Models and images to support place value: Decimals
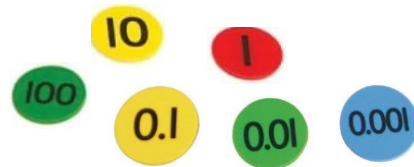
To help you solve a range of place value problems, there a variety of models and images that can support your understanding. These include: number lines, place value charts, place value counters / Diennes, place value sliders. A quick drawing of a place value chart can help you to order and compare numbers quickly and efficiently.
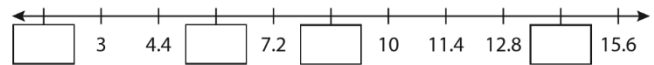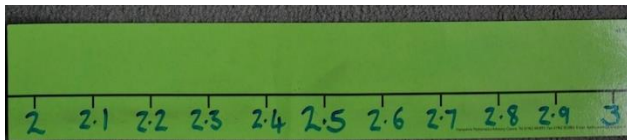
For example, when asked to order the following numbers from smallest to largest and explain how you approached it, what images could you use to support you?

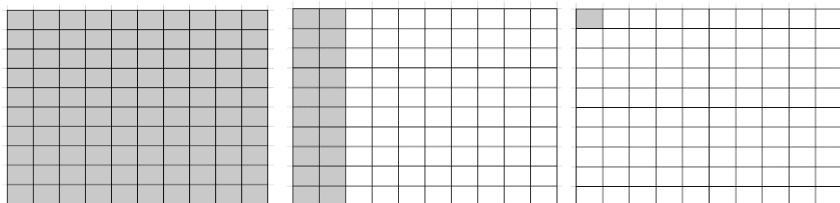Order the following number cards: 163, 63.4; 63.04; 63.44; 63.1, 63.01

H	T	U	Tenths 1/10	Hundredths 1/100
	10 10 10 10 10 10	1 1 1		0.1

A number line is a line drawing where numbers are written from smallest to largest. A number line can be a tool to help you solve maths problems. It is easiest to use a number line to help you add and subtract small numbers or to find the difference. You can also use it to help you solve differences in temperature between negative and positive numbers. However, remember that number lines can be a very useful tool to help you round numbers, compare and order numbers including fractions and decimals.

Decimal numbers can also be shown using 100 squares. If a whole 100 square represents one unit then 10 small squares would be 1/10 or 0.1; 1 small square would represent 1/100 or 0.01

So this decimal number would be 1.21

Or 1 whole +2/10+1/100

Or 1 whole + 21/100

One whole square/ unit divided into 100 equal parts	Each column of 10 squares is 1/10 of the whole square/ unit	There are 100 small squares. Each one is is 1/100 of the whole square/ unit

On the next page you will find a worked example of how to use images to support problem solving with place value.

Then, there are several questions that lend themselves to this approach for you to practise. For each problem, read the question carefully, out loud if you need to, or ask an adult to read the question to you. Then think about how

you could draw a key image to help you unpick the problem and to make sense of what you are being asked to solve. Then answer the question in the context of the problem. Good luck!

A framework for solving a problem involving Place Value (worked examples)

| Problem to solve:

What models and images would help you to solve the problem?

Consider the use of the number line, place value chart, bar model

Work systematically where possible. |

Answers:
1 ½ (=1.5) is greater than 1.2
1.3 is greater than 1 ¼ (=1.25)
1.4 is greater than 1 5/100 (=1.05)
1 3/5 (=1 6/10 or 1.6) is greater than 1.5 | (Paper 3 Q17, 2017)
Hints:
•   Use related facts to help Eg
½ = 5/10 =50/100= 0.5
¼ = 25/100=0.25
•   Use a PV chart to think about <mark>1 5/100</mark> and 1.4
•   How many fifths = 1/10? Think about drawing a fraction wall showing fifths and tenths (3/5=6/10) |
| What models and images would help you to solve the problem?

Consider the use of the number line, place value chart, bar model

Work systematically where possible. |

Answer
0.25 is less than 2 5 because
• 2 5 is 0.4 > 0.25
• 0.25 is 25% and 2 /5 is 40% and 25% is smaller than 40%
• 0.25 is a quarter. You need 8 quarters to make 2, but only 5 lots of 2 /5 to make 2 | |

What models and images would help you to solve the problem? Consider the use of the number line, place value chart, bar model Work systematically where possible.	 Hint • Which numbers are more than one unit? • Which numbers are less than one unit? Try using a place value chart for this one because they are all decimal numbers. 0.328 and 0.96 are both less than one unit. Compare how many tenths are in each number to decide which is smallest. 1.253 and 1.9 are both greater than one whole unit. Compare how many tenths are in each number to decide which is smallest. Answer: 0.328, 0.96, 1.253, 1.9

Problems to solve – decimal place value

1.	I think of a four digit decimal number. When rounded to the nearest tenth my number rounds to 23.6 What could my number be? Find all possibilities. **How could you use a number line to help you with this problem?**
2.	Look at this sequence: 23.46, 23.96, 24.46, 24.96, 25.46 Will 27.64 be in this sequence? Explain your reasoning. Give me a number greater than 50 that will be in your sequence. **Use your place value knowledge to find the difference between each of the numbers in the sequence. What do you notice?**
3.	4.27, 5.73, 4.76, 5.37 Which of these decimals has the digit 7 in the tenths place and rounds to five when rounded to the nearest whole number? **How could a place value chart help you solve this problem?**
4.	Look at the sequence; 1.2, 1.5, 1.8, 2.1 What will the next two numbers be? Will the number 6 be in the sequence? Explain your reasoning. **What models/images could you use to prove your reasoning here?**

5.	Put these decimal fractions in order; 0.36, 0.306, 0.036, 3.06, 3.6 Which decimal fraction goes in the middle?
6.	Which is greater 0.60 or 6? How do you know?
7.	How many grammes in: 0.2Kg; 1.6kg; 0.75kg **What key facts are you using to help you? Hint: 1/10 of 1000g = 100g**
8.	How many cms in 0.6m; 3.5m; 5.8m; 6.2m **What key facts are you using to help you? Hint: 1/10 of 100cm = 10cm**
9	How many m in 0.3km; 0.5km; 4.8km; 5.2km **What key facts are you using to help you? Hint: 1/10 of 1000m = 100m**
10.	Which is longer 39 cms or 4/10 of a metre? How do you know?