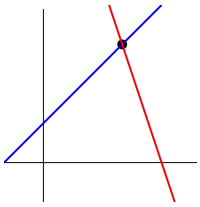
Name & Surname: _____ Class: _____ Date: _____

Where Lines Meet

Solving systems of two linear equations

About 50 minutes Level ★★★☆☆



Two equations at once

A **system** is two linear equations that must both be true at the same time.

- A **solution** is an ordered pair (x, y) that makes both equations true. On a graph it is where the lines cross.
- Graph to **estimate**: make a table, draw both lines, read the crossing point, then check it.
- Solve by algebra: **substitution** means solving one equation for a variable then plugging in, and **elimination** means adding or subtracting to remove a variable.
- Inspect first: if left sides match but right sides do not, there is **no solution**. If one equation is a multiple of the other, there are infinitely many **solutions**.

Task A

/9

Complete each machine. Both give 5 when the input is 2. That common point is the intersection.

1 IN → × 2 → + 1 → OUT

In	Out
0	
1	
2	
	7
	9

2 IN → × -1 → + 7 → OUT

In	Out
0	
2	
	3
	1

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Solve by Substituting

Practice swapping one equation into the other.

Key words

system: two equations that must both be true

intersection: point where lines cross

elimination: add or subtract equations to remove a variable

solution: values that make all equations true

substitution: replace a variable with an equal expression

parallel: lines that never meet

Task B /12

Solve by substitution. Check each pair in both equations.

WARM UP

1. If y = x + 4, find y when x = 2. Use the **expression**.

   Answer: _____

2. If y = 3x - 2, find y when x = 2. Use the **expression**.

   Answer: _____

3. If y = 7 - x, find y when x = 3. Use the **expression**.

   Answer: _____

4. x + y = 9. If x = 5, find y. Use the **total**.

   Answer: _____

PRACTICE

5. Solve y = x + 1 and y = 5 - x by **substitution**.

   Answer: _____

6. Solve x + y = 7 and y = 2x + 1 by **substitution**.

   Answer: _____

7. Solve x + y = 6 and x - y = 2 by **substitution**.

   Answer: _____

8. Solve 2x + y = 11 and y = x + 2 by **substitution**.

   Answer: _____

PROBLEM SOLVING

9. Two **numbers** add to 10. The larger number x is 2 more than the smaller y. Find x and y.

   Answer: _____

10. A student buys 5 items: pencils at $1 each (p) and notebooks at $3 each (n) for $9 in **total**. Solve p + n = 5 and p + 3n = 9.

    Answer: _____

11. Explain how you know the system 3x + 2y = 5 and 3x + 2y = 6 has **no solution**.

    Answer: _____

12. Explain how you know x + y = 4 and 2x + 2y = 8 have infinitely many **solutions**.

    Answer: _____

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Solve by Eliminating

Practice adding or subtracting to remove a variable.

Task C /12

Solve by elimination. Add or subtract to remove one variable.

WARM UP

1 Add x + 2y = 7 and x - 2y = 3. What is x? Use the **sum**.

Answer: _____

2 Subtract x + y = 8 from 2x + y = 13. What is x? Use the **difference**.

Answer: _____

3 How many **solutions** does y = 2x + 1 and y = 2x + 4 have? Write no solution, one solution, or infinitely many solutions.

Answer: _____

4 How many **solutions** does y = 2x + 1 and 2y = 4x + 2 have?

Answer: _____

PRACTICE

5 Solve x + y = 9 and x - y = 3 by **elimination**.

Answer: _____

6 Solve 2x + y = 13 and x + y = 8 by **elimination**.

Answer: _____

7 Solve x + 2y = 11 and x + y = 7 by **elimination**.

Answer: _____

8 Solve 3x + y = 17 and 2x + y = 12 by **elimination**.

Answer: _____

PROBLEM SOLVING

9 A stand sells 20 tickets: adult tickets at $5 each (a) and child tickets at $3 each (c) for $78 in **total**. Solve a + c = 20 and 5a + 3c = 78.

Answer: _____

10 Two **numbers** add to 15 and subtract to 3. Find x and y with x larger.

Answer: _____

11 The graph of y = x + 2 and y = -x + 6 shows one **intersection**. Solve to check. What is the solution?

Answer: _____

12 Explain how you know y = 3x + 1 and y = 3x - 2 have **no solution**.

Answer: _____

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Graph and Choose

Estimate the crossing point and test ideas.

Task D

/14

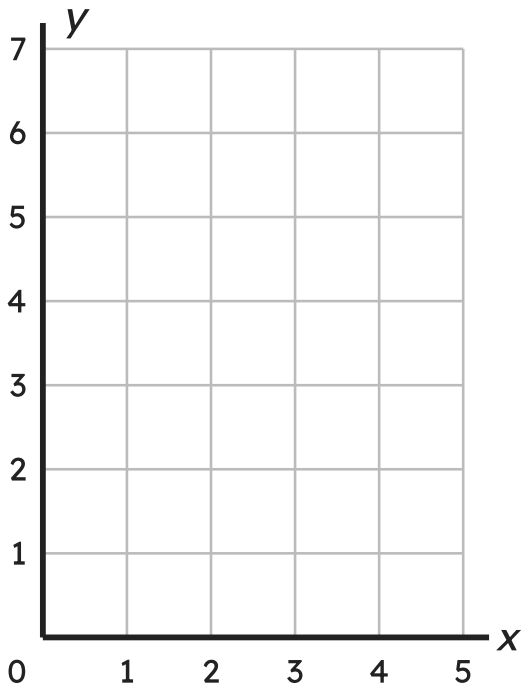
Complete each table, draw both lines, then estimate the intersection.

y = x + 1

x	0	1	2	3	4	5
y						

y = 7 − x

x	0	1	2	3	4	5
y						



Task E

Example done for you

/3

Tick the best answer. Watch for parallel lines and swapped coordinates.

1. **A solution to a system of two linear equations is…**
   - [x] An ordered pair that makes both equations true
   - [ ] A number that makes one side zero
   - [ ] Any point on one of the lines
2. **What is true about 3x + 2y = 5 and 3x + 2y = 6? Think about the left side.**
   - [ ] x = 5, y = 6
   - [ ] No solution
   - [ ] Infinitely many solutions
3. **What is true about x + y = 4 and 2x + 2y = 8? Think about the multiple.**
   - [ ] No solution
   - [ ] Infinitely many solutions
   - [ ] One solution at x = 4, y = 8
4. **The lines y = x + 1 and y = 7 - x cross at (3, 4). What is the solution?**
   - [ ] x = 4, y = 3
   - [ ] x = 1, y = 7
   - [ ] x = 3, y = 4

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Pinpoint and Review

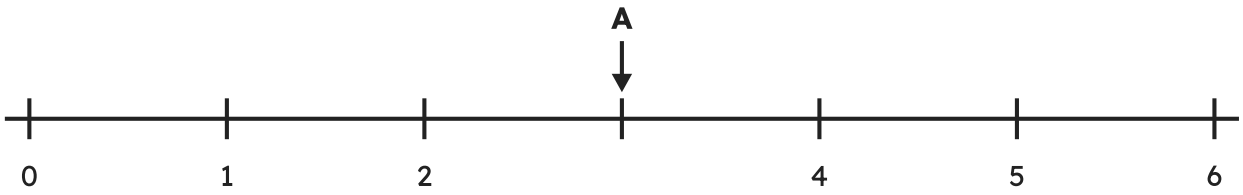
Read values closely and study worked methods.

↑↓ Task F

/4

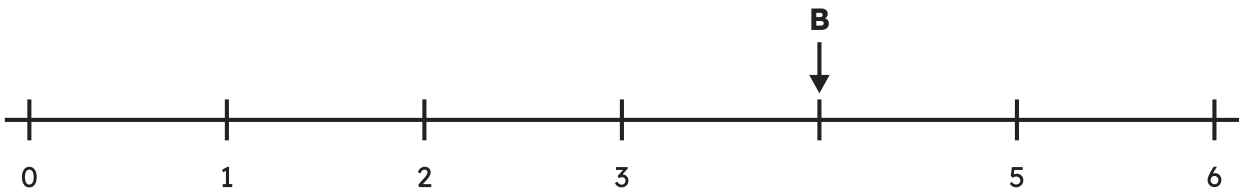
Read the intersection values. Lines cross at x = 3 and y = 4.

1



A = ☐ Draw an arrow to show: 5

2



B = ☐ Draw an arrow to show: 2

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Where Lines Meet

Task G /2

Study each method, then try the matching question.

WORKED EXAMPLE

Solve y = x + 1 and y = 5 - x to find the variable x.

1. Set the expressions for y equal: x + 1 = 5 - x
2. Add x both sides and subtract 1: 2x = 4
3. Divide by 2: x = 2
4. Check: 2 + 1 = 3 and 5 - 2 = 3, so y = 3

Answer: x = 2

YOUR TURN

Solve y = 2x - 1 and y = 11 - 2x to find the variable x.

Answer: _____

WORKED EXAMPLE

Decide how many solutions 3x + 2y = 5 and 3x + 2y = 6 have.

1. Notice both left sides are identical
2. One left side cannot equal 5 and 6 at the same time
3. So the lines are parallel with no solution

Answer: no solution

YOUR TURN

Decide how many solutions x + y = 4 and 2x + 2y = 8 have.

Answer: _____

How did I do?

Circle a face for each line.

I can solve a system by substitution or elimination.	☹	😐	☺
I can estimate a solution by graphing the lines.	☹	😐	☺
I can tell if a system has one, none, or infinitely many solutions.	☹	😐	☺

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Answer sheet: Where Lines Meet

Task A

1. 0 → 1; 1 → 3; 2 → 5; 3 → 7; 4 → 9
2. 0 → 7; 2 → 5; 4 → 3; 6 → 1

Task B

1. y = 6
2. y = 4
3. y = 4
4. y = 4
5. x = 2, y = 3
6. x = 2, y = 5
7. x = 4, y = 2
8. x = 3, y = 5
9. x = 6, y = 4
10. p = 3, n = 2
11. 3x + 2y cannot be 5 and 6 at the same time
12. The second equation is twice the first, so both are the same line

---

Task C

1. x = 5
2. x = 5
3. no solution
4. infinitely many solutions
5. x = 6, y = 3
6. x = 5, y = 3
7. x = 3, y = 4
8. x = 5, y = 2
9. a = 9, c = 11
10. x = 9, y = 6
11. x = 2, y = 4
12. The lines have the same slope but different intercepts, so they are parallel and never meet

---

Task D

y = x + 1: y = 1, 2, 3, 4, 5, 6; a straight line through these points
y = 7 − x: y = 7, 6, 5, 4, 3, 2; a straight line through these points

---

Task E

1. a) An ordered pair that makes both equations true
2. b) No solution
3. b) Infinitely many solutions
4. c) x = 3, y = 4

Task F

1. A = 3; arrows at 5
2. B = 4; arrows at 2

Task G

1. x = 3
2. infinitely many solutions

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