| <b>Y8</b> | UNIT 4 Rounding and Estimating Lesson Plan 1  | Revision:<br>Whole Numbers<br>and Decimals  |
|-----------|---|---|
| Activity  |   | Notes   |
| 1         | Introduction  T: At the beginning of the term we looked back at how to deal with whole numbers and decimals. In this unit we're going to revise just about all the basic arithmetic you have learnt.  T: Let's start with some mental work. | A whole lesson of revision;<br>mental work or writing on BB<br>and in Ex.Bs, with plenty of<br>discussion and with no individual<br>work.         |
|           | PB 4.1, Q1 ((a) 29 (b) 46 (c) 79 (d) 174 (e) 349 (f) 557)  PB 4.1, Q3 ((a) 12 (b) 44 (c) 51 (d) 15 (e) 219 (f) 551)  extended with questions:  5 - 8 = (-3) 21 - 37 = (-16) 38 - 61 = (-23)   | Mental warm-up activity with all Ps contributing. T asks Ps question by question, encouraging slower Ps.  |
|           | PB 4.2, Q1 (a) - (c) $((a) 7.7 (b) 48.7 (c) 5.3)$ PB 4.2, Q2 (a) - (c) $((a) 4.3 (b) 14.2 (c) 2.4)$ extended with questions: $0.5 - 0.9 = (-0.4)$ $1.7 - 3.8 = (-2.1)$ 8 mins   | Agreement. Praising.  |
| 2         | Addition and subtraction  Now you've warmed up, let's work with some less straightforward numbers.  PB 4.1, Q2 (f) (1112)   | Whole class activity.  T calls volunteer/encouraged slower Ps to come to front to give solutions and explain if necessary.                        |
|           | PB 4.1, Q4 (d), (f) (d) 188 (f) 3452 ) PB 4.2, Q1 (e) (19.02) PB 4.2, Q2 (e), (f) (e) 6.28 (f) 2.03 )   | Other Ps write in Ex.Bs, stronger ones can do the calculations in their heads and write down only the answers.                                    |
|           | P <sub>4</sub> : 18.6  + 0.42  19.02  We have to make sure that the same place values are in the same column, with decimal points also lining up in the answer.   | T also asks Ps, here and throughout the lesson, to draw up the rules they've learnt (in this instance, for addition and subtraction of decimals). |
|           | $P_6$ : 8.3 we can write: 8.30 $\frac{-6.27}{2.03} \rightarrow \frac{-6.27}{2.03}$ $14 mins$  | T monitors discussion, ensures orderly, precisely spoken mathematics; agrees and praises.   |
| 3         | Multiplication and division  T: Let's look at multiplication and division by whole numbers.  PB 4.1, Q5 ((a) 36 (b) 55 (c) 46) ((d) 93 (e) 88 (f) 606)  | Mental work, but slower Ps can use Ex.Bs if helpful. If necessary, T can put some questions (multiplication and division) from                    |
|           | PB 4.1, Q8 (a) - (c) (a) 34 (b) 16 (c) 41) PB 4.2, Q3 (a), (b) (a) 8.6 (b) 14) PB 4.2, Q4 (a) (a) 3.4)  | multiplication tables up to 10×10 for the weakest, before starting on PB 4.1, Q5.  Praising.  |
|           | 20 mins   |   |

| <b>Y8</b>   | UNIT 4                         | Roundii<br>Estimat              | ng and<br>ing Le  | esson Plan 1                             | Revision:<br>Whole Numbers<br>and Decimals                  |
|-------------|--------------------------------|---------------------------------|---|--|---|
| Activity    |                                |                                 |   |  | Notes   |
| 4A          | Multiplying and                | dividing by p                   | owers of 10   |  | Mental work.  |
| (continued) | T: I expect you on numbers.    | an remember                     | how to multiply an  | d divide with larger                     | Asking, agreeing, praising, question-by-question.           |
|             | $8 \times 10$                  | (80)                            | $8 \times 100$  | (800)                                    |   |
|             | $8 \times 1000$                | (8000)                          | $80 \times 10$  | (800)                                    |   |
|             | $63 \times 10$                 | (630)                           | $63 \times 100$   | (6300)                                   |   |
|             | $630 \times 100$               | (63 000)                        | $3 \times 20$   | (60)                                     |   |
|             | $3 \times 200$                 | (600)                           | $37 \times 2000$  | (74 000)                                 |   |
|             |                                | left to take a h                | s of 10, each digit i<br>igher value, and th                        | s moved 1, 2, 3,<br>e missing digits are |   |
|             | $6000 \div 10$                 | (600)                           | 60 000 ÷ 100  | (600)                                    |   |
|             | 6000 ÷ 1000                    | (6)                             | 4600 ÷ 100  | (46)                                     |   |
|             | 800 ÷ 20                       | (40)                            | 1200 ÷ 200  | (6)                                      |   |
|             | P: When dividing places to the | g by powers of                  | f 10, each digit is m<br>lower value.                               | ,  |   |
| 4B          | _                              | _                               | ding by powers of   | 10 - spoken                              |   |
|             |                                |                                 | ual about the native  |  | Light-hearted example using                                 |
|             | their age. F                   | For example, it will have 8 tee | n increases proporti<br>an X-ian has 4 tee<br>th at the age of 2, 1 | th at the age                            | calculations in context (!).                                |
|             | How many tee                   | eth will an X-i                 | an have at the age  | of:                                      |   |
|             | T: 10                          | Ps:                             | _   |  |   |
|             | 100                            |                                 | 400   |  |   |
|             | 1000                           |                                 | 4000  |  |   |
|             | T: Fine! Another               | X-ian is 100                    | years old now, and  | has 1400 teeth.                          |   |
|             |                                |                                 | e at the age of:  |  |   |
|             | 10                             | Ps:                             | 140   |  |   |
|             | 1                              |                                 | 14  |  |   |
|             | especially unu                 | ısual - she had                 | other example. This only 0.06 teeth at                              |  |   |
|             | _                              |                                 | ve at the age of:   |  |   |
|             | T: 10<br>100                   | Ps:                             | 0.6<br>6  |  |   |
|             | 100                            |                                 | 60  |  |   |
| 4C          |                                | ving and divi                   | ding by powers of   | ten - written                            |   |
| 70          | _                              | _                               | s in your Ex.Bs and   |  | T writes tasks on BB, Ps<br>volunteer, answer, T agrees (or |
|             |                                | (73 000)                        |   | (70)                                     | not), writes correct answers on                             |
|             |                                | (3400)                          |   | (0.9)                                    | BB, Ps write in Ex.Bs.                                      |
|             |                                | (0.54)                          |   | (0.071)                                  |   |
|             | 780 ÷ 100                      | (7.8)                           | 475.2 ÷ 100   | (4.752)                                  |   |
|             |                                |                                 |   | ns                                       |   |

| <b>Y8</b> | UNIT 4 Ro   | ounding and stimating  | Lesson Plan 1  | Revision:<br>Whole Numbers<br>and Decimals  |
|-----------|---|--|--|---|
| Activity  |   |  |  | Notes   |
| 5A        | T: We've met many   | iplication with whole methods of multiplying is long multiplication. $P_2: 34 \times 260$ $\begin{array}{r} 260 \\ \times 34 \\ \hline 7800 \\ 1040 \\ \hline 8840 \\ \end{array}$ | numbers. The most  | T chooses 3 volunteer Ps to do the multiplications at BB at the same time, and asks the other Ps to observe the role of the zero. (The other Ps can also help the three volunteers.) Write in Ex.Bs. Praising.  |
| 5B        | T: And what about 6 $P_1$ : $52 \times 6.5$ $\begin{array}{r} 65 \\ \times 52 \\ \hline 3250 \\ \hline 130 \\ \hline 3380 \\ \hline 52 \times 6.5 = 338 \\ \end{array}$ | $P_{2}: 5.2 \times 6.5$ $\begin{array}{r} 65 \\ \times 52 \\ \hline 3250 \\ \hline 130 \\ \hline 3380 \\ \\ \hline 5.2 \times 6.5 = 33.8 \\ \end{array}$                           | $P_{3}:  5.2 \times 0.065$ $\times \underbrace{\begin{array}{c} 65 \\ \times 52 \\ \hline 3250 \\ \hline 130 \\ \hline 3380 \\ \end{array}}_{}$ $5.2 \times 0.065 = 0.338$ | Another three volunteers come to show how to work with decimals. Other Ps agree/correct, write in Ex.Bs.  |
|           | P <sub>4</sub> : We count off as n<br>in total in the fac   | tors.  | ne product as there were mins  | One of the volunteers is asked to draw up the rule.  Praising.  |
| 6         | Division (1) PB 4.1, Q8 (f) (2) PB 4.2, Q4 (c) (3) 198 ÷ 12 (4) PB 4.2, Q7 (f)  | $1407 \div 7 = 201$ $52.4 \div 4 = 13.1$ $198 \div 12 = 16.5$ $0.84 \div 0.4 = 8.4 \div$   | mins   | <ul> <li>Whole class activity. T writes tasks on BB, Ps volunteer.</li> <li>In turn, at BB,</li> <li>first P explains the process of dividing (with or without remainder).</li> <li>second P shows how to divide decimals.</li> <li>third P explains how to continue the division of a whole number, rather than just state the remainder.</li> <li>fourth P explains dividing by decimals.</li> <li>Other Ps listen attentively and write in Ex.Bs.</li> <li>T agrees. Praises.</li> </ul> |
|           | Set homework PB 4.1, Q10 (b) - (e) PB 4.1, Q9 (f) PB 4.2, Q1 (f) PB 4.2, Q8 (a) - (f)   |  | muts   | T asks Ps to review the topic covered in this lesson before starting homework, to check that they understand the processes. They should check their answers with a calculator to find their mistakes, and work out why they have made them.   |

| <b>Y8</b>     | UNIT 4 Rounding and Estimating Lesson Plan 2  | Revision:<br>Fractions  |
|---------------|---|---|
| Activity      |   | Notes   |
| 1             | Checking homework  PB 4.1, Q10 (b) - (e) (b) 441 (c) 91 (d) 1548 (e) 183  PB 4.1, Q9 (f) (f) 15  PB 4.2, Q1 (f) (f) 3.752  PB 4.2, Q8 (a) - (f) (a) 54 (b) 7.83 (c) 4.34 (d) 0.544 (e) 1.05 (f) 7.437   | T has asked a P to write results on BB when P arrives.  Checking, correcting, feedback. If several Ps have had problems with a particular question, T should explain it again by going through a similar example at BB  |
| 2             | Revision test   |   |
|               | Questions  (1) (a) $509 + 67.8$ (b) $15.1 - 3.74$ (c) $4.2 - 6.2$ (2) (a) $50.1 \times 100$ (b) $23.8 \div 100$ (c) $0.0067 \times 1000$ (3) (a) $340 \times 260$ (b) $48 \times 0.405$ (c) $3.14 \times 1.4$ (4) (a) $2106 \div 6$ (b) $122 \div 4$ (c) $3.63 \div 1.5$ Solutions $= 576.8$ $= 11.36$ $= -2$ $= 5010$ $= 0.238$ $= 6.7$ $= 88400$ $= 19.44$ $= 4.396$ $= 351$ $= 30.5$ $= 2.42$  | Individual work.  Questions appear on OHP and each P is given a copy. After dealing with all the questions, T checks whether or not Ps understand the processes.  For checking, T has prepared an OS showing solutions.  Feedback will show where there are still weaknesses. (Struggling Ps will be given extra homeworl according to how they have done in the test.)  Self-correction. Praising. |
| 3 (continued) | Addition and subtraction of fractions  T: How do you get on with fractions?  We've looked at their addition and subtraction in Unit 2, so now I'll write some problems on BB and you can explain the method and give the rule in each case.  (a) $\frac{4}{9} + \frac{2}{9}$ $= \frac{6}{9} = \frac{2}{3}$ (We have to add the numerators and leave the denominator as a common one)  (b) $1\frac{3}{7} - \frac{4}{7}$ $= \frac{6}{7}$ (First we have to convert the mixed number into its improper form)  (c) $\frac{3}{5} + \frac{3}{4}$ $= \frac{12}{20} + \frac{15}{20} = \frac{27}{20} = 1\frac{7}{20}$ (First we have to change both fractions to get a common denominator) | After checking Ps' knowledge about whole numbers and decimals, T carries out a short review on dealing with fractions There will be further work on this in Unit 9, but reinforcement at this stage is useful.  T writes on BB, points to volunteer P (slower ones should be encouraged), agrees and writes correct solution on BB (P dictates).  Ps write in Ex.Bs.                                |

| <b>Y8</b>   | UNIT 4 Rounding and Estimating Lesson Plan 2  | Revision:<br>Fractions  |
|-------------|---|---|
| Activity    |   | Notes   |
| 3           | (d) $\frac{5}{48} - \frac{7}{32}$   |   |
| (continued) | $48 	 32$ $48 = 2^4 \times 3$   |   |
|             | $48 = 2 \times 3$ $32 = 2^5$  |   |
|             | 52 = 2<br>LCM = $2^5 \times 3 = 96$   |   |
|             |   |   |
|             | $= \frac{10}{96} - \frac{21}{96} = -\frac{11}{96}$ (The lowest common denominator is the LCM of the two denominators) |   |
|             | 28 mins   |   |
| 4           | Multiplication and division with fractions  |   |
| 4A          | Multiplication and division of a fraction by a whole number  T: Let's review multiplication and division.             | Whole class activity, recalling   |
|             |   | Ps' knowledge about fractions continues. This topic was   |
|             | (a) $\frac{4}{9} \times 2$ = $\frac{8}{9}$  | covered in the previous school year, so T will probably need to   |
|             | (The numerator has to be multiplied, and the denominator is unchanged)  | help (especially with the drawing up of the rules).   |
|             | (b) $\frac{2}{11}$ of 3 $= 3 \times \frac{2}{11} = \frac{2}{11} \times 3 = \frac{6}{11}$                              | Volunteer Ps dictate, T agrees/<br>waits for correction, waits for Ps<br>to draw up rules, ensures that th<br>spoken mathematics is correct a |
|             | (c) $1\frac{2}{3} \div 2 = \frac{5}{6}$   | all times.  |
|             | (The denominator has to be multiplied by the divisor and the numerator is unchanged)                                  |   |
|             | (d) $\frac{4}{5} \div 2$ $= \frac{4}{10} = \frac{2}{5}$   |   |
|             | (If the numerator is divisible by the whole   |   |
|             | number we can also do this process by dividing the numerator and leaving the denominator the same)                    |   |
| 4B          | Multiplication and division of fractions by fractions   |   |
|             | T: Now let's look at the same process with fractions.   |   |
|             | (a) $\frac{5}{3} \times \frac{2}{7}$ $= \frac{10}{21}$  |   |
|             | 3 7 21 (The result will be the quotient of the  |   |
|             | product of numerators and the product of denominators)  |   |
|             | (b) $\frac{7}{6} \times \frac{3}{4}$ $= \frac{7}{2} \times \frac{1}{4} = \frac{7}{8}$                                 |   |
|             |   |   |
|             | (Wherever possible, we can use cancelling)  |   |

| <b>Y8</b> | UNIT 4 Rounding and Estimating Lesson Plan 2  | Revision:<br>Fractions  |
|-----------|---|---|
| Activity  |   | Notes   |
| 4B        | (c) $3 \div \frac{5}{2}$ = $3 \times \frac{2}{5} = \frac{6}{5}$   |   |
|           | (Dividing by the fraction $\frac{a}{b}$ means multiplying by $\frac{b}{a}$ )  |   |
|           | $(d)  \frac{6}{5} \div \frac{8}{3}$   |   |
|           | wrong $\rightarrow = \frac{2}{5} \div \frac{8}{1} = \frac{2}{5} \times \frac{1}{8} = \frac{2}{40} = \frac{1}{20}$                   |   |
|           | correct $\rightarrow = \frac{6}{5} \times \frac{3}{8} = \frac{3}{5} \times \frac{3}{4} = \frac{9}{20}$                              |   |
|           | (Cancelling just after changing it into a multiplication)   | Praising.   |
| 5         | Individual practice 40 mins   |   |
| 3         | Questions Solutions   | Individual work, to check   |
|           | (a) $1\frac{1}{4} - \frac{5}{6}$ $= \frac{5}{4} - \frac{5}{6} = \frac{15}{12} - \frac{10}{12} = \frac{5}{12}$                       | whether or not Ps remember the basic points.  Tasks, and then solutions, appear |
|           | (b) $\frac{3}{7}$ of 4 $= \frac{3}{7} \times 4 = \frac{12}{7} = 1\frac{5}{7}$   | on OHP.   |
|           | (c) $\frac{6}{5} \div 2$ $= \frac{6 \div 2}{5} = \frac{3}{5}$   | T monitors, helps, Ps. Checking: feedback, self-                                |
|           |   | correction. Praising.   |
|           | or $=\frac{4}{9} \times \frac{6}{5} = \frac{4}{3} \times \frac{2}{5} = \frac{8}{15}$  |   |
|           | 45 mins   |   |
|           | Set homework (1) Tasks selected from PB 4.1 and PB 4.2, depending on Ps' mistakes in Revision Test (second Activity in this lesson) |   |
|           | (2) Other tasks with fractions:   |   |
|           | (a) $1\frac{1}{2} + 2\frac{1}{4}$   |   |
|           | <b>(b)</b> $\frac{4}{7} \div 7$   |   |
|           | (c) $7 \div \frac{4}{7}$  |   |
|           | $(\mathbf{d})  \frac{3}{10} \times \frac{9}{5}$   |   |
|           |   |   |
|           |   |   |

## UNIT 4 Rounding and Estimating Negative Numbers and **Y8** Lesson Plan 3 Order of Operations Activity Notes 1 **Checking homework** T has asked a P to write solutions to part (1) on BB as **1A** (1) Selected tasks from PB 4.1 and PB 4.2 soon as P arrives. Detailed discussion if necessary. Agreement, feedback, selfcorrection. Praising. (2) (a) $1\frac{1}{2} + 2\frac{1}{4} = 3 + \frac{2}{4} + \frac{1}{4} = 3\frac{3}{4}$ Solutions to part (2) appear on 1B Ps check and correct their work, or $\frac{3}{2} + \frac{9}{4} = \frac{6}{4} + \frac{9}{4} = \frac{15}{4} = 3\frac{3}{4}$ then feedback, praising. T has to draw attention to the following two possible **(b)** $\frac{4}{7} \div 7 = \frac{4}{49}$ misconceptions: $\frac{4}{7} \div 7 = \frac{4}{1} \div 1 = 4$ (c) $7 \div \frac{4}{7} = 7 \times \frac{7}{4} = \frac{49}{4}$ $\frac{3}{10} \times \frac{9}{5} = \frac{1}{2} \times \frac{3}{1} = \frac{3}{2}$ (d) $\frac{3}{10} \times \frac{9}{5} = \frac{27}{50}$ Fractions can only be cancelled according to the rules! T can also show the connection between tasks (b) and (c). 7 mins 2 Further work with decimals Mental work. **Activity 4.2, Q1-3** Activity 4.2 appears on OHP 3. 1. with only the top triangle (0.3)exposed - the first sentence and the three equations are not visible. 0.4 8.4 T asks Ps to work out the rule of the algorithm. T uncovers the sheet (except the Extension) and praises. 13 mins 3 **Negative numbers** T: Can you remember our work with negative numbers and the rules Short revision session with about them? Let's go over them quickly. negative numbers. **3A** Mental work with negative numbers Mental work. (It might be helpful for slower Ps if a T: 3 + 5Ps: = 8horizontal number line is drawn 3 - 5= -2on BB.) -3 - 5= -8T asks questions, which are also shown on OHP, Ps answer. -3 + 5= 2Agreement. Praising. -2.6 - 3.2= -5.8-4.2 + 6= 1.85.5 - 7.6= -2.1

## UNIT 4 Rounding and Estimating **Y8** Negative Numbers and Lesson Plan 3 Order of Operations Activity Notes **3B** Written practice with negative numbers T: Now write down these calculations and the solutions. Tasks are shown on OS. Answers for these questions can -8 + (+2)-8 + 2 = -6be shown on the number line, if -2 + (-1.8)-2 - 1.8 = -3.8helpful. After agreement, all Ps write 0.2 - (+0.5)0.2 - 0.5 = -0.3correct answers in Ex.Bs. 2.5 - (-1.3)Praising. Then the box of rules 2.5 + 1.3 = 3.8appears on OHP as a reminder; Ps should write the rules in their +(+)=+Ex.Bs. +(-) = --(+) = --(-) = +**3C** Multiplication and division - mental work T: $3 \times (-5)$ Ps: = -15More mental work, recalling the rules of the signs for multiplication and division. $(-0.1) \times (-4)$ = +0.4T asks questions, points to Ps to $(-4.6) \div (+2)$ answer, agrees, praises. $\left(+\frac{1}{3}\right) \times \left(+\frac{1}{2}\right)$ Then multiplication box appears on OHP; Ps copy it into Ex.Bs. $+ \times + = +$ $- \times - = +$ \_ 26 mins \_ 4 Individual work using the rules Individual work, monitored, helped. Tasks appear on OHP or T: Let's see how well you remember the rules. Questions Solutions These are fairly simple tasks, giving practice in dealing with = -3 - 2.4 = -5.4-3 - (+2.4)the rules of the signs. $(-0.8) \div (+2)$ = -0.4Solutions appear on OHP, or T writes them on BB. Ps check -4.1 - (-3)= -4.1 + 3 = -1.1and correct their work. Feedback. Praising. $(-3.1) \times (-3)$ = 9.3(This topic is important and = -3 + 6.3 = 3.3 $-3 + 2.1 \times 3$ should be returned to frequently.) 32 mins

| <b>Y8</b> | UNIT 4 Roun   | nding and nating Lesson Plan 3                                | Negative Numbers and<br>Order of Operations   |
|-----------|---|---|---|
| Activity  |   |   | Notes   |
| 5         | mistake. What do you to P: I should have multiplies T: What rule should you be P: BODMAS: brackets fin addition and subtraction | ave applied?  | Whole class activity.  T and Ps discuss together the order of operations, and look at its application in some specific tasks. |
|           | P: Using brackets: (-3 +  | $(2.1) \times 3$  |   |
|           | `   | explain the order of operations using                         |   |
|           | (1) PB 4.3, Q1 (b)  | $8 - 3 \times 2 = 8 - 6 = 2$                                  | For each question, T writes task  |
|           | (d)   | $3 \times 6 - 9 = 18 - 9 = 9$                                 | on BB, points to P, P gives the first step, with explanation;   |
|           | (2) PB 4.3, Q9 (a)  | $8.2 \div 0.2 - 0.1 = 41 - 0.1 = 40.9$                        | T then points to another P, P <sub>2</sub>  |
|           | (c)   | $8.2 \times (6 - 5.4) = 8.2 \times 0.6 = 4.92$                | gives the second step and the result.   |
|           | (3) (a) $\frac{(-4) \times (+9)}{-6}$   | $=\frac{-36}{-6}=6$   | Other Ps correct if necessary,<br>T agrees, praises and writes<br>solution on BB, Ps write it in                              |
|           | <b>(b)</b> $(-13 + 7) \div (-13 + 7)$   | $=-6 \div 3 = -2$   | Ex.Bs.  |
|           | (4) OS 4.2, Q3  | = 3 + 4 - 24 + 1 = 7 - 25 = -18                               |   |
|           | OS 4.2, Q4  | $= 6 - 11 \times 6 = 6 - 66 = -60$                            |   |
|           |   | 40 mins   |   |
| 6         | BODMAS: individual pr   |   |   |
|           | OS 4.2, Q1  | $= 11 \times 3 - 4 = 33 - 4 = 29$                             | Individual work, monitored, helped.   |
|           | OS 4.2, Q2<br>OS 4.2, Q5  | $= 3 + 21 - 6 = 18$ $= 14 \div 7 - 6 \times 2 = 2 - 12 = -10$ | Detailed checking at BB with explanations as to the order. Agreement, feedback, self-correction. Praising.                    |
|           |   | 45 mins   |   |
|           | Set homework PB 4.3, Q1 (c), (e), (h), (i) PB 4.3, Q9 (d) PB 4.3, Q4, (a), (c)  |   |   |
|           |   |   |   |

| <b>Y8</b>   | UNIT 4 Rounding and Estimating Lesson Plan 4   | Using Brackets  |  |
|-------------|--|---|--|
| Activity    |  | Notes   |  |
| 1           | Checking homework (with more revision)   | Verbal checking of Q1 and Q9.   |  |
| 1A          | PB 4.3, Q1 (c) 7 (e) 25 (h) 15 (i) 25<br>PB 4.3, Q9 (d) 2.06   | T points to P, P gives the steps<br>and the answer. Agreement,<br>feedback, self-correction.<br>Praising.                         |  |
| 1B          | PB 4.3, Q4 (a), (c)  | Detailed checking at BB,  |  |
|             | $P_1: ? \times 3 \rightarrow +2 \rightarrow 17$  | recalling both methods Ps have learnt.  |  |
|             | So $17 - 2 = 15$   | First, T suggests Ps show   |  |
|             | $\rightarrow$ ? $\times$ 3 = 15  | solution from using the   |  |
|             | $\rightarrow ? = 15 \div 3 = 5$  | 'Operation - Inverse Operation' table. For question (a), a  |  |
|             | $P_2$ : ? + 4 $\rightarrow$ × 2 $\rightarrow$ 20   | volunteer P and for (c) an  |  |
|             | So $20 \div 2 = 10$  | encouraged, slower P, should be called to BB.   |  |
|             | $\rightarrow ? + 4 = 10$   |   |  |
|             | $\rightarrow ? = 10 - 4 = 6$   |   |  |
|             | $P_3$ : $3x + 2 = 17$ (-2)   | Then T asks Ps to explain the   |  |
|             | $3x = 15 \tag{÷3}$   | other method (balancing equations) they learnt in Y7.   |  |
|             | x = 5  | equations, they learn in 17.  |  |
|             | $P_4$ : $(x + 4) \times 2 = 20$ (÷2)   |   |  |
|             | $x+4=10 \qquad \qquad \left(-4\right)$   |   |  |
|             | x = 6  |   |  |
|             | $P_s$ : $3 \times 5 + 2 = 17$  | Finally, T reminds Ps to check  |  |
|             | $P_6$ : $(6+4) \times 2 = 20$  | their answer by substituting it into the first equation.  |  |
|             | 10 mins  |   |  |
| 2           | Brackets   | Whole class activity, and mental  |  |
|             | T: Today we're going to deal with the role of brackets. First, we'll review the rules concerning brackets.   | work.   |  |
|             | OS 4.4 extended with   | Tasks appear on OHP.  Ps try to review what they  |  |
|             | (i) $36 \div (9+3)$ (ix) $36 \div 9 - 36 \div 3$   | remember from Unit 4 and Unit   |  |
|             | (j) $36 \div (9-3)$ (x) $15-6+4$   | 8 last year. Try to match the pairs   |  |
|             | (k) $15 - (6 + 4)$ (xi) $15 + 6 - 4$   |   |  |
|             | (1) $15 - (6 - 4)$ (xii) $36 \div 9 + 36 \div 3$   |   |  |
|             | (m) $15 + (6 - 4)$ (xiii) $15 - 6 - 4$   |   |  |
|             | e.g.: P: $(4 + 2) \times 3 = 4 \times 3 + 2 \times 3$ ,<br>since $6 \times 3 = 18$<br>and $12 + 6 = 18$ too. | T points to volunteer P to make a statement, calculate in their head and then clearly say how to match the expressions at OHP, if |  |
| (continued) | This is true, because when multiplying $(4 + 2)$ by 3, we have to multiply both 4 and 2 by 3                 | the statement is true.  |  |

| <b>Y8</b>        | UNIT 4 Rounding and Estimating Lesson Plan 4  | Using Brackets   |
|------------------|---|--|
| Activity         |   | Notes  |
| 2<br>(continued) | or P: $15 - (6 + 4) = 15 - 6 - 4$<br>since $15 - 10 = 5$<br>and $9 - 4 = 5$ too.  | T also asks Ps to give a reason, wherever possible.  Praising. At the end, T stresses the fact that  |
|                  |   | $15 + (6 - 4) = 15 + 6 - 4$ (nothing changes when the brackets are left off), but that $36 \div (9 + 3) = 36 \div 9 + 36 \div 3$ and $36 \div (9 - 3) = 36 \div 9 - 36 \div 3$ are not correct.  |
| 3                | Further practice with brackets PB 4.3, Q7, extended with the question: Which of the eight expressions can be written down   | Individual work, monitored, helped.  |
|                  | without brackets but leaving the numbers in the same places? You can change the operations if necessary.  (PB 4.3, Q7: (a) $T$ (b) $T$ (c) $F$ (d) $F$ )  Solution of extension: $(3 \times 6) \times 2 = 3 \times (6 \times 2) = 3 \times 6 \times 2$  | T should wait for all Ps to answe the original question, but not for them to finish the extra one.  For checking, encouraged slower Ps should be asked to write solutions for the original questions on BB; stronger Ps will   |
|                  | (4+2)+7=4+(2+7)=4+2+7 $(8-2)-1=8-2-1$ $8-(2-1)=8-2+1$ $(8 ÷ 2) ÷ 2 = 8 ÷ 2 ÷ 2$   | probably volunteer to show how to leave off brackets.  Agreement/discussion, pointing out which expressions remain the same without brackets and which ones have to be changed.  |
|                  | $8 \div (2 \div 2) = 8 \div 2 \times 2$<br>e.g. P: When we decrease the subtrahend, the result will increase by the same number. That's why:<br>8 - (2 - 1) = (8 - 2) + 1 = 8 - 2 + 1 $32  mins$  | T can also ask stronger Ps to explain the reason for the change Praising.  |
| 4                | Solving problems using BODMAS  OS 4.3, Q1-5, Q8 e.g: T: Look at question 1 Who thinks it's true? (No-one?) Who thinks it's false? (Most Ps) What do the rest of you think? (?) OK; let's work it through.  P <sub>1</sub> : $3 \times 6 = 18$ , $18 + 2 = 20$ , so it's false.  T: Can you make it true?  P <sub>2</sub> : $3 \times (6 + 2) = 3 \times 8 = 24$ T: Correct. Now question 2 Think about it | Whole class activity with mental work.  Task appears on OHP.  T takes the questions, one at a time. First T makes all Ps say whether the statement is true or false, then asks both groups to explain their answer. Ps use BODMAS to show the correct answer, agreement, and make the statement true by using brackets, if it was false. |

| <b>Y8</b>     | UNIT 4 Rounding and Estimating Lesson Plan 4  | Using Brackets   |
|---------------|---|--|
| Activity      |   | Notes  |
| 4 (continued) | T (to a 'true' P): Why do you think it's true?<br>$P_3$ : $4-6=-2$ , $-2\times 2=-4$<br>T (to a 'false' P): Why do you think the previous answer is wrong?<br>$P_4$ : According to BODMAS, we have to multiply first, etc.  | T has to calm protesting Ps and suggest that they allow this P to explain the reasoning.   |
| 5             | Individual work - competition  T: Let's see how clever you are. You have four minutes and four 2s to produce as many numbers as you can between 0 and 8. Start now!  Produce all the whole numbers from 1 to 8, using four 2s and the signs +, -, ×, ÷, ()  2 2 2 2 2 = 0 2 2 2 2 = 1 2 2 2 2 2 = 2 2 2 2 2 = 3 2 2 2 2 2 = 4 2 2 2 2 2 = 5 2 2 2 2 2 = 6 2 2 2 2 2 = 6 2 2 2 2 2 = 7 2 2 2 2 = 8 | Individual work, monitored - competition. Each P has a copy to work on. T gives Ps four minutes. Some Ps will not have finished at the end of the time. (They will probably have difficulty with '7'.)   |
|               | A possible solution:<br>$(2+2) - (2+2) = 0$ $(2+2-2) \div 2 = 1$ $2 \div 2 + 2 \div 2 = 2$ $(2+2+2) \div 2 = 3$ $2+2-2+2=4$ $2+2+(2 \div 2) = 5$ $2 \times 2 \times 2 - 2 = 6$ $? = 7$ $2 \times 2 + 2 \times 2 = 8$  | After four minutes, T stops the work, puts a copy of the task as an OS on OHP and asks Ps to complete it.  There are many possible solutions (T should listen to all of them) → discussion, agreement, self-correction and praising for each number produced.  At the end, T leaves two questions open:  - how many solutions exist for a number?  - is there any solution for the number 7? |
|               | Set homework  (1) PB 4.3, Q2 (b), (h) (+ Make it true), Q8, Q10 (a)  (2) Give as many solutions as you can for producing the number 4 from four 2s.  (3) For stronger Ps: Try to produce the number 7 from four 2s.   | Feedback. Praising (marking).  |

|             | UNIT 4 Rounding and Estimating Lesson Plan 5                 | 5 Problems in Context   |
|-------------|--|---|
| Activity    |  | Notes   |
| 1           | Checking homework  | T has asked a P to write correct                                |
| 1A          | <b>PB 4.3, Q2</b> (b) False, 35, $8 \times (6 - 2 + 3) = 56$ | solutions on BB for Q2 and Q8 as soon as P arrives.             |
|             | <b>PB 4.3, Q2</b> (b) False, 56, $64 - (10 + 2) = 52$        | Agreement, feedback, self-                                      |
|             | <b>PB 4.3, Q8</b> (a) $13 - (4 - 1) = 10$                    | correction. Praising.   |
|             | <b>PB 4.3, Q8</b> (b) $30 - (9 + 2) = 19$                    |   |
|             | <b>PB 4.3, Q8</b> (c) $60 \div (6 \div 3) = 30$              |   |
|             | <b>PB 4.3, Q10</b> (a) $0.6x + 0.8 = 3.2$ $(-0.8)$           | Then a volunteer P shows the                                    |
|             | 0.6 x = 2.4  (÷6)  | solution to Q10 (a) by balancing                                |
|             | x = 4  | the equation (and checking).                                    |
|             | Check: $4 \times 0.6 = 0.8 = 2.4 + 0.8 = 3.2$                |   |
| 1B          | Some of the solutions:                                       | To check the possible ways of                                   |
|             | (1)  -2 + 2 + 2 + 2  | producing the number 4 from four 2s, T has prepared an OS       |
|             | 2-2+2+2  | showing some solutions. This is                                 |
|             | 2+2-2+2 $2+2+2-2$  | put on OHP and Ps tick the matching solutions in their          |
|             | (2)  2+2+(2-2)   | Ex.Bs.  |
|             | 2 + (2 - 2) + 2 $2 + (2 - 2) + 2$                            | Now only the different solutions remain to be checked (stronger |
|             | (2-2)+2  | Ps who have used the $2^2$ form must be praised).               |
|             | (2-2)+2+2 (3) $2+2-(2-2)$                                    | must be praised).   |
|             | ,  |   |
|             | 2 - (2 - 2) + 2  |   |
|             | -(2-2)+2+2   |   |
|             | (4) $\left(-2+2+2\right) \times 2$                           |   |
|             | $(2-2+2)\times 2$  |   |
|             | $(2+2-2)\times 2$  |   |
|             | (5) $(2+2) \div 2 + 2$                                       |   |
|             | $2 + (2 + 2) \div 2$   |   |
|             | (6) $2 \times 2 - 2 + 2$                                     |   |
|             | $2 \times 2 + 2 - 2$   |   |
|             | $-2 + 2 \times 2 + 2$<br>2 + 2 \times 2 - 2                  |   |
|             | $2+2\times2-2$ $-2+2+2\times2$                               |   |
|             | $2-2+2\times 2$  |   |
|             | $(7)  (2+2) \times 2 \div 2$                                 |   |
|             | $(2+2) \div 2 \times 2$                                      |   |
| (continued) |  |   |

| <b>Y8</b>      | UNIT 4 Rounding and Estimating Lesson Plan 5  | Problems in Context   |
|----------------|---|---|
| Activity       |   | Notes   |
| 1B (continued) | $2 \times (2 + 2) \div 2$<br>$2 \div 2 \times (2 + 2)$  | Before finally counting up the number of solutions, T and Ps  |
|                | $(8)  2 \div 2 \times 2 \times 2$ $2 \times 2 \div 2 \times 2$                                      | must agree which ones are essentially the same as one another. Then T counts the number of different solutions. |
|                | $2 \times 2 \times 2 \div 2$ (9) $2 \div (2 \div 2) \times 2$                                       | Counting, feedback. Praising.   |
|                | $2 \times 2 \div (2 \div 2)$<br>(10) $2 \div ((2 \div 2) \div 2)$                                   |   |
| 1C             | 2 2 2 2 = 7?  10 mins   | Finally T and stronger Ps agree that it is impossible to produce the number 7 from four 2s.                     |
| 2              | Problems in context - whole class   |   |
| 2              | OS 4.5<br>Question 1  | Tasks appear on OHP.  T points to P to read out Q1 clearly.   |
|                | $P_1$ (writes on BB): $5 - 0.49 \times 9$<br>$P_2$ : $0.5 \times 9 - 0.1 \times 9$                  | Ps interpret problem together,<br>then a slower (encouraged) P is<br>asked to come to OHP and                   |
|                | = 0.45 - 0.09 $= 4.41$  | write the appropriate expression.   |
|                | Question 2  | T agrees and asks Ps to suggest   |
|                | P <sub>3</sub> : $4.25 + 0.75 \times 7$<br>T: And cleaning 8 windows?<br>Ps: $4.25 + 0.75 \times 8$ | a quicker way to count this in their heads.   |
|                | T: And cleaning 80 windows?   | Then reading out, interpreting  |
|                | Ps: $4.25 + 0.75 \times 80$   | Q2 (a) and writing down the correct expression on OS. Ps  |
|                | T: Cleaning 12 windows?  Ps: $4.25 + 0.75 \times 12$ T: Cleaning <i>n</i> windows?                  | may answer in chorus.  T calls a slower P to BB to count and answer the question.                               |
|                | Ps: $4.25 + 0.75 \times n$  | T also reminds P that any problem in context must be  |
|                | T: Now answer Question (a).  P <sub>4</sub> (at BB): 0.75  ×7                                       | answered by a complete sentence.  |
|                | 5.25  |   |
|                | 4.25<br>+ 5.25  |   |
|                | 9.50<br>He charges £9.50  |   |
|                |   |   |
|                | 17 mins   |   |

| <b>Y8</b> | UNIT 4 Rounding and Estimating Lesson Plan 5   | Problems in Context  |
|-----------|--|--|
| Activity  |  | Notes  |
| 3         | Problems in context - individual work  PB 4.4, Q5 (b) $(12 + 0.14 \times 82 = 23.48)$ Prakesh is paid £23.48)  | Individual work, monitored, helped. Checking at BB: volunteer P  |
|           | <b>PB 4.4, Q7</b> $(10 - (1.50 + 2.45 + 0.80) = 5.25$ Joanne should get £5.25 change)  | dictates (T writes on BB) expression written as answer  → agreement, feedback, self- correction, praising. Process repeated for second task. |
| 4         | Problems in context - mental work  |  |
| -         | T: See if you can work this out in your head.  | Mental work (slower Ps can use   |
|           | T (reads aloud):   | their Ex.Bs.) T says/reads out the first task  |
|           | (a) Liam buys 40 boxes of chocolates, costing £1.29 each. What is the total cost?  | slowly, waits for Ps to think,<br>asks for the calculation that wil<br>lead to the solution, waits for                                       |
|           | $P_1$ : £1.29 × 40<br>$P_2$ : £51.60<br>$P_3$ : 1.30 × 40 - 0.01 × 40  | thinking, then asks the results and the quickest way to get it.  |
|           | (b) How many bottles, each with a capacity of 0.7 litres are needed to store 7.5 litres of liquid?   | Continue in the same way for (b) and (c).  |
|           | P <sub>1</sub> : $7.5 \div 0.7$ P <sub>2</sub> : 11 P <sub>3</sub> : $0.7 \times 10 = 7$ , plus 1 for the remaining half a litre.  8 bottles are needed.   |  |
|           | (c) A book costs £13.40. How many books can you buy with £280?   |  |
|           | $P_1$ : 280 ÷ 13.4   |  |
|           | $P_2$ : 20<br>$P_3$ : 14 × 20 = 280  | Praising. (T should also praise  |
|           | $13.4 \times 20 = 268$ . The remaining £12 is not enough for another book, so you can buy 20 books.  | those Ps who needed to write to find the solution.)  |
|           | 36 mins  |  |
| 5         | Using brackets when solving problems in context  T: Now you can use your Ex.Bs. Read the question carefully, and then write down an expression which will give the solution. See if you can find a quick method! | Whole class activity.  Task appears on OHP.  Ps discuss the problem togethe  |
|           | Margaret buys 3 balls for her grandchildren, costing £4.68 each. She pays for them with three £5 notes.  How much change should she have?  | and suggest an appropriate expression. Then T asks Ps to use brackets to make the calculation easier.  |
|           | $P_1$ (writes on BB): $5 \times 3 - 4.68 \times 3$   | Praising.  |
|           | $P_2$ (writes on BB): = $(5 - 4.68) \times 3 = 0.32 \times 3 = 0.96$<br>Margaret should have 96p change.   |  |
|           | 41 mins  |  |

| <b>Y8</b> | UNIT 4 Rounding and Estimating Lesson Plan 5  | Problems in Context  |
|-----------|---|--|
| Activity  |   | Notes  |
| 6         | Individual work   |  |
|           | Jim has two rectangular gardens, one has sides of length 38 m and 34.7 m, the other with sides of length 65.3 m and 38 m.  What is the total area, in m <sup>2</sup> , of Jim's gardens?      | Task appears on OHP. Quick-fire individual work. T monitors work and helps slower Ps to write down expression which gives the            |
|           | P <sub>1</sub> : $A = 38 \times 34.7 + 65.3 \times 38 \text{ (m}^2\text{)}$ (T writes on BB.)   | solution. Ps using brackets will find the  |
|           | <ul> <li>T (to the Ps who are not objecting): Why do you think the other are disagreeing with this?</li> <li>P<sub>2</sub>: Because they enjoy multiplying.</li> <li>T: Don't you?</li> </ul> | answer quickly. After two or three minutes, T stops the work and asks for the expressions Ps have written in Ex.Bs.  Discussion follows. |
|           | P <sub>2</sub> : No! T: Is there another way we can find the answer?  |  |
|           | P <sub>2</sub> : Using brackets(writes on BB):<br>= $(34.7 + 65.3) \times 38 = 100 \times 38 = 3800 \text{ m}^2$  | Agreement, completing solution. Feedback. Praising.  |
|           | 45 mins   |  |
|           | Set homework PB 4.4, Q3 PB 4.4, Q6 PB 4.4, Q8 PB 4.4, Q10   |  |
|           |   |  |
|           |   |  |
|           |   |  |
|           |   |  |
|           |   |  |
|           |   |  |

| <b>Y8</b>   | UNIT 4 Rounding and Estimating Lesson Plan 6  | Rounding and Estimating 1  |
|-------------|---|--|
| Activity    |   | Notes  |
| 1           | Checking homework  PB 4.4, Q3 Expression: 6.99 × 30  PB 4.4, Q6 " 110 ÷ 17  PB 4.4, Q8 " 3.25 + 0.40 × 25   | T has asked one of Ps to write<br>on BB just the expressions they<br>wrote down when doing the<br>homework.  |
|             | PB 4.4, Q10 " $20 \times 3 - 8.99 \times 6$ P (Q3): = $7 \times 30 - 0.01 \times 30 = 209.70$ P (Q6): $6 + 1 = 7$ P (Q8): £13.25 P (Q10): = $10 \times 6 - 8.99 \times 6 = (10 - 8.99) \times 6 = 6.06$   | After agreement and self-correction, T asks the results and the quickest way to get them, for Q3 and Q10.  If Ps have not found a quick way for Q10, T can lead them to it with, for example, the question, "Will it matter if Alison pays with six £10 notes instead of three £20 notes?"  Agreement, self-correction.  Praising. |
| 2           | Estimating and rounding  T: A book costs £13.40. How many books can you buy with £280?  Is this calculation familiar to you? In the last lesson we said that  14 × 20 = 280, so we know that we can buy 20 books. After  calculating 13.4 × 20, we realised that there was not enough left to buy another book.  What were we doing when we used 14 instead of 13.4?  Ps: We were estimating.  T: Was this a rounding?  Ps: Yes, but it was incorrect.  T: Was it useful?  Ps: Yes.  T: What did we do?  Ps: We overestimated the price of a book to ensure that we could buy 20 of them.  T: Now we'll round correctly. Can you remember how we do it? | A short discussion about estimating and rounding.  |
|             | Let's see  (a) Round each of the following numbers to the nearest hundred:  T: 319  Ps 300  471  500  800  800  56  100  41  0  3462  3500  T: What have you done?  P <sub>1</sub> : We had to decide which hundred was nearest to each of the numbers.  P <sub>2</sub> : The digit of the hundred in the number remained unchanged if the tens digit was 0, 1, 2, 3 or 4. Otherwise, it was rounded up.  | Mental work (revision) with all Ps contributing. First, volunteer Ps answer the questions, then, after recalling the rule of rounding (with discussion), T points to Ps to answer.   |
| (continued) |   |  |

| <b>Y8</b>   | UNIT 4 Rounding an Estimating  | Lesson Plan 6             | Rounding and Estimating 1                       |
|-------------|--|---------------------------|---|
| Activity    |  |                           | Notes   |
| 2           | T: Is 600 nearer to 550 than to 500?   |                           |   |
| (continued) | Ps: No.  |                           |   |
| (commueu)   | T: So, why do we round it up to 600?   |                           |   |
|             | Ps: There is a convention that this is done  | 2.                        |   |
|             | T: And what about when we estimate? Should 550 be 500 or 600?  Ps: We leave it as 550. |                           |   |
|             |  |                           |   |
|             | T: 549 Ps  | s: 500                    |   |
|             | T: And when we estimate?   |                           |   |
|             | Ps: We can count it as 500.  |                           |   |
|             | T: Do you think that's right? We'll look   | at it.                    |   |
|             | (b) Round each of the following numbers  | s to the nearest tenth:   |   |
|             | T: 4.83  | s: 4.8                    |   |
|             | 0.071  | 0.1                       |   |
|             | 28.65  | 28.7                      |   |
|             | 6.8  | 6.8                       |   |
|             | 1.02   | 1.0                       |   |
|             | 9.95   | 10.0                      |   |
|             | T: What do we say that we have done he   | ere?                      |   |
|             | P: Written the number correct to 1 decin   | nal place.                |   |
|             | (c) Round each of the following numbers  | s to the nearest metre:   |   |
|             | -  | s: 4 m                    |   |
|             | 4.2 m  | 4 m                       |   |
|             | 180 cm   | 2 m                       |   |
|             | 850 cm   | 9 m                       |   |
|             | 2126 mm  | 2 m                       |   |
|             | 3200 cm  | 32 m                      | Agreement. Praising.                            |
|             |  | 18 mins                   | 6   |
| 3           | Rounding   | 10                        | Individual work, monitored,                     |
| 3           | _  | (d) 4 (e) 33 (f) 19       | helped.   |
|             | <b>PB 4.5, Q4</b> (a) 4.26 (b) 0.05  | (c) 10.84                 | Verbal checking with reasons                    |
|             | (d) 82.06 (e) 3.45   | (f) 9.40                  | given for answers.                              |
|             |  |                           | Agreement, self-correction, feedback. Praising. |
|             |  | 26 mins                   | reedback. Fraising.                             |
| 4           | Further practice with rounding   |                           |   |
|             | T: Now I'll give instructions, and you ca  | n write down the answers. | Individual work, led by T.                      |
|             | - Write down the number 6452.  |                           | T gives instruction, waits for Ps               |
|             | - Round it to the nearest 10.  |                           | to write solution (monitors Ps'                 |
|             |  |                           | work), then gives the next instruction.         |
|             | - Round the number you have just v   |                           | msu ucuon.                                      |
|             | - Round this number to the nearest   | 1000.                     |   |
|             | - Write down 6452 again.   |                           |   |
|             | - Round it to the nearest 1000.  |                           |   |
| (continued) | T: What do you notice?   |                           |   |
| (commuea)   |  |                           |   |

| <b>Y8</b>        | UNIT 4 Rounding and Estimating Lesson Plan  | Rounding and Estimating 1  |
|------------------|---|--|
| Activity         |   | Notes  |
| 4<br>(continued) | Solution<br>$6452 \approx 6450$ (to nearest 10)<br>$6450 \approx 6500$ (to nearest 100)<br>$6500 \approx 7000$ (to nearest 1000)<br>$6452 \approx 6000$ (to nearest 1000)   | Checking: solution appears on OHP.  Then T and Ps discuss the difference in the last two results, and Ps realise that rounding step-by-step can give the wrong answer.   |
| 5A               | Correct to 'decimal places' and 'significant figures'  OS 4.6  T: 3.35 → 3.4 correct to 1 decimal place.  4.721 → 5 correct to 1 significant figure.  Ps: 360.25 → 360.3 correct to 1 decimal place.  | Whole class activity.  Task I appears on OHP.  T introduces the concept of 'significant figures', contrasts it with 'correct to decimal places'.  After the first two rows, Ps are asked (helped by T) to explain and complete the table.  Helping, agreement, praising.   |
| 5B               | Further practice           Questions         Solutions           T: 302 to 1 s.f.         ps: 300           302 to 2.s.f.         300, the first 0 is s.f.           0.053 to 1 d.p.         0.1           0.055 to 1 s.f.         0.05, the 5 is the first s.f.           4.604 to 3 s.f.         4.60, the 0 is s.f.           4.605 to 3 s.f.         4.61 | Whole class activity continues. After completing OS 4.6, T checks that Ps have understood the concept by giving further questions (on BB) for them to answer, concentrating on the role of zeros when stating numbers correct to significant figures. Agreement, praising. |
| 6                | Individual practice PB 4.5, Q5 (a) 1.5 (c) 3.2 (d) 11 (e) 140  45 mins  | Individual work, monitored, helped. Checking at BB with explanations from Ps. Agreement, feedback, self-correction. Praising.  |
|                  | Set homework PB 4.6, Q7 PB 4.6, Q8  |  |

| Checking homework  PB 4.5, Q7  147.52 → 147.5 to 4 s.f.   | <b>78</b> | UNIT 4  | Rounding and<br>Estimating   | Lesson Plan 7              | Rounding and<br>Estimating 2  |
|---|-----------|---|--|----------------------------|---|
| IA PB 4.5, Q7  147.52 → 147.5 to 4 s.f.   | ctivity   |   |  |                            | Notes   |
| PB 4.5, Q8  104.735 → 105 to the nearest whole number   |           | PB 4.5, Q7  | $\rightarrow 147.5 \text{ to } 4 \text{ s.f.}$ $\rightarrow 148 \text{ to } 3 \text{ s.f.}$ $\rightarrow 150 \text{ to } 2 \text{ s.f.}$   |                            | T asks Ps, P answers, T writes<br>on BB, others agree or suggest<br>correction, reviewing the<br>concept of significant figures.<br>Feedback, self-correction.<br>Praising. |
| Mental work PB 4.5, Q10    No.   Statement  | 1B I      | · -   |  |                            | Similar method of checking for Q8, comparing correction to decimal places and significant figures at the same time. Feedback, self-correction. Praising.                    |
| PB 4.5, Q10  No. Statement  0.047   |           |   | 5 i  | mins                       |   |
| No.Statement $0.047$ 2 s.f. $0.003$ 3 d.p. $16.22$ 2 d.p. $184\ 200$ 4 s.f. $7.06$ 3 s.f. $10\ mins$ Practice with roundingT: Let's look the two short problems in this question, and use what we now know about rounding.Jimmy and Robert go to a café.<br>Jimmy buys: Pie £0.90<br>Pasty £0.81<br>Burger £1.20Whole class active now have the control of the problems of the control |           |   |  |                            | Mental work to warm up, and to<br>check that Ps who made<br>mistakes in their homework<br>have now fully understood the   |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |           | No.   | Statement  |                            |   |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$   |           | 0.047   | 2 s.f.   |                            | Table appears on OHP, T asks  |
| 16.22   |           | 0.003   | 3 d.p.   |                            | Ps to make the corrections.   |
| 7.06  3 s.f.  Practice with rounding  T: Let's look the two short problems in this question, and use what we now know about rounding.  Jimmy and Robert go to a café.  Jimmy buys: Pie £0.90  Pasty £0.81  Burger £1.20  Robert buys: Chips £0.85  Sausage £0.50  Drink £0.52  Both of them estimate the total cost of their purchases by rounding the price of each item to the nearest £1,  Compare their estimates with the final totals.  T: We'll look at Jimmy's items first. $P_1$ : $0.90 \rightarrow 1$ $P_2$ : $0.81 \rightarrow 1$   |           |   | 2 d.p.   |                            | slower Ps (see above) to correct  |
| T: Let's look the two short problems in this question, and use what we now know about rounding.  Jimmy and Robert go to a café.  Jimmy buys: Pie £0.90  Pasty £0.81  Burger £1.20  Robert buys: Chips £0.85  Sausage £0.50  Drink £0.52  Both of them estimate the total cost of their purchases by rounding the price of each item to the nearest £1,  Compare their estimates with the final totals.  T: We'll look at Jimmy's items first. $P_1$ : $0.90 \rightarrow 1$ $P_2$ : $0.81 \rightarrow 1$   |           |   |  |                            | Explanations, agreement. Praising.  |
|   |           | <ul> <li>Γ: Let's look the we now know all Jimmy and Formular Jimme</li> <li>Robe</li> <li>Both of their rounding the Compare the Compare the P₁: 0.90 → 1</li> </ul> | e two short problems in this obout rounding.  Robert go to a café.  Ly buys: Pie £0.90  Pasty £0.81  Burger £1.20  In the buys: Chips £0.85  Sausage £0.50  Drink £0.52  In estimate the total cost of the price of each item to the near eir estimates with the final total cost. | eir purchases by arest £1, | Whole class activity.  Discussion about how to make a sensible estimate.  Task appears on OHP.  One of Ps is asked to read it out clearly, then                             |
| $\begin{array}{c} P_3: 1.20 \rightarrow 1 \\ T: \text{ What was his estimate?} \\ Ps: £3 \end{array}$   | I         | $P_3$ : 1.20 $\rightarrow$ 1<br>T: What was hi  | s estimate?  |                            |   |

| <b>Y8</b>     | UNIT 4 Rounding and Estimating Lesson Plan 7  | Rounding and<br>Estimating 2  |
|---------------|---|---|
| Activity      |   | Notes   |
| 3 (continued) | T: How much did he actually pay? $P_4$ (at BB or aloud): $0.90$ $0.81$ $\frac{+1.20}{2.91}$ T: Was it a good estimate?  Ps: Yes.  T: Now for Robert's bill. $P_5$ : $0.85 \rightarrow 1$ $P_6$ : $0.50 \rightarrow 1$ $P_7$ : $0.52 \rightarrow 1$ Ps: £3 in total. $P_4$ (at BB or aloud): $0.85$ $0.50$ $\frac{+0.52}{1.87}$ T: This is quite a way from the estimate, isn't it? Why is it so different?  T: $0.85$ $0.50$ $0.50$ $0.50$ $0.52$ $0.50$ Ps: £2 is much closer to the actual total. | T and Ps discuss how they could arrive at a more accurate estimate and agree that rounding to the nearest 50p would be better here.  Rounding, agreeing, praising.  |
| 4             | Individual practice with rounding Activity 4.3  | Whole class activity, monitored, helped.  Each P has a copy of Activity 4.3. Ps who finish the estimate can go on to the Extension.  Verbal checking of the till listing estimate: T points to Ps to give the next rounding, other Ps check/correct. Agreeing the estimate, feedback, praising.  Then a volunteer stronger/faster P gives the result of rounding to nearest 50p.  Agreement, feedback, self-correction. Praising. |
| 5             | More complicated estimations  T: Now we're going to estimate the result of more complicated   | Whole class activity, mental work wherever possible.  |
|               | expressions.  | Task appears on OHP.  |
| (continued)   | OS 4.8, Rows 1-4  | Slower Ps are encouraged to come to OS and give estimates for the easier parts, stronger Ps do the more difficult ones.   |

| <b>Y8</b>   | UNIT 4 Rounding and Estimating Lesson Plan 7   | Rounding and Estimating 2  |
|-------------|--|--|
| Activity    |  | Notes  |
| 5           | $P_1$ : $7 \times 4 = 28$ Ps: 29.2, correct  | After each estimate, all Ps use  |
| (continued) | $P_2$ : $\frac{8 \times 10}{2} = 40$ 37.5, correct   | their calculators, agree the result correct to 3 s.f. (T writes it on OS) and decide if the  |
|             | $P_3$ : $\frac{3+8}{10-5} = \frac{11}{5} = 2.2$ 2.35, correct  | estimate was accurate enough.  |
|             | $P_4$ : $\frac{10 \times 7}{4+4} = \frac{70}{8} = 8.75$ 9.16, correct  |  |
|             | T: Let's look at the last of these, and change the final number by 1 tenth (writes on BB):   | After checking P <sub>4</sub> 's estimate, T starts a discussion.  |
|             | $\frac{9.8 \times 7.4}{3.5 + 4.52}$  |  |
|             | $P_5$ (at BB): $\frac{10 \times 7}{4+5} = \frac{70}{9} \approx 7.78$   |  |
|             | Ps: The result is 9.04, correct to 3 s.f. The estimate is not close.  T: What was the mistake?  (Numbers should have been rounded to the nearest 0.5, or the sum in the denominator should have been rounded 'as a sum'  i.e. $3.5 + 4.53 \approx 8$ , $\frac{70}{8} = 8.75$ ) |  |
|             | 8 39 mins  |  |
| 6           | Individual work with estimations  PB 4.6, Q1 (a) Estimate: $5 \times 8 = 40$ Calculator: 39.2  PB 4.6, Q6 (b) Estimate: $\frac{7+9}{2} = 8$ Calculator: 7.13  (c) Estimate: $\frac{60 \times 20}{30} = 40$ Calculator: 38.2  | Individual work, monitored, helped. OS 4.8 remains on OHP, and stronger Ps are asked to find an accurate method of estimation, when they have finished the set PB questions. Checking: solution appears on |
|             | (all to 3 s.f.)  | OHP or T writes it quickly on BB. Self-correction, feedback. Praising. Then T asks if anyone can find  |
|             | For stronger Ps, when they have completed the questions: OS 4.8, row 5.  | a sensible estimate for the extr<br>question. If no response, T lear<br>Ps to it.<br>Praising.   |
|             | With the product of $116 \times 3461$ in the numerator and the difference of $984 - 623$ in the denominator, an estimate of $\frac{100 \times 3500}{350}$ seems  |  |
|             | sensible.  45 mins   |  |
|             | Set homework   |  |
|             | PB 4.6, Q1 (b)   |  |
|             | PB 4.6, Q3   |  |
|             | PB 4.6, Q6 (a), (e)  | Scientific calculators will be needed for the next lesson.   |

| UNIT 4 Rounding and Les  | son Plan 8 Calculator Logic  |
|--|--|
|  | Notes  |
| <b>PB 4.6, Q3</b> Estimate: $4 \times 5 = 20$ Calcul   | T has asked one of Ps to write down estimation method, estimate and the result correct to 3 significant figures on BB for each task as soon as P arrives.  |
| (e) Estimate: $\frac{140 - 90}{20} = 2.5$ Calcul   | Agreement/correction. Feedback, self-correction. Praising. Discussion:  - why do we round to the nearest whole number in   |
| 5 mins   | Q6 (a) and to 10 in (e)?  - would the product of 3.5 × 5 be a more accurate estimate for 3.61 × 4.72 ?   |
|  | Mental work.   |
| PB 4.6, Q5  (A, B, D and E  e.g: T: Let's look at Kyle's first calculation (waits for the second content of the second content o | Task appears on OHP with only question A uncovered at first, and other questions shown when appropriate.  Tasks give Ps time to think  |
| 12 mins  | of estimation, e.g. rounding the members of an expression to the same significant figure and not to the same decimal place (see 82.3 × 0.625, where the 80×0.6 estimation may seem the most sensible).  Agreement. Praising.   |
| Using scientific calculators  T: Kyle has made lots of incorrect calculations, has know how to use your calculator?  Now you will not be able just to write down the f   | calculator for this lesson.  T writes Worked Example 1 on  BR and asks Ps for a solution. T  |
|  | Checking homework:  PB 4.6, Q1 (b) Estimate: 10 × 20 = 200 Calculation  PB 4.6, Q3 Estimate: 4 × 5 = 20 Calculation  PB 4.6, Q6 (a) Estimate: 6 × 3/4 = 4.5 Calculation  (e) Estimate: 140 - 90/20 = 2.5 Calculation  [all standard of the sta |

| <b>Y8</b> | UNIT 4 Rounding and Estimating Lesson Plan 8  | Calculator Logic   |
|-----------|---|--|
| Activity  |   | Notes  |
| 4         | Practice using scientific calculators  PB 4.7, Q1 (a) 45.9 (d) 5.57 (2 d.p.) (e) 1.08 (2 d.p.) (using bracket keys)  PB 4.7, Q2 (a) 0.509 (3 s.f.) (d) 0.155 (3 s.f.) (using memory keys) | Whole class activity.  T asks Ps, volunteer P suggests solution, T waits for others to agree or correct. Then all Ps use their calculators to get an answer. |
|           | 27 mins   | Compare final results: feedback  → correcting, praising.   |
|           |   |  |
| 5         | Step-by-step calculations   | Individual work, monitored,  |
|           | PB 4.7, Q1 (b), (c) (b) 6.27 (2 d.p.) (c) 7.67 (2 d.p.)   | helped.  |
|           | PB 4.7, Q2 (b), (c) (b) 0.522 (3 s.f.) (c) 3.05 (3 s.f.)  | Ps have to write down just the results.  |
|           | e.g. for Q1 (b)   | When checking, T asks Ps how   |
|           | Proceethe following keyes   | they got their answers and Ps  |
|           | Press the following keys:<br>two - multiplication - four - seven - division -   | dictate (T writes on BB, Ps in   |
|           | bracket - six - addition - nine - bracket.  | Ex.Bs) a set of instructions for each calculation.   |
|           | 36 mins   |  |
| 6         | Revision of significant figures and estimation M 4.2, extended with Q7:   | Mental work; with T making Parevise the new topics.  |
|           | Q7. Give an estimate for the following expressions:  (a) 13.237 + 26.89  (b) 0.341 × 0.415  | T asks/reads out questions from M 4.2; Extension question appears on OHP. T points to P,   |
|           | (c) 8.24 ÷ 0.21   | P answers, T agrees/waits for correction and praises, question   |
|           | (d) $(12.12 + 28.3) \times 1.5$   | by question.   |
|           | Solution of Q7:   | · ·  |
|           | (a) $13 + 27 = 40$  |  |
|           | (b) $0.3 \times 0.4 = 0.12$<br>(c) $8 \div 0.2 = 40$  |  |
|           | • •   |  |
|           | (d) $(12 + 28) \times 1.5 = 40 \times 1.5 = 60$   |  |
|           | 45 mins   |  |
|           | Set homework  |  |
|           | Give two sets of instructions, using bracket keys and memory keys, for carrying out each of the following calculations using a calculator:  |  |
|           | PB 4.7, Q1 (f)  |  |
|           | PB 4.7, Q3 (a), (b)   |  |
|           |   |  |
|           |   |  |
|           |   |  |
|           |   |  |
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|           |   |  |