MATH 60 FINAL EXAM

Solve the following equations and inequalities.

1.) $x - (x + 5) - 2(x - 5) = 17 + x$

③

$x - x + 5 - 2x + 10 = 17 + x$
$-2x + 15 = 17 + x$
$-3x = 2$
$x = -\frac{2}{3}$

2.) $\frac{2}{3}(6 - x) \le 0$

②

$4 - \frac{2}{3}x \le 0$
$-\frac{2}{3}x \le 4$
$\frac{2}{3}x \le 6$

3.) $x(2x - 3) - 2(5x - 7) = x^2 + 28$

②

$2x^2 - 3x - 10x + 14 = x^2 + 28$
$x^2 - 13x + 14 = 28$
$x^2 = 13x + 14$

4.) $x + \frac{10}{x} = 7$

③

$x^2 + 10x = 7x$
$x^2 + 3x = 0$
$x(x + 3) = 0$
$x = 0, -3$

5.) $\frac{7}{2x-3} = \frac{5}{x+9}$

③
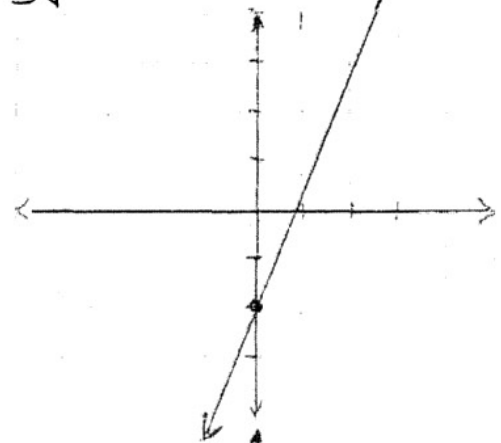
$7x + 63 = 10x - 15$
$-3x = -78$
$x = -26$

6.) Solve for k: $g = \frac{3k - h}{4}$

②

$4g = 3k - h$
$\frac{4}{3}g = k - h$

$\Rightarrow \frac{4}{3}g + h = k$

Graphs of lines.

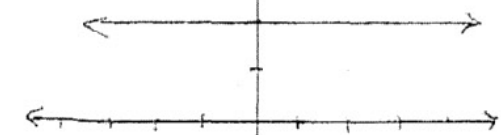**7.)** Show how to draw the graph of the equation: $3x - 7y = 14$

②

$-7y = -3x + 14$
$y = \frac{3}{7}x - 2$

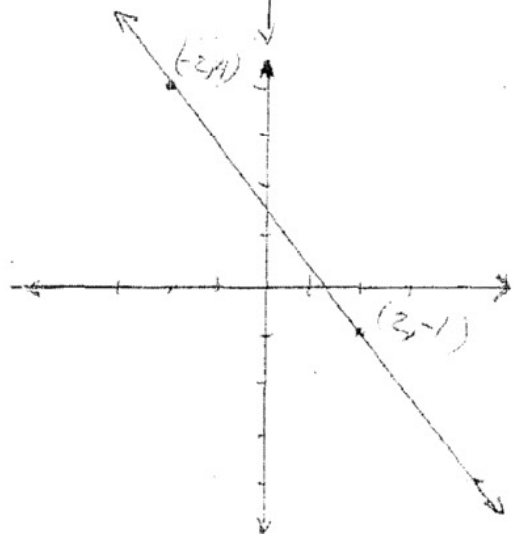**8.)** Draw the graph of a horizontal line and write its equation. What is the slope of the line you drew?

③

$y = 2$
undefined
no slope

9.) Show how to write the equation for the line through the points (-2, 4) and (2, -1)

②

$\frac{4 - 1}{2 - (-2)} = \frac{3}{4}$

$4 = \frac{3}{4}(-2) + b$
$4 = -\frac{3}{2} + b$
$5\frac{1}{2} = b$
$y = \frac{3}{4}x + 5\frac{1}{2}$

Factor each of the following COMPLETELY.

10.) $x^2 - 3x - 70$
$(x-10)(x+7)$

11.) $25x^2 - 30xy + 9y^2 =$
$25x^2 - 25xy - 5xy + 9y^2 =$
$25x(x-y) - 4y(x-5y) =$
$25x(x-y)(x-5y)$

12.) $x^4 - 1 = (x^2-1)(x^2+1)$
$= (x-1)(x+1)(x+1)(x+1)$

13.) $7x^3 - 63x^2 + 140x$
$x(7x^2 - 63x + 140)$
$x(7x-35)(x-4)$

Simplify. Be sure to show all steps, particularly the FACTORS.

14.) $\dfrac{x^2-25}{x+6} \div \dfrac{x^2-10x+25}{5x+30} = \dfrac{(x-5)(x+5)}{x+6} \cdot \dfrac{5x+30}{(x-5)(x-5)} = \dfrac{(x+5)(5x+30)}{(x+6)(x-5)}$

15.) $\dfrac{4x+11}{x^2+3x-4} - \dfrac{3}{x-1}\dfrac{(x+4)}{(x+4)} = \dfrac{4x+11-3x+12}{(x+4)(x-1)} = \dfrac{x+23}{(x+4)(x-1)}$
$(x+4)(x-1)$

16.) $\dfrac{1+\frac{7}{x}}{1-\frac{49}{x^2}} = \dfrac{\left(1+\frac{7}{x}\right)x}{\left(1-\frac{49}{x^2}\right)x^2} = \dfrac{x+7}{x^2-49} = \dfrac{x+7}{(x+7)(x-7)} = x-7$

Solve one of the following word problems by any method, and be sure to write an equation to represent the problem.

17) The perimeter of a triangular flower bed is 87 feet. One side is seven feet longer than the shortest side, and another side is two times as long as the shortest side. Find the lengths of the three sides.

Shortest side			Perim 87
10	17	20	47 too small
20	27	40	87 ✓
x	x+7	2x	
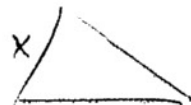
$x+7+2x = 87$
$3x+7 = 87$
$3x = 80$
$x = 26\frac{2}{3}$

18) To determine the number of trout in a lake, a naturalist catches 112 trout, tags them, and throws them back. Later she catches 82 trout, and 32 of them have tags. Show how to use this information to estimate the number of fish in the lake.

$\dfrac{32}{82} = \dfrac{x}{112}$

$82x = 3584$
$x = 43.7$ About 44 trout are in the lake.