Standards INSTITUTE

Rigor

Task Handout, Algebra 2

"A social justice priority in mathematics education is to openly challenge deficit thinking and the institutional tools and practices that perpetuate static views about children and their mathematics competencies. Eliminating the deficit discourse by focusing on learning rather than labels is a key step toward a more just and equitable mathematics education." —*National Council of Supervisors of Mathematics and TODOS: Mathematics for All*

Conceptual Understanding Task #1

Task

A student interested in comparing the effect of different types of music on short-term memory conducted the following study: 80 volunteers were randomly assigned to one of two groups. The first group was given five minutes to memorize a list of words while listening to rap music. The second group was given the same task while listening to classical music. The number of words correctly recalled by each individual was then measured, and the results for the two groups were compared.

a. Is this an experiment or an observational study? Justify your answer.

b. In the context of this study, explain why it is important that the subjects were randomly assigned to the two experimental groups (rap music and classical music).

Conceptual Understanding Task #2

Task

Joanne wants to graph a quadratic function whose roots are $5 \pm 2i$, and says:
I know the graph is a parabola, and the roots tell me that my function does not cross the x-axis, but I'm not sure where to go next—how do I use this information to help with my graph?

a. What can you deduce about the vertex of Joanne's parabola?

b. With the information provided, can you graph Joanne's function? Why?

Procedural Skills and Fluency Task #1

Task

Alicia and Zara are scientists working together. Alicia uses a calculator to evaluate $3^{1.4}$ and gets an answer of 6.473. Zara thinks for a moment, makes some calculations on paper, and says "That cannot be right, because $3^{1.4}$ must be less than 6."

Find some hand calculations which show that, as Zara says, $3^{1.4}$ must be less than 6.

Procedural Skills and Fluency Task #2

Task

Four physicists describe the amount of a radioactive substance, Q in grams, left after t years:

a. $Q = 300e^{-0.0577t}$

b. $Q = 300(1/2)^{t/12}$

c. $Q = 300 \cdot 0.9439^{t}$

d. $Q = 252.290 \cdot 0.9439^{t-3}$

(i) Show that the expressions describing the radioactive substance are all equivalent (using appropriate rounding).

(ii) What aspect of the decay of the substance does each of the formulas highlight?

Application Task #1

Task

Susan has an ear infection. The doctor prescribes a course of antibiotics. Susan is told to take 250 mg doses of the antibiotic regularly every 12 hours for 20 days.

Susan is curious and wants to know how much of the drug will be in her body over the course of the 20 days. She does some research online and finds out that at the end of 12 hours, about 4% of the drug is still in the body.

a. What quantity of the drug is in the body right after the first dose, the second dose, the third dose, the fourth dose?
b. When will the total amount of the antibiotic in Susan's body be the highest? What is that amount?
c. Answer Susan's original question: Describe how much of the drug will be in her body at various points over the course of the 20 days.

Application Task #2

Task

One online source suggests that exploiting solar energy makes sense in an area that receives $9\frac{kWh}{m^2}$ of solar energy per day and does not make sense in an area that receives only $2\frac{kWh}{m^2}$ of solar energy per day. Does it make sense to exploit solar energy in Santa Rosa?