

# Focus & Within Course Coherence

Task Handout, Algebra 2

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# Major Task #1

Consider the function  $f(x) = x^3 - 13x^2 + 44x - 32$ .

- Use the fact that  $x - 4$  is a factor of  $f$  to factor this polynomial.
- Find the  $x$ -intercepts for the graph of  $f$ .
- At which  $x$ -values can the function change from being positive to negative or from negative to positive?
- To sketch a graph of  $f$ , we need to consider whether the function is positive or negative on the four intervals  $x < 1$ ,  $1 < x < 4$ ,  $4 < x < 8$ , and  $x > 8$ . Why is that?

Source: EngageNY.org of the New York State Education Department. Algebra 2 Mathematics, Module 1, Lesson 14. Available from <https://www.engageny.org/resource/algebra-ii-module-1-topic-b-lesson-14/file/102056> accessed 10 June 2016.

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## Major Task #2

Fishing Adventures rents small fishing boats to tourists for day long fishing trips. Each boat can hold at most eight people. Additionally, each boat can only carry 1200 pounds of people and gear for safety reasons. Assume on average an adult weighs 150 pounds and a child weighs 75 pounds. Also assume each group will require 200 pounds of gear plus 10 pounds of gear per person.

- a. Write an inequality that illustrates the weight limit for a group of adults and children on the fishing boat and a second inequality that represents the total number of passengers in the fishing boat. Graph the solution set to the inequalities.
  
- b. Several groups of people wish to rent a boat. Group 1 has 4 adults and 2 children. Group 2 has 3 adults and 5 children. Group 3 has 8 adults. Which of the groups, if any, can safely rent a boat? What other combinations of adults and children are possible?

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# Supporting Task #1

What is the sum of all integer solutions to  $1 < (x - 2)^2 < 25$ ?

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# Within Course Coherence Task #1

Dani has \$1,000 in an investment account that earns 3% per year, compounded monthly.

- Write a recursive sequence for the amount of money in her account after  $n$  months.
- Write an explicit formula for the amount of money in the account after  $n$  months.
- Write an explicit formula for the amount of money in her account after  $t$  years.
- Boris also has \$1,000, but in an account that earns 3% per year, compounded yearly. Write an explicit formula for the amount of money in his account after  $t$  years.
- Boris claims that the equivalent monthly interest rate for his account would be the same as Dani's. Use the expression you wrote in part (d) and the properties of exponents to show why Boris is incorrect.

Source: EngageNY.org of the New York State Education Department. Algebra 2 Mathematics, Module 3, End of Module Assessment. Available from <https://www.engageny.org/resource/algebra-ii-module-3/file/116406> accessed 10 June 2016.

## Within Course Coherence Task #2

The table below shows historical estimates for the population of London.

Year	1801	1821	1841	1861	1881	1901	1921	1939	1961
London population	1,100,000	1,600,000	2,200,000	3,200,000	4,700,000	6,500,000	7,400,000	8,600,000	8,000,000

No data was available in 1941 because of the war.

- Can the London population data be accurately modeled by a linear, quadratic, or exponential function? Explain.
- A *logistic growth* equation can be written in the form

$$P(t) = \frac{a}{1 + e^{-b(t-c)}} \quad \text{where } a, b, \text{ and } c \text{ are positive numbers and } t$$

represents time measured in years. Using the application supplied, determine if the London population data can be accurately modeled by a logistic equation.

- Explain the shape of the graph of  $P$  in terms of the structure of the equation

$$P(t) = \frac{a}{1 + e^{-b(t-c)}} . \text{ What impact do the values of } a, b, \text{ and } c \text{ have on}$$

the graph of  $P$ ?

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