ALBERT

Name _____ Date _____

Remainder Theorem Worksheet

Algebra 2 · Common Core HSA-APR.B.2

> Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).

Practice

Builds the skill step by step.

1. What is the remainder when $p(x) = x^2 + 3x - 4$ is divided by $x - 2$?

2. What is the remainder when $p(x) = x^3 - 2x + 1$ is divided by $x - 1$?

3. Is $x - 1$ a factor of $x^3 - 2x + 1$?

   A. No, because $p(1) = 1$.

   B. Yes, because $p(1) = 0$.

   C. Yes, because $p(-1) = 0$.

   D. No, because the degree is 3.

4. What is the remainder when $2x^2 - 5x + 3$ is divided by $x - 3$?

5. What is the remainder when $x^2 + 4x + 7$ is divided by $x + 1$?

6. What does the Remainder Theorem say?

   A. The remainder is always 0.

   B. The remainder is the leading coefficient.

   C. The remainder when p(x) is divided by x − a is p(a).

   D. The remainder is p(0).

7. What is the remainder when $x^3 + x^2 - x + 2$ is divided by x + 2?

8. For $p(x) = x^2 - 16$, what is p(4)?

9. What is the remainder when $3x^3 - x$ is divided by x − 2?

10. p(5) = 0. Which must be a factor of p(x)?

    A. x + 5

    B. 5x

    C. x − 0

    D. x − 5

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On Level

Grade-level practice.

1. $x - 2$ is a factor of $x^2 + kx - 10$. What is k?

2. What is the remainder when $x^4 - 3x^2 + 2$ is divided by $x + 1$?

3. Which number is NOT a zero of $x^3 - 6x^2 + 11x - 6$?

   A. 4

   B. 1

   C. 2

   D. 3

4. What is the remainder when $2x^3 + x^2 - 5x + 2$ is divided by $x - 1$?

5. What is the remainder when $x^{100} + 5$ is divided by $x + 1$?

6. Explain how to decide whether $x + 3$ is a factor of $x^3 + 27$ without dividing.

7. When $p(x)$ is divided by $x - 4$, the remainder is 7. What is $p(4)$?

8. When $x^3 + kx + 4$ is divided by $x - 2$, the remainder is 6. What is k?

9. $x - 2$ is a factor of $x^3 - 4x^2 + x + 6$, and the quotient is $x^2 - 2x - 3$. What are the other two zeros? List them from least to greatest.

10. $p(-2) = 5$. What does this tell you?

    A. Dividing $p(x)$ by $x - 2$ leaves remainder 5.

    B. Dividing $p(x)$ by $x + 2$ leaves remainder 5.

    C. $x + 2$ is a factor of $p(x)$.

    D. $p(x)$ has a zero at 5.

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Challenge

Multi-step and word problems that stretch it.

1. $p(x) = x^3 + ax^2 + bx - 6$ has $p(1) = 0$ and $p(-1) = -4$. What are a and b?

2. What is the remainder when $2x^5 - 3x^2 + 1$ is divided by $x + 1$?

3. For $p(x) = 2x^3 - x^2 + 2x - 1$, what is $p(\frac{1}{2})$?

4. $x + 2$ is a factor of $x^3 + kx^2 - 4$. What is k?

5. $p(x)$ leaves remainder 4 when divided by $x - 3$ and remainder -4 when divided by $x + 1$. Its remainder when divided by $(x - 3)(x + 1)$ is $ax + b$. What are a and b?

6. Which equation explains why the Remainder Theorem is true?

   A. $p(x) = q(x) + r$

   B. $p(a) = a \cdot q(a)$

   C. $p(x) = (x - a)q(x) + r$, so $p(a) = r$

   D. $p(x) = (x + a)q(x)$

7. $x = 1$ is a zero of $x^3 - 7x + 6$. What are all three zeros? List them from least to greatest.

8. Explain why the Remainder Theorem is true.

9. What is the remainder when $x^3 - 2x^2 + 3x - 5$ is divided by $x - 2$?

10. How many of the numbers 1, -1, 2 and -2 are zeros of $x^4 - 5x^2 + 4$?