Agilemind website- Topic 4 - Introduction to Polynomials
Exploring; Building Polynomials - page 1

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials

Answer SAS2 - Question 1

Definition **Polynomial Function**

$P(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$ where n is a nonnegative integer and the coefficients $a_n, \ldots, a_0$ are real numbers.

also known as Whole Numbers

Polynomials: Exponents must be Whole Numbers

This means exponents can't be:

- Negative
- Fractions (rational #'s)
- Decimals
- Variables

This also means that the variable X can't be

- In a denominator (neg exponent)
- Under a radical (fractional exponent)
- An exponent

Polynomials:

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_2 x^2 + a_1 x + a_0$$

Coefficients are Real Numbers

Which means coefficients can't be imaginary numbers.

Agilemind website- Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials - page 2

What does a polynomial in standard form look like?

Expanded, with terms in descending order according to their exponent.

The leading coefficient of a polynomial is

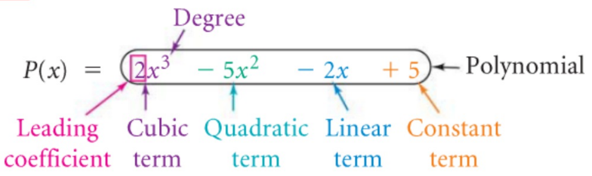
The coefficient of the term with the largest exponent after it's been expanded.
If it's in Standard Form it will be the first coefficient.

The degree of a polynomial is

The largest exponent after it's been expanded.

If it's in Standard Form it will be the first exponent.

standard form of a polynomial. A one-variable polynomial in standard form has no two terms with the same degree, since all like terms have been combined.



Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials

Answer SAS2 - Question 2

Degree = 2
Leading Coefficient = -16
Constant = 5

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials

Answer SAS2 - Question 3

Yes a linear function is a polynomial because the only exponent (1) is a whole number and the coefficients are real numbers.

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials - page 3

Like Terms:

Terms with the same variable(s) with the same exponents.

When you add two polynomial expressions, is your answer also a polynomial expression?

Yes

Exponents won't change and when you add and subtract the coefficients they will remain real numbers.

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials - page 4

Answer SAS2 - Question 5

When you subtract two polynomial expressions, is your answer also a polynomial expression?

Yes

Exponents won't change and when you add and subtract the coefficients they will remain real numbers.

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials - page 5

Answer SAS2 - Question 7

Adding and subtracting polynomials will ALWAYS lead to another polynomial.

Do you think you'll get a polynomial when you multiply two polynomials? Yes

When multiplying polynomials you will add exponents which means they will remain whole numbers.
And, you will multiply coefficients which means that they will remain real numbers.

What if you divide two polynomials? NOT Always

When dividing polynomials you will subtract exponents which may lead to a negative exponent.

Math operations using Polynomials behaves in a very similar fashion to what happens when you perform math operations using Integers.

will the sum of polynomials be a polynomial?	Yes, Always	will the sum of Integers be an Integer?	Yes, Always
will the difference of polynomials be a polynomial?	Yes, Always	will the difference of Integers be an Integer?	Yes, Always
will the product of polynomials be a polynomial?	Yes, Always	will the product of Integers be an Integer?	Yes, Always
will the quotient of polynomials be a polynomial?	Not Always	will the quotient of Integers be an Integer?	Not Always

Agilemind - Topic 4 - Introduction to Polynomials
Exploring- Building Polynomials - page 6

Answer SAS2 - Question 8

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

DISTRIBUTIVE PROPERTY $(3x - 2)(2x + 2) = 6x^2 + 6x - 4x - 4 = \boxed{6x^2 + 2x - 4}$

FOIL METHOD $(3x - 2)(2x + 2)$

$$\underset{F}{6x^2} + \underset{O}{6x} + \underset{I}{-4x} + \underset{L}{-4} = \boxed{6x^2 + 2x - 4}$$

Box method $(3x - 2)(2x + 2)$

	$3x$	-2
$2x$	$6x^2$	$-4x$
$+2$	$+6x$	-4

$\boxed{6x^2 + 2x - 4}$

Find this product. $(x + 4)(x - 3)(x + 5)$

First pick two of the factors to multiply:

$$(x+4)(x-3) = x^2 + 4x - 3x - 12 = x^2 + x - 12$$

Secondly, take this product and multiply by the third factor:

$$(x^2+x-12)(x+5)$$

	x^2	$+x$	-12
x	x^3	$+x^2$	$-12x$
$+5$	$+5x^2$	$+5x$	-60

$$= \boxed{x^3 + 6x^2 - 7x - 60}$$

Definition	Polynomial Function

$P(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$ where n is a nonnegative integer and the coefficients $a_n, \ldots, a_0$ are real numbers.

also known as Whole Numbers

8. Is each of the below a polynomial? If not give a reason.

a) $y = \frac{3}{7}x^2 + 3x - 14x^4 + 4$

Yes.
All exponents are whole numbers and all coefficients are real numbers

b) $y = 4x^{-2} + x^3 - \frac{8}{x}$

No.
There is a negative exponent and $\frac{8}{x}$ means $8x^{-1}$

c) $y = 9\sqrt{x} + 3x^7 - x^{\frac{2}{3}}$

No.
There is a fractional exponent and $\sqrt{x}$ means $x^{\frac{1}{2}}$

d) $y = 9^x + 10ix^4 - 15$

No.
There is an imaginary coefficient and an exponent that is a varialbe.

4. What does a polynomial in standard form look like?
Expanded and simplified with terms in descending order according to their exponent.

5. The leading coefficient of a polynomial is
The coefficient of the term with the largest exponent after it's been expanded.
If it's in Standard Form it will be the first coefficient.

6. The degree of a polynomial is
The largest exponent after it's been expanded.
If it's in Standard Form it will be the first exponent.

10. State the degree of each polynomial.

Polynomials in Expanded Form:

a) $7x^2 + 12 - 13x^4 + 8x$

Degree: 4

b) $9x + 1 = 9x^1 + 1$

Degree: 1

c) $6 = 6 \cdot x^0$

Degree: 0

Polynomials in Factored Form:

d) $(x + 3)(2x - 1) \rightarrow 2x^2$

Degree: 2

e) $(x - 7)^2(x - 5)$

Degree: 3

1ST

2nd

$(x-7)^2 = (x-7)(x-7)$

x^2

$(x^2 \ldots)(x-5)$

$x^2 \cdot x = x^{\boxed{3}}$

Domain of all Polynomials is: $(-\infty, \infty)$