

# Systems of Equations and Inequalities (Approximately 8 questions on STAAR)

## Write Systems of Equations (A2I)

Write systems of two linear equations given a table of values, a graph, and a verbal description

### Sample Questions

24 The tables of ordered pairs represent some points on the graphs of lines  $q$  and  $v$ .

(58%)

|     |    |    |    |
|-----|----|----|----|
| $x$ | -9 | -3 | 2  |
| $y$ | 0  | 18 | 33 |

|     |    |   |    |
|-----|----|---|----|
| $x$ | -4 | 0 | 10 |
| $y$ | 10 | 8 | 3  |

Which system of equations is represented by lines  $q$  and  $v$ ?

F  $21x - y = 9$   
 $5x + 6y = 40$

G  $3x - y = -27$   
 $x + 2y = 16$

H  $21x - y = 9$   
 $5x + 6y = 20$

J  $9x - y = -27$   
 $x + 2y = 8$

*Handwritten notes:*  
 $21(-9) - 0 = 9 \times$   
 $-189 = 9$   
 $3(-9) - 0 = -27$   
 $-27 = -27 \checkmark$   
 \* plug in #s into equations \*

*Handwritten calculations:*  
 $-4 + 2(10) = 16$   
 $-4 + 20 = 16$   
 $\checkmark 16 = 16$

A small-business owner will lease a billboard to advertise her business. The table shows the linear relationship between the cost of leasing a billboard from Company N and the number of months the billboard is leased.

Billboard Cost from Company N

| Number of Months, $x$ | Cost, $N(x)$ |
|-----------------------|--------------|
| 1                     | \$580        |
| 2                     | \$660        |
| 3                     | \$740        |
| 4                     | \$820        |
| 5                     | \$900        |

*Handwritten notes:*  
 X | y  
 0 | 0  
 1 | 100  
 2 | 200  
 3 | 300  
 ...  
 9 | 900  
 10 | 1,000  
 29 | 2,900  
 25 | 2,500

The cost to lease a billboard from a different company, Company P, for  $x$  months can be found using  $P(x) = 100x$ . For what number of months will the cost of leasing a billboard be the same for both companies?

- A 9 months
- B 29 months
- C 10 months
- D 25 months

*Handwritten calculations for Company P:*  
 6 | 600  
 8 | 800  
 9 | 900  
 10 | 1000  
 11 | 1100  
 12 | 1200  
 13 | 1300  
 14 | 1400  
 15 | 1500  
 16 | 1600  
 17 | 1700  
 18 | 1800  
 19 | 1900  
 20 | 2000  
 21 | 2100  
 22 | 2200  
 23 | 2300  
 24 | 2400  
 25 | 2500  
 26 | 2600  
 27 | 2700  
 28 | 2800  
 29 | 2900  
 65

(66%) 37 There are 15 plates in a kitchen cabinet. The diameter of each plate is either 7 inches or 12 inches. The diameter of all 15 plates combined is 140 inches.

Which system of equations can be used to find the number of 7-inch plates,  $x$ , and the number of 12-inch plates,  $y$ , that are in the cabinet?

- A  $x + y = 140$   
 ~~$12x + 7y = 15$~~
- B  ~~$7x + 12y = 140$~~   
 $7x + 12y = 15$
- C  $x + y = 15$   
 $7x + 12y = 140$
- D  ~~$x + y = 15$~~   
 ~~$12x + 7y = 140$~~

all "inches"  
 $7x + 12y = 140$

(70%) 2 A drummer and a guitarist each wrote songs for their band. The guitarist wrote 8 fewer than twice the number of songs that the drummer wrote. They wrote a total of 46 songs.

Which system of equations models this situation if the drummer wrote  $d$  songs and the guitarist wrote  $g$  songs?

- F  $g = 2d - 8$  ✓  
 $g + d = 46$  ✓
- G  ~~$g = 8 - 2d$~~   
 $g = 46 - d$
- H  ~~$g = 2g - 8$~~   
 $d = 46 - g$
- J  ~~$g = 8 - 2g$~~   
 $d + g = 46$  ✓

$g = 2d - 8$

$g + d = 46$

At a school cafeteria a cold lunch costs \$1.80, and a hot lunch costs \$3.00. During one school year a teacher spent a total of \$288.60 on cold lunches and hot lunches. The number of cold lunches the teacher bought was 1 fewer than twice the number of hot lunches the teacher bought.

$c = 2h - 1$   
 $c = 2h - 1$

Which system of equations can be used to find  $c$ , the number of cold lunches, and  $h$ , the number of hot lunches, the teacher bought during the school year?

- A  ~~$3.00c + 1.80h = 288.60$~~   
 $h = 1 - 2c$
- B  $1.80c + 3.00h = 288.60$   
 $c = 1 - 2h$
- C  ~~$3.00c + 1.80h = 288.60$~~   
 $h = 2c - 1$
- D  $1.80c + 3.00h = 288.60$   
 $c = 2h - 1$

$1.80c + 3.00h = 288.60$

66

There are 9 books stacked on a shelf. The thickness of each book is either 1 inch or 2 inches. The height of the stack of 9 books is 14 inches. Which system of equations can be used to determine  $x$ , the number of 1-inch-thick books in the stack, and  $y$ , the number of 2-inch-thick books?

F  ~~$x + y = 14$~~   
 ~~$2x + y = 9$~~

G  ~~$x + y = 14$~~   
 ~~$x + 2y = 9$~~

H  $x + y = 9$   
 $x + 2y = 14$  ✓

J  $x + y = 9$   
 ~~$2x + y = 14$~~

$x = 1 \text{ inch}$   
 $y = 2 \text{ in}$

all "inches" #s in same equation  
1, 2, 14

48 A bag contains 18 coins consisting of quarters and dimes. The total value of the coins is \$2.85. Which system of equations can be used to determine the number of quarters,  $q$ , and the number of dimes,  $d$ , in the bag?

F  $0.10q + 0.25d = 2.85$   
 $q + d = 18$  ✓

G  $0.10q + 0.25d = 18$   
 ~~$q + d = 2.85$~~

H  $0.25q + 0.10d = 2.85$   
 $q + d = 18$  ✓

J  $0.25q + 0.10d = 18$   
 ~~$q + d = 2.85$~~

total  $\rightarrow q + d = 18$

6 A college student needs 11 classes that are worth a total of 40 credits in order to complete her degree. The college offers both 4-credit classes and 3-credit classes. Which system of equations can be used to determine  $f$ , the number of 4-credit classes the student can take to complete her degree, and  $h$ , the number of 3-credit classes?

F  $f + h = 40$   
 ~~$4f + 3h = 11$~~

G  $f + h = 11$   
 ~~$4f + 3h = 40$~~

H  $f + h = 40$   
 ~~$4f + 3h = 11$~~

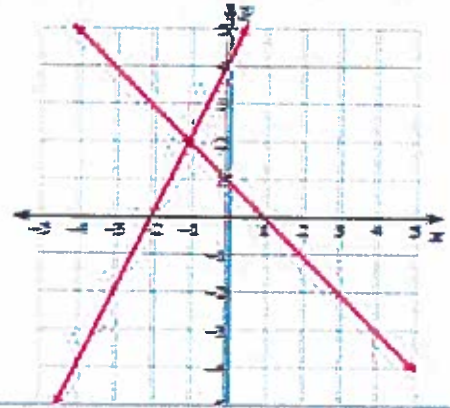
J  $f + h = 11$   
 $4f + 3h = 40$  ✓

$4f + 3h = 40$

1. Which answer choice represents the system of equations graphed below?

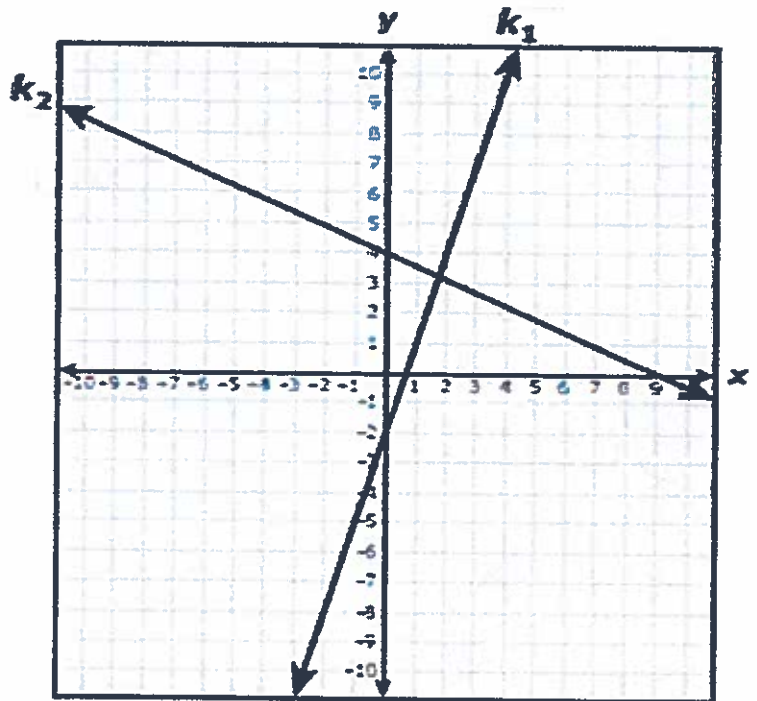
*Put these in graph*

- A.  $y = x + 1$  and  $y = -2x + 4$
- B.  $y = -x + 1$  and  $y = 2x + 4$
- C.  $y = -x + 4$  and  $y = 2x + 1$
- D.  $y = -x - 1$  and  $y = -2x - 4$



48 The graphs of lines  $k_1$  and  $k_2$  are shown on the grid.

*(54%)*



Which system of equations is best represented by this graph?

*Put into graph (relation)*

- F  $3x - y = 2$   
 $4x + 9y = 36$
- G  $3x - y = 6$   
 $4x + 9y = 4$
- H  $x - 3y = -18$   
 $9x + 4y = 9$
- J  $x + y = 10$   
 $9x + 4y = 13$

*68*

## Solve Systems of Equations (A5C)

Solve systems of two linear equations with two variables for mathematical and real-world problems

### Notes:

Solution -

How to Solve in Calculator: Memo, 3: Algebra, 2: Solve System

Solve:  $x + y = 1$  and  $6x + y = -4$

$(-1, 2)$

Solve:  $15x + 4y = 14$

$5x + 3y = -2$

$(2, -4)$

### Sample Questions

(47%)

35 What is the value of  $x$  in the solution to this system of equations?

$$3x = 2y + 14$$

$$y = -6x + 18$$

A  $\frac{10}{3}$

B  $-2$

C  $2$

D  $-\frac{10}{3}$

$(\frac{10}{3}, -2)$

What is the value of  $q$  in the solution to this system of equations?

$$2m - 5q = 8$$

$$4m + 2q = 64$$

A  $4$

B  $6$

C  $9$

D  $14$

$(14, 4)$

A gardener measured the heights of two plants at the end of every week. The function  $y = 3x + 8.5$  gives the height of Plant A in centimeters at the end of  $x$  weeks. The function  $y = 2.5x + 14.5$  gives the height of Plant B in centimeters at the end of  $x$  weeks.

Based on this information, which of these statements is true?

$(12, 44.5)$   
 $\uparrow$  weeks       $\uparrow$  same height

- A Plant A and Plant B will be the same height at the end of Week 3.
- B Plant A and Plant B will be the same height at the end of Week 12.**
- C The height of Plant A will always be greater than the height of Plant B.
- D The height of Plant B will always be greater than the height of Plant A.

52 What is the  $x$ -value of the solution to this system of equations?

$(61\%)$

$$\begin{aligned} x &= 2y - 4 \\ 7x + 5y &= -66 \end{aligned}$$

$(-8, -2)$

- F -2
- G  $-\frac{19}{7}$
- H -8**
- J  $-\frac{62}{19}$

39 What is the solution to this system of equations?

$(59\%)$

$$10x - y = 53$$

$$y = \frac{-13x + 92}{2}$$

- A (6, 7)**
- B (2, 33)
- C (7, 6)
- D (33, 2)

$(6, 7)$

11 What is the value of  $x$  in the solution to the system of equations below?

$$15x - 12y = 13$$

$$30x + 9y = 4$$

A  $\frac{17}{3}$

B  $\frac{1}{3}$

C  $-\frac{2}{3}$

D  $\frac{1}{6}$

$(\frac{1}{3}, -\frac{2}{3})$

52 What is the solution to the system of equations below?

(57%)

$$4x - 7y = -2$$

$$12x - 21y = -42$$

F The ordered pair  $(-\frac{1}{2}, 0)$  is the solution.

G The ordered pair  $(0, \frac{2}{7})$  is the solution.

H There are an infinite number of solutions.

J There is no solution.

"no solution found"

↑  
they never meet

54 What is the value of  $x$  in the solution to this system of equations?

(63%)

$$y + 2x = -1$$

$$y = \frac{1}{2}x + 4$$

F  $\frac{6}{5}$

G -2

H  $-\frac{10}{3}$

J 3

$(-2, 3)$

## Graph Systems of Equations (A3F)

Graph systems of two linear equations in two variables on the coordinate plane and determine the solutions if they exist

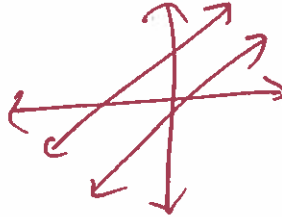
**Notes:**

**Types of Solutions:**

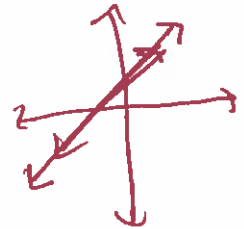
one solution



NO SOLUTION  
(PARALLEL)



infinitely many solutions  
on top of each other



**How to Graph on calculator:**

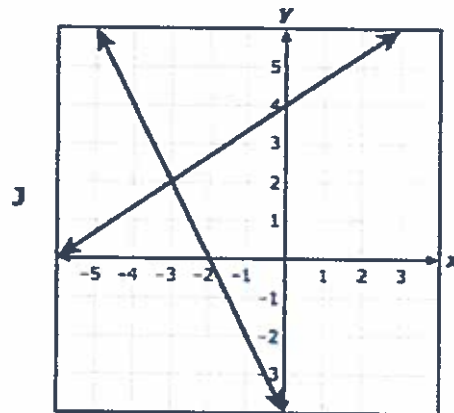
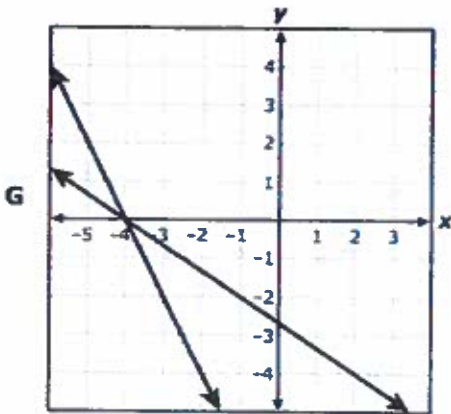
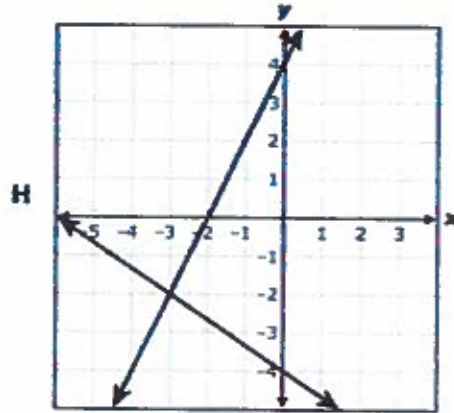
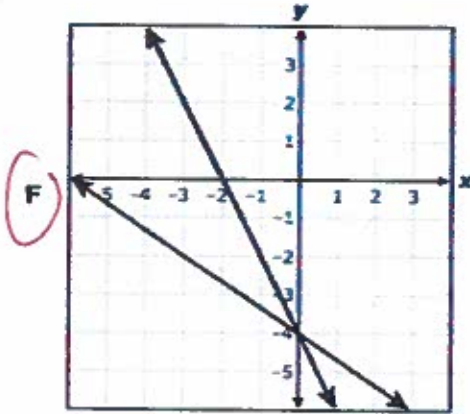
**Sample Questions**

↑  
put into graph,  
(relation)

32 Which graph can be used to find the solution to the system of equations below?

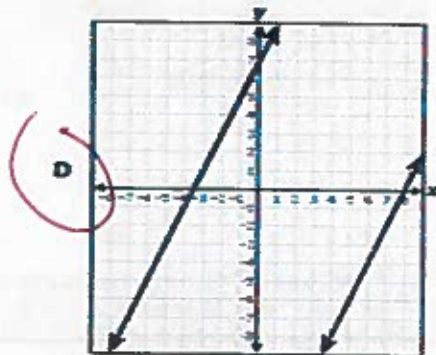
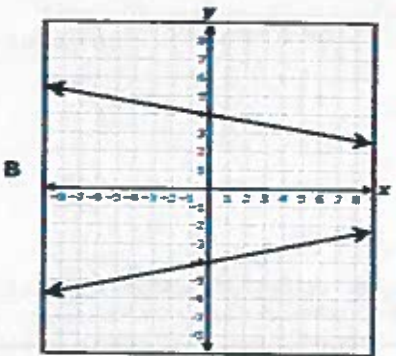
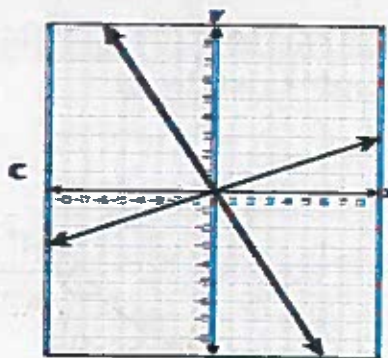
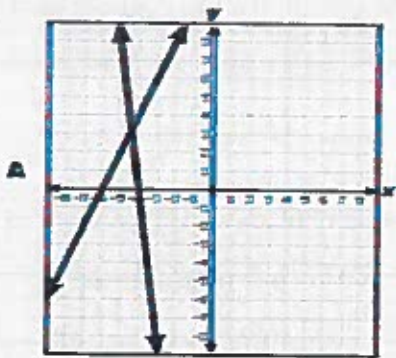
(72%)

$$\begin{aligned} 2x + y &= -4 \\ -3y &= 2x + 12 \end{aligned}$$

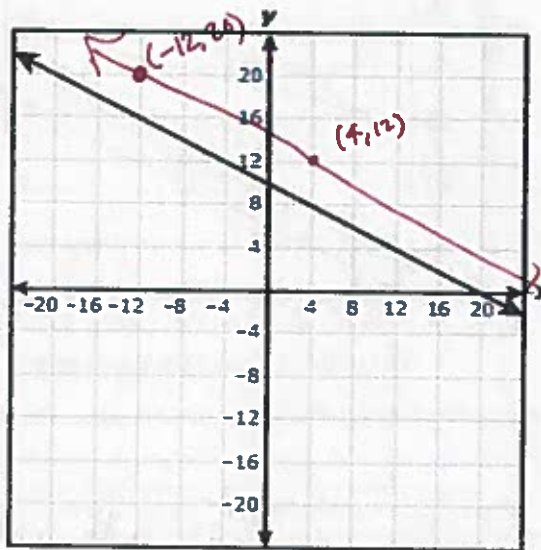




3 Which graph best represents a system of equations that has no solution?



29 The line graphed on the grid represents the first of two equations in a system of linear equations.



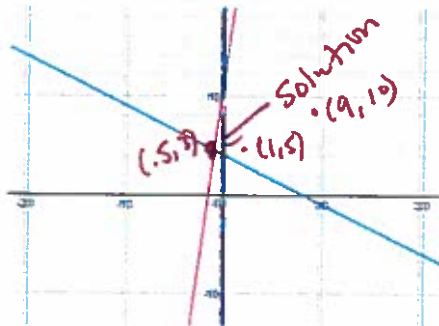
If the graph of the second equation in the system passes through the points  $(-12, 20)$  and  $(4, 12)$ , which statement is true?

- A The only solution to the system is  $(10, 5)$ .
- B The only solution to the system is  $(0, 14)$ .
- C The system has no solution.
- D The system has an infinite number of solutions.

## Estimate Graphically Solution to System (A3G)

Estimate graphically the solutions to systems of two linear equations with two variables in real-world problems

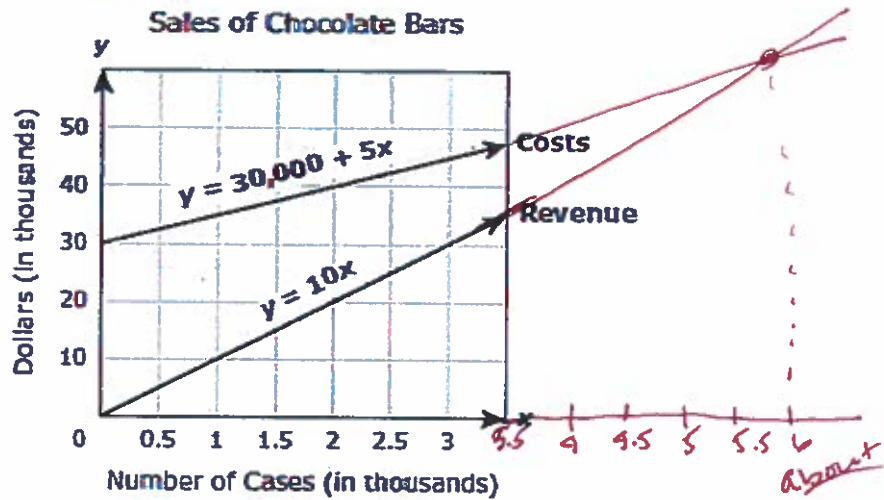
### Notes/Sample Questions:



What is true about this system of equations?

- A. There is no ~~solution~~
- B. The solution is approximately (9, 10)
- C. The solution is approximately (.5, 3) *about*
- D. The solution is approximately (1, 5)

2. A candy company sells cases of chocolate bars. The company has fixed costs of \$30,000, and each case of chocolate bars costs an additional \$5 to make. The company sells each case for \$10. The graph of a system of linear equations representing this company's costs and revenue for manufacturing and selling  $x$  cases of chocolate bars is shown below.



How many cases of chocolate bars will this company need to sell in order for costs and revenue to be equal?

- F. 3,500
- G. 6,000
- H. 35,000
- J. 60,000

*OR*  
 put into  
 Graph (calculator)

## Graph Systems of Linear Inequalities (A3B)

**graph the solution set of systems of two linear inequalities in two variables on the coordinate plane**

**I can...**

- Determine region of the graph that represents solution
- Determine if a point satisfied the system of inequalities

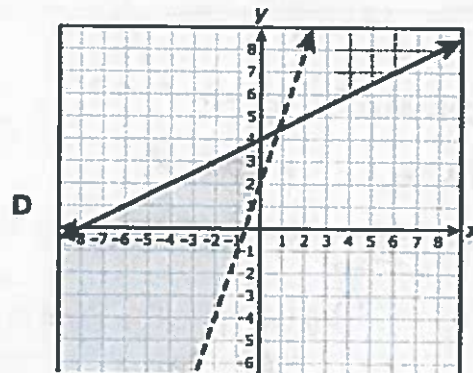
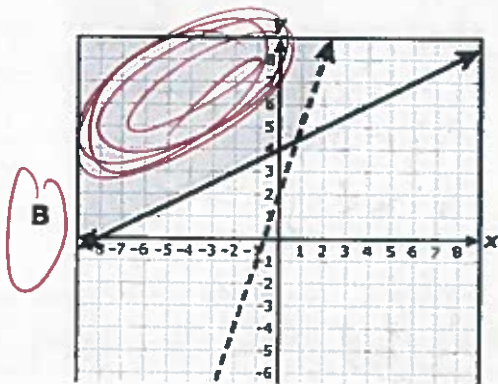
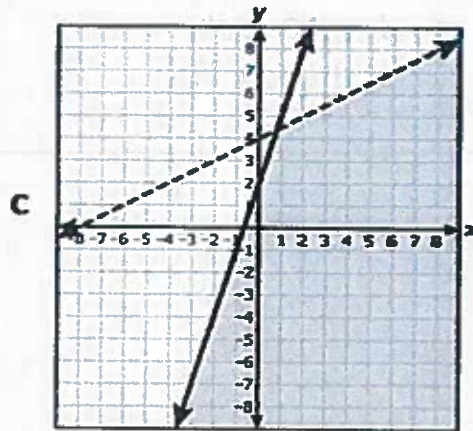
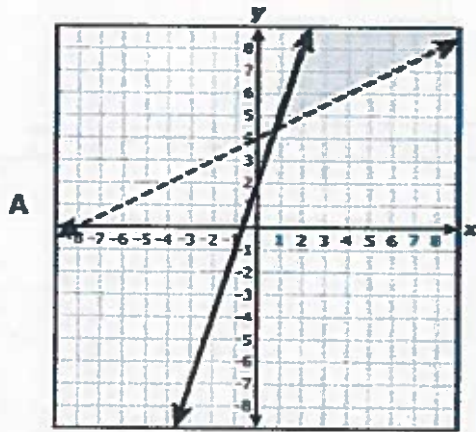
**Notes:**

**Solution set:** *where the shading overlaps*

**How to graph in calculator:** *put in Graph (Relations)*

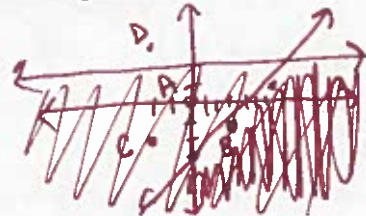
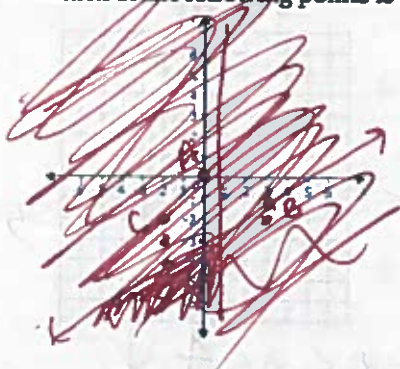
Which graph best represents the solution set for this system of inequalities?

$$\begin{aligned} y &> 3x + 2 \\ 2y - 8 &\geq x \end{aligned}$$



3. Which of the following points is in the solution set of this systems of inequalities?

$$\begin{aligned} y &\leq 1 \\ y &\leq \frac{2}{3}x - 3 \end{aligned}$$



- A. (0, 0)    **B. (3, -2)**    C. (-2, -2)    D. (-2, 3)

# Quadratic Functions

## (Approximately 15 questions on STAAR)

### Domain and Range of Quadratic Functions (A6A)

Determine the **domain and range** of quadratic functions and represent the domain and range using inequalities

I can...

- Determine domain and range given a graph, table, or equation

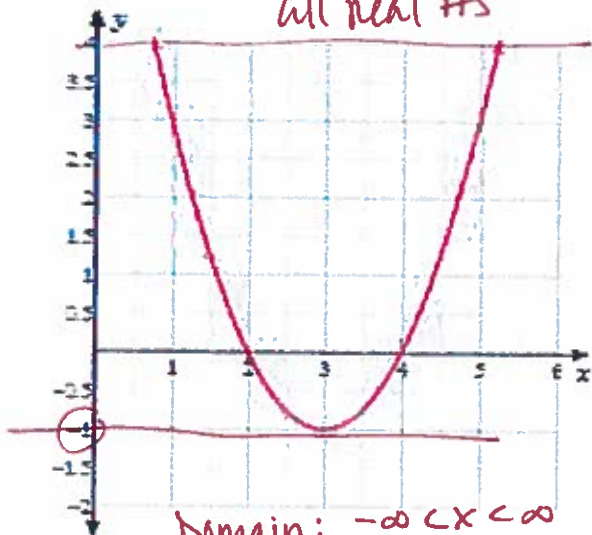
#### Notes:

X Domain: left to right

Y Range: bottom to top

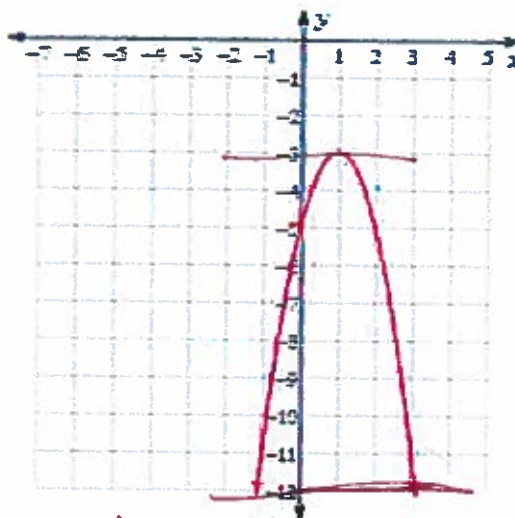
almost always

$-\infty < x < \infty$   
all real #s



Domain:  $-\infty < x < \infty$

Range:  $-1 \leq y < \infty$



D:  $-\infty < x < \infty$

R:  $\infty < y \leq -3$

30 What is the domain of  $f(x) = 9 - x^2$ ?

F  $f(x) \geq 9$

↑ ALWAYS  
all real #s

**G** All real numbers

H  $-3 \leq x \leq 3$

J  $x \leq 9$

5 What is the range of  $y = -x^2 - 2x + 3$ ?

A  $x \leq 4$

B  $x \geq -4$

**C**  $y \leq 4$

D  $y \geq -4$

↑ put into graph



$-\infty < y \leq 4$