

BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 05
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Exam 2
September 29, 2016

Name: _____

Directions: Write your answers in the provided space. To get full credit you *must* show all your work. Simplify your answers whenever possible. Be certain to indicate your final answer clearly. **Each question is worth 4 points**

1. Evaluate: $30 - 3^3 \div 9 \cdot 3 = 30 - 27 - 9 \cdot 3 = 30 - 3 \cdot 3 = 30 - 9 = 21$
A. 29 B. 1 **C. 21** D. -1

2. Write a mathematical statement that represent the following English statement:

Seven less than three times a number is 53.

$$3n - 7 = 53$$

3. Find the number that satisfies the statement in Question 2.

$$\begin{aligned} 3n - 7 = 53 &\Leftrightarrow 3n = 53 + 7 \\ &\Leftrightarrow \frac{3n}{3} = \frac{60}{3} \\ &\Leftrightarrow n = 20 \end{aligned}$$

The number is 20

4. Evaluate $a^2 - b^2$, when $a = 4$ and $b = -4$. $(4)^2 - (-4)^2 = 16 - 16 = 0$
A. 0 B. 32 C. -32 D. 16

5. Evaluate the expression $x^2 - x + y^2$, when $x = -3$ and $y = -2$.

$$\begin{aligned} (-3)^2 - (-3) + (-2)^2 &= 9 - (-3) + 4 \\ &= 9 + 3 + 4 \\ &= 12 + 4 \\ &= \mathbf{16} \end{aligned}$$

$$\frac{(-14) - (-7)}{(5) - (-2)} = \frac{-14+7}{5+2} = \frac{-7}{7} = -1$$

6. Evaluate the expression $\frac{y_2 - y_1}{x_2 - x_1}$, when $x_1 = -2$, $x_2 = 5$, $y_1 = -7$, and $y_2 = -14$.

- A. $\frac{1}{3}$ B. $-\frac{1}{3}$ C. 1 **D. -1**

7. Solve for a : $3(5 - 2a) = 1 - 20a \Leftrightarrow 15 - 6a = 1 - 20a \Leftrightarrow 20a - 6a = 1 - 15$

- A. $a = 1$ **B. $a = -1$** C. $a = -\frac{7}{9}$ D. $a = \frac{7}{13}$

$$\Leftrightarrow \frac{14a}{14} = \frac{-14}{14}$$

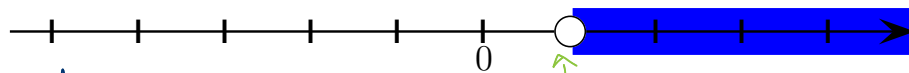
$$\Leftrightarrow a = -1$$

8. If n represents a number, which equation is correct translation of the sentence?

15 is 12 less than 2 times a number.

- A. $15 = 12 - 2n$ B. $15 = 2(n - 12)$ **C. $15 = 2n - 12$** D. $15 = 2(12 - n)$

9. The following is the graph of the solution set of a linear inequality.



Using Test Value 0

The inequality is:

- A. $x + 1 < 2$ **B. $x + 1 > 2$** C. $x + 1 \leq 2$ D. $x + 1 \geq 2$

$1 < 2$ (T) $1 > 2$ (F)

Border Value

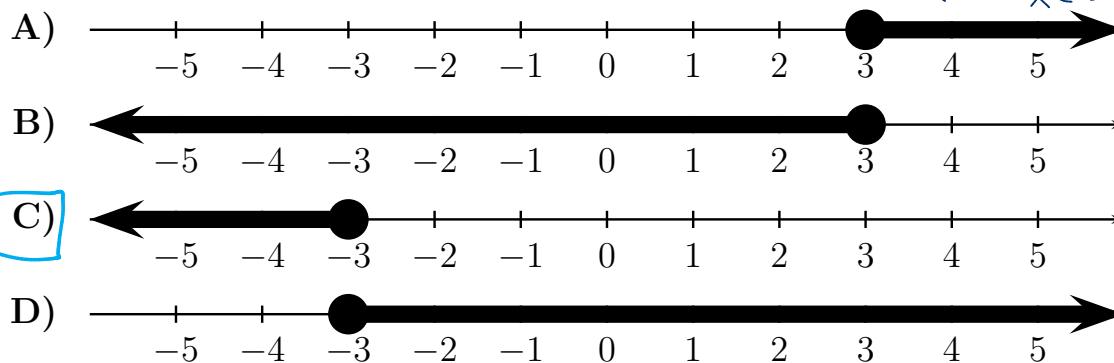
10. Find the graph of the solution to the inequality $2x - 6 \geq 5x + 3$

$$2x - 6 = 5x + 3$$

$$\Leftrightarrow 2x - 5x = 3 + 6$$

$$\Leftrightarrow -3x = 9 / -3$$

$$\Leftrightarrow x = -3$$



Test Value $x = 0$

$-6 \geq 3$ (F)

11. Solve for z : $3x - 7z = 5 - 2y \Leftrightarrow \frac{3x + 2y - 5}{7} = \frac{7z}{7}$

A. $z = -7(3x + 2y - 5)$

B. $z = \frac{3x + 2y - 5}{7}$

$$\Leftrightarrow \frac{3x + 2y - 5}{7} = z$$

C. $z = \frac{5 - 3x - 2y}{7}$

D. $z = \frac{3x - 2y + 5}{7}$

12. Evaluate the expression $\sqrt{b^2 - 4ac}$, when $a = 4$, $b = -4$, $c = -3$.

$$\begin{aligned}\sqrt{(-4)^2 - 4(4)(-3)} &= \sqrt{16 - 4(4)(-3)} \\ &= \sqrt{16 - (16)(-3)} \\ &= \sqrt{16 - (-48)} \\ &= \sqrt{16 + 48} \\ &= \sqrt{64} \\ &= \boxed{8}\end{aligned}$$

13. Solve the equation: $\frac{x-2}{5} + \frac{8-x}{3} = x$ LCD = 15

$$\begin{aligned}\frac{3}{15} \cdot \frac{x-2}{5} + \frac{5}{15} \cdot \frac{8-x}{3} &= 15x \Leftrightarrow 3(x-2) + 5(8-x) = 15x \\ \Leftrightarrow 3x - 6 + 40 - 5x &= 15x \\ \Leftrightarrow -2x + 34 &= 15x \\ \Leftrightarrow 34 &= 15x + 2x \\ \Leftrightarrow \frac{34}{17} &= \frac{17x}{17} \\ \Leftrightarrow \boxed{2} &= x\end{aligned}$$

14. Solve the equation:

$$\begin{aligned}-2(3x-1) &= 5(x+2) - 11x + 7 \\ \Leftrightarrow -6x + 2 &= 5x + 10 - 11x + 7 \\ \Leftrightarrow -6x + 2 &= -6x + 17 \text{ Impossible} \\ \Leftrightarrow -6x + 6x &= 17 - 2 \\ \Leftrightarrow 0 &= 15\end{aligned}$$

So this equation is a contradiction
The equation has no solutions.

15. Find b if when $x = 2$, $y = -3$, and $m = 2$, the following equation is true:

$$y = mx + b$$

$$(-3) = (2)(2) + b$$

$$\Leftrightarrow -3 = 4 + b$$

$$\Leftrightarrow -3 - 4 = b$$

$$\Leftrightarrow \boxed{-7 = b}$$

16. Solve the following equation:

$$3(x + 7) - 8 = x + 3 \Leftrightarrow 3x + 21 - 8 = x + 3$$

$$\Leftrightarrow 3x + 13 = x + 3$$

$$\Leftrightarrow 3x - x = 3 - 13$$

$$\Leftrightarrow \frac{2x}{2} = \frac{-10}{2}$$

$$\Leftrightarrow \boxed{x = -5}$$

17. Solve the following inequality, and graph the solution set in the provided graph.

$$9 - 2(2x + 3) < -7x - 3$$

First we find the Border Value

Using Test Value $x = 0$

$$9 - 2(2x + 3) = -7x - 3$$

$$\Leftrightarrow 9 - 4x - 6 = -7x - 3$$

$$9 - 2(3) < -3 \Leftrightarrow 9 - 6 < -3$$

$$\Leftrightarrow 3 - 4x = -7x - 3$$

$$\Leftrightarrow 3 < -3$$

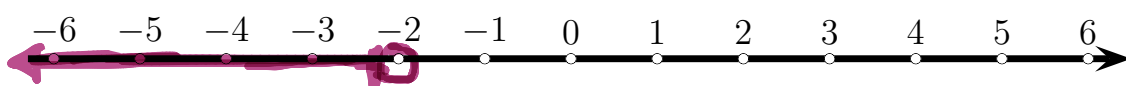
$$\Leftrightarrow -4x + 7x = -3 - 3$$

This is FALSE

$$\Leftrightarrow \frac{3x}{3} = \frac{-6}{3}$$

$$\Leftrightarrow \boxed{x = -2}$$

The graph of the solution set is:



$$LCD = 6$$

18. Solve the equation:

$$\frac{2x}{3} + 1 = \frac{x}{2} \Leftrightarrow \cancel{6} \frac{2x}{\cancel{3}} + 6 \cdot 1 = \cancel{6} \frac{x}{\cancel{2}}$$

$$\Leftrightarrow 4x + 6 = 3x$$

$$\Leftrightarrow 4x - 3x = -6$$

$$\Leftrightarrow \boxed{x = -6}$$

19. Find y so that when $x = -2$ the following equation is true:

Substituting $x = -2$

$$3x - 5y = 7$$

$$3(-2) - 5y = 7 \Leftrightarrow -6 - 5y = 7$$

$$\Leftrightarrow -5y = 7 + 6$$

$$\Leftrightarrow \frac{-5y}{-5} = \frac{13}{-5}$$

$$\Leftrightarrow \boxed{y = -\frac{13}{5}}$$

20. The length of a rectangle is 6 inches less than twice its width. Find the dimensions of the rectangle if its perimeter is 12 inches.

If x is the width then the length is $2x - 6$. So the perimeter is $2x + 2(2x - 6)$. So.

$$2x + 2(2x - 6) = 12 \Leftrightarrow 2x + 4x - 12 = 12$$

$$\Leftrightarrow 6x - 12 = 12$$

$$\Leftrightarrow 6x = 12 + 12$$

$$\Leftrightarrow \frac{6x}{6} = \frac{24}{6}$$

$$\Leftrightarrow x = 4$$

The width is 4 inches and the length $2 \cdot 4 - 6 = 2$ inches

21. Solve for w : $\frac{V}{lh} = \frac{twh}{\cancel{t}h} \Leftrightarrow \frac{V}{lh} = w \Leftrightarrow \boxed{w = \frac{V}{lh}}$

22. The sum of three consecutive integers is 51. Find the integers.

If x is the smallest the other two integers are $x+1$, $x+2$

So we have $x + (x+1) + (x+2) = 51 \Leftrightarrow 3x + 3 = 51$

$$\Leftrightarrow 3x = 51 - 3$$

$$\Leftrightarrow \frac{3x}{3} = \frac{48}{3}$$

$$\Leftrightarrow x = 16$$

The integers are 16, 17, 18

23. Recall that the formula that converts degrees Fahrenheit F to degrees Celsius C :

$$C = \frac{5}{9}(F - 32)$$

The temperature of an object measured in degrees Celsius is 60 more than when it is measured in Fahrenheit. What is the temperature of the object?

The temperature in F of the object satisfies

$$9(F + 60) = 9 \frac{5}{9} (F - 32) \Leftrightarrow 9F + 540 = 5F - 160$$

$$\Leftrightarrow 9F - 5F = -160 - 540$$

$$\Leftrightarrow \frac{4F}{4} = -\frac{700}{4}$$

$$\Leftrightarrow F = -175$$

The temperature of the object is -175°F (or -115°C).

24. $\frac{3}{2}$ is a solution of the equation $4x^2 - 4x - 3 = 0$

A. True B. False

$$4\left(\frac{3}{2}\right)^2 - 4\left(\frac{3}{2}\right) - 3 = 0$$

$$\Leftrightarrow 4\left(\frac{9}{4}\right) - 4\left(\frac{3}{2}\right) - 3 = 0$$

$$\Leftrightarrow 9 - 6 - 3 = 0$$

25. For a linear equation with one unknown both 0 and -7 are solutions. Which of the following must necessarily be true?

A. There are no other solutions.

B. -4 is also a solution.

C. We can't know all solutions.

D. This can't happen with a linear equation.

A linear equation with one variable has exactly one solution, no solution, or all numbers are solutions. Our equation has two different solutions, this can happen only if all numbers are solutions. So -4 is also a solution.