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○	○	○	●	G2-10	Lines of Symmetry	I-7
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Generic Blackline Masters

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Grade 2, Part 2

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○	○	○	●	PA2-10	Identifying Patterns	S-15
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●	○	●	●	PA2-13	Showing Patterns in Different Ways	S-28
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				BLM	Adding and Subtracting Patterns	S-39
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				BLM	What Kind of Pattern?	S-41
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Unit 16 Geometry: 3-D Shapes

Curriculum Requirement				Lesson	Title	Section-Page
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Unit 17 Number Sense: Money

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●	●	●	●	NS2-69	Skip Counting by Different Numbers	U-10
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BLM	Smallest Number of Coins Chart	U-55
BLM	Counting Money Game	U-56
BLM	Trading for Dimes and Pennies	U-57
BLM	Food Sale	U-58
	Letter to Parents/Guardians	U-61

Unit 18 Number Sense: Fractions, Multiplication, and Division

Curriculum Requirement				Lesson	Title	Section-Page
AB	BC	MB	ON			
					Introduction	V-1
○	○	○	●	NS2-75	Fractions	V-3
○	○	○	●	NS2-76	Writing Fractions	V-8
○	○	○	●	NS2-77	Comparing Fractions	V-12
○	○	○	●	NS2-78	More Than One Whole	V-15
○	○	○	●	NS2-79	Multiplication	V-21
○	○	○	●	NS2-80	Multiplying by Skip Counting	V-26
○	○	○	●	NS2-81	Division	V-31
○	○	○	●	NS2-82	How Many Groups?	V-36
				BLM	Fractions Memory	V-39
				BLM	I Have __, Who Has __? Fractions	V-43
				BLM	Finding Fractions	V-46
				BLM	Reading Fractions	V-47
				BLM	Matching Fractions to Pictures	V-48
				BLM	Shading Fractions	V-49
				BLM	Blank Fraction Strips	V-50
				BLM	Shaded Fraction Strips	V-51
				BLM	Fractions to Cut	V-53
				BLM	Times and Plus	V-54
				BLM	Multiplication and Order	V-55
				BLM	Multiplying in Different Ways	V-56
				BLM	Sharing Equally	V-57

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Unit 19 Measurement: Time

Curriculum Requirement				Lesson	Title	Section-Page
AB	BC	MB	ON			
					Introduction	W-1
○	○	○	●	ME2-21	Measuring Time	W-3
○	○	○	●	ME2-22	Clock Faces	W-8
○	○	○	●	ME2-23	Measuring Time with Clocks	W-11
○	○	○	●	ME2-24	Time to the Hour	W-16
○	○	○	●	ME2-25	Half Past	W-20
○	○	○	●	ME2-26	Time to the Half Hour	W-23
○	○	○	●	ME2-27	Quarter Past	W-27
○	○	○	●	ME2-28	Quarter To	W-30
				BLM	In One Minute	W-33
				BLM	Estimate Using a Sand-Timer	W-34
				BLM	Make Your Own Clock	W-35
				BLM	Clocks	W-36
				BLM	About How Many?	W-37
				BLM	Starting Anywhere	W-38
				BLM	Comparing Units of Time	W-39
				BLM	Matching Analog to Digital	W-40
				BLM	Draw the Clock	W-44
				BLM	How Long Is the Car Ride?	W-45
				BLM	Finish Time	W-46
				BLM	Analog and Digital	W-47
				BLM	Reading and Writing Times	W-48
					Letter to Parents/Guardians	W-49

Unit 20 Probability and Data Management: Probability

Curriculum Requirement				Lesson	Title	Section-Page
AB	BC	MB	ON			
					Introduction	X-1
○	○	○	●	PDM2-8	Bar Graphs	X-3
○	○	○	●	PDM2-9	Line Plots	X-10
●	○	●	●	PDM2-10	Tallies	X-16
●	○	●	●	PDM2-11	Asking Questions about Data	X-21
●	○	●	●	PDM2-12	Surveys	X-26
○	●	○	●	PDM2-13	Certain or Impossible?	X-30
○	●	○	●	PDM2-14	Likely or Unlikely?	X-34

<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	PDM2-15	More Likely or Less Likely?	X-38
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	PDM2-16	More Likely, Equally Likely, or Less Likely?	X-41
				BLM	Bar Graphs	X-44
				BLM	Bar Graph Template	X-47
				BLM	Journal Entries	X-48
				BLM	Spinner Experiment	X-50
				BLM	My Survey	X-51
				BLM	Events	X-52
				BLM	Spinners	X-54
				BLM	Word Cards	X-55
				BLM	Weather in April	X-56

Unit 21 Measurement: Area, Calendars, Temperature, and Capacity

Curriculum Requirement				Lesson	Title	Section-Page
AB	BC	MB	ON			
					Introduction	Y-1
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-29	Comparing Areas	Y-2
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-30	Measuring Area	Y-6
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-31	Comparing Units of Area	Y-10
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	ME2-32	Days and Months	Y-12
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	ME2-33	Calendars	Y-15
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-34	Thermometers	Y-20
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-35	What Holds More?	Y-23
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-36	Capacity	Y-26
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-37	Measuring Capacity	Y-29
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	ME2-38	Measuring Cups	Y-33
				BLM	Shapes for Cutting	Y-36
				BLM	Shapes—Comparing Area	Y-37
				BLM	Comparing Rectangles	Y-38
				BLM	Trace, Cut, and Compare	Y-39
				BLM	Cake	Y-40
				BLM	How to Measure	Y-41
				BLM	Estimate and Measure	Y-42
				BLM	Covering Shapes with Blocks	Y-43
				BLM	Pattern Blocks and Area	Y-44
				BLM	Tangram	Y-46
				BLM	Calendar Word Search	Y-47
				BLM	Empty Calendar	Y-48

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BLM	Patterns on Calendars	Y-49
BLM	Which Thermometer?	Y-53
	Letter to Parents/Guardians	Y-55

Generic Blackline Masters

Lesson	Title	Section-Page
BLM	Hundreds Chart	Z-1
BLM	Number Lines to 10	Z-2
BLM	1 cm Grid Paper	Z-3
BLM	Blank Spinners	Z-4
BLM	2 cm Grid Paper	Z-5
BLM	Pattern Blocks	Z-6

Assessment Checklists

Title	Section-Page
Unit 12	AA-1
Unit 13	AA-3
Unit 14	AA-5
Unit 15	AA-7
Unit 16	AA-9
Unit 17	AA-11
Unit 18	AA-13
Unit 19	AA-15
Unit 20	AA-17
Unit 21	AA-19

Unit Quizzes and Tests

Title	Section-Page
Unit 12	BB-1
Unit 13	BB-10
Unit 14	BB-19
Unit 15	BB-26
Unit 16	BB-33
Unit 17	BB-44
Unit 18	BB-51
Unit 19	BB-60

Unit 20	BB-67
Unit 21	BB-76

JUMP Math Correlation to the Alberta Curriculum

Title	Section-Page
Correlation to Specific Outcomes	CC-1

JUMP Math Correlation to the New BC Curriculum

Title	Section-Page
Correlation to Content	DD-1
Exemplar Lessons for Curricular Competencies	DD-7

JUMP Math Correlation to the Manitoba Curriculum

Title	Section-Page
Correlation to Specific Learning Outcomes	EE-1

JUMP Math Correlation to the Ontario Curriculum

Title	Section-Page
Correlation to Specific Expectations	FF-1

Welcome to JUMP Math and Your Grade 2 Teacher Resource

JUMP Math is ...

JUMP Math is an award-winning charitable organization dedicated to helping people lead more fulfilled lives. JUMP Math's research-informed materials and professional development replace math anxiety with an understanding and a love of math in students and educators.

JUMP Math Features

The following are the features of JUMP Math:

- Confidence building
- Structured inquiry
- Guided practice
- Scaffolded instruction
- Continuous assessment
- Differentiation
- Mental math

Confidence building

JUMP Math recognizes that math anxiety is a significant barrier to learning for many students. The research in cognition that shows the brain can be altered by education also shows that the brain can't register the effects of education if it is not attentive. However, a student's brain can't be truly attentive unless the student is confident and excited and believes that there is a point in being engaged in the work. The JUMP Math approach reduces math anxiety by building on success in small steps. When students who are struggling become convinced that they cannot keep up with the rest of the class, their brains begin to work less efficiently, as they are never attentive enough to fully consolidate new skills or develop new neural pathways. That is why it is so important to give students the skills they need to take part in lessons and to give them opportunities to show off by answering questions in front of their classmates.

Structured inquiry

Structured inquiry is a balanced instructional approach that incorporates explicit instruction combined with guided and independent practice. In JUMP Math lessons, students are expected to derive concepts and solve problems themselves, but the teacher provides enough rigorous guidance to make sure this happens with all students and not just the advanced few. Students are led to deep conceptual understanding and computational fluency.

Guided practice

In guided practice, teachers offer students purposeful practice that immediately follows the teaching of a skill or scaffolded step of a concept. This guided practice allows the teacher to continuously assess and confirm students' understanding and mastery.

Scaffolded instruction

Scaffolded instruction is an effective instructional practice where new ideas and skills are reviewed and introduced in smaller incremental steps directly linked to and built upon earlier learning. Each lesson offers a series of carefully considered exercises and explorations in which each new concept follows from the last. Students are more likely to make discoveries if the progression of ideas makes sense to them and does not overwhelm them.

Continuous assessment

The progression of learning contained in each JUMP Math lesson enables active and ongoing assessment, often referred to as “continuous assessment.” Through observation, questioning, and interaction with students as they work, teachers are readily able to check for understanding, identify and correct misunderstandings, and differentiate instruction with timely interventions. Continuous assessment often provides a more accurate and complete picture of a student’s ability and has a positive impact on learning.

Differentiation

JUMP Math recognizes that classrooms are diverse in their makeup and needs, and that students range in their levels of focus, concentration, engagement, processing speed, and readiness to explore and demonstrate learning. In order to support this diversity, JUMP Math lessons and supporting resources provide multiple approaches to exploring, practising, and assessing skills. Teachers can differentiate the development of skills without differentiating the outcomes of their students by teaching lessons in short instructional pieces and assigning scaffolded exercises, hands-on activities, and extension questions. In JUMP Math, mastery is the goal of each lesson and all students are supported to reach that goal.

Mental math

Mental math is a mathematical framework that includes number sense, computational fluency, and the application of number concepts through purposeful and varied practice, not just rote memorization. In JUMP Math, mental math is explored through regular practice.

JUMP Math Classroom Materials

JUMP Math has developed a variety of materials to help you teach math. In this section, we will describe the following components and features of the JUMP Math classroom materials:

- Teacher Resource Table of contents
- Mental math
- Unit introductions
- Lesson plans
- Digital lesson slides
- Blackline Masters (BLMs)
- Assessment tools
- Assessment & Practice Books
- AP Answer Key Books
- Curriculum correlations
- Confidence Building Units

Teacher Resource Table of Contents

The table of contents for the Teacher Resource contains information on where to find each component, as well as details on the provincial curriculum requirement for each lesson. The lessons are flagged as required, recommended, or optional for each province. Lessons labelled as required are necessary to cover the curriculum. Lessons labelled as recommended are either essential review or contain extra material that is used in future lessons. Lessons labelled as optional cover material that is not required by the curriculum or in future lessons. Review lessons are marked with an asterisk (*) in the table of contents. If the significant majority of your students have a strong foundation in the material covered in a review lesson, we recommend you use the material with individuals or small groups of students who need the review. Otherwise, you should teach them to the whole class.

Mental Math

Mental math is a mathematical framework that includes number sense, computational fluency, and the application of number concepts through purposeful and varied practice, not just rote memorization. Essential mental math concepts, skills, exercises, and assessments that can be used throughout the year are presented in this section (see p. A-23).

Unit Introductions

Each unit begins with an introduction that is designed to serve as a planning support. The unit introductions include some or all of the following:

- Overview of the topics covered in the unit
- Specifications on meeting your curriculum
- Correlation between the lessons and the assessments
- Notes on materials and vocabulary used in the lessons, where applicable

2. Subtract.

a) $7 - 5 =$ b) $8 - 6 =$ c) $5 - 3 =$ d) $5 - 2 =$
e) $9 - 6 =$ f) $10 - 5 =$ g) $11 - 7 =$ h) $17 - 14 =$
i) $33 - 31 =$ j) $27 - 24 =$ k) $43 - 39 =$ l) $62 - 58 =$

Skill 1: Adding 2 to an Even Number
This skill has been broken down into a number of sub-skills. After teaching each sub-skill, give students a short diagnostic quiz to verify that they have learned the skill. Sample quizzes for Skills 1 to 4 are included below.

a) Name the next one-digit even number:
Numbers that have ones digit 0, 2, 4, 6, or 8 are called the even numbers. Using practice or games, teach students to say the sequence of one-digit even numbers without hesitation. Ask students to imagine the sequence going on in a circle so that the next number after 8 is 0 (0, 2, 4, 6, 8, 0, 2, 4, 6, 8, ...). Then play the following game: name a number in the sequence and ask students to give the next number. Don't move on until all students have mastered the game.

b) Name the next two-digit even number:
CASE 1: Numbers that end in 0, 2, 4, or 6
Write an even two-digit number that ends in 0, 2, 4, or 6 on the board. Ask students to name the next even number. Students should recognize that if a number ends in 0, then the next even number ends in 2; if it ends in 4, then the next even number ends in 6, etc. For instance, the number 54 has ones digit 4, so the next even number will have ones digit 6.

QUIZ 1
Name the next even number.
a) 52 b) 64 c) 36 d) 22 e) 80

CASE 2: Numbers that end in 8
Write the number 58 on the board. Ask students to name the next even number. Remind students that even numbers must end in 0, 2, 4, 6, or 8. But 50, 52, 54, and 56 are all less than 58 so the next even number is 60. Students should see that an even number ending in 8 is always followed by an even number ending in 0 (with a tens digit that is one higher).

QUIZ 2
Name the next even number.
a) 58 b) 68 c) 38 d) 48 e) 78

c) Add 2 to an even number:
Point out to students that adding 2 to any even number is equivalent to finding the next even number. Examples: $46 + 2 = 48$, $48 + 2 = 50$. Knowing this, students can easily add 2 to any even number.

QUIZ 3
Add.
a) $26 + 2 =$ b) $82 + 2 =$ c) $40 + 2 =$ d) $56 + 2 =$ e) $34 + 2 =$

Mental Math — Teacher Resource for Grade 2 A-29

Lesson Plans

The JUMP Math lesson plans guide teachers through a progression of skill and concept development, tasks to demonstrate and model, and varied opportunities to guide student exploration, practice, and learning. The lesson plans provide clear explanations and explicit guidance on how to introduce one concept at a time, explore concepts and make connections in a variety of ways, assess students quickly, enhance learning with interactive activities, and challenge students with bonus questions. Problem-solving skills are developed progressively throughout the lesson with a series of probing questions and enriched discussions. The lesson plans are designed to be used in conjunction with Blackline Masters, digital lesson slides, and corresponding pages in the Assessment & Practice Books.

Pages in the Assessment & Practice Book related to this lesson

Indicates if the lesson is required, recommended, or optional to cover your provincial curriculum

New vocabulary terms appear in bold in the vocabulary list and in italics when defined in the lesson plan.

Grade

Lesson number

G2-1 Lines

Pages 70–71

Lesson title

The purpose of the lesson

Skills and concepts students need for this lesson

Materials and teaching aids that need to be prepared ahead of time for the lesson

PA = Patterns and Algebra
NS = Number Sense
ME = Measurement
G = Geometry
PDM = Probability and Data Management

CURRICULUM REQUIREMENT
 AB: required
 BC: required
 MB: required
 ON: required

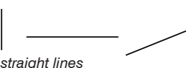
VOCABULARY
 circle
 closed
 curved
 line
 open
 rectangle
 shape
 sides
 square
 straight
 triangle

Goals
 Students will identify straight and curved lines and sides, and open and closed lines.


PRIOR KNOWLEDGE REQUIRED
 Knows the words “line” and “shape”

MATERIALS
 large paper square, rectangle, triangle, and circle
 attribute blocks made from **BLM Attribute Blocks** (p M-8–10)
 yarn circles
BLM Find Closed Lines (p F-34)
 catalogues, magazines, and newspapers

Curved and straight lines. Draw an assortment of straight line segments (see samples below). Tell students that lines that go straight from one point to another are called *straight* lines. Draw a few curved lines. SAY: A line that is not straight and has no pointed corners is called a *curved* line. Have volunteers draw two or three more examples of straight and curved lines.



straight lines




curved lines

Sides of a shape. Show students a large paper square. ASK: What shape is this? If students do not recall the name, SAY: This shape is a square. Run your finger along each of the sides in turn and SAY: These are the sides of the square. ASK: Are the sides of a square straight or curved? (straight) Repeat with a large paper triangle and rectangle. Then show students a large paper circle and ASK: Which type of line makes a circle? Is a circle made with a straight line or a curved line? (curved line)


Show students some shapes with curved and straight sides (from **BLM Attribute Blocks**, for example). Point to each side of the shape in turn and ASK: Is this side straight or curved? Draw the shapes in the exercises below on the board, one at a time. Ask the questions below for each shape and have students signal the answer with thumbs up for yes and thumbs down for no.

Exercises: Does the shape have at least one straight side? Does the shape have at least one curved side?


a)



b)



c)



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Many lessons include activities.

The main idea behind each part of the lesson is in bold at the beginning of the paragraph.

Exercises for individual practice (with answers) are highlighted.

Specific prompts provide suggested wording.


CONNECTION  Probability and Data Management

ACTIVITY 1 (Essential)


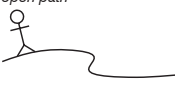
1. **Sorting shapes** (see p F-2). Give students attribute blocks from BLM Attribute Blocks (1). Have them sort the shapes according to whether they have all straight sides or at least one curved side.

Answers: a) yes, no; b) no, yes; c) yes, yes; d) no, yes; e) yes, no;
Bonus: yes, yes







Have volunteers draw shapes on the board and ask the same questions as in the exercises above.

Bonus: 

Closed and open lines. Draw two curved lines, one closed and one open (see examples below). SAY: These are two paths. Draw a person at some point on the closed path—where will she end up? (back where she started) Draw a person at one end of the open path and ASK: Where will this person end up as he walks along the path? Will he end up where he started? (no). Why not? (because the path has two ends). Tell students that a path that has no ends is called a **closed** path. A path that has two ends is called an **open** path. SAY: We also use the words “closed” and “open” to describe lines. Draw several more curved lines (without vertices), both closed and open, and ASK: Is this line closed or open? **PROMPT:** Can you get back where you started without turning around?

closed path  *open path* 

Exercises: Is the line closed or open?

a)  b)  c) 
d)  e)  f) 

Answers: a) closed, b) open, c) open, d) open, e) closed, f) closed

Shapes are closed lines. Draw three sides of a square on the board. ASK: Is this an open line or a closed line? (open) Then add the fourth side to the square. ASK: Is a square an open or closed line? (closed) Will people walking along the sides of a square end up where they started? (yes)

Geometry 2-1 F-5

Bonus questions are often provided.

Sample answers are provided in brackets.

Connections to other strands, other subjects, or real-world contexts are highlighted.

Strand, grade, and lesson number

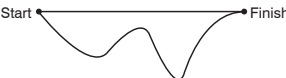
Extensions

1. Length of straight and curved lines.

Create the following picture on the floor using rope. Use masking tape to keep the straight and curved lines in place. Point to each line separately and ask students to describe it as straight or curved.

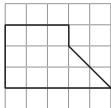
Start

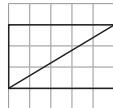
Finish

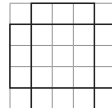


Invite two volunteers to walk, heel to toe, along the lines. Volunteers should start from the same dot at the same time and walk at the same pace. Before they begin, invite students to guess who will get from start to finish faster and explain their guesses. ASK: Which line is shorter and why? (the straight line; it does not wander around) Have the volunteers walk along the lines to check the prediction.

2. Copy the shape onto grid paper. Draw the shape without lifting your pencil from the paper. Draw each line only once.


a) 

b) 

c) 

3. Have students look at traditional Irish designs, such as Celtic knots. You can find images online by searching for "traditional Irish designs" or "Celtic knots." Students can pretend that the designs are knots made of lines. Have students determine if the lines are open or closed and how many separate lines are in each design.

CONNECTION



Art, Social Studies

Geometry 2-1

F-7

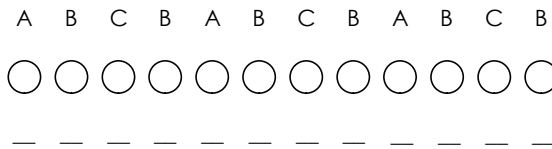
Extension questions appear at the end of the lesson plan.

Digital Lesson Slides

Digital lesson slides guide teachers to follow the progression of skill development within a lesson. They are not intended as stand-alone tools or lessons, but are to be used in tandem with the lesson plans. The slides include diagrams, sample problems, practice exercises, bonus questions, and extensions.

See p. D-18 for details.

Draw a **matching pattern** of different faces.



Use the numbers 1, 2, and 3 to create a second **matching pattern**.

This activity is essential.

Activity:

Partner 1:

Use all the cubes to create two connected chains.

Partner 2:

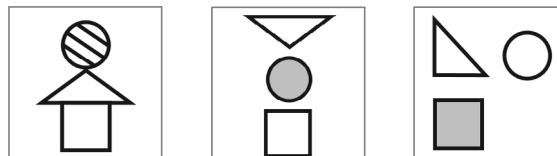
Write an **addition sentence** that matches the **model**.

Switch roles and repeat.

See p. J-4 for details and material needs.

The square is **below** the circle and the triangle is **above** the square.

Which picture am I describing?



Draw your own picture that fits with the description.

Blackline Masters (BLMs)

Blackline Masters (BLMs) are reproducible pages that are lesson-specific or used repeatedly throughout the unit and are designed to supplement instruction in the lesson. BLMs can be used to, for example, provide practice that is integral to the lesson, provide additional practice for students who require it, or serve as templates or manipulatives that can be used during the lesson.

NAME _____ DATE _____

Skip Counting

☐ Write the **ones digits** when counting by 2s from 0.

0	2	4	6	8	10	12	14	16	18	20
0	2				0	2				

☐ Write the **ones digits** when counting by 5s from 0.

0	5	10	15	20	25	30	35	40	45	50
0	5	0	5							

Start at 0.

☐ Circle the numbers you say when you count by 2s.

☐ Cross out the numbers you say when you count by 5s.

44	10	23	39	18	30	47	46
47		35	11	15		58	99
42	28		85	84			
	35	60		48	27	72	
40		53		70		68	

☐ Find the numbers you say when counting by 10s from 0.

What do you notice? _____

P-32 Blackline Master — Number Sense — Teacher's Guide for Grade 2

NAME _____ DATE _____

Number Lines to 10, 20, 30, and 40

0 1 2 3 4 5 6 7 8 9 10

10 11 12 13 14 15 16 17 18 19 20

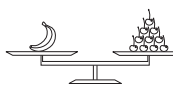
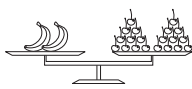
20 21 22 23 24 25 26 27 28 29 30

30 31 32 33 34 35 36 37 38 39 40

R-28 Blackline Master — Number Sense — Teacher's Guide for Grade 2


NAME _____ DATE _____


Bananas and Cherries

1 banana	weighs	10 cherries.
2 bananas	weigh	20 cherries.
3 bananas	weigh	cherries.
4 bananas	weigh	cherries.
bananas	weigh	50 cherries.
bananas	weigh	60 cherries.
7 bananas	weigh	cherries.
bananas	weigh	80 cherries.

☐ Describe the growing pattern.

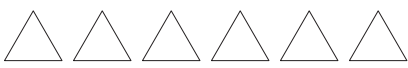
 Start at ____.

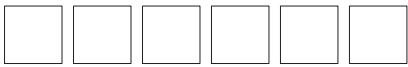
 Start at ____.


Blackline Master — Patterns and Algebra — Teacher's Guide for Grade 2 S-37


NAME _____ DATE _____

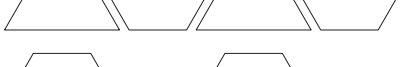
Pattern Blocks











Blackline Master — Generic — Teacher's Guide for Grade 2 M-11

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Assessment Tools

JUMP Math provides checklists for progressive assessment. We provide one checklist per unit grouped into topics covering, on average, four lessons. Key “look fors” with suggested opportunities for assessment are listed. The assessment checklists are available in print and online at www.jumpmath.org as PDFs that can be filled out electronically.

In addition, we provide one test for each unit in Part 1 and, starting in Part 2, we provide quizzes and test for each unit for summative assessment. Students should need no more than 10 minutes to complete a quiz and no more than 45 minutes to complete a test. Quizzes cover material both from lessons that are required to cover the curriculum and lessons labelled as recommended, while tests only cover material from lessons that are required to cover the curriculum. The quizzes and tests are available in print and in a modifiable format online at www.jumpmath.org.

Unit 3: Patterns and Algebra

Assessment Checklist

CT Calendar Time
NT Number Talks
✓ Check when student has demonstrated associated skill.

● Required
● Recommended
○ Optional

Student Name: _____

Lessons PA2-1 to 3

Look For

Identifies the core of single-attribute patterns.
● AB ● BC ● MB ● ON

Extends single-attribute patterns.
● AB ● BC ● MB ● ON

Creates single-attribute patterns.
● AB ● BC ● MB ● ON

Identifies the core of double-attribute patterns.
● AB ● BC ● MB ● ON

Extends double-attribute patterns.
● AB ● BC ● MB ● ON

Creates double-attribute patterns.
● AB ● BC ● MB ● ON

Describes single-attribute patterns.
● AB ● BC ● MB ● ON

Describes double-attribute patterns.
● AB ● BC ● MB ● ON

Notes:

In Lesson

Date Assessed

PA2-1

PA2-1

PA2-1

PA2-2

PA2-2

PA2-2

PA2-3

PA2-3

PA2-3

✓

Assessment Checklists for Grade 2

N-5

Unit 7: Number Sense

Test (Lessons 20–25, 27)

Name: _____
Date: _____

1. Fill in the table. Write the number.

tens

ones

Number: _____

2. Write the numbers in order from smallest to largest.

a) 94 55 96 b) 27 18 45 31 81

3. a) Can you take away 7 from 4? ☆☆☆☆☆ yes / no

b) Does 4 – 7 make sense? yes / no

4. Add by counting on.

a) 48 + 3 = _____ b) 92 + 5 = _____

0-16

Sample Unit Tests for Grade 2

Assessment & Practice Books

These consumable books dovetail seamlessly with the lesson plans. Students work directly in the books to consolidate the skills and concepts taught in the lesson, while teachers assess student understanding. Each student requires one set of Assessment & Practice Books, which includes a Part 1 and Part 2, for the school year.

PA = Patterns and Algebra

NS = Number Sense

ME = Measurement

G = Geometry

PDM = Probability and Data Management

Lesson title

Adding and Subtracting 0

☐ Add 0 dots.

Grey boxes show complete answers.

Partial or complete answers appear in italics.

The boxes around each problem create clear separation of questions.

The notebook icon indicates that students must answer in a notebook.

3 + 0 = *3*

0 + 5 = _____

6 + 0 = _____

0 + 8 = _____

0 + 9 = _____

Bonus
36 + 0 = _____

☐ Take away 0 objects.

5 - 0 = _____

7 - 0 = _____

4 - 0 = _____

8 - 0 = _____

10 - 0 = _____

Bonus
27 - 0 = _____

☐ Take away all the objects.

3 - 3 = _____


5 - 5 = _____

4 - 4 = _____

q - q = _____

8 - 8 = _____

Bonus
qq - qq = _____

 What is 7 + 0? What is 7 - 0? Explain why.

16

Number Sense 2-8

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Students can use checkboxes to keep track of completed tasks.

Even numbers have ones digit 0, 2, 4, 6, or 8.
Odd numbers have ones digit 1, 3, 5, 7, or 9.

- ☐ Circle the even numbers.
- ☐ Underline the odd numbers.


1 ② 3 4 5 6 7 8 9 10

2 4 6 8 10 12 14 16 18 20

5 10 15 20 25 30 35 40 45 50

10 20 30 40 50 60 70 80 90 100

17 4 94 26 47
9 3 17 71 43 61
81 94 18 26 62 34 90

 **Bonus:** Describe all the patterns you see.

Number Sense 2-49

19

Strand, grade, and lesson number

AP Answer Key Books

Answer keys are available for purchase for the Assessment & Practice Books.

Grade 2 JUMP Math Correlation to the New BC Curriculum		
<p>NOTES:</p> <p><u>Underlined</u> JUMP Math lessons are review from a previous grade.</p> <p><i>Italicized</i> JUMP Math lessons contain prerequisite material required to meet the learning standard.</p> <p>An asterisk (*) indicates that a JUMP Math lesson covers a curriculum requirement primarily in the Teacher's Guide.</p> <p>JUMP Math strands are represented by:</p> <p>NS Number Sense ME Measurement G Geometry PA Patterns and Algebra PDM Probability and Data Management</p>		
<p>Big Ideas</p> <p>Numbers to 100 represent quantities that can be decomposed into 10s and 1s.</p> <p>Development of computational fluency in addition and subtraction with numbers to 100 requires an understanding of place value.</p> <p>The regular change in increasing patterns can be identified and used to make generalizations.</p> <p>Objects and shapes have attributes that can be described, measured, and compared.</p> <p>Concrete items can be represented, compared, and interpreted pictorially in graphs.</p>		
Content	JUMP Math Lessons	
number concepts to 100	Part	Unit Lessons
	1	7 NS2-18 to 21
	2	12 NS2-43, 44, 46 to 49
	2	13 NS2-51, 56
	2	17 NS2-68, 69
* counting:	Part	Unit Lessons
	2	12 NS2-43, 44
	2	17 NS2-68, 69

JUMP Math Correlation to the New BC Curriculum — Grade 2

DD-1

Skip Counting by 5s and 10s

☐ Start at 5 and count by 5s. Colour the numbers that you say.

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

The coloured numbers have ones digit 5 or 0.

☐ Count by 5s.

0 5 10 15 20 25 30

60 65 70 75 80 85 90

70 75 80 85 90 95 100

☐ Count back by 5s.

30 25 20 15 10 5 0

80 75 70 65 60 55 50

100 95 90 85 80 75 70

2

Answer Key for Number Sense 2-44

Curriculum Correlations

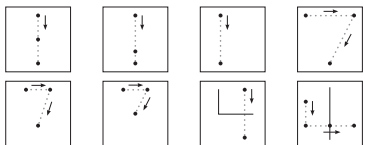
Curriculum correlations are documents that show, for each region and grade level, how JUMP Math lessons are aligned to curriculum learning outcomes in Alberta, British Columbia, Manitoba, and Ontario.

Confidence Building Units

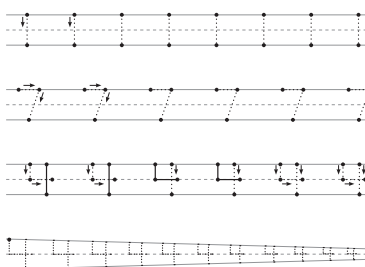
There are five Confidence Building Units provided separately from the other classroom materials. Their purpose is to generate excitement in the classroom and convince all students that they are good at mathematics. Each Confidence Building Unit includes short, carefully designed “challenge lessons” in a Teacher’s Manual and associated student practice pages. We recommend that teachers only use these units for no more than five days, preferably at the beginning of the school year.


W-1B

Join the dots in order.



Trace.



2  Writing Numbers Challenge — Level A

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Teaching with JUMP Math

Professional Development

JUMP Math provides a variety of engaging on-site and online professional learning (PD) opportunities throughout the year. Each PD session is designed to enhance and support instructional practices, leading to improved success for students. Learn from our team of experienced educators who work closely with K–8 classroom teachers, principals, administrators, and parents to use research-informed instruction, practice, and assessment methods.

You can learn more about our professional learning opportunities on the Professional Development section at www.jumpmath.org, or by getting in touch (see the Contact Us section).

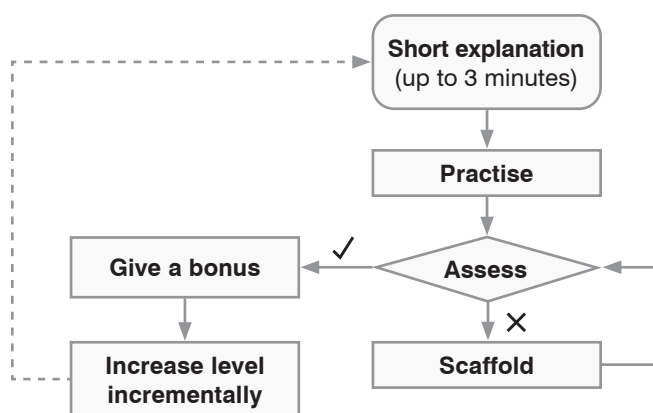
Teaching Order

To use JUMP Math to its full effect, you should teach the units in the suggested order and follow the lesson plans very closely. You should teach approximately one lesson per day; this will allow enough time to teach all of the lessons labelled as required and recommended for your curriculum.

Lesson Structure

JUMP Math lessons are designed to keep the class engaged and moving through the material together. A typical lesson begins with a brief review of relevant previous material. This recalls knowledge that will be needed in the current lesson and starts students on a comfortable footing.

The body of the lesson is taught in manageable pieces, with frequent opportunities for student participation and assessment. The bold in-line descriptive subheadings in the lesson plans outline the content and flow of the lesson. Within these sections, you will teach explicitly only for brief periods before you ask a question or assign a challenge that students can explore independently in pairs or in groups. These challenges are taken up and discussed immediately, with the expectation that all (or virtually all) students will understand and master the material before moving on. The lesson continues with an incremental increase in difficulty and another short explanation.



After you teach a lesson, or a significant portion of a lesson, students work independently on a more significant task, usually an activity or on corresponding pages in the Assessment & Practice Book. As they work, you can circulate around the class and help students who need assistance. When students complete this summative task, they can work on some of the extensions that are included at the end of most lesson plans.

Instructional Strategies

Classroom Environment

Here are some effective techniques to keep students of all ability levels engaged in the classroom.

Build confidence and excitement about math.

Engaging the entire class in lessons is not simply a matter of fairness; it is also a matter of efficiency. While the idea may seem counterintuitive, you will enable stronger students to go further by helping students who struggle. You can create a real sense of excitement about math in the classroom simply by convincing struggling students that they can do well in the subject. The class will cover far more material in the year, and students who excel will no longer have to hide their love of math for fear of appearing strange or different. In addition to the everyday techniques described below, you may wish to use a Confidence Building Unit at the beginning of the year, especially for students who are new to JUMP Math. Quizzes can also work as confidence builders when administered to students who are prepared to succeed.

Use daily routines.

Establish predictable routines that support deliberate practice of counting, math fact fluency, and mathematical terminology by incorporating exercises from the Mental Math section, calendar activities, or number talks into your daily schedule.

Working in pairs or groups.

Promote communication by encouraging students to work in pairs or in small groups. Support students to organize and justify their thinking by demonstrating how to use mathematical terminology, symbols, models, and manipulatives as they discuss and share their ideas. Student groupings should be random and vary throughout the week.

Allow students enough time to think.

Discuss one or two skills or concepts at a time with the whole class, allowing students to develop ideas by themselves, but giving hints and guidance when necessary (the lesson plans show you how to do this). Ask questions in several different ways and allow students time to think and share their solutions with a partner before you solicit an answer. After presenting a particular concept, do not go on until all students are assessed and show a readiness to move ahead.

Use bonus questions.

When students have mastered a skill or concept, raise the bar slightly by challenging them to answer a question that is only incrementally more difficult or complex than the questions previously assigned. Be ready to write bonus questions on the board from time to time during the lesson for students who finish their tasks or quizzes early. Bonus questions are included in most of the lesson plans. While students who finish quickly are occupied with these questions, circulate around the class doing spot checks of the work of students who are struggling. The bonus questions you create should generally be simple extensions of the material. (See “How to Create Bonus Questions” on p. A-19).

Use extension questions.

Extension questions should be used to keep students who work quickly engaged in the content of the lesson; they can also be assigned as a group exploration activity. Extension questions don't often introduce any skills or concepts that aren't taught in the lesson, so students who complete their work quickly should be able to work on these questions independently. Placing students into random groupings allows them to work together to find solutions to more challenging problems. Students can submit work for assessment either as a group or individually.

Support independent work.

Take the time to show students how to develop independent work habits during a lesson and while working on their own. The length of time required for this will vary depending upon age, attention, and maturity levels, so be prepared to model and demonstrate these skills over the course of several days or weeks, as needed.

During a lesson. Explain and demonstrate effective use of whiteboards and notebooks as a practice tool throughout the learning process. Emphasize that these tools are useful in keeping track of important information; recording examples of mathematical procedures, models, and conventions; and exploring methods for solving problems.

Have students use grid paper notebooks instead of regular lined notebooks, which help with, for example, lining up digits, making tables, drawing shapes such as rectangles, and drawing coordinate planes, and are an invaluable tool for students with diagnosed and undiagnosed problems in visual organization. Demonstrate effective use of grids on the board; if your board does not have a grid section, photocopy BLM 1 cm Grid Paper onto a transparency and project it onto the board (so you can erase pictures from the board without erasing the grid).

Following a lesson. Guide students to navigate the corresponding pages in the Assessment & Practice Books by showing them where to find and how to use:

- page numbers
- instructions
- worked-out examples
- hints and memory aids
- prompts to use a notebook
- bonus and investigation questions

Teacher Explanations

Explain and demonstrate the work that you expect your students to do. If a student doesn't understand an explanation, select one to three students to rephrase or reword explanations. Sometimes lessons go too fast for a student or component concepts are inadvertently skipped. It is always possible to make an increment smaller. Taking time to reflect on what worked and didn't work in a lesson can help you reach even students who are having the most difficulty. When students are struggling, always ask, "How could I have improved the lesson?"

Continuous Assessment

The progression of learning contained in each JUMP Math lesson enables active and ongoing assessment, often referred to as "continuous assessment." Through observation, questioning, and interaction with students as they work, you are readily able to check for understanding, identify and correct misunderstandings, and differentiate instruction with timely interventions. Continuous assessment often provides a more accurate and complete picture of a student's ability and has a positive impact on learning. Here are some strategies for immediate assessment.

Signalling. When a problem has a simple answer, such as one word, a short phrase, or even a sign (such as $+$ or $-$), ask students to signal their answer with, for example, a thumbs up for yes or a thumbs down for no. Signalling is also useful when you have multiple-choice questions: number the answers and have students hold up the number of fingers corresponding to the answer they think is correct.

Signalling is most effective when students signal their answers at the same time. Give students adequate thinking time, and then have them show their answer on the count of three. Make sure students are familiar with the structure before using it in content-learning situations. Have students practise signalling the answers at the same time beforehand.

Individual whiteboards. Provide students with individual whiteboards to use throughout the lesson as they work through challenge tasks. Similar to the strategy of signalling, have students hold up their boards together on the count of three.

Using JUMP Math Components Together

Planning to Teach

Read each lesson from beginning to end, paying attention to the progression of learning that starts with the review of prior knowledge and ends with the extension questions. Following the initial reading, go back through the lesson and:

1. Review the Mental Math section and decide which skills you will introduce, practise, and assess prior to teaching a lesson. It is most effective to concentrate on one or two skills per day. Begin each math class with a quick review of the mental math skills that were explored the previous day and then introduce one or two new skills. Do not introduce new skills until you have verified mastery of the skills introduced in earlier lessons.
2. Link the layers of skill development in the print lesson to the corresponding digital lesson slides. Decide which slides you will use, which slides you will modify or add, and how you will use the slides to support your teaching and student practice.
3. Re-read the lesson and consider how you may need to modify or adapt the lesson to meet the needs of your students.

Consider the following:

- Do my students have the prerequisite skills?
- How much review will I need?
- What materials, including Blackline Masters, will I need to gather and/or copy?

Decide in advance:

- Which prompts, activities, and extensions will I use?
 - Will I need to create more bonus questions?
 - What is the most effective means of organizing my students for learning, discussion, and practice?
 - How will I assess?
 - What questions will I have ready for struggling students?
 - Which questions will I have ready for students who grasp the concepts quickly?
4. Preview the corresponding pages in the Assessment & Practice Books. You may wish to use some of the exercises as models for practice during the lesson, or you may want to determine how many of the exercises you will assign to students.

Use of the Assessment & Practice Books

The Assessment & Practice Books are designed to be used in tandem with the lesson plans. Before assigning questions from the Assessment & Practice Books, it is important to verify that all students are prepared to answer the questions without your help (or with minimal help). Never allow students to work ahead in the Assessment & Practice Books on material you haven't covered with the class. Students who finish the assigned pages from the Assessment & Practice Books early should be assigned bonus questions similar to the questions on the page or extension questions from the lesson plans. Write the bonus questions on the board or have extra pages prepared and ask students to answer the questions in their notebooks. While students are working independently on the bonus questions, you can spend extra time with anyone who needs help.

Use of the Assessment Tools

The most effective assessment strategy is one where student learning is verified throughout their learning process, and not simply at the end of a unit. We recommend using the activities suggested in the assessment checklists to observe and assess student performance every two to four lessons to ensure students are working toward mastery of the skills explored in those lessons. Information gleaned from close observation will help you catch and correct misunderstandings through review or re-teaching. At the end of each unit, use one of the suggested summative activities to assess the depth and consolidation of all of the skills covered in the unit. You can also assign a test to assess the depth and consolidation of all of the skills covered in the unit. In Part 2, we recommend assigning a quiz to ensure students are working toward mastery of skills explored in the lessons. Information gleaned from quizzes will help you catch and correct misunderstandings through review or re-teaching.

How to Create Bonus Questions

You can make math lessons more exciting (and also make time to check the work of students who need extra time) if you know how to create engaging bonus questions. Bonus questions generally shouldn't be based on new concepts and they don't have to be extremely difficult to capture the attention of students. Students are more likely to consolidate their understanding and commit material to memory when they are attentive and engaged in appropriately challenging work.

Before You Create Bonus Questions

- Bonus questions shouldn't look tedious; avoid giving students an endless series of calculations that appear to have no purpose.
- Assign only a few questions at a time.
- It helps if you are excited when you assign bonus questions; students should feel like they are involved in a quest, faced with increasingly difficult challenges that they believe they can meet.
- Students can make conceptual gains even when the bonus questions vary the task only slightly, such as involving larger numbers or more terms or elements.
- Generalizing from smaller to larger numbers will help all students develop the ability to hold more material in their working memory, follow a series of steps in a procedure, stay on task, and see patterns and apply rules in increasingly complex situations.
- Be careful not to introduce any new skills or concepts in bonus questions.

Creating Bonus Questions

Here are some strategies you can use to create questions that will look hard enough to interest students who work quickly, but that all students can aspire to answer.

Make the numbers in a problem larger.

The simplest way to create bonus questions without introducing any new concepts is to make the numbers in a problem larger or to introduce extra terms. Students of all ages love showing off with larger numbers or with more challenging-looking rules and procedures. You can use this strategy in almost any lesson. For example, the following problems all use place value addition without regrouping and can be done by students who have mastered adding in columns.

Example

Add.

$$\begin{array}{r} 2 \\ + 4 \\ \hline \end{array} \longrightarrow \begin{array}{r} 23 \\ + 45 \\ \hline \end{array} \longrightarrow \begin{array}{r} 235 \\ + 452 \\ \hline \end{array} \longrightarrow \begin{array}{r} 2354 \\ + 4521 \\ \hline \end{array}$$

Make a mistake and ask students to correct it.

Students love correcting a teacher's mistakes, and you can find a way to make mistakes in any lesson. For instance, if you are teaching additive sequences, you might write the following on the board:

Where is the mistake?

3, 7, 12, 16, 20, ...

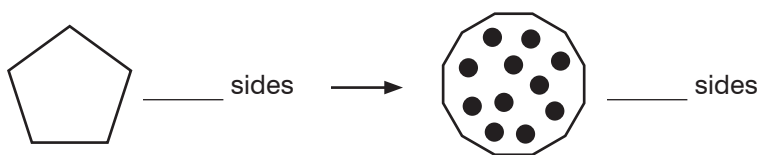
Tell students you created the sequence by adding the same number repeatedly to the initial number, but you think you made a mistake. Ask them to find the mistake and explain where you went wrong.

Increase the complexity of presentation.

When counting or matching, move objects farther apart or arrange them less neatly. In geometry lessons, combine several distractors, such as position, pattern, background, or number of sides, to hide shapes. In the higher grades, add distractors to word problems.

Example

Count the number of sides.



Partially complete a problem and ask students to say what is missing.

When matching to compare quantity, omit a matching line. When finding triangles, skip a few. When finding pairs that add to 5 or 10, create a list that is missing one addition. When teaching the counting sequence by 1s, 2s, 5s, or 10s, write the first ten numbers in a ten-frame but omit some numbers. In the higher grades, omit a step when solving an equation and have students fill it in.

Example

Fill in the missing numbers.

2	4		8	10
12		16	18	

Use more elements.

When sorting, sort more objects into more categories. Add three or more numbers instead of only two numbers. Create longer expressions, with more parentheses, to be evaluated.

Example

Evaluate.

$$15 + (7 \times 3 - 1) \longrightarrow (3 \times 5 - 7) \times 5 \div (16 - 6)$$

Make differences more subtle.

When the task is noticing differences, such as comparing numbers or distinguishing circles from non-circles, make the differences more subtle. For example, when comparing fractions with the same denominator, use numerators that vary by a single digit. Draw graphs on smaller grids or place points not on grid lines so that students have to pay attention to detail.

Example

Which is greater?

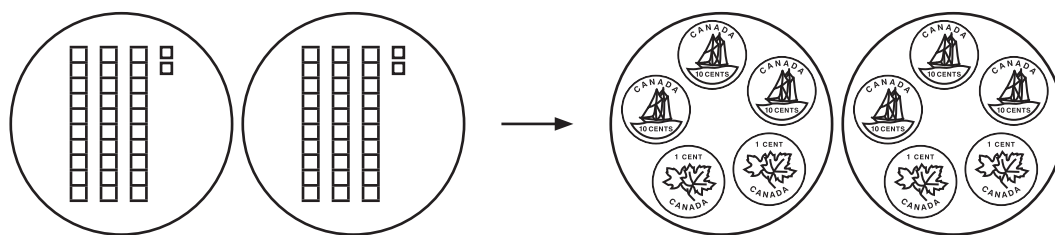
$$\frac{8}{11} \text{ or } \frac{9}{11} \longrightarrow \frac{54\ 645}{4\ 567\ 341} \text{ or } \frac{54\ 154}{4\ 567\ 341}$$

Vary the presentation of the problem.

Since students often under-generalize concepts, using different materials to present the same problem can seem like an entirely new problem. For example, you can use different shapes in models. Ask students to use triangles or squares instead of dots when drawing a model for a word problem, or have students identify fractions of a star instead of a circle. Division can be modelled with money instead of tens blocks. Represent the same repeated pattern with numbers, letters, colours, and shapes. When working with fractions or decimals, present a problem using money. Write rates in unconventional ways, such as hours/mile, or reverse the axes on graphs.

Example

Model $2 \overline{)64}$.



Look for applications of the concept.

Lessons generally begin from a concrete representation of a concept and move towards abstract ideas. Once students have been taught an abstract idea, reapplying it can be an added challenge. For example, once students have mastered comparing numbers, present problems such as, “Thirty-seven students are going on a school trip. The bus has forty-five seats. Are there enough seats for everyone?” For another example, students could identify applications of the Pythagorean Theorem in word problems.

Example

When teaching fractions of whole numbers, ASK: How many months are in ...

a) $\frac{1}{2}$ a year?

b) $\frac{2}{3}$ of a year?

c) $1\frac{1}{2}$ years?

Use extension questions from the lesson plans.

As students become more confident, create questions that challenge them more and that extend the ideas in the lesson. The JUMP Math lesson plans contain many extension questions that students can explore. These extension questions allow students to develop a deeper knowledge of the curriculum by working on incremental variations on the same topic. Extensions often require minimal or no teaching. Extensions that require some guidance can be taught to the whole class or to small groups.

JUMP Math Website: www.jumpmath.org

For more information about, or support in using your new resource, please contact your regional Manager of Outreach & Teacher Support. You can find contact information by region on our website in the About Us section, along with information on:

- Research
- Professional learning (PD)
- K–8 classroom materials
- Videos
- Online store materials (e.g., digital lesson slides)

Mental Math

Contents of Mental Math Section

- What is Mental Math?
- Addition and Subtraction
 - Addition and Subtraction Fluency
 - Further Strategies
 - Exercises
 - Place Value Addition
 - Checklists
- Multiplication
 - Skip Counting
 - How to Learn Your Times Tables in a Week
 - Exercises
 - Checklist
- Game: Modified Go Fish

What is Mental Math?

Mental math is a mathematical framework that includes number sense, computational fluency, and the application of number concepts through purposeful and varied practice, not just rote memorization. In JUMP Math, mental math is explored with regular practice throughout most lessons. You can also use the exercises beginning below.

Counting

In developing a sense of numeracy, most students will progress in the following order. First they learn to say the counting sequence in order, but without assigning meaning. Next they learn one-to-one correspondence (one number for each object being counted). The third step is an understanding of cardinality (the last number said is the number of objects in the group and is independent of the order in which the objects are counted).

Small quantities can sometimes be subitized (identified without counting) before students can count, but students usually recognize familiar arrangements of quantities greater than three only after checking by counting many times. The JUMP Math materials are written to support this process. We proceed in this order: first within 5, then 10, 20, and 100 to the degree expected by the curriculum.

Students who learn in an atypical fashion will have ample opportunity to revisit concepts when they are ready to assimilate them. The counting checklists that follow list the required counting skills in the order in which they are usually acquired. When assessing student progress, keep in mind that some students will learn differently.

Most students will acquire counting skills 1–4 in Unit 2.

Counting skill 1: Say the count sequence from 1 to 10

Counting skill 2: Say the next number, within 10

Counting skill 3: Name the numeral, within 10

Counting skill 4: Name the number of fingers, within 10

Most students will acquire counting skills 5–8 in Unit 4.

Counting skill 5: Count backwards within 10

Counting skill 6: Say the next number, within 20

Counting skill 7: Recognize 10 and some more

Counting skill 8: Say the number before, within 20

Most students will acquire counting skills 9–11 in Unit 7.

Counting skill 9: Say the count sequence within a ten, to 100

Counting skill 10: Say the count sequence by 10s, to 100

Counting skill 11: Say the count sequence to 100

Most students will acquire counting skills 12–15 in Unit 10.

Counting skill 12: Count by 5s from 0 to 100

Counting skill 13: Count by 2s from 0 to 100

Counting skill 14: Count back by 5s from 20 to 0

Counting skill 15: Count back by 2s from 20 to 0

Most students will acquire counting skills 16–18 in Unit 12.

Counting skill 16: Say the previous number, within 20

Counting skill 17: Count back two within 20

Counting skill 18: Count back a given amount within 20

Mental Math

Counting Checklist #1

[illegible]

Mental Math

Counting Checklist #2

[illegible]

Mental Math

Counting Checklist #3

[illegible]

Addition and Subtraction

Students practise the simple computations in the exercises below using only their minds and (sometimes) their fingers. The exercises also teach students to recognize when a calculation can be done in an easier way than by direct computation. Many of the exercises are first taught during the regular lesson so that students understand what they are doing and why it works.

Addition and Subtraction Fluency

Students who don't know how to add, subtract, or estimate readily are at a great disadvantage in mathematics. Students can learn to mentally add and subtract numbers in a short time if they are given daily practice in a few basic skills.

In Grade 2, students are expected to gain fluency in the skills described in this section. These techniques can be used once the necessary concepts have been taught.

At the beginning of Grade 2, if students don't know their addition and subtraction facts within 18, teach them to add and subtract using their fingers by the methods shown below. You can also reinforce basic facts using practice, games, and flash cards. (Until students know all their facts, allow them to add and subtract on their fingers when necessary.)

Eventually, students should know their addition and subtraction facts and should not have to rely on mental math tricks. One of the greatest gifts you can give students is to teach them their number facts.

To **ADD** $4 + 8$, Grace says 8 with her fist closed. She counts up from 8, raising one finger at a time. She stops when 4 fingers are raised:



She said "12" when she raised her fourth finger, so $4 + 8 = 12$.

1. Add.

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a) $5 + 2 = \underline{\quad}$ | b) $2 + 3 = \underline{\quad}$ | c) $6 + 2 = \underline{\quad}$ | d) $9 + 2 = \underline{\quad}$ |
| e) $2 + 4 = \underline{\quad}$ | f) $2 + 7 = \underline{\quad}$ | g) $5 + 3 = \underline{\quad}$ | h) $6 + 3 = \underline{\quad}$ |
| i) $11 + 4 = \underline{\quad}$ | j) $3 + 9 = \underline{\quad}$ | k) $7 + 3 = \underline{\quad}$ | l) $14 + 4 = \underline{\quad}$ |
| m) $21 + 5 = \underline{\quad}$ | n) $32 + 3 = \underline{\quad}$ | o) $4 + 56 = \underline{\quad}$ | p) $39 + 4 = \underline{\quad}$ |

To **SUBTRACT** $9 - 5$, Grace says the second number (5) with her fist closed. She counts up from 5 raising one finger at a time. She stops when she says the first number (9):



She has 4 fingers raised when she stops, so $9 - 5 = 4$.

2. Subtract.

- a) $7 - 5 = \underline{\quad}$ b) $8 - 6 = \underline{\quad}$ c) $5 - 3 = \underline{\quad}$ d) $5 - 2 = \underline{\quad}$
e) $9 - 6 = \underline{\quad}$ f) $10 - 5 = \underline{\quad}$ g) $11 - 7 = \underline{\quad}$ h) $17 - 14 = \underline{\quad}$
i) $33 - 31 = \underline{\quad}$ j) $27 - 24 = \underline{\quad}$ k) $43 - 39 = \underline{\quad}$ l) $62 - 58 = \underline{\quad}$

Skill 1: Adding 2 to an Even Number

This skill has been broken down into a number of sub-skills. After teaching each sub-skill, give students a short diagnostic quiz to verify that they have learned the skill. Sample quizzes for Skills 1 to 4 are included below.

a) Name the next one-digit even number:

Numbers that have ones digit 0, 2, 4, 6, or 8 are called the even numbers. Using practice or games, teach students to say the sequence of one-digit even numbers without hesitation. Ask students to imagine the sequence going on in a circle so that the next number after 8 is 0 (0, 2, 4, 6, 8, 0, 2, 4, 6, 8 ...). Then play the following game: name a number in the sequence and ask students to give the next number. Don't move on until all students have mastered the game.

b) Name the next two-digit even number:

CASE 1: Numbers that end in 0, 2, 4, or 6

Write an even two-digit number that ends in 0, 2, 4, or 6 on the board. Ask students to name the next even number. Students should recognize that if a number ends in 0, then the next even number ends in 2; if it ends in 4, then the next even number ends in 6, etc. For instance, the number 54 has ones digit 4, so the next even number will have ones digit 6.

QUIZ

Name the next even number.

- a) 52 $\underline{\quad}$ b) 64 $\underline{\quad}$ c) 36 $\underline{\quad}$ d) 22 $\underline{\quad}$ e) 80 $\underline{\quad}$

CASE 2: Numbers that end in 8

Write the number 58 on the board. Ask students to name the next even number. Remind students that even numbers must end in 0, 2, 4, 6, or 8. But 50, 52, 54, and 56 are all less than 58 so the next even number is 60. Students should see that an even number ending in 8 is always followed by an even number ending in 0 (with a tens digit that is one higher).

QUIZ

Name the next even number.

- a) 58 $\underline{\quad}$ b) 68 $\underline{\quad}$ c) 38 $\underline{\quad}$ d) 48 $\underline{\quad}$ e) 78 $\underline{\quad}$

c) Add 2 to an even number:

Point out to students that adding 2 to any even number is equivalent to finding the next even number. **Examples:** $46 + 2 = 48$, $48 + 2 = 50$. Knowing this, students can easily add 2 to any even number.

QUIZ

Add.

- a) $26 + 2 = \underline{\quad}$ b) $82 + 2 = \underline{\quad}$ c) $40 + 2 = \underline{\quad}$ d) $58 + 2 = \underline{\quad}$ e) $34 + 2 = \underline{\quad}$

Skill 2: Subtracting 2 from an Even Number

- a) Find the preceding one-digit even number:

Name a one-digit even number and ask students to give the number that comes before in the sequence. For instance, the number that comes before 4 is 2 and the number that comes before 0 is 8. (**Remember:** The sequence is circular.)

- b) Find the preceding two-digit number:

CASE 1: Numbers that end in 2, 4, 6, or 8

Write a two-digit number that ends in 2, 4, 6, or 8 on the board. Ask students to name the even number that comes before. Students should recognize that if a number ends in 2, then the preceding even number ends in 0; if it ends in 4, then the preceding even number ends in 2, etc. For instance, the number 78 has ones digit 8, so the preceding even number has ones digit 6.

QUIZ

Name the even number that comes before.

- a) 48 ____ b) 26 ____ c) 34 ____ d) 62 ____ e) 78 ____

CASE 2: Numbers that end in 0

Write the number 80 on the board and ask students to name the even number that comes before. Students should recognize that if an even number ends in 0, then the preceding even number ends in 8 (but the tens digit is one less). So the even number that comes before 80 is 78.

QUIZ

Name the even number that comes before.

- a) 40 ____ b) 60 ____ c) 80 ____ d) 50 ____ e) 30 ____

- c) Subtracting 2 from an even number:

Point out to students that subtracting 2 from an even number is exactly the same as finding the even number that comes before. **Examples:** $48 - 2 = 46$, $46 - 2 = 44$.

QUIZ

Subtract.

- a) $58 - 2 =$ ____ b) $24 - 2 =$ ____ c) $36 - 2 =$ ____ d) $42 - 2 =$ ____ e) $60 - 2 =$ ____

Skill 3: Adding 2 to an Odd Number

- a) Name the next one-digit odd number:

Numbers that have ones digit 1, 3, 5, 7, or 9 are called odd numbers. Using practice or games, teach students to say the sequence of one-digit odd numbers without hesitation. Ask students to imagine the sequence going on in a circle so that the next number after 9 is 1 (1, 3, 5, 7, 9, 1, 3, 5, 7, 9 ...). Then play the following game: name a number in the sequence and ask students to give the next number. Don't move on until all students have mastered the game.

- b) Name the next two-digit odd number:

CASE 1: Numbers that end in 1, 3, 5, or 7

Write an odd two-digit number that ends in 1, 3, 5, or 7 on the board. Ask students to name the next odd number. Students should recognize that if a number ends in 1, then the next odd number ends in 3; if it ends in 3, then the next odd number ends in 5, etc. For instance, the number 35 has ones digit 5, so the next odd number will have ones digit 7.

QUIZ

Name the next odd number.

- a) 51 ____ b) 65 ____ c) 37 ____ d) 23 ____ e) 87 ____

CASE 2: Numbers that end in 9

Write the number 59 on the board. Ask students to name the next odd number. Remind students that odd numbers must end in 1, 3, 5, 7, or 9. But 51, 53, 55, and 57 are all less than 59. So the next odd number is 61. Students should see that an odd number ending in 9 is always followed by an odd number ending in 1 (with a tens digit that is one higher).

QUIZ

Name the next odd number.

- a) 59 ____ b) 69 ____ c) 39 ____ d) 49 ____ e) 79 ____

- c) Add 2 to an odd number:

Point out to students that adding 2 to any odd number is exactly the same as finding the next odd number. **Examples:** $47 + 2 = 49$, $49 + 2 = 51$. Knowing this, students can easily add 2 to any odd number.

QUIZ

Add.

- a) $27 + 2 =$ ____ b) $83 + 2 =$ ____ c) $41 + 2 =$ ____ d) $59 + 2 =$ ____ e) $35 + 2 =$ ____

Skill 4: Subtracting 2 from an Odd Number

- a) Find the preceding one-digit odd number:

Name a one-digit odd number and ask students to give the odd number that comes before in the sequence. For instance, the number that comes before 3 is 1 and the number that comes before 1 is 9. (**Remember:** The sequence is circular.)

- b) Find the preceding odd two-digit number:

CASE 1: Numbers that end in 3, 5, 7, or 9

Write a two-digit number that ends in 3, 5, 7, or 9 on the board. Ask students to name the odd number that comes before. Students should recognize that if a number ends in 3, then the preceding odd number ends in 1; if it ends in 5, then the preceding odd number ends in 3, etc. For instance, the number 79 has ones digit 9, so the preceding odd number has ones digit 7.

QUIZ

Name the odd number that comes before.

- a) 49 ____ b) 27 ____ c) 35 ____ d) 63 ____ e) 79 ____

CASE 2: Numbers that end in 1

Write the number 81 on the board and ask students to name the odd number that comes before. Students should recognize that if an odd number ends in 1 then the preceding odd number ends in 9 (but the tens digit is one less). So the odd number that comes before 81 is 79.

QUIZ

Name the odd number that comes before.

- a) 41 _____ b) 61 _____ c) 81 _____ d) 51 _____ e) 31 _____

- c) Subtract 2 from an odd number:

Point out to students that subtracting 2 from an odd number is exactly the same as finding the odd number that comes before. **Examples:** $49 - 2 = 47$, $47 - 2 = 45$.

QUIZ

Subtract.

- a) $59 - 2 =$ _____ b) $25 - 2 =$ _____ c) $37 - 2 =$ _____ d) $43 - 2 =$ _____ e) $61 - 2 =$ _____

The skills that follow combine skills students have acquired to this point. You may wish to combine them in other ways that you have found useful.

Skills 5 and 6

Once students can add and subtract the numbers 1 and 2 they can easily add and subtract the number 3. Add 3 to a number by first adding 2, then 1. **Example:** $35 + 3 = 35 + 2 + 1$. Subtract 3 from a number by subtracting 2, then subtracting 1. **Example:** $35 - 3 = 35 - 2 - 1$.

Skills 7 and 8

Add 4 to a number by adding 2 twice. **Example:** $51 + 4 = 51 + 2 + 2$. Subtract 4 from a number by subtracting 2 twice. **Example:** $51 - 4 = 51 - 2 - 2$.

Skills 9 and 10

Add 5 to a number by adding 4 then 1. Subtract 5 by subtracting 4 then 1.

Skill 11

Add pairs of identical numbers by learning the sums ($1 + 1 = 2$, $2 + 2 = 4$, $3 + 3 = 6$, etc.). You may also wish to teach students to count on their fingers by 2s, as shown below.



Skill 12

Add a pair of numbers that differ by 1 by rewriting the larger number as 1 plus the smaller number (then use doubling to find the sum). **Examples:** $6 + 7 = 6 + 6 + 1 = 12 + 1 = 13$; $7 + 8 = 7 + 7 + 1 = 14 + 1 = 15$.

Skill 13

Add a one-digit number to 10 by replacing the zero in 10 by the one-digit number.

Example: $10 + 7 = 17$.

Skills 14 and 15

To add 9 to a number, subtract 1 from the number and then add 10.

Examples: $9 + 6 = 10 + 5 = 15$; $59 + 7 = 60 + 6 = 66$.

To add 8 to a number, subtract 2 from the number and add 10.

Examples: $8 + 6 = 10 + 4 = 14$; $38 + 7 = 40 + 5 = 45$.

Skill 16

To add a pair of one-digit numbers whose sum is greater than 10, break apart one of the numbers to make 10. **Examples:** $7 + 8 = 7 + 3 + 5 = 10 + 5 = 15$; $6 + 5 = 6 + 4 + 1 = 10 + 1 = 11$.

To help your students learn the pairs of numbers that add to 10, we recommend the game Modified Go Fish on p. A-42.

Skill 17

Add 10 to any two-digit number by increasing the tens digit of the two-digit number by 1.

Example: $53 + 10 = 63$.

Skill 18

Add a pair of two-digit numbers (with no regrouping) by adding the ones digits of the numbers and then the tens digits. **Example:** $23 + 64 = 87$.

Skills 19 and 20

To subtract a multiple of 10 from another multiple of 10, subtract the tens digits and add a zero for the ones digit. **Example:** $70 - 50 = 20$.

To subtract a two-digit number from another two-digit number (without regrouping), subtract the ones digit from the ones digit and the tens digit from the tens digit. **Example:** $57 - 34 = 23$.

Exercises

NOTE: These exercises are related to the previous skills. Students may need more practice than is provided here. Create more exercises as needed. Assign the existing exercises as a test to ensure students have learned the material fully. Do not distribute these pages to students as they may be intimidated by the number of questions and the size of the font. Write each exercise on the board as students work through them.

Skills 1, 2, 3, and 4

1. Name the even number that comes after the number shown.

- a) 32 ____ b) 46 ____ c) 14 ____ d) 92 ____ e) 56 ____
f) 30 ____ g) 84 ____ h) 60 ____ i) 72 ____ j) 24 ____

2. Name the even number that comes after the number shown.

- a) 28 ____ b) 18 ____ c) 78 ____ d) 38 ____ e) 68 ____

3. Add. **Remember:** Adding 2 to an even number is the same as finding the next even number.

- a) $42 + 2 =$ ____ b) $76 + 2 =$ ____ c) $28 + 2 =$ ____ d) $16 + 2 =$ ____
e) $68 + 2 =$ ____ f) $12 + 2 =$ ____ g) $36 + 2 =$ ____ h) $90 + 2 =$ ____
i) $70 + 2 =$ ____ j) $24 + 2 =$ ____ k) $66 + 2 =$ ____ l) $52 + 2 =$ ____

4. Name the even number that comes before the number shown.

- a) 38 ____ b) 42 ____ c) 56 ____ d) 72 ____ e) 98 ____
f) 48 ____ g) 16 ____ h) 22 ____ i) 66 ____ j) 14 ____

5. Name the even number that comes before the number shown.

- a) 30 ____ b) 70 ____ c) 60 ____ d) 10 ____ e) 80 ____

6. Subtract. **Remember:** Subtracting 2 from an even number is the same as finding the preceding even number.

- a) $46 - 2 =$ ____ b) $86 - 2 =$ ____ c) $90 - 2 =$ ____ d) $14 - 2 =$ ____
e) $54 - 2 =$ ____ f) $72 - 2 =$ ____ g) $12 - 2 =$ ____ h) $56 - 2 =$ ____
i) $32 - 2 =$ ____ j) $40 - 2 =$ ____ k) $60 - 2 =$ ____ l) $26 - 2 =$ ____

7. Name the odd number that comes after the number shown.

- a) 37 ____ b) 51 ____ c) 63 ____ d) 75 ____ e) 17 ____
f) 61 ____ g) 43 ____ h) 81 ____ i) 23 ____ j) 95 ____

8. Name the odd number that comes after the number shown.

- a) 69 ____ b) 29 ____ c) 9 ____ d) 79 ____ e) 59 ____

9. Add. **Remember:** Adding 2 to an odd number is the same as finding the next odd number.

- a) $25 + 2 = \underline{\quad}$ b) $31 + 2 = \underline{\quad}$ c) $47 + 2 = \underline{\quad}$ d) $33 + 2 = \underline{\quad}$
e) $39 + 2 = \underline{\quad}$ f) $91 + 2 = \underline{\quad}$ g) $5 + 2 = \underline{\quad}$ h) $89 + 2 = \underline{\quad}$
i) $11 + 2 = \underline{\quad}$ j) $65 + 2 = \underline{\quad}$ k) $29 + 2 = \underline{\quad}$ l) $17 + 2 = \underline{\quad}$

10. Name the odd number that comes before the number shown.

- a) 39 b) 43 c) 57 d) 17 e) 99
f) 13 g) 85 h) 79 i) 65 j) 77

11. Name the odd number that comes before the number shown.

- a) 21 b) 41 c) 11 d) 91 e) 51

12. Subtract. **Remember:** Subtracting 2 from an odd number is the same as finding the odd number that comes before.

- a) $47 - 2 = \underline{\quad}$ b) $85 - 2 = \underline{\quad}$ c) $91 - 2 = \underline{\quad}$ d) $15 - 2 = \underline{\quad}$
e) $51 - 2 = \underline{\quad}$ f) $73 - 2 = \underline{\quad}$ g) $11 - 2 = \underline{\quad}$ h) $59 - 2 = \underline{\quad}$
i) $31 - 2 = \underline{\quad}$ j) $43 - 2 = \underline{\quad}$ k) $7 - 2 = \underline{\quad}$ l) $25 - 2 = \underline{\quad}$

Skills 5 and 6

13. Add 3 to the number by adding 2, then adding 1. **Example:** $35 + 3 = 35 + 2 + 1$.

- a) $23 + 3 = \underline{\quad}$ b) $36 + 3 = \underline{\quad}$ c) $29 + 3 = \underline{\quad}$ d) $16 + 3 = \underline{\quad}$
e) $67 + 3 = \underline{\quad}$ f) $12 + 3 = \underline{\quad}$ g) $35 + 3 = \underline{\quad}$ h) $90 + 3 = \underline{\quad}$
i) $78 + 3 = \underline{\quad}$ j) $24 + 3 = \underline{\quad}$ k) $6 + 3 = \underline{\quad}$ l) $59 + 3 = \underline{\quad}$

14. Subtract 3 from the number by subtracting 2, then subtracting 1. **Example:** $35 - 3 = 35 - 2 - 1$.

- a) $46 - 3 = \underline{\quad}$ b) $87 - 3 = \underline{\quad}$ c) $99 - 3 = \underline{\quad}$ d) $14 - 3 = \underline{\quad}$
e) $8 - 3 = \underline{\quad}$ f) $72 - 3 = \underline{\quad}$ g) $12 - 3 = \underline{\quad}$ h) $57 - 3 = \underline{\quad}$
i) $32 - 3 = \underline{\quad}$ j) $40 - 3 = \underline{\quad}$ k) $60 - 3 = \underline{\quad}$ l) $28 - 3 = \underline{\quad}$

15. Fred has 49 stamps. He gives 3 stamps away. How many stamps does he have left?

16. There are 25 minnows in a tank. Alice adds 3 more to the tank. How many minnows are now in the tank?

Skills 7 and 8

17. Add 4 to the number by adding 2 twice. **Example:** $51 + 4 = 51 + 2 + 2$.

- a) $42 + 4 = \underline{\quad}$ b) $76 + 4 = \underline{\quad}$ c) $27 + 4 = \underline{\quad}$ d) $17 + 4 = \underline{\quad}$
e) $68 + 4 = \underline{\quad}$ f) $11 + 4 = \underline{\quad}$ g) $35 + 4 = \underline{\quad}$ h) $8 + 4 = \underline{\quad}$
i) $72 + 4 = \underline{\quad}$ j) $23 + 4 = \underline{\quad}$ k) $60 + 4 = \underline{\quad}$ l) $59 + 4 = \underline{\quad}$

18. Subtract 4 from the number by subtracting 2 twice. **Example:** $26 - 4 = 26 - 2 - 2$.

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a) $46 - 4 = \underline{\quad}$ | b) $86 - 4 = \underline{\quad}$ | c) $91 - 4 = \underline{\quad}$ | d) $15 - 4 = \underline{\quad}$ |
| e) $53 - 4 = \underline{\quad}$ | f) $9 - 4 = \underline{\quad}$ | g) $13 - 4 = \underline{\quad}$ | h) $57 - 4 = \underline{\quad}$ |
| i) $40 - 4 = \underline{\quad}$ | j) $88 - 4 = \underline{\quad}$ | k) $69 - 4 = \underline{\quad}$ | l) $31 - 4 = \underline{\quad}$ |

Skills 9 and 10

19. Add 5 to the number by adding 4, then adding 1 (or add 2 twice, then add 1).

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a) $84 + 5 = \underline{\quad}$ | b) $27 + 5 = \underline{\quad}$ | c) $31 + 5 = \underline{\quad}$ | d) $44 + 5 = \underline{\quad}$ |
| e) $63 + 5 = \underline{\quad}$ | f) $92 + 5 = \underline{\quad}$ | g) $14 + 5 = \underline{\quad}$ | h) $16 + 5 = \underline{\quad}$ |
| i) $9 + 5 = \underline{\quad}$ | j) $81 + 5 = \underline{\quad}$ | k) $51 + 5 = \underline{\quad}$ | l) $28 + 5 = \underline{\quad}$ |

20. Subtract 5 from the number by subtracting 4, then subtracting 1 (or subtract 2 twice, then subtract 1).

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a) $48 - 5 = \underline{\quad}$ | b) $86 - 5 = \underline{\quad}$ | c) $55 - 5 = \underline{\quad}$ | d) $69 - 5 = \underline{\quad}$ |
| e) $30 - 5 = \underline{\quad}$ | f) $13 - 5 = \underline{\quad}$ | g) $92 - 5 = \underline{\quad}$ | h) $77 - 5 = \underline{\quad}$ |
| i) $45 - 5 = \underline{\quad}$ | j) $24 - 5 = \underline{\quad}$ | k) $91 - 5 = \underline{\quad}$ | l) $8 - 5 = \underline{\quad}$ |

Skill 11

21. Add.

- | | | | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| a) $6 + 6 = \underline{\quad}$ | b) $7 + 7 = \underline{\quad}$ | c) $8 + 8 = \underline{\quad}$ | d) $3 + 3 = \underline{\quad}$ |
| e) $5 + 5 = \underline{\quad}$ | f) $4 + 4 = \underline{\quad}$ | g) $9 + 9 = \underline{\quad}$ | h) $2 + 2 = \underline{\quad}$ |

Skill 12

22. Add by thinking of the larger number as a sum of two smaller numbers.

- | | | | |
|------------------------------------|--------------------------------|--------------------------------|---|
| a) $6 + 7 = \underline{6 + 6 + 1}$ | b) $7 + 8 = \underline{\quad}$ | c) $2 + 3 = \underline{\quad}$ | d) $4 + 3 = \underline{\quad}$ |
| e) $4 + 5 = \underline{\quad}$ | f) $5 + 6 = \underline{\quad}$ | g) $9 + 8 = \underline{\quad}$ | Bonus: $6 + 8 = \underline{\quad}$ |

Skill 13

23. Add.

- | | | | |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| a) $10 + 3 = \underline{\quad}$ | b) $10 + 7 = \underline{\quad}$ | c) $5 + 10 = \underline{\quad}$ | d) $10 + 1 = \underline{\quad}$ |
| e) $9 + 10 = \underline{\quad}$ | f) $10 + 4 = \underline{\quad}$ | g) $10 + 8 = \underline{\quad}$ | h) $10 + 2 = \underline{\quad}$ |

Skills 14 and 15

24. Add.

- | | | | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| a) $9 + 3 = \underline{\quad}$ | b) $9 + 7 = \underline{\quad}$ | c) $6 + 9 = \underline{\quad}$ | d) $4 + 9 = \underline{\quad}$ |
| e) $9 + 9 = \underline{\quad}$ | f) $5 + 9 = \underline{\quad}$ | g) $9 + 2 = \underline{\quad}$ | h) $9 + 8 = \underline{\quad}$ |

25. Add.

- | | | | |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| a) $8 + 2 = \underline{\quad}$ | b) $8 + 6 = \underline{\quad}$ | c) $8 + 7 = \underline{\quad}$ | d) $4 + 8 = \underline{\quad}$ |
| e) $5 + 8 = \underline{\quad}$ | f) $8 + 3 = \underline{\quad}$ | g) $9 + 8 = \underline{\quad}$ | h) $8 + 8 = \underline{\quad}$ |

Skill 16**26.** Add by making 10.

a) $8 + 3$

$= 8 + \underline{2} + \underline{1}$

$= 10 + \underline{1}$

$= \underline{\quad}$

b) $7 + 5$

$= 7 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

c) $6 + 5$

$= 6 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

d) $9 + 7$

$= 9 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

e) $5 + 9$

$= 5 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

f) $7 + 5$

$= 7 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

g) $4 + 8$

$= 4 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

h) $2 + 9$

$= 2 + \underline{\quad} + \underline{\quad}$

$= 10 + \underline{\quad}$

$= \underline{\quad}$

Skill 17**27.** Add.

a) $10 + 20 = \underline{\quad}$

b) $40 + 10 = \underline{\quad}$

c) $10 + 80 = \underline{\quad}$

d) $10 + 50 = \underline{\quad}$

e) $30 + 10 = \underline{\quad}$

f) $10 + 60 = \underline{\quad}$

g) $10 + 10 = \underline{\quad}$

h) $70 + 10 = \underline{\quad}$

28. Add.

a) $10 + 25 = \underline{\quad}$

b) $67 + 10 = \underline{\quad}$

c) $10 + 31 = \underline{\quad}$

d) $82 + 10 = \underline{\quad}$

e) $43 + 10 = \underline{\quad}$

f) $10 + 51 = \underline{\quad}$

g) $10 + 68 = \underline{\quad}$

h) $21 + 10 = \underline{\quad}$

i) $10 + 11 = \underline{\quad}$

j) $19 + 10 = \underline{\quad}$

k) $44 + 10 = \underline{\quad}$

l) $10 + 88 = \underline{\quad}$

29. Add.

a) $20 + 30 = \underline{\quad}$

b) $40 + 20 = \underline{\quad}$

c) $30 + 30 = \underline{\quad}$

d) $50 + 30 = \underline{\quad}$

e) $20 + 50 = \underline{\quad}$

f) $40 + 40 = \underline{\quad}$

g) $50 + 40 = \underline{\quad}$

h) $40 + 30 = \underline{\quad}$

i) $60 + 30 = \underline{\quad}$

j) $20 + 60 = \underline{\quad}$

k) $20 + 70 = \underline{\quad}$

l) $60 + 40 = \underline{\quad}$

Skill 18**30.** Add.

a) $20 + 23 = \underline{\quad}$

b) $32 + 24 = \underline{\quad}$

c) $51 + 12 = \underline{\quad}$

d) $12 + 67 = \underline{\quad}$

e) $83 + 14 = \underline{\quad}$

f) $65 + 24 = \underline{\quad}$

g) $41 + 43 = \underline{\quad}$

h) $70 + 27 = \underline{\quad}$

i) $31 + 61 = \underline{\quad}$

j) $54 + 33 = \underline{\quad}$

k) $28 + 31 = \underline{\quad}$

l) $42 + 55 = \underline{\quad}$

Skills 19 and 20

31. Subtract.

- | | | | |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| a) $40 - 10 = \underline{\quad}$ | b) $50 - 10 = \underline{\quad}$ | c) $70 - 10 = \underline{\quad}$ | d) $20 - 10 = \underline{\quad}$ |
| e) $40 - 20 = \underline{\quad}$ | f) $60 - 30 = \underline{\quad}$ | g) $40 - 30 = \underline{\quad}$ | h) $60 - 50 = \underline{\quad}$ |

32. Subtract.

- | | | | |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| a) $25 - 10 = \underline{\quad}$ | b) $67 - 10 = \underline{\quad}$ | c) $89 - 10 = \underline{\quad}$ | d) $93 - 10 = \underline{\quad}$ |
| e) $54 - 20 = \underline{\quad}$ | f) $42 - 30 = \underline{\quad}$ | g) $71 - 40 = \underline{\quad}$ | h) $66 - 50 = \underline{\quad}$ |

33. Subtract.

- | | | | |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| a) $57 - 34 = \underline{\quad}$ | b) $43 - 12 = \underline{\quad}$ | c) $62 - 21 = \underline{\quad}$ | d) $59 - 36 = \underline{\quad}$ |
| e) $87 - 63 = \underline{\quad}$ | f) $95 - 62 = \underline{\quad}$ | g) $35 - 10 = \underline{\quad}$ | h) $17 - 8 = \underline{\quad}$ |

Addition and Subtraction Checklist #1

[illegible]

Addition and Subtraction Checklist #2

[illegible]

Addition and Subtraction Checklist #3

[illegible]

Games

Modified Go Fish

Purpose

If students know the pairs of one-digit numbers that add up to particular target numbers, they will be able to mentally break sums into easier sums. Grade 2 students should learn pairs to 5 and to 10.

Example: Since it is easy to add any one-digit number to 10, you can add a sum more readily if you can decompose the sum so that it includes pairs of numbers that add to 10.

$$7 + 5 = \underbrace{7 + 3}_{\text{These numbers add to 10.}} + 2 = 10 + 2 = 12$$

To help students remember pairs of numbers that add to a given target number, we have developed a cooperative version of Go Fish as well as a competitive version. We recommend that students play the cooperative version with each other in groups of 2–4. If you choose to use the competitive version, we recommend having a caring adult play with each individual student. The adult can build the student’s confidence by allowing the student to win as many times as the adult feels is necessary. We do not recommend that students play the competitive version with each other.

The Cooperative Game

Object of the Game: To make and lay down pairs of cards that add to 5

Materials: Four sets of cards numbered 1 to 4

The player to the left of the dealer starts the game. To decide the first dealer, pick a student at random.

The dealer gives each player 3 cards and puts the remaining cards face down into a draw pile. If players have any pairs of cards that add to 5 (e.g., one and four, two and three), they place these pairs on the table before play begins. If any player is left with no cards at this point, that player takes a card from the pile.

Player 1 selects one of the cards in her hand and asks Player 2 for a card that adds to 5 with the chosen card. For example, if Player 1’s chosen card is a three, she asks Player 2 for a two.

If Player 2 has the requested card, he must give it to Player 1. Player 1 puts the resulting pair down immediately. If Player 2 doesn’t have the requested card, he says “Go fish,” and Player 1 picks a card from the draw pile. If this card adds to 5 with a card in Player 1’s hand, she lays the pair down right away.

If Player 1 has no cards left, she takes a card from the draw pile.

Now it is Player 2’s turn to ask for a card from Player 3, and so on. On each turn, players ask for a card from the next player or pick one from the draw pile. On each turn, players may also set down any extra pairs in their hands.

Play ends when the draw pile runs out. At the end of the game, players are allowed to put down any pairs that remain in their hands. The team wins if, together, they have made the required number of pairs between them.

Scaffolding: Some students have trouble sorting their cards and finding pairs that add to 5. If this is the case, give the student only three cards, two of which add to 5. Ask the student to find the pair that adds to 5. After the student has mastered this step, repeat the exercise with four cards, then five cards, and so on.

You can also give a student a list of pairs that add to 5. As the student gets used to the game, gradually remove pairs from the list so that the student learns the pairs by heart.

The Competitive Game

Play as above with the following changes:

- Play ends when one player lays down all of his or her cards. This player receives four points. Players then receive one point for each pair they have laid down. The goal of the game is to score as many points as possible.
- Players get another turn if the player from whom they request a card has it.

Different Target Numbers

Go Fish is easily adapted to finding pairs that add to 10. Simply use cards numbered 1 to 9 and play as before.

Domino Tens

Use dominoes that have 10 dots on them. Place the dominoes face down. Students play in pairs.

Player 1 picks a domino, covers one half, and shows Player 2 the other half. Player 2 guesses the hidden number of dots. Player 1 informs Player 2 whether the guess is correct, too low, or too high. If the guess was too low or too high, Player 2 continues guessing until they find the correct answer. Players switch roles. Play until all students consistently guess correctly without hints.

Memory

Use a standard deck of cards. Arrange the 4s, 5s, and 6s in a 3 by 4 array. Students can play in pairs or individually (the rules below are for playing in pairs).

Player 1 turns over two cards. If the cards add to 10, Player 1 places them in the discard pile; if they do not, he turns them face down again. Player 2 then takes a turn, placing any matching pair (a pair that adds to 10) in the discard pile. Students can check whether a pair of cards match by counting the shapes (hearts, diamonds, spades, or clubs) on the middle area of both cards to ensure that there are ten shapes in total. The goal is to place all the cards into the discard pile. If students have any non-matching cards left at the end, then some of their cards must have been matched incorrectly.

When students have mastered this, create a bigger array by adding the 3s and 7s (a 4 by 5 array), then the 2s and 8s (a 4 by 7 array), and finally the aces and 9s (a 6 by 6 array).

Calendar Time

From September to February, we recommend about 10 minutes per day of “calendar time.” Calendar time is composed of two sets of routines: Mental Math Fluency (number facts, as well as counting, reading numerals, and hundreds chart familiarity) and Days and Dates (calendar familiarity). Routines vary over the school year; see **BLM Calendar Time Routines** (pp. A-48–50) for the routines we recommend in each month.

In general, you should introduce new activities in a routine only after teaching the related concepts. However, we recommend some rote counting and vocabulary terms be introduced prior to the related math lesson to make that lesson easier.

NOTE: Number talks (see p. A-57) gradually replace parts of calendar time starting in November. From February to the end of the year, we recommend doing number talks three or four times a week.

Materials. Display a large hundreds chart and the month names in order. Reserve wall space to use for very large yes/no sorting groups, and another large space labelled “Weather.” At the start of each month, display a large monthly calendar (including the year).

Provide each student with a binder to create a calendar journal. Put one copy of **BLM Weather Calendar** (p. A-51) in each calendar journal at the beginning of the year.

NOTE: If you plan to cover graphs and probability words (required in the Ontario and British Columbia curricula) and experiences of temperature (required in the Ontario curriculum), students can use their calendar journals in Units 20 and 21.

Mental Math Fluency (about 5 minutes each day)

Counting practice (about 1 minute each day). Have students perform one step from the progression below in order each day throughout the year.

1. Have students sit in a circle and count forwards. Student 1 says “one,” Student 2 says “two,” and so on around the circle. Have students start over at one after reaching 10 and go around the circle at least twice.
2. Have students sit in a circle and count backwards from 10 to 1 while you point at the corresponding number on the first row of the hundreds chart. Go around the circle at least twice.
3. Tell students to count forwards when you show thumbs up and backwards when you show thumbs down. Vary the speed at which you switch their counting direction.

Repeat the three steps with counting to 10 and back three times in the beginning of the year. Once you have finished, repeat the progression each day with the following variations: counting by 1s from 10 to 19, from 5 to 15, and from 1 to 20. Then, after teaching the lesson on counting to 100, start with counting from 20 to 29, from 30 to 39, and so on, up to 90 to 99; continue to counting by 1s from 5 to 25, from 25 to 45, from 45 to 65, from 65 to 85; and then to counting by 1s from 85 to 100.

Once you have finished all of the variations, on subsequent days do the following activities first as a class, and then in circle fashion: count forwards and backwards by 10s from 0 to 100, by 5s from 0 to 100, by 2s from 0 to 100, and by 2s from 1 to 99. You can also count backwards by 5s from 100, by 2s from any number within 100, and by 10s forwards and backwards starting at random numbers. If you have time left, focus on counting forwards by 2s, 5s, and 10s in preparation for multiplication in the following year.

For the Ontario curriculum, once you have introduced three-digit numbers, have students count by 1s from random numbers between 100 and 200, count forwards by 2s, 5s, or 10s from 100 to 200, and count forwards by 25s from 0 to 200. Have students also count forwards and backwards by 10s from any number between 0 and 200, including going over 100.

For variety, have students say “boom” instead of a number with a particular property (for example, a number with a digit 5, with both digits the same, with an “f” sound, or that is a “skip counting by 5” number).

NOTE: You can also make counting part of routine transitions. For example, count back from 20 to 0 when students line up for lunch and then call on the third person in line to open the door. Or, count how many toe touches the class can do while volunteers go to hand in the attendance, and then use the number of toe touches to compare the relative lengths of time the volunteers were outside the classroom each day.

Reading numerals practice (about 2 minutes each day). Show students sticky notes with two-digit numbers written on them and have volunteers show where these numbers are on a hundreds chart. Have volunteers explain how they found the numbers. Then, tell students a number (for example, 24) and SAY: I want to find this number on the hundreds chart. ASK: What do I need to look for? (a 2 and then a 4). Point to a number (sometimes correct and sometimes not) and ask students to tell you if it is the right one. ASK: Is today’s number a skip counting by 10 (or 5 or 2) number? How do you know?

Fluency practice (about 2 minutes each day). Write addition or subtraction problems on the board and tell students what strategy you want them to use to find the answer. As the year progresses, encourage students to do the calculation mentally, without keeping track on their fingers. Have students signal thumbs up against their chests when they have an answer. When most students have their thumbs up, ask two or three volunteers to provide their answers.

During Unit 1, have students solve addition and subtraction problems within 10, accompanied by a picture of shapes students can count. During Unit 2, have students solve addition problems within 20 (start with a chart and continue by counting up while keeping track on fingers) and subtraction problems within 10 with a picture of shapes for students to count.

During Units 3 through 7, have students solve addition problems within 20 by counting up (keeping track on fingers) and subtraction problems within 10 with or without a picture. During Units 8 and 9, have students solve addition problems within 100 by counting up and subtraction problems by counting on and by counting back.

Starting from Unit 10, rotate between different strategies students have learned. Focus on addition and subtraction problems with one-digit numbers, using the nearest ten to add (for example, $37 + 5 = 37 + 3 + 2 = 40 + 2 = 42$) and adding and subtracting tens and ones separately.

Days and Dates (about 5 minutes each day)

In several of the routines that follow, you will need a student to serve as a “calendar helper.” Use any method of your choice to ensure that all students have a chance to be the calendar helper during the year (for example, from youngest to oldest, in alphabetical order).

Today’s weather. Each month, provide students with a new copy of BLM Weather Calendar for their calendar journal. Fill in the days of the week and the month or have students do so. Each day, have the calendar helper (see calendar patterns above) check the weather and choose the appropriate card from **BLM Weather Cards** (p. A-52). Add the card to the wall space labelled

“Weather.” Leave the symbols on the wall up all month. Have students draw the weather symbol for the day on their copy of BLM Weather Calendar. At month’s end, ASK: What kind of weather did we have the most? Did it rain more or snow more? Students can predict the answer by looking at their completed BLM Weather Calendar. Check as a class by moving all the weather symbols for the month into labelled rows to sort them. You might introduce the term “pictograph.”

Always, sometimes, never. Each day, display all the pictures from **BLM Activities** (p. A-53) or **BLM Clothes** (p. A-54)—include both, if time permits. Ask questions to prompt thinking about the outdoor temperature, such as “Which of these could you do/wear outside today?” and “Is it warm/cold enough to do/wear that outside?” Use students’ answers to sort pictures into the yes/no sorting groups on the wall. Leave the sorted pictures up all month. You can also add activities from your local community or traditional practices. Provide each student with **BLM Always, Sometimes, Never** (p. A-55), glue, and pictures from BLM Activities or BLM Clothes. Have students fill in the month (or do so for them), and ask them to sort the pictures based on whether they could always, sometimes, or never do the activities or wear the clothes outside during the month. Have volunteers name the month of their birthday and list the activities they can do outside on that day.

Name the months or weekdays. Say or sing the months or the days of the week in order. Ask a question such as “How many months until the summer holidays?” or “How many sleeps until Friday?”

Did it change? Show, or have the calendar helper show, where the month, year, or weekday is written on the wall calendar. Ask the calendar helper whether the month (and picture), year, or weekday changed. In January, point out how the months make a repeating pattern in which each new year starts with January.

Name the month number. Have students count the months displayed on the wall to determine the current month number. Use ordinals as they gain that vocabulary. From October onwards, have them check the number by counting backwards from December.

Say the date. Each day, say the date together as a class or have a volunteer say it.

Before, after, or in between months. Have students say the month that happens right before a given month (such as the current month or the month of a volunteer’s birthday), right after a given month, or in between two given months. Towards the end of the month, have students predict the month that will come next.

Yesterday, today, and tomorrow. SAY: Yesterday was the day before today and tomorrow will be the day after today. Ask questions such as: What day was it yesterday? What day is it today? What day will it be tomorrow? What day will it be after school today? What day was it when you had breakfast this morning? What day is between Tuesday and Thursday?

School days and weekend days. Have students recognize the repeating pattern of five school days and two weekend days. Then, at the beginning of each week, have students name things they did yesterday (Sunday) and things they did the day before that (Saturday).

Make weather comparisons. Students can use their completed BLM Always, Sometimes, Never for each month to decide which of two months was warmer. Pick an event that is in different categories in the two months you are comparing. For example, ASK: How often could you go skating outside in September: always, sometimes, or never? (never) In January? (sometimes) Could you go skating more often in September or in January? (January) Why? (January is colder than September) How often did you need a snowsuit in October, always, sometimes, or never? In February? Did you need a snowsuit more often in October or in February? Why?

Calendar Time Routines (I)

<p>September</p> <p>Mental Math Fluency</p> <ul style="list-style-type: none">• Counting practice• Fluency practice <p>Days and Dates</p> <ul style="list-style-type: none">• Say the date (month, day, year)• Today’s weather• Always, sometimes, never (activities)• One of: <p>Name the months</p> <p>Did it change? (month)</p> <p>Name the month number</p>	<p>October</p> <p>Mental Math Fluency</p> <ul style="list-style-type: none">• Fluency practice <p>Days and Dates</p> <ul style="list-style-type: none">• Say the date (month, day, year)• Today’s weather• Always, sometimes, never (clothes)• One or two of: <p>Name the months</p> <p>Did it change? (month)</p> <p>Name the month number</p>
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Calendar Time Routines (2)

<div><div>November</div><div>Mental Math Fluency*</div><div><ul style="list-style-type: none">Counting practiceReading numerals practiceFluency practice</div><div>Days and Dates</div><div><ul style="list-style-type: none">Say the date (including weekday)Today's weatherAlways, sometimes, never (activities)One or two of:*</div><div>Name the months</div><div>Did it change? (month, year, weekday)</div><div>Name the month number</div><div>Before, after, or in between months</div><div>Yesterday, today, and tomorrow</div><div>*Replace with number talks once or twice per month</div></div>	<div><div>December</div><div>Mental Math Fluency*</div><div><ul style="list-style-type: none">Counting practiceReading numerals practiceFluency practice</div><div>Days and Dates</div><div><ul style="list-style-type: none">Say the date (including weekday)Today's weatherAlways, sometimes, never (clothes)One or two of:*</div><div>Name the weekdays</div><div>Did it change? (month, year, weekday)</div><div>Before, after, or in between months</div><div>Yesterday, today, and tomorrow</div><div>*Replace with number talks once or twice per month</div></div>
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Calendar Time Routines (3)


<p>January</p> <p>Mental Math Fluency*</p> <ul style="list-style-type: none"> • Counting practice • Reading numerals practice • Fluency practice <p>Days and Dates</p> <ul style="list-style-type: none"> • Say the date (including weekday) • Today's weather • Always, sometimes, never (activities) • Two or three of:* <p>Name the weekdays</p> <p>Did it change? (month, year, weekday; discuss repeating pattern of months each year)</p> <p>Yesterday, today, and tomorrow</p> <p>School days and weekend days</p> <p>*Replace with number talks once or twice per month</p>	<p>February to June</p> <p>Mental Math Fluency</p> <ul style="list-style-type: none"> • Counting practice • Reading numerals practice • Fluency practice <p>Days and Dates</p> <ul style="list-style-type: none"> • Say the date (including weekday) • Today's weather • Two or three of:* <p>Always, sometimes, never (clothes or activities)</p> <p>Name the weekdays</p> <p>Did it change? (month, year, weekday)</p> <p>School days and weekend days</p> <p>Make weather comparisons</p> <p>Number Talks (three or four times a week)</p> <p>*Once a week, instead of number talks</p>
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Weather Calendar


Month _____


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					



rainy


sunny


cloudy
(no rain)


partly
sunny

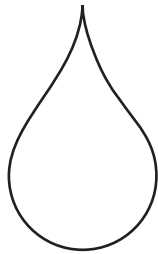

snow


windy

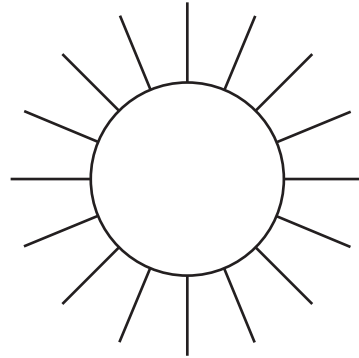
Weather Cards



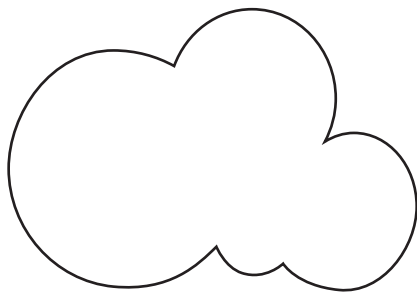
rainy



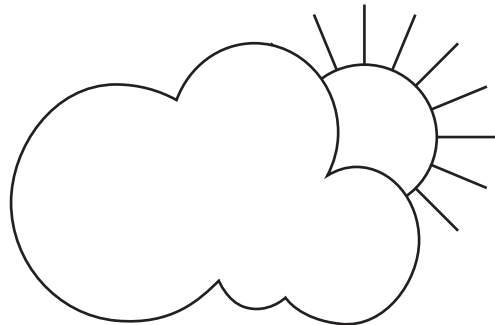
sunny



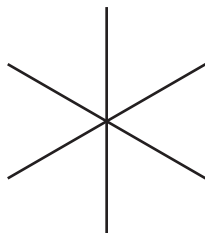
cloudy (no rain)



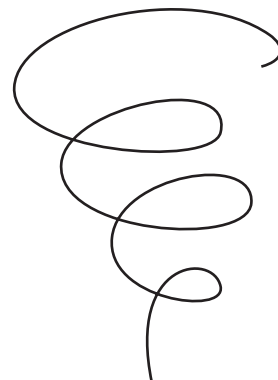
partly sunny



snow



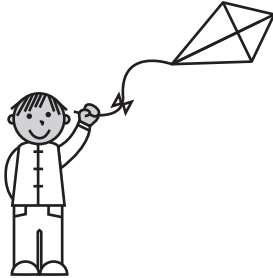
windy



Activities



fly a kite



rake leaves



plant a tree



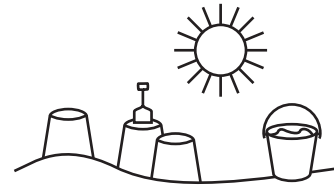
pick flowers



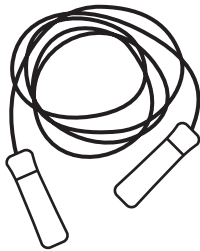
go skating



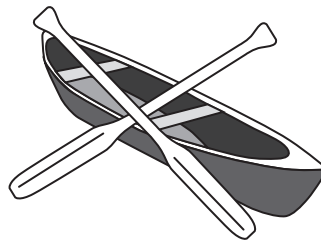
go to the beach



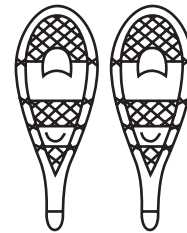
skip rope



go canoeing



go snowshoeing



play basketball



build snowmen



ride a bike



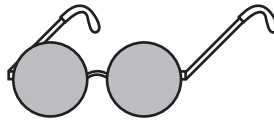
Clothes



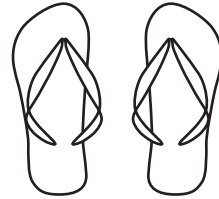
snowsuit



sunglasses



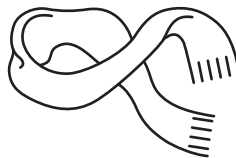
flip-flops



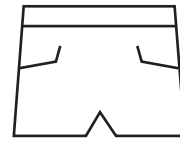
winter boots



scarf



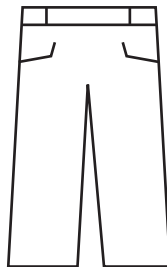
shorts



rubber boots



pants



umbrella



jacket



mittens



shoes



NAME _____ DATE _____

Always, Sometimes, Never

Month _____

Always

Sometimes

Never

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Number Talks

A number talk is a structured discussion that can help students develop a flexible sense of numbers and improve their communication skills. Number talks provide a non-judgmental space for students to share their ideas and hear the ideas of others, and usually take place on the carpet. We recommend doing one or two number talks each month in November and December, one number talk once a week in January, and three or four number talks a week from February onwards.

Choose a sequence of problems. Usually, a sequence of two or more problems are presented during a number talk. This sequence is meant to elicit a particular strategy. In Grade 2, these problems will generally involve addition or subtraction. Choose problems to which students can apply a variety of strategies, and choose sequences of problems that will elicit specific strategies that students have already learned. We provide a number of sample strategies on **BLM Eliciting Strategies** (p. A-61) that you might want to elicit during number talks. We also provide a sample sequence of problems that you could use to elicit each strategy, and a consolidating exercise for use after the sequence of problems has been completed. We indicate the lesson after which students can be expected to use each strategy.

Number Talk Steps

Each number talk involves several steps; these are summarized on **BLM Number Talk Cue Cards** (pp. A-62–64).

Step 1: Introduce or review the signals. In a number talk, students use specific signals so as not to distract other students. Before each number talk, remind students not to wave their hands around to avoid distracting others. ASK: Can you think clearly when someone waves their hand around?

Tell or remind students (or have them remind you) about the signals:

1. Ready and thinking = closed fist against chest
2. I have a strategy = thumb up against chest
3. I have more than one strategy = same number of fingers as strategies against chest
4. I agree with an answer or with someone's thinking = hold up thumb and pinky finger against chest

NOTE: When you are only doing number talks occasionally, have students use only the first two signals. Incorporate the last two signals when you do daily number talks.

Step 2: Present a problem. Show students the problem. Tell them that you want them to think of as many strategies as they can to get the answer.

Step 3: Whole-class answer sharing. If necessary, review signalling and remind students not to wave their hands about. Ask three to five students to share their answers. Remind students that you don't want their reasoning yet. Record all the answers; be sure to react the same way to both correct and incorrect answers. Students who are not called on can signal their agreement when a student gives the same answer they got. Occasionally, ask whether two answers can both be correct to emphasize that there is only one correct numerical answer.

Step 4: Partners share thinking (optional). If you have time constraints, skip this step to ensure that you devote enough time to whole-class analysis (Step 8). However, if time permits, this step ensures that everyone can practise sharing their thinking and gives students a safe way to explore their strategy before presenting it to the whole class.

Have partners take turns sharing their strategies. You might want to create a signal to indicate when students should switch roles (talker or listener) to ensure that neither student dominates the discussion, as well as a signal for calling students' attention back to the whole class. You will also need a way to decide who will share their strategy first, such as whoever has shorter hair, a lighter shirt, or the next birthday.

NOTE: You are likely to only have time for this step once students have done a significant quantity of number talks focused on a particular strategy. It is also unlikely you will have enough time to do this step for more than one of the problems in the sequence (we recommend the problems marked with an asterisk on BLM Eliciting Strategies).

Step 5: Whole-class strategy sharing. You might wish to prepare for this step by reviewing "Sample Number Talk Presentations and Prompts" on the next page. Look for strategies that students might use for the number talk you are doing, and then write out sample strategies and how you would present them.

ASK: Who would like to share their thinking? Have a volunteer answer questions such as "How did you figure that out?" Occasionally, call first on a student who answered incorrectly to explain their strategy. As students answer, record, clarify, and restate what they say using pictures, symbols, and words. Keep these visual representations for use during whole-class analysis (Step 8). As before, react the same way to both correct and incorrect reasoning. If a student's reasoning leads them to a different answer than they gave in whole-class answer sharing (Step 3), ask if they would like to revise their answer.

If a desired strategy is not suggested, do not suggest it during the number talk. Instead, teach the strategy again during a regular lesson and follow up with more number talks to attempt to elicit it. This helps students understand that number talks are a time when they are not judged for choosing a wrong or inefficient strategy. If students come up with a strategy that has not yet been taught, allow them to explain it just as you would for other strategies. If you expect that not all students will understand the strategy, explain that you will be teaching it later in the year, so it might make more sense later. If students have trouble justifying their strategy, allow other volunteers to try to do so for them. As the year progresses, allow students to struggle for longer to encourage perseverance.

Step 6: Other students' responses. After you have visually presented one student's reasoning, others can signal whether they agree. Ask questions such as "Who did it exactly the same way?", "Does anyone have any questions about this strategy?", or "Can someone explain this strategy in your own words?" Keep the visual presentation for later.

Step 7: More whole-class sharing (2 to 4 more students). Repeat Steps 5 and 6 by asking two to four more students to share their reasoning.

Step 8: Whole-class analysis. During this step, students resolve any misconceptions, agree on an answer, and make important connections among strategies. Display three to five strategies. Have the class agree on the correct answer. Ask questions such as "Does anyone want to revise their answer?", "Which methods work?", and "What mistake was made here?"

Have students compare strategies. Ask questions such as "How are these two strategies the same? How are they different?", "Can you find two strategies that are almost the same? Why are

they almost the same?”, “Which strategy seems easiest to you?”, “Which strategy would be the fastest?”, and “Which strategy that you didn’t use would you like to try?”

Step 9: Consolidating exercise (optional). Provide a consolidating exercise after a series of number talks focused on a particular strategy. Have students share their thinking with a partner. Encourage students to pick a favourite strategy that they didn’t use before, use it, and explain to a partner why they like it. Partners can then work together to find as many strategies as they can.

Sample Number Talk Presentations and Prompts

The examples of number talk problems below can be done at different times of the year, and include ways you might visually present various strategies. Strategies become more complex over the year, so students gradually improve their communication skills. The lesson after which you can expect to see a strategy is indicated (note that some students might use it earlier).

Students are unlikely to present fully formed strategies without prompting. After each example, sample prompts and student responses are provided for selected strategies that lead to the presentations shown.

NOTE: Be sure to write addition and subtraction problems horizontally during number talks. Writing the problems vertically could bias students towards the standard algorithm and stop them from exploring other valuable strategies.

EXAMPLE 1: What answer did you get?

$$7 + 9$$

Strategy A (NS2-54) ASK: How did you figure that out? ($7 + 3$ is 10 and 6 more is 16) Where do the 3 and 6 come from? (the 9) PROMPT: I see where the 7 comes from, but why did you add 3 and then 6, when the question asks for $7 + 9$? (because 3 and 6 make 9) ASK: So, you took 9 apart into 3 and 6? (yes)

$$\begin{aligned} &7 + 9 \\ &= 7 + 3 + 6 \\ &= 10 + 6 \\ &= 16 \end{aligned}$$

Strategy B (NS2-54) ASK: How did you figure that out? (it is one less than $7 + 10$, or 17) How did you know that $7 + 9$ is one less than $7 + 10$? (because 9 is one less than 10) How did you find one less than 17? (counted back)

$$\begin{aligned} &9 \text{ is 1 less than } 10 \\ &7 + 9 \text{ is 1 less than } 7 + 10 \\ &7 + 10 \text{ is } 17 \\ &16 \text{ is 1 less than } 17 \end{aligned}$$

Strategy C (NS2-60) ASK: How did you figure that out? (it’s two more than 14, or 16) How did you get 14? ($7 + 7$) So $7 + 9$ is two more than $7 + 7$? (yes) How do you know that $7 + 9$ is two more than $7 + 7$? (because 9 is two more than 7)

$$\begin{aligned} &7 + 7 = 14 \\ &7 + 9 \text{ is two more} \\ &14 \quad \underline{15} \quad \underline{16} \end{aligned}$$

Strategy D (NS2-60) ASK: How did you figure that out? ($8 + 8$ is 16, so $7 + 9$ is 16) How did you know that $7 + 9$ is the same as $8 + 8$? (because you can take 1 from the 9 and give it to the 7) Use cubes on ten-frames to show why this works by moving one of the cubes from the 9 to the 7.

$$\begin{array}{c} 1 \text{ more } \left(\begin{array}{c} 7 + 9 \\ \swarrow \quad \searrow \\ 8 + 8 \end{array} \right) 1 \text{ less} \\ = 16 \end{array}$$

EXAMPLE 2: What answer did you get?

$$28 + 9$$

Strategy A (NS2-41) ASK: How did you figure that out? ($28 + 10$ is 38, so one less than that is 37) How did you know that $28 + 9$ is one less than $28 + 10$? (because 9 is one less than 10) How did you find one less than 38? (counted back)

9 is 1 less than 10

$28 + 9$ is 1 less than $28 + 10$

$28 + 10$ is 38

37 is 1 less than 38

Strategy B (NS2-54) ASK: How did you figure that out? ($28 + 2$ is 30. $9 - 2 = 7$, so $30 + 7 = 37$) So you added 2 to 28, and then subtracted 2 from 9? (yes) What new addition did you get? ($30 + 7$) Is that an easier addition? (yes)

$$\begin{array}{r} 28 + 9 \\ +2 \quad \downarrow \quad \downarrow \quad -2 \\ 30 + 7 \\ = 37 \end{array}$$

Strategy C (NS2-54) ASK: How did you figure that out? ($9 + 1$ is 10. $28 - 1 = 27$, so $27 + 10 = 37$) So you added 1 to 9, and then subtracted 1 from 28? (yes) What new addition did you get? ($27 + 10$) Why is that an easier addition? (because adding 10 is easy)

$$\begin{array}{r} 28 + 9 \\ -1 \quad \downarrow \quad \downarrow \quad +1 \\ 27 + 10 \\ = 37 \end{array}$$

Eliciting Strategies

Number sentence number talks: What answer did you get? How did you figure that out?

NS2-22	NS2-26	NS2-27	NS2-39	NS2-39
You can add in any order	Counting back to subtract	Counting on to subtract	Finding pairs that make 10	Recognizing pairs that make 20
A. $7 + 2$ B. $2 + 7$ C. $19 + 4$ D. $4 + 19$ Exercise: $3 + 28$	A. $10 - 2$ B. $39 - 4$ C. $52 - 5$ Exercise: $61 - 7$	A. $11 - 9$ B. $13 - 11$ C. $31 - 27$ Exercise: $72 - 64$	A. $3 + 7$ B. $6 + \underline{\quad} = 10$ C. $9 + \underline{\quad} = 10$ Exercise $2 + \underline{\quad} = 10$	A. $8 + 2$ *B. $18 + 2$ C. $8 + 12$ Exercise: $4 + 16$

NS2-39	NS2-39	NS2-39	NS2-41	NS2-41
Finding pairs that make 20	Recognizing pairs that make 50	Finding pairs that make 50	Finding two numbers that add to 10	Finding an easy order to add
A. $13 + 7$ *B. $17 + \underline{\quad} = 20$ C. $6 + \underline{\quad} = 20$ Exercise $\underline{\quad} + 8 = 20$	A. $2 + 3$ *B. $20 + 30$ C. $40 + 10$ Exercise: $30 + 20$	A. $3 + \underline{\quad} = 5$ *B. $30 + \underline{\quad} = 50$ C. $\underline{\quad} + 40 = 50$ Exercise $20 + \underline{\quad} = 50$	A. $6 + 4$ B. $6 + 4 + 5$ C. $8 + 2$ *D. $8 + 5 + 2$ Exercise: $7 + 6 + 3$	A. $8 + 2 + 5 + 3$ *B. $2 + 5 + 3 + 8$ C. $3 + 4 + 7 + 6$ Exercise $1 + 8 + 9 + 2$

NS2-41	NS2-51	NS2-54	NS2-54	NS2-55
Adding close to 10	Adding tens	Bridging ten by decomposing	Bridging ten by compensating	Using tens and ones to add
A. $24 + 10$ B. $36 + 10$ *C. $36 + 11$ D. $56 + 11$ Exercise: $63 + 9$	A. $5 + 4$ *B. $50 + 40$ C. $20 + 30 + 40$ Exercise $20 + 10 + 30 + 10$	A. $10 + 6$ B. $9 + 1 + 6$ *C. $9 + 7$ D. $29 + 7$ Exercise: $38 + 8$	A. $10 + 5$ *B. $9 + 6$ C. $30 + 5$ D. $28 + 7$ Exercise: $59 + 7$	A. $20 + 40 + 5 + 3$ *B. $25 + 43$ C. $20 + 40 + 5 + 8$ D. $25 + 48$ Exercise: $48 + 37$

NS2-60	NS2-60	NS2-60	NS2-61	NS2-63
Changing to a double to add	Using one more than a double	Using one less than a double	Using the nearest ten to subtract	Using tens and ones to subtract
A. $7 + 7$ *B. $6 + 8$ C. $8 + 8$ D. $7 + 9$ Exercise: $5 + 7$	A. $6 + 6$ B. $6 + 6 + 1$ *C. $6 + 7$ Exercise: $8 + 9$	A. $8 + 8$ B. $8 + 8 - 1$ *C. $8 + 7$ Exercise: $9 + 8$	A. $14 - 4$ *B. $13 - 4$ C. $53 - 4$ D. $45 - 7$ Exercise: $57 - 8$	A. $80 - 30$ *B. $85 - 35$ C. $85 - 32$ D. $97 - 41$ Exercise: $76 - 53$

Number Talk Cue Cards (I)



Step 1: Introduce or review the signals (I)

ASK: Can you think clearly when someone waves their hand around?

Signals:

1. Ready and thinking = closed fist against chest
2. I have a strategy = thumb up against chest

Step 1: Introduce or review the signals (2)

3. I have more than one strategy = same number of fingers as strategies against chest
4. I agree with an answer or with someone's thinking = hold up thumb and pinky finger against chest

Step 2: Present a problem

SAY: Think of as many different ways as you can to solve this problem.

Provide wait time (one or two minutes or until all students signal thumb up against chest).

Step 3: Whole-class answer sharing

ASK: What answer did you get? SAY: No reasons or thinking yet!

ASK: Did anyone get a different answer?

Record all answers.

Same reaction for correct/incorrect answers.

Number Talk Cue Cards (2)

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Step 4: Partners share thinking (optional)

Create new signals:

- When students should switch roles.
- Call attention back to the whole class.

Decide who shares first.

Step 5: Whole-class strategy sharing (I)

ASK: Who would like to share their thinking?

ASK: How did you figure that out?

Step 5: Whole-class strategy sharing (2)

Present correct/incorrect thinking:

- Record, clarify, and restate.
- Use pictures, symbols, and words.

Provide opportunity to revise answers.

Step 6: Other students' responses

ASK: Who did it exactly the same way?

ASK: Does anyone have any questions about this strategy?

ASK: Can someone explain this strategy in your own words?

Keep the visual presentation for later.

Number Talk Cue Cards (3)



Step 7: More whole-class sharing (2 to 4 more students)

ASK: Did anyone use a different way?
 ASK: How did you figure it out?
 Record correct/incorrect thinking.
 Provide an opportunity to revise answers.
 Provide other students' responses.

Step 8: Whole-class analysis (I)

Class agrees on the correct answer.
 ASK: Does anyone want to revise their answer?
 ASK: Which methods work?
 ASK: What mistake was made here?

Step 8: Whole-class analysis (2)

ASK: How are these two ways the same?
 How are they different?
 ASK: Which strategy seems easiest to you?
 ASK: Which strategy would be the fastest?
 ASK: Which strategy that you didn't use would you like to try?

Step 9: Consolidating exercise (optional)

Partners share thinking.
 SAY: Try to use a way that you didn't use before and explain why you like it.
Bonus: Find as many strategies as you can with your partner.



Letter to Parents/Guardians

What is JUMP Math?

JUMP Math is an innovative, research-based math resource and teaching approach used by schools to foster a deep understanding and love of math in their students. Our approach is based on the belief that all children can excel at math and, through early and continued success, can develop the confidence and cognitive abilities required to do well in all subjects.

The JUMP Math approach, which has produced significant improvements in student achievement in a number of studies (including a randomized controlled trial), is based on a method called “guided discovery.” Each lesson is thorough and rigorous, and comes with instructional supports, exercises, assessments, activities, and extension questions that allow students to develop a deeper knowledge of the curriculum by working on incremental variations on the same topic. This allows teachers to focus their time and energy on real-time instruction and differentiation, rather than piecing lessons together from a variety of sources.

What are the components of JUMP Math?

The lesson plans are the heart of JUMP Math. Developed by a team of mathematicians and educators, it shows teachers how to:

- break concepts into fundamental units of understanding,
- assess and address gaps in student knowledge,
- present concepts in different ways and from different perspectives,
- build excitement with incrementally harder challenges, and
- foster advanced problem-solving skills.

Used in tandem with the student Assessment & Practice Books (AP Books), our teaching resources are aligned to provincial curricula.

How does JUMP Math benefit my child?

With JUMP Math, students derive concepts and solve problems themselves, and teachers provide guidance along the way to ensure this happens for all students, not just the advanced few. This approach ensures a critical balance of teaching and practice, and allows for varied forms of engagement, incremental challenge, and continuous assessment. At the end of each lesson, students work in their AP Books. These exercises match the material taught in the lesson exactly, allowing students to work independently to consolidate newly learned skills and concepts. At the same time, teachers get an immediate sense of where each student is and can provide individualized support as needed.

How can I support my child at home?

It’s important that children understand how you use math every day: to compare prices and calculate change, measure ingredients in a recipe, estimate how much gas to buy, and predict if it will rain. Talk with them about this, and use coins, dice, cards, or dominoes to increase basic numeracy skills, pattern recognition, and fluency with math facts. Most importantly, believe in your child’s potential to learn and become a mathematical thinker. If family members say “I don’t have a math brain” or “I was always bad at math,” your child gets the impression that math is scary and hard. Instead, use the language of possibility: “You don’t have it yet but you will!”

To learn more, speak to your child’s teacher or visit www.jumpmath.org.

