Anchor Paper Scoring and Rationales - Task: Shake, Rattle, and Roll

Name: Student A

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Advanced	The student demonstrates an understanding of the concepts and skills associated with the task. The student correctly identifies the equations of the circle and plots these using DESMOS and graph paper. The student applies mathematical concepts of the equation of three circles' intersection to finding the epicenter of an earthquake correctly. The student uses the knowledge that the distance between any point on the circle and the center is the length of the radius, which leads to a valid and correct solution.
Problem Solving	Proficient	The student's problem-solving strategy displays an understanding of the underlying mathematical concept. The student, given the coordinates of the center and length of the radius of a circle, identifies the coordinates of a point(s) on the circle. The student produces a solution relevant to the problem and confirms the reasonableness with an algebraic solution and graphical solution.
Communication and Reasoning	Proficient	The student demonstrates reasoning by justifying all solution steps with the equations of the three given circles and creating the new circle that contains the earthquake's epicenter.
Representations and Connections	Proficient	The student uses multiple representations with accurate labels to explore and model the problem. The student connects the graphs and equations of the circle to the context of the problem.

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Name: Student B

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Proficient	The student demonstrates an understanding of the concepts and skills associated with the task. The student correctly identifies the epicenter's coordinate and creates an equation for its proposed circle of impact. The student applies mathematical concept of the equation of three circles' intersection to finding the epicenter of an earthquake correctly. The student's use of the knowledge of a standard form for the equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and r is the length of the radius leads to a correct solution.
Problem Solving	Proficient	The student's problem-solving strategy displays an understanding of the underlying mathematical concept. The student, given the coordinates of the center and length of the radius of a circle, identifies the coordinates of a point(s) on the circle. The student produces a solution relevant to the problem and confirms the reasonableness with an algebraic solution and graphical solution.
Communication and Reasoning	Proficient	The student uses algebraic language to communicate thinking.
Representations and Connections	Proficient	The student makes a mathematical connection that is relevant to the context of the problem.

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<u>Name: Student C</u>

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	The student demonstrates a partial understanding of the concepts and skills associated with the task. The student does not correctly identify the epicenter's coordinate and create an equation for its proposed circle of impact. The student applies the knowledge of a standard form for the equation of a circle, $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and r is the length of the radius which leads to an incorrect solution.
Problem Solving	Proficient	The student's problem-solving strategy displays an understanding of the underlying mathematical concept. The student, given the coordinates of the center and length of the radius of a circle, identifies the coordinates of a point(s) on the circle. The student produces a solution relevant to the problem and confirms the reasonableness with an algebraic solution and graphical solution even though the original equation used is not correctly found.
Communication and Reasoning	Proficient	The student uses mathematical, graphical and algebraic language to communicate thinking.
Representations and Connections	Developing	The student makes a partial mathematical connection that is relevant to the context of the problem. The radius the student uses to create circles is improperly set for two of the three circles created.

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<u>**Name: Student D**</u>

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	The student demonstrates a partial understanding of concepts and skill associated with this task. The student understands that the midpoint formula and distance formula are important when determining the equation of a circle, however, the application of this concept leads to an incorrect solution.
Problem Solving	Emerging	The student does not produce a solution that is relevant to the problem.
Communication and Reasoning	Emerging	The student does not provide correct reasoning when finding the coordinates of the epicenter, nor when finding the equation of the circle.
Representations and Connections	Emerging	The student does not make a mathematical connection to the problem.

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Name: Student E

Criteria	Performance Level (Advanced, Proficient, Developing, Emerging)	Rationale
Mathematical Understanding	Developing	The student demonstrates a partial understanding of concepts and skills associated with this task. The student recognizes the need for equations of circles to be created however the equations are created incorrectly.
Problem Solving	Developing	The student's problem-solving strategy displays a limited understanding of the underlying mathematical concept. The student plots two of three points correctly and attempts to find the center of the triangle.
Communication and Reasoning	Emerging	The student does not provide evidence to support arguments and claims.
Representations and Connections	Emerging	The student makes no mathematical connections.