Winter Quiz 3

MATH 100:11 Mathematical Concepts
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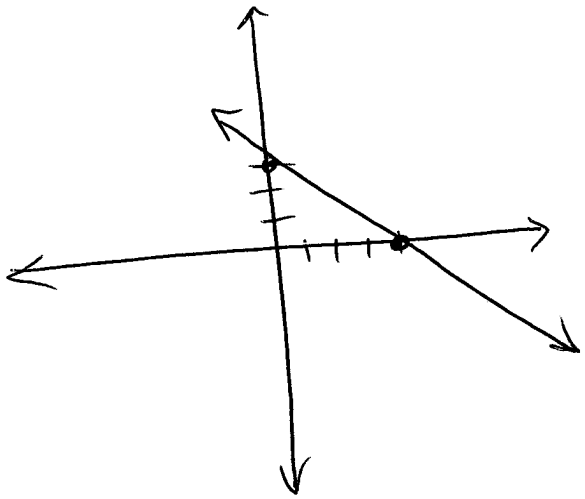
Name: SOLUTIONS

You may use calculators, but each question can be done without them. This quiz is double-sided! Be sure to explain your answers. Even if you get the correct answer, you may not get full marks if you haven't explained how. However, if you don't get the correct answer, you may get partial marks for trying something- so don't leave anything blank! The total quiz is out of 10, and the mark value for each question is given beside the question.

1. Consider the linear equation $3x + 4y = 12$. [4]
   (a) Draw the graph. 1
   (b) Find the value of the x and y-intercepts. 2
   (c) Find the slope. 1

If $x=0$, $3(0)+4y=12 \rightarrow y=3$ point $(0,3)$
If $y=0$, $3x+4(0)=12 \rightarrow x=4$ point $(4,0)$



x intercept is $(4,0)$
y intercept is $(0,3)$

$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{3-0}{0-4} = -\frac{3}{4}$

2. Solve for x and be sure to check your answer: [2]

$$\frac{1}{3}x + \frac{2}{5}x - 7 = \frac{8}{15}x - 4$$

Common denominator is 15

$15\left(\frac{1}{3}\right)x + 15\left(\frac{2}{5}\right)x - 15(7) = \left(\frac{8}{15}\right)(15)x - 15(4)$

$5x + 6x - 105 = 8x - 60$

$11x - 105 = 8x - 60$

$11x - 8x = -60 + 105$

$3x = 45 \rightarrow x = 45/3 = 15$ $\boxed{x = 15}$

Check: $\frac{1}{3}(15) + \frac{2}{5}(15) - 7 = \frac{8}{15}(15) - 4$ $4 = 4$ ✓

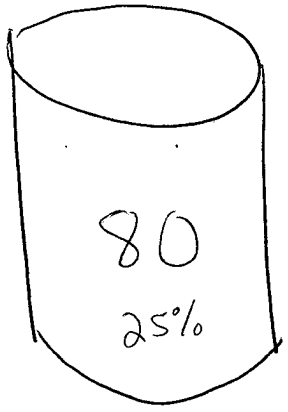
$\frac{5}{3} + 6 - 7 = \frac{8}{3} - 4$

$\frac{5}{3} - 5 = \frac{5}{3} - \frac{15}{3}$

$\frac{8}{3} - 4 = \frac{8}{3} - \frac{12}{3}$

$\boxed{\text{Solution is } x = 15}$

3. Use linear equations to solve the following problem (and check your answer): A tank holds 80 liters of a chemical solution. Currently, the solution has a strength of 25%. How much of this should be drained and replaced with water (which is 0%) to get a final strength of 20%? [4]



Let x = amount of liquid drained

strength	amount of liquid	amount of chemical
25%	$80L - x$	$.25(80 - x)$
0%	x	0
20%	$80L$	$.2(80) = 16 = .25(80 - x)$

$.2(80) = .25(80 - x)$

$\rightarrow 16 = 20 - .25x$

$.25x = 20 - 16 = 4$

$x = \frac{4}{.25} = 16$

16 L should be drained

Check: Left with 64 L of 25% gives 16 L of chemical

$\frac{16L}{80L} = 20\%$