

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 1</p>	<p><i>Revision: Whole Numbers and Decimals</i></p>
<p><i>Activity</i></p>	<p><b>1</b></p> <p><b>Introduction</b></p> <p>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.</p> <p>T: Let's start with some mental work.</p> <p><b>PB 4.1, Q1</b> ( (a) 29 (b) 46 (c) 79 (d) 174 (e) 349 (f) 557 )</p> <p><b>PB 4.1, Q3</b> ( (a) 12 (b) 44 (c) 51 (d) 15 (e) 219 (f) 551 )</p> <p>extended with questions:</p> $5 - 8 = (-3) \quad 21 - 37 = (-16) \quad 38 - 61 = (-23)$ <p><b>PB 4.2, Q1 (a) - (c)</b> ((a) 7.7 (b) 48.7 (c) 5.3 )</p> <p><b>PB 4.2, Q2 (a) - (c)</b> ((a) 4.3 (b) 14.2 (c) 2.4 )</p> <p>extended with questions:</p> $0.5 - 0.9 = (-0.4) \quad 1.7 - 3.8 = (-2.1)$ <p style="text-align: right;">8 mins</p>	<p><b>Notes</b></p> <p>A whole lesson of revision; mental work or writing on BB and in Ex.Bs, with plenty of discussion and with no individual work.</p> <p>Mental warm-up activity with all Ps contributing. T asks Ps question by question, encouraging slower Ps.</p> <p>Agreement. Praising.</p>
<p><b>2</b></p>	<p><b>Addition and subtraction</b></p> <p>Now you've warmed up, let's work with some less straightforward numbers.</p> <p><b>PB 4.1, Q2 (f)</b> (1112)</p> <p><b>PB 4.1, Q4 (d), (f)</b> ( (d) 188 (f) 3452 )</p> <p><b>PB 4.2, Q1 (e)</b> (19.02)</p> <p><b>PB 4.2, Q2 (e), (f)</b> ( (e) 6.28 (f) 2.03 )</p> <p>P<sub>4</sub>: <math display="block">\begin{array}{r} 18.6 \\ + 0.42 \\ \hline 19.02 \end{array}</math></p> <p>We have to make sure that the same place values are in the same column, with decimal points also lining up in the answer.</p> <p>P<sub>6</sub>: <math display="block">\begin{array}{r} 8.3 \\ - 6.27 \\ \hline \end{array}</math> we can write: <math display="block">\begin{array}{r} 8.30 \\ - 6.27 \\ \hline 2.03 \end{array}</math></p> <p style="text-align: right;">14 mins</p>	<p>Whole class activity.</p> <p>T calls volunteer/encouraged slower Ps to come to front to give solutions and explain if necessary.</p> <p>Other Ps write in Ex.Bs, stronger ones can do the calculations in their heads and write down only the answers.</p> <p>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> <p>T monitors discussion, ensures orderly, precisely spoken mathematics; agrees and praises.</p>
<p><b>3</b></p>	<p><b>Multiplication and division</b></p> <p>T: Let's look at multiplication and division by whole numbers.</p> <p><b>PB 4.1, Q5</b> ( (a) 36 (b) 55 (c) 46 ) ( (d) 93 (e) 88 (f) 606 )</p> <p><b>PB 4.1, Q8 (a) - (c)</b> ( (a) 34 (b) 16 (c) 41 )</p> <p><b>PB 4.2, Q3 (a), (b)</b> ( (a) 8.6 (b) 14 )</p> <p><b>PB 4.2, Q4 (a)</b> ( (a) 3.4 )</p> <p style="text-align: right;">20 mins</p>	<p>Mental work, but slower Ps can use Ex.Bs if helpful. If necessary, T can put some questions (multiplication and division) from multiplication tables up to 10×10 for the weakest, before starting on PB 4.1, Q5.</p> <p>Praising.</p>

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<p><b>Activity</b></p>	<p><b>Multiplying and dividing by powers of 10</b></p> <p>T: I expect you can remember how to multiply and divide with larger numbers.</p> <table border="0"> <tr> <td><math>8 \times 10</math></td> <td>(80)</td> <td><math>8 \times 100</math></td> <td>(800)</td> </tr> <tr> <td><math>8 \times 1000</math></td> <td>(8000)</td> <td><math>80 \times 10</math></td> <td>(800)</td> </tr> <tr> <td><math>63 \times 10</math></td> <td>(630)</td> <td><math>63 \times 100</math></td> <td>(6300)</td> </tr> <tr> <td><math>630 \times 100</math></td> <td>(63 000)</td> <td><math>3 \times 20</math></td> <td>(60)</td> </tr> <tr> <td><math>3 \times 200</math></td> <td>(600)</td> <td><math>37 \times 2000</math></td> <td>(74 000)</td> </tr> </table> <p>P: <i>When multiplying by powers of 10, each digit is moved 1, 2, 3, ... places to the left to take a higher value, and the missing digits are replaced with zeros.</i></p> <table border="0"> <tr> <td><math>6000 \div 10</math></td> <td>(600)</td> <td><math>60\,000 \div 100</math></td> <td>(600)</td> </tr> <tr> <td><math>6000 \div 1000</math></td> <td>(6)</td> <td><math>4600 \div 100</math></td> <td>(46)</td> </tr> <tr> <td><math>800 \div 20</math></td> <td>(40)</td> <td><math>1200 \div 200</math></td> <td>(6)</td> </tr> </table> <p>P: <i>When dividing by powers of 10, each digit is moved 1, 2, 3, ... places to the right to take a lower value.</i></p> <p><b>4B Practice multiplying and dividing by powers of 10 - spoken</b></p> <p>T: <span style="border: 1px solid black; padding: 5px; display: inline-block;">There is something unusual about the natives of Planet X. The number of their teeth increases proportionally with their age. For example, if an X-ian has 4 teeth at the age of 1, they will have 8 teeth at the age of 2, 12 teeth at the age of 3, and so on.</span></p> <p>How many teeth will an X-ian have at the age of:</p> <table border="0"> <tr> <td>T: 10</td> <td>Ps: 40</td> </tr> <tr> <td>100</td> <td>400</td> </tr> <tr> <td>1000</td> <td>4000</td> </tr> </table> <p>T: Fine! Another X-ian is 100 years old now, and has 1400 teeth. How many teeth did he have at the age of:</p> <table border="0"> <tr> <td>10</td> <td>Ps: 140</td> </tr> <tr> <td>1</td> <td>14</td> </tr> </table> <p>T: Well done! Let's look at another example. This X-ian was especially unusual - she had only 0.06 teeth at the age of 1. How many teeth will she have at the age of:</p> <table border="0"> <tr> <td>T: 10</td> <td>Ps: 0.6</td> </tr> <tr> <td>100</td> <td>6</td> </tr> <tr> <td>1000</td> <td>60</td> </tr> </table> <p><b>4C Practice multiplying and dividing by powers of ten - written</b></p> <p>T: Now write these calculations in your Ex.Bs and write down the solutions.</p> <table border="0"> <tr> <td><math>730 \times 100</math></td> <td>(73 000)</td> <td><math>0.7 \times 100</math></td> <td>(70)</td> </tr> <tr> <td><math>3.4 \times 1000</math></td> <td>(3400)</td> <td><math>9 \div 10</math></td> <td>(0.9)</td> </tr> <tr> <td><math>5.4 \div 10</math></td> <td>(0.54)</td> <td><math>71 \div 1000</math></td> <td>(0.071)</td> </tr> <tr> <td><math>780 \div 100</math></td> <td>(7.8)</td> <td><math>475.2 \div 100</math></td> <td>(4.752)</td> </tr> </table>	$8 \times 10$	(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)	$6000 \div 10$	(600)	$60\,000 \div 100$	(600)	$6000 \div 1000$	(6)	$4600 \div 100$	(46)	$800 \div 20$	(40)	$1200 \div 200$	(6)	T: 10	Ps: 40	100	400	1000	4000	10	Ps: 140	1	14	T: 10	Ps: 0.6	100	6	1000	60	$730 \times 100$	(73 000)	$0.7 \times 100$	(70)	$3.4 \times 1000$	(3400)	$9 \div 10$	(0.9)	$5.4 \div 10$	(0.54)	$71 \div 1000$	(0.071)	$780 \div 100$	(7.8)	$475.2 \div 100$	(4.752)	<p><b>Notes</b></p> <p>Mental work. Asking, agreeing, praising, question-by-question.</p> <p>Light-hearted example using calculations in context (!).</p> <p>T writes tasks on BB, Ps volunteer, answer, T agrees (or not), writes correct answers on BB, Ps write in Ex.Bs.</p>
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32 mins

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 1</p>	<p><i>Revision: Whole Numbers and Decimals</i></p>
<p><i>Activity</i></p>	<p><b>Revision: long multiplication with whole numbers</b>                      T: We've met many methods of multiplying numbers. The most important of them is long multiplication. Who'd like to show us how to do it?                      P<sub>1</sub>: <math>34 \times 26</math>                      P<sub>2</sub>: <math>34 \times 260</math>                      P<sub>3</sub>: <math>34 \times 206</math>  <math display="block">\begin{array}{r} 34 \\ \times 26 \\ \hline 680 \\ 204 \\ \hline 884 \end{array}</math> <math display="block">\begin{array}{r} 260 \\ \times 34 \\ \hline 7800 \\ 1040 \\ \hline 8840 \end{array}</math> <math display="block">\begin{array}{r} 206 \\ \times 34 \\ \hline 6180 \\ 824 \\ \hline 7004 \end{array}</math> </p> <p><b>Revision: long multiplication with decimals</b>                      T: And what about decimals?                      P<sub>1</sub>: <math>52 \times 6.5</math>                      P<sub>2</sub>: <math>5.2 \times 6.5</math>                      P<sub>3</sub>: <math>5.2 \times 0.065</math>  <math display="block">\begin{array}{r} 65 \\ \times 52 \\ \hline 3250 \\ 130 \\ \hline 3380 \end{array}</math> <math display="block">\begin{array}{r} 65 \\ \times 52 \\ \hline 3250 \\ 130 \\ \hline 3380 \end{array}</math> <math display="block">\begin{array}{r} 65 \\ \times 52 \\ \hline 3250 \\ 130 \\ \hline 3380 \end{array}</math>  <math>52 \times 6.5 = 338</math>                      <math>5.2 \times 6.5 = 33.8</math>                      <math>5.2 \times 0.065 = 0.338</math>                      P<sub>4</sub>: We count off as many decimal places in the product as there were in total in the factors.  <p style="text-align: right;">38 mins</p> </p>	<p><i>Notes</i></p> <p>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.</p> <p>Another three volunteers come to show how to work with decimals. Other Ps agree/correct, write in Ex.Bs.</p> <p>One of the volunteers is asked to draw up the rule. Praising.</p>
<p><b>6</b></p>	<p><b>Division</b></p> <p>(1) PB 4.1, Q8 (f)                      <math>1407 \div 7 = 201</math>                      (2) PB 4.2, Q4 (c)                      <math>52.4 \div 4 = 13.1</math>                      (3) 198 <math>\div</math> 12                              <math>198 \div 12 = 16.5</math>                      (4) PB 4.2, Q7 (f)                      <math>0.84 \div 0.4 = 8.4 \div 4 = 2.1</math></p> <p style="text-align: right;">45 mins</p>	<p>Whole class activity. T writes tasks on BB, Ps volunteer. In turn, at BB,</p> <ul style="list-style-type: none"> <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> </ul> <p>Other Ps listen attentively and write in Ex.Bs. T agrees. Praises.</p>
	<p><b>Set homework</b>                      PB 4.1, Q10 (b) - (e)                      PB 4.1, Q9 (f)                      PB 4.2, Q1 (f)                      PB 4.2, Q8 (a) - (f)</p>	<p>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.</p>

<h1>Y8</h1>	<h2>UNIT 4 <i>Rounding and Estimating</i> Lesson Plan 2</h2>	<h3>Revision: Fractions</h3>												
<p><b>Activity</b></p> <p><b>1</b></p>	<p><b>Checking homework</b></p> <p><b>PB 4.1, Q10 (b) - (e)</b> (b) 441 (c) 91 (d) 1548 (e) 183</p> <p><b>PB 4.1, Q9 (f)</b> (f) 15</p> <p><b>PB 4.2, Q1 (f)</b> (f) 3.752</p> <p><b>PB 4.2, Q8 (a) - (f)</b> (a) 54 (b) 7.83 (c) 4.34 (d) 0.544 (e) 1.05 (f) 7.437</p> <p style="text-align: right;">5 mins</p>	<p><b>Notes</b></p> <p>T has asked a P to write results on BB when P arrives.</p> <p>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.</p>												
<p><b>2</b></p>	<p><b>Revision test</b></p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left; width: 50%;">Questions</th> <th style="text-align: left; width: 50%;">Solutions</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">                     (1) (a) <math>509 + 67.8</math>                      (b) <math>15.1 - 3.74</math>                      (c) <math>4.2 - 6.2</math>                      (2) (a) <math>50.1 \times 100</math>                      (b) <math>23.8 \div 100</math>                      (c) <math>0.0067 \times 1000</math>                      (3) (a) <math>340 \times 260</math>                      (b) <math>48 \times 0.405</math>                      (c) <math>3.14 \times 1.4</math>                      (4) (a) <math>2106 \div 6</math>                      (b) <math>122 \div 4</math>                      (c) <math>3.63 \div 1.5</math> </td> <td style="border: 1px solid black; padding: 5px;"> <math>= 576.8</math>  <math>= 11.36</math>  <math>= -2</math>  <math>= 5010</math>  <math>= 0.238</math>  <math>= 6.7</math>  <math>= 88400</math>  <math>= 19.44</math>  <math>= 4.396</math>  <math>= 351</math>  <math>= 30.5</math>  <math>= 2.42</math> </td> </tr> </tbody> </table> <p style="text-align: right;">20 mins</p>	Questions	Solutions	(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) $3.63 \div 1.5$	$= 576.8$ $= 11.36$ $= -2$ $= 5010$ $= 0.238$ $= 6.7$ $= 88400$ $= 19.44$ $= 4.396$ $= 351$ $= 30.5$ $= 2.42$	<p>Individual work.</p> <p>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.</p> <p>For checking, T has prepared an OS showing solutions.</p> <p>Feedback will show where there are still weaknesses. (Struggling Ps will be given extra homework according to how they have done in the test.)</p> <p>Self-correction. Praising.</p>								
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<p><b>3</b></p> <p>(continued)</p>	<p><b>Addition and subtraction of fractions</b></p> <p>T: How do you get on with fractions?</p> <p>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.</p> <table border="0" style="width: 100%;"> <tr> <td style="border: 1px solid black; padding: 5px;">                     (a) <math>\frac{4}{9} + \frac{2}{9}</math> </td> <td style="padding: 5px;"> <math>= \frac{6}{9} = \frac{2}{3}</math> </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 5px;"> <i>(We have to add the numerators and leave the denominator as a common one)</i> </td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">                     (b) <math>1\frac{3}{7} - \frac{4}{7}</math> </td> <td style="padding: 5px;"> <math>= \frac{10}{7} - \frac{4}{7} = \frac{6}{7}</math> </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 5px;"> <i>(First we have to convert the mixed number into its improper form)</i> </td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">                     (c) <math>\frac{3}{5} + \frac{3}{4}</math> </td> <td style="padding: 5px;"> <math>= \frac{12}{20} + \frac{15}{20} = \frac{27}{20} = 1\frac{7}{20}</math> </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 5px;"> <i>(First we have to change both fractions to get a common denominator)</i> </td> </tr> </table>	(a) $\frac{4}{9} + \frac{2}{9}$	$= \frac{6}{9} = \frac{2}{3}$	<i>(We have to add the numerators and leave the denominator as a common one)</i>		(b) $1\frac{3}{7} - \frac{4}{7}$	$= \frac{10}{7} - \frac{4}{7} = \frac{6}{7}$	<i>(First we have to convert the mixed number into its improper form)</i>		(c) $\frac{3}{5} + \frac{3}{4}$	$= \frac{12}{20} + \frac{15}{20} = \frac{27}{20} = 1\frac{7}{20}$	<i>(First we have to change both fractions to get a common denominator)</i>		<p>After checking Ps' knowledge about whole numbers and decimals, T carries out a short review on dealing with fractions.</p> <p>There will be further work on this in Unit 9, but reinforcement at this stage is useful.</p> <p>T writes on BB, points to volunteer P (slower ones should be encouraged), agrees and writes correct solution on BB (P dictates).</p> <p>Ps write in Ex.Bs.</p>
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<p><b>Activity</b></p> <p><b>3</b> (continued)</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>(d) <math>\frac{5}{48} - \frac{7}{32}</math></p> </div> <p style="text-align: right;"> <math>48 = 2^4 \times 3</math>  <math>32 = 2^5</math>  <math>LCM = 2^5 \times 3 = 96</math> </p> <p style="text-align: center;"> <math>= \frac{10}{96} - \frac{21}{96} = -\frac{11}{96}</math> </p> <p style="text-align: center;"><i>(The lowest common denominator is the LCM of the two denominators)</i></p> <p style="text-align: right;">_____ 28 mins _____</p>	<p style="text-align: center;"><b>Notes</b></p>
<p><b>4</b> <b>4A</b></p> <p><b>4B</b></p> <p>(continued)</p>	<p><b>Multiplication and division with fractions</b></p> <p><b>Multiplication and division of a fraction by a whole number</b></p> <p>T: Let's review multiplication and division.</p> <p>(a) <math>\frac{4}{9} \times 2 = \frac{8}{9}</math>  <i>(The numerator has to be multiplied, and the denominator is unchanged)</i></p> <p>(b) <math>\frac{2}{11}</math> of 3 <math>= 3 \times \frac{2}{11} = \frac{2}{11} \times 3 = \frac{6}{11}</math></p> <p>(c) <math>1\frac{2}{3} \div 2 = \frac{5}{3} \div 2 = \frac{5}{6}</math>  <i>(The denominator has to be multiplied by the divisor and the numerator is unchanged)</i></p> <p>(d) <math>\frac{4}{5} \div 2 = \frac{4}{10} = \frac{2}{5}</math>  <i>(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)</i></p> <p><b>Multiplication and division of fractions by fractions</b></p> <p>T: Now let's look at the same process with fractions.</p> <p>(a) <math>\frac{5}{3} \times \frac{2}{7} = \frac{10}{21}</math>  <i>(The result will be the quotient of the product of numerators and the product of denominators)</i></p> <p>(b) <math>\frac{7}{6} \times \frac{3}{4} = \frac{7}{2} \times \frac{1}{4} = \frac{7}{8}</math>  <i>(Wherever possible, we can use cancelling)</i></p> <p style="text-align: right;">_____ 37 mins _____</p>	<p>Whole class activity, recalling Ps' knowledge about fractions continues. This topic was covered in the previous school year, so T will probably need to help (especially with the drawing up of the rules).</p> <p>Volunteer Ps dictate, T agrees/ waits for correction, waits for Ps to draw up rules, ensures that the spoken mathematics is correct at all times.</p>

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 2</p>	<p><i>Revision: Fractions</i></p>
<p><b>Activity</b></p> <p><b>4B</b></p>	<p>(c) <math>3 \div \frac{5}{2} = 3 \times \frac{2}{5} = \frac{6}{5}</math></p> <p>(Dividing by the fraction <math>\frac{a}{b}</math> means multiplying by <math>\frac{b}{a}</math>)</p> <p>(d) <math>\frac{6}{5} \div \frac{8}{3}</math></p> <p>wrong <math>\rightarrow = \frac{2}{5} \div \frac{8}{1} = \frac{2}{5} \times \frac{1}{8} = \frac{2}{40} = \frac{1}{20}</math></p> <p>correct <math>\rightarrow = \frac{6}{5} \times \frac{3}{8} = \frac{3}{5} \times \frac{3}{4} = \frac{9}{20}</math></p> <p>(Cancelling just after changing it into a multiplication)</p> <p style="text-align: right;">40 mins</p>	<p><b>Notes</b></p> <p>Praising.</p>
<p><b>5</b></p>	<p><b>Individual practice</b></p> <p><i>Questions</i></p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>(a) <math>1\frac{1}{4} - \frac{5}{6}</math></p> <p>(b) <math>\frac{3}{7}</math> of 4</p> <p>(c) <math>\frac{6}{5} \div 2</math></p> <p>(d) <math>\frac{4}{9} \div \frac{5}{6}</math></p> </div> <p><i>Solutions</i></p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p><math>= \frac{5}{4} - \frac{5}{6} = \frac{15}{12} - \frac{10}{12} = \frac{5}{12}</math></p> <p><math>= \frac{3}{7} \times 4 = \frac{12}{7} = 1\frac{5}{7}</math></p> <p><math>= \frac{6 \div 2}{5} = \frac{3}{5}</math></p> <p><math>= \frac{4}{9} \times \frac{6}{5} = \frac{24}{45} = \frac{8}{15}</math></p> <p>or <math>= \frac{4}{9} \times \frac{6}{5} = \frac{4}{3} \times \frac{2}{5} = \frac{8}{15}</math></p> </div> <p style="text-align: right;">45 mins</p>	<p>Individual work, to check whether or not Ps remember the basic points.</p> <p>Tasks, and then solutions, appear on OHP.</p> <p>T monitors, helps, Ps.</p> <p>Checking: feedback, self-correction. Praising.</p>
	<p><b>Set homework</b></p> <p>(1) <b>Tasks selected from PB 4.1 and PB 4.2, depending on Ps' mistakes in Revision Test (second Activity in this lesson)</b></p> <p>(2) <b>Other tasks with fractions:</b></p> <p>(a) <math>1\frac{1}{2} + 2\frac{1}{4}</math></p> <p>(b) <math>\frac{4}{7} \div 7</math></p> <p>(c) <math>7 \div \frac{4}{7}</math></p> <p>(d) <math>\frac{3}{10} \times \frac{9}{5}</math></p>	





<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 3</p>	<p><i>Negative Numbers and Order of Operations</i></p>
<p><i>Activity</i></p> <p><b>5</b></p>	<p><b>BODMAS</b></p> <p>T: I've noticed that several of you have been making the same mistake. What do you think it was, and why was it wrong?</p> <p>P: I should have multiplied first, before adding.</p> <p>T: What rule should you have applied?</p> <p>P: BODMAS: brackets first, then division, multiplication, addition and subtraction.</p> <p>T: How could we have got your wrong answer, <math>-2.7</math> in the last question?</p> <p>P: Using brackets: <math>(-3 + 2.1) \times 3</math></p> <p>T: Find the solutions and explain the order of operations using BODMAS, in the following tasks:</p> <p>(1) <b>PB 4.3, Q1</b> (b) <math>8 - 3 \times 2 = 8 - 6 = 2</math>                      (d) <math>3 \times 6 - 9 = 18 - 9 = 9</math></p> <p>(2) <b>PB 4.3, Q9</b> (a) <math>8.2 \div 0.2 - 0.1 = 41 - 0.1 = 40.9</math>                      (c) <math>8.2 \times (6 - 5.4) = 8.2 \times 0.6 = 4.92</math></p> <p>(3) (a) <math>\frac{(-4) \times (+9)}{-6} = \frac{-36}{-6} = 6</math>                      (b) <math>(-13 + 7) \div (+3) = -6 \div 3 = -2</math></p> <p>(4) <b>OS 4.2, Q3</b> <math>= 3 + 4 - 24 + 1 = 7 - 25 = -18</math>  <b>OS 4.2, Q4</b> <math>= 6 - 11 \times 6 = 6 - 66 = -60</math></p> <p style="text-align: right;">40 mins</p>	<p><i>Notes</i></p> <p>Whole class activity.</p> <p>T and Ps discuss together the order of operations, and look at its application in some specific tasks.</p> <p>For each question, T writes task on BB, points to P, P gives the first step, with explanation; T then points to another P, P<sub>2</sub> gives the second step and the result.</p> <p>Other Ps correct if necessary, T agrees, praises and writes solution on BB, Ps write it in Ex.Bs.</p>
<p><b>6</b></p>	<p><b>BODMAS: individual practice</b></p> <p><b>OS 4.2, Q1</b> <math>= 11 \times 3 - 4 = 33 - 4 = 29</math></p> <p><b>OS 4.2, Q2</b> <math>= 3 + 21 - 6 = 18</math></p> <p><b>OS 4.2, Q5</b> <math>= 14 \div 7 - 6 \times 2 = 2 - 12 = -10</math></p> <p style="text-align: right;">45 mins</p>	<p>Individual work, monitored, helped.</p> <p>Detailed checking at BB with explanations as to the order.</p> <p>Agreement, feedback, self-correction. Praising.</p>
	<p><b>Set homework</b></p> <p><b>PB 4.3, Q1</b> (c), (e), (h), (i)</p> <p><b>PB 4.3, Q9</b> (d)</p> <p><b>PB 4.3, Q4</b>, (a), (c)</p>	

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 4</p>	<p><i>Using Brackets</i></p>										
<p><b>Activity</b></p> <p><b>1</b></p> <p><b>1A</b></p> <p><b>1B</b></p>	<p><b>Checking homework (with more revision)</b></p> <p><b>PB 4.3, Q1</b> (c) 7 (e) 25 (h) 15 (i) 25</p> <p><b>PB 4.3, Q9</b> (d) 2.06</p> <p><b>PB 4.3, Q4</b> (a), (c)</p> <p><math>P_1: ? \times 3 \rightarrow + 2 \rightarrow 17</math>            So <math>17 - 2 = 15</math>  <math>\rightarrow ? \times 3 = 15</math>  <math>\rightarrow ? = 15 \div 3 = 5</math></p> <p><math>P_2: ? + 4 \rightarrow \times 2 \rightarrow 20</math>            So <math>20 \div 2 = 10</math>  <math>\rightarrow ? + 4 = 10</math>  <math>\rightarrow ? = 10 - 4 = 6</math></p> <p><math>P_3: 3x + 2 = 17</math> <span style="float: right;">(-2)</span>  <math>3x = 15</math> <span style="float: right;">(+3)</span>  <math>x = 5</math></p> <p><math>P_4: (x + 4) \times 2 = 20</math> <span style="float: right;">(+2)</span>  <math>x + 4 = 10</math> <span style="float: right;">(-4)</span>  <math>x = 6</math></p> <p><math>P_5: 3 \times 5 + 2 = 17</math></p> <p><math>P_6: (6 + 4) \times 2 = 20</math></p> <p style="text-align: right;"><i>10 mins</i></p>	<p style="text-align: center;"><b>Notes</b></p> <p>Verbal checking of Q1 and Q9. T points to P, P gives the steps and the answer. Agreement, feedback, self-correction. Praising.</p> <p>Detailed checking at BB, recalling both methods Ps have learnt.</p> <p>First, T suggests Ps show solution from using the 'Operation - Inverse Operation' table. For question (a), a volunteer P and for (c) an encouraged, slower P, should be called to BB.</p> <p>Then T asks Ps to explain the other method (balancing equations) they learnt in Y7.</p> <p>Finally, T reminds Ps to check their answer by substituting it into the first equation.</p>										
<p><b>2</b></p> <p><i>(continued)</i></p>	<p><b>Brackets</b></p> <p>T: Today we're going to deal with the role of brackets. First, we'll review the rules concerning brackets.</p> <p><b>OS 4.4 extended with</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">(i) <math>36 \div (9 + 3)</math></td> <td style="padding: 5px;">(ix) <math>36 \div 9 - 36 \div 3</math></td> </tr> <tr> <td style="padding: 5px;">(j) <math>36 \div (9 - 3)</math></td> <td style="padding: 5px;">(x) <math>15 - 6 + 4</math></td> </tr> <tr> <td style="padding: 5px;">(k) <math>15 - (6 + 4)</math></td> <td style="padding: 5px;">(xi) <math>15 + 6 - 4</math></td> </tr> <tr> <td style="padding: 5px;">(l) <math>15 - (6 - 4)</math></td> <td style="padding: 5px;">(xii) <math>36 \div 9 + 36 \div 3</math></td> </tr> <tr> <td style="padding: 5px;">(m) <math>15 + (6 - 4)</math></td> <td style="padding: 5px;">(xiii) <math>15 - 6 - 4</math></td> </tr> </table> <p>e.g.: P: <math>(4 + 2) \times 3 = 4 \times 3 + 2 \times 3</math>,            since <math>6 \times 3 = 18</math>            and <math>12 + 6 = 18</math> too.</p> <p>This is true, because when multiplying <math>(4 + 2)</math> by 3, we have to multiply both 4 and 2 by 3 ...</p>	(i) $36 \div (9 + 3)$	(ix) $36 \div 9 - 36 \div 3$	(j) $36 \div (9 - 3)$	(x) $15 - 6 + 4$	(k) $15 - (6 + 4)$	(xi) $15 + 6 - 4$	(l) $15 - (6 - 4)$	(xii) $36 \div 9 + 36 \div 3$	(m) $15 + (6 - 4)$	(xiii) $15 - 6 - 4$	<p>Whole class activity, and mental work.</p> <p>Tasks appear on OHP.</p> <p>Ps try to review what they remember from Unit 4 and Unit 8 last year. Try to match the pairs ...</p> <p>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 the statement is true.</p>
(i) $36 \div (9 + 3)$	(ix) $36 \div 9 - 36 \div 3$											
(j) $36 \div (9 - 3)$	(x) $15 - 6 + 4$											
(k) $15 - (6 + 4)$	(xi) $15 + 6 - 4$											
(l) $15 - (6 - 4)$	(xii) $36 \div 9 + 36 \div 3$											
(m) $15 + (6 - 4)$	(xiii) $15 - 6 - 4$											

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 4</p>	<p><i>Using Brackets</i></p>
<p><b>Activity</b></p> <p><b>2</b></p> <p><i>(continued)</i></p>	<p>or P: <math>15 - (6 + 4) = 15 - 6 - 4</math></p> <p>since <math>15 - 10 = 5</math></p> <p>and <math>9 - 4 = 5</math> too.</p> <p style="text-align: right;"><i>12 mins</i></p>	<p style="text-align: center;"><b>Notes</b></p> <p>T also asks Ps to give a reason, wherever possible.</p> <p>Praising. At the end, T stresses the fact that</p> <p><math>15 + (6 - 4) = 15 + 6 - 4</math> (nothing changes when the brackets are left off), but that</p> <p><math>36 \div (9 + 3) = 36 \div 9 + 36 \div 3</math> and</p> <p><math>36 \div (9 - 3) = 36 \div 9 - 36 \div 3</math> are not correct.</p>
<p><b>3</b></p>	<p><b>Further practice with brackets</b></p> <p><b>PB 4.3, Q7, extended with the question:</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Which of the eight expressions can be written down without brackets but leaving the numbers in the same places? You can change the operations if necessary.</b></p> </div> <p style="text-align: center;"><i>(PB 4.3, Q7: (a) T (b) T (c) F (d) F)</i></p> <p><i>Solution of extension:</i></p> <p><math>(3 \times 6) \times 2 = 3 \times (6 \times 2) = 3 \times 6 \times 2</math></p> <p><math>(4 + 2) + 7 = 4 + (2 + 7) = 4 + 2 + 7</math></p> <p><math>(8 - 2) - 1 = 8 - 2 - 1</math></p> <p><math>8 - (2 - 1) = 8 - 2 + 1</math></p> <p><math>(8 \div 2) \div 2 = 8 \div 2 \div 2</math></p> <p><math>8 \div (2 \div 2) = 8 \div 2 \times 2</math></p> <p>e.g. P: When we decrease the subtrahend, the result will increase by the same number. That's why:</p> <p><math>8 - (2 - 1) = (8 - 2) + 1 = 8 - 2 + 1</math></p> <p style="text-align: right;"><i>32 mins</i></p>	<p>Individual work, monitored, helped.</p> <p>T should wait for all Ps to answer the original question, but not for them to finish the extra one.</p> <p>For checking, encouraged slower Ps should be asked to write solutions for the original questions on BB; stronger Ps will probably volunteer to show how to leave off brackets.</p> <p>Agreement/discussion, pointing out which expressions remain the same without brackets and which ones have to be changed.</p> <p>T can also ask stronger Ps to explain the reason for the change.</p> <p>Praising.</p>
<p><b>4</b></p> <p><i>(continued)</i></p>	<p><b>Solving problems using BODMAS</b></p> <p><b>OS 4.3, Q1-5, Q8</b></p> <p>e.g:</p> <p>T: Look at question 1 ... Who thinks it's true? <span style="float: right;"><i>(No-one?)</i></span></p> <p>Who thinks it's false? <span style="float: right;"><i>(Most Ps)</i></span></p> <p>What do the rest of you think? <span style="float: right;"><i>(?)</i></span></p> <p>OK; let's work it through.</p> <p>P<sub>1</sub>: <math>3 \times 6 = 18</math>, <math>18 + 2 = 20</math>, so it's false.</p> <p>T: Can you make it true?</p> <p>P<sub>2</sub>: <math>3 \times (6 + 2) = 3 \times 8 = 24</math></p> <p>T: Correct. Now question 2 ... Think about it ...</p> <p>Are you ready? Who thinks it's true? ... Who thinks it's false?</p>	<p>Whole class activity with mental work.</p> <p>Task appears on OHP.</p> <p>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.</p>

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 4</p>	<p><i>Using Brackets</i></p>
<p><b>Activity</b> <b>4</b> <i>(continued)</i></p>	<p>T (to a 'true' P): Why do you think it's true?  <math>P_3: 4 - 6 = -2, -2 \times 2 = -4</math>                      T (to a 'false' P): Why do you think the previous answer is wrong?  <math>P_4:</math> According to BODMAS, we have to multiply first ..., etc.</p> <p style="text-align: right;">40 mins</p>	<p><b>Notes</b></p> <p>T has to calm protesting Ps and suggest that they allow this P to explain the reasoning.</p>
<p><b>5</b></p>	<p><b>Individual work - competition</b></p> <p>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!</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Produce all the whole numbers from 1 to 8, using four 2s and the signs +, -, ×, ÷, ( )</p> <math display="block">2 \ 2 \ 2 \ 2 = 0</math> <math display="block">2 \ 2 \ 2 \ 2 = 1</math> <math display="block">2 \ 2 \ 2 \ 2 = 2</math> <math display="block">2 \ 2 \ 2 \ 2 = 3</math> <math display="block">2 \ 2 \ 2 \ 2 = 4</math> <math display="block">2 \ 2 \ 2 \ 2 = 5</math> <math display="block">2 \ 2 \ 2 \ 2 = 6</math> <math display="block">2 \ 2 \ 2 \ 2 = 7</math> <math display="block">2 \ 2 \ 2 \ 2 = 8</math> </div> <p>A possible solution:</p> $(2 + 2) - (2 + 2) = 0$ $(2 + 2 - 2) \div 2 = 1$ $2 \div 2 + 2 \div 2 = 2$ $(2 + 2 + 2) \div 2 = 3$ $2 + 2 - 2 + 2 = 4$ $2 + 2 + (2 \div 2) = 5$ $2 \times 2 \times 2 - 2 = 6$ $? = 7$ $2 \times 2 + 2 \times 2 = 8$ <p style="text-align: right;">45 to 50 mins</p>	<p>Individual work, monitored - competition.</p> <p>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'.)</p> <p>After four minutes, T stops the work, puts a copy of the task as an OS on OHP and asks Ps to complete it.</p> <p>There are many possible solutions (T should listen to all of them) → discussion, agreement, self-correction and praising for each number produced.</p> <p>At the end, T leaves two questions open:</p> <ul style="list-style-type: none"> <li>- how many solutions exist for a number?</li> <li>- is there any solution for the number 7?</li> </ul> <p>Feedback. Praising (marking).</p>
	<p><b>Set homework</b></p> <p>(1) PB 4.3, Q2 (b), (h) (+ Make it true), Q8, Q10 (a)</p> <p>(2) Give as many solutions as you can for producing the number 4 from four 2s.</p> <p>(3) For stronger Ps: Try to produce the number 7 from four 2s.</p>	



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

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 5</p>	<p><i>Problems in Context</i></p>
<p><b>Activity</b></p> <p><b>3</b></p>	<p><b>Problems in context - individual work</b></p> <p><b>PB 4.4, Q5 (b)</b> <math>(12 + 0.14 \times 82 = 23.48</math> <i>Prakesh is paid £23.48)</i></p> <p><b>PB 4.4, Q7</b> <math>(10 - (1.50 + 2.45 + 0.80) = 5.25</math> <i>Joanne should get £5.25 change)</i></p> <p style="text-align: right;">26 mins</p>	<p style="text-align: center;"><b>Notes</b></p> <p>Individual work, monitored, helped.</p> <p>Checking at BB: volunteer P dictates (T writes on BB) expression written as answer → agreement, feedback, self-correction, praising. Process repeated for second task.</p>
<p><b>4</b></p>	<p><b>Problems in context - mental work</b></p> <p>T: See if you can work this out in your head.</p> <p>T (reads aloud):</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>(a) Liam buys 40 boxes of chocolates, costing £1.29 each. What is the total cost?</p> </div> <p>P<sub>1</sub>: £1.29 × 40  P<sub>2</sub>: £51.60  P<sub>3</sub>: 1.30 × 40 – 0.01 × 40</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>(b) How many bottles, each with a capacity of 0.7 litres are needed to store 7.5 litres of liquid?</p> </div> <p>P<sub>1</sub>: 7.5 ÷ 0.7  P<sub>2</sub>: 11  P<sub>3</sub>: 0.7 × 10 = 7, plus 1 for the remaining half a litre.  8 bottles are needed.</p> <div style="border: 1px solid black; padding: 5px;"> <p>(c) A book costs £13.40. How many books can you buy with £280?</p> </div> <p>P<sub>1</sub>: 280 ÷ 13.4  P<sub>2</sub>: 20  P<sub>3</sub>: 14 × 20 = 280  13.4 × 20 = 268. The remaining £12 is not enough for another book, so you can buy 20 books.</p> <p style="text-align: right;">36 mins</p>	<p>Mental work (slower Ps can use their Ex.Bs.)</p> <p>T says/reads out the first task slowly, waits for Ps to think, asks for the calculation that will lead to the solution, waits for thinking, then asks the results and the quickest way to get it.</p> <p>Continue in the same way for (b) and (c).</p> <p>Praising. (T should also praise those Ps who needed to write to find the solution.)</p>
<p><b>5</b></p>	<p><b>Using brackets when solving problems in context</b></p> <p>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!</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>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?</p> </div> <p>P<sub>1</sub> (writes on BB): <math>5 \times 3 - 4.68 \times 3</math>  P<sub>2</sub> (writes on BB): <math>= (5 - 4.68) \times 3 = 0.32 \times 3 = 0.96</math>  Margaret should have 96p change.</p> <p style="text-align: right;">41 mins</p>	<p>Whole class activity.</p> <p>Task appears on OHP.</p> <p>Ps discuss the problem together, and suggest an appropriate expression. Then T asks Ps to use brackets to make the calculation easier.</p> <p>Praising.</p>

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 5</p>	<p><i>Problems in Context</i></p>
<p><i>Activity</i></p> <p><b>6</b></p>	<p><b>Individual work</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>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?</p> </div> <p>P<sub>1</sub>: <math>A = 38 \times 34.7 + 65.3 \times 38</math> (m<sup>2</sup>) (T writes on BB.)</p> <p>T (to the Ps who are not objecting): Why do you think the other are disagreeing with this?</p> <p>P<sub>2</sub>: Because they enjoy multiplying.</p> <p>T: Don't you?</p> <p>P<sub>2</sub>: No!</p> <p>T: Is there another way we can find the answer?</p> <p>P<sub>2</sub>: Using brackets ...(writes on BB):</p> $= (34.7 + 65.3) \times 38 = 100 \times 38 = 3800 \text{ m}^2$ <p style="text-align: right;">45 mins</p>	<p><i>Notes</i></p> <p>Task appears on OHP. Quick-fire individual work. T monitors work and helps slower Ps to write down expression which gives the solution. Ps using brackets will find the 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> <p>Agreement, completing solution. Feedback. Praising.</p>
	<p><b>Set homework</b></p> <p><b>PB 4.4, Q3</b></p> <p><b>PB 4.4, Q6</b></p> <p><b>PB 4.4, Q8</b></p> <p><b>PB 4.4, Q10</b></p>	





<b>Y8</b>	<b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 6	<i>Rounding and Estimating 1</i>				
<b>Activity 4</b> (continued)	<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p><i>Solution</i></p> <p>6452 <math>\approx</math> 6450 (to nearest 10)</p> <p>6450 <math>\approx</math> 6500 (to nearest 100)</p> <p>6500 <math>\approx</math> 7000 (to nearest 1000)</p> <p>6452 <math>\approx</math> 6000 (to nearest 1000)</p> </div> <p style="text-align: right; margin-right: 50px;"><i>32 mins</i></p>	<p style="text-align: center;"><b>Notes</b></p> <p>Checking: solution appears on OHP.</p> <p>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.</p>				
<p><b>5A</b></p> <p><b>Correct to 'decimal places' and 'significant figures'</b></p> <p><b>OS 4.6</b></p> <p>T: 3.35 <math>\rightarrow</math> 3.4 correct to 1 decimal place.</p> <p>4.721 <math>\rightarrow</math> 5 correct to 1 significant figure.</p> <p>Ps: 360.25 <math>\rightarrow</math> 360.3 correct to 1 decimal place.</p> <p><b>5B</b></p> <p><b>Further practice</b></p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; border-bottom: 1px solid black;"><i>Questions</i></th> <th style="text-align: left; border-bottom: 1px solid black;"><i>Solutions</i></th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">           T: 302 to 1 s.f.                302 to 2.s.f.                0.053 to 1 d.p.                0.053 to 1 s.f.                0.055 to 1 s.f.                4.604 to 3 s.f.                4.605 to 3 s.f.         </td> <td style="border: 1px solid black; padding: 5px;">           Ps: 300                300, the first 0 is s.f.                0.1                0.05, the 5 is the first s.f.                0.06                4.60, the 0 is s.f.                4.61         </td> </tr> </tbody> </table> <p style="text-align: right; margin-right: 50px;"><i>41 mins</i></p>	<i>Questions</i>	<i>Solutions</i>	T: 302 to 1 s.f. 302 to 2.s.f. 0.053 to 1 d.p. 0.053 to 1 s.f. 0.055 to 1 s.f. 4.604 to 3 s.f. 4.605 to 3 s.f.	Ps: 300 300, the first 0 is s.f. 0.1 0.05, the 5 is the first s.f. 0.06 4.60, the 0 is s.f. 4.61	<p>Whole class activity.</p> <p>Task 1 appears on OHP.</p> <p>T introduces the concept of 'significant figures', contrasts it with 'correct to decimal places'.</p> <p>After the first two rows, Ps are asked (helped by T) to explain and complete the table.</p> <p>Helping, agreement, praising.</p> <p>Whole class activity continues.</p> <p>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.</p> <p>Agreement, praising.</p>
<i>Questions</i>	<i>Solutions</i>					
T: 302 to 1 s.f. 302 to 2.s.f. 0.053 to 1 d.p. 0.053 to 1 s.f. 0.055 to 1 s.f. 4.604 to 3 s.f. 4.605 to 3 s.f.	Ps: 300 300, the first 0 is s.f. 0.1 0.05, the 5 is the first s.f. 0.06 4.60, the 0 is s.f. 4.61					
<p><b>6</b></p> <p><b>Individual practice</b></p> <p><b>PB 4.5, Q5 (a) 1.5 (c) 3.2 (d) 11 (e) 140</b></p> <p style="text-align: right; margin-right: 50px;"><i>45 mins</i></p>		<p>Individual work, monitored, helped.</p> <p>Checking at BB with explanations from Ps.</p> <p>Agreement, feedback, self-correction. Praising.</p>				
	<p><b>Set homework</b></p> <p><b>PB 4.6, Q7</b></p> <p><b>PB 4.6, Q8</b></p>					

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 7</p>	<p><i>Rounding and Estimating 2</i></p>												
<p><i>Activity</i></p>	<p><b>Checking homework</b></p> <p><b>1A</b> <b>PB 4.5, Q7</b></p> <p>147.52 → 147.5 to 4 s.f.            → 148 to 3 s.f.            → 150 to 2 s.f.            → 100 to 1 s.f.</p> <p><b>1B</b> <b>PB 4.5, Q8</b></p> <p>104.735 → 105 to the nearest whole number            → 104.74 to 2 d.p.            → 100 to 2 s.f.            → 104.7 to 1 d.p.            → 100 to 1 s.f.</p> <p style="text-align: right;"><i>5 mins</i></p>	<p style="text-align: center;"><b>Notes</b></p> <p>T asks Ps, P answers, T writes on BB, others agree or suggest correction, reviewing the concept of significant figures. Feedback, self-correction. Praising.</p> <p>Similar method of checking for Q8, comparing correction to decimal places and significant figures at the same time. Feedback, self-correction. Praising.</p>												
<p><b>2</b></p>	<p><b>Mental work</b> <b>PB 4.5, Q10</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;"><i>No.</i></th> <th style="text-align: center;"><i>Statement</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0.047</td> <td style="text-align: center;">2 s.f.</td> </tr> <tr> <td style="text-align: center;">0.003</td> <td style="text-align: center;">3 d.p.</td> </tr> <tr> <td style="text-align: center;">16.22</td> <td style="text-align: center;">2 d.p.</td> </tr> <tr> <td style="text-align: center;">184 200</td> <td style="text-align: center;">4 s.f.</td> </tr> <tr> <td style="text-align: center;">7.06</td> <td style="text-align: center;">3 s.f.</td> </tr> </tbody> </table> <p style="text-align: right;"><i>10 mins</i></p>	<i>No.</i>	<i>Statement</i>	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.	<p>Mental work to warm up, and to check that Ps who made mistakes in their homework have now fully understood the work.</p> <p>Table appears on OHP, T asks Ps to make the corrections. Ps volunteer, T encourages slower Ps (see above) to correct the entries.</p> <p>Explanations, agreement. Praising.</p>
<i>No.</i>	<i>Statement</i>													
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.													
<p><b>3</b></p> <p><b>Practice with rounding</b></p> <p>T: Let's look the two short problems in this question, and use what we now know about rounding.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Jimmy and Robert go to a café.</p> <p>Jimmy buys: Pie     £0.90                              Pasty    £0.81                              Burger   £1.20</p> <p>Robert buys: Chips   £0.85                              Sausage   £0.50                              Drink     £0.52</p> <p>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.</p> </div> <p>T: We'll look at Jimmy's items first.</p> <p><math>P_1: 0.90 \rightarrow 1</math>  <math>P_2: 0.81 \rightarrow 1</math>  <math>P_3: 1.20 \rightarrow 1</math></p> <p>T: What was his estimate?          Ps: £3</p> <p><i>(continued)</i></p>		<p>Whole class activity.</p> <p>Discussion about how to make a sensible estimate.</p> <p>Task appears on OHP.</p> <p>One of Ps is asked to read it out clearly, then ...</p>												

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 7</p>	<p><i>Rounding and Estimating 2</i></p>
<p><b>Activity 3</b> (continued)</p>	<p>T: How much did he actually pay?</p> <p>P<sub>4</sub> (at BB or aloud):</p> $\begin{array}{r} 0.90 \\ 0.81 \\ + 1.20 \\ \hline 2.91 \end{array}$ <p>T: Was it a good estimate?</p> <p>Ps: Yes.</p> <p>T: Now for Robert's bill.</p> <p>P<sub>5</sub>: 0.85 → 1</p> <p>P<sub>6</sub>: 0.50 → 1</p> <p>p<sub>7</sub>: 0.52 → 1</p> <p>Ps: £3 in total.</p> <p>P<sub>4</sub> (at BB or aloud):</p> $\begin{array}{r} 0.85 \\ 0.50 \\ + 0.52 \\ \hline 1.87 \end{array}$ <p>T: This is quite a way from the estimate, isn't it? Why is it so different?</p> <p>T:     0.85                   Ps: 1</p> <p>          0.50                   0.50</p> <p>          0.52                   0.50</p> <p>Ps: £2 is much closer to the actual total.</p> <p style="text-align: right;"><i>18 mins</i></p>	<p style="text-align: center;"><b>Notes</b></p> <p>... T asks, Ps volunteer to round and calculate the actual total, T agrees and praises.</p> <p>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.</p> <p>Rounding, agreeing, praising.</p>
<p><b>4</b></p>	<p><b>Individual practice with rounding</b></p> <p><b>Activity 4.3</b></p> <p style="text-align: right;"><i>28 mins</i></p>	<p>Whole class activity, monitored, helped.</p> <p>Each P has a copy of Activity 4.3. Ps who finish the estimate can go on to the Extension.</p> <p>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.</p> <p>Then a volunteer stronger/faster P gives the result of rounding to nearest 50p.</p> <p>Agreement, feedback, self-correction. Praising.</p>
<p><b>5</b>  (continued)</p>	<p><b>More complicated estimations</b></p> <p>T: Now we're going to estimate the result of more complicated expressions.</p> <p><b>OS 4.8, Rows 1-4</b></p>	<p>Whole class activity, mental work wherever possible.</p> <p>Task appears on OHP.</p> <p>Slower Ps are encouraged to come to OS and give estimates for the easier parts, stronger Ps do the more difficult ones.</p>

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

<p><b>Y8</b></p>	<p><b>UNIT 4</b> <i>Rounding and Estimating</i> Lesson Plan 8</p>	<p><i>Calculator Logic</i></p>
<p><i>Activity</i></p> <p><b>1</b></p>	<p><b>Checking homework:</b></p> <p><b>PB 4.6, Q1 (b)</b> Estimate: <math>10 \times 20 = 200</math> Calculator: 206</p> <p><b>PB 4.6, Q3</b> Estimate: <math>4 \times 5 = 20</math> Calculator: 17.0</p> <p><b>PB 4.6, Q6 (a)</b> Estimate: <math>\frac{6 \times 3}{4} = 4.5</math> Calculator: 4.94</p> <p>(e) Estimate: <math>\frac{140 - 90}{20} = 2.5</math> Calculator: 2.05 (all to 3 s.f.)</p> <p style="text-align: right;">5 mins</p>	<p><b>Notes</b></p> <p>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.</p> <p>Agreement/correction. Feedback, self-correction. Praising. Discussion:</p> <ul style="list-style-type: none"> <li>- why do we round to the nearest whole number in Q6 (a) and to 10 in (e)?</li> <li>- would the product of <math>3.5 \times 5</math> be a more accurate estimate for <math>3.61 \times 4.72</math> ?</li> </ul>
<p><b>2</b></p>	<p><b>Mental work with estimations</b> <b>PB 4.6, Q5</b> (A, B, D and E all incorrect)</p> <p>e.g: T: Let's look at Kyle's first calculation ... (waits for thinking) ... Who thinks that he's done it correctly? Who thinks it's not correct? ... Why? ...</p> <p style="text-align: right;">12 mins</p>	<p>Mental work.</p> <p>Task appears on OHP with only question A uncovered at first, and other questions shown when appropriate.</p> <p>T asks, give Ps time to think (slower Ps can use their Ex.Bs) then Ps vote 'Yes' or 'No'; T asks for reasons for their decision.</p> <p>T and Ps talk about the method of estimation, e.g. rounding the members of an expression to the same significant figure and not to the same decimal place (see <math>82.3 \times 0.625</math>, where the <math>80 \times 0.6</math> estimation may seem the most sensible).</p> <p>Agreement. Praising.</p>
<p><b>3</b></p>	<p><b>Using scientific calculators</b></p> <p>T: Kyle has made lots of incorrect calculations, hasn't he? Do you know how to use your calculator? Now you will not be able just to write down the final answer. Switch on your calculator and then we'll do some work.</p> <p><b>Worked Examples 1 and 2 on p77 of Y8A PB.</b></p> <p style="text-align: right;">20 mins</p>	<p>Whole class activity.</p> <p>Each P must have a scientific calculator for this lesson.</p> <p>T writes Worked Example 1 on BB and asks Ps for a solution. T introduces bracket keys on calculator, their properties (error message if they are not in pairs) and the memory keys. T helps Ps who are not familiar with this.</p> <p>Ps now work in pairs and help each other find out the way their calculators work. (Solutions to Worked Examples are given in PB.)</p>

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