

Unit 4

Using mental calculation strategies

Five daily lessons

Primary
National Strategy

Year 2
Autumn term

Unit Objectives

Year 2

- Identify near doubles using doubles already known (e.g. $8 + 9$, $40 + 41$).
- Repeat addition in a different order.
- **Choose and use appropriate operations and efficient calculation strategies** (e.g. mental, mental with jottings) **to solve problems.**
- **Explain how a problem was solved** orally, and where appropriate in writing.
- Recognise all coins and begin to use £.p notation for money (For example, know that £4.65 indicates £4 and 65p). Find totals, give change, and work out how to pay.

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This Unit Plan is designed to guide your teaching.

You will need to adapt it to meet the needs of your class.

Resources needed to teach this unit:

- OHT 4.1
- Activity sheet 4.1
- Ten-sided dice
- Mega money (large coins)
- Imitation silver coins
- Whiteboards
- Digit cards
- Bead string
- Tin and 5p coins
- Four baskets with labels 2, 4, 6 and 8
- 15 beanbags
- Three plastic cups and 15 counters per pair of children

See also Models and Images Charts:

- Understanding addition and subtraction;
- Addition and subtraction facts to 20;
- Counting on and back in ones.

Year 1

Link Objectives

Year 3

- Identify near doubles using doubles already known (e.g. $6 + 5$).
- Recognise coins of different values. Find totals and change up to 20p. Work out how to pay an exact sum using smaller coins.
- Choose and use appropriate number operations and mental strategies to solve problems.
- Explain methods and reasoning orally.

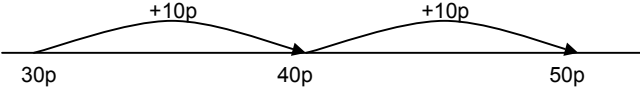
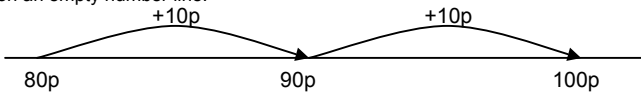
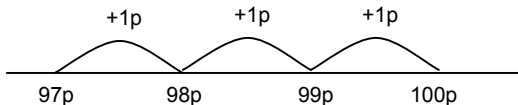
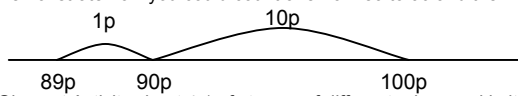
- Identify near doubles from doubles already known (e.g. $80 + 81$).
- Solve word problems in 'real life', money and measures, using one or more steps, including finding totals and giving change, and working out which coins to pay. Explain how the problem was solved.
- Recognise all coins and notes. **Understand and use £.p notation** (for example, know that £3.06 is £3 and 6p).
- Repeat addition or multiplication in a different order.
- **Choose and use appropriate operations (including multiplication and division) to solve word problems**, and appropriate ways of calculating: mental, mental with jottings, pencil and paper.
- Explain methods and reasoning.

(Key objectives in bold)


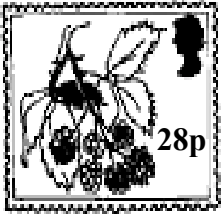





Planning sheet	Day One	Unit 4 <i>Using mental calculation strategies</i>	Term: <i>Autumn</i>	Year Group: 2
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Know by heart doubles of all numbers to 10 and the corresponding halves.</p> <p>VOCABULARY double half</p> <p>RESOURCES Digit cards</p>	<ul style="list-style-type: none"> Revise double 1, 2, 3, 4 and 5 by asking the children to hold up two thumbs and saying double 1 is 2, holding thumbs and forefingers and saying double 2 is 4, and so on until all fingers are held up, saying double 5 is 10. Ask for the corresponding halves by asking children to hold up the correct number of fingers. Draw on the board: ●●●●●○ ●●●●●○ <div>Q What double is this? What is double 6? What is half of 12?</div> <p>●●●●●○ ●●●●●○</p> <div>Q What double is this? What is double 7? What is half of 14?</div> <ul style="list-style-type: none"> Repeat for double 8, 9 and 10. Ask for any doubles from double 1 to double 10 at random, asking the children to use digit cards to respond. Increase speed as the children become more confident. 	<p>Identify near doubles using doubles already known.</p> <p>VOCABULARY double near double one more one less</p> <p>RESOURCES Bead string Mega money (large 1p, 5p, 10p, 20p, 50p and £1 coins)</p>	<ul style="list-style-type: none"> Use two ends of a bead string to show $11 + 10$: ●●●●●●●●○ ●●●●●●●●● <div>Q What double is this close to? What is double 10? And one more?</div> <ul style="list-style-type: none"> Draw the following beads on the board (or use coloured counters on an OHP). ●●●●●○ ●●●●●○ <div>Q What number sentences could we write here? What double is it close to? What other double is it close to? What is double 6? What is double 7? What is the total?</div> <ul style="list-style-type: none"> Write $7 + 6$ on the board. Say that we could use double 6 to help us, and then add another one, because $7 + 6 = 6 + 1 + 6$. Or we could use double 7 to help us and then subtract one, because $7 + 6 = 7 + 7 - 1$. <p>Add another pair of beads on the board: ●●●●●○ ●●●●●○</p> <div>Q What double could we use to help us here? Is there another double? What is the total?</div> <ul style="list-style-type: none"> Explain that 6 and 7, and 7 and 8 are called 'near doubles'. Write the following calculations on the board, ask the children to complete them in their books and also to write the double statement below the calculation which helped them. $5 + 6$ $8 + 7$ $8 + 9$ $6 + 7$ $10 + 9$ $5 + 7$ $10 + 12$ <p>Show them how to record one as an example. $5 + 6 = 11$ double 5 or $5 + 5 = 10$.</p>	<ul style="list-style-type: none"> Ask two children to come to the front. Give 5p to one child and 1p and 5p to the other. <div>Q How much has David got? How much has Manjit got? What's an easy way to find the total?</div> <p>Record on the board $5p + 5p + 1$.</p> <ul style="list-style-type: none"> Repeat the activity using: $10p + 11p$ $(10p + 10p + 1)$ $20p + 21p$ $(20p + 20p + 1)$ $50p + 51p$ $(50p + 50p + 1)$ <div>Q Does anyone know another way of saying or writing 101p?</div> <ul style="list-style-type: none"> Repeat the activity with 100p and 110p converting to £1 and £1.10, reading the notation, and then discussing how to record £2.10. <div>By the end of the lesson, children should be able to:</div> <ul style="list-style-type: none"> work out mentally that $6 + 7 = 13$ and explain that it is double 6 plus 1, or double 7 minus 1. <p>(Refer to supplement of examples, section 5, page 33.)</p>

Planning sheet	Day Two	Unit 4 <i>Using mental calculation strategies</i>	Term: <i>Autumn</i>	Year Group: 2
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Know by heart addition facts up to 10, and doubles up to $10 + 10$.</p> <p>VOCABULARY pairs to ten double total</p> <p>RESOURCES Four baskets with labels 2, 4, 6 and 8 Two beanbags</p>	<ul style="list-style-type: none"> Label four baskets, the first with the number 2, the second with 4, the third with 6 and the fourth with 8 (alternatively draw them on the board). Say that you have two beanbags to throw into the baskets. You gain the number of points on the basket. Two beanbags can go in the same basket. <p>Q What's the biggest score you could get? How did you work this out? What is the smallest score you could get?</p> <p>Q What doubles could you get? How could you score 10?</p> <p>Q Have you got all the possible scores? How do we know?</p> <ul style="list-style-type: none"> Discuss children's strategies and explanations. <p>Q Could we get a score of 7 or 11?</p> <ul style="list-style-type: none"> Establish why this is not possible. 	<p>Choose and use efficient calculation strategies to solve problems.</p> <p>Explain methods orally and in writing.</p> <p>VOCABULARY pair total double near double strategy</p> <p>RESOURCES Class set of ten-sided dice</p>	<ul style="list-style-type: none"> Write the following calculations on the board: $6 + 4$ $3 + 8$ $5 + 5$ $5 + 6$ <p>Q Which of these do you know the answer to without having to work it out? Is there a pair that make 10 or a double you know?</p> <p>Write 'F' for fact by the side of $6 + 4$ and $5 + 5$.</p> <p>Q How could you work out the other two if you don't know the answer?</p> <ul style="list-style-type: none"> Draw out the strategy of putting the larger number first for $3 + 8$ and write 'L' (for larger number first) by the side. Draw out using a double for solving $5 + 6$ and write 'ND' by the side (for near double). Ask the children to work in pairs. They should take it turns to roll two ten-sided dice. They should then decide how to add the two numbers together, record the number sentence and write either F, L or ND by the side to communicate how they worked them out. Towards the end of the session ask the children to choose one of their calculations and to prepare to explain how they worked this out in the plenary. 	<ul style="list-style-type: none"> Ask each pair of children to share one calculation and ask whether this was a known fact, a near double or a calculation where they put the larger number first. Play 'What's my number?' <p>I'm thinking of a number. Double this number is 10. What's my number?</p> <p>I'm thinking of two numbers. They have a difference of one, that means one is one more than the other. Together they add to 11. What are they?</p> <p>I'm thinking of two numbers. They have a difference of one. Together they add to 9. What are they?</p> <p>I'm thinking of two numbers. They have a difference of one. Together they add to 13. What are they?</p> <p>HOMEWORK – Find as many different ways as you can of making 30p using only silver coins.</p> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> explain orally and record that $8 + 7 = 15$; I did double 7 plus 1. <p>(Refer to supplement of examples, section 5, page 65.)</p>

Planning sheet	Day Three	Unit 4 <i>Using mental calculation strategies</i>	Term: <i>Autumn</i>	Year Group: 2
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Count on in fives from zero and back again.</p> <p>VOCABULARY count on fives 'how much more to make...?'</p> <p>RESOURCES Ten 5p coins Tin</p>	<ul style="list-style-type: none"> Practise counting in fives from zero to 50, asking children to show five fingers on one hand as they say each number. Say to the children that you are going to drop 5p coins into a tin, one at a time. Ask them to count in fives to keep track of how much money you have put into the tin. Stop periodically to ask how much money is in the tin so far. <p>Q How much money is in the tin now? If there is 25p in the tin, how much more money do I need to put in to get 30p? How many coins is that? If there is 40p in the tin, how much more money do I need to add to get 50p? How many 5p coins is that?</p> <ul style="list-style-type: none"> Put 50p in the tin, take out 5p. <p>Q How much is in the tin now?</p> <p>Establish it is 45p. Continue to take out 5p at a time, encouraging the children to count back in fives.</p>	<p>Recognise all coins and begin to use £.p notation for money.</p> <p>Find totals and work out how to pay.</p> <p>VOCABULARY altogether total pound pence decimal point</p> <p>RESOURCES Mega money (large coins) OHT 4.1 Imitation silver coins for each group Whiteboards</p>	<ul style="list-style-type: none"> Review the homework. <p>Q What was the least number of coins you could use? The most?</p> <ul style="list-style-type: none"> Show the children large £2, £1, 50p, 20p, 10p, 5p, 2p and 1p coins, one by one, and check that they know what each is. <p>Q Which coin is worth the most? The least?</p> <ul style="list-style-type: none"> Take two coins at a time and ask the children how much money you have altogether, for example, £2 and £1; 50p and 10p; £1 and 50p. Record each number sentence on the board, drawing attention to the £ and p signs and to how we write amounts such as £1.50 using the £ sign and the decimal point. <p>When the children are confident, ask three to come out and hold up three coins to add together, for example £1, 10p and 50p.</p> <p>Q What order should we add them in? What is the total? What have we learned to help us add on the 10p? How do we record the answer?</p> <p>Repeat with other combinations, moving on to find the total of four coins.</p> <ul style="list-style-type: none"> Show OHT 4.1 of various items and their prices. Take each in turn and ask the children to discuss in pairs and record on their whiteboard which coins they could use to pay the exact amounts. Set the children the following task: Find a way of paying 50p using only silver coins. Find a way using one coin, then two coins, then three coins, then four coins and finally five coins. Give the children silver coins to help them. <p>Q Which silver coin is worth the most? Which is worth the least? What other coins are there? How could counting in tens help us? What two coins have the same value as 10p?</p>	<ul style="list-style-type: none"> Discuss children's solutions. <p>Q Did you find a way using one coin? Did you find a way using two coins? Why not? Three coins? Is there another way? Four coins? Is there another way? Five coins? Is there another way?</p> <ul style="list-style-type: none"> Write $10p + 10p + 10p + 10p + 10p = 50p$. <p>Q If we changed one of these 10p coins for two 5p coins, how many coins would we have altogether? How many coins would we have if we changed each of the five 10p coins for two 5p coins?</p> <p>Demonstrate using the multiplication sign to record $5p \times 10$ and say they will learn more about this sign next term.</p> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> exchange coins for those of equivalent value; investigate ways of paying 50p using silver coins. <p>(Refer to supplement of examples, section 5, page 69.)</p>

Planning sheet		Day Four	Unit 4 <i>Using mental calculation strategies</i>	Term: <i>Autumn</i>	Year Group: 2
Oral and Mental		Main Teaching			Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions	
<p>Understand subtraction as 'how many more to make...?'</p> <p>VOCABULARY count on 'how many more to make...?'</p> <p>RESOURCES Bead string</p>	<ul style="list-style-type: none"> Slide 27 beads to one side of the string. <p>Q Which is the next multiple of ten? How many more beads do I need to slide across to make 30? How do you know?</p> <p>Slide three more beads across, saying 28, 29, 30.</p> <ul style="list-style-type: none"> Show 38 beads on the string. <p>Q Which is the next multiple of ten? How many more beads do I need to slide across to make 40? How do you know?</p> <p>Slide two more beads across, saying 39, 40.</p> <ul style="list-style-type: none"> Show 45 beads on the string. <p>Q Which is the next multiple of ten? How many more beads do I need to slide across to make 50? How do you know?</p> <p>Ask a child to slide five beads across counting on from 45 to 50.</p> <ul style="list-style-type: none"> Repeat with other two-digit numbers, drawing attention to how the pairs with a total of 10 help us to know how much money to add on. 	<p>Give change and work out which coins are needed.</p> <p>VOCABULARY count on tens ones change cost</p> <p>RESOURCES Bead string Mega money coins Imitation coins Activity sheet 4.1</p>	<ul style="list-style-type: none"> Say that you have a 50p coin and want to buy three apples which together come to 30p. <p>Q Will I get any change? How much? How did you work it out? What coin(s) might the shopkeeper give me? What if the apples cost only 20p? Would I get more or less change? How much would I get? What coin(s) might the shopkeeper give me?</p> <p>Encourage counting on from 30 to 50 in tens. Show 30 beads on the bead string and slide ten and then another ten along to make 50. Model the calculation on an empty number line.</p>  <ul style="list-style-type: none"> Say that you now want to buy 80p worth of apples and have a £1 coin. <p>Q How much change would I get? How did you work it out? Can counting in tens help? What coin(s) might you get for the change?</p> <p>Show 80 beads on the bead string, move ten beads and then another ten along to make 100 beads. Model counting on in tens, on an empty number line.</p>  <ul style="list-style-type: none"> Say that you're now buying four bananas. The shopkeeper weighs them and says they come to 97p. <p>Q If I give the shopkeeper a £1 coin, will I get any change? How many pennies are there in a pound? How could I work out the change?</p> <p>Encourage the children to count on in ones from 97 to 100. Show 97 on the bead string, move three beads along one at a time to make 100. Model the calculation on an empty number line.</p>  <ul style="list-style-type: none"> Repeat, this time buying 94p worth of grapes. <p>Q What do we add on to 4 to get 10? So what might we add onto 94p to get to 100p?</p> <ul style="list-style-type: none"> Now say that you're buying a punnet of peaches for 89p. <p>Q How could we work out what change we would get from £1? Should we count on in ones? In tens? Could we do both? What coins might we get in the change?</p> <p>Demonstrate how you could count one from 89 to 90 and then 10 to 100p. Draw this on an empty number line.</p>  <ul style="list-style-type: none"> Give out Activity sheet 4.1 of stamps of different prices and imitation coins. Ask the children to work out the change they would get from the amounts given, and also to draw/write what coins they might get in the change. Suggest to the children that they draw number lines on the back of the sheet to help them. 	<p>Q Which question was the easiest? Which was the hardest? Why? For which questions did you count in ones? In tens? Both?</p> <p>Q If you gave £1 for the 45p stamp, how much change would you get? And for the 35p? Does knowing the change from 50p help?</p> <ul style="list-style-type: none"> Say that you've bought a stamp and have the paid the right amount for it using two identical coins. <p>Q How much might the stamp cost?</p> <p>Ask the children to discuss this in pairs and to respond using their whiteboards with as many different solutions as they can.</p> <p>Q Could the stamp cost 8p? Why not?</p> <p>Collect responses and write the possible doubles on the board.</p> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> calculate change and work out what coins are necessary. <p>(Refer to supplement of examples, section 5, page 69.)</p>	

Planning sheet	Day Five	Unit 4 <i>Using mental calculation strategies</i>	Term: <i>Autumn</i>	Year Group: 2
Oral and Mental		Main Teaching		Plenary
Objectives and Vocabulary	Teaching Activities	Objectives and Vocabulary	Teaching Activities	Teaching Activities/ Focus Questions
<p>Know by heart pairs with a total of 10.</p> <p>VOCABULARY pairs total</p> <p>RESOURCES Digit cards</p>	<ul style="list-style-type: none"> Give each pair of children a set of digit cards. Ask them to shuffle them and lay them face up on their tables. <p>Challenge them to find as many pairs as they can with a total of 10 in two minutes.</p> <p>Q Which pairs could you not make with your cards?</p> <p>Point out that they could not make $5 + 5$ or $10 + 0$.</p> <ul style="list-style-type: none"> Ask the children to lay their digit cards in order (0, 1, 2...) on their tables. <p>Write three numbers on the board, two of which have a total of 10, e.g. $7 + 2 + 3$.</p> <p>Ask them to hold up the two numbers that have a total of 10.</p> <p>Q What is the total of all three numbers? How did finding the pair with a total of 10 help you to add the three numbers together?</p>	<p>Repeat addition in a different order.</p> <p>Solve problems.</p> <p>VOCABULARY total more fewer order one more two more three more four more</p> <p>RESOURCES Three baskets/trays 15 beanbags Three plastic cups and 15 counters/cubes for each pair of children Mega money 10p coins</p>	<ul style="list-style-type: none"> Show the children three empty baskets/trays and 15 beanbags. Put five beanbags in each basket and write $5 + 5 + 5 = 15$ on the board. Then take one beanbag from the first basket and put it into the third basket. <p>Q How many beanbags are in the first basket now? And the third? In all three baskets?</p> <ul style="list-style-type: none"> Write $4 + 5 + 6$ on the board. Say that each basket has one more beanbag than the previous basket. <p>Q Which pair of numbers have a total of 10?</p> <ul style="list-style-type: none"> Say that you want to put some beanbags in each basket, so that each basket has three more beanbags than the previous basket and that you must have no beanbags left over. <p>Q How shall we start? What shall we put in the first basket? And then what? Will we have enough beanbags? Will we have any left over?</p> <p>Take suggestions as to what you should put in the first basket, and then ask what must go in the second and third baskets.</p> <p>Repeat until you arrive at a solution.</p> <p>Q Shall we start with more beanbags in the first basket or fewer? Why?</p> <p>Write the solution $2 + 5 + 8 = 15$ on the board.</p> <p>Q Do these three numbers definitely have a total of 15? Could we add them in a different order to check? Which pair of numbers is a good pair to add together?</p> <p>Move the baskets round to show that you could add them together in a different order and the total would be the same.</p> <ul style="list-style-type: none"> Set the children a similar challenge to use all 15 counters in three plastic cups, so that each cup has two more counters than the previous one. Ask them to work in pairs and to write down their solution in a number sentence. <p>Next they could put 15 counters in three cups so that each cup has four more counters than the previous cup. Again they should record their solution in a number sentence.</p>	<ul style="list-style-type: none"> Ask children to come and write their solutions on the board. <p>Q How can we check that these add up to 15? Could we add them in different order?</p> <p>Draw out finding the pair with a total of 10 first as in the oral and mental starter.</p> <ul style="list-style-type: none"> Imagine that we have 60p and we want to put it in three purses so that each purse has 10p more than the previous purse. Ask the children to discuss this in pairs and to use their whiteboards as jotting pads. <p>Q How could we start? How will counting in tens help?</p> <p>Use the Mega money to demonstrate the solution of 10p in the first purse, 20p in the second and 30p in the third.</p> <p>By the end of the lesson, children should be able to:</p> <ul style="list-style-type: none"> check addition by repeating in a different order; solve puzzles such as putting 15 buttons in three boxes so that each box has one more button than the previous box. <p>(Refer to supplement of examples, section 5, pages 59 and 61.)</p>

Stamp	Give	Change	Coins
	20p		
	30p		
	50p		
	40p		
	£1		
	50p		
	50p		

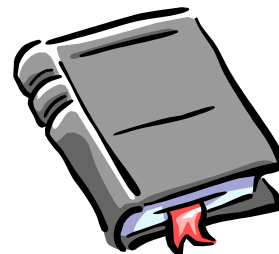
A gel pen

£1.10



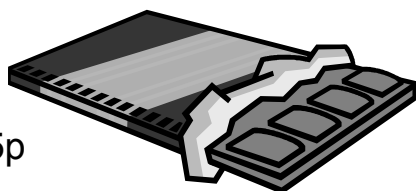
Book

£2.20



Bar of chocolate

35p



Carton of orange juice

50p



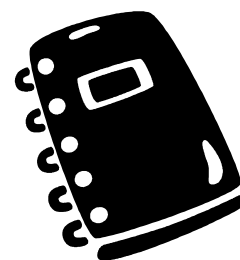
4 chews

12p



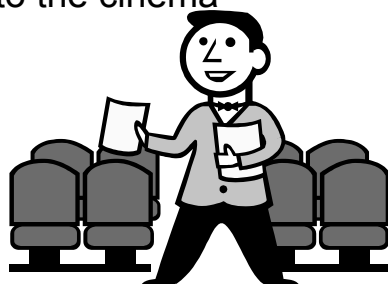
A notebook

£1.05



A trip to the cinema

£3.50



1 hour's swimming

£1.25

