Standards INSTITUTE

Focus & Within Course Coherence

Task Handout, High School

Major Task: Algebra I

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: Geometry

If two triangles satisfy the SAS criteria, describe the rigid motion(s) that would map one onto the other in the following cases.

1. The two triangles share a single common vertex.

2. The two triangles are distinct from each other.

3. The two triangles share a common side.

Source: EngageNY.org of the New York State Education Department. Geometry Mathematics, Module 1, Lesson 22. Available from https://www.engageny.org/resource/geometry-module-1-topic-d-lesson-22/file/57766 accessed 10 June 2016.

Major Task: Algebra II

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

a. Use the fact that $x - 4$ is a factor of f to factor this polynomial.

b. Find the x-intercepts for the graph of f.

c. At which x-values can the function change from being positive to negative or from negative to positive?

d. 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.

Supporting Task: Algebra I

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.

a. Which bank will provide the largest balance if you plan to invest $10,000 for 10 years? For 15 years?

b. 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.

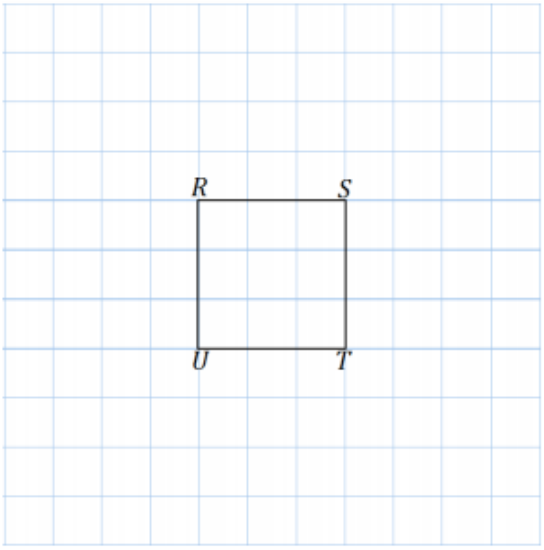
c. Create a table of values indicating the balances in the two bank accounts from year 1 to year 15. For which years is City Bank a better investment, and for which years is National Bank a better investment?

Supporting Task: Geometry

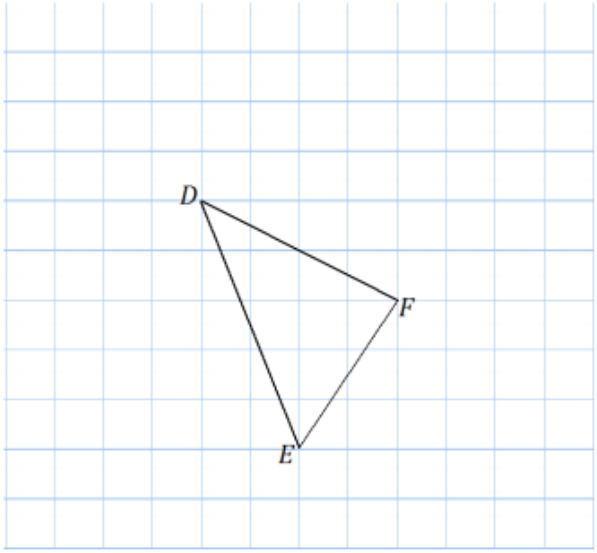
Problem Set

Translate each figure according to the instructions provided.

1. 2 units down and 3 units left
   Draw the vector that defines the translation.



2. 1 unit up and 2 units right
   Draw the vector that defines the translation.



Source: EngageNY.org of the New York State Education Department. Geometry Mathematics, Module 1, Lesson 16. Available from https://www.engageny.org/resource/geometry-module-1-topic-c-lesson-16/file/57331 accessed 10 June 2016.

Supporting Task: Algebra II

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

Within Course Coherence Task: Algebra I

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.

Within Course Coherence Task: Geometry

$GDAY$ is a rhombus. If point G has coordinates $(2, 6)$ and A has coordinates $(8, 10)$, what is the equation of the line that contains the diagonal $\overline{DY}$ of the rhombus?

Source: EngageNY.org of the New York State Education Department. Geometry Mathematics, Module 4, End of Module Assessment. Available from https://www.engageny.org/resource/geometry-module-4/file/106211 accessed 10 June 2016.

Within Course Coherence Task: Algebra II

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

a. Write a recursive sequence for the amount of money in her account after n months.

b. Write an explicit formula for the amount of money in the account after n months.

c. Write an explicit formula for the amount of money in her account after t years.

d. 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.

e. 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.