

THE SNOWBALL GAMES



Category	4	3	2	1	Points
Sketch	Students provide a rough sketch of the proposed catapult that is neat, clearly labeled and representative of the final product	The rough sketch of the proposed catapult is neat and clearly labeled but does not represent the final product	The rough sketch of the proposed catapult is not neat nor labeled	The students do not provide a rough sketch of the proposed catapult.	
Construction	The catapult is sturdy, follows the plan/sketch accurately, and remains intact during operation	The catapult exhibits 3 of the required construction elements	The catapult exhibits 2 of the required construction elements	The catapult exhibits 1 of the required construction elements	
Measurements	Students measure the height of the catapult, the height of the projectile at two points on the horizontal component, and the distance from the launch apparatus to the target	Students obtain measurements for 3 of the required elements	Students obtain measurements for 2 of the required elements	Students obtain measurements for 1 of the required elements	
Distance	The catapult propels the snowball at least 1.5 meters	The catapult propels the snowball between 1.0 and 1.49 meters	The catapult propels the snowball between 0.5 and 0.99 meters	The catapult propels the snowball less than 0.5 meters	
Accuracy and Precision	The snowball hits the target and is both accurate and precise	The snowball hits the target and is either accurate or precise		The snowball does not hit the target	
Calculations - Speed	Students calculate the speed of the snowball with only 1 error	Students calculate the speed of the snowball with no more than 2 errors.	Students calculate the speed of the snowball with no more than 3 errors.	Students calculate the speed of the snowball with no more than 5 errors.	
Calculations – Kinetic Energy	Students calculate the kinetic energy of the snowball with only 1 error	Students calculate the kinetic energy of the snowball with no more than 2 errors.	Students calculate the kinetic energy of the snowball with no more than 3 errors.	Students calculate the kinetic energy of the snowball with no more than 5 errors.	
Calculations – Gravitational	Students calculate the gravitational potential energy of the snowball with only 1 error	Students calculate the gravitational potential energy of the snowball	Students calculate the gravitational potential energy of the	Students calculate the gravitational potential energy of the snowball	

Potential Energy		with no more than 2 errors.	snowball with no more than 3 errors.	with no more than 5 errors.	
Creativity/ Attractiveness	The catapult is exceptionally attractive in design, layout, and neatness.	The catapult is attractive in terms of design, layout, and neatness.	The catapult is acceptably attractive, though it may be a bit messy.	The catapult is distractingly messy or very poorly designed. It is not attractive.	
Reflection	Students reflect on: <ul style="list-style-type: none"> • Discuss precision and accuracy • Describe projectile motion with regards to gravity, trajectory, and the horizontal and vertical component • Describe the difference between potential and kinetic energy, • Describe energy transformation, • Explain in terms of the law of conservation of energy what happens to the catapult throughout the snowball launch - what happens to the mechanical energy, and • Describe the points on the horizontal component of the projectile in which the snowball will have the most and least potential and kinetic energy • Describe how simple machines do work to magnify force 	Students reflect on 5 to 6 of the required elements.	Students reflect on 3 to 4 of the required elements.	Students reflect on 2 or less of the required elements.	
Real Life Application	Student include 4 real life applications to the transformation of energy from one type to another	Student includes 3 real life applications to the transformation of energy from one type to another	Student includes 2 real life applications to the transformation of energy from one type to another	Student includes 1 real life application to the transformation of energy from one type to another	
Career Connection	For the selected career associated with energy and energy transformation, students describe all of the following: job duties, education/training/certification, salary, and work settings.	For the selected career associated with energy and energy transformation, students describe 3 of the following: job duties, education/training/certification, salary, and work settings.	For the selected career associated with energy and energy transformation, students describe 2 of the following: job duties, education/training/certification, salary, and work settings.	For the selected career associated with energy and energy transformation, students describe 1 of the following: job duties, education/training/certification, salary, and work settings.	

Sources-Quality	Students use at least 4 high quality references using the appropriate APA style referencing. Use http://citationmachine.net/ as a template for the reference.	Students use at least 3 high quality references using the appropriate APA style referencing. Use http://citationmachine.net/ as a template for the reference.	Students use at least 2-3 references using the APA style referencing, however the quality or citations are questionable. Use http://citationmachine.net/ as a template for the reference.	Students use at least 1 reference using APA style referencing, however the quality or citations are questionable. Use http://citationmachine.net/ as a template for the reference.	
Source Accuracy	Students cite the reference with no errors.	Students cite the reference with 1-2 errors.	Students cite the reference with 3-4 errors.	Students cite the reference with more than 5 errors.	