Solving a Linear System By Substitution Practice

Use the following information to answer the first question.

A.	B.
$6x - 2y = 9$ $3x + 10y = -1$	$4x + y = 8$ $7x - 11y = -5$
C.	D.
$2m + 6n = 16$ $m - 9 = 12n$	$-12m = 3n + 4$ $5m + 3m = 11$

1. Of the 4 linear systems listed above, the 2 *most* suitable for solving by the substitution method are

   A) A and B   B) C and D   C) B and C   D) A and D

2. When y is isolated in the equation, $7 = 8x + y$, the correct equivalent equation is

   A) $-7 - 8x = y$ B) $7 + 8x = y$ C) $-7 + 8x = y$ D) $7 - 8x = y$

3. The value of x in the linear system is _____. Verify.

   $$7x + 3y = -3$$
   $$x - 2y = 19$$

4. The solution to the linear system

   $$2x + 3y = 224$$
   $$y = 10x$$

   is

   A) $(7, -70)$

   B) $(-7, -70)$

   C) $(7, 70)$

   D) $(-7, 70)$

Use the following information to answer the next question.

A math student was asked to solve the linear system:
$$11 = 3x - 2y$$
$$5x = y + 16$$

The initial part of his work is shown below.

Step 1	y = 5x - 16
Step 2	11 = 3x – 2(5x – 16)
Step 3	11 = 3x – 10x – 32
Step 4	42 = -7x
Step 5	x = -6
Step 6	5(-6) = y + 16 -46 = y

5. Unfortunately, his work is not correct. The step where he makes the first error is

A) Step 1   B) Step 2   C) Step 3   D) Step 4

6. The solution to the linear system | -x + 2k = 6 | is (-8, k).
   Determine the value of k. | 3x – k = -23 |

7. Sam scored 80% on part A of a math test and 92% on part B of the math test. His total mark for the test was 63%. The total marks possible for the test was 75. How many marks is each part worth? [Show the system of linear equations and solve with the substitution method]

Solving a Linear System By Substitution Practice Solutions

Use the following information to answer the first question.

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$6x - 2y = 9$ $3x + 10y = -1$	$4x + y = 8$ $7x - 11y = -5$
C.	D.
$2m + 6n = 16$ $m - 9 = 12n$	$-12m = 3n + 4$ $5m + 3m = 11$

1. Of the 4 linear systems listed above, the 2 *most* suitable for solving by the substitution method are

   A) A and B   B) C and D   C) B and C   D) A and D

Solution

The substitution method works best when the initial goal is to isolate a variable that has a coefficient of positive one. For choice B above, the variable *y* in the first equation has a coefficient of positive one. For choice C above, the variable *m* in the second equation has a coefficient of positive one.

The coefficients for all of the other variables, in all of the options, is not positive one.

The correct answer is C.

2. When *y* is isolated in the equation, $7 = 8x + y$, the correct equivalent equation is

   A) $-7 - 8x = y$ B) $7 + 8x = y$ C) $-7 + 8x = y$ D) $7 - 8x = y$

Solution

To isolate y, subtract 8x from both sides of the equation.

The correct answer is D.

3. The value of x in the linear system is __3__. Verify.

$$7x + 3y = -3$$
$$x - 2y = 19$$

Solution

Isolate x in the second equation $\longrightarrow$ $x = 2y + 19$

Substitute this expression for x into the first equation.

$7(2y + 19) + 3y = -3$

Solve for y.

$14y + 133 + 3y = -3$

$17y + 133 = -3$

$17y = -136$

$y = -8$

Substitute this value for y into **either** equation to solve for x.

$x - 2(-8) = 19$

$x + 16 = 19$

$x = 3$

The solution is $(3, -8)$.

The value of x in the linear system is __3__.

Verify

$7x + 3y = -3$ $x - 2y = 19$

$7(3) + 3(-8) = -3$ $(3) - 2(-8) = 19$

21 + (-24) = -3   3 + 16 = 19

-3 = -3   19 = 19

4. The solution to the linear system | 2x + 3y = 224 | is
   | y = 10x |
   A) (7, -70)
   B) (-7, -70)
   C) (7, 70)
   D) (-7, 70)

Solution

Substitute 10x for y in the first equation.

2x + 3(10x) = 224

2x + 30x = 224

32x = 224

x = 7

Substitute x = 7 into **either** equation to find y.

y = 10(7)

y = 70

The solution is (7,70).

The correct answer is C.

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Step 3	$11 = 3x - 10x - 32$
Step 4	$42 = -7x$
Step 5	$x = -6$
Step 6	$5(-6) = y + 16$
	$-46 = y$

5. Unfortunately, his work is not correct. The step where he makes the first error is

   A) Step 1   B) Step 2   C) Step 3   D) Step 4

Solution

In step 3, when clearing the brackets, the multiplication is not correct. Step 3 should be:

$11 = 3x - 10x + 32$

The correct answer is C.

6. The solution to the linear system

$$-x + 2k = 6$$
$$3x - k = -23$$

is (-8, k). Determine the value of k.

Solution

When given a solution, the ordered pair will satisfy the equation. In other words, we can substitute what we know, to determine what we do not know.

Select either equation and substitute -8 for x.

-(-8) + 2k = 6

8 + 2k = 6

2k = -2

k = -1

The value of k is -1.

7. Sam scored 80% on part A of a math test and 92% on part B of the math test. His total mark for the test was 63%. The total marks possible for the test was 75. How many marks is each part worth? [Show the system of linear equations and solve with the substitution method]

Solution

Let A = number of marks in Part A

Let B = number of marks in Part B

A + B = 75

0.8A + 0.92B = 63

Isolate either A or B in the first equation.

A = 75 – B

0.8(75 – B) + 0.92B = 63

60 – 0.8B + 0.92B = 63

60 + 0.12B = 63

0.12B = 3

B = 25

A = 75 – 25

A = 50

Part A was worth 50 marks and Part B was worth 25 marks.