CHAPTER EXERCISE: Answers for this chapter start on page 272.

A calculator should NOT be used on the following questions.

1

$$3x - 5y = -11$$
$$x = 1 - 3y$$

What is the solution (x, y) to the system of equations above?

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

2

$$y + 2x = 20$$
$$6x - 5y = 12$$

What is the solution (x, y) to the system of equations above?

A) $(-7, 6)$
B) $(-6, 7)$
C) $(6, 7)$
D) $(7, 6)$

3

$$3x - 4y = 21$$
$$4x - 3y = 14$$

If (x, y) is a solution to the system of equations above, what is the value of $y - x$?

A) -18
B) -5
C) 5
D) 8

4

$$2x + 5y = 24$$
$$x + 4y = 15$$

If (x, y) satisfies the system of equations above, what is the value of $x + y$?

A) 7
B) 8
C) 9
D) 10

5

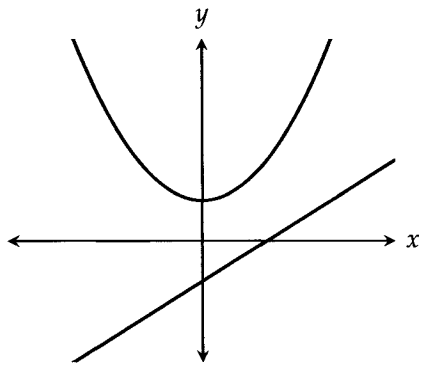
$$3x + y = -2x + 8$$
$$-3x + 2y = -10$$

If (x, y) is a solution to the system of equations above, what is the value of xy?

A) -16
B) -8
C) -4
D) 4

6

$$y = x^2 + 1$$
$$y = x - 1$$



A system of two equations and their graphs in the xy-plane are shown above. How many solutions does the system have?

A) Zero
B) One
C) Two
D) Three

7

$$-5x = y + 2$$
$$2(2x - 1) = 3 - 3y$$

What is the solution (x, y) to the system of equations above?

A) $(-2, 8)$
B) $(-1, 3)$
C) $(1, -7)$
D) $(3, -17)$

8

$$2x - 4y = 8$$
$$x + 2y = 4$$

How many solutions (x, y) are there to the system of equations above?

A) Zero
B) One
C) Two
D) More than two

9

$$2x - 5y = a$$
$$bx + 10y = -8$$

In the system of equations above, a and b are constants. If the system has infinitely many solutions, what is the value of a?

A) -4
B) $\frac{1}{4}$
C) 4
D) 16

10

$$ax + 2y = 5$$
$$3x - 6y = 20$$

In the system of equations above, a is a constant. If the system has one solution, which of the following can NOT be the value of a?

A) -1
B) $\frac{3}{4}$
C) 1
D) 3

11

$$4x - \frac{1}{3}y = -8$$

$$y = 4x + 16$$

What is the solution (x, y) to the system of equations above?

A) $(-2, 8)$
B) $(-1, 12)$
C) $(1, 20)$
D) $(3, 28)$

12

$$y = 0.5x + 14$$

$$x - y = -18$$

According to the system of equations above, what is the value of y?

10

13

$$\frac{1}{3}x - \frac{1}{6}y = 4$$

$$6x - ay = 8$$

In the system of equations above, a is a constant. If the system has no solution, what is the value of a?

A) $\frac{1}{3}$
B) 1
C) 3
D) 6

14

$$3x - 6y = 15$$

$$-2x + 4y = -10$$

How many solutions (x, y) are there to the system of equations above?

A) Zero
B) One
C) Two
D) More than two

15

$$mx - 6y = 10$$

$$2x - ny = 5$$

In the system of equations above, m and n are constants. If the system has infinitely many solutions, what is the value of $\frac{m}{n}$?

A) $\frac{1}{12}$
B) $\frac{1}{3}$
C) $\frac{4}{3}$
D) 3

$\frac{m}{2} = \frac{6}{n} = \frac{10}{5}$

16

$$y = \sqrt{x} + 3$$

$$\sqrt{4x} - y = 3$$

If (x, y) is the solution to the system of equations above, what is the value of y?

A calculator is allowed on the following questions.

17

A local supermarket sells jelly in small, medium, and large jars. Sixteen small jars weigh as much as two medium jars and one large jar. Four small jars and one medium jar have the same weight as one large jar. How many small jars have the weight of one large jar?

A) 7
B) 8
C) 9
D) 10

18

On a math test with 30 questions, 5 points are rewarded for each correct answer and 2 points are deducted for each incorrect answer. If James answered all the questions and scored 59 points, solving which of the following systems of equations gives his number of correct answers, x, and his number of incorrect answers, y, on the math test?

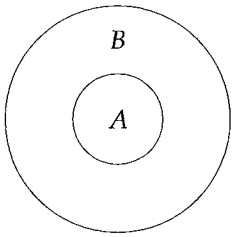
A) $x + y = 59$
$5x - 2y = 30$

B) $x + y = 30$
$5x + 2y = 59$

C) $x + y = 30$
$2x - 5y = 59$

D) $x + y = 30$
$5x - 2y = 59$

19



A game of darts rewards points depending on which region is hit. There are two regions, A and B, as shown above. James throws 3 darts, hitting region A once and region B twice, for a total of 18 points. Oleg also throws 3 darts, but hits regions A twice and region B once for a total of 21 points. How many points are rewarded for hitting region B once?

20

A restaurant has two types of tables, rectangular ones that can each seat 4 people and circular tables that can each seat 8 people. If 144 people are enough to fill all 30 tables at the restaurant, how many rectangular tables does the restaurant have?

A) 12
B) 16
C) 20
D) 24

10 Inequalities

Just as we had equations and systems of equations, we can have inequalities and systems of inequalities.

The only difference is that you must reverse the sign every time you either multiply or divide both sides by a negative number.

For example,

$$2x + 3 < 9$$

Do we have to reverse the sign at any point? Well, we would subtract by 3 to get $2x < 6$ and then divide by 2 to get $x < 3$. Yes, we did a subtraction but at no point did we multiply or divide by a negative number. Therefore, the sign stays the same.

Let's take another example:

$$3x + 5 < 4x + 4$$

The first step is to combine like terms. We subtract both sides by $4x$ to get the x's on the left hand side. We then subtract both sides by 5 to get the constants on the right hand side:

$$3x - 4x < 4 - 5$$
$$-x < -1$$

Notice that the sign hasn't changed yet. Now, to get rid of the negative in front of the x, we need to **multiply** both sides by -1. Doing so means we need to reverse the sign.

$$x > 1$$

This concept is the cause of so many silly mistakes that it's important to reiterate it. Just working with negative numbers does NOT mean you need to change the sign. Some students see that they're dividing a negative number and impulsively reverse the sign. Don't do that. Only reverse the sign when you multiply or divide both sides **by** a negative number.