

TEACHER AND STUDENT RESOURCE

Function Notation in Context



NC Math 1 • NC.M1.F-IF.2

Interpreting Functions

Seven instructional sections with 30 multiple-choice and 30 open or performance tasks, teaching scripts, original mathematical visuals, generous workspaces, and worked keys.

Free sample | Contents

NC.M1.F-IF.2 | NC Math 1 mathematics

This sample contains 19 complete selected pages from the 97-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-15, 30-31, 60, 75

Representative activities

M01: sample PDF page(s) 16; original page(s) 15

M02: sample PDF page(s) 16; original page(s) 15

O01: sample PDF page(s) 17; original page(s) 30

O02: sample PDF page(s) 18; original page(s) 31

Selected teacher prompts and keys: original page(s) 60, 75

Using this sample

Read the preparation and access guidance before using a selected activity.

Keep teacher keys and private preparation pages separate from student copies.

Use the original resource contents to see the scope of the complete packet.

Complete paid download

The complete resource includes the full PDF task bank and teaching materials.

ALIGNMENT

Standard and learning targets

Use function notation to evaluate linear, quadratic, and exponential functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

T1 Evaluate linear functions at allowed inputs.

T2 Evaluate quadratic functions at allowed inputs.

T3 Evaluate exponential functions at allowed inputs.

T4 Interpret function statements with units and domain restrictions.

Each item names its own target. The bank supports multiple sessions; do not assign all 60 tasks in one sitting.

NAVIGATION

Choose evidence deliberately

Warm-up: M01-M04 and O01-O04

I Do: M05-M08 and O05-O08

We Do: M09-M13 and O09-O13

Collaborative practice: M14-M18 and O14-O18

Independent practice: M19-M23 and O19-O23

Small-group reteach: M24-M27 and O24-O27

Exit ticket: M28-M30 and O28-O30

T1: M01, M05, M07, M11, M13, M17, M19, M23, M25, M29, O01, O05, O07, O11, O13, O17, O19, O23, O25, O29

T2: M02, M08, M14, M20, M26, O02, O08, O14, O20, O26

T3: M03, M09, M15, M21, M27, O03, O06, O09, O12, O15, O18, O21, O24, O27, O30

T4: M04, M06, M10, M12, M16, M18, M22, M24, M28, M30, O04, O10, O16, O22, O28

DAILY LEARNING TARGETS

A multi-session teaching path

Session 1: identify and interpret

Learning target: Evaluate linear functions at allowed inputs.

Learning target: Evaluate quadratic functions at allowed inputs.

Warm-up, I Do and selected We Do tasks. Use the model as explicit instruction; preserve a first independent response.

Session 2: represent and connect

Learning target: Evaluate quadratic functions at allowed inputs.

Learning target: Evaluate exponential functions at allowed inputs.

Learning target: Interpret function statements with units and domain restrictions.

Selected We Do and collaborative tasks. Ask partners to compare representations and justify domains.

Session 3: apply independently

Learning target: Evaluate linear functions at allowed inputs.

Learning target: Evaluate quadratic functions at allowed inputs.

Learning target: Evaluate exponential functions at allowed inputs.

Learning target: Interpret function statements with units and domain restrictions.

Select independent tasks spanning all targets; retain first responses. Reteach one evidenced gap, then collect a fresh exit task.

PLANNING

Materials, access and pacing

Materials

Pencils, erasers, straightedge, student pages, and optional graph paper. A calculator may support arithmetic after a learner states the intended relationship. No device or paid software is required.

Prerequisites

Check ordered-pair order, integer arithmetic, exponents, axis scales, and the meaning of input and output. Teach missing prerequisites before collecting independent evidence.

Pacing

Use a short diagnostic warm-up, a model and shared task in one session; collaborative and independent reasoning in later sessions; then targeted reteaching and an exit task. Select two to four tasks at a time based on evidence. Each section's full bank is reusable, not mandatory in one lesson.

Neutral access

Read directions aloud without interpreting the graph, enlarge a page, supply a writing or pointing response method, and allow a learner to dictate an explanation. Keep axes, units, data and mathematical demand unchanged.

Separate instruction from evidence

Keep the learner's first response. Record answer-supplying cues separately from access supports. A completed teacher graph or worked key is for discussion after independent work, never a student construction template.

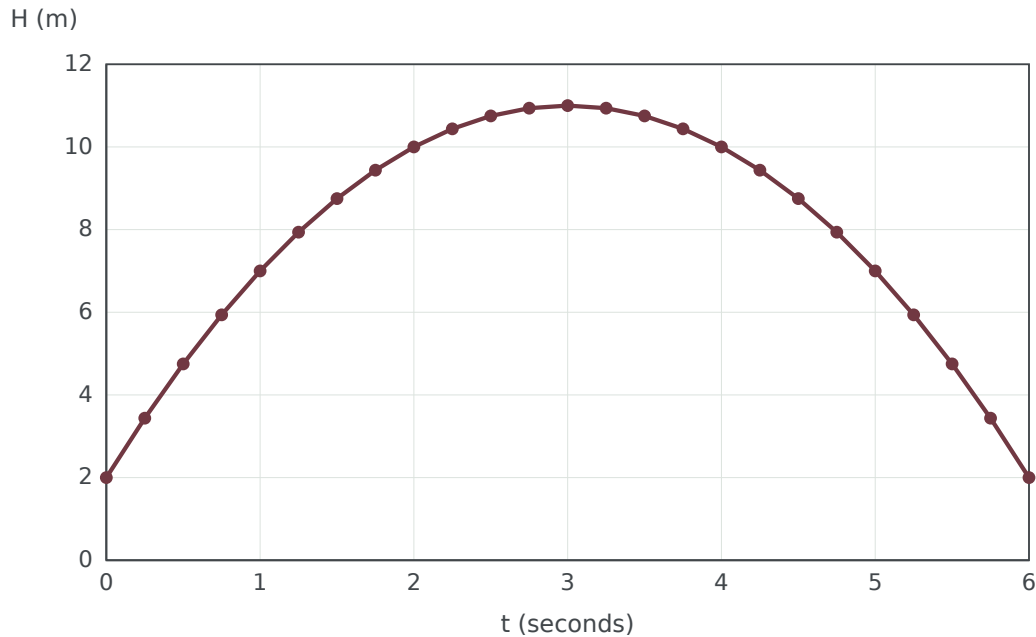
Review convention

A function assigns exactly one output to each allowed input. A repeated output is permitted. Finite lists contain only the points stated; connect points only when the stated model includes all intervening real inputs. Parentheses in $f(x)$ mark an input, not multiplication.

TEACHER MODEL

Read the input before computing

A model gives ball height $H(t) = -t^2 + 6t + 2$ meters for $0 \leq t \leq 6$ seconds. Evaluate $H(2)$, interpret it, and explain why $H(8)$ is outside the model.



Substitute the whole input: $H(2) = -(2^2) + 6(2) + 2 = -4 + 12 + 2 = 10$. The ball is 10 meters high at 2 seconds. $H(8)$ is outside $0 \leq t \leq 6$; algebra can produce -14, but this is not a model prediction in the stated domain.

REUSABLE REASONING GUIDE

Represent, justify, interpret

Name: _____ Date: _____

Givens, quantities and restrictions**Representation and calculation****Justification or check****Conclusion, domain and units**

WARM-UP

Teaching script

Core: 001 • T1: Evaluate linear functions at allowed inputs.

Optional bank: M01–M04; O01–O04. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O01, including its graph when present. Invite a first independent response before discussion. Ask, “What do the symbols represent? What evidence supports your claim?”

Core task

A workshop charges $W(p)=7p+12$ dollars for p participants, where p is a whole number from 0 to 20. Find $W(3)$ and $W(0)$. Show substitutions and explain both results with units.

Teacher solution and discussion

$W(3)=7(3)+12=33$ dollars for 3 participants. $W(0)=12$ dollars is the fixed charge with no participants. Both inputs are whole numbers in $[0,20]$.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M01 to compare all alternatives after evidence is collected.

I DO

Teaching script

Core: 005 • T1: Evaluate linear functions at allowed inputs.

Optional bank: M05–M08; O05–O08. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–12 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O05, including its graph when present. Think aloud through the core task. Say, “I will identify the quantities first, then build a representation and check it against the stated domain.” Hide the worked key until after predictions.

Core task

Ticket revenue is $R(n)=8n$ dollars for whole-number ticket counts $0 \leq n \leq 100$. Find $R(8)$, then find n such that $R(n)=96$. Interpret the difference between finding $R(8)$ and solving $R(n)=96$.

Teacher solution and discussion

$R(8)=8(8)=64$ dollars. Solve $8n=96$ to get $n=12$ tickets. The first task gives the input and asks for output; the second gives output and asks for input. Both counts are in the domain.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M05 to compare all alternatives after evidence is collected.

WE DO

Teaching script

Core: 009 • T3: Evaluate exponential functions at allowed inputs.

Optional bank: M09–M13; O09–O13. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O09, including its graph when present. Have learners propose the next step, then ask a partner to verify it using the original representation. Record more than one valid explanation.

Core task

A sample has mass $M(t) = 192(1/2)^t$ grams for $t \geq 0$ hours. Find $M(0)$ and $M(2)$, and interpret each. Is the exponent a multiplier on t ? Explain.

Teacher solution and discussion

$M(0) = 192 \cdot 1 = 192$ g initially. $M(2) = 192/2^2 = 48$ g after 2 hours. The exponent represents repeated factors of $1/2$ for whole-number hours, not multiplication by t .

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M09 to compare all alternatives after evidence is collected.

COLLABORATIVE PRACTICE

Teaching script

Core: O14 • T2: Evaluate quadratic functions at allowed inputs.

Optional bank: M14–M18; O14–O18. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O14, including its graph when present. Assign reader, representer, checker and explainer roles. Each learner first makes a private prediction; compare reasoning and resolve differences with the data.

Core task

For $q(x)=2x^2-6x+3$, domain all real numbers, calculate $q(5)$ and $q(-5)$. Explain why these outputs need not be equal.

Teacher solution and discussion

$q(5)=2(5)^2-6(5)+3=23$. $q(-5)=2(25)+30+3=83$. The square terms match, but the linear term changes sign. Both inputs belong to the domain.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M14 to compare all alternatives after evidence is collected.

INDEPENDENT PRACTICE

Teaching script

Core: O19 • T1: Evaluate linear functions at allowed inputs.

Optional bank: M19–M23; O19–O23. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 15–20 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O19, including its graph when present. Provide the printed task and neutral access supports. Preserve the first independent response; do not point to the requested answer or select a method for the learner.

Core task

A workshop charges $W(p)=10p+18$ dollars for p participants, where p is a whole number from 0 to 20. Find $W(6)$ and $W(0)$. Show substitutions and explain both results with units.

Teacher solution and discussion

$W(6)=10(6)+18=78$ dollars for 6 participants. $W(0)=18$ dollars is the fixed charge with no participants. Both inputs are whole numbers in $[0,20]$.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M19 to compare all alternatives after evidence is collected.

SMALL-GROUP RETEACH

Teaching script

Core: O24 • T3: Evaluate exponential functions at allowed inputs.

Optional bank: M24–M27; O24–O27. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 10–15 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O24, including its graph when present. Start with the learner's prior evidence. Rebuild one representation with explicit terms and operations, then use a fresh item to check transfer without the prior cue.

Core task

A sequence of designs has $N(k)=6 \cdot 3^k$ tiles, for stages $k=0,1,\dots,5$. Make a table for every allowed stage, graph $y=N(k)$ using approximate vertical positions, and interpret $N(5)$. Explain whether $N(1.5)$ describes an allowed stage.

Teacher solution and discussion

Table/graph: $\{(0, 6), (1, 18), (2, 54), (3, 162), (4, 486), (5, 1458)\}$. $N(5)=6 \cdot 3^5=1458$ tiles at stage 5. Use discrete points; the table gives exact values and vertical placement may be approximate at this scale. 1.5 is not a whole-number stage in the domain. The algebraic extension does not add stages to this context.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M24 to compare all alternatives after evidence is collected.

EXIT TICKET

Teaching script

Core: 028 • T4: Interpret function statements with units and domain restrictions.

Optional bank: M28–M30; O28–O30. Select tasks across more than one meeting if needed.

Suggested discussion/work time: 5–8 minutes. Adjust for access and evidence; this is not a speed criterion.

Display student page O28, including its graph when present. Ask for a concise claim supported by the representation. Collect the response before sharing a solution; use it to choose the next instructional step.

Core task

$V(t)$ is water volume in liters at t minutes after drainage begins, with $0 \leq t \leq 19$. Interpret $V(14)=80$ and $V(16)=72$. Write a statement for “at 18 minutes, 67 liters remain.” Explain whether either given value is a rate.

Teacher solution and discussion

At 14 minutes, 80 L remain; at 16 minutes, 72 L remain. The new statement is $V(18)=67$. These values are volumes at times, not liters per minute. All named times belong to the stated domain.

Evidence and response

Look for a claim tied to allowed inputs, assigned outputs, function notation or graph features. If a learner only names an answer, ask which values or parts of the graph support it. If input and output are reversed, trace one ordered pair from its horizontal coordinate to its vertical coordinate, then collect a fresh response. A selected option alone does not identify a unique misconception.

Closure: Ask learners to state one feature they verified and one check they used. Use the worked key for M28 to compare all alternatives after evidence is collected.

MULTIPLE-CHOICE BANK

M01 / M02 • Select and justify**M01 | Warm-up | T1****A rental costs $C(h)=3h+7$ dollars for $0 \leq h \leq 12$ hours. Find $C(2)$.**

- A. 10
- B. 13
- C. -1
- D. 6

Reasoning: _____

M02 | Warm-up | T2**For $f(x)=x^2+3x+5$, with all real inputs allowed, evaluate $f(-3)$.**

- A. 14
- B. 23
- C. 41
- D. 5

Reasoning: _____

WARM-UP

001 • Show your reasoning

T1: Evaluate linear functions at allowed inputs.

A workshop charges $W(p)=7p+12$ dollars for p participants, where p is a whole number from 0 to 20. Find $W(3)$ and $W(0)$. Show substitutions and explain both results with units.

Representation / calculation

Explanation / check

WARM-UP

002 • Show your reasoning

T2: Evaluate quadratic functions at allowed inputs.

**For $q(x)=2x^2-4x+1$, domain all real numbers, calculate $q(3)$ and $q(-3)$.
Explain why these outputs need not be equal.**

Representation / calculation

Explanation / check

WORKED TEACHER KEYS

M01 / M02**M01 • T1: Evaluate linear functions at allowed inputs.****Answer: B. 13** $C(2)=3\times 2+7=13$: renting for 2 hours costs \$13.**Check each alternative**

- A. Adds the hourly rate and fixed fee without applying the hour input. This calculation produces 10.
- B. $3(2)+7=13$.
- C. Subtracts the fixed fee instead of adding it. This calculation produces -1.
- D. Omits the fixed fee after calculating the hourly charge. This calculation produces 6.

M02 • T2: Evaluate quadratic functions at allowed inputs.**Answer: D. 5** $f(-3)=(-3)^2+3(-3)+5=9+(-9)+5=5$.**Check each alternative**

- A. Omits the linear term. This calculation produces 14.
- B. Uses the positive input instead of the specified negative input. This calculation produces 23.
- C. Squares the input in the linear term as well as in the quadratic term. This calculation produces 41.
- D. Square the entire negative input, then multiply the linear term.

WORKED TEACHER KEYS

001 / 002**001 • T1: Evaluate linear functions at allowed inputs.**

$W(3)=7(3)+12=33$ dollars for 3 participants. $W(0)=12$ dollars is the fixed charge with no participants. Both inputs are whole numbers in $[0,20]$.

002 • T2: Evaluate quadratic functions at allowed inputs.

$q(3)=2(3)^2-4(3)+1=7$. $q(-3)=2(9)+12+1=31$. The square terms match, but the linear term changes sign. Both inputs belong to the domain.