

My Basic Number Facts Book:

Milestones Assessment

Introduction

This series of short tests has been designed to help teachers determine

- which facts students know and
- if there is a pattern to the facts they do not currently know
- These tests are **NOT** designed to be completed on a regular basis.
- They are **NOT** designed as timed tests, although a student taking longer than one minute (6 seconds per question) is likely to be using inefficient strategies.

Tests involving speed as well as accuracy tend to give students between two and three seconds response time. Note if responses are written or typed then the time taken to do this needs to be taken into account.

When administering a test, consider whether it will be given in a written form, oral form, or both.

Note these tests have NOT been normed. The tests are short and simple to administer so the teacher and the student can gain valuable feedback.

The teacher may then focus on or provide appropriate tasks to help the student progress.

Note: there are two tests per page to save paper.

Analysis

We've designed these tests so that each item on every test set is linked to the others.

For example, Item 1 across the +- tests shows related facts:

Test A: $4 + 2$

Test B: $2 + 4$ (Commutative version)

Test C: $6 - 2$

Test D: $6 - 4$

Test E: Two more than 4

Test F: I have 4 lollies and I got 2 more from the packet. How many lollies do I have altogether?

Test G: $14 + 2$

Test H: $40 + 20$

This allows comparisons to be made across tests easily.

BASIC FACTS: ADDITION AND SUBTRACTION MILESTONES

Foundation

Yr F ACMNA001: Establish understanding of the language and processes of **counting by naming numbers in sequences**, initially to and from 20, moving from *any starting point*

Ability to Identify the Larger Number

Links may be made to moves along a track. A roll of 4 moves further than a roll of 3.

Start	1	2	3	4	5	6
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Materials such as dominoes and cubes may be used to model this.



Counting Principles

Five Principles

How to Count:

1. Know the number names in order.
2. One to one matching.
3. The last name spoken in the count represents the total of the set (cardinality).

What to Count:

4. Order irrelevance: the count can start anywhere.
5. Abstraction: children will at first only count objects that are similar. Later they will count collections of different objects and later still, unseen objects.

Year 1

Yr 1 ACMNA015: Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts.

Explore links between addition and subtraction.

Whole (9)		
Part (7)	Part (2)	

Make use of the commutative property to apply the Count on from the Larger Number strategy e.g. $7 + 2$ is the same as $2 + 7$.

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Year 1 Strategies and Understandings: New Facts to Learn

Addition Strategy 1

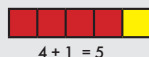
COUNT ON FROM THE LARGER NUMBER

Represent and solve simple addition and subtraction problems using a range of strategies including counting on, partitioning and rearranging parts.

Count on:

By 1: **Facts to Learn:** $1+1, 2+1, 3+1, 4+1, 5+1, 6+1, 7+1, 8+1, 9+1$

Join Cubes to form the larger number. Add (join) a cube of a different colour. Hold the stick at the point where the two colours join. Count on.



By 2: **Facts to Learn:** $2+2, 3+2, 4+2, 5+2, 6+2, 7+2, 8+2, 9+2$

Hold a number in your head and count on.

e.g. $5 + 2$.



By 3: **Facts to Learn:** $3+3, 4+3, 5+3, 6+3, 7+3, 8+3, 9+3$

By 0: **Facts to Learn:** $1+0, 2+0, 3+0, 4+0, 5+0, 6+0, 7+0, 8+0, 9+0$

This is really the Addition Property of Zero, that is, the sum of any number and zero is that number. Ensure that students understand this pattern.

Understanding 2

ADDITION PROPERTY OF ZERO

Facts to Learn: See 'Count on from the Larger Number: By 0'

The Addition Property of Zero states that a number will not change when 0 is added to it (see the green shaded numbers in the above addition grid). Essentially this is using the strategy 'Count on from the Larger Number, by 0.'

COMMUTATIVE PROPERTY

Facts to Learn: Once a fact is learned, the turn around fact should be known too.

Numbers may be added in any order without affecting the result (sum) e.g. $4 + 1 = 1 + 4$. This means that if you learn one fact you get one free. In effect you are rearranging parts.

Teaching Tools:

- Use cubes in two colours.



Subtraction Strategy 1

COUNT BACK (SUBTRACTION) BY 1, 2, 3 OR 0

Facts to Learn: Related to count on by 1, 2 and 3: e.g. $1-1, 2-1, 3-1...$

Counting back is similar to counting forward by 1, 2, 3, 0. Some students experience difficulty counting back across the decade. Begin counting back one.

Subtraction Strategy 2

SEE SUBTRACTION, THINK ADDITION

Facts to Learn: All related addition facts

Whole		9	
Part	Part	7	?

Year 2

Yr 2 ACMNA030: Solve simple addition and subtraction problems using a range of efficient mental ... strategies.

Yr 2 ACMNA029: Explore the connection between addition and subtraction.

Fact Families: Link addition and subtraction facts: learn one fact get 5 free. For example:

Whole (9)		
Part (7)	Part (2)	

$7 + 2 = 9$ | $7 + \square = 9$ | $9 - 2 = \square$
 $2 + 7 = 9$ | $\square + 2 = 9$ | $9 - 7 = \square$

Review all Count on from the Larger Number facts.

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Year 2 Strategies: New Facts to Learn

Addition Strategy 2

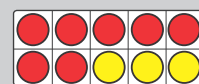
BUILD TO TEN

Facts to Learn: $9+1, 8+2, 7+3, 6+4, 5+5, 1+9, 2+8, 3+7, 4+6$

This strategy accounts for 3 new facts ($6+4, 5+5, 4+6$) and revision of 6 facts.

Teaching Tools:

- Ten frames are an ideal tool for teaching the 'ten facts'.



Addition Strategy 3

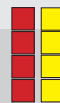
DOUBLES

Facts to Learn: $0+0, 1+1, 2+2, 3+3, 4+4, 5+5, 6+6, 7+7, 8+8, 9+9$

This strategy accounts for 5 new facts ($4+4, 5+5, 6+6, 7+7, 8+8, 9+9$) and revision of four facts ($0+0, 1+1, 2+2, 3+3$). The associated subtraction facts for the doubles equal zero, e.g. $4-4=0$.

Teaching Tools:

- Cubes in two colours may be used to model this strategy.



Addition Strategy 4

NEAR DOUBLES

Prerequisite: Knowledge of doubles facts

Facts to Learn: $1+0, 2+1, 3+2, 4+3, 5+4, 6+5, 7+6, 8+7, 9+8$

Students will need to know their doubles facts and then make an adjustment to the calculation and compensate for it. For example $6+7$ is $6+6$ and one more or $7+7$ take one. The associated subtraction facts all have a difference of one, e.g. $5-4=1$.

Teaching Tools:

- Cubes in two colours.



Addition Strategy 5

BRIDGE TEN

Prerequisite: Build to ten facts, partitioning

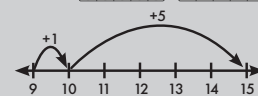
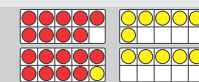
Facts to Learn: $7+4, 8+4, 9+4, 7+5, 8+5, 9+5, 8+6, 9+6, 9+7$

This strategy accounts for 9 new facts. Commutatively there are 9 more facts ($7+4, 7+5, 8+4, 8+5, 8+6, 9+4, 9+5, 9+6, 9+7$). The 9+ facts can be tackled first then the 8+ facts and so on.

Teaching Tools:

- Ten Frames
- Number Line

Example: $9 + 6 = 10 + 5$



Leads to Year 3

Yr 3 ACMNA055: Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation.

Yr 3 ACMNA054: Recognise and explain the connection between addition and subtraction. Link via part part whole thinking.



The Initial addition test covers the 5 basic addition facts strategies:

- Count on from the larger number 1, 2, 3, or 0. (CO)
- Build to ten (T)
- Doubles (D)
- Near Doubles (ND)
- Bridge ten (BT)

Addition & Subtraction Tests (+ -)

Use at the End of Year 2 / Start of Year 3

The following series of tests have been designed to determine where the students are experiencing difficulty, not just a score out of ten.

It is important that test A be used as the benchmark and then any of the later tests may be linked back to this original test. The questions have been designed to give data about accuracy and then they may be used to explore why students might be making mistakes.

Year Levels

The basic facts addition and subtraction test could be given late Year 2 or at the start of Year 3. The related Australian Curriculum content descriptors are:

Year 2

ACMNA030: Solve simple addition and subtraction problems using a range of efficient mental ... strategies.

ACMNA029: Explore the connection between addition and subtraction.

Year 3

ACMNA055: Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation.

ACMNA054: Recognise and explain the connection between addition and subtraction.

Timing

Typically researchers assign three seconds per questions when assessing whether a student has achieved fluency. This is somewhat impractical to monitor in a written test as time needs to be allowed for writing answers.

When giving students a written test to complete, it is difficult to know how much time they spend on an individual question. For example, if the student is given three minutes to complete a test they could spend two and a half minutes doing the first question and rush through the rest.

+ - Test A					
1	4 + 2				
2	8 + 0				
3	7 + 3				
4	3 + 3				
5	6 + 4				
6	9 + 5				
7	6 + 6				
8	9 + 1				
9	6 + 5				
10	8 + 7				
Mark:					

+ - Test A (Initial)

The 5 basic addition fact strategies

Covers the 5 basic addition facts strategies.

- Count on from the larger number 1, 2, 3, or 0. (CO)
- Build to Ten (T)
- Doubles (D)
- Near Doubles (ND)
- Bridge Ten (BT)

+ - Test B

Commutative Property of Addition

Designed to determine whether students understand the *commutative property of addition*, that is,

$$4 + 3 = 3 + 4 \quad (a + b = b + a).$$

+ - Test C and Test D

Related Subtraction

Designed to determine whether students know the two associated subtraction facts that are linked to an addition fact. That is $7 + 2 = 9$, therefore $9 - 2 = 7$ and $9 - 7 = 2$. This is underpinned by an understanding of the part part whole relationship (see p. 20 First Steps in Mathematics: Number Book 1: <http://det.wa.edu.au/stepsresources/detcms/navigation/first-steps-mathematics/>).

If there is a large drop off in scores from Test A to Test C/D then schools should consider teaching fact families. When learning a specific fact, students can be taught to associate it with a family of facts. i.e;

$$7 + 2 = 9, \quad 2 + 7 = 9$$

$$9 - 2 = 7, \quad 9 - 7 = 2$$

$$9 - \underline{\quad} = 7 \quad \text{etc.}$$

+ - Test E and Test F

Related Vocabulary and Word Questions

Designed to focus on the *vocabulary* associated with addition and subtraction questions and the different types of word questions that students might encounter. For example, students often struggle with the word 'difference'.

+ - Test G and Test H

Applying Basic Facts

Tests G and H are NOT tests of basic facts. They are designed to see if students are able to apply their basic fact knowledge to larger numbers.

+ - Test A

Name _____

① $4 + 2$ _____

② $8 + 0$ _____

③ $7 + 3$ _____

④ $3 + 3$ _____

⑤ $6 + 4$ _____

⑥ $9 + 5$ _____

⑦ $6 + 6$ _____

⑧ $9 + 1$ _____

⑨ $6 + 5$ _____

⑩ $8 + 7$ _____

Mark: _____ / 10

+ - Test A

Name _____

① $4 + 2$ _____

② $8 + 0$ _____

③ $7 + 3$ _____

④ $3 + 3$ _____

⑤ $6 + 4$ _____

⑥ $9 + 5$ _____

⑦ $6 + 6$ _____

⑧ $9 + 1$ _____

⑨ $6 + 5$ _____

⑩ $8 + 7$ _____

Mark: _____ / 10

+ - Test B

Name _____

① $2 + 4$ _____

② $0 + 8$ _____

③ $3 + 7$ _____

④ $3 + 3$ _____

⑤ $4 + 6$ _____

⑥ $5 + 9$ _____

⑦ $6 + 6$ _____

⑧ $1 + 9$ _____

⑨ $5 + 6$ _____

⑩ $7 + 8$ _____

Mark: _____ / 10

+ - Test B

Name _____

① $2 + 4$ _____

② $0 + 8$ _____

③ $3 + 7$ _____

④ $3 + 3$ _____

⑤ $4 + 6$ _____

⑥ $5 + 9$ _____

⑦ $6 + 6$ _____

⑧ $1 + 9$ _____

⑨ $5 + 6$ _____

⑩ $7 + 8$ _____

Mark: _____ / 10

+ - Test C

Name _____

① $6 - 2$ _____

② $8 - 0$ _____

③ $10 - 3$ _____

④ $6 - 3$ _____

⑤ $10 - 6$ _____

⑥ $14 - 5$ _____

⑦ $12 - 6$ _____

⑧ $10 - 1$ _____

⑨ $11 - 6$ _____

⑩ $15 - 7$ _____

Mark: _____ / 10

+ - Test C

Name _____

① $6 - 2$ _____

② $8 - 0$ _____

③ $10 - 3$ _____

④ $6 - 3$ _____

⑤ $10 - 6$ _____

⑥ $14 - 5$ _____

⑦ $12 - 6$ _____

⑧ $10 - 1$ _____

⑨ $11 - 6$ _____

⑩ $15 - 7$ _____

Mark: _____ / 10

+ - Test D

Name _____

① $6 - 4$ _____

② $8 - 0$ _____

③ $10 - 7$ _____

④ $6 - 3$ _____

⑤ $10 - 4$ _____

⑥ $14 - 9$ _____

⑦ $12 - 6$ _____

⑧ $10 - 9$ _____

⑨ $11 - 5$ _____

⑩ $15 - 8$ _____

Mark: _____ / 10

+ - Test D

Name _____

① $6 - 4$ _____

② $8 - 0$ _____

③ $10 - 7$ _____

④ $6 - 3$ _____

⑤ $10 - 4$ _____

⑥ $14 - 9$ _____

⑦ $12 - 6$ _____

⑧ $10 - 9$ _____

⑨ $11 - 5$ _____

⑩ $15 - 8$ _____

Mark: _____ / 10

+ - Test E

Name _____

1 Two more than 4 _____

2 Add Zero and 8 _____

3 Three less than ten _____

4 Double 3 _____

5 Decrease 10 by 4 _____

6 Subtract 5 from 14 _____

7 Six fewer than 12 _____

8 Take 1 from 10 _____

9 Add 6 and 5 _____

10 Increase 7 by 8 _____

Mark: _____ / 10

+ - Test E

Name _____

1 Two more than 4 _____

2 Add Zero and 8 _____

3 Three less than ten _____

4 Double 3 _____

5 Decrease 10 by 4 _____

6 Subtract 5 from 14 _____

7 Six fewer than 12 _____

8 Take 1 from 10 _____

9 Add 6 and 5 _____

10 Increase 7 by 8 _____

Mark: _____ / 10

+ - Test F

Name _____

1 I have 4 lollies and I got 2 more from the packet. How many lollies do I have altogether? _____

2 Peter had 8 toy cars and his brother had 0. How many do they have altogether? _____

3 Kim had 10 pencils and she lost 3. How many pencils does Kim have now? _____

4 A recipe requires 3 eggs and I want to double the recipe. How many eggs will I need? _____

5 I had 10 lollies but I ate some. Now I have 6 lollies. How many did I eat? _____

6 I have some pet fish and bought 5 new fish. Now I have 14 fish. How many did I have to start with? _____

7 I have \$6 and my mum says that she will give me as much again. How much money will I have? _____

8 I have \$9 and I need \$10. How much more do I need to save? _____

9 I bought two items, one worth \$6 and the other \$5. How much did I spend altogether? _____

10 Together my sister and I have \$15. I have one dollar more than she has. How much do we each have? _____

Mark: _____ / 10

+ - Test F

Name _____

1 I have 4 lollies and I got 2 more from the packet. How many lollies do I have altogether? _____

2 Peter had 8 toy cars and his brother had 0. How many do they have altogether? _____

3 Kim had 10 pencils and she lost 3. How many pencils does Kim have now? _____

4 A recipe requires 3 eggs and I want to double the recipe. How many eggs will I need? _____

5 I had 10 lollies but I ate some. Now I have 6 lollies. How many did I eat? _____

6 I have some pet fish and bought 5 new fish. Now I have 14 fish. How many did I have to start with? _____

7 I have \$6 and my mum says that she will give me as much again. How much money will I have? _____

8 I have \$9 and I need \$10. How much more do I need to save? _____

9 I bought two items, one worth \$6 and the other \$5. How much did I spend altogether? _____

10 Together my sister and I have \$15. I have one dollar more than she has. How much do we each have? _____

Mark: _____ / 10

+ - Test G

Name _____

① $14 + 2$ _____

② $18 + 0$ _____

③ $17 + 3$ _____

④ $13 + 3$ _____

⑤ $16 + 4$ _____

⑥ $19 + 5$ _____

⑦ $16 + 6$ _____

⑧ $19 + 1$ _____

⑨ $16 + 5$ _____

⑩ $18 + 7$ _____

Mark: _____ / 10

+ - Test G

Name _____

① $14 + 2$ _____

② $18 + 0$ _____

③ $17 + 3$ _____

④ $13 + 3$ _____

⑤ $16 + 4$ _____

⑥ $19 + 5$ _____

⑦ $16 + 6$ _____

⑧ $19 + 1$ _____

⑨ $16 + 5$ _____

⑩ $18 + 7$ _____

Mark: _____ / 10

+ - Test H

Name _____

1 $40 + 20$ _____

2 $80 + 0$ _____

3 $70 + 30$ _____

4 $30 + 30$ _____

5 $60 + 40$ _____

6 $90 + 50$ _____

7 $60 + 60$ _____

8 $90 + 10$ _____

9 $60 + 50$ _____

10 $80 + 70$ _____

Mark: _____ / 10

+ - Test H

Name _____

1 $40 + 20$ _____

2 $80 + 0$ _____

3 $70 + 30$ _____

4 $30 + 30$ _____

5 $60 + 40$ _____

6 $90 + 50$ _____

7 $60 + 60$ _____

8 $90 + 10$ _____

9 $60 + 50$ _____

10 $80 + 70$ _____

Mark: _____ / 10

BASIC FACTS: MULTIPLICATION AND DIVISION MILESTONES

Year 2

Yr 2 ACMA031:
Recognise and represent multiplication as repeated addition, groups and arrays.

The 'Doubles' Addition Facts are learned in Yr 2.

Yr 2 ACMA032:
Recognise and represent division as grouping into equal sets and solve simple problems using these representations.

Groups
Counters may be used to model groups of numbers. Two groups of 3 looks different to three groups of 2.

Commutative Property of Multiplication (CPM)
Numbers may be multiplied in any order without affecting the product. Understanding this property almost halves the number of multiplication facts that need to be learned. Understanding **Arrays** will help too.

Arrays
Arrays are made up of rows, which go across, and columns, which go down.

Repeated addition
The same number is added (or subtracted for division). This would include skip counting such as 5, 10, 15, 20, 25, ... It can be shown on a number line.

Year 3

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

1) Understandings: Properties
Yr 3 ACMA056: Recall multiplication facts of two, three, five and ten and related division facts.

2) Facts to Learn (Some Commutative)

Understanding 1

MULTIPLICATION PROPERTY OF ZERO

Facts To Learn: 0×0 , 1×0 , 2×0 , 3×0 , 4×0 , 5×0 , 6×0 , 7×0 , 8×0 , 9×0 , 10×0 and commutative equivalents: 0×1 , 0×2 , 0×3 , ...

Any number multiplied by zero is zero. This can be illustrated through arrays. It is impossible to draw an array $n \times 0$ or $0 \times n$. This pattern needs to be made explicit.

Understanding 2

MULTIPLICATION PROPERTY OF ONE

Facts To Learn: 0×1 , 1×1 , 2×1 , 3×1 , 4×1 , 5×1 , 6×1 , 7×1 , 8×1 , 9×1 , 10×1 and commutative equivalents: 1×2 , 1×3 , 1×4 , ...

Any number multiplied by one is itself ($n \times 1 = n$). This pattern needs to be made explicit.

Understanding 3

COMMUTATIVE PROPERTY OF MULTIPLICATION

Facts To Learn: Commutative versions of all applicable facts.

Numbers may be multiplied in any order without affecting the product.

Teaching Tools: Arrays

Recall

x2 FACTS **Note:** ~~Struck-through~~ facts are facts which will have been already encountered.

Facts To Learn: 0×2 , 1×2 , 2×2 , 3×2 , 4×2 , 5×2 , 6×2 , 7×2 , 8×2 , 9×2 , 10×2 and commutative equivalents: 2×0 , 2×1 , 2×2 , 2×4 , ...

Link the doubles addition facts learned in Year 2 to the x2 facts. Introduce vocabulary such as double.

Teaching Tools: • Joining two sets of Unifix cubes of different colours will help make the links.

Recall

x10 FACTS

Facts To Learn: 0×10 , 1×10 , 2×10 , 3×10 , 4×10 , 5×10 , 6×10 , 7×10 , 8×10 , 9×10 , 10×10 and commutative equivalents.

Pattern: End digit is zero. Double the fives facts.

Recall

x5 FACTS

Facts To Learn: 0×5 , 1×5 , 2×5 , 3×5 , 4×5 , 5×5 , 6×5 , 7×5 , 8×5 , 9×5 , 10×5 and commutative equivalents: 5×0 , 5×1 , 5×2 , ...

Pattern: End digit is zero or five.

Recall

x3 FACTS

Facts To Learn: 0×3 , 1×3 , 2×3 , 3×3 , 4×3 , 5×3 , 6×3 , 7×3 , 8×3 , 9×3 , 10×3 and commutative equivalents: 3×1 , 3×2 , 3×4 , ...

Use known facts to derive new facts e.g. Use $6 \times 2 = 12$ to work out 6×3 . $6 \times 3 = (6 \times 2) + 6$.

Year 4

Yr 4 ACMA075: Recall multiplication facts up to 10×10 and related division facts.

Review facts learned in Year 3:

- Multiplication Property of Zero ($\times 0$) facts,
- Multiplication Property of One ($\times 1$) facts,
- Commutative Property of Multiplication ($2 \times 3 = 3 \times 2$),
- $\times 2$ facts,
- $\times 10$ facts,
- $\times 5$ facts
- $\times 3$ facts

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

3) Remaining Facts to Learn in Year 4 (Some Commutative)

Recall

x9 FACTS

Facts To Learn: 0×9 , 1×9 , 2×9 , 3×9 , 4×9 , 5×9 , 6×9 , 7×9 , 8×9 , 9×9 , 10×9 and commutative equivalents.

Show the pattern on a Number Grid. Relate to 10 facts: e.g. $3 \times 9 = (3 \times 10) - 3$

Strategy 1

DOUBLING See 'Halving' Strategy below.

Recall

x4 FACTS

Facts To Learn: 0×4 , 1×4 , 2×4 , 3×4 , 4×4 , 5×4 , 6×4 , 7×4 , 8×4 , 9×4 , 10×4 and commutative equivalents.

Revise the 2x facts.

Link x 2 facts to x 4 facts. (Doubling Strategy)

Recall

x8 FACTS

Facts To Learn: 0×8 , 1×8 , 2×8 , 3×8 , 4×8 , 5×8 , 6×8 , 7×8 , 8×8 , 9×8 , 10×8 and commutative equivalents.

Link x 4 facts to x 8 facts. (Doubling Strategy)

or

Link x 2 facts to x 8 facts using double-double strategy.

Recall

x6 FACTS

Facts To Learn: 0×6 , 1×6 , 2×6 , 3×6 , 4×6 , 5×6 , 6×6 , 7×6 , 8×6 , 9×6 , 10×6 and commutative equivalents.

Link x 3 facts to x 6 facts. (Doubling Strategy).

Recall

x7 FACTS

Facts To Learn: 0×7 , 1×7 , 2×7 , 3×7 , 4×7 , 5×7 , 6×7 , 7×7 , 8×7 , 9×7 , 10×7 and commutative equivalents.

Review Square Numbers. Patterns.

Recall

DIVISION FACTS

Use known facts to derive new facts

Relate division to multiplication. e.g. show that:

$4 \times 3 = 12$, $3 \times 4 = 12$
 $12 \div 3 = 4$, $12 \div 4 = 3$

Strategy 2

HALVING STRATEGIES

Divide by 4: halve and halve again ($\div 2, \div 2$).
Divide by 8: halve, halve and halve again ($\div 2, \div 2, \div 2$).

Year 5/6

Yr 5 ACMA098: Identify and describe factors and multiples of whole numbers and use them to solve problems.

Factors and Multiples. Apply Simple Divisibility Tests.

Yr 5 ACMA101: Solve problems involving division by a one digit number, ...

Review all basic division facts.

Continued Practise of Multiplication and Division Facts

To maintain recall.

Factors

For example, 18 not just linked to one fact of 6×3 but has factors of 1, 2, 3, 6, 9 and 18.

Divisibility

End digit rules
 $\div 10$: end digit zero.
 $\div 5$: end digit five or zero.
 $\div 2$: even number.
 $\div 3$: sum of digits is 3, 6 or 9.
 $\div 9$: sum of digits is 9.

Yr 6 ACMA127: Find a simple fraction of a quantity where the result is a whole number ...

Link to know multiplication and division facts.

$3 \times 4 = 12$
 $4 \times 3 = 12$
 $12 \div 4 = 3$
 $12 \div 3 = 4$
 $1/3$ of $12 = 4$
 $1/4$ of $12 = 3$

An opportunity to review all basic multiplication and division facts

The Initial test covers the following:

- Knowing a bank of basic multiplication facts
- Using a known fact to generate a new fact
- Doubling strategies (Doubling, Doubling/Halving, Halving)
- Pattern, Square Numbers
- Multiplication Property

Multiplication & Division Tests ($\times \div$)

Use at the End of Year 2 / Start of Year 3

The tests have been designed to test fluency and student understanding of the following:

Properties of number

- Multiplication property of zero
- Multiplication property of one
- Commutative property (arrays)

Strategies

- Knowing a bank of basic multiplication facts
- Using a known fact to generate a new fact
- Doubling strategies (Doubling, Doubling/Halving, Halving)
- Related division facts

Year Levels

In the Australian Curriculum, basic multiplication facts are taught in Year 3 and Year 4.

Test A is designed to focus on the multiplication facts to be learned in Year 3. The Australian Curriculum Link is ACMNA056 (Recall multiplication facts of two, three, five and ten and related division facts.). The test can be used later in Year 3 once the appropriate basic multiplication facts have been taught.

By the end of Yr 3 students should have learned the 0x, 1x, 2x, 3x, 5x and 10x tables.

$\times \div$ Test A	
1 9×2	■ ■ ■
2 7×3	■
3 4×1	■ ■
4 5×5	■ ■
5 3×0	■
6 2×10	■
7 3×3	■ ■
8 5×2	■ ■
9 6×3	■
10 8×5	■ ■
10 Mark:	

× ÷ Test A (Initial)

*Multiplication Property of 0
Multiplication Property of 1*

Multiplication Test A should be administered to all students. In addition to testing Year 3 multiplication facts, it checks understanding of the multiplication property of zero and the multiplication property of one.

× ÷ Test B

Commutative Property of Multiplication

Test B is designed to assess whether the students understand the commutative property of multiplication - that is - that $3 \times 6 = 6 \times 3$ or $a \times b = b \times a$.

× ÷ Test C

Related Division Facts

Test C diagnoses whether students have learned the related division facts (See latter part of ACMNA056).

× ÷ Test D

Related Vocabulary and Word Problems

Test D: Multiplication words and phrases test. The multiplication and division questions are mixed - otherwise there would be no need for students to read the questions. Both grouping and sharing forms of division are included.

× ÷ Test E

Test E: This test is provided as an option to determine whether Year 3 students are able to use place value in conjunction with basic multiplication facts. It would not make sense to give this test to struggling students.

× ÷ Test A

Name _____

① 9×2 _____

② 7×3 _____

③ 4×1 _____

④ 5×5 _____

⑤ 3×0 _____

⑥ 2×10 _____

⑦ 3×3 _____

⑧ 5×2 _____

⑨ 6×3 _____

⑩ 8×5 _____

Mark: _____ / 10

× ÷ Test A

Name _____

① 9×2 _____

② 7×3 _____

③ 4×1 _____

④ 5×5 _____

⑤ 3×0 _____

⑥ 2×10 _____

⑦ 3×3 _____

⑧ 5×2 _____

⑨ 6×3 _____

⑩ 8×5 _____

Mark: _____ / 10

× ÷ Test B

Name _____

① 2×9 _____

② 3×7 _____

③ 1×4 _____

④ 5×5 _____

⑤ 0×3 _____

⑥ 10×2 _____

⑦ 3×3 _____

⑧ 2×5 _____

⑨ 3×6 _____

⑩ 5×8 _____

Mark: _____ / 10

× ÷ Test B

Name _____

① 2×9 _____

② 3×7 _____

③ 1×4 _____

④ 5×5 _____

⑤ 0×3 _____

⑥ 10×2 _____

⑦ 3×3 _____

⑧ 2×5 _____

⑨ 3×6 _____

⑩ 5×8 _____

Mark: _____ / 10

× ÷ Test C

Name _____

① $18 \div 2$ _____

② $21 \div 3$ _____

③ $4 \div 1$ _____

④ $25 \div 5$ _____

⑤ $9 \div 3$ _____

⑥ $20 \div 2$ _____

⑦ $9 \div 3$ _____

⑧ $10 \div 5$ _____

⑨ $18 \div 3$ _____

⑩ $40 \div 5$ _____

Mark: _____ / 10

× ÷ Test C

Name _____

① $18 \div 2$ _____

② $21 \div 3$ _____

③ $4 \div 1$ _____

④ $25 \div 5$ _____

⑤ $9 \div 3$ _____

⑥ $20 \div 2$ _____

⑦ $9 \div 3$ _____

⑧ $10 \div 5$ _____

⑨ $18 \div 3$ _____

⑩ $40 \div 5$ _____

Mark: _____ / 10

× ÷ Test D

Name _____

1 9 groups of 2 _____

2 calculate the product of 7 and 3

3 4 by 1 _____

4 How many times can you take 5 from 25 before you reach zero? _____

5 0, how many threes _____

6 2 multiplied by 10 _____

7 9 lollies, 3 groups, how many for each group? _____

8 10 shared evenly among 2

9 6 lots of 3 _____

10 Calculate the product of 8 and 5

Mark: _____ / 10

× ÷ Test D

Name _____

1 9 groups of 2 _____

2 calculate the product of 7 and 3

3 4 by 1 _____

4 How many times can you take 5 from 25 before you reach zero? _____

5 0, how many threes _____

6 2 multiplied by 10 _____

7 9 lollies, 3 groups, how many for each group? _____

8 10 shared evenly among 2

9 6 lots of 3 _____

10 Calculate the product of 8 and 5

Mark: _____ / 10

× ÷ Test E

Name _____

① 90×2 _____

② 70×3 _____

③ 40×10 _____

④ 5×50 _____

⑤ 30×0 _____

⑥ 20×100 _____

⑦ 30×3 _____

⑧ 5×20 _____

⑨ 6×30 _____

⑩ 80×5 _____

Mark: _____ / 10

× ÷ Test E

Name _____

① 90×2 _____

② 70×3 _____

③ 40×10 _____

④ 5×50 _____

⑤ 30×0 _____

⑥ 20×100 _____

⑦ 30×3 _____

⑧ 5×20 _____

⑨ 6×30 _____

⑩ 80×5 _____

Mark: _____ / 10

The Initial test covers the following:

- Knowing a bank of basic multiplication facts
- Using a known fact to generate a new fact
- Doubling strategies (Doubling, Doubling/Halving, Halving)
- Pattern
- Multiplication Property

× ÷ Test Aa					
1	5 x 4				
2	7 x 0				
3	8 x 3				
4	6 x 1				
5	7 x 7				
6	6 x 9				
7	7 x 2				
8	8 x 6				
9	9 x 5				
10	7 x 8				
Mark:					

Year 4 Multiplication & Division Tests (× ÷)

Use at the End of Year 4 / Start of Year 5

In Year 4 students learn all of the basic multiplication and division facts to 10

ACMNA075: Recall multiplication facts up to 10×10 and related division facts.

It would make sense to test all basic facts toward the end of Year 4 or the start of Year 5 after students have been given the opportunity to learn them.

As some facts, properties and strategies will already have been used and tested in the Year 3, this expanded set includes only one Multiplication Property of zero and one Multiplication Property of one. The focus in these tests is on:

- knowing a bank of facts and using this bank to generate a new fact
- the doubling strategy (halving for division)
- the commutative property of multiplication

All students should complete Test A, so that the results from tests B, C etc may be related to the initial test.

Note: The Year 4 $\times \div$ tests are labelled 'Aa', 'Bb' and so on to differentiate these tests from the Yr 3 $\times \div$ test series which are 'A', 'B' and so on.

For multi-year classes, teachers will know 'Test B' is the CPM test for Year 3 and 'Test Bb' is the CPM test for Year 4.

$\times \div$ Test Aa (Initial)

*Multiplication Property of 0
Multiplication Property of 1*

Multiplication Test A should be administered to all students. In addition to testing Year 4 multiplication facts it checks understanding of the multiplication property of zero and the multiplication property of one.

$\times \div$ Test Bb

*Commutative Property of
Multiplication*

Commutative version of test

$\times \div$ Test Cc

Related Division Facts

Related division facts test

$\times \div$ Test Dd

Multiplication Vocabulary

Mixed multiplication and division phrase/word questions related to the original set.

$\times \div$ Test Ee

Facts for Multiples of 10

Extended multiplication facts (place value)

$\times \div$ Test Ff

Extended Division

Test F: Extended facts for division questions which includes multiples of 10, decimal division and calculating a unit fraction of a whole (Year 6: ACMNA127).

× ÷ Test Aa

Name _____

① 5×4 _____

② 7×0 _____

③ 8×3 _____

④ 6×1 _____

⑤ 7×7 _____

⑥ 6×9 _____

⑦ 7×2 _____

⑧ 8×6 _____

⑨ 9×5 _____

⑩ 7×8 _____

Mark: _____ / 10

× ÷ Test Aa

Name _____

① 5×4 _____

② 7×0 _____

③ 8×3 _____

④ 6×1 _____

⑤ 7×7 _____

⑥ 6×9 _____

⑦ 7×2 _____

⑧ 8×6 _____

⑨ 9×5 _____

⑩ 7×8 _____

Mark: _____ / 10

× ÷ Test Bb

Name _____

① 4×5 _____

② 0×7 _____

③ 3×8 _____

④ 1×6 _____

⑤ 7×7 _____

⑥ 9×6 _____

⑦ 2×7 _____

⑧ 6×8 _____

⑨ 5×9 _____

⑩ 8×7 _____

Mark: _____ / 10

× ÷ Test Bb

Name _____

① 4×5 _____

② 0×7 _____

③ 3×8 _____

④ 1×6 _____

⑤ 7×7 _____

⑥ 9×6 _____

⑦ 2×7 _____

⑧ 6×8 _____

⑨ 5×9 _____

⑩ 8×7 _____

Mark: _____ / 10

× ÷ Test Cc

Name _____

① $20 \div 4$ _____

② $0 \div 7$ _____

③ $24 \div 3$ _____

④ $6 \div 1$ _____

⑤ $49 \div 7$ _____

⑥ $54 \div 9$ _____

⑦ $14 \div 2$ _____

⑧ $48 \div 8$ _____

⑨ $45 \div 5$ _____

⑩ $56 \div 8$ _____

Mark: _____ / 10

× ÷ Test Cc

Name _____

① $20 \div 4$ _____

② $0 \div 7$ _____

③ $24 \div 3$ _____

④ $6 \div 1$ _____

⑤ $49 \div 7$ _____

⑥ $54 \div 9$ _____

⑦ $14 \div 2$ _____

⑧ $48 \div 8$ _____

⑨ $45 \div 5$ _____

⑩ $56 \div 8$ _____

Mark: _____ / 10

× ÷ Test Dd

Name _____

1 20, how many fives? _____

2 0 multiplied by 7 _____

3 3 groups of 8 _____

4 6 by 1 _____

5 Calculate the product of 7 and 7 _____

6 6 groups of nine _____

7 Share 14 evenly among 2 _____

8 Eight rows of seedlings. Six seedlings in each row. How many seedlings? _____

9 45 cards, 5 groups, how many for each group? _____

10 There were 7 rows of soldiers with eight soldiers per row. How many soldiers altogether? _____

Mark: _____ / 10

× ÷ Test Dd

Name _____

1 20, how many fives? _____

2 0 multiplied by 7 _____

3 3 groups of 8 _____

4 6 by 1 _____

5 Calculate the product of 7 and 7 _____

6 6 groups of nine _____

7 Share 14 evenly among 2 _____

8 Eight rows of seedlings. Six seedlings in each row. How many seedlings? _____

9 45 cards, 5 groups, how many for each group? _____

10 There were 7 rows of soldiers with eight soldiers per row. How many soldiers altogether? _____

Mark: _____ / 10

× ÷ Test Ee

Name _____

① 50×4 _____

② 70×0 _____

③ 80×30 _____

④ 60×1 _____

⑤ 700×70 _____

⑥ 60×9 _____

⑦ 7×20 _____

⑧ 8×600 _____

⑨ 90×0.5 _____

⑩ 70×80 _____

Mark: _____ / 10

× ÷ Test Ee

Name _____

① 50×4 _____

② 70×0 _____

③ 80×30 _____

④ 60×1 _____

⑤ 700×70 _____

⑥ 60×9 _____

⑦ 7×20 _____

⑧ 8×600 _____

⑨ 90×0.5 _____

⑩ 70×80 _____

Mark: _____ / 10

× ÷ Test Ff

Name _____

1 $200 \div 4$ _____

2 $0 \div 70$ _____

3 $240 \div 3$ _____

4 $60 \div 10$ _____

5 $7 \times \underline{\quad} = 49$

6 $540 \div 9$ _____

7 $\frac{1}{2}$ of 14 _____

8 $48 \div 4$ and divide by 2 again _____

9 $450 \div 50$ _____

10 $56 \div 0.8$ _____

Mark: _____ / 10

× ÷ Test Ff

Name _____

1 $200 \div 4$ _____

2 $0 \div 70$ _____

3 $240 \div 3$ _____

4 $60 \div 10$ _____

5 $7 \times \underline{\quad} = 49$

6 $540 \div 9$ _____

7 $\frac{1}{2}$ of 14 _____

8 $48 \div 4$ and divide by 2 again _____

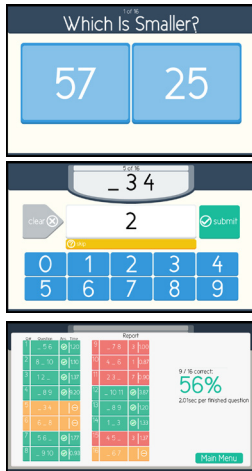
9 $450 \div 50$ _____

10 $56 \div 0.8$ _____

Mark: _____ / 10

Further Support For Assessing

www.drpaulswan.com.au



<https://drpaulswan.com.au/interactive-materials/>

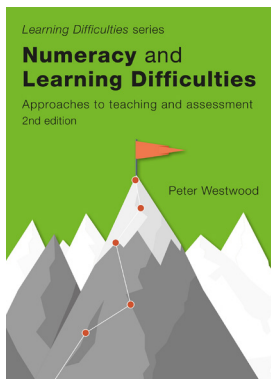
These short online tests are designed to be used with individuals to diagnose potential problems.

Starting Point Tests



These booklets are designed to help teachers /schools determine where their students' strengths and weaknesses lie.

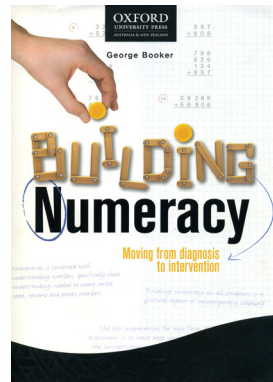
One Minute Basic Fact Tests



These tests may be found in the back of Westwood, P. (2000). Numeracy and Learning Difficulties: Approaches to teaching and assessment. Victoria: ACER.

Note the entire book is worth reading

Diagnosis and Intervention



This book provides diagnostic tests (A and B versions) of all four operations and numeration (place value) and fractions.

Booker, G. (2011). Building Numeracy: Moving from diagnosis to intervention. Victoria: Oxford University Press.

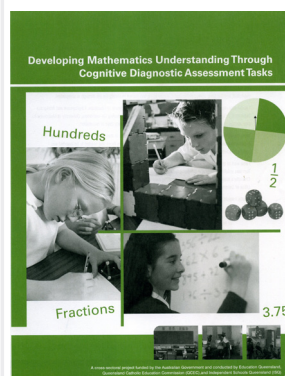
Problem Solving and Reasoning



Includes rich tasks, a common marking rubric and work samples.

Downton, A., Knight, R., Clarke, C., and Lewis, G. (2006). Mathematics Assessment for Learning: Rich Tasks and Work Samples. Victoria: A.C.U

General Maths Tests



This free collection includes number, common fractions, decimal fractions and probability.

http://eprints.qut.edu.au/18714/1/CDAT_complete_document.pdf