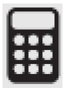
DATE: __________

Unit 2 (Chapter 2): Polynomial & Rational Functions **Pre-Calculus**

2.4 Real Zeroes of Polynomial Functions

Target 2B: Find Real and Complex Zeroes of Polynomials by Synthetic and Long Division



SAT Connection

Passport to Advanced Mathematics

11. Understand the relationship between zeros and factors of polynomials.

Example: For a polynomial $p(x)$, the value of $p(3)$ is -2.
Which of the following must be true about $p(x)$?

A) $x-5$ is a factor of $p(x)$.

B) $x-2$ is a factor of $p(x)$.

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

D) The remainder when $p(x)$ is divided by $x-3$ is -2.

Solution

Rational Zeroes Theorem

Watch a video or view a website to learn about Rational Zeroes Theorem

http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/col_alg_tut38_zero1.htm

https://www.youtube.com/watch?v=7p2yeuAXSCs

Given a polynomial with integer coefficients,

$$f(x) = \underbrace{a_n}_{} x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + \underbrace{a_0}_{},$$

and $x = \frac{p}{q}$ (in lowest terms) is a rational zero of $f(x)$

then, $\frac{p}{q} =$ ______________________________

(write an example from the website/video)

Example 1:

Example 2:

Find the rational zeroes of $f(x) = 2x^3 - 3x^2 - 23x + 12$

- Factors of the constant $\rightarrow$

- Factors of the *l.c.* $\rightarrow$

- Possible rational zeroes:

Example 3: Find the zeroes of $f(x) = x^3 - 6x^2 + 7x + 4$ and identify as rational or irrational.

More Practice

Rational Zeroes Theorem

http://www.sparknotes.com/math/algebra2/polynomials/section4.rhtml
http://www.virtualnerd.com/algebra-2/polynomials/roots-zeros/rational-zero-theorem/rational-zeros-example
http://www.math-prof.com/Alg2/Alg2_Ch_16.asp
https://www.youtube.com/watch?v=YMyv9-9VXw4
https://www.youtube.com/watch?v=7mNBBBspqUc

Homework Assignment

p.206 #33,34,49,51,54,71,72

SAT Connection

Solution

Choice D is correct. If the polynomial $p(x)$ is divided by $x - 3$, the result can be written as $\frac{p(x)}{x-3} = q(x) + \frac{r}{x-3}$, where $q(x)$ is a polynomial and r is the remainder. Since $x - 3$ is a degree 1 polynomial, the remainder is a real number. Hence, $p(x)$ can be written as $p(x) = (x - 3)q(x) + r$, where r is a real number. It is given that $p(3) = -2$ so it must be true that $-2 = p(3) = (3 - 3)q(3) + r = (0)q(3) + r = r$. Therefore, the remainder when $p(x)$ is divided by $x - 3$ is -2.

Choice A is incorrect because $p(3) = -2$ does not imply that $p(5) = 0$. Choices B and C are incorrect because the remainder -2 or its negative, 2, need not be a root of $p(x)$.