

# Focus & Within Course Coherence

Task Handout, Algebra 1

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# Major Task #1

1. Celina says that each of the following expressions is actually a binomial in disguise:

i.  $5abc - 2a^2 + 6abc$

ii.  $5x^3 \cdot 2x^2 - 10x^4 + 3x^5 + 3x \cdot (-2)x^4$

iii.  $(t + 2)^2 - 4t$

iv.  $5(a - 1) - 10(a - 1) + 100(a - 1)$

v.  $(2\pi r - \pi r^2)r - (2\pi r - \pi r^2) \cdot 2r$

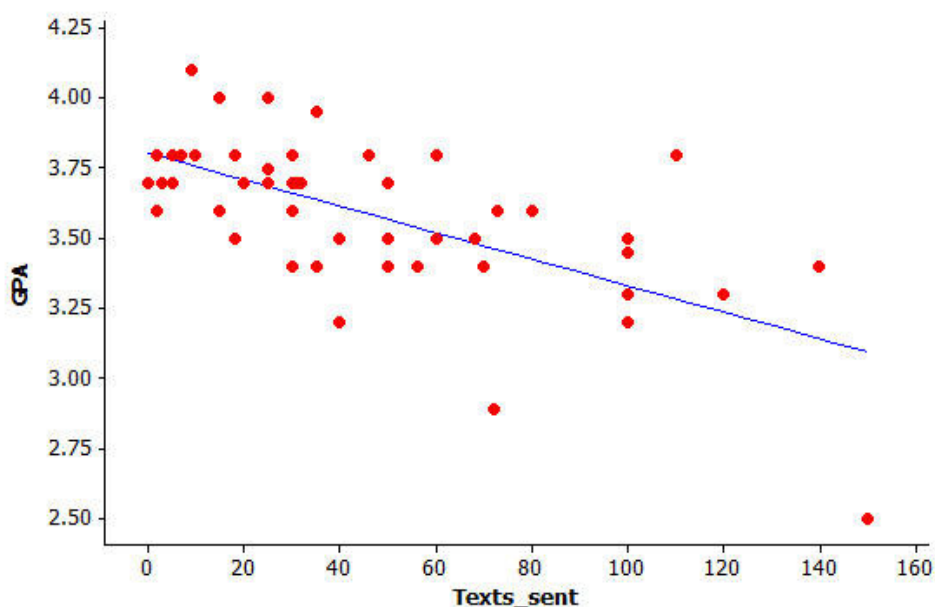
For example, she sees that the expression in (i) is algebraically equivalent to  $11abc - 2a^2$ , which is indeed a binomial. (She is happy to write this as  $11abc + (-2)a^2$ , if you prefer.)

Is she right about the remaining four expressions?

Source: EngageNY.org of the New York State Education Department. Algebra 1 Mathematics, Module 1, Lesson 8. Available from <https://www.engageny.org/resource/algebra-i-module-1-topic-b-lesson-8/file/50331> accessed 10 June 2016.

## Major Task #2

Medhavi suspects that there is a relationship between the number of text messages high school students send and their academic achievement. To explore this, she asks a random sample of 52 students at her school how many text messages they sent yesterday and what their grade point average (GPA) was during the most recent marking period. Her data are summarized in the scatter plot below. The line of best fit is also shown.



The equation of the line of best fit is  $GPA = 3.8 - 0.005(\text{Texts sent})$ . Interpret the quantities  $-0.005$  and  $3.8$  in the context of these data.

Source: Available from <https://www.illustrativemathematics.org/content-standards/HSS/ID/C/7/tasks/1028> accessed on 10 June 2016, licensed by Illustrative Mathematics under CC BY--NC--SA 4.0.

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# Supporting Task #1

City Bank pays a simple interest rate of 3% per year, meaning that each year the balance increases by 3% of the initial deposit. National Bank pays a compound interest rate of 2.6% per year, compounded monthly, meaning that each month the balance increases by one twelfth of 2.6% of the previous month's balance.

- Which bank will provide the largest balance if you plan to invest \$10,000 for 10 years? For 15 years?
- Write an expression for  $C(y)$ , the City Bank balance,  $y$  years after a deposit is left in the account. Write an expression for  $N(m)$ , the National Bank balance,  $m$  months after a deposit is left in the account.
- Create a table of values indicating the balances in the two bank accounts from year 1 to year 15. For which years is City Bank a better investment, and for which years is National Bank a better investment?

Source: Available from <https://www.illustrativemathematics.org/content-standards/tasks/302> accessed on 10 June 2016, licensed by Illustrative Mathematics under CC BY-NC-SA 4.0.

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# Within Course Coherence Task #1

3. An arrow is shot into the air. A function representing the relationship between the number of seconds it is in the air,  $t$ , and the height of the arrow in meters,  $h$ , is given by:

$$h(t) = -4.9t^2 + 29.4t + 2.5.$$

a. Complete the square for this function. Show all work.

Source: EngageNY.org of the New York State Education Department. Algebra 1 Mathematics, Module 4, End of Module Assessment. Available from <https://www.engageny.org/resource/algebra-i-module-4/file/117636> accessed 10 June 2016.

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## Within Course Coherence Task #2

- a. In a carefully controlled biology lab, a population of 100 bacteria reproduces via *binary fission*. That is, every hour, on the hour, each bacteria splits into two bacteria. Assuming no bacteria deaths, find an expression for the number  $P(t)$  of bacteria in the population after  $t$  hours.
- b. In the next lab over, a population of *protists* reproduces hourly according to *multiple fission*. The function which gives the population of protists after  $t$  hours is

$$P(t) = 50 \cdot 3^t.$$

Interpret the significance of the numbers 50 and 3 in the context of the biological experiment.

Source: Available from <https://www.illustrativemathematics.org/content-standards/HSA/SSE/A/1/tasks/2116> accessed on 12 February, 2017, licensed by Illustrative Mathematics under CC BY-NC-SA 4.0.

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## Within Course Coherence Task #3

Chase and his brother like to play basketball. About a month ago they decided to keep track of how many games they have each won. As of today, Chase has won 18 out of the 30 games against his brother.

- a. How many games would Chase have to win in a row in order to have a 75% winning record?
- b. How many games would Chase have to win in a row in order to have a 90% winning record?
- c. Is Chase able to reach a 100% winning record? Explain why or why not.
- d. Suppose that after reaching a winning record of 90% in part (b), Chase had a losing streak. How many games in a row would Chase have to lose in order to drop down to a winning record below 55% again?

Source: Available from <https://www.illustrativemathematics.org/content-standards/HSA/REI/A/2/tasks/702> accessed on 10 June 2016, licensed by Illustrative Mathematics under CC BY--NC--SA 4.0.