**MAT 110 - Test 2 - Open Response Portion - Version E** Name Key

EKU ID _____

Write answers, and only answers, in answer blanks. Show all work in spaces provided.
NO calculator use of any kind is permitted on this portion of the test.
Answers without supporting work may not receive credit.

1) Divide. $\frac{x^2-25}{6x+30} \div \frac{x-5}{x}$ Simplify your answer completely. State any restrictions on the variable.

Answer $\frac{x}{6}$

Restriction(s) on the variable $x \neq 0, -5, 5$

$$\frac{x^2-25}{6x+30} \div \frac{x-5}{x} = \frac{x^2-25}{6x+30} \cdot \frac{x}{x-5} = \frac{(x+5)(x-5)(x)}{6(x+5)(x-5)} = \frac{x}{6}$$

2) Solve the proportion. $\frac{x+3}{5x} = \frac{x-1}{6x}$ Write only valid solution(s) in the blank.

restriction: $x \neq 0$

Solution(s) $x = -23$

$\frac{x+3}{5x} = \frac{x-1}{6x}$ so we have: $(x+3)(6x) = (x-1)(5x)$

$6x^2 + 18x = 5x^2 - 5x$ quadratic!

$-5x^2 + 5x \quad -5x^2 + 5x$

$x^2 + 23x = 0$

$x(x+23) = 0$

$x = 0$ or $x + 23 = 0$

cannot use $x = -23$ ✓

3) Read the scenario below. Do not solve. Answer only the one question that follows.
Scenario:
Beth can travel 208 miles in the same amount of time it takes Anna to travel 192 miles. If Beth's speed is 4 mph greater than Anna's speed, find the rates.

Let the variable " r " represent *Anna's* rate. Write an equation that would be used to solve for the rate.

Equation: $\frac{208}{r+4} = \frac{192}{r}$

$d = rt$ so $\frac{d}{r} = t$ : times are equal

4) Let z vary directly as $\sqrt{x}$ and inversely as y. If z = 24 when x = 4 and y = 3, find k (the constant of variation).

k = 36

$z = \frac{k\sqrt{x}}{y}$ so $24 = \frac{k\sqrt{4}}{3}$

$24 = k\left(\frac{2}{3}\right)$

$\frac{3}{2}(24) = k\left(\frac{2}{3}\right)\left(\frac{3}{2}\right)$

$36 = k$

5) Factor completely: $2x^2 - 5x - 12$ use trial and error or ac method

Answer $(2x+3)(x-4)$

$2x^2 - 5x - 12$

$2x^2 + 3x - 8x - 12$

$x(2x+3) - 4(2x+3)$

$(2x+3)(x-4)$

$ac = 2(-12) = -24$ | $b = -5$

| | |
|---|---|
| 1 | 24 |
| 2 | 12 |
| +3 | −8 |
| 4 | 6 |

6) Write a polynomial equation in standard form with the given roots. x = 3 and x = - 4.

Equation: $x^2 + x - 12 = 0$

$x = 3$ is a root, so $(x - 3)$ is a factor

$x = -4$ is a root, so $(x - (-4))$ or just $(x + 4)$ is a factor

$(x - 3)(x + 4) = 0$

standard form: everything = 0 and at end, be sure terms are in decreasing order of the variable, and all like terms are combined.

$x(x + 4) - 3(x + 4) = 0$

$x^2 + 4x - 3x - 12 = 0$

$x^2 + x - 12 = 0$