Computational Fluency

GRADE 2
- Introduce computational strategies for facts to 20 (eg doubles; doubles plus 1)
- Addition and subtraction to 100
- change in quantity (pictorial/symbolic)
- symbolic representation of equality and inequality

GRADE 3
- Emerging computational fluency to 20
- Addition and subtraction to 1000
- Multiplication and division concepts
- one-step addition and subtraction equations with unknown number

GRADE 4
- Developing computational fluency to 20
- Introduce computational strategies for multiplication and division facts to 100
- Addition and subtraction to 10 000
- Multiplication and division of two- or three-digit numbers by one-digit numbers
- Addition and subtraction of decimals to hundredths
- Algebraic relationships among quantities
- One-step equations with an unknown number using all operations

Grade 5
- Extending computational fluency to 20
- Emerging strategies for multiplication and division facts to 100
- Addition and subtraction of whole numbers to 1 000 000
- Multiplication and division to three digits, including division with remainders
- Addition and subtraction of decimals to thousandths
- One-step equations with variables

Grade 6
- Developing strategies for multiplication and division facts to 100
- Order of operations with whole numbers
- Multiplication and division of decimals
- One-step equations with whole number coefficients and solutions

Grade 7
- Extending strategies for multiplication and division facts to 100
- Operations with integers (addition, subtraction, multiplication, division, and order of operations)
- Operations with decimals (addition, subtraction, multiplication, division, and order of operations)
- Two-step equations with whole number coefficients, constants, and solutions

Grade 8
- Operations with fractions (addition, subtraction, multiplication, division, and order of operations)
- Expressions – writing and evaluating using substitution
- Two-step equations with integer coefficients, constants, and solutions

CLASSROOM EXPERIENCES TO SUPPORT COMPUTATIONAL FLUENCY

- Number line routines (e.g. Clothesline Math)
- Number talks
- Interactive read alouds
- Small group instruction
- Math stations
- Collaborative problem-solving
- Critical thinking problem-solving
- Land-based learning opportunities

STAGES OF COMPUTATIONAL FLUENCY

COUNTING

Counts with objects or mentally

Example: 8+4 make a group of 8 and group of 4 and count to 12

DERIVING

Uses reasoning strategies based on known facts

Provide multiple strategies and students select

Example: 8+4= make 10 and then add 2 (8+2+2)

Example: 8+4= 6+6

MASTERY

Efficiently produces answers

Example: 8+4=12 student is able to select a strategy to efficiently produce an answer

ASSESSMENT FOR COMPUTATIONAL FLUENCY

SNAP

Fact Fluency Assessments (Addition and Multiplication)

Observations and Observational Data Collection Sheet

Conferences

SNAP Zoom-Ins

RESOURCES/SUPPORTS FOR MATHEMATICAL COMPUTATIONAL FLUENCY

Math Fact Fluency by Jennifer Bay-Williams

Math Games

Fact Fluency Practice

Small group instruction

Fact Fluency Strategy Progressions

Addition   **Multiplication**

K	**Counting** • one-to-one correspondence • conservation • cardinality • stable order counting • sequencing 1-10 • linking sets to numerals • subitizing	**"Add and Subtract 0, 1, and 2"** Examples: 2 more than 5, 1 less than 8, 2 less than 3, 1 more than 7	**"Combos of 10"** Examples: 10+0, 9+1, 8+2, 7+3, 6+4, 5+5, 4+6, 3+7, 2+8, 1+9, 0+10	**"Doubles to 10"** Examples: 1+1=2 2+2=4 3+3=6 4+4=8 5+5=10
Gr. 1	Review, reinforce, and allow practice time for the K strategies, plus ➡ Extend addition fluency strategies to numbers up to 20.	**"10+___"** Examples: 10+6=16 3+10=13 9+10=19 10+1=11	**"Doubles to 20"** Examples: 6+6=12 7+7=14 8+8=16 9+9=18 10+10=20	

Gr. 2	Review, reinforce, and allow practice time for the K and 1 strategies, plus ➡ Extend addition fluency strategies to two-digit numbers up to 100.	**"Making Ten"** Example: 7+5= 7+3+2= 10+2=12	**"Near Doubles"** Example: 7+8= 7+7+1=15	**"Skip count by 2s, 5s, and 10s"** Examples: From zero: 2, 4, 6, 8, 10, 12... From a multiple: 15, 20, 25, 30, 35... Backward: 80, 70, 60, 50, 40, 30...
Gr. 3	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition fact from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	**Multiplication Concepts** • Understanding concepts of multiplication (e.g., groups of, arrays, repeated addition) • Connecting multiplication to skip-counting.		**"Multiply by 0 and 1"** Examples: 1x1=1 1x0=0 2x1=2 0x2=0 1x3=3 8x0=0 4x1=4 0x6=0

By the end of Grade 3, most students should be able to recall addition facts to 20 (From the BC Curriculum)

Gr. 4	Review, reinforce, and allow practice time for all addition strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for Gr. 2 and 3 multiplication strategies, plus ➡		**"Add/Subtract a Group"** Examples: 10x5 = 50, so 9x5 = 50-5 = 45 2x4 = 8, so 3x4 = 8+4 = 12	

Students should be able to recall the following multiplication facts by the end of Grade 4 (2s, 5s, 10s). (From the BC Curriculum)

Gr. 5	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for Gr. 2, 3, and 4 strategies, plus ➡	**"Squares"** Examples: 1x1=1 2x2=4 3x3=9 4x4=16	**"Near Squares"** Example: 8x8 = 64, so 9x8 = 64+8 = 72 7x7 = 49, so 6x7 = 49-7 = 42	**"Doubling"** If you can multiply by 2, then you can double to find your 4s, and double again to find your 8s. Examples: 2x6 = 12 4x6 = 24 8x6 = 48

Students should be able to recall the following multiplication facts by the end of Grade 5 (2s, 3s, 4s, 5s, 10s). (From the BC Curriculum)

Gr. 6	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with multiplication facts from 0x0=0 to 10x10=100. Extend multiplication fluency strategies to multi-digit numbers.

Students should be able to recall all one-digit by one-digit multiplication facts by the end of Grade 6. (0x0 = 0 to 10x10 = 100)

Gr. 7	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with multiplication facts from 0x0=0 to 10x10=100. Extend multiplication fluency strategies to multi-digit numbers.

Fact Fluency Games for Strategy Practice
from "Math Fact Fluency"
by Jennifer Bay-Williams and Gina Kling

Addition

Multiplication

QR code for game instructions and blackline masters

Grade				
K	**Counting** • one-to-one correspondence • conservation • cardinality • stable order counting • sequencing 1-10 • linking sets to numerals • subitizing	**"Add and Subtract 0, 1, and 2"** • Sleeping Bears • Bears Race to 10 • Bears Race to 0 • Bears Race to Escape	**"Combos of 10"** • 10 Sleeping Bears • Go Fish for 10s • Erase	**"Doubles to 10"** • Doubles Match-Up • Doubles Bingo
Gr. 1	Review, reinforce, and allow practice time for the K strategies, plus ➡ Extend addition fluency strategies to numbers up to 20.	**"10+___"** • Square Deal	**"Doubles to 20"** • Doubles Match-Up • Doubles Bingo	
Gr. 2	Review, reinforce, and allow practice time for the K and 1 strategies, plus ➡ Extend addition fluency strategies to two-digit numbers up to 100.	**"Making Ten"** **"Near Doubles"** • Addition Salute • Old Mascot • Diffy Dozen • Concentration • Sum War • Lucky 13	**"Skip count by 2s, 5s, and 10s"** Classroom activities and resources: • Choral Counting • Songs and Chants • Counting Collections • Hundred Charts and Number Lines	
Gr. 3	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition fact from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	**Multiplication Concepts** • Sticker Book Patterns • On the Double • Trios • Capture the 5 First	**"Multiply by 0 and 1"** • How Low Can you Go?	

By the end of Grade 3, most students should be able to recall addition facts to 20 (From the BC Curriculum)

Grade				
Gr. 4	Review, reinforce, and allow practice time for all addition strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for Gr. 2 and 3 multiplication strategies, plus ➡	**"Add/Subtract a Group"** • Multiplication Pathways • Strive to Derive • Multiplication Salute • Fixed Factor War	

Students should be able to recall the following multiplication facts by the end of Grade 4 (2s, 5s, 10s). (From the BC Curriculum)

Grade					
Gr. 5	Review, reinforce, and allow practice time for all strategies from previous grades until students have achieved automaticity with addition facts from 1+1=2 to 10+10=20. Extend addition fluency strategies to multi-digit numbers.	Review, reinforce, and allow practice time for Gr. 2, 3, and 4 strategies, plus ➡	**"Squares"** • Squares Bingo	**"Near Squares"** • Multiplication Pathways • Strive to Derive • Multiplication Salute • Fixed Factor War	**"Doubling"** • Multiplication Pathways • Strive to Derive • Multiplication Salute • Fixed Factor War

Students should be able to recall the following multiplication facts by the end of Grade 5 (2s, 3s, 4s, 5s, 10s). (From the BC Curriculum)

Gr. 6	**Games to practice all four operations:** • Net Zero • Softball Hits • Three Dice Take

Students should be able to recall all one-digit by one-digit multiplication facts by the end of Grade 6. (0x0 = 0 to 10x10 = 100)

Gr. 7	**Games to practice all four operations:** • Net Zero • Softball Hits • Three Dice Take

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