Add and Subtract Decimals.

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Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

Intervene

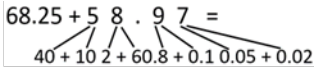
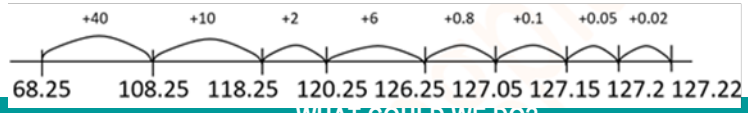
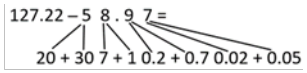
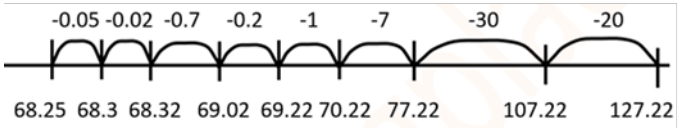
Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

ADD AND SUBTRACT DECIMALS.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PLAYING CARDS, PENCIL, PAPER

WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children: • add decimals using place value, for example,   	Children • ask one another questions about adding and subtracting decimals, for example: ▸ How could we add these numbers using place value? ▸ Are either of these numbers close to a place value?
WHAT COULD WE DO?	**WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?**
• add decimals using compensation, for example, 68.25 + 58.97 = 127.22 68.25 + 60 = 128.25 128.25 – 1.03 = 127.22 • subtract decimals using place value, for example,   • subtract decimals using compensation, for example, 127.22 – 58.97 = 68.25 127.22 – 60 = 67.22 67.22 + 1.03 = 68.25	numbers using compensation? ▸ How is adding decimals the same as adding whole numbers? ▸ How could we subtract these numbers using place value? ▸ Are either of these numbers close to a place value? ▸ Because this number is close to a place value, how could we subtract these numbers using compensation? ▸ How is subtracting decimals the same as subtracting whole numbers?

ADD AND SUBTRACT DECIMALS.

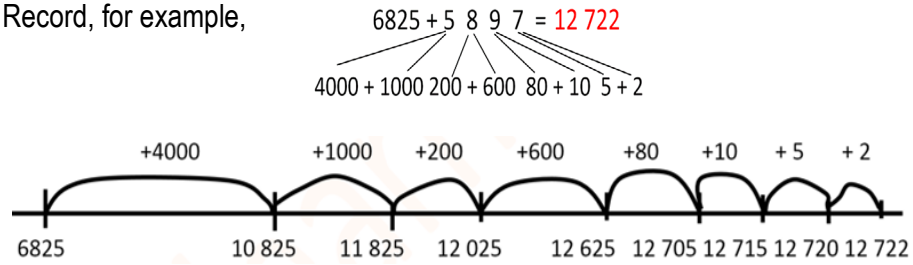
EXPLICIT TEACHING PLAN

FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.

- Today brings an investigation about addition.
- What do you know about addition?
- Talk about addition with a friend.
- Is anyone ready to share what they are thinking about addition?

Record, for example,



6825 + 5897 = 12 722

6825 + 6000 = 12 825

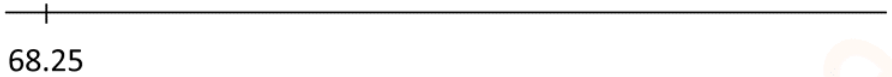
12 825 – 103 = 12 722

- We've investigated adding whole numbers using place value and compensation.

- Today we're going to add decimals using place value and compensation.
- Let's place a decimal point into each of the numbers to change their values.
- What numbers have we created?
- Have we created 68 point 2 5, plus 58 point 9 7
- Let's start with 68.25 and add 58.97
- What are the new values of the digits?
- Are the values of the digits now 6 tens and 8 ones and 2 tenths and 5 hundredths plus 5 tens and 8 ones and 9 tenths and 7 hundredths?

Record, for example, 68.25 + 58.97 =

Record a number line with the start number at the left end, for example,



- Let's add the highest value first – the tens.
- We want to add to the next place value first.

Record a jump, record + 40 above it and record 108.25 where the jump lands, for example,

Partition 50 into 40 and 10, for example, 68.25 + 5 8 . 9 7 =

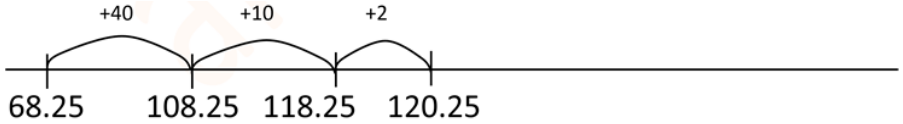
40 + 10

Record a jump, record + 10 above it and record 118.25 where the jump lands, for example,

- Because we're adding tens, we want to add to the next 100s number. We want to add to 100.
- Because we have 68.25, if we add some tens, will we have exactly 100, or will we have some ones, tenths and hundredths?
- Will we have 1 hundred and 8 ones and 2 tenths and 5 hundredths?
- We have 6 tens. How many tens do we need to make 10 tens?
- Do we need to add 4 tens?
- Let's add 4 tens.
- Did we add all of the 50?
- How did we partition the 50?
- Did we partition the 50 into 40 and 10?
- How could we use place value to add the 10 to 108.25?
- If we have 1 hundred and 8 ones and 2 tenths and 5 hundredths and we add 1 ten, will we have 1 hundred and 1 ten and 8 ones and 2 tenths and 5 hundredths?
- Will we have 118.25?
- Let's add the next value – the ones.

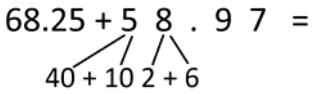
- We want to add to the next place value first.
- Because we're adding ones, we want to add to the next 10s number. We want to add to 20.
- Because we have 118.25, if we add some ones, will we have exactly 20, or will we have some tenths and hundredths?
- Will we have 1 hundred and 2 tens and 2 tenths and 5 hundredths?
- We have 8 ones. How many ones do we need to make 10 ones?
- Do we need to add 2 ones?
- Let's add 2 ones.

Record a jump, record + 2 above it and record 120.25 where the jump lands, for example,



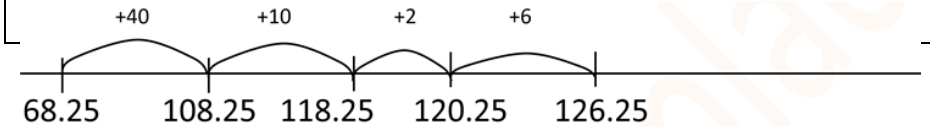
- Did we add all of the 8?
- How did we partition the 8?
- Did we partition the 8 into 2 and 6?

Partition 8 into 2 and 6, for example,



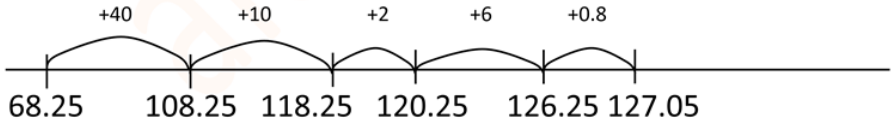
- How could we use place value to add the 6 to 120.25?
- If we have 1 hundred and 2 tens and 2 tenths and 5 hundredths and we add 6 ones, will we have 1 hundred and 2 tens and 6 ones and 2 tenths and 5 hundredths?
- Will we have 126.25?

Record a jump, record + 6 above it and record 126.25 where the jump lands, for example,

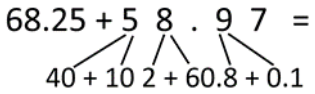


- Let's add the next value – the tenths.
- We want to add to the next place value first.
- Because we're adding tenths, we want to add to the next ones number. We want to add to 7.
- Because we have 126.25, if we add some tenths, will we have exactly 7, or will we have some hundredths?
- Will we have 127 and 5 hundredths?
- We have 2 tenths. How many tenths do we need to make 70 tenths?
- Do we need to add 8 tenths?
- Let's add 8 tenths.
- Did we add all of the 9 tenths?

Record a jump, record +0.8 above it and record 127.05 where the jump lands, for example,



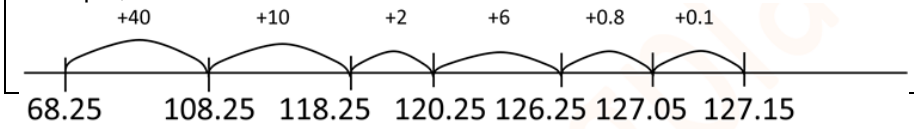
Partition 0.9 into 0.8 and 0.1, for example,



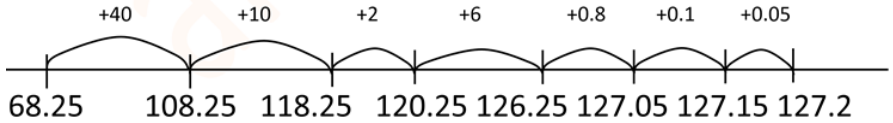
- How did we partition the 9 tenths?
- Did we partition the 9 tenths into 8 tenths and 1 tenth?

- How could we use place value to add the 1 tenth to 127.05?
- If we have 1 hundred and 2 tens and 7 ones and 5 hundredths and we add 1 tenth, will we have 1 hundred and 2 tens and 7 ones and 1 tenth and 5 hundredths?
- Will we have 127.15?

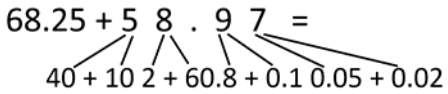
Record a jump, record +0.1 above it and record 127.15 where the jump lands, for example,



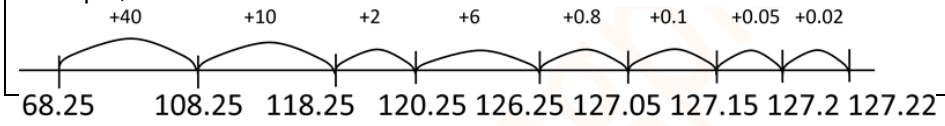
Record a jump, record +0.05 above it and record 127.2 where the jump lands, for example,



Partition 0.9 into 0.8 and 0.1, for example,



Record a jump, record +0.02 above it and record 127.22 where the jump lands, for example,



- Let's add the next value – the hundredths.
- We want to add to the next place value first.
- Because we're adding hundredths, we want to add to the next tenths number. We want to add to 2 tenths.
- We have 15 hundredths. How many hundredths do we need to make 20 hundredths?
- Do we need to add 5 hundredths?
- Let's add 5 hundredths.

- Did we add all of the 7 hundredths?
- How did we partition the 7 hundredths?
- Did we partition the 7 hundredths into 5 hundredths and 2 hundredths?

- How could we use place value to add the 2 hundredths to 127.2?
- If we have 1 hundred and 2 tens and 7 ones and 2 tenths and we add 2 hundredths, will we have 1 hundred and 2 tens and 7 ones and 2 tenths and 2 hundredths?
- Will we have 127.22?

Record, for example, 68.25 + 58.97 = 127.22

Record, for example, 68.25 + 58.97 =

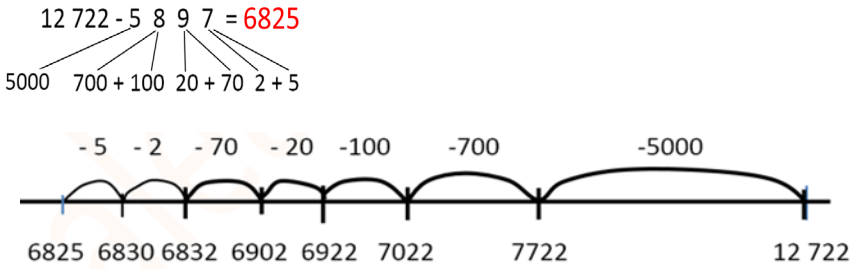
Record, for example, 68.25 + 60 = 128.25

Record, for example, 128.25 – 1.03 = 127.22

Record, for example, 682.5 + 58.97 = 127.22

Children alternate between addition and subtraction to ensure they develop deep understanding of both, and their reciprocal natures.

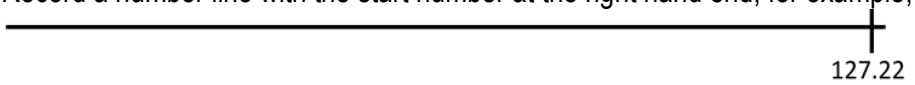
Display, for example,



- That was a lot of calculation!
- I wonder if we could have used compensation.
- Let's look at our numbers, 68.25 plus 58.97.
- Is 58.97 almost 60?
- Is 58.97, 1.03 less than 60?
- Could we add 60, then subtract 1.03? Let's investigate!
- What does 68.25 plus 60 equal?
- Does 68.25 plus 60 equal 128.25?
- What does 128.25 minus 1.03 equal?
- Does 128.25 minus 1.03 equal 127.22
- Let's look at our answer, 127.22.
- Does it make sense that if we add almost 68 to almost 60, we'll get close to 127?
- Is adding numbers with decimals just the same as adding whole numbers?
- **We've investigated subtracting whole numbers using place value.**

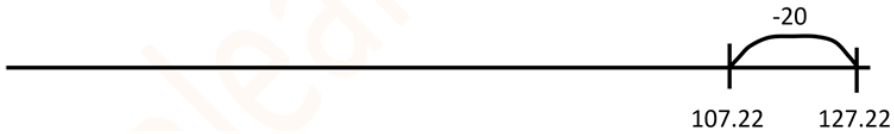
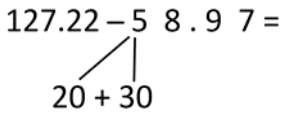
Record, for example, 127.22 – 58.97 =

Record a number line with the start number at the right hand end, for example,

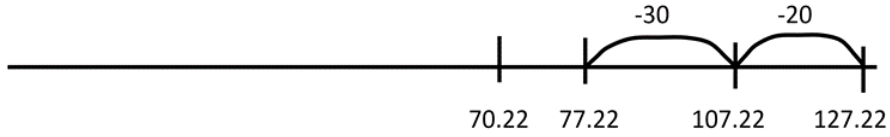


Record 107.22 on the number line, for example,

- Let's place a decimal point into each of the numbers to change their values.
- What are the new values of the digits?
- Are the values of the digits now 1 hundred and 2 tens and 7 ones and 2 tenths and 2 hundredths minus 5 tens and 8 ones and 9 tenths and 7 hundredths?
- Let's investigate how we can use place value to subtract decimals.
- First let's look at the numbers.
- How big is 127.22?
- Is 127.22 just over 127?
- How big is 58.97?
- Is 58.97 almost 60?
- If we subtract about 60 from about 127, how big a number do we estimate we will have?
- Does it make sense that almost 127 minus almost 60 would equal almost 67?
- Let's start by recording an open empty number line and placing the number we are imagining making a group of on the right end so we can get smaller as we move to the left.
- So we're subtracting 58.97. Will we subtract the whole 58.97 all at the same time, or could we partition 58.97?
- Let's subtract the highest value first – the tens.
- How could we subtract the tens?
- We want to subtract to a place value.
- Because we're subtracting tens, we want to subtract to a hundreds number.
- We want to subtract to 1 hundred.
- Because we have 127.22, if we subtract some tens will we have exactly 1

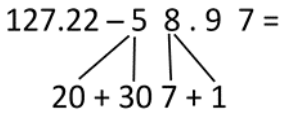
Record a jump and – 20 above it, for example,  	hundred, or will we have some ones and tenths and hundredths as well? ► Will we have 1 hundred, and 7 ones and 2 tenths and 2 hundredths? ► We have 127.22. ► If we subtract 2 tens, will we have 107.22? ► Let's subtract the 20.
Partition 50 into 20 and 30, for example,  	► How did we partition the 50? ► We've subtracted 20, so did we partition 50 into 20 and 30? ► Do we have another 30 to subtract?
Record a jump and – 30 above it and 77.22 where it lands, for example,  	► How could we subtract the 30? ► Could we use friends of 10? ► We have 10 tens and we want to subtract 3 tens. ► Will we have 7 tens left? ► Will we have 70? ► Because we have 107.22, if we subtract 30 will we have exactly 70, or will we have some ones and tenths and hundredths as well? ► Will we have 77.22? ► So we've subtracted the tens.

Record 70.22 on the number line, for example,

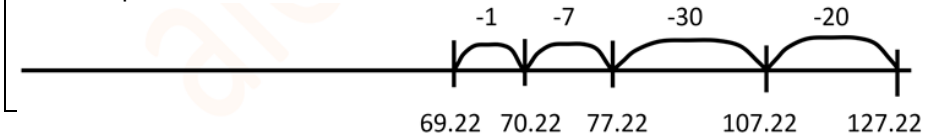


Record a jump and- 7, for example,

Partition 8 into 7 and 1, for example,



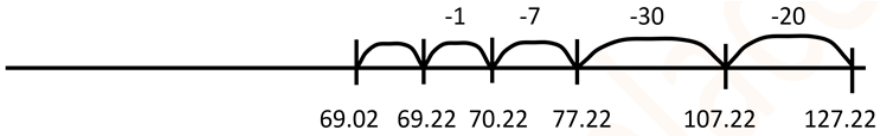
Record a jump and -1 above it, and 69.22 on the number line where the jump lands, for example,



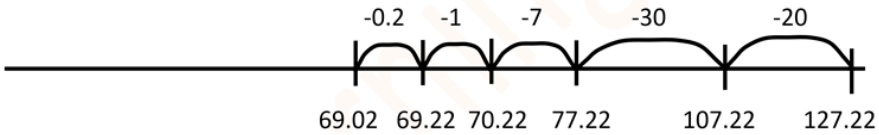
- Let's subtract the next highest value - the ones.
- We want to subtract to a place value.
- Because we're subtracting ones, we want to subtract to a tens number.
- We want to subtract to 70.
- Because we have 77.22, if we subtract some ones, will we have exactly 70, or will we have some tenths and hundredths too?
- Will we have 70.22?
- How many ones do we have?
- Do we have 7 ones?
- If we subtract the 7 ones, will we just have the 7 tens and the 2 tenths and 2 hundredths left?
- Will we have 70.22?
- Let's subtract 7.

- How did we partition the 8?
- We've subtracted 7, so did we partition 8 into 7 and 1?
- Do we have another 1 to subtract?
- How could we subtract the 1?
- Could we use friends of 10?
- What is 1's friend of 10?
- Is 1's friend of 10, 9?
- If we have 70.22 and we subtract 1, will we have 69.22 left?

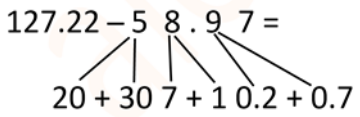
Record 69.02 on the number line where the jump lands, for example,



Record a jump and -0.2 above it, for example,



Partition 8 into 7 and 1, for example,

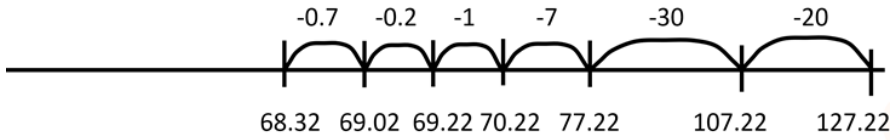


- So we've subtracted the ones.
- Let's subtract the next highest value – the tenths.
- We want to subtract to a place value.
- Because we're subtracting tenths, we want to subtract to a ones number.
- We want to subtract to 9.
- Because we have 69.22, if we subtract some ones, will we have exactly 69, or will we have some hundredths too?
- Will we have 69.02?
- How many tenths do we have?
- Do we have 2 tenths?
- If we subtract the 2 tenths, will we just have the 6 tens and the 9 ones and 2 hundredths left?
- Will we have 69.02?
- Let's subtract 2 tenths.

- How did we partition the 9 tenths?
- We've subtracted 2 tenths, so did we partition 9 tenths into 2 tenths and 7 tenths?
- Do we have another 7 tenths to subtract?

- How could we subtract the 7 tenths?

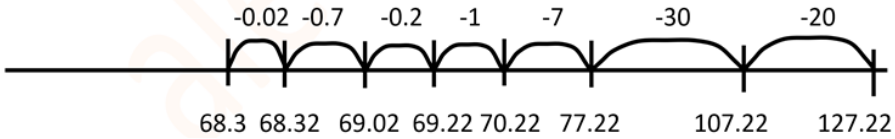
Record a jump and -0.7 above it and 68.32 where it lands, for example,



- Could we use friends of 10?
- What is 7's friend of 10?
- Is 7's friend of 10, 3?
- If we have 69.02 and we subtract 0.7, will we have 68.32 left?

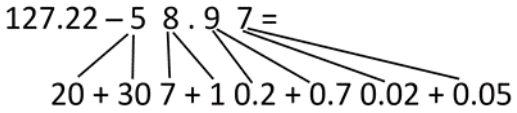
- So we've subtracted the tenths.
- Let's subtract the next highest value – the hundredths.
- We want to subtract to a place value.
- Because we're subtracting hundredths, we want to subtract to a tenths number.
- We want to subtract to 3 tenths.

Record a jump and -0.02 above it and 68.3 where it lands, for example,



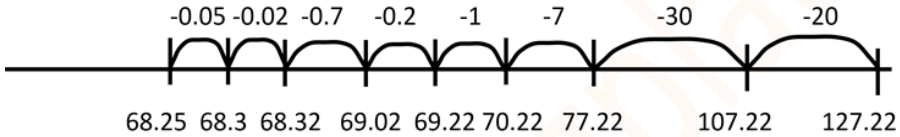
- How many hundredths do we have?
- Do we have 2 hundredths?
- If we subtract the 2 hundredths, will we have the 6 tens and the 8 ones and 3 tenths left?
- Will we have 68.3?
- Let's subtract 2 hundredths.

Partition 8 into 7 and 1, for example,



- How did we partition the 7 hundredths?
- We've subtracted 2 hundredths, so did we partition 7 hundredths into 2 hundredths and 5 hundredths?
- Do we have another 5 hundredths to subtract?

- How could we subtract the 5 hundredths?

Record a jump and -0.05 above it and 68.25 where it lands, for example,  	► Could we use friends of 10? ► What is 5's friend of 10? ► Is 5's friend of 10, 5? ► If we have 68.3 and we subtract 0.05, will we have 68.25 left?
Record, for example, 127.22 – 58.97 =	► Let's look closely at the numbers that we subtracted, 127.22 minus 58.97 ► Who noticed that 58.97 is almost 60? ► Do you think we could use that to make our subtraction easier? ► How many less than 60 is 58.97?
Record, for example, 127.22 – 60 = 67.22	► Is 58.97, 1.03 less than 60? ► Could we subtract 60, then add 1.03? Let's investigate! ► What is 127.22 minus 60?
Record, for example, 67.22 + 1.03 = 68.25	► Doss 127.22 minus 60 equal 67.22? ► What is 67.22 plus 1.03?
Record, for example, 127.22 – 58.97 = 68.25	► Does 67.22 plus 1.03 equal 68.25 ► That was much quicker! ► Looking at the numbers before we launch into a solution strategy can really save us some time and some brain power! ► Let's record what 127.22 minus 58.97 equals ► Let's look at our answer, 68.25 ► Does it make sense that just over 127 minus almost 60 would equal around 68?
	► So can we subtract numbers with decimals in the same way as we can subtract whole numbers?

Children alternate between addition and subtraction to ensure they develop deep understanding of both, and their reciprocal natures.