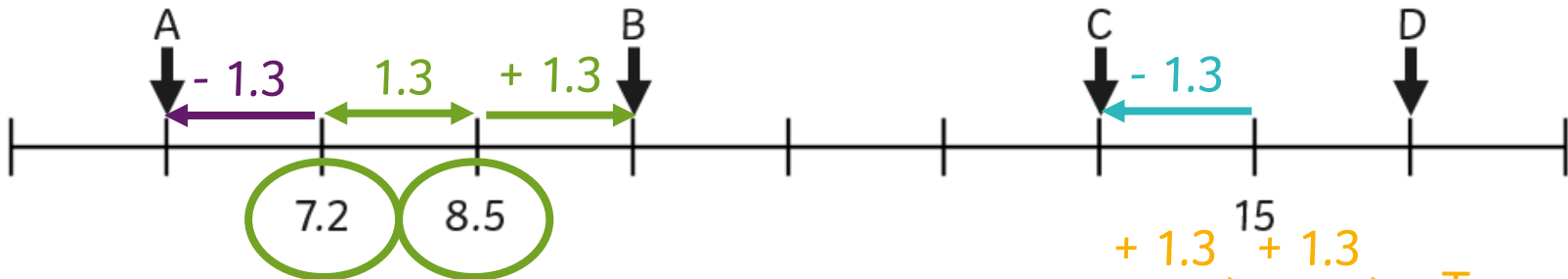
$$7.2 - 1.3 = 5.9$$

True

$$8.5 + 1.3 = 9.8$$

False

$$15 - 1.3 = 13.6$$



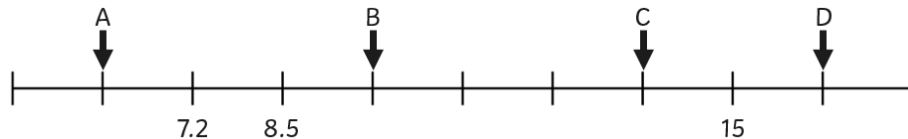
$$1.3 + 1.3 = 2.6$$

True

# Guided Maths Question 3

Finally, let's **check our answer** with the information and key vocabulary in the question.

Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

a) Point B is located at the number 9.8

T

b) The number located at point A is less than 6.

T

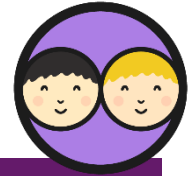
c) Point C is located at the number 13.5

F

d) The difference between point C and D is 2.6

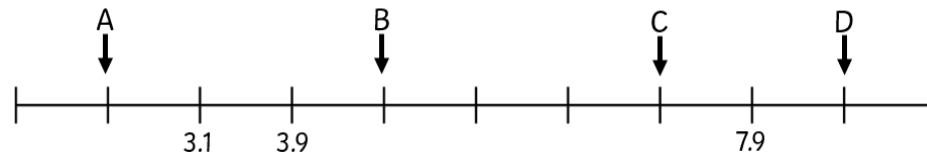
T

# Partner Maths Question 3



Working with a partner, use your reasoning skills to answer this question.

Look at this partially labelled number line.



Show Answer

Decide if the following statements about the number line are true (T) or false (F).

a) Point B is located at the number 4.5

F

Point B is located at 4.7

b) The number located at point A is less than 2.5

T

Point A is located at 2.3

c) Point C is located at the number 7.1

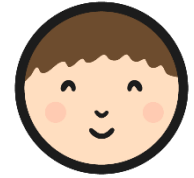
T

The incremental difference is 0.8 so the difference between point C and D is 1.6

d) The difference between point C and D is 1.5

F

# Reasoning Practice



Have a go at **independently** solving the reasoning questions on your activity sheet.

## ★ Decimal Place Value Reasoning

To solve multiplying and dividing decimals by powers of 10 reasoning questions.

1. Put these calculations in order from smallest (1) to largest (6).

$0.694 \times 10$	<input type="text"/>
$6 + 0.8 + 0.02 + 0.001$	<input type="text"/>
$6.985 \times 10$	<input type="text"/>
$697.4 \div 10$	<input type="text"/>
$698 \div 10$	<input type="text"/>
$691 \div 100$	<input type="text"/>

## Place Value Reasoning

To solve multiplying and dividing decimals by powers of 10 reasoning questions.

3. Look at the partially labelled number line. Decide if the following statements about the number are true (T) or false (F).

a. Point B is located at the number 10.2.

b. The number located at point A is less than 3.

c. Point C is located at the number 18.4.

d. The difference between points C and D is 5.2.

## ★★ Decimal Place Value Reasoning

To solve multiplying and dividing decimals by powers of 10 reasoning questions.

<p>1. Put these calculations in order from smallest (1) to largest (6).</p> <p><math>57\ 070 \div 1000</math> <input type="text"/></p> <p><math>5 + 0.7 + 0.07 + 0.001</math> <input type="text"/></p> <p><math>5720 \div 1000</math> <input type="text"/></p> <p><math>0.571 \times 100</math> <input type="text"/></p> <p><math>57 + 0.6 + 0.08 + 0.000</math> <input type="text"/></p> <p><math>50.7 \div 10</math> <input type="text"/></p>	<p>2. Calculate the starting number.</p> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px auto;"> <p>I'm thinking of a number. I multiply it by 100 and then add 25. I then divide it by 10. I get 895.7 as my answer. What number did I start with?</p> </div>	
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# Reasoning Practice Answers



Did you correctly answer the **first** reasoning question?

★ Put these calculations in order from smallest (1) to largest (6)

$0.694 \times 10$ $= 6.94$	3
$6 + 0.8 + 0.02 + 0.001$ $= 6.821$	1
$6.985 \times 10$ $= 69.85$	6
$697.4 \div 10$ $= 69.74$	4
$698 \div 10$ $= 69.8$	5
$691 \div 100$ $= 6.91$	2

Show Answers

★★ Put these calculations in order from smallest (1) to largest (6)

$57,070 \div 1000$ $= 57.07$	4
$5 + 0.7 + 0.07 + 0.001$ $= 5.771$	3
$5720 \div 1000$ $= 5.720$	2
$0.571 \times 100$ $= 57.1$	5
$57 + 0.6 + 0.08 + 0.000$ $= 57.68$	6
$50.7 \div 10$ $= 5.07$	1

Show Answers

★★★ Put these calculations in order from smallest (1) to largest (6)

$24.03 \div 10$ $= 2.403$	1
$24 + 0.4 + 0.03$ $= 24.43$	4
$24,030.4 \div 100$ $= 240.304$	5
$0.243 \times 10$ $= 2.43$	2
$240.43 \div 10$ $= 24.043$	3
$240 + 0.3 + 0.04$ $= 240.34$	6

Show Answers



# Reasoning Practice Answers



Did you correctly answer the **second** reasoning question?



Calculate the starting number:

I'm thinking of a number. I multiply it by 10 and then add 30. I then divide it by 100. I get 0.812 as my answer. What number did I start with?



I started with the number **5.12**

Show Answer



Calculate the starting number:

I'm thinking of a number. I multiply it by 100 and then add 25. I then divide it by 10. I get 895.7 as my answer. What number did I start with?



I started with the number **89.32**

Show Answer



Calculate the starting number:

I'm thinking of a number. I add 35 and then multiply it by 1000. I then subtract 500. Finally, I divide it by 100. I get 1701 as my answer. What number did I start with?



I started with the number **135.6**

Show Answer

# Reasoning Practice Answers



Did you correctly answer the **third** reasoning question?



Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 6.4  T
- b) The number located at point A is less than 4.5  F  
Point A is at 4.6
- c) Point C is located at the number 8.3  F  
Point c is at 8.2
- d) The difference between points C and D is 1.2  T

Show Answers



Look at this partially labelled number line.



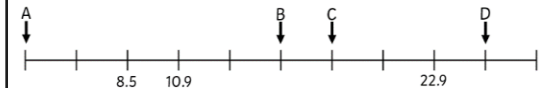
Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 10.2  F  
Point B is at 10.4
- b) The number located at point A is less than 3  T
- c) Point C is located at the number 18.4  F  
Point C is at 18.2
- d) The difference between points C and D is 5.2  T

Show Answers



Look at this partially labelled number line.



Decide if the following statements about the number line are true (T) or false (F).

- a) Point B is located at the number 15.7  T
- b) The number located at point A is less than 3.8  T
- c) Point C is located at the number 18.2  F  
Point C is at 18.1
- d) The difference between points C and D is 7.4  F  
The difference is 7.2

Show Answers

# Reasoning Practice Answers



How confident do you feel about...

Show me using a silent signal:



# Aim



- To solve multiplying and dividing decimals by powers of 10 reasoning questions.

# Success Criteria

- I can break down complex decimal power of 10 problems into smaller steps.
- I can use mathematical language to explain solutions to decimal problems.
- I can use inverse operations by multiplying or dividing by 10, 100 and 1000 to solve a mystery number.

