

17

$$y < -3x + 1$$

$$y < -\frac{1}{2}x + 1$$

Which ordered pair (x, y) is a solution to the given system of inequalities in the xy -plane?

- A) $(-2, 3)$
- B) $(1, 2)$
- C) $(0, 2)$
- D) $(-1, 1)$

4

$$y \geq -2x + 11$$

$$y > 3x - 9$$

In the xy -plane, point A is contained in the graph of the solution set of the system of inequalities above. Which of the following could be the coordinates of point A ?

- A) $(2, 1)$
- B) $(4, 1)$
- C) $(4, 5)$
- D) $(6, 6)$

6

$$y > 2x - 1$$

$$2x > 5$$

Which of the following consists of the y -coordinates of all the points that satisfy the system of inequalities above?

- A) $y > 6$
- B) $y > 4$
- C) $y > \frac{5}{2}$
- D) $y > \frac{3}{2}$

8

$$y > 4x$$

$$y < -x$$

When graphed in the xy -plane, what point (x, y) is a solution to the given system of inequalities?

- A) $(1, 1)$
- B) $(-2, -2)$
- C) $(3, -3)$
- D) $(-4, 4)$

36

$$y \leq -15x + 3000$$

$$y \leq 5x$$

In the xy -plane, if a point with coordinates (a, b) lies in the solution set of the system of inequalities above, what is the maximum possible value of b ?

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$$y \leq 3x + 1$$

$$x - y > 1$$

Which of the following ordered pairs (x, y) satisfies the system of inequalities above?

- A) $(-2, -1)$
- B) $(-1, 3)$
- C) $(1, 5)$
- D) $(2, -1)$

17

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

$$y > -2x + 4$$

Which ordered pair (x, y) is a solution to the given system of inequalities in the xy -plane?

A) $(0, 2)$
 B) $(1, 0)$
 C) $(1, 5)$
 D) $(2, 4)$

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$$y < -x + a$$

$$y > x + b$$

In the xy -plane, if $(0, 0)$ is a solution to the system of inequalities above, which of the following relationships between a and b must be true?

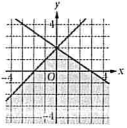
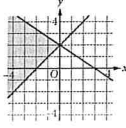
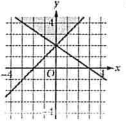
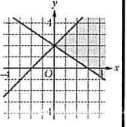
A) $a > b$
 B) $b > a$
 C) $|a| > |b|$
 D) $a = -b$

14

$$y \geq x + 2$$

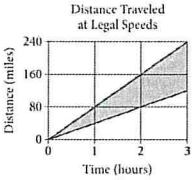
$$2x + 3y \leq 6$$

In which of the following does the shaded region represent the solution set in the xy -plane to the system of inequalities above?

A)  B)  C)  D) 

16

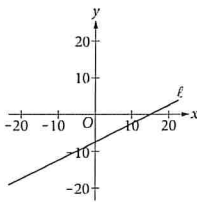
Distance Traveled at Legal Speeds



A) $t \leq 40d$
 $t \geq 80d$
 B) $t \geq 40d$
 $t \leq 80d$
 C) $d \leq 40t$
 $d \geq 80t$
 D) $d \geq 40t$
 $d \leq 80t$

The shaded region of the graph above represents all possible distances d , in miles, that a car can travel along a certain road in t hours if the driver obeys the minimum and maximum posted speed limits and drives without stopping. Which of the following systems of inequalities best represents the shaded region, where $0 \leq t \leq 3$

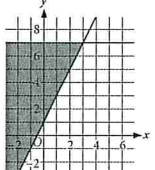
20



Line l is shown on the xy -plane above. If the corresponding equation for line l is $y = ax + b$, where a and b are constants, which set of inequalities is true about a and b ?

A) $\begin{cases} 0 < a < 1 \\ b < 1 \end{cases}$
 B) $\begin{cases} -1 < a < 0 \\ b > -10 \end{cases}$
 C) $\begin{cases} a < 0 \\ b < 1 \end{cases}$
 D) $\begin{cases} a > 0 \\ b > 10 \end{cases}$

22



The solution to which system of inequalities is represented by the shaded region of the graph?

A) $y \leq 7$
 $y \leq 2x + 1$
 B) $y \leq 7$
 $y \geq 2x + 1$
 C) $x \leq 7$
 $2y \leq x$
 D) $x \leq 7$
 $2y \geq x$

24 Phase Diagram for Aluminosilicate Polymorphs

Which of the following systems of inequalities best describes the region where sillimanite can form?

A) $P \geq 0.0021T - 0.67$
 $P \geq 0.0013T - 0.25$

B) $P \leq 0.0021T - 0.67$
 $P \geq -0.0015T + 1.13$

C) $P \leq 0.0013T - 0.25$
 $P \geq -0.0015T + 1.13$

D) $P \leq 0.0013T - 0.25$
 $P \leq -0.0015T + 1.13$

During mineral formation, the same chemical compound can become different minerals depending on the temperature and pressure at the time of formation. A phase diagram is a graph that shows the conditions that are needed to form each mineral. The graph above is a portion of the phase diagram for aluminosilicates, with the temperature T , in degrees Celsius ($^{\circ}\text{C}$), on the horizontal axis, and the pressure P , in gigapascals (GPa), on the vertical axis.

27

A system of inequalities and a graph are shown above. Which section or sections of the graph could represent all of the solutions to the system?

$$\begin{cases} y \leq -x \\ 2y > 3x + 2 \end{cases}$$

A) Section R
 B) Sections Q and S
 C) Sections Q and P
 D) Sections Q, R, and S

28

If the system of inequalities $y \geq 2x + 1$ and $y > \frac{1}{2}x - 1$ is graphed in the xy -plane above, which quadrant contains no solutions to the system?

A) Quadrant II
 B) Quadrant III
 C) Quadrant IV
 D) There are solutions in all four quadrants.

16

Ryan has 1,500 yards of yarn. He wants to knit at least 2 scarves and at least 3 hats. Each scarf requires 300 yards of yarn, and each hat requires 120 yards of yarn. If s represents the number of scarves and h represents the number of hats, which of the following systems of inequalities represents this situation?

A) $s + h \leq 1,500$
 $s \geq 2$
 $h \geq 3$

B) $2s + 3h \leq 1,500$
 $s \geq 2$
 $h \geq 3$

C) $2s + 3h \leq 1,500$
 $s \geq 300$
 $h \geq 120$

D) $300s + 120h \leq 1,500$
 $s \geq 2$
 $h \geq 3$

14

A laundry service is buying detergent and fabric softener from its supplier. The supplier will deliver no more than 300 pounds in a shipment. Each container of detergent weighs 7.35 pounds, and each container of fabric softener weighs 6.2 pounds. The service wants to buy at least twice as many containers of detergent as containers of fabric softener. Let d represent the number of containers of detergent, and let s represent the number of containers of fabric softener, where d and s are nonnegative integers. Which of the following systems of inequalities best represents this situation?

A) $7.35d + 6.2s \leq 300$
 $d \geq 2s$

B) $7.35d + 6.2s \leq 300$
 $2d \geq s$

C) $14.7d + 6.2s \leq 300$
 $d \geq 2s$

D) $14.7d + 6.2s \leq 300$
 $2d \geq s$

10

A carpenter has \$60 with which to buy supplies. The carpenter needs to buy both nails and screws. Nails cost \$12.99 per box, and screws cost \$14.99 per box. If n represents the number of boxes of nails and s represents the number of boxes of screws, which of the following systems of inequalities models this situation?

A) $\begin{cases} 12.99n + 14.99s \geq 60 \\ n + s \leq 1 \end{cases}$

B) $\begin{cases} 12.99n + 14.99s \leq 60 \\ n + s \leq 1 \end{cases}$

C) $\begin{cases} 12.99n + 14.99s \geq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$

D) $\begin{cases} 12.99n + 14.99s \leq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$

7 Jackie has two summer jobs. She works as a tutor, which pays \$12 per hour, and she works as a lifeguard, which pays \$9.50 per hour. She can work no more than 20 hours per week, but she wants to earn at least \$220 per week. Which of the following systems of inequalities represents this situation in terms of x and y , where x is the number of hours she tutors and y is the number of hours she works as a lifeguard?

A) $12x + 9.5y \leq 220$
 $x + y \geq 20$

B) $12x + 9.5y \leq 220$
 $x + y \leq 20$

C) $12x + 9.5y \geq 220$
 $x + y \leq 20$

D) $12x + 9.5y \geq 220$
 $x + y \geq 20$

9 Marisa needs to hire at least 10 staff members for an upcoming project. The staff members will be made up of junior directors, who will be paid \$640 per week, and senior directors, who will be paid \$880 per week. Her budget for paying the staff members is no more than \$9,700 per week. She must hire at least 3 junior directors and at least 1 senior director. Which of the following systems of inequalities represents the conditions described if x is the number of junior directors and y is the number of senior directors?

A) $640x + 880y \geq 9,700$
 $x + y \leq 10$
 $x \geq 3$
 $y \geq 1$

B) $640x + 880y \leq 9,700$
 $x + y \geq 10$
 $x \geq 3$
 $y \geq 1$

C) $640x + 880y \geq 9,700$
 $x + y \geq 10$
 $x \leq 3$
 $y \leq 1$

D) $640x + 880y \leq 9,700$
 $x + y \leq 10$
 $x \leq 3$
 $y \leq 1$

9 A worker uses a forklift to move boxes that weigh either 40 pounds or 65 pounds each. Let x be the number of 40-pound boxes and y be the number of 65-pound boxes. The forklift can carry up to either 45 boxes or a weight of 2,400 pounds. Which of the following systems of inequalities represents this relationship?

A) $\begin{cases} 40x + 65y \leq 2,400 \\ x + y \leq 45 \end{cases}$ C) $\begin{cases} 40x + 65y \leq 45 \\ x + y \leq 2,400 \end{cases}$

B) $\begin{cases} \frac{x}{40} + \frac{y}{65} \leq 2,400 \\ x + y \leq 45 \end{cases}$ D) $\begin{cases} x + y \leq 2,400 \\ 40x + 65y \leq 2,400 \end{cases}$

10 Jonathan needs to earn at least \$175 next week and can work at most 20 hours. He earns \$10 per hour at his lawn service job and \$8 per hour at his job at the gym. Which of the following systems of inequalities represents this situation in terms of the number of hours he will work at his lawn service job, ℓ , and the number of hours he will work at his job at the gym, g , next week?

A) $10\ell + 8g \leq 175$
 $\ell + g \leq 20$

B) $10\ell + 8g \leq 175$
 $\ell + g \geq 175$

C) $10\ell + 8g \geq 175$
 $\ell + g \leq 20$

D) $10\ell + 8g \geq 20$
 $\ell + g \geq 175$

12 Roberto is an insurance agent who sells two types of policies: a \$50,000 policy and a \$100,000 policy. Last month, his goal was to sell at least 57 insurance policies. While he did not meet his goal, the total value of the policies he sold was over \$3,000,000. Which of the following systems of inequalities describes x , the possible number of \$50,000 policies, and y , the possible number of \$100,000 policies, that Roberto sold last month?

A) $x + y < 57$
 $50,000x + 100,000y < 3,000,000$

B) $x + y > 57$
 $50,000x + 100,000y > 3,000,000$

C) $x + y < 57$
 $50,000x + 100,000y > 3,000,000$

D) $x + y > 57$
 $50,000x + 100,000y < 3,000,000$

- | | | | | | |
|------------|--------------|-------------|-------------|-------------|-------------|
| <u>1 D</u> | <u>5 750</u> | <u>9 B</u> | <u>13 B</u> | <u>17 A</u> | <u>21 A</u> |
| <u>2 C</u> | <u>6 D</u> | <u>10 D</u> | <u>14 A</u> | <u>18 D</u> | <u>22 C</u> |
| <u>3 B</u> | <u>7 D</u> | <u>11 A</u> | <u>15 C</u> | <u>19 C</u> | <u>23 C</u> |
| <u>4 B</u> | <u>8 A</u> | <u>12 B</u> | <u>16 D</u> | <u>20 B</u> | |