1.2 Decimals

- Money can be a useful context because decimal currency is so familiar (people who can't work out 0.25 + 0.85 may know that 25p + 85p = £1.10). But decimals aren't limited to money contexts. Finding "real-life" numbers with more than 2 dp can be difficult: one example is lap times in Formula 1 car racing, which are measured in thousandths of a second.
- Number-line work is vital to see that decimals aren't necessarily "small"; they're "normal" numbers and they fill in the gaps between the integers – hence the first task (1.2.1).
- Plotting points on number-lines helps with seeing the difference between 7.1 and 7.01, and that 0.1 more than 7.9 is 8.0 and not 7.10.

1.2.1 I'm thinking of a number between 1 and 10. What could it be?

Could illustrate using an acetate of horizontal lines marked off in tenths (see sheet).

e.g., 7 – too big – 3 – too small – 5 – too small – 6 – too small [could pause here to think about what that implies] – 6.5 – [show where it is on the number-line] – too big – 6.3 – too small – etc., zooming in, homing in on, say, 6.42.
(Can have the number you've chosen written on a piece of paper taped under someone's desk – to prove you didn't "cheat"!)

1.2.2 **NEED** "In-betweens" sheet.
Tell me a number in between 43.711 and 43.71.

Extension: Perhaps using a different colour pen (or pencil) fill in in-between your in-between answers (one between the low number and your number; one between your number and the high number).

A harder task would be to find a decimal in between $\frac{6}{13}$ and $\frac{7}{15}$. Convert each to decimal, find an in-between number and convert that back to a fraction.

Lots of right answers (infinitely many, in fact): Can you tell me another number that fits?
Can you think of a bigger number than that that works as well?

Could use < and > signs to write answers down.

As there are so many correct answers, pupils could mark each other's work to save the teacher a very tedious job!

For example, $0.462 = \frac{231}{500}$.

1.2.3 **NEED** metre stick marked off in tenths or an acetate of horizontal lines marked off in tenths (see sheet), or sketch it on the board.
Ask questions like "If this end is 3.4 and this end is 3.5 what is this?" (point to a mark along the line)

Can make this quite tricky; e.g., one end can be 14.3 and the other end 17.6.

If the left end is a *and the right end is* b*, then each tenth of the line is worth* $\frac{1}{10}(b-a)$ *and the* n^{th} *mark along has the value* $\frac{n}{10}(b-a)+a = a(1-\frac{n}{10})+\frac{n}{10}b$.

1.2.4 Oral work: Go around the class counting up in 0.3's, say, beginning at 5.
Will we ever hit 100?
What's the closest we'll get?

If Sally said 14.5 what would Mark (next pupil or a pupil some distance away) have to say?
What number would George have to say for Lena to say 12.8? etc.

No, because 100 – 5 = 95 and 95 ÷ 0.3 isn't an integer. Starting at 7 would work.
After 317 pupils we'd get to 100.1 (closest).

Keeping the same "add 0.3" rule or using a different one.

In-Betweens

Write in the space *any* number *in between* the two you're given.
There are lots of possibilities. The first one has been done already.

5	6	120	68	7
6.3				
7	10	130	72	8
2	14	103	6.2	4.9
3	15	104	6.4	5.1
1.1	0.6	13.6	26.8	0.81
1.6	0.9	13.8	27.2	0.83
64	3.57	2.9	1.45	79
88	3.6	3	1.46	80
32.08	2.8	0.75	29.3	0.007
32.1	2.85	0.8	29.6	0.009
3.8	1.029	15.72	30.04	3.07
3.82	1.03	15.78	30.05	3.15
2.5	7.38	0.11	0	0
2.6	7.39	0.12	0.1	0.01

Extra Task Can you make up some that are harder than these?