



• PREVIEW

SAMPLE · 8 OF 125 PAGES

GRADE 8 MATHEMATICS · COMPLETE UNIT

Comparing *Function* Representations

A 125-page print-and-teach unit bridging tables, graphs, equations, and verbal descriptions — built for CCSS 8.F standards.

125

PAGES

155

PROBLEMS

12WORKED
EXAMPLES**4**

REPRESENTATIONS

5CCSS
STANDARD

CCSS ALIGNED

8.F.A.1

8.F.A.2

8.F.A.3

8.F.B.4

8.F.B.5

This preview contains selected pages from the full unit. Full answer keys, all 155 problems, and complete worked solutions are included in the paid download.

*Print &
teach.*

Unit Overview & How to Use This Resource

CCSS: 8.F.A.1, 8.F.A.2, 8.F.A.3, 8.F.B.4, 8.F.B.5

Comparing Function Representations is a complete Grade 8 mathematics unit that develops student fluency in translating among the four representations of a linear function — tables, graphs, equations, and verbal descriptions — and then extends that fluency to function comparison and the recognition of non-linear functions. The unit is fully aligned to the Common Core State Standards for Grade 8 Functions (8.F.A.1 through 8.F.B.5) and is designed for approximately 5–7 instructional days.

This resource is built for both student use and teacher use. Students work through guided notes, worked examples, and progressively structured practice sets; teachers receive full answer keys with complete worked solutions for every problem, plus ready-to-administer quiz and test papers with point values and grading scales. Every section is explicitly labelled with the CCSS standard(s) it addresses so that lesson planning, standards alignment documentation, and observation rubrics are straightforward.

Unit at a Glance

Topic	CCSS	Problems	Suggested Pacing
Topic 1: The Four Representations	8.F.A.1, 8.F.A.2	35-problem drill	~1.5 days
Topic 2: Identifying Key Characteristics	8.F.B.4	30-problem set	~1.5 days
Topic 3: Comparing Two Functions	8.F.A.2	25-problem activity	~1 day
Topic 4: Non-Linear Functions	8.F.A.3, 8.F.B.5	15-problem set	~1 day
Cumulative Review	All 5	20-problem review	~0.5 day
Unit Quiz	All 5	10 Q / 50 pts	30 min
Comprehensive Unit Test	All 5	20 Q / 100 pts	60 min

What's Included

This single resource includes everything needed to teach, practice, and assess the unit:

- **Guided Notes (4 sets)** — Fill-in-the-blank notes with visual four-representation translation diagrams, key definitions, and worked mini-examples for each topic.
- **Worked Examples (12+ examples)** — Fully annotated worked examples showing every extraction step, every arithmetic step, and complete construction of $y = mx + b$.

Given (verbal): A water tank starts with 12 liters of water and drains at a rate of 2 liters per minute. Let x = minutes since draining started, y = liters of water remaining.

Step 1 — Identify the initial value b .

'Starts with 12 liters' means when $x = 0$, $y = 12$. So $b = 12$.

Step 2 — Identify the rate of change m .

'Drains at 2 liters per minute' means y decreases by 2 each minute. So $m = -2$ (negative because the quantity is decreasing).

Step 3 — Write the equation.

$$y = -2x + 12 \leftarrow \text{equation form}$$

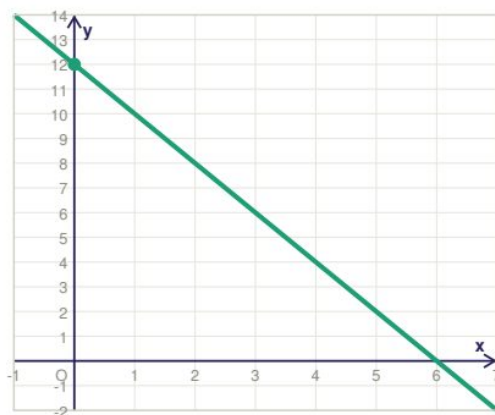
Step 4 — Build a table of values.

Substitute $x = 0, 1, 2, 3, 4, 5, 6$ into $y = -2x + 12$:

0	1	2	3	4	5	6
12	10	8	6	4	2	0

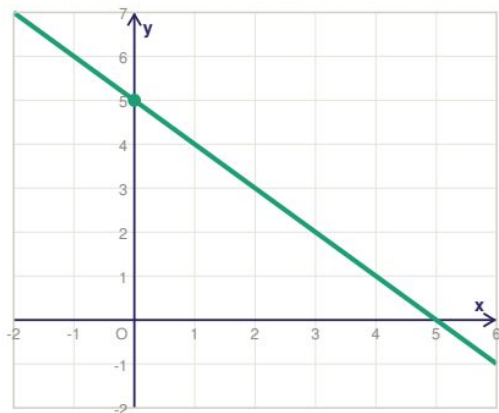
Step 5 — Sketch the graph.

Plot (0, 12) for the y -intercept, then use slope -2 (down 2, right 1): (1, 10), (2, 8), (3, 6), (4, 4), (5, 2), (6, 0).

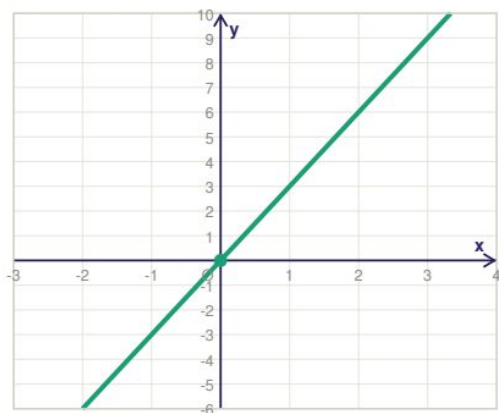


Example 3 — From GRAPH to Equation, Table & Words

29. The graph of a linear function is shown. Find the equation and write a verbal description.



30. The graph of a linear function is shown. Find the equation and write a verbal description.



31. The graph of a linear function is shown. Find the equation and write a verbal description.

Given: A linear function represented by the table below.

0	1	2	3	4
-2	1	4	7	10

Step 1 — Find the slope m .

Pick two rows. Using (0, -2) and (1, 1):

$$m = (y_2 - y_1) / (x_2 - x_1) = (1 - (-2)) / (1 - 0) = 3 / 1 = 3$$

Check with another pair: $(7 - 4) / (3 - 2) = 3 / 1 = 3$ ✓

Step 2 — Find the y-intercept b .

Look at the y-value when $x = 0$: the table shows $y = -2$ when $x = 0$, so $b = -2$.

Step 3 — Construct $y = mx + b$.

Substitute $m = 3$ and $b = -2$:

$$y = 3x + (-2), \text{ which simplifies to } y = 3x - 2.$$

Verification: Substitute $x = 4$ into the equation: $y = 3(4) - 2 = 12 - 2 = 10$. Matches the table ✓

Example 2 — Extracting m and b from a GRAPH

25. Find m and b . Write in $y = mx + b$ form if not already.

Given: $y = -x + 7$

26. Find m and b . Write in $y = mx + b$ form if not already.

Given: $y = 6x$

27. Find m and b . Write in $y = mx + b$ form if not already.

Given: $y = -3x - 4$

28. Find m and b . Write in $y = mx + b$ form if not already.

Given: $y = 2$

29. Find m and b . Write in $y = mx + b$ form if not already.

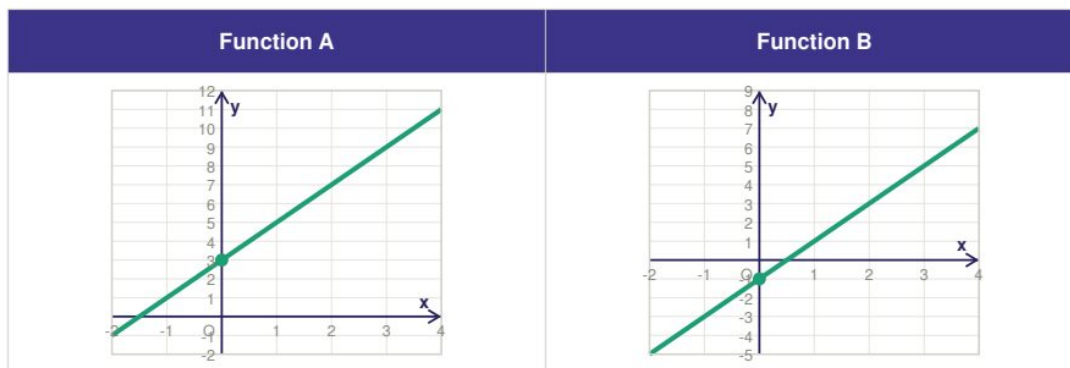
Given: $y = x - 9$

30. Find m and b . Write in $y = mx + b$ form if not already.

Given: $y = (2/3)x + 1$



12.



Extract m and b for each, build a comparison table, and write a complete conclusion statement.

13.

Function A	Function B
$y = -2x + 5$	$y = -2x - 3$

Extract m and b for each, build a comparison table, and write a complete conclusion statement.

14.

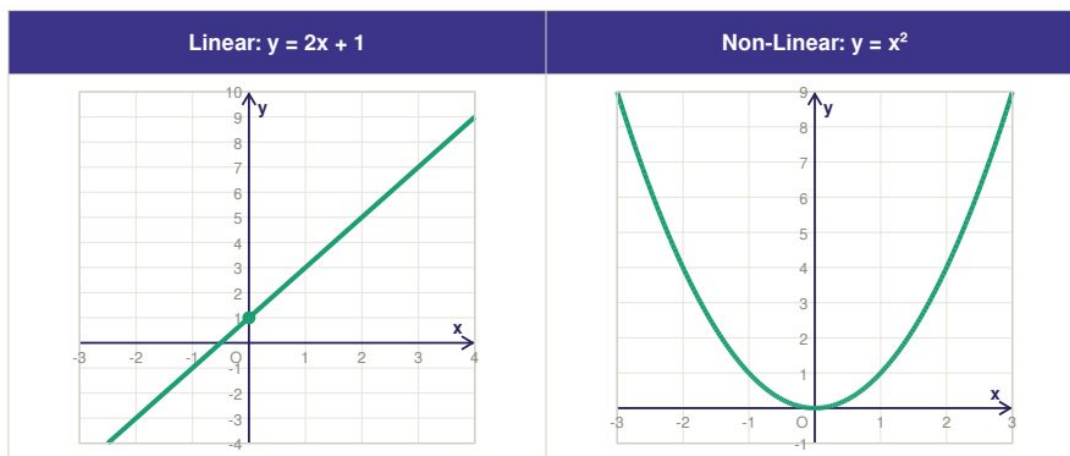
Function A	Function B
Start at 4, add 3 for each unit increase in x .	Start at 4, subtract 2 for each unit increase in x .

Extract m and b for each, build a comparison table, and write a complete conclusion statement.

Table	The first differences of y (consecutive y -value changes) are ALL EQUAL. Equally-spaced x -values produce equally-spaced y -values — constant rate of change.	The first differences of y are NOT all equal. Equally-spaced x -values produce unequally-spaced y -values — the rate of change is changing.
Graph	The graph is a STRAIGHT LINE. Every pair of points on the line has the same slope.	The graph is CURVED (not a straight line). Different pairs of points have different slopes.

Visual Examples: Linear vs. Non-Linear

The two graphs below show a linear function ($y = 2x + 1$) and a non-linear function ($y = x^2$), both displayed in the same coordinate window. Notice that the linear function is a straight line while the non-linear function is a curve (a parabola).



KEY INSIGHT — Linear vs. Non-Linear Growth

Linear functions grow at a **constant rate**: every unit increase in x adds the same amount (m) to y . The graph is a straight line; doubling x doubles the change in y .

Non-linear functions grow at a **changing rate**: the amount added to y per unit of x changes as x grows. Quadratic functions ($y = x^2$) grow **faster and faster**; inverse functions ($y = 1/x$) shrink; exponential functions ($y = 2^x$) grow explosively after a slow start.

For large x , a non-linear function with positive growth will eventually exceed any linear function — no matter how large the linear function's slope. This is why non-linear functions model things like compound interest, population growth, and projectile motion.

TRY IT — Fill in the Blanks

Solution 17

$y = -4x + 40$ (slope = -4 gallons/min, y-intercept = 40 gallons). Table: (0, 40), (5, 20), (10, 0). Slope $m = -4$ means 4 gallons drain per minute. y-intercept $b = 40$ means the tub starts with 40 gallons. The tub is empty at $x = 10$ minutes.

Solution 18

Plan A: $y = 0.10x + 20$. Plan B: $y = 0.25x$. Set equal: $0.10x + 20 = 0.25x \rightarrow 20 = 0.15x \rightarrow x = 20/0.15 \approx 133.33$. At about 133 texts, the two plans cost the same. For fewer texts, Plan B is cheaper; for more texts, Plan A is cheaper.

Solution 19

First differences: $2-1=1$, $4-2=2$, $8-4=4$, $16-8=8$. The first differences (1, 2, 4, 8) are NOT all equal — they double each time. NON-LINEAR (this is exponential: $y = 2^x$). When $x = 5$, $y = 2^5 = 32$ (continuing the doubling pattern).

Solution 20

Table: $x=0 \rightarrow A=0$, $B=1$; $x=1 \rightarrow A=3$, $B=3$; $x=2 \rightarrow A=6$, $B=9$; $x=3 \rightarrow A=9$, $B=27$; $x=4 \rightarrow A=12$, $B=81$; $x=5 \rightarrow A=15$, $B=243$. For $x=0$, 1: similar values. Starting at $x=2$, the non-linear function $y = 3^x$ grows much faster than $y = 3x$. By $x=5$, $y = 3x$ gives 15 while $y = 3^x$ gives 243. The non-linear function (exponential) eventually dominates because exponentials grow far faster than linear functions.

Unit Quiz

CCSS: 8.F.A.1, 8.F.A.2, 8.F.A.3, 8.F.B.4, 8.F.B.5

Unit Quiz — Comparing Function Representations

Grade 8 Mathematics · 50 points total · 30 minutes

Name: _____	Date: _____	Score: _____ / 50	Time: 30 min
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CCSS Alignment: 8.F.A.1, 8.F.A.2, 8.F.A.3, 8.F.B.4, 8.F.B.5. Show all work for full credit.

Section 1 — Multiple Choice (3 pts each = 9 pts)

1. 3 Which of the following is NOT one of the four representations of a linear function?

pts

(A) Table (B) Graph (C) Equation (D) Fraction





WHAT'S INSIDE THE COMPLETE UNIT

The Complete 125-page Unit

Comparing Function Representations | Grade 8 Mathematics | CCSS 8.F

125

PAGES

155

PROBLEMS

12+

WORKED EXAMPLES

4

TOPICS

5

CCSS STANDARDS

CCSS ALIGNMENT

8.F.A.1

8.F.A.2

8.F.A.3

8.F.B.4

8.F.B.5

FOUR TOPIC PROGRESSIONS

TOPIC 01

THE FOUR REPRESENTATIONS

35-problem drill

Tables, graphs, equations, and verbal descriptions.

TOPIC 02

KEY CHARACTERISTICS

30-problem set

Rate of change and initial value from representations.

TOPIC 03

COMPARING TWO FUNCTIONS

25-problem activity

Compare two functions in different representations.

TOPIC 04

NON-LINEAR FUNCTIONS

15-problem set

Identify and justify linear vs. non-linear functions.

ALSO INCLUDED IN THE FULL PDF

Guided Notes

4 sets of fill-in-the-blank guided notes with visual translation support.

Cumulative Review

20 mixed problems spanning the four topic areas.

Comprehensive Unit Test

20 questions | 100 points | 60 minutes | grading scale.

Worked Examples

12+ annotated examples with translation and extraction steps.

Unit Quiz

10 questions | 50 points | 30 minutes | grading scale.

Teacher Answer Keys

Full solutions and worked answers for the unit practice and assessments.