

BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 05
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Exam 1
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KEY

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 problem is worth 5 points

1. Evaluate: $5 - 3(4 - 3) - 2^3 \div 8 \cdot 4$

$$= 5 - 3(1) - 2^3 \div 8 \cdot 4 = 5 - 3(1) - 8 \div 8 \cdot 4 = 5 - 3 - 1 \cdot 4 =$$

$$= 5 - 3 - 4 = \boxed{-2}$$

2. Evaluate:

$$\frac{\frac{4}{-16}}{\frac{1}{8}} \cdot \frac{\frac{2}{18}}{\frac{1}{-27}} \cdot \left(\frac{\frac{2}{10}}{\frac{1}{8}} \right) \cdot \frac{\frac{1}{-8}}{\frac{1}{4}} \cdot \frac{\frac{1}{8}}{\frac{1}{4}} = \boxed{+2}$$

3. Evaluate, if $a = -\frac{2}{5}$ and $b = \frac{7}{10}$:

$$-3a + 11b = -3\left(-\frac{2}{5}\right) + 11\left(\frac{7}{10}\right)$$

$$= \frac{6}{5} + \frac{77}{10}$$

$$= \frac{12}{10} + \frac{77}{10} = \boxed{\frac{89}{10}}$$

4. Evaluate if $c = -2$ and $d = -3$: $c^2 - d^2$.

$$(-2)^2 - (-3)^2 = (4) - (9) = \boxed{-5}$$

5. Solve the equation:

$$-2(3x - 1) + 3 = 5(x + 2) - 11x + 8$$

$$-6x + 2 + 3 = 5x + 10 - 11x + 8$$

$$\Leftrightarrow -6x + 5 = -6x + 18$$

$$\Leftrightarrow \underline{0 = 13} \quad \text{impossible}$$

No solutions.

6. Solve the equation:

$$\frac{x-2}{5} + \frac{8-x}{3} = x$$

$$LCD = 15$$

$$3 \cdot \frac{x-2}{5} + 5 \cdot \frac{8-x}{3} = 15 \cdot x \Leftrightarrow 3(x-2) + 5(8-x) = 15x$$

$$\Leftrightarrow 3x - 6 + 40 - 5x = 15x$$

$$\Leftrightarrow -2x + 34 = 15x$$

$$\Leftrightarrow 34 = 17x$$

$$\Leftrightarrow \frac{34}{17} = x$$

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

7. Solve the equation:

$$2(3x - 1) + 2x + 5 = 5x - 2(x - 3) + 12$$

$$\Leftrightarrow 6x - 2 + 2x + 5 = 5x - 2x + 6 + 12$$

$$\Leftrightarrow 8x + 3 = 3x + 18$$

$$\Leftrightarrow 5x = 15$$

$$\Leftrightarrow \boxed{x = 3}$$

8. Solve for m : $\frac{2am}{b} - 2 = 7a + 4 \iff \frac{2am}{b} = 7a + 6$

$\iff \frac{2am}{2a} = \frac{7ab + 6b}{2a}$

$\iff m = \frac{7ab + 6b}{2a}$

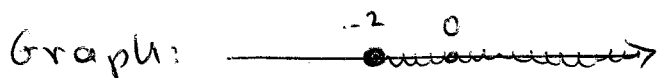
9. Solve the following inequality, give the answer using interval notation and graph the solution set.

$9 - 2(2x + 3) \geq -7x - 3 \iff 9 - 4x - 6 \geq -7x - 3$

$\iff 3 - 4x \geq -7x - 3$

$\iff 3x \geq -6$

$\iff x \geq -2$



Interval $[-2, \infty)$

10. The width of a rectangle is 2 inches more than 3 times its length. If the perimeter of the rectangle is 84 inches find its dimensions.

Let l be the length of the rectangle, in inches. Then the width will be $3l + 2$. Then the perimeter is $2l + 2(3l + 2)$. So we have

$2l + 2(3l + 2) = 84 \iff 2l + 6l + 4 = 84$

$\iff 8l + 4 = 84$

$\iff 8l = 80$

$\iff l = 10$

So the length is 10 inches and the width is $3 \cdot 10 + 2 = \underline{32}$ in.

11. The sum of three consecutive integers is 24. Find the three integers.

Let x be the smaller integer. Then the next is $x + 1$ and the larger $x + 2$. So we have $x + (x + 1) + (x + 2) = 24$

$\iff 3x + 3 = 24 \iff 3x = 21 \iff x = 7$. So the three

consecutive integers are 7, 8, 9.

12. The coordinates of a solution to the following equation:

$$5x - 3y = 25$$

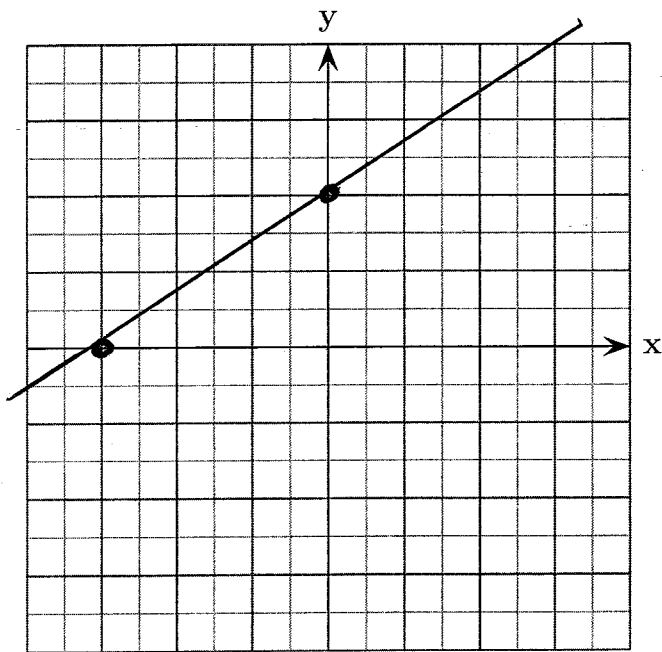
are consecutive integers. What's the solution?

We either
have $y = x + 1$ ①
or $y = x - 1$ ②

① In the first case we get $5x - 3(x + 1) = 25 \Leftrightarrow$
 $\Leftrightarrow 5x - 3x - 3 = 25 \Leftrightarrow 2x - 3 = 25 \Leftrightarrow 2x = 28 \Leftrightarrow x = 14$
 We get the solution $(14, 15)$

② In the second case: $5x - 3(x - 1) = 25 \Leftrightarrow 5x - 3x - 3 = 25$
 $\Leftrightarrow 2x - 3 = 25 \Leftrightarrow 2x = 28 \Leftrightarrow x = 14$ So in this
 case we get the solution $(11, 10)$

13. Graph the line with equation $2x - 3y = -6$ in the following grid.



x	y
0	2
-3	0

$$-3y = -6$$

$$\Leftrightarrow y = 2$$

$$2x = -6$$

$$\Leftrightarrow x = -3$$

14. Find the slope and the x- and y-intercepts of the line with equation $3x - 4y = 12$.

To find the x-intercept: $y = 0$ so $3x = 12 \Rightarrow x = 4$

To find the y-intercept: $x = 0$ so $-4y = 12 \Rightarrow y = -3$

So the line passes through $(4, 0)$ and $(0, -3)$.

~~The~~ Its slope is therefore $m = \frac{-3 - 0}{0 - 4} = \frac{3}{4}$

15. A line has slope -2 and passes through the point $(-1, -3)$. Find its equation.

If b is the y -intercept the equation will be $y = -2x + b$. Substituting the coordinates of the point we have $-3 = -2(-1) + b \Leftrightarrow -3 = 2 + b$
 $\Leftrightarrow \boxed{-5 = b}$

So the equation is $\boxed{y = -2x - 5}$

16. A line passes through the points with coordinates $(-2, 18)$ and $(3, 3)$. Find an equation for this line.

The slope of the line is $m = \frac{18-3}{-2-3} = \frac{15}{-5} = -3$.

If b is the intercept of the line then the equation is $y = -3x + b$. Substituting $(3, 3)$ we have $3 = -3(3) + b \Leftrightarrow 3 = -9 + b \Leftrightarrow \underline{12 = b}$.

So equation is $\boxed{y = -3x + 12}$

17. A line is parallel to the line with equation $4x - 2y = 3$ and contains the point with coordinates $(-3, 4)$. Find the equation of this line.

The equation of the line in standard form will be $4x - 2y = C$, for some number C .

Substituting $(-3, 4)$ we get $4(-3) - 2 \cdot (4) = C$

or equivalently $\underline{-20 = C}$. So the equation

is $\underline{4x - 2y = -20}$ or

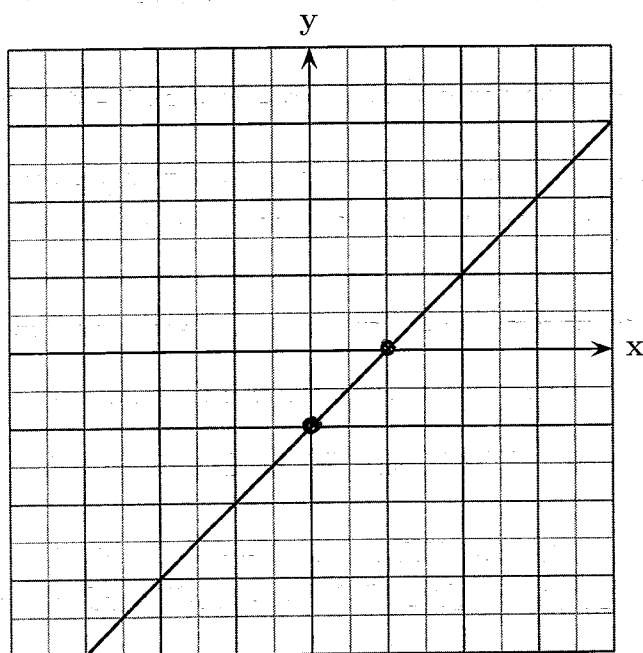
after dividing by 2:

$$\boxed{2x - y = 10}$$

18. A line passes through the point $(3, 4)$ and is parallel to the line with equation $x = -4$. Find its equation.

Since the line is parallel to $x = -4$, it is a vertical line. Since it passes through $(3, 4)$ its equation is $x = 3$

19. Find an equation for the line whose graph is shown below:



From the graph the line contains $(0, -1)$ and $(1, 0)$. So its slope is $m = \frac{0 - (-1)}{1 - 0} = 1$

The y-intercept of the line is -1 .

Thus the equation is

$$y = x - 1$$

20. Do the lines with equations $y = 3x - 4$ and $y = 4x - 3$ intersect? Justify your answer.

The first line has slope 3 and the second has slope 4. Since the slopes are different the lines are not parallel. Therefore they do intersect.