**Question 21:** When the device is in the charging zone and has completed charging, can it be manually placed at the starting loading zone or must it be remotely returned?  
**Answer 21:** After the device has been charged in the Charging Zone, it must move to the Weight Loading Zone under its own power. Team members may only manually remove the device from the Playing Field if its power becomes fully depleted at which point the device is placed in the Charging Zone and a time penalty is incurred.

**Question 20:** Must a path of arrows be utilized, i.e., if we wanted to simply maneuver from loading to unloading in the blue areas (crossing 0 arrows) will points still be awarded?  
**Answer 20:** Per the equations provided with Rules #10 and #11, moving from the Weight Loading Zone to the Weight Unloading Zone without crossing an arrow in the direction the arrow is pointing will result in an Arrow Scoring Factor of zero and a Trip Score of zero. At least one arrow must be properly crossed in order to earn a non-zero Trip Score.

**Question 19:** Referencing Figure 1: Playing Field on page 4 of the Project pdf, are there any penalties for utilizing the blue “free” space in the diagram?  
**Answer 19:** The blue area in Figure 1 represents the 5m x 5m playing field. A team’s device may move freely within the playing field during the demonstration.

**Updated October 1, 2020**

**Question 18:** Can capacitors be used to store energy and charge the battery?  
**Answer 18:** Yes. See Question 1.

**Question 17:** Does all of the energy from the charging have to go through the battery to be used?  
**Answer 17:** No. See Question 6.

**Question 16:** Can the solar panels on the robot extend past the 50 cm limit once out of the box?  
**Answer 16:** Yes. See Question 11.
Question 15: Are we allowed to use magnets and electromagnets on the robot?  
Answer 15: Yes. Magnets are allowed and electromagnets may be used as long as they are powered by the AAA battery and no energy is stored using the magnets at the beginning of each demonstration.

Question 14: Will we be allowed to have parts of the robot detach, specifically can we have a charging unit to leave in the charging zone while the robot goes around the course or a detachable cart to hold the weights?  
Answer 14: No. See Questions 3 and 11.

Question 13: Rule 9 mentions that there may be variability in weight dimensions, but exactly how much should be expected?  
Answer 13: Because this competition will not be taking place at a face-to-face event, teams will be responsible for providing their own uniform half-kilogram weights to be used for the competition. Details will be provided in the future for the procedures that each team will be required to follow in order to ensure their course adheres to the official rules.

Question 12: Can the mass of the weights, when these are being loaded by a team member, be used to store energy for later use (compressing a spring, for example), as long as these springs are not precompressed to start the round?  
Answer 12: No. Team members may not add energy to the device at any time during a demonstration. All energy must come from the AAA battery and energy collected from the wind and solar energy provided in the Charging Zone.

Question 11: Can the robot extend out of its 50 x 50 x 50 cm^3 volume after the round has begun?  
Answer 11: A team may design their device to expand under its own power beyond the 50cm x 50cm x 50cm volume however the device must fit completely within the 1m x 1m Weight Loading Area before a team may load weights and it must fit completely within the 1m x 1m Weight Unloading Area before the weights may be unloaded.

Question 10: Do we need to remove the weights from our robot if our battery dies mid-transit to the unloading area or can we keep our weights after the time penalty is over?  
Answer 10: If a team’s device becomes stranded and must be manually returned to the Charging Zone, any weights on the device must be unloaded and returned to the Weight Loading Area. In order for a team to earn points, their device must complete an uninterrupted trip from the Weight Loading Area to the Weight Unloading Area.

Question 9: In the Day 2 tie breaker, do the batteries start charged or uncharged?  
Answer 9: For every round, each team will start with their AAA battery charged.

Question 8: Is there any penalty for hitting your robot into the other robot or for roughness in the head to head rounds?
Answer 8: The decision has been made that no face-to-face competitions will be held for the 2021 ASME Student Design Competition. Teams will be asked to submit a video recording of their individual devices running a course at their home schools which will only involve a single device.

**Question 7:** Can both the light and fan be used to generate electricity for the AAA battery or just one?

Answer 7: Teams may choose to design their device to harvest wind energy, solar energy, or both to recharge the device’s AAA battery.

**Question 6:** Can the fan be used to store mechanical energy without going through the AAA battery as long as the light is able to recharge the AAA battery?

Answer 6: Yes. Mechanical energy can be stored and used by a device during the demonstration as long as no mechanical energy is stored within the device at the start of each round.

**Question 5:** At what speed will the 3 speed Lasko fan be set?

Answer 5: Students teams may set the fan speed to any of the three speed settings of the unaltered fan.

**Question 4:** I understand that the loading of the weights is done by a student, but is the unloading of the weights done by the same student or must it be done by a mechanism of the device?

Answer 4: After the weights have been loaded into a team’s device and it has traversed the Playing Field, a team member may manually unload the weights from the device after it has completely entered the Weight Unloading Area.

**Question 3:** Must we build an all-in-one device that moves the desired weights to the unloading area and also deploys a mechanism to start recharging with wind and solar or can we create a device focused on moving weights and a separate collection station to deploy within the charging zone?

Answer 3: Each student team is required to design, build, test, and demonstrate a single mobile device which is able to both harvest energy and transport weights. All elements of the device must move from the Weight Loading Area to the Weight Unloading Area in order to earn points.

**Question 2:** Can we use a gasoline engine, chemical energy, or a Stirling Engine to power our robot?

Answer 2: No, per Rules #5 & #6, gasoline engines and chemical energy are not permitted. A Stirling Engine could be used to produce mechanical energy as long as the AAA battery is used to power the heating element.

**Question 1:** Are we allowed to use capacitors as part of our circuit design on our robot?

Answer 1: Yes.