

Appendix A

This appendix contains the adapted version of Charalambous et al.'s (2010) textbook analysis template used in the present study.

Pupil materials

Pupil tasks were coded on two dimensions: potential cognitive demand and type of response required. Within potential cognitive demands, codes are:

- Recall of facts, terms of concepts
- Implementation of procedures (with and without connections)
- Reasoning, connecting or problem-solving

The type of response required can be categorised as:

- Closed response, i.e. answer only
- Extended/ open response (may include explanation or justification)

Teacher materials

Teacher prompts were coded on two dimensions. First, is there a script, representation or specific instruction that could be *directly copied*? (Coded as yes or no). Second, the type of teacher activity prompted was coded, based on the general and specific characteristics below.

GENERAL	SPECIFIC
A) Elicit orally:	1. Answer only
	2. Explanation of answer/ process
	3. Justification of reasonableness of approach
B) Explain:	1. Fact, procedure or step in procedure
	2. Deep conceptual reason/ mathematical generalisation
C) Draw or write	1. Representation
D) Initiate pupil activity	1. Pupil use of structured manipulatives
	2. Pupil use of everyday materials
	3. Pupil discussion
	4. Pupils drawing or writing (including textbook/copybook work)
E) Make link	1. With other mathematical concepts/ procedures
	2. With other school subjects and/or everyday situations
F) Anticipate	1. Probable pupil error/ confusion
	2. Connections between present and past/ future work
	3. Need for differentiation among pupils

*Code E ("Make link") differs from Code F2 ("Anticipate [Connections between present and past/future work]") in that E implies that the teacher is prompted to communicate a link *to pupils*, whereas F2 implies that teachers should be aware of a link *themselves*.

Appendix B

This appendix contains the tailored observation schedule, used for all live classroom observations.

Checklist

Teacher Initials: _____

Start & end times: _____ to _____

5 min period	% of time spent ...							Did these happen in the 5 minutes?		
	T:I/I	P:Ans	P: Q/D	Solo	Group	on task	Rpt proced	Homework	Transfer	Prob-Sol
0-5								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T2								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T3								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T4								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T5								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T6								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T7								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T8								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T9								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T10								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
T11								<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

T: I/I Teacher providing **I**nstruction (i.e., not just instructions) or **I**nformation to pupils.

P: Ans Pupil(s) **A**nswering question from teacher.

P: Q/D Pupil(s) asking **Q**uestions or **D**iscussing maths (with others, or with teacher)

Solo Pupil working as an individual (with or without help from teacher)

Group Pairs/small groups working on maths

on task Time spent *on task* (time minus classroom management, discipline, interruptions etc)

Homework Correcting/assigning/discussing homework

Rpt proced practice and repeat routine procedures (e.g., multiplication facts / fraction procedure)

Transfer Transfer or application of skills or knowledge to new situation or problem. E.g., can pupils transfer understanding fractions of *area* to fractions of *length*?

P-S Individual or collaborative problem-solving (e.g., solving a practical problem involving subtraction of two-digit numbers)

How many pupils were in the classroom, **in total**?

And what class levels?

9. Did you see evidence of ...?

	<i>Yes, definitely</i>	<i>Yes, probably</i>	<i>Not sure</i>	<i>Not really</i>	<i>Not at all</i>
collaborative problem-solving.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
rote learning.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
differentiated teaching practices ...	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

10 About how much of the total lesson time was *time-on-task* (i.e., excluding admin., roll, distributing materials, managing pupil discipline, interruptions, etc)?

<i><25%</i>	<i>25-50%</i>	<i>51-75%</i>	<i>76-90%</i>	<i>91-100%</i>
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

11 Roughly what percentage of class time did pupils spend working from their Assessment & Practice (AP) books during class?

<i>NONE</i>	<i>1-20%</i>	<i>21-40%</i>	<i>41-60%</i>	<i>61-80%</i>	<i>81%+</i>
<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

12 How many pupils do you think had a *good* understanding of the lesson by the end of the class?

<i>None</i>	<i>Less than half</i>	<i>About half</i>	<i>Over half</i>	<i>All of them</i>
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

13 Rank the three types of instruction below by the frequency with which you observed them during the lesson. Put "1" below that observed most often, "3" for the least common, etc.

Simple direct instruction *Instruction by a series of questions* *Guided discovery*

14 Were any pupils assigned "bonus questions"?

<i>Yes</i>	<i>No</i>
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

15 Rate on a scale of 1 to 10 teacher fidelity to the JUMP Math lesson plan/IMPACT principles during the observed lesson. (1 =extremely low, 10 =extremely high)

NOTE: for the second set of observations, question 15 was split for JUMP classes into ratings for fidelity to JUMP Math lesson plan and to JUMP Math ethos

16 Any other comments or points of relevance?

Appendix C

This appendix contains the sheet used by SMEs to take notes about each recorded observation.

Class ID: _____

Teacher Initials: _____

JUMP/ IMPACT lesson

Video time:	Activity	Description	Materials used
			RLMs, Dienes' blocks, pegs, sticks, blocks, cubes, string, paper cut-outs/ folding, other (please specify)
			RLMs, Dienes' blocks, pegs, sticks, blocks, cubes, string, paper cut-outs/ folding, other (please specify)
			RLMs, Dienes' blocks, pegs, sticks, blocks, cubes, string, paper cut-outs/ folding, other (please specify)
			RLMs, Dienes' blocks, pegs, sticks, blocks, cubes, string, paper cut-outs/ folding, other (please specify)
Total length of video:			

Appendix D

This appendix contains the modified version of the Mathematical Quality of Instruction (Learning Mathematics for Teaching Project, 2011) rating scale, as used in the present study.

MQI: Summarised checklist

Classroom work is connected to mathematics

- | | | |
|--|--|---|
| 1. Focus on <u>mathematics content</u> for >50% of time? | Yes
<input type="checkbox"/> ₁ | No
<input type="checkbox"/> ₂ |
|--|--|---|

Richness of the mathematics

- | | <i>Low</i> | <i>Mid</i> | <i>High</i> |
|--|---------------------------------------|---------------------------------------|---------------------------------------|
| 2. Linking and connection | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 3. Explanations | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 4. Multiple procedures or solution methods | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 5. Developing mathematical generalizations | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 6. Mathematical language | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 7. Overall richness of the mathematics | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Working with students and mathematics

- | | <i>Low</i> | <i>Mid</i> | <i>High</i> |
|--|---------------------------------------|---------------------------------------|---------------------------------------|
| 8. Remediation of student errors and difficulties | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 9. Responding to student mathematical productions in instruction | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 10. Overall working with students and mathematics | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Errors and imprecision

- | | <i>Low</i> | <i>Mid</i> | <i>High</i> |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| 11. Major mathematical errors | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 12. Imprecision in language or notation | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 13. Lack of clarity in presentation of mathematical content | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 14. Overall errors and imprecision | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Student participation in meaning-making & reasoning

- | | <i>Low</i> | <i>Mid</i> | <i>High</i> |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| 15. Students provide explanations | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 16. Student mathematical questioning and reasoning | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 17. Enacted task cognitive activation | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 18. Overall student participation in meaning-making and reasoning | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Overall lesson codes

- | | <i>Low</i> | <i>Mid</i> | <i>High</i> |
|-------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 19. Whole-lesson MQI | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| 20. Lesson-based guess at MKT | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

Appendix E

This appendix contains the Teacher and Pupil Questionnaires used in the present study. Questionnaires shown are:

- Teacher Questionnaire administered in September 2013
- Teacher Questionnaire administered in May 2014
- Pupil Questionnaire administered in September 2013
- Pupil Questionnaire administered in May 2014

Maths Evaluation

Questionnaire for Third Class Teachers

Questionnaire administered in September 2013

Please complete this questionnaire **BEFORE** your professional development day, and bring it to the session in Athlone Education Centre.

This questionnaire collects baseline information about you as a teacher. As such, it is very important that it is filled in before you complete the professional development, rather than during or after.

Please note that all questionnaire responses are entirely confidential. Thank you for taking part in this research.

1. Are you..... Male ₁ Female ₂
2. By the end of the current school year, how many years will you have been teaching? *Exclude career breaks, etc.*
3. On how many days in the past three years did you attend professional development courses related to mathematics? *Exclude post-graduate courses.* days
4. On average, how much time per week do you allocate to teaching mathematics?
 hours **AND** minutes

The next questions ask about teaching mathematics to **Third class** pupils. If you have recently taught a Third class group, please base your answers on your previous experience. If not, please base your answers on what you intend to do over the coming school year.

5. How often are the following used in your Third class mathematics lessons?

- | | Most or
all lessons | Once or
twice a week | Once or twice
a month | Rarely or
never |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Real-life materials (e.g., timetables, weights) .. | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| b) Manipulatives (e.g., Dienes blocks) | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| c) Mathematics games..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| d) Tablebooks..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| e) Textbooks..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| f) Workbooks / worksheets..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

6. How often do you organise your mathematics lessons in the following ways?

Consider only Third class, even if you teach in a multigrade classroom.

- | | Most
lessons | Some
lessons | Rarely or
never |
|--|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Whole class teaching | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) Small group work | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) Working in pairs | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) Individual (independent) work | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) Team teaching..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

7. In teaching mathematics to this class, how often do you usually ask pupils to do the following?

	<i>Every or almost every lesson</i>	<i>About half the lessons</i>	<i>Some lessons</i>	<i>Never</i>
a) Listen to me explain how to solve problems	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
b) Memorise rules, procedures and facts	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
c) Work problems individually or with peers, with my guidance.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
d) Work problems together in the whole class, with my guidance.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
e) Explain their answers	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
f) Self-assess their mathematical performance ...	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

8. When you teach mathematics to this class, how do you use the following?

	<i>Basis for instruction</i>	<i>Supplement</i>	<i>Not used</i>
a) Textbooks	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
b) Workbooks or worksheets	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
c) Concrete objects or materials that help pupils understand quantities or procedures	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
d) Computer software for mathematics instruction	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

9. How often do you do the following for teaching this class? (Tick one box for each line).

	<i>Every or almost every lesson</i>	<i>About half the lessons</i>	<i>Some lessons</i>	<i>Never</i>
a) Break ideas down into very simple steps.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
b) Ask pupils what they learned from lessons	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
c) Relate the lessons to daily life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
d) Bring interesting materials to class.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
e) Teach how to solve a problem by using multiple similar problems	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

10. How well prepared do you feel you are to teach the following mathematics strands?

	<i>Very well prepared</i>	<i>Somewhat prepared</i>	<i>Not well prepared</i>
a) Number	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
b) Space and shape	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
c) Measures.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
d) Data.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

11. In teaching mathematics to your Third class, how confident do you feel doing the following?

	<i>Very confident</i>	<i>Somewhat confident</i>	<i>Not confident</i>
a) Connecting one mathematics topic to another	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
b) Showing pupils a variety of methods for doing calculations	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
c) Providing challenging tasks for capable pupils	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
d) Adapting my teaching to engage pupils' interest	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
e) Working with lower-achieving pupils	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
f) Teaching real-life problem solving.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

12. How often do you have the following types of interactions with other teachers?

	<i>Never or almost never</i>	<i>2 or 3 times a month</i>	<i>1 to 3 times a week</i>	<i>Daily or almost daily</i>
a) Discuss how to teach a particular topic	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
b) Work together to try out new ideas	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

13. How often do you usually give mathematics homework to Third class pupils?

<i>Never/rarely</i>	<i>Once or twice a week</i>	<i>3 days a week</i>	<i>4 days a week</i>	<i>Every day</i>
<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

14. If you assign mathematics homework, about how many minutes do you usually give?

Consider the time it would take an average pupil in your class.

 mins

15. This school year, what percentages of teaching time for mathematics will you spend on each of the following strand areas?

Consider Third class only.

a) Number	<div style="text-align: center;">%</div> <div style="border: 1px solid black; width: 100%; height: 100%; margin: 0 auto;"> <div style="border: 1px solid black; width: 90%; height: 10%; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 90%; height: 10%; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 90%; height: 10%; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 90%; height: 10%; margin: 0 auto;"></div> </div> <div style="text-align: center; margin-top: 5px;">100%</div>
b) Shape and space	
c) Measures	
d) Data	

Thank you for completing this questionnaire.

Programme Evaluations

JUMP & IMPACT

*Questionnaire for
Third Class Teachers*

Questionnaire administered in May 2014

Please complete this questionnaire and give it to the ERC representative when they visit the school to conduct the pupil achievement tests (the DPMTs).

NOTE: All questionnaire responses are entirely confidential. Thank you for taking part in this research.

1. In which of the following evaluation-related activities have you participated?

(Tick all that apply)

- a) Attended initial CPD day (Sep. 2013)..... ₁
- b) Viewed online recording of initial CPD day ₁
- c) Participated in first CPD webinar (Nov. 2013) ₁
- d) Participated in second CPD webinar (Feb. 2014) ₁
- e) Discussed the programme with participating teachers in other school(s)..... ₁
- f) Watched a recording of your own classroom observation ₁

2. Aside from that provided as part of the evaluation, on how many days since September 2013 did you attend CPD related to maths?

Exclude post-graduate courses.

days

3. On average, how much time per week do you allocate to teaching maths?

hours **AND** minutes

The next questions ask about teaching maths to **Third class** pupils. If you teach a multigrade class, please try to think **only** of Third class when answering.

4. How often are the following used in your Third class maths lessons?

- | | <i>Most or
all lessons</i> | <i>Once or
twice a week</i> | <i>Once or twice
a month</i> | <i>Rarely
or never</i> |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Real-life materials (<i>e.g., timetables, weights</i>)... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| b) Manipulatives (<i>e.g., Dienes blocks</i>) | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| c) Maths games..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| d) Tablebooks | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| e) Textbooks..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| f) Workbooks / worksheets | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

5. How often do you ask Third class pupils to do the following in maths class?

- | | <i>Every/almost
every lesson</i> | <i>About half
the lessons</i> | <i>Some
lessons</i> | <i>Never</i> |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Listen to you explain how to solve problems..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| b) Memorise rules, procedures and facts | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| c) Work problems individually, with your guidance .. | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| d) Work problems in groups with peers, with your guidance | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| e) Work problems together in the whole class, with your guidance..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| f) Explain their answers | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| g) Self-assess their maths performance..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| h) Repeat and practice skills to understand procedures | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

6. **How often do you organise your Third class maths lessons in the following ways?**
- | | <i>Most lessons</i> | <i>Some lessons</i> | <i>Rarely or never</i> |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Whole class teaching..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) Small group work | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) Working in pairs | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) Individual (independent) work..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) Team teaching..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
7. **When you teach maths to this class, how do you use the following?**
- | | <i>Basis for instruction</i> | <i>Supplement</i> | <i>Not used</i> |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Textbooks | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) Workbooks or worksheets..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) Concrete objects or materials that help pupils understand quantities or procedures | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) Computer software for maths instruction | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) Teacher manual/guide supplied as part of the evaluation ... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
8. **How often do you do the following for teaching this class?**
- | | <i>Every/almost every lesson</i> | <i>About half the lessons</i> | <i>Some lessons</i> | <i>Never</i> |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Break ideas down into very simple steps..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| b) Ask pupils what they learned from lessons | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| c) Relate the lessons to daily life..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| d) Bring interesting materials to class | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| e) Teach how to solve a problem by using multiple similar problems..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| f) Give quizzes or mini-tests to assess pupils' understanding of a topic | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
9. **How often do you usually give maths homework to Third class pupils?**
- | <i>Never/rarely</i> | <i>Once or twice a week</i> | <i>3 days a week</i> | <i>4 days a week</i> | <i>Every day</i> |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ | <input type="checkbox"/> ₅ |
10. **IF you assign maths homework, about how long do you think it usually takes an average pupil to complete it?** mins
11. **How well prepared do you feel to teach the following maths strands?**
- | | <i>Very well prepared</i> | <i>Somewhat prepared</i> | <i>Not well prepared</i> |
|-------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| a) Number | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) Shape and space..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) Measures..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) Data | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) Algebra | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
12. **How confident do you feel doing the following?**
- | | <i>Very</i> | <i>Somewhat</i> | <i>Not</i> |
|--|-------------|-----------------|------------|
|--|-------------|-----------------|------------|

- | | | | |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| | <i>confident</i> | <i>confident</i> | <i>confident</i> |
| a) Connecting one maths topic to another..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| b) Showing pupils a variety of methods for doing calculations | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| c) Providing challenging tasks for capable pupils | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| d) Adapting my teaching to engage pupils' interest | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| e) Working with lower-achieving pupils..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| f) Teaching real-life problem solving | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| g) Anticipating pupil errors and misunderstandings.... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |
| h) Assessing all pupils' understanding of a topic..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ |

- 13. This year, how often did you have the following types of interactions with other teachers?**
- | | | | | |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | <i>Never or almost never</i> | <i>2 or 3 times a month</i> | <i>1 to 3 times a week</i> | <i>Daily or almost daily</i> |
| a) Discuss how to teach a particular topic..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| b) Work together to try out new ideas | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| c) Discussed issues related to using IMPACT Maths or JUMP Math..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

14. Would you like to use aspects of the JUMP/IMPACT approach in your maths lessons next year?

- | | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <i>Yes, definitely</i> | <i>Yes, probably</i> | <i>No, probably not</i> | <i>No, definitely not</i> |
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

15. Which aspect(s) of JUMP/IMPACT methodology and materials did you find:

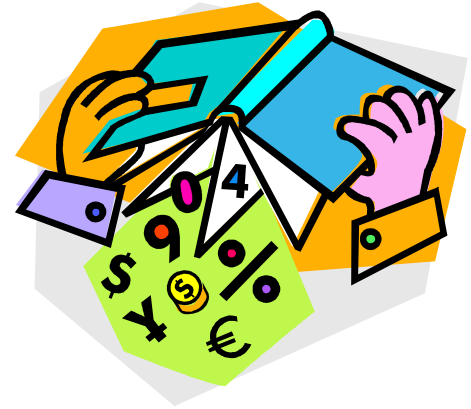
- a) Most helpful? _____
- b) Least helpful? _____

16. This year, what percentages of maths teaching time did you spend on each of the following strand areas? Consider Third class only.

- | | |
|--------------------------|---|
| | % |
| a) Number | <input style="width: 100px; height: 25px;" type="text"/> |
| b) Shape and space | <input style="width: 100px; height: 25px;" type="text"/> |
| c) Measures | <input style="width: 100px; height: 25px;" type="text"/> |
| d) Data..... | <input style="width: 100px; height: 25px;" type="text"/> |
| e) Algebra..... | <input style="width: 100px; height: 25px;" type="text"/> |
| | <hr style="width: 100%; border: 0; border-top: 1px solid black; margin: 0;"/> 100% |

Thank you for completing this questionnaire.

Maths Survey



Questionnaire for Pupils in Third Class

Questionnaire administered in September 2013

1. Do you like school?

Yes, I like school ₁

I'm not sure ₂

No, I don't like school ₃

**Here are some things that people say about maths.
You might agree with some of them and not with others.**

*Tick whether you 'agree a lot', 'agree a little',
'disagree a little' or 'disagree a lot' with each one.*

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
2. I wish I didn't have to study maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
3. I learn interesting things in maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
4. I like maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
5. I think everyone can be good at maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
6. I worry that I won't be able to answer questions in maths class	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
7. I am good at maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄



**Hop on to the
next page for
some more
questions!!**

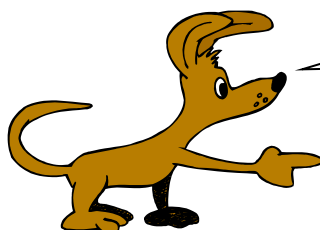
Think about what your **TEACHER** does in your **MATHS** lessons.
Tick to show if you agree or disagree with these sentences
below.

- | | Agree a
lot | Agree a
little | Disagree a
little | Disagree a
lot |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 8. My teacher always explains what we are expected to do | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 9. My teacher always asks do we understand stuff..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 10. My teacher often praises me..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 11. My teacher gets me to practice lots of examples | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 12. My teacher gives us fun things to do | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 13. My teacher lets us play games.... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

- | | Hardly
ever or
never | 1 or 2
days a
week | 3 days
a week | 4 days
a week | Every
school
day |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 14. How often do you do maths homework? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 15. How long do you normally spend doing maths homework? | | | | | |

I spend about

minutes each time I do maths homework.



**Go to the
next page.**

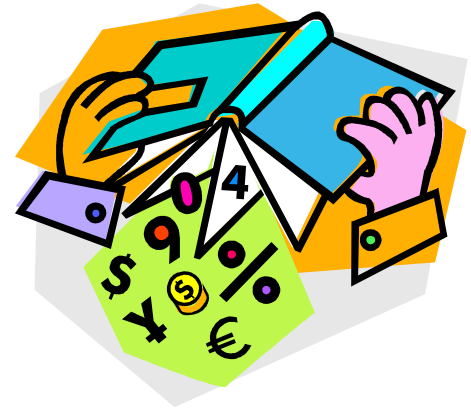
Now think about what **YOU** do in your **MATHS** lessons. Tick to show if you do something in *Every class, Most classes, Some classes*; or if you *Hardly ever* do it.

	Every class	Most classes	Some classes	Hardly ever
16. I think about how I can use maths in everyday life	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
17. I think of more than one way to get the answer to a problem	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
18. When we do new things, I learn as much as I can by heart	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
19. I try to understand new stuff by thinking about what I already know	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
20. I go through examples again and again to help me remember them.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
21. I work with my classmates to solve a problem.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
22. I work out a sum in my head	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄



Thank you for answering our questions.

Educational Research Centre
St Patrick's College
Dublin 9



Questionnaire for Pupils in Third Class

Questionnaire administered in May 2014

1. Do you like school?

Yes, I like school ₁

I'm not sure ₂

No, I don't like school ₃

Here are some things that people say about maths.
You might agree with some of them and not with others.

Tick whether you *'agree a lot'*, *'agree a little'*,
'disagree a little' or *'disagree a lot'* with each one.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
2. I wish I didn't have to study maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
3. I learn interesting things in maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
4. I like maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
5. I think everyone can be good at maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
6. I worry that I won't be able to answer questions in maths class.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
7. I am good at maths	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄



Hop on to the
next page for
some more
questions!!

Think about what your **TEACHER** does in your **MATHS** lessons. Tick to show if you agree or disagree with these sentences below.

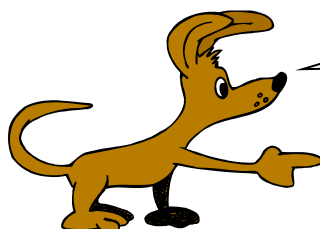
- | | Agree a
lot | Agree a
little | Disagree a
little | Disagree a
lot |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 8. My teacher always explains what we are expected to do..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 9. My teacher always asks do we understand stuff..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 10. My teacher often praises me..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 11. My teacher gets me to practice lots of examples..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 12. My teacher gives us fun things to do..... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |
| 13. My teacher lets us play games.... | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

- | | Hardly
ever or
never | 1 or 2
days a
week | 3 days
a week | 4 days
a week | Every
school
day |
|---|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 14. How often do you do maths homework? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₃ | <input type="checkbox"/> ₄ |

15. How long do you normally spend doing maths homework?

I spend about

minutes each time I do maths homework.



**Go to the
next page.**

Now think about what **YOU** do in your **MATHS** lessons. Tick to show if you do something in *Every class, Most classes, Some classes*; or if you *Hardly ever* do it.

	Every class	Most classes	Some classes	Hardly ever
16. I think about how I can use maths in everyday life.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
17. I think of more than one way to get the answer to a problem	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
18. When we do new things, I learn as much as I can by heart	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
19. I try to understand new stuff by thinking about what I already know	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
20. I go through examples again and again to help me remember them.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
21. I work with my classmates to solve a problem.....	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
22. I work out a sum in my head	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
23. I spend time working on problems on my own	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄



Thank you for answering our questions.

Appendix F

This appendix contains the interview schedules used for teacher and pupil interviews. Teacher interviews shown are those used for teachers using the JUMP programme.

Although not shown, the schedule for IMPACT is largely the same for both the first and second set of interviews. The main differences are the changes in prompts relating to the programme name, and some additional questions that are specific to JUMP (use of CBU, lesson unit, Grade 4 books).

TEACHER ID _____ Initials:

6. Do you think JUMP is more effective for some pupils than others? For example, weaker pupils / really good pupils

Weaker Stronger Good for all Not great for any Other

₁ ₂ ₃ _____

7. Do **you** see any major benefits to using JUMP?

8. Are there aspects you **don't** like – for example, hard to use, or because you think they just don't work?

9. If you had to describe your skill or comfort level in using JUMP, which of these would it be?

(READ the options ALOUD)

non-user novice fairly comfortable skilled ex-user

₁ ₂ ₃ ₄ ₅

10. Apart from JUMP Maths, are you or your school involved in any other maths projects or evaluations – like, for example, Maths Recovery?

Yes No

₁ ₂

IF YES

Do you find you tend to mix and match across the programmes,
or do you find that one is much better than the other??

Yes No

₁ ₂

₁ ₂

TEACHER ID _____ Initials:

11. Was your lesson today fairly typical? For example, was it normal length, were the pupils normally engaged in the class, were you or the pupils put off by the observation?
- | | Yes | No |
|----------------|---------------------------------------|---------------------------------------|
| Length | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| Pupil interest | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| Observation | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
-
-

12. Did you use a JUMP Math lesson plan today?
- | Yes | No |
|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |

12A IF YES, which plan(s) and how much of it did you cover during the class?

Plan ID No.	Very little	Less than half	Most of it	All of it
_____	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

13. What was the *main thing* you wanted pupils to learn from today's maths class?
-
-

14. Is there anything else you'd like to say about JUMP or the evaluation?
-
-
-

TEACHER ID _____ Initials:

SECOND Teacher interview

1. Did you do the webinar in February? Yes ₁ No ₂
IF YES What did you think of it?

2. Apart from the CPD sessions, have you been in contact with other JUMP teachers outside your own school (by email or otherwise)? Yes ₁ No ₂
IF YES How useful was that?

3. Did you get the email about a website for JUMP teachers (jumpmathteachers.org)? Have you had a chance to look at it? Yes ₁ No ₂
IF YES What did you think of it?

4. The last time you were interviewed, you were asked how well you thought JUMP aligned with the curriculum. What would you say **now** to the same question?

_____ | _____ | _____ | _____ | _____
Not at all *perfect match*

5. This year, how much of each of the five strands did you cover using JUMP? For example, did you use JUMP to cover most or all of Number, some of Number, or little or none of Number?

	<i>None/ almost none</i>	<i>Some of it</i>	<i>Most/ all of it</i>
Number	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Shape and Space	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Measures	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Data	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
Algebra	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

6. Did you use the JUMP 'Confidence Building Unit' with pupils? Yes ₁ No ₂

IF YES At what stage of the year? Start of year ₁ Other: _____

TEACHER ID _____ Initials:

How long did it take? _____

6a What did you think of it?

7. Did you get the Grade 4 JUMP workbooks after Christmas? . . . What did you think of them, and did you use them at all?

8. Looking back on the year, how do you feel your pupils responded to the JUMP approach?

_____ | _____ | _____ | _____ | _____ |
They hate it /useless *Love it / big effect*

9. Based on your experience this year, do you think JUMP is more effective for some pupils than others? For example, weaker pupils / really good pupils

Weaker *Stronger* *Good for all* *Not great for any* *Other*

₁ ₂ ₃ _____

10. Having had nearly a year of JUMP, do you see any major benefits to using it?

11. And are there aspects you **don't** like?

TEACHER ID _____ Initials:

12. At this stage, how would you describe your skill or comfort level in using JUMP? Would it be..?
(READ the options ALOUD)

non-user *novice* *fairly comfortable* *skilled* *ex-user*

₁ ₂ ₃ ₄ ₅

13. Now, today's lesson. Was it fairly typical? For example, was it normal length, were the pupils normally engaged in the class, were you or the pupils put off by the observation?
- | | Yes | No |
|--------------------------|---------------------------------------|---------------------------------------|
| Length typical? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| Pupil interest typical? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
| Observation off-putting? | <input type="checkbox"/> ₁ | <input type="checkbox"/> ₂ |
-
-

14. When you planned today's lesson, did you use a JUMP lesson plan? Yes No
- ₁ ₂

IF YES, which plan(s) and how much of it did you cover during the class?

Plan ID No. *Very little* *Less than half* *Most of it* *All of it*

₁ ₂ ₃ ₄

15. What was the **main thing** you wanted pupils to learn from today's maths class?
-
-

16. OK, and now a question about the evaluation as a whole. If we were to do this evaluation again – even in a different set of schools – would you suggest any changes to how the whole thing was organised?

All teachers need to have initial CPD ₁

More contact / support in general ₂

17. Is there anything else you'd like to say about JUMP or the evaluation?
-
-

TEACHER ID _____ Initials:

FIRST pupil interview

I'm trying to find out all about good ways of learning maths. To do that, we're looking at what your teachers do (that's why I was in the class today). But we also really want to know what YOU think of your maths classes.

I'm going to ask you a few questions, and you can tell me anything you want. There are no right or wrong answers – I'm interested in what you really think, not what you're supposed to say. So, don't worry, just tell me what you think. Is that Ok? Do you want to ask me any questions before we start?

Right, my name is [First name only]. What are your names?

Pupil L: _____ Pupil M: _____ Pupil R: _____

What age are you all? Who's the oldest?.

Do any of you have a favourite subject?

1. Is maths anyone's favourite?

	Yes	No
L	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
M	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
R	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

[Direct Q1A to any pupils who have **not** picked maths as their favourite]

1a. Do you like maths?

	Yes	Ambivalent	No
L	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
M	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
R	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

2. If you had to say one thing, what would you say is the best thing about maths?

L _____

M _____

R _____

TEACHER ID _____ Initials:

3. And, if you had to say one thing,what would you say is the worst thing about maths?

L

M

R

4. What were you doing in maths class today – I know I was there, but I was trying to use the camera so I didn't see everything.

L

M

R

5. Did you like doing that?

L

M

R

6. Are most of your maths classes like today? Apart from me being there of course! Do you normally do different stuff?

L

M

R

7. Does your teacher ask people questions in maths class? Do you like when you get asked questions? Why? [if not already answered]

L

M

R

TEACHER ID _____ Initials:

8 Now I want you to think back to last year when you were in Second class. Did you all have the same teacher as now? Ok, think *right back* to before last Christmas. Remember your maths class Did you like it?

	Yes / was ok	Unclear/Not sure	Not really/No
L	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
M	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃
R	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃

9. Do you think maths was harder or easier last year?

L _____

M _____

R _____

10. Do you like maths more now, or did you like it more last year?

L _____

M _____

R _____

Finish up with thanks and any questions

Well, that's all the questions I have so thanks for all your help. Do you want to ask me any questions?

.....

TEACHER ID _____ Initials:

SECOND pupil interview

Hi everyone. My name is _____ and I'm here to find out all about good ways of learning maths. To do that, I'm looking at what your teachers do. That's why I was in the class today, and that's why I was here around Christmas time too.

I also really want to know what *pupils* think of maths. So, I'm talking to pupils like you. Did I talk to any of you when I was here the last time? [pause and let them answer]

OK, I'm going to ask you a few questions, and you can tell me *anything* you want. There are no right or wrong answers – I'm interested in what you *really* think, not what you're *supposed* to say. So, don't worry, just tell me what you think.

Is that Ok? Do you want to ask me any questions? [pause] Now, before we start, what are your names?

Pupil L: _____ Pupil M: _____ Pupil R: _____

What age are you all? Who's the oldest?.

1. Do any of you have a favourite subject? [pause] Is maths anyone's favourite?

	Yes	No
L	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
M	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
R	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

[Direct Q1A to any pupils who have **not** picked maths as their favourite]

1a. Even if it's not your favourite, do you like maths?

	Yes	Ambivalent	No
L	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
M	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂
R	<input type="checkbox"/> ₁	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂

2. If you had to say one thing, what would you say is the best thing about learning maths?

L

M

R

TEACHER ID _____ Initials:

3. **And, if you had to say one thing,what would you say is the worst thing about learning maths?**

L

M

R

4. **Are most of your maths classes like today? Apart from me being there of course! Do you normally do different stuff?**

L

M

R

5. **Does your teacher ask people questions in maths class? Do you like when you get asked questions? Why? [if not already answered]**

L

M

R

6. **Do you ever have to ask *each other* questions in maths class? [if yes] What's that like?**

L

M

R

7. **Do you spend much time working on your own – like in your workbook or copybook? [pause] Do you like that?**

L

M

R

TEACHER ID _____ Initials:

Now I want you to think back to last year when you were in Second class. Did you all have the same teacher as now? Ok, think *riiiight* back. Remember your maths class Think, "did I like it? Was it easy or hard, fun or boring, did I play more games" – that sort of thing?

8 So – first harder or easier?

L Harder last year ₁ Easier last year ₂

M Harder last year ₁ Easier last year ₂

R Harder last year ₁ Easier last year ₂

9 Fun or boring?

L fun ₁ boring ₂

M fun ₁ boring ₂

R fun ₁ boring ₂

10 Do you play more games now? Or did you play more then?

L More now ₁ then ₂

M More now ₁ then ₂

R More now ₁ then ₂

11 And finally, do you like maths more now, or more last year?

Now

Unclear/Not sure

Then

L

₁

₂

₃

M

₁

₂

₃

R

₁

₂

₃

Finish up with thanks and any questions

Well, that's all the questions I have so thanks for all your help. Do you want to ask me any questions?

.....

TEACHER ID _____ Initials:

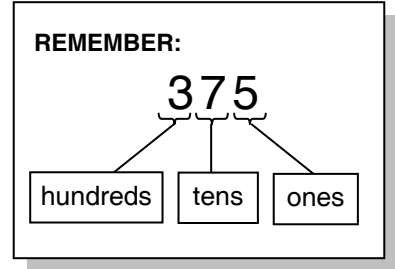
Appendix G

This appendix contains the sample JUMP lesson plans (with accompanying BLMs) and sample pupil worksheets, both covering the following topics:

- Place Value
- Writing and Reading Number Words
- Writing Numbers
- Representation with Base Ten Materials.

1. Write the place value of the underlined digit.


- a) 17 b) 98
- c) 24 d) 63
- e) 381 f) 972
- g) 457 h) 79
- i) 261 j) 8



2. Give the place value of the number 5 in each of the numbers below.

HINT: Underline the 5 in each question first.

- a) 50 b) 15
- c) 251 d) 586
- e) 375 f) 584

 3. You can also write numbers using a place value chart.

Example:

In a place value chart, 431 is:

hundreds	tens	ones
4	3	1

Write the following numbers into the place value chart.

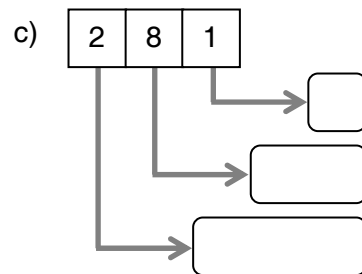
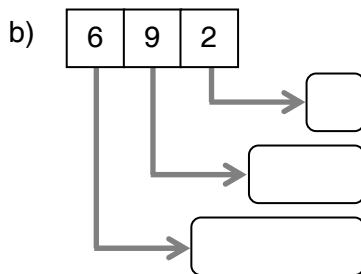
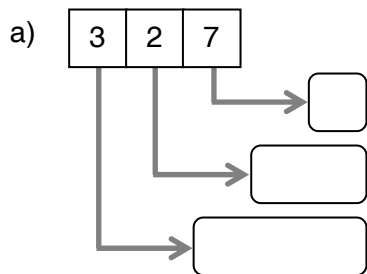
	hundreds	tens	ones
a) 65	0	6	5
b) 283			
c) 17			
d) 942			
e) 408			

	hundreds	tens	ones
f) 130			
g) 753			
h) 4			
i) 201			
j) 989			

The number 475 is a **3-digit number**.

- The **digit** 4 stands for 400 – the **value** of the digit 4 is 400.
- The **digit** 7 stands for 70 – the **value** of the digit 7 is 70.
- The **digit** 5 stands for 5 – the **value** of the digit 5 is 5.

1. Write the **value** of each digit.



2. What does the digit 3 stand for in each number? The first one is done for you.

- | | | | |
|---|--|--|--|
| a) 237
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text" value="30"/> | b) 523
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | c) 638
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | d) 326
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> |
| e) 403
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | f) 732
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | g) 309
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | h) 883
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> |
| i) 321
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | j) 203
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | k) 532
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> | l) 937
<input style="width: 50px; height: 20px; border: 1px solid black;" type="text"/> |

3. Fill in the blanks.

- a) In the number 657, the **digit** 5 stands for _____ .
- b) In the number 248, the **digit** 2 stands for _____ .
- c) In the number 129 the **digit** 1 stand for _____ .
- d) In the number 380, the **value** of the digit 8 is _____ .
- e) In the number 267, the **value** of the digit 7 is _____ .
- f) In the number 847 the **value** of the digit 8 is _____ .
- g) In the number 803, the digit _____ is in the **hundreds place**.
- h) In the number 596, the digit _____ is in the **tens place**.
- i) In the number 401, the digit _____ is in the **tens place**.

1. Circle the pair of numbers that starts with same sound.

a) two
2 fifteen
15 twelve
12

b) thirteen three fifteen
13 3 15

2. Write numbers for the number words.

a) nineteen = 1 9

b) eighteen =

c) sixteen =

d) fifteen =

e) thirteen =

f) twelve =

 g) seventy =

h) fifty =

i) eighty =

j) forty =

3. Write the word ending for each numeral.

- | | | |
|-----------------------------|--------------------|--------------------|
| a) 60 = six <u>ty</u> _____ | b) 16 = six_____ | c) 40 = for_____ |
| d) 14 = four_____ | e) 50 = fif_____ | f) 20 = twen_____ |
| g) 13 = thir_____ | h) 18 = eight_____ | i) 70 = seven_____ |

4. Cover up your work in Questions 2 and 3. Write words for the numerals.

- | | | |
|------------------------------|---------------|---------------|
| a) 70 = <u>seventy</u> _____ | b) 60 = _____ | c) 90 = _____ |
| d) 17 = _____ | e) 16 = _____ | f) 19 = _____ |
| g) 40 = _____ | h) 50 = _____ | i) 30 = _____ |
| j) 14 = _____ | k) 15 = _____ | l) 13 = _____ |

1. Write numerals for the following words.

- a) six _____ b) eight _____ c) nine _____
 d) thirty-two _____ e) seventy-five _____ f) eighty-two _____
 g) two hundred six _____ h) three hundred twelve _____
 i) four hundred sixty-seven _____
 j) six hundred forty-nine _____

Number Words for the Ones Place

zero	five
one	six
two	seven
three	eight
four	nine

2. Write the number words for the numerals.

- a) 2 _____ b) 5 _____
 c) 17 _____ d) 12 _____
 e) 22 _____ f) 73 _____
 g) 37 _____ h) 64 _____

Number Words for the Teens

eleven	sixteen
twelve	seventeen
thirteen	eighteen
fourteen	nineteen
fifteen	

3. Writing numbers 100 to 999.

Step 1: *Underline the left-most digit. Write its value.*

- a) 4 3 5 four hundred _____
 b) 2 3 7 _____
 c) 5 2 1 _____

Number Words for the Tens Place

ten	sixty
twenty	seventy
thirty	eighty
forty	ninety
fifty	

Step 2: *Cover the left-most digit. Write the number words for the remaining digits.*

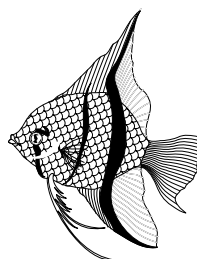
- d) **6** 8 2 six hundred eighty-two _____
 e) 7 9 3 seven hundred _____
 f) 8 5 1 eight hundred _____

4. Write number words for the following numerals.

- a) 121 _____
- b) 307 _____
- c) 698 _____
- d) 846 _____
- e) 913 _____

5. Underline the number word or words in each sentence.

- a) Paula has three pet fish.
- b) Keiko bought thirty grapes.
- c) A bus can hold sixty-four children.
- d) Pat ran three kilometres in forty-five minutes.
- e) Jerome will be nine years old in two weeks.



6. In each blank write a number word that would make sense.

- a) There are _____ days in a week and _____ hours in a day.
- b) There are _____ boys and _____ girls in a grade _____ class.
- c) In the last _____ hours, I ate _____ meals.
- d) I can run non-stop for _____ minutes.
- e) I can hold my breath for _____ seconds.

7. Write the numbers provided in words on the signs where they are missing.

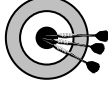
a)

FOR SALE

(8) _____ kittens.



b)

Dart Toss 

Grey: (3) _____ points.

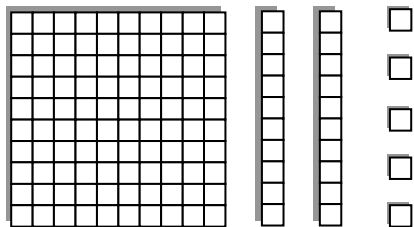
White: (7) _____ points.

Black: (12) _____ points.

1. What number is shown in the picture?

Write your answer in **expanded form** (as shown in the example).

Example:



1 hundreds + 2 tens + 5 ones = 125

Base ten blocks are used to represent ones, tens, and hundreds:

= 100
 = 10
 = 1

a) _____ hundreds + _____ tens + _____ ones =

b) _____ hundreds + _____ tens + _____ ones =

c) _____ hundreds + _____ tens + _____ ones =

d) _____ hundreds + _____ tens + _____ ones =

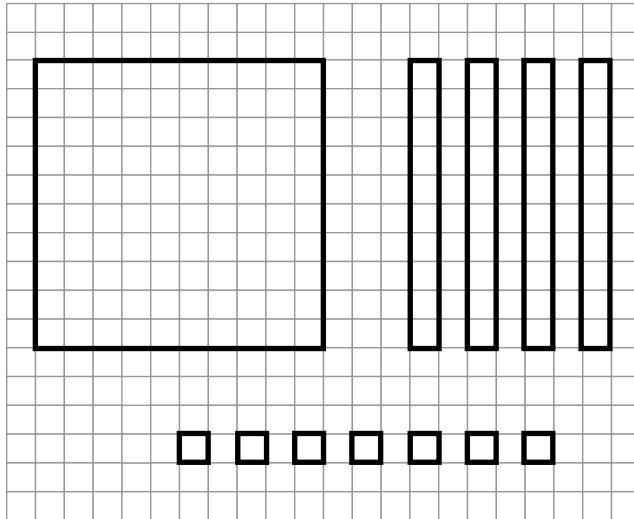
BONUS

2. Make your own model of a number using base ten blocks.
Write your number in expanded form in the space below.

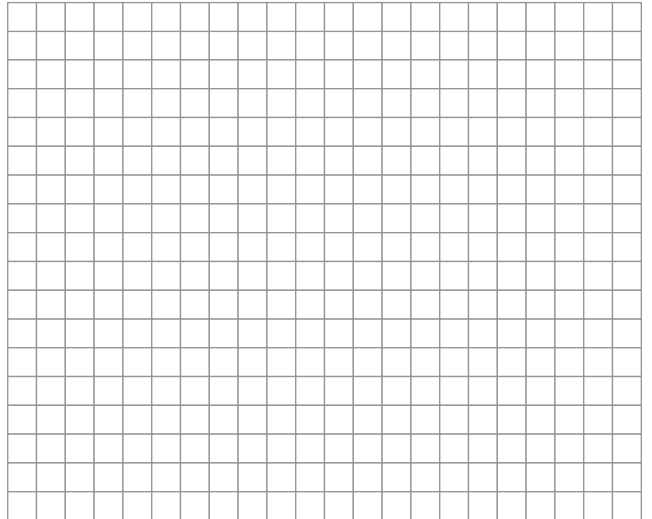
3. Using the chart paper below, draw base ten models for the following numbers.
(Be sure to make your models the right size!)

The first one has been done for you.

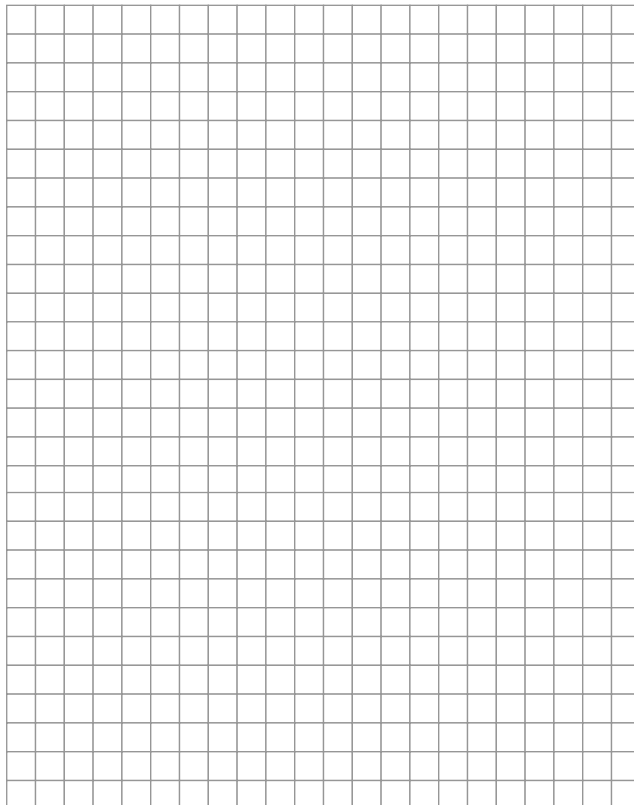
a) 147



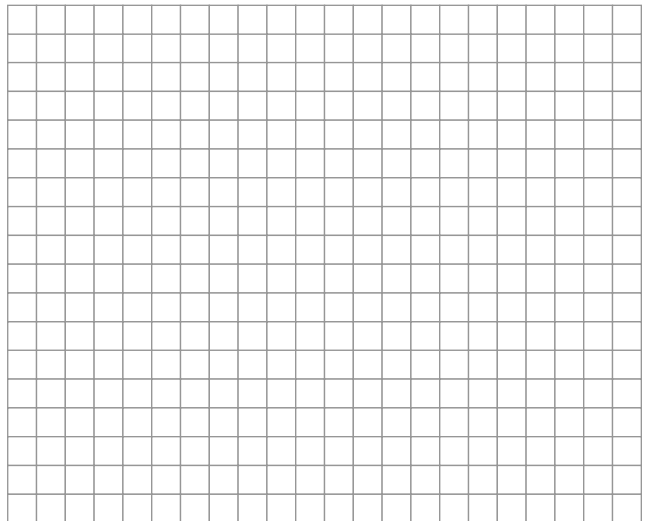
b) 63



c) 405



d) 98



4. Draw base ten models for ...

a) 327 b) 200 c) 52

NS3-1 Place Value – Ones, Tens and Hundreds

Goals: Students will identify the place value of digits in 2- and 3-digit numbers.

Prior Knowledge Required: Number Words — one, ten, hundred— and their corresponding numerals

Vocabulary: the numbers from 1–10, both the sounds and the numerals

Photocopy the **BLM** “Place Value Cards” and cut out the three cards. Write the number 321 on the board, leaving extra space between all the digits, and hold the “ones” card under the 3.

ASK: Did I put the card in the right place? Is 3 the ones digit? Have a volunteer put the card below the correct digit. Invite volunteers to position the other cards correctly. Cards can be affixed to the board temporarily using tape or sticky tack.

Now erase the 3 and take away the hundreds card. ASK: Are these cards still in the right place? Write the 3 back in, put the hundreds card back beneath the 3, erase the 1, and remove the ones card. ASK: Are these cards still in the right place? Have a volunteer reposition the cards correctly. Repeat this process with 3 1 (erase the 2).

Write 989 on the board and ask students to identify the place value of the underlined digit. (**NOTE:** If you give each student a copy of the **BLM** “Place Value Cards,” individuals can hold up their answers. Have students cut out the cards before you begin.) Repeat with several 2- and 3-digit numbers that have an underlined digit.

Vary the question slightly by asking students to find the place value of a particular digit without underlining it. (EXAMPLE: Find the place value of the digit 4 in the numbers: 401, 124, 847.) Continue until students can identify place value correctly and confidently. Include examples where you ask for the place value of the digit 0.

Then introduce the place value chart and have students write the digits from the number 231 in the correct column:

	Hundreds	Tens	Ones
a) 231	2	3	1

Do more examples together. Include numbers with 1, 2, and 3 digits and have volunteers come to the board to write the numbers in the correct columns.

Extensions:

1. Teach students the Egyptian system for writing numerals, to help them appreciate the utility of place value.

1 = | (stroke)

10 = ∩ (arch)

100 = ☉ (coiled rope)

Write the following numbers using both the Egyptian and our Arabic systems:

234 ୧୧ ୩ ୩ ୩ ||||

848 ୧୧୧୧ ୧୧୧୧ ୩ ୩ ୩ ୩ |||||

423 ୧୧୧୧ ୩ ୩ ||||

Invite students to study the numbers for a moment, then ASK: What is different about the Egyptian system for writing numbers? (It uses symbols instead of digits. You have to show the number of ones, tens, and so on individually—if you have 7 ones, you have to draw 7 strokes. In our system, a single digit (7) tells you how many ones there are.) Review the ancient Egyptian symbols for 1, 10, and 100, and ask students to write a few numbers the Egyptian way and to translate those Egyptian numbers into regular numbers (using Arabic numerals). Emphasize that the order in which you write the symbols doesn't matter:

234 = ୧୧ ୩ ୩ ୩ |||| = |||| ୧୧ ୩ ୩ ୩

ASK: Does the order in which you write regular digits matter? Is 234 the same as 423? In the Egyptian way, does the value of a symbol depend on its place? In our way, does the value of a digit depend on its place? Are the ones, tens and so on always in the same place in our system? In the Egyptian system? Why is our way called a place value system?

Have students write a number that is really long to write the Egyptian way (EXAMPLE: 798). ASK: How is our system more convenient? Why is it helpful to have a place value system (i.e. the ones, tens, and so on are always in the same place)? Having a place value system allows you to use the same symbol to mean many different values. The digit 7, for example, can mean 7 ones, 7 tens or 7 hundreds depending on where it is in the number.

Students might want to invent their own number system using the Egyptian system as a model.

2. Have students identify and write numbers given specific criteria and constraints.
 - a) Write a number between 30 and 40.
 - b) Write an even number with a 6 in the tens place.
 - c) Write a number that ends with a zero.
 - d) Write a 2-digit number.
 - e) Write an odd number greater than 70.
 - f) Write a number with a tens digit one more than its ones digit.

Harder

- g) Which number has both digits the same: 34, 47, 88, 90?
- h) Write a number between 50 and 60 with both digits the same.
- i) Find the sum of the digits in each of these numbers: 37, 48, 531, 225, 444, 372.
- j) Write a 2-digit number where the sum of the digits is 11.
- k) Write a 2-digit number where the digits are the same and the sum of the digits is 14.
- l) Write a 3-digit number where the digits are the same and the sum of the digits is 15.

Bonus:

Is there a 2-digit number satisfying the same conditions?

- m) Which number has a tens digit one less than its ones digit: 34, 47, 88, 90?
- n) Write a 2-digit number with a tens digit eight less than its ones digit.
- o) Write a 3-digit number where all three digits are odd.
- p) Write a 3-digit number where the ones digit is equal to the sum of the hundreds digit and the tens digit.

Make up more such questions, or have students make up their own.

NS3-2 Place Value

Goals: Students will understand the value of digit in 2-, and 3-digit numbers.

Prior Knowledge Required: Place Value: Ones, Tens, Hundreds

Vocabulary: ones, tens, and hundreds digit, value

Write 836 on the board. SAY: The number 836 is a 3-digit number. What is the place value of the digit 8? (If necessary, point to each digit as you count aloud from the right: ones, tens, hundreds). SAY: The 8 is in the hundreds place, so it stands for 800. What does the digit 3 stand for? (30) The 6? (6)

Explain that 836 is just a short way of writing $800 + 30 + 6$. The 8 actually has a value of 800, the 3 has a value of 30, and the 6 has a value of 6. Another way to say this is that the 8 stands for 800, and so on.

ASK: What is 537 short for? 480? 35? 601? Write out the corresponding addition statements for each number (also known as the expanded form).

ASK: What is the value of the 6 in 608? In 306? In 762? In 506?

ASK: In the number 831, what does the digit 3 stand for? The 1? The 8?

ASK: What is the value of the 0 in 340? In 403? In 809? Emphasize that 0 always has a value of 0, no matter what position it is in.

ASK: In the number 856, what is the tens digit? Ones? Hundreds? Repeat for 350, 503, 455, 770, 820.

Write the following numbers on the board: 350, 503, 435, 537, 325, 753. Ask students to identify which digit, the 5 or the 3, is worth more in each number. Students should be using the phrases introduced in the lesson—stands for, has a value of, is short for. (EXAMPLE: In 350, the 5 stands for 50 and the 3 stands for 300, so the digit 3 is worth more.)

Extension: If your students are familiar with the concept “how many times more”, ASK: What is the value of the first 1 in the number 11? What is the value of the second 1? How many times more is the first 1 worth than the second 1? Repeat with more numbers in which the digit 1 is repeated (EXAMPLES: 131, 110, 101, 211, 171).

Goals: Students will read and write number words to twenty and multiples of ten up to ninety.

Prior Knowledge Required: Reading and writing number words to ten
Place value (ones and tens)
Saying the alphabet

Vocabulary: numeral, number word, ones and tens digits

Write the following words on the board, all in a row:

eighteen thirteen seventeen sixteen nineteen fifteen

Ask the class to read the words out loud together and then ask volunteers to write the corresponding numerals under the words.

ASK: What number does the word “teen” remind you of? Guide them by asking them to look at the letters—is it spelled almost the same as a number they know? Tell them that eighteen is $8 + 10 = 18$. ASK: Where can you see “eight” in eighteen? Where can you see a word that looks like “ten” in the word eighteen?

Have volunteers fill in the blanks with the correct number words:

- | | |
|-----------------------------|------------------------------|
| a) fourteen = _____ + ten | b) seventeen = _____ + seven |
| c) eighteen = _____ + _____ | d) nineteen = _____ + _____ |
| e) thirteen = _____ + _____ | f) fifteen = _____ + _____ |
| g) _____ = six + ten | h) twelve = _____ + _____ |
| i) eleven = _____ + _____ | |

Have individual students write the missing words in their notebooks:

- | | |
|----------------------------|----------------------------|
| a) sixteen = _____ + ten | b) seventeen = _____ + ten |
| c) nineteen = nine + _____ | d) thirteen = _____ + ten |
| e) fourteen = _____ + four | f) fifteen = _____ + ten |

Have student volunteers circle the beginning letters that are the same.

- | | | |
|------------------|-------------------|------------------|
| a) six sixteen | b) five fifteen | c) nine nineteen |
| d) four fourteen | e) three thirteen | f) two twelve |

Then, for each pair above, have students write the correct numerals in their notebooks and to circle the digits that are in common.

Repeat the above exercise with ending letters instead of beginning letters for the following pairs.

- | | | |
|----------------------|-----------------------|---------------------|
| a) thirteen fourteen | b) seventeen eighteen | c) nineteen fifteen |
|----------------------|-----------------------|---------------------|

Then write on the board: twenty = 20 two = 2

ASK: What two beginning letters do those words have in common? (tw) What digit is in both numbers? (2)

Write on the board: thirty. ASK: Can anyone think of a word for a 1-digit number that starts with the same two letters? (three) Then write: thirty = 0 ___ ___ three = 3
 Have a volunteer fill in the blank.

Write: forty = ___0___ fifty = 0 ___ ___ thirty = sixty = ___ ___
 Have volunteers fill in the blanks by looking carefully at the beginning letters and asking themselves what one-digit number those letters remind them of.

ASK: What ones digit do these numbers all have? What letter do the words all end with? Tell them that any number word ending with “y” will always mean a number having ones digit 0.

Ask volunteers to guess how the following number words are written as numbers:
 eighty ninety seventy

Challenge them to find a 2-digit number having ones digit 0 whose number word doesn't end with “y”. (10)

Have students write the numerals for the following number words individually:

- | | | | | | |
|-------------|----------|----------|-------------|--------|----------|
| a) thirty | thirteen | three | b) twenty | two | twelve |
| c) four | fourteen | forty | d) eighteen | eighty | eight |
| e) seven | ninety | thirteen | eighty | nine | fourteen |
| f) nineteen | sixty | forty | fifteen | twelve | eight |

Have students write individually the number word ending for these words:

- | | | |
|--------------------|--------------------|-------------------|
| a) 30 = thir_____ | b) 20 = twen _____ | c) 13 = thir_____ |
| d) 17 = seven_____ | e) 40 = for_____ | f) 80 = eigh_____ |
| g) 18 = eigh_____ | h) 19 = nine_____ | i) 90 = nine_____ |

Finally, have students write the full number words:

- | | | | |
|---------------|---------------|---------------|---------------|
| a) 20 = _____ | b) 19 = _____ | c) 90 = _____ | d) 17 = _____ |
| e) 13 = _____ | f) 80 = _____ | g) 50 = _____ | h) 15 = _____ |

Activity: On the web-site: <http://www.funbrain.com/numwords/index.html> students can use Method 1 to write the number word in the correct place on the cheque or use Method 2 to read the number word and write the correct numeral. You may choose between numbers from 0 to 10, 0 to 100, 0 to 1000 or 0 to 10 000, depending on the level of your students.

Extensions:

1. Provide the **BLM** “*Number Word Search*.” Encourage students to use the message they find after finishing the puzzle as a way to check that they did the puzzle correctly.
2. Write the alphabet on the board with enough spacing between the letters to circle some of them.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Write the word “act” on the board and ask a volunteer to circle, in the list, the letters that appear in the word “act”. ASK: Are the letters in the same order in the word “act” as they are in the alphabet?

Have another student, using a different colour of chalk, circle the letters from the word “sun”.

ASK: Are the letters in the same order in the word “sun” as they are in the alphabet? What order do they appear in the alphabet? (n-s-u). Have students decide whether or not each of the following words are written alphabetically: bat, box, cat, mom, snow, most, now, win, lose, knot, knots, stone, ghost.

Challenge students to find the longest alphabetical word that they can.

ASK: Is “dog” alphabetical? Is “doghouse” alphabetical? Fun? Funny? On? One? Pony? Phone? Bone? Top? Stop? Tops?

Tell your students that you know that since “on” is not alphabetical, you know that the following words cannot be alphabetical either: pony, money, gone, only. Ask them to explain your thinking.

Then make the connection to number words: Are any of the number words from one to ten written alphabetically? Eleven to twenty? Did they need to check all the number words from eleven to twenty? Is there a sequence of letters common to many of the number words? (teen is in many of them and is not alphabetical, so we don’t even need to check thirteen to nineteen)

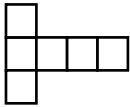
Which of the following multiples of ten is written alphabetically?

- a) ten b) twenty c) thirty d) forty e) fifty f) sixty

3. Make a chart on the board with headings as follows:

3 letters 4 letters 5 letters 6 letters 7 letters 8 letters 9 letters

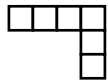
Have student volunteers write number words that fit in each column. Students should use number words from zero to twenty as well as multiples of ten up to ninety (thirty, forty, and so on to ninety). When most words are on the list, draw the following puzzle on the board:



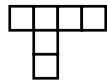
Tell students that we want to solve this puzzle using number words. Point to the vertical group of 3 squares and ask students if the word FIVE will fit. Why not? How many letters does the word need to have to fit? Refer your students to the list of 3-letter words they made and ask if there are any they missed.

THEN SAY: How many letters should the other word have? Repeat the chart for words with 4 letters (zero, four, five, nine).

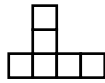
Then tell students that one of the letters from the 3-letter word has to be the same as one of the letters from the 4-letter word. Ask if they can tell which letter from each word needs to overlap the other word. Have a volunteer circle the second letter from each 3-letter word and have another volunteer circle the first letter from each 4-letter word. Tell them that the 2nd letter from the 3-letter word is either n, w, i or e and that the 1st letter from the 4-letter word is either f, f or n. Tell them that if there are going to be words that fit in the puzzle, there had better be a letter in both lists. What letter is in both lists? (n) Which 3-letter word has n as its second letter? (one) Which 4-letter word starts with n? (nine) Write the words into the puzzle for them. Below are more puzzles (with the answers in brackets) your students can practice with.



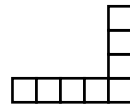
(zero, one)



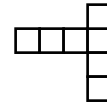
(four, one)



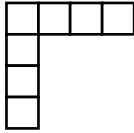
(one, zero
or two, four)



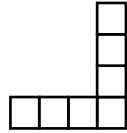
(five, three)
or nine, three)



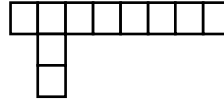
(zero, four
or five, zero
or nine, zero)



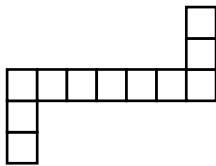
(four, five)



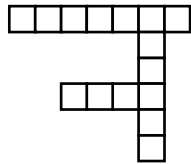
(five, nine)



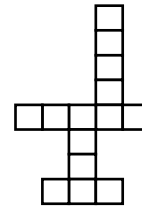
(fourteen, one)



(six, sixteen, ten)



(seventy three, four)



(eight, fifty, five, ten)

4. Give students the **BLM** “Number Words Crossword Puzzle”.
5. Give students the **BLM** “Crossword Without Clues”.
6. Hand out the **BLM** “Recognizing Number Words”. The sheet asks students to circle the number words and to cross out the words that only sound like number words. Have a copy of the BLM on the board or overhead projector. Read the page out loud and point to the words as you say them. Give lots of hints. For example, “Eight children ate pie”. What were the people in this sentence doing? Were they sleeping, playing, eating or working? What were they eating? How many children ate pie?” Repeat the sentence several times so that all students can see that “eight” is the number word and “ate” only sounds like a number word. Remind the students that they should circle the number words and cross out the words that only sound like number words. When a word sounds like a number word other than the one in the sentence, students will benefit from hearing you read the sentence out loud and then saying some of the number words from one to ten and then repeating the sentence out loud as often as necessary. When all students have correctly done this sheet, hand out the **BLM** “Spelling Number Words” and have students look at their completed sheet to answer the questions. This sheet will give students a taste of how they can use the context of words to figure out the correct spelling. It will also show them that some words that sound the same can be spelled differently.

NS3-4 Writing Numbers

Goal: Students will read and write number words up to nine hundred ninety-nine.

Prior Knowledge Required: Reading and writing number words to twenty and multiples of ten to ninety

Vocabulary: numeral, number word, digit

Write “twenty” on the board and ask a volunteer to write the corresponding numeral. Ask them what number they think the number word “twenty-three” means. Can they think of an addition sentence from this word? ($20 + 3 = 23$) Repeat for twenty-seven and twenty-one. Have students individually write the numbers for the following words:

twenty-two twenty-five twenty-nine twenty-six twenty-eight twenty-four

Then write: thirty-six. SAY: if thirty means 30 and six means 6, what number do you think thirty-six means? What addition sentence can you write from that? ($30 + 6 = 36$) To help them find $30 + 6$, provide a number line or use a metre stick as a number line. Show them where 30 is on the number line so that they just have to move ahead six places.

Have a volunteer write the number for thirty-five with the addition sentence ($35 = 30 + 5$), then have students write the numbers with addition sentences for each number word below:

thirty-three thirty-two thirty-eight thirty-four

Provide them with a number line so that they can see how to add the numbers.

Show them where to find 10, 20 and 30 on the number line and then challenge them to find 40 on the number line. Have a volunteer write the 2-digit number “forty-seven” on the board by looking at a number line and adding the two parts of the number they see. Summarize to the class how the volunteer is finding the number 40 and then adding 7 to find 47. Repeat: thirty-six, twenty-seven, forty-two, thirty-one, forty-five, fifty-four.

Write the number sentences on the board:

$$73 = \mathbf{70} + 3$$

seventy-three

$$32 = \mathbf{30} + 2$$

thirty-two

$$54 = \mathbf{50} + 4$$

fifty-four

$$61 = \mathbf{60} + 1$$

sixty-one

$$15 = 5 + \mathbf{10}$$

fifteen

$$18 = 8 + \mathbf{10}$$

eighteen

$$13 = 3 + \mathbf{10}$$

thirteen

$$16 = 6 + \mathbf{10}$$

sixteen

If available, use an overhead projector and write the parts in bold in a different colour. Point to each question and ASK: Where do you see the first digit of the number in the number word – at the beginning or at the end? Which numbers have the first digit at the beginning? (twenty and higher) Which numbers have the first digit at the end? (thirteen to nineteen).

When you write twenty-seven, where do you see the first digit in the number word? Where do you see the last digit? Have them compare this with the number word seventeen. Tell them that number words for numbers twenty and higher are a bit different from what they've seen so far because the first digit is read first and the last digit is read last. Have students individually write the numbers for the following number words:

thirty-eight forty-five twenty-six thirty-four fifty-one fifty-four
sixty-seven eighty-nine seventy-four ninety-one eighty-eight forty-two

Then have students write numerals for number words between zero and ninety-nine:

twenty-eight eighteen sixteen four forty
forty-three zero fifty fifty-eight thirteen
twelve nineteen twenty-nine fifty-nine forty-eight
thirty-four thirty-one eleven six fifteen

Have students write number words for numerals between 0 and 99:

a) 41 b) 32 c) 90 d) 9 e) 89 f) 74 g) 99 h) 0 i) 50 j) 25 k) 17 l) 11

Invite students to find any mistakes in the way the following number words are written and to correct them (some are correct):

forty-zero forty-three twenty-eight thirty nine eight-five seventy-six

Summarize the process for writing numbers between 20 and 99: You can write the 2-digit number by writing the word for the first digit times ten, a hyphen, and then the word for the second digit, as long as it isn't zero. If the second digit is zero, you write only the word for the first digit times ten.

EXAMPLE: $35 = 3 \times 10 + 5$ and is written as thirty-five, but 30 is written as thirty, not thirty-zero.

ASK: How is writing the number words for 11 to 19 different? (They don't follow the same pattern.)

Write the number words for 11 through 19 on the board and invite students to look for patterns and exceptions (eleven and twelve are unique; the other numbers have the ending "teen").

Once students have mastered writing numbers up to 99, tell them that writing hundreds is even easier. There's no special word for three hundreds like there is for three tens:

$30 = 10 + 10 + 10 =$ thirty *but*

$300 = 100 + 100 + 100 =$ three hundred (not three hundreds)

SAY: You just write what you see: three hundred. There's no special word to remember.

Have students write the number words for the 3-digit multiples of 100: 200, 300, 400, and so on.

Remind them not to include a final "s" even when there is more than one hundred.

Tell students that they can write out 3-digit numbers like 532 by breaking them down. Say the number out loud and invite students to help you write what they hear: five hundred thirty-two. Point out that there is no dash between "five" and "hundred." Have students practice writing number words for many 3-digit numbers. EXAMPLES: 134, 761, 898, 903, 740, 500, 601. Emphasize that the word "and" should not appear: 301 is written as "three hundred one" not as "three hundred and one."

Write some typical text from signs and banners and have students replace any number words with numerals and vice versa.

EXAMPLES:

- a) Montreal 181 km
- b) Speed Limit – 110 km/h
- c) Max. Height 3 m
- d) Seventy-Four Queen Street
- e) Saskatoon next four exits
- f) Bulk Sale! Buy ten for the price of five!
- g) Highway 61
- h) Bus Stop: Route 18
- i) Montreal Canadiens –
24 Stanley Cup Titles!
- j) Top Racing Broom for Witches and Wizards –
only \$599!

Then have students individually write the correct number words in the following sentences:

- a) There are _____ months in a year.
- b) There are _____ days in a week.
- c) There are (52) _____ weeks in a year.
- d) February normally has _____ days.
- e) A year normally has _____ days.
- f) A leap year has _____ days.

Then have students write number words that make sense:

- a) There are _____ girls and _____ boys in grade _____ at my school.
- b) My house is about _____ city blocks from my school.
- c) I can run _____ km in _____ minutes
- d) My teacher is about _____ years old.
- e) There are about _____ days in summer vacation.
- f) My birthday is in about _____ days from now.

Goal: Students will practice representing numbers with base ten materials.

Prior Knowledge Required: Place value
Base ten materials

Vocabulary: digit, ones digit, tens digit, hundreds digit, ones block, tens block, hundreds block

Photocopy the **BLM** “*Hundreds Chart and Base Ten Materials*” onto a transparency if available. Demonstrate how to find $3 + 4$ by taking 3 ones blocks and then another 4 ones blocks and placing them on the chart in order, so that the last block is on square 7. **ASK:** How can I find $13 + 5$ by using ones blocks and the hundreds chart?

ASK: How is the counting already done for them when they put the ones blocks on in order? Emphasize that they can see the answer by looking under the last ones block.

Tell your students that instead of using ten ones blocks to cover a row, you find it easier just to use one bigger block. Show them a tens block and ask if anyone remembers what the block is called.

Provide your students with the **BLM** “*Hundreds Charts*” as well as 10 tens blocks and 9 ones blocks each. Have students use 3 tens blocks and 5 ones blocks and cover the squares in order. The hundreds charts were drawn to be 10 cm by 10 cm so that a ones block will cover a grid square exactly. **ASK:** How many squares are covered? How do you know? (They should look under the last ones block to see the number 35.) Repeat for several examples. (41, 23, 59, 74, 99) Then ask your students what number they get if they use two tens blocks and no ones blocks (20). 5 tens blocks? 7 tens blocks? 10 tens blocks?

Tell your students that we used a tens block instead of ten separate ones blocks. **ASK:** What can we use instead of 10 tens blocks? (a hundreds block)

Give your students 2 hundreds blocks to add to their 10 tens blocks and 9 ones blocks. **ASK:** What number do you get if you place a hundreds block on the first hundreds chart and then 3 tens blocks and 7 ones blocks in order on the next hundreds chart? Repeat with:

- a) 1 hundreds blocks, 5 tens blocks, 4 ones blocks
- b) 1 hundreds block, 6 tens blocks, 2 ones blocks
- c) 1 hundreds blocks, 7 tens blocks, 5 ones blocks
- d) 1 hundreds blocks, 3 ones blocks
- e) 1 hundreds blocks, 2 tens block, 2 ones block
- f) 1 hundreds blocks, 1 tens block
- g) 1 hundreds block, 3 tens blocks
- h) 2 hundreds blocks.

Then show models of base ten blocks without using the hundreds chart and have students tell you what number is represented. **EXAMPLES:** 3 hundreds blocks, 4 tens blocks and 2 ones blocks; 5 hundreds blocks and 8 ones blocks.

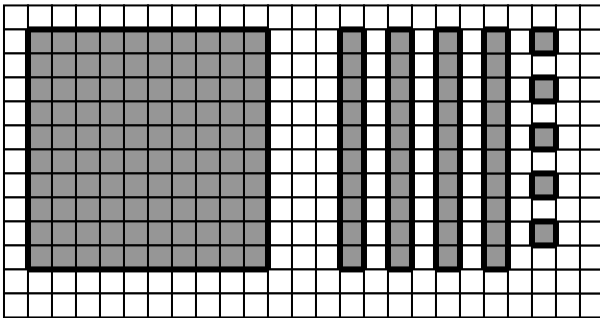
Now write only the expanded form and have students tell you what number is represented:

- a) 7 hundreds + 5 tens + 3 ones
- b) 9 hundreds + 0 tens + 6 ones
- c) 8 hundreds + 1 ten + 1 one
- d) 4 hundreds + 7 tens + 0 ones

Have your students write out the expanded form from the numerals.

EXAMPLE: 790 = 7 hundreds + 9 tens + 0 ones.

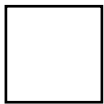
Demonstrate drawing a base ten model for 145 on grid paper:



Shade the blocks and ASK: How many little squares are shaded altogether? (145) Have students draw base ten models for other 2- and 3-digit numbers: 45, 60, 74, 104, 251, 300, 260.

Activities:

1. Give your students ones, tens, and hundreds blocks. Students might work in teams (with each team scoring a point for each right answer). Students might also sketch their answers (so you can verify that they have successfully completed the work):



Hundreds block



Tens block



Ones block

Instruction:

- a) Show 17, 31, 252, etc. with base ten blocks.
 - b) Show 22 using exactly 13 blocks.
 - c) Show 31 using 13 blocks.
- HINT: for b and c: Start with a standard model and trade for blocks of equal value.

Harder

- d) Show 315 using exactly 36 blocks.

Extension: Change the order of the words hundreds, tens and ones and have students fill in the blanks.

EXAMPLE: 793 = ____ tens + ____ hundreds + ____ ones

Place Value Cards



Ones



Tens



Hundreds



Number Word Search

Find:

one	ten	eleven	two	twenty
twelve	three	thirty	four	forty
fifty	zero	seventeen	eight	

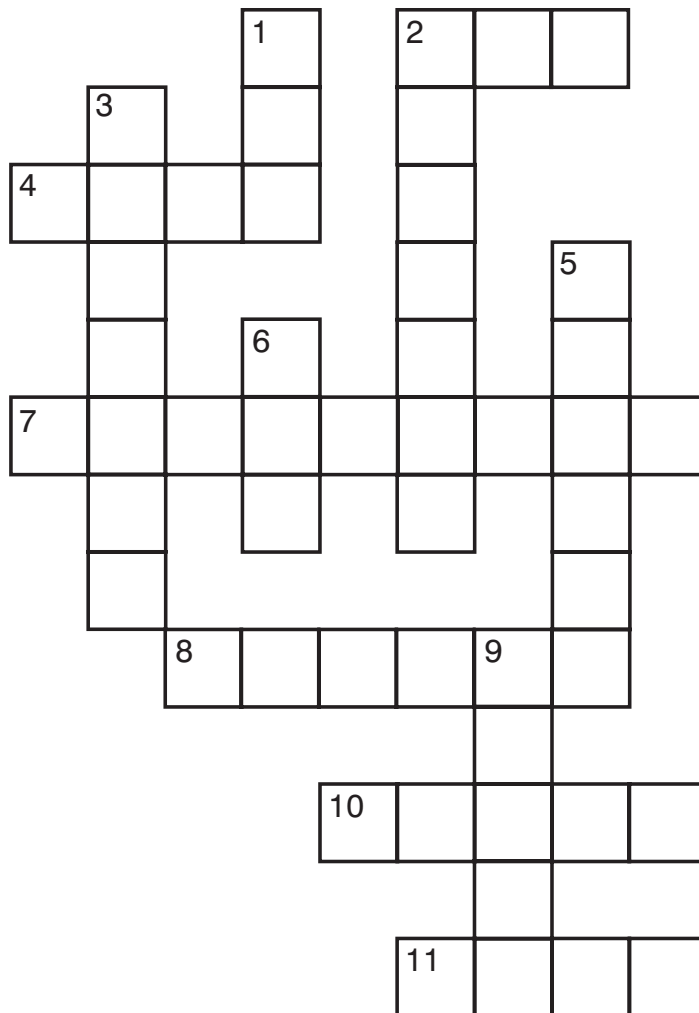
w	t	i	t	w	e	n	t	y
n	w	t	e	o	e	r	t	s
f	o	u	r	v	n	y	w	p
s	e	v	e	n	t	e	e	n
z	t	l	e	r	r	i	l	f
e	e	f	i	f	t	y	v	o
r	n	h	g	n	g	a	e	r
o	t	t	h	r	e	e	n	t
d	s	u	t	m	m	e	r	y

Use the leftover letters to finish the message.

The four seasons are fall, _____ ,
 _____ .

This puzzle was made using the Internet tool at <http://www.superkids.com/aweb/tools/words/search>

Number Words Crossword Puzzle



Across

2. Four less than ten
4. Rhymes with fine
7. Ten + Seven
8. Fifty + Thirty
10. Twenty + Twenty
11. Nothing

Down

1. Eleven - Ten
2. Two more than sixty-eight
3. Twenty - Five
5. Two tens
6. Seven + Three
9. Seven - Four

Recognizing Number Words

Circle the number words.

Cross out the words that only sound like number words.

1. Eight children ate pie.
2. Ravi ate eight cookies.
3. She won two games.
4. He only won one game.
5. Four friends played soccer for fun.
6. She had to fix six bikes.

Spelling Number Words

Circle the spelling of the number words.

HINT: Look at the words you circled.

1	one	won	wun
---	-----	-----	-----

2	to	too	two
---	----	-----	-----

4	for	four	fore
---	-----	------	------

6	six	sicks	siks
---	-----	-------	------

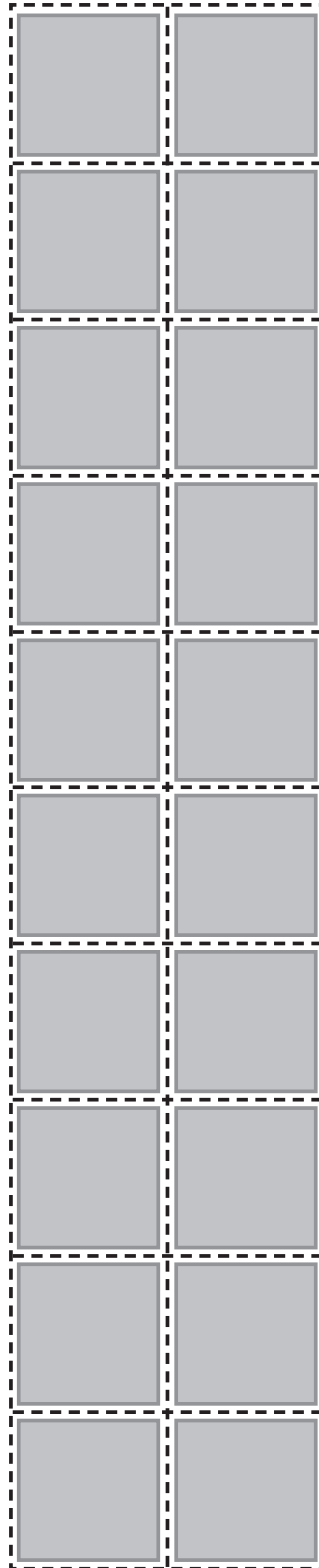
8	ate	eight	ait
---	-----	-------	-----

Hundreds Chart and Base Ten Materials

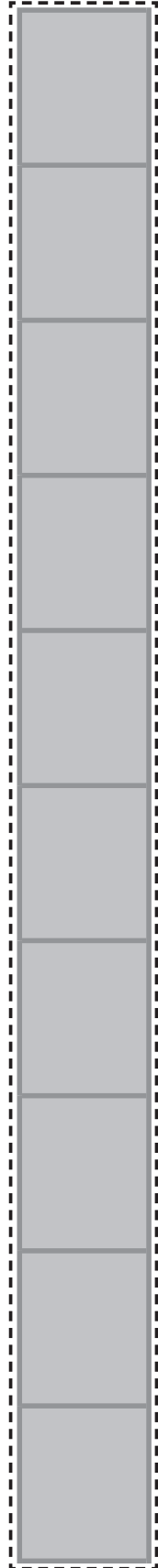
2 rows of a hundred chart:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Ones blocks:



Tens block:



Hundreds Charts

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	60
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	60
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	60
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	60
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Appendix H

PSMC Objectives: Coverage in JUMP materials

This appendix summarises which objectives are wholly, partly or not addressed by JUMP teaching materials. As can be seen from the JUMP differences column, coverage may be deemed partial because JUMP deals only with some of the detailed points mentioned by the Irish curriculum. (For instance, in the strand unit 'Number sentences', JUMP only partly addresses the objective 'Solve one-step number sentences' because the Irish curriculum cites examples using three-digit numbers, while JUMP only contains examples using one- and two-digit numbers). Coverage may also be deemed partial because material would need significant adaptation by teachers to be used in an Irish context. (For instance, in the strand unit 'Money – euro', JUMP's emphasis on the details of the Canadian currency mean that all materials would require adaptation).

JUMP materials fully address 63 objectives, partly address 6 objectives, and do not address one objective.

Strand: Number

Objective	JUMP Lesson Unit	JUMP differences	Addressed?
<i>Strand unit: Place value</i>			
Explore and identify place value in whole numbers, 0-999.	NS3-1, NS3-2. Also NS3-5.	Does not emphasise concrete materials	Yes
Read, write and order 3-digit numbers	NS3-4, NS3-5, NS3-6, NS3-8, NS3-9, NS3-11. See also money sections: NS-70 - 73	Uses 'three hundred [and] one' Refers to Canadian money.	Yes
Round whole numbers to the nearest ten or hundred	NS3-52, NS3-53.		Yes
Explore and identify place value in decimal numbers to one place of decimals.	NS3-87	Introduces decimal numbers as expressing tenths. Only deals with numbers between 0 and 10.	Yes
<i>Strand unit: Operations (Addition and subtraction)</i>			
Add and subtract, with and without renaming, within 999	NS3-21, 22, 23, 24, 25, 26,27. Also NS3-19- 20 (regrouping); NS3-55- 56 (estimating).	Uses term 'regrouping' for what PSMC terms 'renaming'.	Yes
Know and recall addition and subtraction facts	As above. Also Mental Math section in Teacher Manual 3.1, 'Addition and subtraction'	JUMP relies heavily on finger-counting model as strategy, in contrast to PSMC.	Yes
Solve word problems involving addition and subtraction	NS3-88- 91.		Yes

<i>Strand unit: Operations (Multiplication)</i>			
Develop an understanding of multiplication as repeated addition and vice versa.	NS3-36- 38. NS3-12-18 (skip-counting). NS3-34 (arrays).		Yes
Explore, understand and apply the zero, commutative and distributive properties of multiplication	NS3-35- 36 (zero). Also touches on commutative and distributive properties.	No formal treatment of commutative and (especially) distributive properties.	Yes
Develop and/or recall multiplication facts within 100.	NS3-39 (doubles). Also NS3-12- 18 (skip-counting) and Mental Math section in 3.1 'How to learn your times tables in a week'	No specific section on trebles. Strategies used for learning times tables differ from those generally used following PSMC	Yes
Multiply a one-digit or two-digit number by 0-10	NS3-36- 39 (multiplication of one-digit numbers). Also NS3-54- 55 (rounding).	Mainly excludes multiplication of two-digit numbers (exceptions: doubling, multiplying larger numbers by 10). Rounding section does not deal with multiplication.	Partly
Solve and complete practical tasks and problems involving multiplication of whole numbers	NS3-39 (includes word problems using multiplication). See also NS3-88 (word problems generally).		Yes
<i>Strand unit: Operations (Division)</i>			
Develop an understanding of division as sharing and as repeated subtraction, without and with remainders	NS3-58 – 61 (sharing); NS3-62 – 65 (division, incl. repeated addition); NS3-66 (remainders)	Expresses the principle termed repeated subtraction in PSMC as repeated addition.	Yes
Develop and/or recall division facts within 100	As above (esp/ NS3-65 – relates division to multiplication)	While division facts are embedded in the JUMP sections listed, there is not a specific section on them.	Yes
Divide a one-digit or two-digit number by a one-digit number with and without remainders	NS3-62 – 63; NS3-66.	PSMC mentions recording using division algorithm, JUMP does not use this.	Partly
Solve and complete practical tasks and problems involving division of whole numbers	NS3-64 – 66.	Examples integrated throughout these sections.	Yes
<i>Strand unit: Fractions</i>			
Identify fractions and equivalent forms of fractions with denominators 2, 4, 8, 10	NS3-78 – 84 (esp. 83). Also. 'Fractions Challenge', p. 3.		Yes

Compare and order fractions with appropriate denominators and position on the number line	NS3-84. 'Fractions Challenge' also relevant.	Does not address positioning fractions on number line.	Yes
Calculate a fraction of a set using concrete materials	NS3-81 and 82.	Various concrete materials suggested	Yes
Develop an understanding of the relationship between fractions and division		Only one section deals with fractions > 1 (NS3-85). No link with division is made.	No
Calculate a unit fraction of a number and calculate a number, given a unit fraction of the number	NS3-83 (calculate unit fraction of number).	Limited examples of calculating number when given unit fraction of the number.	Yes
Solve and complete practical tasks and problems involving fractions	NS3-83 and 84.	Examples integrated throughout these sections.	Yes
<i>Strand unit: Decimals</i>			
Identify tenths and express in decimal form	NS3-87	Terminology: 'two decimal eight' (for 'two point eight').	Yes
Order decimals on the number line	NS3-87		Yes
Solve problems involving decimals	NS3-87	Relatively few money-based problems included	Yes

Strand: Algebra

Objective	JUMP Lesson Unit	JUMP differences	Addressed?
<i>Strand unit: Number patterns and sequences</i>			
Explore, recognise and record patterns in number, 0-999	PA3-1 – 7. See also PA3-22.		Yes
Explore, extend and describe (explain rule for) sequences	PA3-3, PA3-6 – 18, PA3-23 – 25, PA3-30-32.	Very thorough coverage in JUMP materials.	Yes
Use patterns as an aid in the memorisation of number facts	PA3-26 – 29. See also NS3-34 (arrays).	JUMP covers this, although without using the hundred square mentioned by the IC.	Yes
<i>Strand unit: Number sentences</i>			
Translate an addition or subtraction number sentence with a frame into a word problem (frame not in initial position)	PA3-33 and 35; NS3-88 – 91.	JUMP focuses on translating word problems to number sentences, not vice versa.	Partly

Solve one-step number sentences	PA3-33, 35, 36.	E.g.s in PSMC contain three-digit numbers. JUMP does not move above two-digit numbers for these questions.	Yes
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Strand: Shape and Space

Objective	JUMP Lesson Unit	JUMP differences	Addressed?
<i>Strand unit: 2-D shapes</i>			
Identify, describe and classify 2-D shapes: square, rectangle, triangle, hexagon, circle, semicircle, oval and irregular shapes	G3-1, 3, 4. See also G11 – 13 (symmetry)	JUMP focuses on polygons, therefore no sections explicitly dealing with circle, semicircle, oval. Irregular shapes are not explicitly mentioned.	Yes
Explore, describe and compare the properties (sides, angles, parallel and non-parallel lines) of 2-D shapes	G3-1 – 17 (esp. 15)	Again, only covers polygons, but does this very thoroughly.	Yes
Construct and draw 2-D shapes	G3-1, 2, 5, 9, 10, 13, 15, 17.	PSMC suggests using templates, stencils, geostrips, geoboards. J provides templates and suggests using geoboards.	Yes
Combine, tessellate and make patterns with 2-D shapes/	G3-1, 5, 7, 17	Term “tessellation” not used, though principle applies in some congruency exercises (G3-7, 17).	Yes
Identify the use of 2-D shapes in the environment	G3-43. See also G3-13.		Yes
Solve and complete practical tasks and problems involving 2-D shapes	G3-1 – 17 inclusive.		Yes
<i>Strand unit: 3-D shapes</i>			
Identify, describe and classify 3-D shapes, including cube, cuboid, cylinder, cone, sphere, triangular prism, pyramid	G3-33, 34, 35, 38, 41	Most emphasis on pyramids and various kinds of prisms. Cylinders and cones in G3-38 and BLMs, also A and P pupil workbook G3-40. Spheres not mentioned.	Yes
Explore, describe and compare the properties of 3-D shapes	G3-35, 38, 40, 41, 42	Again, most emphasis on pyramids and prisms.	Yes
Explore and describe the relationship of 3-D shapes with constituent 2-D shapes	G3-35, 36, 37, 39, 40, 41 (esp. 40).	Again, most emphasis on pyramids and prisms. Table included in J in G3-40 (as suggested in IC), but does not require all names of 2-D parts.	Yes

Construct 3-D shapes	G3-36, 37. See also G3-39 (drawing 3-D shapes on dot paper).	Again, limited to prisms and pyramids. (G3-39).	Yes
Solve and complete practical tasks and problems involving 2-D and 3-D shapes	G-33 – 43 inclusive		Yes
<i>Strand unit: Symmetry</i>			
Identify line symmetry in the environment	G3-12 and 13	At least some 'environmental' examples are included in these JUMP sections.	Yes
Identify and draw lines of symmetry in two-dimensional shapes	G11 – 13.		Yes
<i>Strand unit: Lines and angles</i>			
Identify, describe and classify vertical, horizontal and parallel lines	A and P pupil workbook G3-12.	While vertical and horizontal lines are implicit in JUMP symmetry sections (G3-11 – 14), there is nothing on parallel lines.	Partly
Recognise an angle in terms of a rotation	G3-2 (angles), G3-30 (rotations).	While PSMC emphasises forming angles through concrete materials, JUMP introduces angles more theoretically, and does not explicitly link them with rotations. (However, G3-2 includes some suggestions of using concrete materials).	Yes
Classify angles as greater than, less than or equal to a right angle	G3-2		Yes
Solve problems involving lines and angles	G3-2, G3-12 – 13. See also A and P pupil workbook G3-2.	Main line problems involve symmetry (G3-12 – 13). Bonus qus in pupil wb G3-2 relevant	Yes

Strand: Measures

Objective	JUMP Lesson Unit	JUMP differences	Addressed?
<i>Strand unit: Length</i>			
Estimate, compare, measure and record lengths of a wide variety of objects using appropriate metric units (m, cm)	ME3-1, 2, 3, 4,5, 6, 7,8, 9, 10	JUMP also goes on to km (ME3-9), not mentioned in PSMC.	Yes
Rename units of length in m and cm	ME3-10	Units of measurement compared here, but limited emphasis on renaming (see A and P pupil workbook ME3-10 for some e.g.s)	Yes

Solve and complete practical tasks and problems involving the addition and subtraction of units of length (m, cm)	A and P pupil workbook ME3-14		Yes
<i>Strand unit: Area</i>			
Estimate, compare and measure the area of regular and irregular shapes	ME3-11 – 14 (perimeter); ME3-28 – 32 (area).		Yes
<i>Strand unit: Weight</i>			
Estimate, compare, measure and record the weight of a wide variety of objects using appropriate metric units (kg, g)	ME3-15	Brief coverage in JUMP – no exercise explicitly pointing out the disconnect between weight and size, as recommended by PSMC. JUMP uses term “mass” instead of “weight”.	Yes
Solve and complete practical tasks and problems involving the addition and subtraction of units of weight (kg and g)	A and P pupil workbook ME3-15	Limited examples.	Yes
<i>Strand unit: Capacity</i>			
Estimate, compare, measure and record the capacity of a wide variety of objects using appropriate metric units (l, ml)	ME3-16	Brief coverage in JUMP.	Yes
Solve and complete practical tasks and problems involving the addition and subtraction of units of capacity (l, ml)	A and P pupil workbook ME3-16		Yes
<i>Strand unit: Time</i>			
Consolidate and develop a further sense of time passing	PA3-20 and 21 (patterns involving time); ME3-18 – 26 (esp. 25 and 26).		Yes
Read time in five-minute intervals on analogue and digital clock (12-hour)	ME3-21 – 24.	Links to everyday life in PSCM not made explicit in JUMP.	Yes
Record time in analogue and digital forms	ME2-21 – 24.		Yes
Read and interpret simple timetables	A and P pupil workbook ME2-24		Yes
Rename minutes as hours and hours as minutes	ME3-25	In JUMP, very brief coverage - forms part of broader exercise of expressing time intervals in different units.	Yes
Read dates from calendars and express weeks as days and vice versa	PA3-21, ME3-25.		Yes

Solve and complete practical tasks and problems involving times and dates	PA3-20, 21; ME3-24, 26.		Yes
<i>Strand unit: Money</i>			
Rename amounts of euro or cents and record using symbols and decimal point	NS3-42 – 47; NS3-70 – 74.	All reference is to Canadian currency. Would need adaptation to euros to fit PSMC.	Partly
Solve and complete one-step problems and tasks involving the addition and subtraction of money	NS3-48; NS3-75 and 76.	All reference is to Canadian currency. Would need adaptation to euros to fit PSMC.	Partly

Strand: Data

Objective	JUMP Lesson Unit	JUMP differences	Addressed?
<i>Strand unit: Representing and interpreting data</i>			
Collect, organise and represent data using pictograms, block graphs and bar charts	PDM3-1 – 10.	JUMP does not overtly refer to block charts, but includes a section on tally charts. Also includes Venn diagrams.	Yes
Read and interpret tables, pictograms, block graphs and bar charts	PDM3-4, 5, 6, 8, 9, 10.	JUMP does not deal with tables (aside from tally charts) or block graphs.	Yes
Use data sets to solve and complete practical tasks and problems	PDM3-10 – 14.		Yes
<i>Strand unit: Chance</i>			
Use vocabulary of uncertainty and chance: possible, impossible, might, certain, not sure	PDM3-18 – 21.		Yes
Order events in terms of likelihood of occurrence	PDM3-18, 19.		Yes
Identify and record outcomes of simple random processes	PDM3-18 – 21.		Yes

