

Linear Inequalities in One or Two Variables

CollegeBoard Question Bank

Abstract

This exercise sheet contains

- an **Easy** category with 8 questions;
- a **Medium** category with 10 questions;
- a **Hard** category with 9 questions

for you to attempt. A digital copy of this sheet is available for you on [moodle](#). Feel free to utilize [the Question Space on Teams](#) to ask for guidance.

Best,
Omar :)

Linear Inequalities in One or Two Variables

Easy

- (1) **2c121b25** MULTIPLE CHOICE One answer only

Valentina bought two containers of beads. In the first container 30% of the beads are red, and in the second container 70% of the beads are red. Together, the containers have at least 400 red beads. Which inequality shows this relationship, where x is the total number of beads in the first container and y is the total number of beads in the second container?

- a. $\frac{x}{3} + \frac{y}{7} \leq 400$
- b. $0.7x + 0.3y \leq 400$
- c. $30x + 70y \geq 400$
- d. $0.3x + 0.7y \geq 400$

(2) **563407e5**

MULTIPLE CHOICE

One answer only

A bakery sells trays of cookies. Each tray contains at least 50 cookies but no more than 60. Which of the following could be the total number of cookies on 4 trays of cookies?

- a. 245
- b. 165
- c. 285
- d. 205

- (3) **df32b09c** MULTIPLE CHOICE One answer only

Tom scored 85, 78, and 98 on his first three exams in history class. Solving which inequality gives the score, G , on Tom's fourth exam that will result in a mean score on all four exams of at least 90?

- a. $\frac{(G + 85 + 78 + 98)}{4} \geq 90$
- b. $90 - (85 + 78 + 98) \leq 4G$
- c. $4G + 85 + 78 + 98 \geq 360$
- d. $\frac{(85 + 78 + 98)}{4} \geq 90 - 4G$

(4) **915463e0** MULTIPLE CHOICE One answer only

Normal body temperature for an adult is between 97.8°F and 99°F , inclusive. If Kevin, an adult male, has a body temperature that is considered to be normal, which of the following could be his body temperature?

- a. 97.9°F
- b. 99.7°F
- c. 96.7°F
- d. 97.6°F

(5) **89541f9b** MULTIPLE CHOICE One answer only

Which of the following ordered pairs (x, y) satisfies the inequality $5x - 3y < 4$?

I. $(1, 1)$

II. $(2, 5)$

III. $(3, 2)$

a. I and II only

b. I only

c. II only

d. I and III only

(6) 84d0d07e MULTIPLE CHOICE One answer only

A clothing store is having a sale on shirts and pants. During the sale, the cost of each shirt is \$15 and the cost of each pair of pants is \$25. Geoff can spend at most \$120 at the store. If Geoff buys s shirts and p pairs of pants, which of the following must be true?

- a. $25s + 15p \geq 120$
- b. $25s + 15p \leq 120$
- c. $15s + 25p \leq 120$
- d. $15s + 25p \geq 120$

(7) e744499e

MULTIPLE CHOICE

One answer only

An elementary school teacher is ordering x workbooks and y sets of flash cards for a math class. The teacher must order at least 20 items, but the total cost of the order must not be over \$80. If the workbooks cost \$3 each and the flash cards cost \$4 per set, which of the following systems of inequalities models this situation?

- a.
$$\begin{array}{l} x+y \leq 20 \\ 3x+4y \geq 80 \end{array}$$
- b.
$$\begin{array}{l} 3x+4y \leq 20 \\ x+y \geq 80 \end{array}$$
- c.
$$\begin{array}{l} x+y \geq 20 \\ 3x+4y \geq 80 \end{array}$$
- d.
$$\begin{array}{l} x+y \geq 20 \\ 3x+4y \leq 80 \end{array}$$

(8) **b75f7812** SHORT ANSWER Case-Insensitive

Maria plans to rent a boat. The boat rental costs \$60 per hour, and she will also have to pay for a water safety course that costs \$10. Maria wants to spend no more than \$280 for the rental and the course. If the boat rental is available only for a whole number of hours, what is the maximum number of hours for which Maria can rent the boat?

Medium

- (1) **f224df07** MULTIPLE CHOICE One answer only

A cargo helicopter delivers only 100–pound packages and 120–pound packages. For each delivery trip, the helicopter must carry at least 10 packages, and the total weight of the packages can be at most 1,100 pounds. What is the maximum number of 120–pound packages that the helicopter can carry per trip?

- a. 4
- b. 5
- c. 2
- d. 6

(2) **b1228811** MULTIPLE CHOICE One answer only

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.
$$\begin{aligned} 640x + 880y &\leq 9700 \\ x + y &\leq 10 \\ x &\leq 3 \\ y &\leq 1 \end{aligned}$$

b.
$$\begin{aligned} 640x + 880y &\geq 9700 \\ x + y &\geq 10 \\ x &\leq 3 \\ y &\leq 1 \end{aligned}$$

c.
$$\begin{aligned} 640x + 880y &\geq 9700 \\ x + y &\leq 10 \\ x &\geq 3 \\ y &\geq 1 \end{aligned}$$

d.
$$\begin{aligned} 640x + 880y &\leq 9700 \\ x + y &\geq 10 \\ x &\geq 3 \\ y &\geq 1 \end{aligned}$$

(3) **64c85440**

MULTIPLE CHOICE

One answer only

In North America, the standard width of a parking space is at least 7.5 feet and no more than 9.0 feet. A restaurant owner recently resurfaced the restaurant's parking lot and wants to determine the number of parking spaces, n , in the parking lot that could be placed perpendicular to a curb that is 135 feet long, based on the standard width of a parking space. Which of the following describes all the possible values of n ?

- a. $18 \leq n \leq 135$
- b. $15 \leq n \leq 18$
- c. $15 \leq n \leq 135$
- d. $7.5 \leq n \leq 9$

(4) 968e9e51 MULTIPLE CHOICE One answer only

$$y \leq xy \leq -x$$

Which of the following ordered pairs (x, y) is a solution to the system of inequalities above?

- a. $(1, 0)$
- b. $(0, 1)$
- c. $(-1, 0)$
- d. $(0, -1)$

(5) **bf5f80c6**

MULTIPLE CHOICE

One answer only

$$y < -4x + 4$$

Which point (x, y) is a solution to the given inequality in the xy -plane?

- a. $(0, 5)$
- b. $(-4, 0)$
- c. $(2, 1)$
- d. $(2, -1)$

(6) 948087f2

MULTIPLE CHOICE

One answer only

$y \leq 3x + 1$
$x - y > 1$

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

- a. $(2, -1)$
- b. $(-2, -1)$
- c. $(-1, 3)$
- d. $(1, 5)$

(7) 90bd9ef8 MULTIPLE CHOICE One answer only

The average annual energy cost for a certain home is \$4,334. The homeowner plans to spend \$25,000 to install a geothermal heating system. The homeowner estimates that the average annual energy cost will then be \$2,712. Which of the following inequalities can be solved to find t , the number of years after installation at which the total amount of energy cost savings will exceed the installation cost?

- a. $25,000 < (4,334 - 2,712)t$
- b. $25,000 - 4,334 > 2,712t$
- c. $25,000 > \frac{4,332}{2,712}t$
- d. $25,000 > (4,334 - 2,712)t$

- (8) **e9ef0e6b** MULTIPLE CHOICE One answer only

A model estimates that whales from the genus *Eschrichtius* travel 72 to 77 miles in the ocean each day during their migration. Based on this model, which inequality represents the estimated total number of miles, x , a whale from the genus *Eschrichtius* could travel in 16 days of its migration?

- a. $72 + 16 \leq x \leq 77 + 16$
- b. $72 \leq 16x \leq 77$
- c. $(72)(16) \leq x \leq (77)(16)$
- d. $72 \leq 16 + x \leq 77$

(9) **b31c3117**

MULTIPLE CHOICE

One answer only

$$H = 120p + 60$$

The Karvonen formula above shows the relationship between Alice's target heart rate H , in beats per minute (bpm), and the intensity level p of different activities. When $p = 0$, Alice has a resting heart rate. When $p = 1$, Alice has her maximum heart rate. It is recommended that p be between 0.5 and 0.85 for Alice when she trains. Which of the following inequalities describes Alice's target training heart rate?

- a. $102 \leq H \leq 120$
- b. $120 \leq H \leq 162$
- c. $60 \leq H \leq 102$
- d. $60 \leq H \leq 162$

(10) **80da233d**

MULTIPLE CHOICE

One answer only

A certain elephant weighs 200 pounds at birth and gains more than 2 but less than 3 pounds per day during its first year. Which of the following inequalities represents all possible weights w , in pounds, for the elephant 365 days after birth?

- a. $930 < w < 1,295$
- b. $565 < w < 930$
- c. $730 < w < 1,095$
- d. $400 < w < 600$

Hard

- (1) 45cfb9de MULTIPLE CHOICE One answer only

Adam's school is a 20-minute walk or a 5-minute bus ride away from his house. The bus runs once every 30 minutes, and the number of minutes, w , that Adam waits for the bus varies between 0 and 30. Which of the following inequalities gives the values of w for which it would be faster for Adam to walk to school?

- a. $w + 5 > 20$
- b. $w - 5 < 20$
- c. $w + 5 < 20$
- d. $w - 5 > 20$

- (2) **95cad55f** MULTIPLE CHOICE One answer only

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.
$$\begin{array}{l} 7.35d + 6.2s \leq 300 \\ 2d \geq s \end{array}$$
- b.
$$\begin{array}{l} 14.7d + 6.2s \leq 300 \\ d \geq 2s \end{array}$$
- c.
$$\begin{array}{l} 7.35d + 6.2s \leq 300 \\ d \geq 2s \end{array}$$
- d.
$$\begin{array}{l} 14.7d + 6.2s \leq 300 \\ 2d \geq s \end{array}$$

(3) **ee2f611f** SHORT ANSWER Case-Insensitive

A local transit company sells a monthly pass for \$95 that allows an unlimited number of trips of any length. Tickets for individual trips cost \$1.50, \$2.50, or \$3.50, depending on the length of the trip. What is the minimum number of trips per month for which a monthly pass could cost less than purchasing individual tickets for trips?

(4) **1a621af4** SHORT ANSWER Case-Insensitive

A number x is at most 2 less than 3 times the value of y . If the value of y is -4 , what is the greatest possible value of x ?

(5) **1035faea** MULTIPLE CHOICE One answer only

A psychologist set up an experiment to study the tendency of a person to select the first item when presented with a series of items. In the experiment, 300 people were presented with a set of five pictures arranged in random order. Each person was asked to choose the most appealing picture. Of the first 150 participants, 36 chose the first picture in the set. Among the remaining 150 participants, p people chose the first picture in the set. If more than 20% of all participants chose the first picture in the set, which of the following inequalities best describes the possible values of p ?

- a. $p > 0.20(300 + 36)$, where $p \leq 150$
- b. $p - 36 > 0.20(300)$, where $p \leq 150$
- c. $p + 36 > 0.20(300)$, where $p \leq 150$
- d. $p > 0.20(300 - 36)$, where $p \leq 150$

(6) **e8f9e117** SHORT ANSWER Case-Insensitive

$$I = \frac{V}{R}$$

The formula above is Ohm's law for an electric circuit with current I , in amperes, potential difference V , in volts, and resistance R , in ohms. A circuit has a resistance of 500 ohms, and its potential difference will be generated by n six-volt batteries that produce a total potential difference of $6n$ volts. If the circuit is to have a current of no more than 0.25 ampere, what is the greatest number, n , of six-volt batteries that can be used?

(7) **963da34c** MULTIPLE CHOICE One answer only

A shipping service restricts the dimensions of the boxes it will ship for a certain type of service. The restriction states that for boxes shaped like rectangular prisms, the sum of the perimeter of the base of the box and the height of the box cannot exceed 130 inches. The perimeter of the base is determined using the width and length of the box. If a box has a height of 60 inches and its length is 2.5 times the width, which inequality shows the allowable width x , in inches, of the box?

- a. $0 \leq x \leq 10$
- b. $0 \leq x \leq 17\frac{1}{2}$
- c. $0 \leq x \leq 11\frac{2}{3}$
- d. $0 \leq x \leq 20$

- (8) **b8e73b5b** MULTIPLE CHOICE One answer only

Ken is working this summer as part of a crew on a farm. He earned \$8 per hour for the first 10 hours he worked this week. Because of his performance, his crew leader raised his salary to \$10 per hour for the rest of the week. Ken saves 90% of his earnings from each week. What is the least number of hours he must work the rest of the week to save at least \$270 for the week?

- a. 22
- b. 33
- c. 38
- d. 16

(9) 830120b0

MULTIPLE CHOICE

One answer only

$$y > 2x - 12x > 5$$

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

- a. $y > \frac{3}{2}$
- b. $y > \frac{5}{2}$
- c. $y > 4$
- d. $y > 6$

Total of marks: 27