Name: _____ Date: _____

3-5 THE REMAINDER THEOREM

FLUENCY

1. Which of the following is the remainder when the polynomial $x^2 - 5x + 3$ is divided by $(x - 8)$?

   (1) 107 (3) 3

   (2) 27 (4) 9

   _____

2. If the ratio $\frac{2x^2 + 17x + 42}{x + 5}$ is placed in the form $q(x) + \frac{r}{x + 5}$, where $q(x)$ is a polynomial, then which of the following is the correct value of *r*?

   (1) −3 (3) 18

   (2) 177 (4) 7

   _____

3. When the polynomial $p(x)$ was divided by the factor $x - 7$ the result was $x + \frac{11}{x - 7}$. Which of the following is the value of $p(7)$?

   (1) −8 (3) 11

   (2) 7 (4) It does not exist

   _____

4. Which of the following binomials is a factor of the quadratic $4x^2 - 35x + 24$? Try to do this without factoring but by using the Remainder Theorem.

   (1) $x + 6$ (3) $x - 8$

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

   _____

5. Which of the following linear expressions is a factor of the cubic polynomial $x^3 + 9x^2 + 16x - 12$?

   (1) $x + 6$ (3) $x - 3$

   (2) $x - 1$ (4) $x + 2$

   _____

6. Consider the cubic polynomial $p(x) = x^3 + x^2 - 46x + 80$.

   (a) Using polynomial long division, write the ratio of $\frac{p(x)}{x-3}$ in **quotient-remainder form**, i.e. in the form $q(x) + \frac{r}{x-3}$. Evaluate $p(3)$. How does this help you check your quotient-remainder form?

   (b) Evaluate $p(5)$. What does this tell you about the binomial $x-5$?

   (c) If $q(x) = \frac{p(x)}{x-5}$, then use polynomial long division to find an expression for the polynomial $q(x)$.

   (d) Use your answer from (c) to **completely factor** the cubic polynomial $p(x)$. Besides $x = 5$, what are its other zeroes?

7. For the cubic $x^3 + 7x^2 + 13x + 3$ has only one rational zero, $x = -3$. Use polynomial long division to show that the remainder is zero when dividing the cubic by $x+3$. Then use the quadratic formula to find the other two (irrational) zeroes.