LESSON MAKER PRO

System Sleuths

Use algebra and graphs to find where two lines meet.

GRADE 8 · 8.EE.C.8b

CCSS.Math.Content.8.EE.C.8b "Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example..."

NAME _____ DATE _____

FIND THE SHARED POINT

A solution to a system makes both equations true. You can use elimination by adding or subtracting equations to remove one variable. On a graph, the solution is the point where the two lines intersect, while parallel lines have no solution.

WORKED EXAMPLE

Solve the system: $5x + y = 19$ and $x + y = 7$.

1. Subtract the second equation from the first: $4x = 12$.
2. Divide by 4: $x = 3$.
3. Replace x with 3 in $x + y = 7$: $3 + y = 7$.
4. $y = 4$, so the solution is (3, 4).

Answer: (3, 4)

PRACTICE 6 problems

1 Solve by inspection: $2x + 6y = 8$ and $2x + 6y = 10$.

ANSWER _____

2 Solve by inspection: $2x + 6y = 8$ and $6x + 18y = 24$.

ANSWER _____

3 Solve the system algebraically: $6x + 2y = 40$ and $2x - 2y = 8$.

ANSWER _____

4 Solve the system algebraically: $2x + 6y = 52$ and $6x - 2y = 36$.

ANSWER _____

5 Graph both equations. Estimate the intersection, then verify it algebraically: $y = 2x + 6$ and $y = -2x + 14$.

ANSWER _____

6 Solve the system algebraically: $2x + 2y = 36$ and $6x - 2y = 44$.

ANSWER _____

APPLY IT Show your work

1 A gaming club sells student passes and guest passes. Two student passes and six guest passes cost $52. Six student passes and two guest passes cost $60. What is the cost of each type of pass?

WORK SPACE

ANSWER _____

2 At a student art market, two sticker packs and eight enamel pins cost $76. Six sticker packs and two enamel pins cost $52. What is the cost of one sticker pack and one enamel pin?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Without solving for x or y, find the value of k that makes this system have no solution: $2x + 6y = 8$ and $kx + 18y = 30$. Explain your reasoning.

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_____

ANSWER KEY

System Sleuths

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve by inspection: 2x + 6y = 8 and 2x + 6y = 10.	**no solution**
2	Solve by inspection: 2x + 6y = 8 and 6x + 18y = 24.	**infinitely many solutions**
3	Solve the system algebraically: 6x + 2y = 40 and 2x - 2y = 8.	**(6, 2)**
4	Solve the system algebraically: 2x + 6y = 52 and 6x - 2y = 36.	**(8, 6)**
5	Graph both equations. Estimate the intersection, then verify it algebraically: y = 2x + 6 and y = -2x + 14.	**(2, 10)**
6	Solve the system algebraically: 2x + 2y = 36 and 6x - 2y = 44.	**(10, 8)**

PART 2 · APPLY IT

1. **student pass = $8; guest pass = $6** Let s be the student-pass cost and g be the guest-pass cost. Solve 2s + 6g = 52 and 6s + 2g = 60 by elimination.
2. **sticker pack = $6; enamel pin = $8** Let s be the sticker-pack cost and p be the enamel-pin cost. Solve 2s + 8p = 76 and 6s + 2p = 52 by elimination.

CHALLENGE

k = 6. Multiplying the first equation by 3 gives 6x + 18y = 24. When k = 6, the equations have the same left side but different constants, so they cannot both be true. For any other value of k, the lines have different slopes and one solution.

Accept equivalent ordered-pair notation and clear algebraic work using substitution or elimination. For the graphing problem, accept a reasonable estimate of (2, 10) that is verified algebraically.