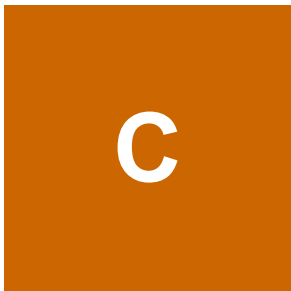# Curriculum Framework: Competency C. Understand and Use Numbers

Ontario Ministry of Training, Colleges and Universities
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EMPLOYMENT ONTARIO

C Understand and Use Numbers

C. Understand and Use Numbers comprises tasks that involve working with numbers in a wide variety of contexts.

The competency *C. Understand and Use Numbers* is organized into the following four task groups:

- C1. Manage money
- C2. Manage time
- C3. Use measures
- C4. Manage data

C1. Manage money

The task group *C1. Manage money* encompasses the numeracy skills required for making financial transactions. Typical examples of managing money include comparing prices, calculating costs, and preparing budgets.

There are no examples of Level 1 estimation tasks in *C1. Manage money.* Estimates related to money require calculations, background knowledge, or both, increasing task complexity beyond the scope of Level 1.

Indicator Overview: ***Manage money***

Level 1	Compare costs and make simple calculations
Level 2	Make low-level inferences to calculate costs and expenses that may include rates such as taxes and discounts
Level 3	Find, integrate, and analyze numerical information to make multi-step calculations to compare cost options and prepare budgets

C2. Manage time

The task group *C2. Manage time* encompasses the numeracy skills related to tracking and calculating numbers representing time. Time management is captured both in this task group and in competency *E. Manage Learning*. Typical examples of managing time include reading digital and analog clocks, comparing and measuring time intervals, and preparing schedules.

There are no examples of Level 1 estimation tasks in *C2. Manage time.* Estimates related to time require calculations, background knowledge, or both, which increases task complexity beyond the scope of Level 1.

*Indicator Overview: **Manage time***

Level 1	Measure time and make simple comparisons and calculations
Level 2	Make low-level inferences to calculate using time
Level 3	Find, integrate, and analyze numerical information to make multi-step calculations using time

C3. Use measures

This task group explores the ways in which measurement is performed and used. At the lower end of the scale, using measures includes taking and comparing measurements with common tools, such as measuring tapes and thermometers. At the upper end, this task group comprises tasks that include calculating and converting measurements, and using basic geometry. Typical examples of using measures include measuring dimensions of objects, calculating area and volume, and using measures to create scale drawings.

*Indicator Overview: **Use measures***

Level 1	Measure and make simple comparisons and calculations
Level 2	Use measures to make one-step calculations
Level 3	Use measures to make multi-step calculations; use specialized measuring tools

C4. Manage data

The task group *C4. Manage data* addresses the ways in which adults use numbers to understand and explain the world around them. Managing data involves comparing, calculating, and displaying numerical data, including creating graphs to display numerical information. Typical examples of managing data include counting and comparing numbers of items, calculating summary measures, such as averages, and graphing these measures over time, and using statistics and data patterns to make predictions.

*Indicator Overview: **Manage data***

Level 1	Make simple comparisons and calculations
Level 2	Make low-level inferences to organize, make summary calculations and represent data
Level 3	Find, integrate, and analyze data; identify trends in data

Connecting this competency to other competencies and their task groups

Many numeracy tasks require the use of documents. Examples include verifying costs itemized on receipts, interpreting statistics in continuous texts, making calculations to complete invoices, and entering measurements and data into tables. Tasks that require learners to extract and interpret numbers in texts with sentences and paragraphs should be examined for their reading requirements under the task group

A1. Read continuous text. Tasks that require referring to documents should be examined for their document use requirements under the task group *A2. Interpret documents*. Tasks requiring the learner to complete or create documents should be examined for their document use requirements within *B3. Complete and create documents*.

C1.1

Competency C:
Understand and Use Numbers

Task Group C1:
Manage money

Level **1**

At this level, learners:
Compare costs and make simple calculations

Performance Descriptors	Task Descriptors
The learner:	Scope of task is limited
Adds, subtracts, multiplies, and divides whole numbers and decimals	Has a concrete and familiar context
Recognizes values in number and word format	May require one operation; operation is apparent
Understands numerical order	May require the same operation to be performed more than once
Begins to interpret integers, such as in a negative bank balance	Requires up to a few steps to complete
Identifies and performs required operation	Has a set procedure
Interprets and represents costs using monetary symbols and decimals	May involve one simple document (e.g. grocery store flyer, list)
Follows apparent steps to reach solutions	Uses whole numbers and/or decimals
Rounds to the nearest dollar	Has a highly explicit purpose
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 1:
Compare costs and make simple calculations

Tasks	E	A	SS	PS	I
Calculate the retail price of a coat, less a store coupon					●
Compare the cost of buying two or more products at two grocery stores	●	●			●
Keep a running total of travel expenses over the course of a month	●	●			●
Calculate change from a purchase	●	●			●
Calculate how many notebooks can be purchased for $20			●	●	

C1.2

Competency C:
Understand and Use Numbers

Task Group C1:
Manage money

Level **2**

At this level, learners:

Make low-level inferences to calculate costs and expenses that may include rates such as taxes and discounts

Performance Descriptors	Task Descriptors
The learner:	Scope of task is clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers	May include unfamiliar elements (e.g. context, content)
Calculates percentages	Requires the use of rates, or requires two or more operations, where operations are easily inferred
Interprets and applies rates (e.g. $/kg, $/l)	Requires up to a few steps to complete
Chooses and performs required operation(s); may make inferences to identify required operation(s)	May be completed in more than one way
Selects appropriate steps to reach solutions	May involve one document, such as a table
Represents costs and rates using monetary symbols, decimals, and percentages	May require converting between whole numbers, fractions, decimals, ratios, and percentages
Makes simple estimates	
Interprets, represents, and converts amounts using whole numbers, decimals, percentages, ratios, and simple, common fractions (e.g. ½, ¼)	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 2:
Make low-level inferences to calculate costs and expenses that may include rates such as taxes and discounts

Tasks	E	A	SS	PS	I
Calculate the cost of each pair of shoes during a "buy one, get one at ½ off" sale					●
Calculate cost savings on a purchase during a "15% off" sale	●	●			●
Prepare an invoice calculating unit costs, subtotal, taxes, and total	●	●			
Calculate one's share of a restaurant bill including tip					●
Calculate the unit price of each item sold in a package	●				●
Estimate the cost of a roast using the price per kilo	●	●			●

C1.3

Competency C:
Understand and Use Numbers

Task Group C1:
Manage money

Level **3**

At this level, learners:

Find, integrate, and analyze numerical information to make multi-step calculations to compare cost options and prepare budgets

Performance Descriptors	Task Descriptors
The learner:	Scope of task may not be clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers	May include unfamiliar elements (e.g. context, content)
Manages unfamiliar elements (e.g. context, content) to complete the task	Requires two or more operations; operations must be inferred
Chooses and performs required operations; makes inferences to identify operations	Requires multiple steps to complete
Selects appropriate steps to reach solutions from among options	Has many options to complete; does not have a set procedure
Identifies a variety of ways to complete the task	May involve documents such as utility bills
Finds, integrates, and analyses numerical information	May involve working within differing cost structures
Organizes and displays numerical information (e.g. tables, graphs)	May require converting between whole numbers, fractions, decimals, ratios, and percentages
Makes estimates	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 3:

Find, integrate, and analyze numerical information to make multi-step calculations to compare cost options and prepare budgets

Tasks	E	A	SS	PS	I
Prepare and monitor a household budget					●
Compare costs and services from several providers to select a cell phone plan	●				●
Calculate and compare the annual costs of owning a car, carpooling, and using public transportation					●

C2.1	Competency C: **Understand and Use Numbers**	
	Task Group C2: **Manage time**	Level **1**

At this level, learners:

Measure time and make simple comparisons and calculations

Performance Descriptors

The learner:

Adds, subtracts, multiplies, and divides whole numbers and decimals

Recognizes values in number and word format

Understands chronological order

Understands and uses common date formats

Reads time on analog and digital clocks

Identifies and performs required operation

Represents dates and times using standard conventions

Measures time using common instruments, such as clocks, timers, and stopwatches

Chooses appropriate units of measurement (e.g. hours, minutes, seconds)

Interprets and represents time using whole numbers, decimals (e.g. .25, .5), and simple, common fractions (e.g. ½, ¼ hour)

Follows apparent steps to reach solutions

Rounds to nearest minute or hour

Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)

Task Descriptors

Scope of task is limited

Has a concrete and familiar context

May require one operation; operation is apparent

May require the same operation to be performed more than once

Requires up to a few steps to complete

Has a set procedure

May involve one simple document (e.g. product label, appointment card)

Has a highly explicit purpose

Uses whole numbers and/or simple common fractions or decimals

Examples of tasks learners can do at the end of Level 1:

Measure time and make simple comparisons and calculations

Tasks	E	A	SS	PS	I
Use a stopwatch to time an event	●				●
Use "best before" dates to select fresh foods	●	●			●
Calculate the number of hours a class is offered in a week		●	●	●	●
Calculate travel time from departure and arrival times	●	●			●
Compare finish times for a marathon					●

C2.2	Competency C: **Understand and Use Numbers**	
	Task Group C2: **Manage time**	Level **2**

At this level, learners:
Make low-level inferences to calculate using time

Performance Descriptors

The learner:

Calculates using numbers expressed as whole numbers, fractions, decimals, and percentages

Interprets and applies rates (e.g. $/hr, km/hr, cooking time/pound)

Converts between units of time (e.g. millennia, centuries, decades, years, months, weeks, days, hours, minutes, seconds)

Makes simple estimates

Interprets, represents, and converts time using whole numbers, decimals, percentages, ratios, and simple, common fractions (e.g. ½, ¼)

Chooses and performs required operation(s); may make inferences to identify required operation(s)

Selects appropriate steps to reach solutions

Understands and converts time between 12- and 24-hour clocks

Converts time between time zones

Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)

Task Descriptors

Scope of task is clearly defined

May include unfamiliar elements (e.g. context, content)

Requires the use of rates, or requires two or more operations, where operations are easily inferred

Requires up to a few steps to complete

May be completed in more than one way

May involve one document (e.g. table, schedule)

May require converting between whole numbers, decimals, fractions, ratios, and percentages

Examples of tasks learners can do at the end of Level 2: **Make low-level inferences to calculate using time**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Calculate the cooking time for a chicken using a rate	●	●			●
Plan one's day by estimating how long activities will take and sequence them accordingly	●	●	●	●	●
Calculate the number of hours worked in a week, taking into account breaks	●	●			
Convert fractions of hours to decimals to complete a timesheet	●	●			
Convert minutes logged on the Internet to hours and minutes	●	●	●	●	●
Convert a departure time from the 24-hour to 12-hour clock	●				●

C2.3

Competency C:
Understand and Use Numbers

Task Group C2:
Manage time

Level **3**

At this level, learners:

Find, integrate, and analyze numerical information to make multi-step calculations using time

Performance Descriptors	Task Descriptors
The learner:	Scope of task may not be clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, and percentages	May include unfamiliar elements (e.g. context, content)
Manages unfamiliar elements (e.g. context, content) to complete tasks	Requires two or more operations; operations must be inferred
Makes estimates	Requires multiple steps to complete
Chooses and performs required operations; makes inferences to identify required operations	Has many options to complete; does not have a set procedure
Selects appropriate steps to reach solutions from amongst options	May involve documents (e.g. tables, schedules)
Identifies a variety of ways to complete tasks	May require converting between whole numbers, decimals, fractions, ratios, and percentages
Finds, integrates, and analyzes numerical information	
Organizes and displays numerical information (e.g. Gantt chart, schedules)	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 3: **Find, integrate, and analyze numerical information to make multi-step calculations using time**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Create a weekly work schedule for several employees	●				
Adjust a project schedule to accommodate delays	●	●	●	●	
Identify and schedule activities					●

<table>
<tr><td>**C3.1**</td><td>Competency C:
Understand and Use Numbers

Task Group C3:
Use measures</td><td>Level **1**</td></tr>
</table>

At this level, learners:

Measure and make simple comparisons and calculations

Performance Descriptors	Task Descriptors
The learner:	Scope of task is limited
Adds and subtracts whole number measurements	Has a concrete and familiar context
Recognizes values in number and word format	May require adding or subtracting measurements; operation is apparent
Recognizes simple, common shapes (e.g. circle, square, rectangle, triangle)	May require the same operation to be performed more than once
Measures distance, length, width, height, weight, liquid volume, angles, and temperature	Requires up to a few steps to complete
Uses common measuring tools, such as rulers, scales, and thermometers	Has a set procedure
Understands numerical order	Uses common units of measurement within the same system
Makes simple estimates	May involve one simple document, such as an office supply flyer
Begins to interpret integers (e.g. temperature, elevation)	Has a highly explicit purpose
Chooses appropriate units of measurement (e.g. centimetres, metres, kilometres)	Uses whole numbers and/or simple common fractions or decimals
Uses common standard units (e.g. metres, inches) and non-standard units (e.g. paces, cupfuls, scoops)	
Identifies and performs required operation	
Interprets and represents measures using whole numbers, decimals, and simple, common fractions (e.g. ½, ¼)	
Interprets and represents measures using symbols and abbreviations (e.g. inches as ", centimetres as cm, pounds as lbs, kilograms as kilos or kg)	
Follows apparent steps to reach solutions	
Rounds to the nearest whole unit (e.g. kilos)	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 1: **Measure and make simple comparisons and calculations**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Use a store flyer to select a desk that is big enough to fit a computer and printer	●				●
Check the temperature on an outdoor thermometer	●	●			●
Compare grams of sodium in two types of soup	●				●
Check a child's height against the minimum measure for an amusement park ride					●
Work out personal weight gain or loss over a period of time					●
Estimate whether a jacket is the correct size					●
Compare distances in a ski jumping event	●				●
Measure a piece of furniture to see if it will fit through a doorway	●				●

C3.2

Competency C:
Understand and Use Numbers

Task Group C3:
Use measures

Level **2**

At this level, learners:
Use measures to make one-step calculations

Performance Descriptors

The learner:

Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers

Calculates angles in simple, common shapes

Makes estimates

Understands and uses ratio and proportion

Interprets and represents area and volume using symbols and abbreviations (e.g. m3)

Interprets and applies rates (e.g. km/hr, km/l) and ratios (e.g. map scales)

Converts units of measurement within the same system and between systems

Understands and uses formulas for finding the perimeter, area, and volume of simple, common shapes

Chooses and performs required operation(s); may make inferences to identify required operation(s)

Selects appropriate steps to solutions

Interprets, represents, and converts measures using whole numbers, decimals, percentages, ratios, and simple, common fractions (e.g. ½, ¼)

Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)

Task Descriptors

Scope of task is clearly defined

May include unfamiliar elements (e.g. context, content)

Requires the use of rates or common formulas

Requires one-step calculations, which may be repeated; operations are easily inferred

May be completed in more than one way

May involve one document, such as a simple conversion table

May require converting between whole numbers, decimals, fractions, ratios, and percentages

Examples of tasks learners can do at the end of Level 2: **Use measures to make one-step calculations**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Adjust quantities to double or half a recipe	●				●
Using a floor plan, calculate and compare the square footage of two hotel rooms	●				●
Use a map scale to calculate the distance between two points	●	●	●	●	●
Convert kilobytes to megabytes to determine the remaining capacity of an electronic device	●		●	●	●
Dilute a cleaning product using a ratio	●	●			●
Estimate whether there is enough flour and sugar on hand to carry out a recipe	●	●			●

C3.3

Competency C:
Understand and Use Numbers

Task Group C3:
Use measures

Level **3**

At this level, learners:
Use measures to make multi-step calculations; use specialized measuring tools

Performance Descriptors	Task Descriptors
The learner:	Scope of task may not be clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers	May include unfamiliar elements (e.g. context, content)
Calculates the radius, diameter, and circumference of circles	Requires multi-step calculations where one step builds on the previous step
Understands and uses properties of angles and triangles to solve problems	Requires the use of rates or common formulas or both
Understands and uses formulas for finding the perimeter, area, and volume of non-rectangular, composite shapes	May require converting measurements to make calculations
Manages unfamiliar elements (e.g. context, content) to complete tasks	May involve documents (e.g. rate tables, scale drawings)
Makes estimates involving many factors where precision is required	May require converting between whole numbers, decimals, fractions, ratios, and percentages
Interprets and represents measurements taken with specialized tools (e.g. callipers, multimeters)	May require converting between measurement systems or between units in one system
Chooses and performs required operations; makes inferences to identify required operations	
Selects appropriate steps to solutions from among options	
Identifies a variety of ways to complete tasks	
Interprets, represents, and converts measures using whole numbers, decimals, percentages, ratios, and fractions	
Organizes and displays numerical information (e.g. graphs, tables)	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 3: **Use measures to make multi-step calculations; use specialized measuring tools**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Calculate paint quantity given room dimensions and paint coverage rates	●	●			●
Calculate the number of cans of tomatoes (in ml) needed when doubling a recipe calling for ounces	●				●
Calculate the area of a room that includes a bay window	●	●			●
Estimate the volume of sand required to prepare the foundation for a curved walkway	●	●			●
Create a scale drawing for a shed	●	●			●
Calculate the area of an irregularly shaped room to determine whether furniture and equipment will fit	●	●	●	●	●

C4.1

Competency C:
Understand and Use Numbers

Task Group C4:
Manage data

Level **1**

At this level, learners:
Make simple comparisons and calculations

Performance Descriptors	Task Descriptors
The learner:	Scope of task is limited
Adds, subtracts, multiplies, and divides whole numbers and decimals	Has a concrete and familiar context
Recognizes values in number and word format	May require one operation; operation is apparent
Identifies and compares quantities of items	May require the same operation to be performed more than once
Understands numerical order	Requires up to a few steps to complete
Identifies and performs required operation	Has a set procedure
Begins to interpret integers	May involve one simple document (e.g. list, label)
Makes simple estimates	Has a highly explicit purpose
Interprets and represents values using whole numbers, decimals, percentages, and simple, common fractions (e.g. ½, ¼)	Uses whole numbers and/or simple common fractions or decimals
Follows apparent steps to reach solutions	
Interprets simple, common probabilities, such as the chance of precipitation from a weather forecast	
Recognizes simple patterns	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 1: **Make simple comparisons and calculations**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Count the number of boxes in a shipment to verify that the correct number was received	●				
Compare two boxes of granola bars to find out which box contains more bars	●				●
Calculate the number of cars required to take a class of children to a sporting event	●				●
Estimate the number of packages of paper to purchase for a semester		●	●	●	

C4.2

Competency C:
Understand and Use Numbers

Task Group C4:
Manage data

Level **2**

At this level, learners:
Make low-level inferences to organize, make summary calculations, and represent data

Performance Descriptors	Task Descriptors
The learner:	Scope of task is clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers	May include unfamiliar elements (e.g. context, content)
Understands and uses ratio and proportion	Requires the use of rates, or requires two or more operations, where operations are easily inferred
Makes estimates	Requires up to a few steps to complete
Finds ranges for data sets	May be completed in more than one way
Calculates averages (mean) and percentages	May involve one document (e.g. simple table, simple bar graph)
Identifies medians and modes	May require calculating percentages
Collects, organizes, and represents data using simple tables and graphs	May require converting between whole numbers, decimals, fractions, ratios, and percentages
Interprets rates (e.g. crime rates) and ratios (e.g. shots–on-net to goals)	
Interprets, represents, and converts values using whole numbers, decimals, percentages, ratios, and simple, common fractions (e.g. ½, ¼)	
Chooses and performs required operation(s); may make inferences to identify required operation(s)	
Selects appropriate steps to solutions	
Recognizes patterns and begins to identify trends in data (e.g. population, crime, demographic, inventory, injury)	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 2: **Make low-level inferences to organize, make summary calculations, and represent data**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Calculate the average age of students in class			●	●	
Identify peak production periods by interpreting a line graph	●				
Collect data and create a bar graph to represent classmates' food preferences			●	●	
Compare employment rates among graduates from different college programs		●	●	●	●
Interpret a pie graph to identify election results	●		●	●	●
Estimate how much stock to order based on last year's sales	●				

<table>
<tr><td>**C4.3**</td><td>Competency C:
Understand and Use Numbers</td><td></td></tr>
<tr><td></td><td>Task Group C4:
Manage data</td><td>Level **3**</td></tr>
</table>

At this level, learners:
Find, integrate, and analyze data; identify trends in data

Performance Descriptors	Task Descriptors
The learner:	Scope of task may not be clearly defined
Calculates using numbers expressed as whole numbers, fractions, decimals, percentages, and integers	May include unfamiliar elements (e.g. context, content)
Manages unfamiliar elements (e.g. context, content) to complete tasks	May require two or more operations; operations must be inferred
Makes estimates involving many factors where precision is required	Requires multiple steps to complete
Begins to recognize bias in data and in displays, such as graphs	Has many options to complete; does not have a set procedure
Calculates and interprets summary measures (e.g. mean, median, mode)	May require calculating rates
Calculates percent change	May involve documents (e.g. tables, graphs)
Applies statistics (e.g. population change, growth rates)	May require converting between whole numbers, decimals, percentages, ratios, and fractions
Chooses and performs required operations; makes inferences to identify required operations	
Selects appropriate steps to solutions from among options	
Interprets, represents, and converts values using whole numbers, decimals, percentages, ratios, and fractions	
Identifies a variety of ways to complete tasks	
Finds, integrates, and analyses data	
Organizes and represents numerical information (e.g. tables, graphs)	
Makes predictions using data; identifies trends	
Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)	

Examples of tasks learners can do at the end of Level 3: **Find, integrate, and analyze data; identify trends in data**					
Tasks	**E**	**A**	**SS**	**PS**	**I**
Collect and interpret income data across several occupations to establish an employment goal		●	●	●	●
Monitor a child's growth over time using weight and height percentiles	●				●
Predict which sports team will win the championship using team and player statistics					●
Calculate the percent change in a population over a given time period	●		●	●	
Estimate expected household internet data usage for the next year, taking into account previous patterns of use and changing family needs					●