

MATHEMATICS INSTRUCTIONAL PACKET

Systems, graphs and shared solutions



Grade 8 • NC.8.EE.8

Teacher guide • 30 multiple-choice tasks • 30 open and performance tasks • worked keys • observation tools

A reusable bank for instruction across multiple sessions. Select a purposeful subset each day; this is not a single-sitting test.

Free sample | Contents

NC.8.EE.8 | Eighth Grade mathematics

This sample contains 18 complete selected pages from the 91-page resource, plus this sample contents page. Original printed page numbers are retained. Gaps are intentional.

Included original pages: 1-14, 29-30, 59, 74

Representative activities

M01: sample PDF page(s) 15; original page(s) 14

M02: sample PDF page(s) 15; original page(s) 14

O01: sample PDF page(s) 16; original page(s) 29

O02: sample PDF page(s) 17; original page(s) 30

Selected teacher prompts and keys: original page(s) 59, 74

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.

TEACHER GUIDE

Standard and learning targets

Analyze and solve a system of two linear equations in two variables in slope-intercept form.

- Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously.
- Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.

Learning targets

Interpret a system solution as a point satisfying both equations.

Solve slope-intercept systems by graphing.

Use inspection for simple systems and distinguish solution cases.

Model and solve contextual problems using two lines.

The seven sections move from activation to independent evidence. Each task states its own target. Recognition tasks complement, but do not replace, the open performances.

TEACHER GUIDE

Plan the learning

Prerequisites

Plot ordered pairs, interpret slope and intercept, substitute into equations, and use consistent axis scales.

Materials and pacing

Pencil, ruler and two colors; supplied grids. An accessible graphing tool may replace hand plotting, but retain both graphs and the intersection check. No paid software required.

Use 3–5 sessions as needed: launch and model; guided and collaborative reasoning; independent transfer; targeted reteaching and exit evidence. Each section offers a bank, not a requirement to complete every item at once.

Access and differentiation

Read directions aloud, enlarge print, allow a scribe for dictated reasoning, or provide an accessible graphing surface. Keep the mathematical demand unchanged. Permit a calculator when computation is not the intended evidence; record its use. Preserve an independent first response before giving a worked example.

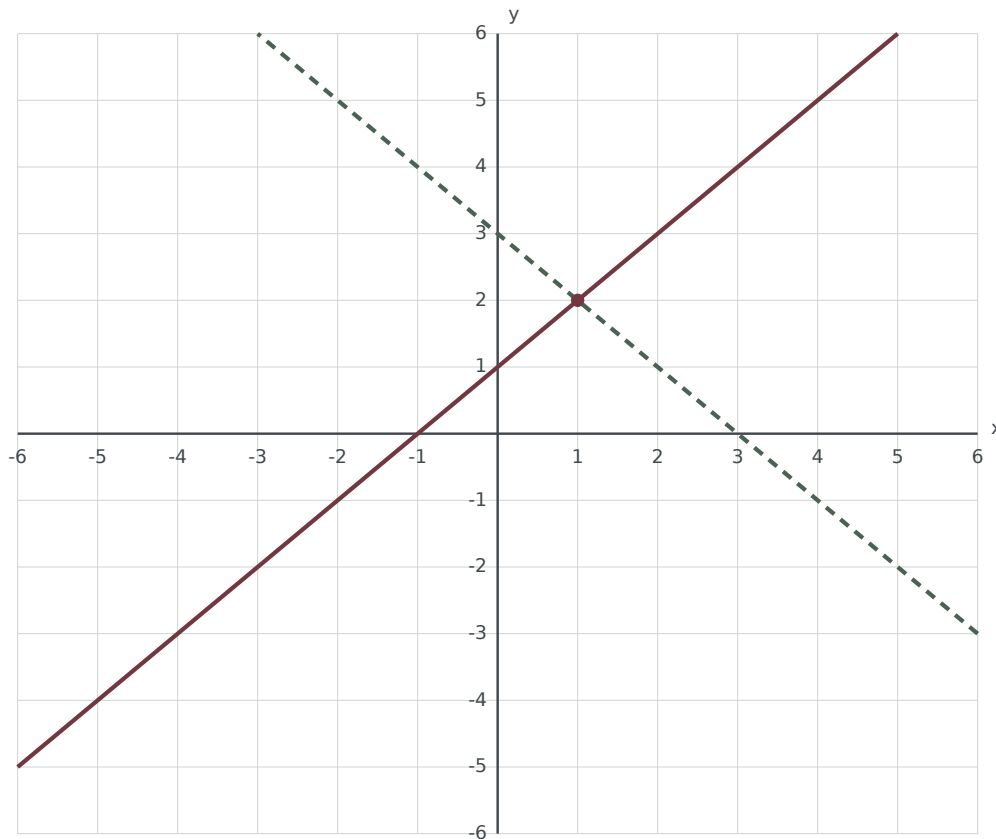
For extension, ask students to create a related case with a changed outcome and prove why it changes. For reteaching, return to the specific representation or operation that broke down, then use a fresh item.

Allocation in EACH bank: warm-up 01–04; I Do 05–08; We Do 09–13; collaborative 14–18; independent 19–23; small-group 24–27; exit 28–30.

TEACHER GUIDE

Worked teacher model

For $y = x + 1$ and $y = -x + 3$, plot $(0,1)$, $(1,2)$, $(2,3)$ on the first line and $(0,3)$, $(1,2)$, $(2,1)$ on the second. Draw each straight line through its points. Their intersection is $(1,2)$. Check: $2 = 1 + 1$ and $2 = -1 + 3$. Both equations hold at the same ordered pair. A point on only one line is not a system solution.



Solid burgundy: first equation. Dashed green: second equation.

TEACHER GUIDE

Reasoning anchor

At a crossing, one ordered pair belongs to both graphs. Distinct parallel lines have no shared point. Coincident lines have every point on that line in common, so there are infinitely many ordered-pair solutions (not every point in the plane).

Use slope and intercept to plot at least two points per line. Label axes and scales. If the intersection falls outside a window, enlarge the window; a blank window alone does not prove no solution.

Ask before accepting an answer

Does the intersection satisfy BOTH original equations? Are x and y in the correct order? Do the graphed slopes and intercepts match? Does a contextual domain rule out an otherwise valid intersection?

Instructional decision

Ask the learner to explain one decisive step. A selected option alone does not establish a unique misconception. Use the worked option checks to choose a follow-up question, not to label a learner.

STUDENT REPRODUCIBLE

Reusable reasoning organizer

Name: _____ Date: _____

Givens, quantities and units**Representation or calculation****Justification and check****Conclusion in the problem context**

TEACHER GUIDE

Warm-up teaching script

Bank: M01–M04 and O01–O04. Core task: O01. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Find and verify a shared ordered pair.

Say: “Show what each symbol and quantity represents before calculating.” Allow a private attempt, then compare two explanations. Ask which prior idea makes the first step legal. Keep the first attempt as baseline evidence.

Core task to use

Graph $y = x + 1$ and $y = -x + 3$. Plot at least two points on EACH line, label the lines, mark their intersection, and substitute the intersection into both equations.

Teacher solution and discussion

Intersection (1, 2). First line: (0,1), (2,3). Second: (0,3), (2,1). At $x=1$, both produce $y=2$. The shared point satisfies both simultaneously.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

I Do teaching script

Bank: M05–M08 and O05–O08. Core task: O05. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Explain simultaneous satisfaction.

Say: “Watch me represent the givens and explain each change.” Work the core problem below aloud, including its check. Pause before the final conclusion and ask students to predict its size or form. Have students annotate why each step preserves the situation.

Core task to use

For $y = \frac{1}{2}x + 1$ and $y = -\frac{1}{2}x + 3$, examine the first line’s y-intercept (0,1) and the intersection you obtain by graphing. Check each candidate in both equations and explain the difference.

Teacher solution and discussion

(0,1) satisfies the first equation; the second gives 3, so it is not a shared solution. The graph intersection (2,2) satisfies both: each yields 2 at $x=2$. A point on one graph alone is insufficient.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

We Do teaching script

Bank: M09–M13 and O09–O13. Core task: O09. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Interpret a system with a contextual domain.

Say: “You choose the next step; I will record and question it.” Invite two approaches to the core task. Ask the class to test a disputed step with the original quantities, then complete another task without copying the model.

Core task to use

Service A costs $y = x + 2$; B costs $y = 2x + 4$. Here x is a nonnegative number of hours. Graph the full lines, identify their mathematical intersection, then decide whether the services have equal costs for an allowed time.

Teacher solution and discussion

Full-line intersection $(-2, 0)$. At $x = -2$ both $y = 0$. Negative hours are outside $x \geq 0$, so there is no equal-cost time in context. The algebraic solution remains valid for the unrestricted system.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

Collaborative practice teaching script

Bank: M14–M18 and O14–O18. Core task: O14. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Analyze the solution set of a system.

Assign partners as solver and verifier, then switch roles. Say: “The verifier must use the original problem, not just repeat the solver’s steps.” Compare representations and require a shared explanation of any disagreement before moving on.

Core task to use

Graph both equations $y = -x$ and $y = -x$. State the solution set and give two example solutions. Is every point in the plane a solution? Explain.

Teacher solution and discussion

The graphs coincide. Solutions are all $(x, -x)$ for real x . Examples $(0,0)$ and $(1,-1)$. Not every plane point is on this line: $(0,1)$ fails both.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

Independent practice teaching script

Bank: M19–M23 and O19–O23. Core task: O19. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Interpret a system with a contextual domain.

Give a quiet first attempt without answer-supplying hints. Say: “Choose a representation, show your reasoning and check your conclusion.” Record what students can produce independently, then discuss after collecting first responses.

Core task to use

Service A costs $y = x + 3$; B costs $y = 2x + 5$. Here x is a nonnegative number of hours. Graph the full lines, identify their mathematical intersection, then decide whether the services have equal costs for an allowed time.

Teacher solution and discussion

Full-line intersection $(-2, 1)$. At $x = -2$ both $y = 1$. Negative hours are outside $x \geq 0$, so there is no equal-cost time in context. The algebraic solution remains valid for the unrestricted system.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

Small-group reteach teaching script

Bank: M24–M27 and O24–O27. Core task: O24. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Analyze the solution set of a system.

Use earlier evidence to select a precise gap. Say: “Let us make the meaning visible, then reconnect it to symbols.” Contrast a valid step with one proposed by a learner; test both. Give a fresh bank item after the supported model and label that evidence separately.

Core task to use

Graph both equations $y = 2x + 1$ and $y = 2x + 1$. State the solution set and give two example solutions. Is every point in the plane a solution? Explain.

Teacher solution and discussion

The graphs coincide. Solutions are all $(x, 2x + 1)$ for real x . Examples $(0, 1)$ and $(1, 3)$. Not every plane point is on this line: $(0, 2)$ fails both.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

TEACHER GUIDE

Exit ticket teaching script

Bank: M28–M30 and O28–O30. Core task: O28. Suggested focus: 10–20 minutes; adjust for evidence.

Target: Solve a simple system by inspection.

Ask for an individual response and a short check. Say: “Explain why your result fits the original problem.” Collect the work before discussing answers. Use the result to select the next lesson, rather than treating one item as a final mastery judgment.

Core task to use

Without graphing first, solve $y = 2x + 3$ and $y = -x + 3$ by inspection. Explain what you notice, then sketch both graphs to confirm and check both equations.

Teacher solution and discussion

Both have y-intercept 3, so $(0,3)$ solves both. Slopes 2 and -1 differ, hence the graphs intersect only once. Substitution gives $y=3$ in each.

Evidence and response

Look for the representation, justified steps and contextual conclusion requested here. If an error appears, ask “Which statement can we check directly?” Have the student test it using the original givens. After discussion, use another item from this section and record independent versus supported evidence separately.

Closure: “What made your conclusion reasonable, and what would you check on a new problem?”

STUDENT BANK

Multiple-choice tasks

M01 • Find and verify a shared ordered pair.

Which ordered pair solves $y = x + 1$ and $y = -x + 3$?

A. (1, 2)

B. (-1, 0)

C. (0, 5)

D. (2, 1)

Reasoning notes: _____

M02 • Find and verify a shared ordered pair.

Which ordered pair solves $y = 2x - 2$ and $y = -x + 4$?

A. (2, 2)

B. (1, 3)

C. (4, 5)

D. (3, 4)

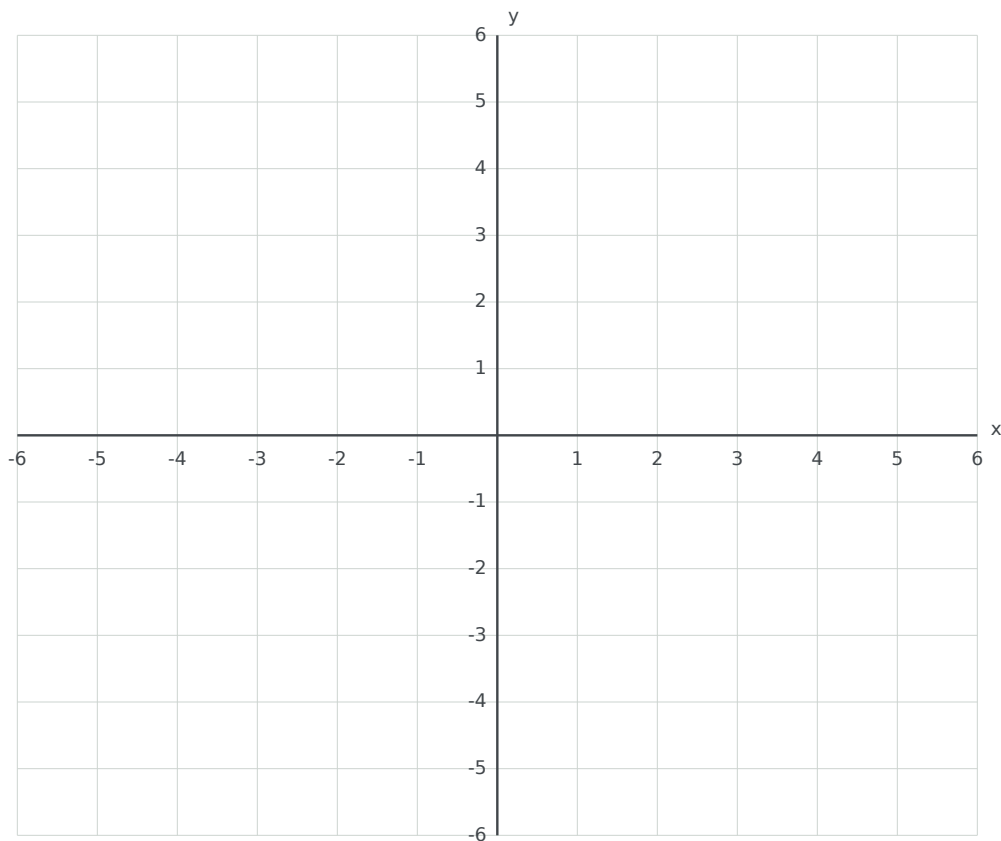
Reasoning notes: _____

OPEN / PERFORMANCE TASK

001 • Warm-up

Target: Find and verify a shared ordered pair.

Graph $y = x + 1$ and $y = -x + 3$. Plot at least two points on EACH line, label the lines, mark their intersection, and substitute the intersection into both equations.



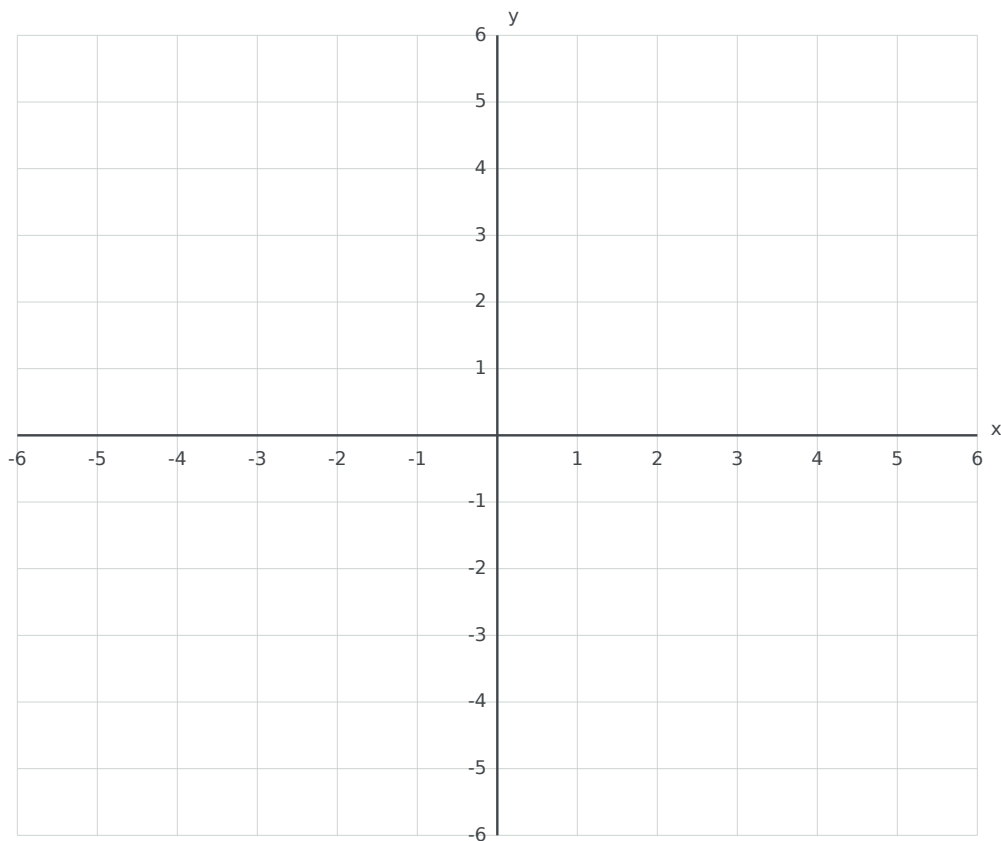
Calculations, intersection check and interpretation

OPEN / PERFORMANCE TASK

002 • Warm-up

Target: Find and verify a shared ordered pair.

Graph $y = 2x - 2$ and $y = -x + 4$. Plot at least two points on EACH line, label the lines, mark their intersection, and substitute the intersection into both equations.



Calculations, intersection check and interpretation

TEACHER GUIDE

Multiple-choice worked keys

M01 • Find and verify a shared ordered pair.

A. (1, 2). The lines meet at (1, 2). Substitute $x=1$: first $y=2$ and second $y=2$.

Option checks: A: at $x=1$, the equations give $y=2$ and $y=2$; candidate $y=2$ matches both. B: at $x=-1$, the equations give $y=0$ and $y=4$; candidate $y=0$ does not match both. C: at $x=0$, the equations give $y=1$ and $y=3$; candidate $y=5$ does not match both. D: at $x=2$, the equations give $y=3$ and $y=1$; candidate $y=1$ does not match both.

M02 • Find and verify a shared ordered pair.

A. (2, 2). The lines meet at (2, 2). Substitute $x=2$: first $y=2$ and second $y=2$.

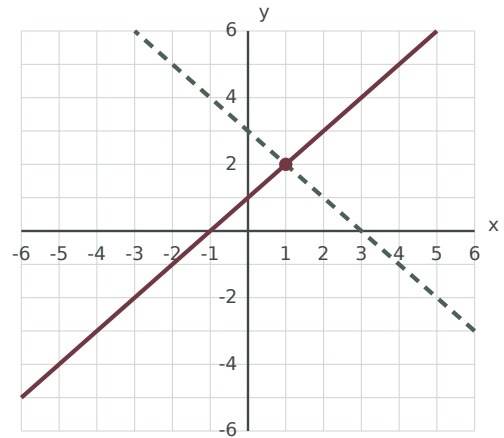
Option checks: A: at $x=2$, the equations give $y=2$ and $y=2$; candidate $y=2$ matches both. B: at $x=1$, the equations give $y=0$ and $y=3$; candidate $y=3$ does not match both. C: at $x=4$, the equations give $y=6$ and $y=0$; candidate $y=5$ does not match both. D: at $x=3$, the equations give $y=4$ and $y=1$; candidate $y=4$ does not match both.

TEACHER GUIDE

Open-task worked keys

001 • Find and verify a shared ordered pair.

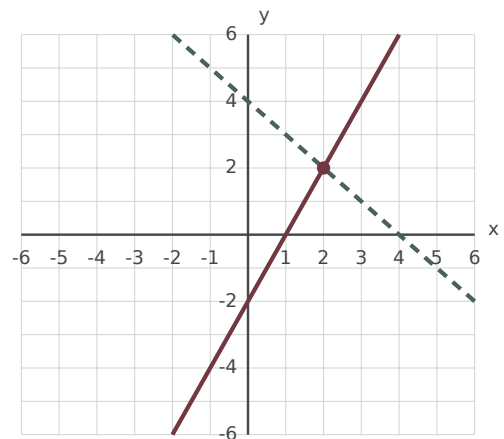
Intersection (1, 2). First line: (0,1), (2,3). Second: (0,3), (2,1). At $x=1$, both produce $y=2$. The shared point satisfies both simultaneously.



Solid: first; dashed: second.

002 • Find and verify a shared ordered pair.

Intersection (2, 2). First line: (0,-2), (2,2). Second: (0,4), (2,2). At $x=2$, both produce $y=2$. The shared point satisfies both simultaneously.



Solid: first; dashed: second.