Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages* Lesson Plan 1	*Revision: Fractions*

Activity		*Notes*

1

Revising addition and subtraction of fractions

T: We've already looked at fractions this term; now we're going to go over the four basic operations once again.

T; First, some mental work. Write in your Ex.Bs. if you need to.

OS 9.1, OS 9.2

T (writes what Ps dictate):

1. $\dfrac{2}{7} + \dfrac{4}{7} = \dfrac{6}{7}$

3. $\dfrac{3}{4} + \dfrac{2}{3} = \dfrac{9}{12} + \dfrac{8}{12} = \dfrac{17}{12} = 1\dfrac{5}{12}$

2. $\dfrac{5}{8} + \dfrac{4}{8} = \dfrac{9}{8} = 1\dfrac{1}{8}$

4. $\dfrac{5}{7} + \dfrac{2}{5} = \dfrac{25}{35} + \dfrac{14}{35} = \dfrac{39}{35} = 1\dfrac{4}{35}$

P_1: $\dfrac{5}{7} - \dfrac{2}{7} = \dfrac{3}{7}$

P_2: $\dfrac{5}{8} - \dfrac{3}{8} = \dfrac{2}{8} = \dfrac{1}{4}$

P_3: $\dfrac{3}{4} - \dfrac{1}{8} = \dfrac{6}{8} - \dfrac{1}{8} = \dfrac{5}{8}$

P_4: $\dfrac{5}{7} - \dfrac{2}{5} = \dfrac{25}{35} - \dfrac{14}{35} = \dfrac{11}{35}$

Notes

A whole lesson of revision; mental work and writing on BB/OHP and in Ex.Bs, with discussion - no individual work.

This is one of the fundamental topics in mathematics, and must be revisited frequently. In Unit 4 there was a review of the basic operations and in Unit 2 Ps looked at addition and subtraction of fractions.

Now, when tasks appear on OHP or BB, T should get volunteer Ps to explain for the slower Ps how to add, subtract, multiply and divide by fractions. Slower Ps should also be encouraged to contribute.

Mental work, first with volunteer Ps dictating solutions to Q1 and Q3 of OS 9.1 (T agrees and writes on OS what Ps say), reviewing the rules for addition and subtraction of fractions with the same denominator, or how to change them if the denominators are different) and also recalling the concepts of improper form and mixed numbers.

Finally, slower Ps are asked to come and show solutions to OS 9.2 at OHP (write on OS). Other Ps follow the calculations and agree/correct. Very slow Ps write in Ex.Bs (Q2 provides an example of reducing to the simplest form of a fraction.) Praising.

8 mins

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 1	*Revision: Fractions*

Activity		*Notes*
2	**Fractions with mixed numbers** T: Let's look at additions and subtractions with mixed numbers.	Whole class activity. T writes tasks on BB, Ps volunteer, come to BB and explain solutions.

(a) $1\frac{5}{7} + \frac{4}{7}$

(b) $2\frac{1}{3} + 3\frac{1}{3}$

(c) $4\frac{1}{2} + 3\frac{1}{3}$

(d) $2\frac{3}{4} - 1\frac{2}{3}$

P_1: $1\frac{5}{7} + \frac{4}{7} = \frac{12}{7} + \frac{4}{7} = \frac{16}{7} = 2\frac{2}{7}$

P_2: $1\frac{5}{7} + \frac{4}{7} = 1\frac{9}{7} = 2\frac{2}{7}$

P_3: $2\frac{1}{3} + 3\frac{1}{3} = 5\frac{2}{3}$

P_4: $4\frac{1}{2} + 3\frac{1}{3} = (4 + 3) + \left(\frac{3}{6} + \frac{2}{6}\right) = 7\frac{5}{6}$

P_5: $2\frac{3}{4} - 1\frac{2}{3} = (2 - 1) + \left(\frac{9}{12} - \frac{8}{12}\right) = 1\frac{1}{12}$

Notes (right column for above): After first P's solution, T asks for an alternative method. Then asks the other Ps coming to BB to choose the method they find quicker. Agreement. Praising.

12 mins

3A	**Revision of simple multiplications and divisions of whole numbers** T: Let's do some simple multiplications and divisions of whole numbers.	Mental work, although slower Ps may use Ex.Bs if necessary. T asks, Ps volunteer and answer. Agreement. Praising.

T: $\frac{1}{3}$ of 18   Ps: $18 \div 3 = 6$

$\frac{2}{3}$ of 18 $6 \times 2 = 12$

$\frac{3}{4}$ of 12 m $\frac{12 \text{ m}}{4} \times 3 = 9 \text{ m}$

T: Share $\frac{5}{8}$ of a cake equally between five brothers.

Ps: They have $\frac{1}{8}$ each.

T: Share $\frac{8}{15}$ of a cake equally between four sisters.

Ps: They each have $\frac{2}{15}$.

T: $\frac{6}{7} \div 3$

Ps: $\frac{2}{7}$

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 1	*Revision: Fractions*

Activity		*Notes*

3B

Multiplication and division - the rules

T: Now you will need to write in your Ex.Bs.

T: $\dfrac{2}{5}$ of 3 kg   Ps: $\dfrac{2 \times 3}{5}$ kg $= \dfrac{6}{5}$ kg $= 1\dfrac{1}{5}$ kg

$\dfrac{3}{4} \times 7$ $\dfrac{3 \times 7}{4} = \dfrac{21}{4} = 5\dfrac{1}{4}$

$\dfrac{9}{5} \div 3$ $\dfrac{9 \div 3}{5} = \dfrac{3}{5}$

$\dfrac{a}{b} \times c$ $\dfrac{a \times c}{b}$

T writes tasks on BB, Ps volunteer and come to front to explain and write solutions.

During the lesson, T asks Ps draw up the rules, ensuring that the spoken mathematics is correct at all times.

T: What have you done to get these answers?

P: The numerator has been multiplied, while the denominator remains the same.

T: $\dfrac{1}{5} \div 2$ Ps: $\dfrac{1}{10}$

$\dfrac{4}{5} \div 2$ $\dfrac{2}{5}$

$\dfrac{3}{5} \div 2$ $\dfrac{3}{10}$

T: How do we divide a fraction by a whole number?

P: If the numerator is divisible by the whole number we should divide it and leave the denominator unchanged, otherwise the denominator has to be multiplied by the divisor and the numerator left unchanged.

T: How can we write this in general?

P: $\dfrac{a}{b} \div c = \dfrac{a \div c}{b}$

T: And in another way?

P: $\dfrac{a}{b} \div c = \dfrac{a}{b \times c}$

T: Are these the same?

P: Yes.

T: Let's check. Calculate $\boxed{\dfrac{6}{5} \div 2}$ using the formula.

P_1: $\dfrac{6}{5} \div 2 = \dfrac{6 \div 2}{5} = \dfrac{3}{5}$

P_2: $\dfrac{6}{5} \div 2 = \dfrac{6}{5 \times 2} = \dfrac{6}{10} = \dfrac{3}{5}$

T asks, Ps volunteer and T chooses one to answer.
T writes on BB.

T asks for volunteer Ps to show the calculations on BB.

24 mins

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 1	*Revision: Fractions*

Activity		*Notes*

4

Applying the rules for multiplication and division

T: Now we'll combine the two rules we've just revised.

(a) $\left(\dfrac{3}{4} + \dfrac{1}{2}\right) \times 3$

(b) $\dfrac{3}{5} - 3\dfrac{1}{3} \div 5$

P (a): $= \left(\dfrac{3}{4} + \dfrac{2}{4}\right) \times 3 = \dfrac{5}{4} \times 3 = \dfrac{15}{4} = 3\dfrac{3}{4}$

P (b): $= \dfrac{3}{5} - \dfrac{10}{3} \div 5 = \dfrac{3}{5} - \dfrac{2}{3} = \dfrac{9}{15} - \dfrac{10}{15} = -\dfrac{1}{15}$

29 mins

Notes: Whole class activity, again with class discussion, applying Ps' knowledge about the order of operations with the rules they've just revised. Slower Ps are continually encouraged to solve problems at BB.

5

Multiplication and division of fractions

T: There are still two operations we haven't yet revised (writes on BB):

T: $\dfrac{a}{b} \times \dfrac{c}{d} =$ Ps: $\dfrac{a \times c}{b \times d}$

$A \div \dfrac{a}{b} =$ $A \times \dfrac{b}{a} = \dfrac{A \times b}{a}$

$\dfrac{3}{5} \times \dfrac{1}{4} =$ $\dfrac{3}{20}$

$\dfrac{3}{4} \times 3\dfrac{1}{2} =$ $\dfrac{3}{4} \times \dfrac{7}{2} = \dfrac{21}{8} = 2\dfrac{5}{8}$

$1\dfrac{1}{3} \times 1\dfrac{2}{7} =$ $\dfrac{4}{3} \times \dfrac{9}{7} = \dfrac{4}{1} \times \dfrac{3}{7} = \dfrac{12}{7} = 1\dfrac{5}{7}$

$2 \div \dfrac{5}{7} =$ $2 \times \dfrac{7}{5} = \dfrac{14}{5} = 2\dfrac{4}{5}$

$\dfrac{2}{5} \div \dfrac{7}{3} =$ $\dfrac{2}{5} \times \dfrac{3}{7} = \dfrac{6}{35}$

$1\dfrac{1}{8} \div 1\dfrac{5}{6} =$ $\dfrac{9}{8} \div \dfrac{11}{6} = \dfrac{9}{8} \times \dfrac{6}{11} = \dfrac{9}{4} \times \dfrac{3}{11} = \dfrac{27}{44}$

36 mins

Notes: Whole class activity. First, T writes, Ps dictate and draw up the rules, then Ps come to BB to use the formulae, remembering to cancel wherever possible.

For the final question, T draws attention to the possible misconception:
$\dfrac{9}{8} \div \dfrac{11}{6} = \dfrac{3}{8} \div \dfrac{11}{2} = \dfrac{3}{8} \times \dfrac{2}{11} = ...$
cancelling at a division before changing it into a multiplication. Agreement. Praising throughout.

6

Further practice

T: Now two tasks using addition/subtraction and multiplication/division in one example.

(a) $2 + 3 \div \dfrac{4}{3}$

(b) $2\dfrac{2}{3} \times \dfrac{9}{16} - \dfrac{1}{2}$

P (a): $= 2 + 3 \times \dfrac{3}{4} = 2 + \dfrac{9}{4} = 2 + 2\dfrac{1}{4} = 4\dfrac{1}{4}$

P (b): $= \dfrac{8}{3} \times \dfrac{9}{16} - \dfrac{1}{2} = \dfrac{1}{1} \times \dfrac{3}{2} - \dfrac{1}{2} = \dfrac{3}{2} - \dfrac{1}{2} = 1$

40 mins

Notes: Whole class activity. T writes tasks on BB, asks what will be the first (second, etc.) step, Ps volunteer, one of them (pointed to by T) answers, others agree/correct. T writes on BB, Ps in Ex.Bs, step by step. Praising.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 1	*Revision: Fractions*

Activity		*Notes*
7	**Mental work using rules of multiplication and division** **OS 9.3, OS 9.4**	Mental work at the end of the lesson to check whether or not Ps can use the rules of multiplication and division of fractions they've just revised. Task appears on OHP. T points to Ps to answer questions, one by one, agrees or waits for correction, writes correct answers on OS.

T: $\dfrac{2}{3}$ of 24   Ps: $= (24 \div 3) \times 2 = 16$

$\dfrac{2}{5}$ of 18 $= \dfrac{2 \times 18}{5} = \dfrac{36}{5} = 7\dfrac{1}{5}$

$\dfrac{3}{5} \times \dfrac{2}{3}$ $= \dfrac{1}{5} \times \dfrac{2}{1} = \dfrac{2}{5}$

$\dfrac{3}{7} \times \dfrac{2}{5}$ $= \dfrac{6}{35}$

$3 \div \dfrac{1}{4}$ $= 3 \times \dfrac{4}{1} = 12$

$\dfrac{3}{4} \div \dfrac{2}{5}$ $= \dfrac{3}{4} \times \dfrac{5}{2} = \dfrac{15}{8} = 1\dfrac{7}{8}$

$1\dfrac{1}{2} \div \dfrac{3}{8}$ $= \dfrac{3}{2} \times \dfrac{8}{3} = \dfrac{1}{1} \times \dfrac{4}{1} = 4$

$1\dfrac{3}{7} \div \dfrac{2}{5}$ $= \dfrac{10}{7} \times \dfrac{5}{2} = \dfrac{5}{7} \times \dfrac{5}{1} = \dfrac{25}{7} = 3\dfrac{4}{7}$

45 mins

	Set homework **PB 9.1, Q1 (b), (h)** **PB 9.1, Q2 (d), (h)** **PB 9.1, Q3 (b), (h)** **PB 9.1, Q4 (d)** **PB 9.1, Q5 (h)** **PB 9.1, Q6 (h)** **PB 9.1, Q7 (h)** **PB 9.1, Q9 (d)**	

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 2	*Revision and Practice*

Activity		*Notes*
1	**Checking homework**	The first lesson of this unit was hard work (although Ps have been continually reviewing fractions since the beginning of term), and they have had to repeat all the basic processes involving fractions.
	PB 9.1, Q1 (b) $\quad 1\frac{1}{4}$	
	PB 9.1, Q1 (h) $\quad \frac{1}{3}$	
	PB 9.1, Q2 (d) $\quad 1\frac{1}{6}$	
	PB 9.1, Q2 (h) $\quad 1\frac{1}{9}$	Now the homework is checked in detail. T has prepared an OS with solutions and shows it on OHP. Questions are considered one by one, T seeing, from the feedback, if there are problems. If there are problems, T should explain the solution one more time.
	PB 9.1, Q3 (b) $\quad 8$	
	PB 9.1, Q3 (h) $\quad 7\frac{13}{21}$	
	PB 9.1, Q4 (d) $\quad \frac{6}{7}$	
	PB 9.1, Q5 (h) $\quad 29.4 \text{ or } 29\frac{2}{5}$	T also asks Ps if they have used a different method to get any of the solutions - Ps show on BB.
	PB 9.1, Q6 (h) $\quad \frac{4}{21}$	
	PB 9.1, Q7 (h) $\quad \frac{16}{21}$	
	PB 9.1, Q9 (d) $\quad 14$	
	e.g.: for Q4 (d)	
	P: $\; 4\frac{5}{7} - 3\frac{6}{7} = (4-3) + \left(\frac{5}{7} - \frac{6}{7}\right) = 1 - \frac{1}{7} = \frac{6}{7}$ etc.	
	10 mins	
2	**Revision Test**	Individual work.
	Questions / Solutions	Questions appear on OHP and each P has a copy. This test will show Ps and T whether or not Ps understand the basic processes. For checking, T has prepared an OS showing the results. Feedback will show which Ps need further practice and will prove to them that there are still weaknesses.
	(1) (a) $\frac{1}{8} + \frac{3}{8}$ $\quad = \frac{4}{8} = \frac{1}{2}$	
	(b) $1\frac{1}{6} - \frac{5}{6}$ $\quad = \frac{2}{6} = \frac{1}{3}$	
	(c) $1\frac{2}{3} + \frac{1}{2}$ $\quad = \frac{13}{6} = 2\frac{1}{6}$	
	(d) $2\frac{3}{5} - 1\frac{1}{3}$ $\quad = \frac{19}{15} = 1\frac{4}{15}$	Praising, encouraging, dividing the class into two groups for the next part of the lesson (see next Activity).
	(2) (a) $\frac{3}{7}$ of £14 $\quad = £6$	
	(b) $\frac{2}{9} \times 4$ $\quad = \frac{8}{9}$	
(continued)	(c) $1\frac{3}{5} \div 3$ $\quad = \frac{8}{15}$	

Y8	**UNIT 9**	***Arithmetic: Fractions and Percentages*** Lesson Plan 2	*Revision and Practice*

Activity			Notes
2 (continued)	<u>Questions</u> (3) (a) $\dfrac{5}{6} \times \dfrac{3}{2}$ (b) $2\dfrac{1}{3} \times 1\dfrac{2}{3}$ (c) $3 \div \dfrac{4}{5}$ (d) $\dfrac{2}{9} \div \dfrac{3}{4}$	<u>Solutions</u> $= \dfrac{15}{12} = 1\dfrac{1}{4}$ $= \dfrac{35}{9} = 3\dfrac{8}{9}$ $= \dfrac{15}{4} = 3\dfrac{3}{4}$ $= \dfrac{8}{27}$	

25 mins

3A (slower)	**Checking Revision Test** Detailed checking and then practising similar tasks.	T divides Ps into two groups according to results in Revision Test. Those who had problems sit together and work as a group, using BB, to go through the questions in detail, and to practise more, similar tasks (selected from PB) to strengthen their basic numeracy skills.
3B (stronger)	**Further practice** (1) Factorise and/or simplify: (a) $\dfrac{2}{3}x + \dfrac{1}{3}x$ (b) $\dfrac{1}{2}x + \dfrac{1}{3}x + 2$ (c) $2\left(x - \dfrac{3}{7}\right)$ (d) $\dfrac{3}{4}\left(x + \dfrac{1}{2}\right)$ (e) $3\left(2x + \dfrac{1}{4}\right) - 2\left(x - \dfrac{1}{3}\right)$ (f) $(x + 2)\left(x + \dfrac{2}{5}\right)$ (g) $\left(x + \dfrac{1}{2}\right)\left(x - \dfrac{1}{3}\right)$ (2) Solve the equations: (a) $2\left(x + \dfrac{1}{7}\right) = 1\dfrac{1}{3}$ (b) $3\left(x - \dfrac{2}{5}\right) = x + \dfrac{1}{3}$ (c) $2\left(\dfrac{2}{3}x + 1\right) = \dfrac{1}{3}(x + 7)$	Those with no mistakes in Revision Test now work as a group, sitting together, trying to apply their knowledge about fractions. Ps are given copies of the tasks (one copy for each pair of Ps). When compiling these questions, T must bear in mind Ps abilities with the topic. 4 minutes before the end of the lesson, T stops stronger Ps' work and puts prepared OS on OHS showing solutions, so that Ps can check their work. Self-correction, feedback. Praising. For Q2, T should encourage Ps to check their answers in the original equation.
(continued)		

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 2	*Revision and Practice*

Activity		**Notes**

3B

(continued)

<u>Solutions</u>

(1) (a) x

(b) $\dfrac{5}{6}x + 2$

(c) $2x - \dfrac{6}{7}$

(d) $\dfrac{3}{4}x + \dfrac{3}{8}$

(e) $4x + 1\dfrac{5}{12}$

(f) $x^2 + 2\dfrac{2}{5}x + \dfrac{4}{5}$

(g) $x^2 + \dfrac{1}{6}x - \dfrac{1}{6}$

(2) (a) $2\left(x + \dfrac{1}{7}\right) = 1\dfrac{1}{3}$

$$2x + \dfrac{2}{7} = \dfrac{4}{3} \qquad \left(-\dfrac{2}{7}\right)$$

$$2x = \dfrac{22}{21} \qquad (\div 2)$$

$$x = \dfrac{11}{21}$$

or: $2\left(x + \dfrac{1}{7}\right) = 1\dfrac{1}{3} \qquad (\div 2)$

$$x + \dfrac{1}{7} = \dfrac{2}{3} \qquad \left(-\dfrac{1}{7}\right)$$

$$x = \dfrac{11}{21}$$

(b) $3\left(x - \dfrac{2}{5}\right) = x + \dfrac{1}{3}$

$$3x - \dfrac{6}{5} = x + \dfrac{1}{3} \qquad (-x)$$

$$2x - \dfrac{6}{5} = \dfrac{1}{3} \qquad \left(+\dfrac{6}{5}\right)$$

$$2x = \dfrac{23}{15} \qquad (\div 2)$$

$$x = \dfrac{23}{30}$$

(continued)

Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages* Lesson Plan 2	*Revision and Practice*

Activity			**Notes**
3B *(continued)*	(c) $2\left(\dfrac{2}{3}x + 1\right) = \dfrac{1}{3}(x + 7)$ $\dfrac{4}{3}x + 2 = \dfrac{1}{3}x + \dfrac{7}{3} \quad \left(-\dfrac{1}{3}x\right)$ $x + 2 = \dfrac{7}{3} \qquad (-2)$ $x = \dfrac{1}{3}$ ——— *45 mins* ———		There might not be enough time to solve the final equation. In this case, stronger Ps can be given it as an extra homework task.
	Set homework **Activity 9.1**		Each P is given a copy of Activity 9.1 to work on at home.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 3	*Fractions in Context*

Activity		*Notes*

1	**Introduction to real life problems**
	
	T: We often meet fractions in real life, perhaps without realising that they *are* fractions. Let's look at two problems.
	
	OS 9.5, Q1 OS 9.6, Q2
	
	(1) $\frac{1}{8} \times 72 = 9$
	
	  So there are <u>9 faulty matches</u> in the box.
	
	(2) $1\frac{1}{2} \div \frac{3}{4} = \frac{3}{2} \times \frac{4}{3} = 2$
	
	  So Hannah can make <u>2 cakes</u> with this amount of sugar.
		Whole class activity.
		To capitalise on the homework checking that is to follow, T introduces (lets Ps interpret) two problems containing fractions.
		Tasks appear on OHP, one at a time, T asks a P to read out the text, gives a short time for Ps to think, and waits for Ps to dictate the type of operation that has to be used and the result.
		Agreement, T writes on OS, praises and reminds Ps to always answer a problem in context with a whole sentence.

	6 mins	

2	**Checking homework and more ...**
	Activity 9.1
	e.g.
	
	P (1st step): $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ is the first correct statement, since
	
	  $\frac{1}{2} = \frac{2}{4}$.
	
	  Some of the possible contexts:
	(1) For the first step:
	
	  Yesterday David ate $\frac{1}{2}$ of Margaret's cake.
	  Today he ate $\frac{1}{4}$ of the original cake.
	  What fraction of Margaret's cake has he eaten altogether?
	
	(2) For the second step:
	  Jim has a baguette half a metre long.
	
	  What length of bread does he have left if he eats $\frac{1}{8}$ m of the baguette?
	
	(3) For the third step:
	
	  Bill had $\frac{1}{4}$ gallon of milk in his fridge. He drank $\frac{1}{2}$ of it.
	  How much milk has he drunk? etc. ... the seventh step.
		T puts Activity 9.1 on OHP and asks Ps to volunteer to show the next step of the correct route. Chosen P gives the next step, explaining it aloud and after agreement, comes to OHP to circle true statement on OS. This process continues, step by step. Each time, T asks if Ps can give a context for which this particular process would lead to the solution. (T will need to encourage Ps to think about this.)
		
		After the seventh step, T should ask if Ps have any doubt how to finish the route, and asks for a quick explanation of the last steps (including circling the correct option and finding a context). Praising.

	22 mins	

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 3	*Fractions in Context*

Activity		*Notes*
3	**Whole class practice** **OS 9.5, Q2 and OS 9.6, Q1** P_1: $\frac{3}{5} \times 950 = 3 \times 190 = 570$ So 570 pupils have school lunches. P_2: $P = 2 \times \left(\frac{7}{10}\ m + \frac{2}{5}\ m\right) = 2 \times \left(\frac{7}{10}\ m + \frac{4}{10}\ m\right)$ $= 2 \times 1.1\ m = \underline{2.2\ m}$ P_3: $A = \frac{7}{10}\ m \times \frac{2}{5}\ m = \left(\frac{7}{5} \times \frac{1}{5}\right) m^2 = \frac{7}{25}\ m^2$ —————— *29 mins* ——————	Whole class activity. Tasks appear on OHP. After listening to many contexts, slower Ps are encouraged (and helped) to give the appropriate processes and then the solutions, at BB. T helps, agrees, praises, Ps write in Ex.Bs.
4	**Individual practice** **PB 9.2, Q4 and PB 9.2, Q6 (a)** P_1: $\frac{2}{5}$ of $800 = (800 \div 5) \times 2 = 160 \times 2 = 320$ So 320 pupils receive a questionnaire. P_2: $3 \div \frac{3}{8} = 3 \times \frac{8}{3} = 8$ So 8 cakes can be made with 3 kg of flour. T: And with 6 kg of flour? Ps: Twice as many; 16 cakes. T: And with $6\frac{1}{8}$ kg of flour? Ps: The same number, 16 cakes. T: Why? Ps: Because $\frac{1}{8}$ kg of flour is not enough for another cake. T: And with $1\frac{1}{4}$ kg of flour? P: $1\frac{1}{4} \div \frac{3}{8} = \frac{5}{4} \times \frac{8}{3} = \frac{10}{3} = 3\frac{1}{3}$ So 3 cakes can be made from the $1\frac{1}{4}$ kg of flour. —————— *37 mins* ——————	Individual work, monitored, helped. Verbal checking, agreement, feedback, self-correction. Praising. Then some more questions, with discussion, finally working on BB. Volunteer P writes on BB, explains, others listen and correct if necessary. Praising.
5A *(continued)*	**Writing equations using numbers in context** T: Which number has to be multiplied by $\frac{3}{2}$ to get $\frac{5}{7}$? P_1: $x \times \frac{3}{2} = \frac{5}{7}$ $\qquad \left(\div \frac{3}{2}\right)$ P_2: $x = \frac{5}{7} \times \frac{2}{3}$ P_3: $x = \frac{10}{21}$ P_3: *Check:* LHS $= \frac{10}{21} \times \frac{3}{2} = \frac{5}{7} =$ RHS	Whole class activity. T puts two questions and asks Ps to write an equation for each. After volunteer P has written it on BB, T points to a slower P to solve it at BB (with help) and another P to check it at BB. Agreement, praising. Ps write in Ex.Bs.

Y8	**UNIT 9**	***Arithmetic: Fractions and Percentages*** Lesson Plan 3	*Fractions in Context*

Activity		Notes
5A *(continued)*	T: I thought of a number, added $\frac{3}{4}$ to it and got $1\frac{1}{8}$. What was the number I thought of? P_1: $x + \frac{3}{4} = 1\frac{1}{8}$ $\left(-\frac{3}{4}\right)$ P_2: $x = \frac{9}{8} - \frac{6}{8}$ $x = \frac{3}{8}$ P_3: *Check*: LHS $= \frac{3}{8} + \frac{3}{4} = \frac{9}{8}$ = RHS	
5B	**Individual work** T: I thought of a number, multiplied it by $\frac{3}{5}$ and then took away $1\frac{1}{5}$ from the product and got $\frac{2}{5}$. What was the number I thought of? $x \times \frac{3}{5} - 1\frac{1}{5} = \frac{2}{5}$ $\left(+1\frac{1}{5}\right)$ $x \times \frac{3}{5} = \frac{8}{5}$ $\left(\div\frac{3}{5}\right)$ $x = \frac{8}{3} = 2\frac{2}{3}$	Individual work, monitored, helped. Task appears on OHP, followed by solution. T puts solution on BB, Ps check and correct their work. Feedback. Praising.
	──── *45 mins* ────	
	Set homework **PB 9.2, Q3 (b)** **PB 9.2, Q5 (a)** **PB 9.2, Q6 (f)** **PB 9.2, Q7**	

Y8	**UNIT 9** *Arithmetic:* *Fractions and* Lesson Plan 4 *Percentages*	*Conversion Between Fractions and Percentages*

Activity		*Notes*
1	**Checking homework**	T has asked a stronger P to write brief solutions on BB as soon as P arrives.
	PB 9.2, Q3 (b) $A = \left(\dfrac{13}{5} \times \dfrac{5}{4}\right) m^2 = 3\dfrac{1}{4}\ m^2$	
	$P = 2\left(2\dfrac{12}{20} + 1\dfrac{5}{20}\right) m = 7\dfrac{7}{10}\ m$	T checks solutions on BB, asks others for corrections if necessary. Then self-correction, feedback. Praising.
	PB 9.2, Q5 (a) $\dfrac{1}{20}$ of $100 = 5$	
	PB 9.2, Q6 (f) $1\dfrac{1}{3} \div \dfrac{3}{8} = 3\dfrac{5}{9} \rightarrow$ the answer is 3.	
	PB 9.2, Q7 $x \times \dfrac{3}{4} = 2\dfrac{3}{5}$	
	$\rightarrow x = \dfrac{13}{5} \div \dfrac{3}{4} = 3\dfrac{7}{15}$ (cm)	
	5 mins	
2A	**Mental work**	
	T: Now some mental work: convert the numbers I give you into hundredths.	Mental work to warm up and in preparation for percentages.
	T: $\dfrac{1}{2} =$ Ps: $\dfrac{50}{100}$	
	$\dfrac{2}{5} =$ $\dfrac{40}{100}$	T asks, and writes fractions on BB, waits for Ps to find the number to be used for multiplying both the denominator and numerator to get hundredths. P dictates, agreement, T writes conversion on BB, question by question.
	$\dfrac{9}{10} =$ $\dfrac{90}{100}$	
	$\dfrac{3}{20} =$ $\dfrac{15}{100}$	
	$\dfrac{2}{25} =$ $\dfrac{8}{100}$	
	$\dfrac{7}{50} =$ $\dfrac{14}{100}$	
	T: What do you think of when you look at these answers?	
	Ps: ?	
	T: If I write one of them in Latin, for example, the last one (writes on BB), what does it remind you of?	
	14 per centum	
	Ps: Percentages!	
	T: What percentage does each answer mean?	T points to the results on BB and Ps can convert in chorus. (T writes the percentages close to the hundredths.)
	Ps: 50%, 40%, 90%, 15%, 8%, 14%	
2B	**Introducing conversions**	
	T: What percentage was the last answer?	
	Ps: 14 per cent	
	T: How did we get 14% from the fraction $\dfrac{14}{100}$?	Whole class activity, introducing conversions.
	Ps: We multiplied it by 100.	
	T: Was it difficult to find the multipliers to get hundredths?	
(continued)	Ps: Yes!	

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 4	*Conversion Between Fractions and Percentages*

Activity		Notes
2B *(continued)*	T: Can we multiply the original fractions to get percentages? For example, what would we get if we multiplied $\frac{2}{5}$ by 100 ? P: $\frac{2}{5} \times 100 = \frac{200}{5} = 40$ This is the value of the fraction as a percentage. T: Try it with another one, e.g. $\frac{2}{25}$. P: $\frac{2}{25} \times 100 = 2 \times 4 = 8$ T: Let's look at it the other way round; how do we get $\frac{14}{100}$ from 14 ? Ps: With the opposite operation; we have to divide it by 100. T: Try it. P: $14 \div 100 = \frac{14}{100} = \frac{7}{50}$ T: Try 15%. P: $15 \div 100 = \frac{15}{100} = \frac{3}{20}$ T: This was very easy, since you could see on the BB the simplest form of the fraction you had to reach. Now ...	Volunteer P comes to BB and writes solution. Another P writes the next solution on BB. P writes on BB. Praising wherever possible.
	15 mins	
3	**Further conversions** T: ... Let's look at some conversions without any help. **OS 9.7** P_1: $\frac{1}{2} \times 100 = 1 \times 50 = 50 \quad \rightarrow \quad 50\%$ P_2: $7 \div 100 = \frac{7}{100} \qquad\qquad \leftarrow \quad 7\%$ P_3: $\frac{1}{4} \times 100 = 1 \times 25 = 25 \quad \rightarrow \quad 25\%$ P_4: $80 \div 100 = \frac{80}{100} = \frac{4}{5} \quad \leftarrow \quad 80\%$ $\qquad\qquad\qquad\qquad\qquad$ etc.	Whole class activity. Task appears on OHP, T asks Ps to convert fractions into percentages and percentages into fractions. Volunteer and encouraged Ps come to front to do conversions at OHP, but for converting, for example, $33\frac{1}{3}\%$ $\left(\frac{100}{3} \div 100 = \frac{100}{3} \times \frac{1}{100} = \frac{1}{3} \right)$ a slower P should be chosen. (More, similar problems will occur later on.) Agreement. Praising, Ps write in Ex.Bs.
	24 mins	
4 *(continued)*	**Individual practice** **PB 9.3, Q1 (f), (h), (i)** **PB 9.3, Q2 (f), (k)** $10\% \quad \rightarrow \quad \frac{10}{100} = \frac{1}{10}$ $58\% \quad \rightarrow \quad \frac{58}{100} = \frac{29}{50}$	Individual work, monitored, helped.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 4	*Conversion Between Fractions and Percentages*

Activity		Notes
4 (continued)	$36\% \rightarrow \dfrac{36}{100} = \dfrac{9}{25}$ $\dfrac{6}{25} \times 100 = 6 \times 4 = 24 \rightarrow 24\%$ $\dfrac{11}{20} \times 100 = 11 \times 5 = 55 \rightarrow 55\%$ ———— *31 mins* ————	Checking: solutions appear on OHP or T writes them quickly on BB. Ps check and correct their work, T monitors self-correction. Then feedback, praising.
5	**More difficult conversions** T: Let's look at some less straightforward conversions. You've seen the conversion of $33\frac{1}{3}\%$, but what do we do with 33.6% ? P_1: $33.6 = 33\dfrac{6}{10} = 33\dfrac{3}{5} = \dfrac{168}{5}$ P_2: $\dfrac{168}{5} \div 100 = \dfrac{168}{5} \times \dfrac{1}{100} = \dfrac{42}{5} \times \dfrac{1}{25} = \dfrac{42}{125}$ T: That was really awkward! Next time you see a percentage like that, leave it as a percentage! T: Here's an easier one: e.g. $5\dfrac{1}{3}\%$ P_3: $\dfrac{16}{3} \times \dfrac{1}{100} = \dfrac{4}{3} \times \dfrac{1}{25} = \dfrac{4}{75}$ T: And inversely? Convert $\dfrac{5}{8}$ to a percentage. P_4: $\dfrac{5}{8} \times 100 = \dfrac{5}{2} \times 25 = \dfrac{125}{2} = 62\dfrac{1}{2} \rightarrow 62.5\%$ T: Convert $\dfrac{19}{200}$. P_5: $\dfrac{19}{200} \times 100 = \dfrac{19}{2} \times 1 = 9\dfrac{1}{2} \rightarrow 9.5\%$ T: You can see, it's much easier. ———— *37 mins* ————	Whole class activity to learn how to deal with 'not whole' percentages. Whole class discussio. Stronger Ps will probably work out the way to solve the first problem. A slower P should be encouraged to come to front to solve the second (easier) problem. Then the inverse follows ... Agreement. Praising.
6 (continued)	**Conversions in context** (a) According to a survey, $14\frac{2}{7}\%$ of students at a certain university smoke. What fraction is that? (b) On a Maths test, Jack scored 50 marks out of 60. What fraction of the marks has he scored? What percentage is that? *Solutions*: P (a): $14\dfrac{2}{7} \div 100 = \dfrac{100}{7} \div 100 = \dfrac{1}{7}$ So $\dfrac{1}{7}$ of the students at this university smoke. P (b): $\dfrac{50}{60} = \dfrac{5}{6}$ of the total marks have been scored.	Individual work involving real life topics. For part (b), Ps may need some help. T monitors Ps' work and helps where encessary. Detailed discussion with volunteer Ps writing solutions at BB. Agreement, feedback, self-correction. Praising.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 4	*Conversion Between Fractions and Percentages*
Activity		*Notes*
6 *(continued)*	$\frac{5}{6} \times 100 = \frac{5}{3} \times 50 = \frac{250}{3} = 83\frac{1}{3}$ So Jack's percentage count was $83\frac{1}{3}\%$. ———— *45 mins* ————	
	Set homework **PB 9.3, Q1 (b), (j)** **PB 9.3, Q2 (g), (h)** **PB 9.3, Q3 (a), (b)** **PB 9.3, Q4 (b), (d)** **PB 9.3, Q5**	

Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages* Lesson Plan 5	*Percentages of Quantities*

Activity			*Notes*
1	**Checking homework**		Detailed discussion of all questions. Ps dictate the key steps and the results, T agrees and write on BB for each question.
	PB 9.3, Q1	**(b)** $\dfrac{3}{4}$ **(j)** $\dfrac{16}{25}$	
	PB 9.3, Q2	**(g)** 95% **(h)** 68%	
	PB 9.3, Q3	**(a)** $\dfrac{1}{8}$ **(b)** $\dfrac{2}{3}$	Self-correction, feedback. Praising.
	PB 9.3, Q4	**(b)** $16\dfrac{2}{3}\%$ **(d)** $23\dfrac{1}{2}\%$	
	PB 9.3, Q5	32%	
		7 mins	

2	**Making a survey**	Whole class activity.
	T: There are many companies involved in taking polls of peoples' opinions. They usually give their results as percentages. You can use an opinion poll to find out what your classmates feel about some topics. (T puts OS on OHP.)	
	Activity 9.3	Questions from Activity 9.3 appear on OHP.
	T: Read through the questions on the OHP. Choose the ones that interest you the most.	The first volunteer P is called to front, chooses a question, asks other Ps and counts the 'Yes' votes and writes the number in the box on OS. Then P calculates the percentage $\left(\dfrac{\text{No. of 'Yes' votes}}{\text{No. of Ps}} \times 100 \right).$
		Other Ps listen, agree, T praises, P fills in '% Yes' box on OS. Then other volunteer Ps choose and pose questions, either from OS or of their own.
		T should allow about six questions; further discussion time can be spent on possible surveys within the school, or outside.
	20 mins	

3A	**Introducing 'percentages of quantities'**	Whole class activity/ introduction. T asks questions and introduces the concept of 'percentages of quantities' from the concept of 'fractions of quantities'.
	T: According to the results of a survey, in a school of 400 pupils,	
	(a) $\dfrac{1}{4}$ of them hate playing football.	
	How many Ps hate playing football? $\left(\dfrac{1}{4} \times 400 = 100 \right)$	
	(b) $\dfrac{7}{10}$ of them have lunch at school.	Ps calculate mentally, volunteer and come to BB to explain, show solutions and answer the questions.
	How many have lunch at school?	Agreement. Praising.
	$\left(\dfrac{7}{10} \times 400 = 7 \times 40 = 280 \right)$	
(continued)		

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 5	*Percentages of Quantities*

Activity		**Notes**
3A *(continued)*	(c) $\frac{17}{100}$ of them would like to be Prime Minister of the UK. How many would like to be Prime Minister? $$(\frac{17}{100} \times 400 = 17 \times 4 = 68)$$ (d) 90% would like to shake hands with David Beckham. How many ... ? $(\frac{90}{100} \times 400 = 90 \times 4 = 360)$	
3B	**Finding percentages** **OS 9.8** P_1: 20% of £40 $= \frac{20}{100} \times £40 = \frac{1}{5} \times £40 = £8$ etc. *————— 29 mins —————*	After a short discussion of the last question in 3A, T puts OS 9.8 on OHP and calls out and encourages slower Ps to solve the tasks on OS 9.8 (maybe with help). Agreement, praising. Ps write in Ex.Bs.
4	**Practice** **PB 9.4, Q1 (d), (g), (i), (l)** **PB 9.4, Q6** P_1: $\frac{30}{100} \times 80$ m $= \frac{3}{10} \times 80$ m $= 24$ m P_2: $\frac{75}{100} \times £30 = \frac{3}{4} \times £30 = £\frac{3}{2} \times 15 = £22.50$ P_3: $\frac{30}{100} \times 32$ kg $= \frac{3}{10} \times 32$ kg $= 0.3 \times 32$ kg $= 9.6$ kg P_4: $\frac{35}{100} \times £20 = \frac{7}{20} \times £20 = £7$ P_5: $17\frac{1}{2}\% = \frac{35}{2} \div 100 = \frac{35}{200} = \frac{7}{20}$ and $\frac{7}{40} \times 900 = \frac{7}{2} \times 45 = 157.50$ (£) *————— 38 mins —————*	Individual work, monitored, helped. Many Ps will probably struggle with Q6, but should be encouraged to attempt it. Checking at BB: four Ps are asked to come to BB to write solutions to Q1 simultaneously. (T encourages Ps to use decimals if that makes the calculations easier.) Agreement and correction. Self-correction, feedback. Praising. Then a fifth volunteer comes to front to show solution for calculation of VAT in Q6. Agreement, feedback, self-correction. Praising.
5A *(continued)*	**Practice with VAT** T: Did you think the last question was too long? Ps: Yes. T: It's a calculation we might have to do often, since most items we buy include VAT at $17\frac{1}{2}\%$. $17\frac{1}{2}\%$ is much easier to calculate than many other percentages, for example, 3.83%. **Activity 9.5, Q1 (a), (b)** P_1: For £120, 10% $\rightarrow$ £12 5% $\rightarrow$ £6 2.5% $\rightarrow$ £3 $\underline{17.5\% \rightarrow £21}$	Whole class activity. T puts Activity 9.5 on OHP and asks Ps to read as far as Q1. Ps and T then discuss VAT. First a volunteer, then an encouraged slower P, are called to front to show calculation on BB.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 5	*Percentages of Quantities*

Activity		**Notes**
5A *(continued)*	P_2: For £80, 10% → £8 5% → £4 2.5% → £2 —————— 17.5% → £14	
5B	T: Now show me how you could have found the VAT and total cost of the computer in Q6 in a clever way. *(Use this method to calculate the VAT:* £900 ⇒ 10% → £90 5% → £45 2.5% → £22.50 —————— 17.5% →£157.50 *Add this to the £900 to find the total cost of the computer)*	Individual work for T to check that Ps understand this method and for Ps to compare the two types of calculation. Self-correction, feedback. Praising.
	————— *45 mins* —————	
	Set homework **PB 9.4, Q1 (b), (c), (e)** **PB 9.4, Q2 (b), (e)** **PB 9.4, Q7**	

Y8	**UNIT 9**	*Arithmetic:* *Fractions and* *Percentages* **Lesson Plan 6**	*Increasing and Decreasing* *Quantities by Percentages*

Activity		*Notes*

1A	**Converting percentages to decimals**
	
	T: In the last lesson we converted percentages into fractions, but we can also convert them into decimals.
	
	Can you remember how to do the conversions?
	
	  T: 13% Ps: That is $\frac{13}{100} = 0.13$
	
	      47% 0.47
	
	      60% 0.6
	
	      10% 0.1
	
	      75% 0.75
	
	      100% $\frac{100}{100} = 1$
	
	      110% $\frac{110}{100} = 1.1$
	
	      130% 100% + 30% = 1.3
	
	      125% 1.25
	
	      210% 2.1
		Mental work as a warm up activity and preparing the topic for this lesson, with all slower Ps contributing.
		
		T makes Ps recall how to convert percentages to decimals ...

1B	**Discussion** T: How would you calculate 17% of 2 kg? P_1: 17% of 2 kg $= \frac{17}{100} \times 2$ kg $= 0.17 \times 2$ kg $= 0.34$ kg T: And 75% of 440 m? P_2: 75% of 440 m $= \frac{3}{4} \times 440$ m $= 3 \times 110$ m $= 330$ m *————— 8 mins —————*	... then during discussion of two simple questions (solved by volunteer Ps at BB), T and Ps agree that sometimes it is quicker to convert percentages into fractions, and at other times it is quicker to convert them to decimals.
2	**Checking homework** **PB 9.4, Q1** **(b)** 7 m **(c)** £15 **(e)** £24 **PB 9.4, Q2** **(b)** £52.50 **(e)** £4.90 **PB 9.4, Q7** P_1: 20% of 240 $= \frac{20}{100} \times 240 = \frac{1}{5} \times 240 = 48$ So the company employs 48 new staff. T: Can you also do the calculation converting percentages into decimals? P_2: $0.2 \times 240 = 48$ *————— 15 mins —————*	Verbal checking of Q1 and Q2, with T asking whether or not calculating with decimals would be quicker for Q1. Agreement, feedback, self-correction. Praising. Detailed checking of Q7 at BB: volunteer P writes solution on BB then Ps are asked to also calculate the answer using decimals.
3A *(continued)*	**Increasing and decreasing with percentages** T: A company employed 310 workers but has made 30% of them redundant. How many workers does the company now employ? Give a plan for reaching the solution. P_1: We have to find the decrease of 30% and subtract it from the original number of workers.	Continuing the topic of Q7 from the homework, the class moves on to a new topic - calculating the percentage increase/decrease in one step.

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 6	*Increasing and Decreasing Quantities by Percentages*

Activity		**Notes**

3A *(continued)*	T: And what will the percentage be?
	 P_2: $100\% - 30\% = 70\%$
	 T: So? ... Is there a quicker way of doing this?
	 P_3: If we calculate 70% of the workers, we get the answer immediately.
	
	 P_4: 30% of 310 P_5: $= 70\%$ of 310
	      $= 0.3 \times 310 = 93$ $= 0.7 \times 310 = 217$
	      $310 - 93 = 217$
	
	 T: And in the homework question, could you find the total number of employees using only one calculation?
	      $100\% + 20\% = 120\%$
	 T: And what is this equivalent to?
	 Ps: Multiplying by 1.2.
	 T: What is meant by ...
	
	     T: increasing by 30% Ps: 130%
	         increasing by 15% 115%
	         decreasing by 20% 80%
	         decreasing by 7% 93%
	         increasing by 50% 150%
	         decreasing by 50% 50%
	         increasing by 100% 200%
		T asks two Ps to calculate the result in different ways to show which is the quicker.
		
		 Agreement. Praising.

3B	**Practice** T: Now you can see for yourself why this way is shorter. **OS 9.9, Q2 and OS 9.10, Q1**	Individual work, monitored, helped. Task (the two questions together on one sheet) appears on OHP. Ps have to copy and calculate the solutions by both methods. Checking: T asks, Ps dictate, T agrees and writes on OS. Self-correction, feedback. Praising.
	28 mins	
4	**Individual work** **PB 9.5, Q3 (a), (c), (f), (g)** *(a) 52 m (c) £79.20 (f) £45 (g) 66.5 kg* e.g. P_1: A 30% increase is equivalent to multiplying by 1.3 to get the new amount. So $40 \text{ m} \times 1.3 = 52 \text{ m}$. etc.	Individual work, following on from detailed discussion which has just taken place, but now without the help given previously on the OS. T monitors and helps Ps' work. Verbal checking: for each question, T asks Ps the multiplier equivalent to the increase/decrease and the result. Agreement, self-correction, feedback. Praising.
	35 mins	

Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages* Lesson Plan 6	*Increasing and Decreasing Quantities by Percentages*

Activity			**Notes**
5		**Looking at interest**	
		T: Which was the most difficult calculation in the previous section?	
		Ps: Multiplying 70 by 0.95.	
		T: Why didn't you use calculators?	
		Ps: Are we allowed to?	
		T: You can in the next part ...	
5A		**Activity 9.2, Q1**	
		P_1: 8% interest means an 8% increase in the amount of money Ben has, so	Whole class activity to introduce the topic.
		$1.08 \times £50 = £54$	Each P is given a copy of Activity 9.2.
		T: What is the increase?	After a short discussion about the meaning of 'interest', a
		Ps: £4	slower P is asked to come to
		T: And after five years?	front and show how to calculate
		Ps: $5 \times £4 = £20$	the money Ben will have in his account after the first year.
			Agreement, praising, then a discussion about how to proceed.
		T: Are you sure? ... How much money was there in Ben's account at the start?	
		Ps: £50	
		T: And how have you calculated the increase?	
		Ps: $1.08 \times £50$	
		T: How much money is in Ben's account after the first year?	
		Ps: £54	
		T: So, what can you say about the increase in the second year?	
		Ps: It will be more than in the first year.	
		T: Come to the front and calculate the amounts for the five years.	After agreement, T asks Ps to volunteer to come to BB and
		P_2: $1.08 \times £54 = £58.32$	calculate the balance of Ben's account to the nearest pence
		P_3: $1.08 \times £58.32 \approx £63.00$	after each year, using their
		p_4: $1.08 \times £63.00 = £68.04$	calculator.
		P_5: $1.08 \times £68.04 \approx £73.48$	Agreement, praising, Ps write in Ex.Bs.
			Finally a short discussion as to whether, for example in the fourth year, they should use the actual amount or the rounded amount.
5B		**Further practice calculating interest**	Individual work, monitored, helped.
		Activity 9.2, Q2, first column	Verbal checking, agreement, self-correction, feedback, praising. (Going over calculation once again, if necessary.)
		—— *45 mins* ——	
		Set homework	
		Complete Activity 9.2, Q2	
		PB 9.5, Q6	

Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages*	Lesson Plan 7	*Finding Percentage Increase and Decrease*

Activity		**Notes**

1

Mental work, summarising topic covered in the unit M 9.2, with extra questions:

Q1 (b) $\quad \dfrac{4}{9} \div \dfrac{7}{9}$ $\qquad\qquad\qquad\qquad (\dfrac{4}{7})$

Q2 (b) $\quad \dfrac{1}{3} \times \dfrac{1}{2}$ $\qquad\qquad\qquad\qquad (\dfrac{1}{6})$

Q11

T: Kate scores 44 out of 50 in a test. Express her score as a percentage.

P: 44 out of 50 is $\dfrac{44}{50}$ of the total, and that is $\dfrac{44}{50} \times 100 \to 88\%$.

Q12

T: A CD player costs £90. Calculate the sale price when it is reduced by 25%.

Ps: But, ... that was in our homework! (PB 9.5, Q6)

T: Was it? So?

P: Decreasing something by 25% is equivalent to multiplying it by 0.75. And $0.75 \times £90 = £67.50$

T: Who got the same answer at home? What was your mistake? ... Correct it.

12 mins

Notes:

Mental work as a warm-up activity and to go over the topics covered in this unit. Task appears on OHP and T also reads out questions. T gives Ps a short time to think (slower ones may write in Ex.Bs), then points to a P to answer, T agrees or waits for correction, praises, question by question.

Repeating Q11 and Q12 (one of the homework exercises) should be tackled in detail, with explanations, and perhaps writing the solutions on BB.

2

Continuing homework checking
Activity 9.2, Q2

		Interest Rate			
		5%	10%	15%	20%
	0	£50.00	£50.00	£50.00	£50.00
	1	£52.50	£55.00	£57.50	£60.00
Years Invested	2	£55.13	£60.50	£66.13	£72.00
	3	£57.89	£66.55	£76.05	£86.40
	4	£60.78	£73.20	£87.46	£103.68
	5	£63.82	£80.52	£100.60	£124.42

T: Which rate of interest would you choose if you had some money to invest?

Ps: 20%

T: So would I. 20% interest every year over 5 years is big money! What percentage is that?

(Some) Ps: $5 \times 20\% = 100\%$

T: So I would have earned in interest the same amount as I originally invested. If my original amount was £50, I would get £100 after five years, wouldn't I?

Ps: Not really. In the table there is an amount of £124.42.

T: Why do you think this is?

Ps: Because in the second year we got 20% interest on £60, in the third year 20% on £72, etc.

T: So what percentage was the interest?

Ps: ?

18 mins

T puts pre-prepared OS showing completed table on OHP.
Ps check/correct their work, T monitors self-correction, helping if needed.
Feedback, praising.

After checking, Ps and T discuss percentage increase in value, leading on to the introduction of the topic of this lesson.

This will be dealt with later in the lesson.

Y8	**UNIT 9**	*Arithmetic: Fractions and Percentages* Lesson Plan 7	*Finding Percentage Increase and Decrease*

Activity			**Notes**

3A **Percentage increase and decrease**

T: How do you express part of an amount as a percentage? Look at the solution to Q 11 on the BB.

Ps: We found the percentage by working out $\dfrac{44}{50} \times 100$, so

$\dfrac{\text{part}}{\text{whole}} \times 100$ gives the percentage of the amount.

T: And if I want to calculate what the percentage the increase is of the original amount?

Ps: $\dfrac{\text{increase}}{\text{original amount}} \times 100$

*Whole class activity.
T has left solution to Q11 on BB and can now refer to it. Looking at this solution, Ps can see how to calculate the percentage increase.*

Agreement, Ps write the formula in Ex.Bs.

3B **Practice**

T: Now let's look at two simple problems.

OS 9.11

P_1: Increase $= 30 - 25 = 5$

Percentage increase $= \dfrac{5}{25} \times 100$

$\rightarrow 20\%$

P_2: Decrease $= 800 - 780 = 20$

Percentage decrease $= \dfrac{20}{800} \times 100$

$\rightarrow 2.5\%$

Then T puts OS 9.11 on OHP and all discuss an increase and a decrease problem. Volunteer Ps come to OHP (T should encourage slower ones) to explain and write solutions on OS, helped by OS and/or T. Agreement, praising. T must stress that increase/decrease has to be divided by (compared to) the original amount each time when calculating a percentage increase/decrease.

3C **Whole class activity**

PB 9.6, Q3

T: What was the original price? *(£8000)*

T: What is the new price? *(£8240)*

T: What is the increase? *(£8240 − £8000 = £240)*

T: How do we find the percentage increase? Come and show us the calculation.

P: $\dfrac{240}{8000} \times 100 = \dfrac{240}{80} \times 1 = 3$, so the percentage increase is 3%.

*Whole class activity.
T asks a P to read out the text clearly, then gets Ps to interpret the problem ...*

... and asks a slower P to use the formulae they've just learned. (T may help P to cancel when necessary.) Agreement, praising, Ps write in Ex.Bs.

———— *28 mins* ————

4 **PB 9.6, Q1, Q2** (1. 10% 2. 20%)

*Individual work, monitored, helped. Verbal checking, repeating the formulae and giving the increase/decrease and the percentage.
Agreement, feedback, self-correction. Praising.
If there are many mistakes, detailed checking should be done at BB.*

———— *33 mins* ————

Y8	**UNIT 9** *Arithmetic: Fractions and Percentages* Lesson Plan 7	*Finding Percentage Increase and Decrease*

Activity		*Notes*
5	**Further practice with interest rates** T: Let's look back at the remaining questions in Activity 2 that you didn't have to do for homework. The numbers won't be as easy as in the last question, so you should use your calculator. **Activity 9.2, Q3** Percentage increase for 5% $= \dfrac{63.81 - 50}{50} \times 100$ $\approx 28\%$ Percentage increase for 10% $= \dfrac{80.53 - 50}{50} \times 100$ $\approx 61\%$ Percentage increase for 15% $= \dfrac{100.57 - 50}{50} \times 100$ $\approx 101\%$ Percentage increase for 20% $= \dfrac{124.42 - 50}{50} \times 100$ $\approx 149\%$ **Activity 9.2, Q4** The higher the rate, the more interest is added, but at a faster rate. For example, if the interest rate is doubled, the total interest earned is more than doubled. — *42 mins* —	Individual work, monitored, helped. T can decide whether it is better to approach this by treating one of the calculations (e.g. at 5% interest) as a whole class activity and then the others as individual work, or to get Ps to work alone for all the questions. Detailed checking at BB, with discussion and comments on the results (Activity 9.2, Q4) at the end. (See Teacher Support for this unit on the internet.)
6	**Problem in context** T: Finally, let's look at something similar. Read this question carefully. **PB 9.6, Q4** T: What was the original price? Ps: 60p T: And the selling price? Ps: 80p T: The increase/profit? Ps: 20p T: What is the question? ... Read it out clearly ... What does it mean? Ps: 20p out of 80p is profit, that is, $\dfrac{20}{80} \times 100$; 25% of the selling price. — *45 mins* —	Whole class activity with Ps interpreting the question together. T makes Ps read the question individually, then asks questions leading to the solution. T makes a P read out just the question, and then waits for Ps to give the key to the solution, and for a P to volunteer to show solution on BB. Agreement, praising, and stressing that this is not the percentage interest.
	Set homework **M 9.3 (each P is given a copy)** **PB 9.6, Q5**	