x-intercepts of a graph are also called:

- Real Zeros
- Real Roots
- Real Solutions

Y - intercepts -- All polynomials have exactly ONE y-intercept.

Every polynomial equation has exactly $n$ solutions, where $n$ is the degree of the polynomial.

Some of these solutions may be imaginary so not all solutions can be found on a graph.

6. How many distinct real zeros can a cubic function have?

1, 2, or 3

Find the distinct zeros

$y = (x - 3)(x + 1)$

$x = 3, -1$

Find the distinct zeros

$(x - 5)(x - 5)$

$x = 5$ only — since both factors have the same zero there is only 1 distinct zero

"distinct"

is another way of saying different

Suppose you need to find a 3rd-degree polynomial function with x-intercepts of 8, -7, and 3. Construct the equation of a polynomial with these x-intercepts.

$$y = (x-8)(x+7)(x-3)$$

This is only one of many possible answers.

Another answer could be: $y = (2x - 16)(x+7)(x - 3)$

Suppose you need to find a 4th-degree polynomial function with the following distinct zeros of -3, -2, and 0. Construct the equation of a polynomial with these zeros.

Possible Answers:

$$y = (x+3)(x+2)(x-0)(x+3) = x(x+3)^2(x+2)$$

$$y = x(x+3)(x+2)^2$$

$$y = x^2(x+3)(x+2)$$

Hwk #24

Due tomorrow

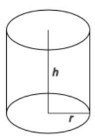
Agilemind - Topic 5 - Analyzing Polynomial Functions

Exploring "Long-term Behavior and Real Zeros"

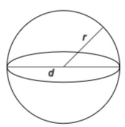
Guided Practice pages 1-11

You'll need to the formulas for Volume of a Cylinder and a Sphere first.

$V = \pi r^2 h$




$V = 4\pi \frac{r^3}{3}$




Answer Question #1 on SAS4

1. Focusing on distinct real zeros, which are indicated graphically as ***x***-intercepts, find the maximum number of zeros that are possible for polynomials of each degree.

| Degree | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Maximum number of zeros | 0 | 1 | 2 | 3 | 4 | 5 | 6 |



Answer Question #2 on SAS4

Agilemind website:

Exploring "Higher degree polynomials"

page 2

Agilemind - Topic 5 - Analyzing Polynomial Functions

Agilemind website:

Exploring "Higher degree polynomials"

page 3 (answer to previous question)

Agilemind - Topic 5 - Analyzing Polynomial Functions

Agilemind website:

Exploring "Higher degree polynomials"

page 4

Agilemind - Topic 5 - Analyzing Polynomial Functions

## Answer Question #3 on SAS4

some possible answers are given on:

Agilemind website:

Exploring "Higher degree polynomials"

page 4

Agilemind - Topic 5 - Analyzing Polynomial Functions

## Answer Question #7 on SAS4

Agilemind website:

Exploring "Higher degree polynomials"

page 6

7. Fill in the blanks to complete the statements.

| negative | even | odd | positive |
|---|---|---|---|

If a polynomial has **odd** degree, the "ends" of its graph point in opposite directions. If the leading coefficient is **Pos**, the left "end" of the graph points down and the right "end" of the graph points up. If the leading coefficient is **Neg**, the left "end" of the graph points up and the right "end" of the graph points down.

If a polynomial has **even** degree, the "ends" of its graph point in the same direction. If the leading coefficient is **Neg**, both "ends" of the graph point down. If the leading coefficient is **Pos**, both "ends" of the graph point up.

Agilemind - Topic 5 - Analyzing Polynomial Functions

## Answer Question #8 on SAS4

Agilemind website:

Exploring "Higher degree polynomials"

page 8

8. Fill in the blanks to complete some generalizations about the relationship between the degree of a polynomial and the number of zeros, extreme values, and inflection points it could have.

| $n$ | 1 | $n$ - 2 | 0 | $n$ - 1 | $a_n$ |
|---|---|---|---|---|---|

Consider the $n$th degree nonlinear polynomial $P(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x^1 + a_0$, where $a_n \neq 0$. If $n$ is even, the polynomial can have no fewer than [0] and no more than [n] real zeros. If $n$ is odd, the polynomial can have no fewer than [1] and no more than [n] real zeros. If $n$ is even, the polynomial can have no fewer than [1] and no more than [n-1] extreme (maximum or minimum) values. If $n$ is odd, the polynomial can have no fewer than [0] and no more than [n-1] extreme (maximum or minimum) values. If $n$ is even, the polynomial can have no fewer than [0] and no more than [n-2] inflection points. If $n > 1$ $n$ is odd, the polynomial can have no fewer than [1] and no more than [n-2] inflection points.

Agilemind - Topic 5 - Analyzing Polynomial Functions

## Answer Question #9 on SAS4

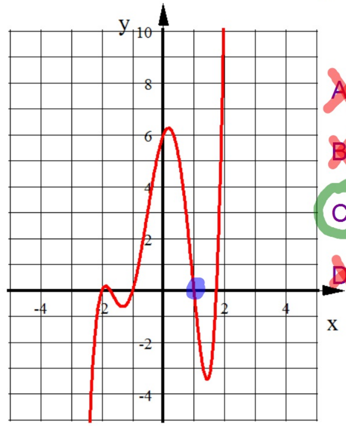
Agilemind website:

Exploring "Higher degree polynomials"

page 9

answer to previous question

Which function could represent the given graph?




A. $y = x^5 + 2x^4 - 4x^3 - 8x^2 + 3x - 6$

B. $y = -x^5 + 2x^4 - 4x^3 - 8x^2 + 3x + 6$

C. $y = x^5 + 2x^4 - 4x^3 - 8x^2 + 3x + 6$

D. $y = x^5 + 3x^4 - 4x^3 - 8x^2 + 5x + 6$

Answer can't be A because the graph shows a y-int of +6 but the equation in A has a y-int of -6.

Answer can't be B because the graph shows a positive odd end behavior but the equation in B is a negative odd polynomial.

Both C and D are possible because the have the correct end behavior (pos odd) and correct y-int (+6). Looking at the graph you can see that is has an x-int of +1. Replace x with 1 in the equations y should equal zero for 1 to be an x-intercept. For D f(1) = 3 and for C f(1) = 0. Therefore, The answer is C.

Hwk #25: Due tomorrow too!

Agilemind website:

Topic 5: Analyzing Polynomial Functions

More Practice 4-13

Agilemind quiz Tomorrow 10 questions

NO caclulator