MESA DAY CONTEST RULES 2014 - 2015

Model Science – The Heart

LEVEL: **High School – All Grades**

TYPE OF CONTEST: Individual / Team

COMPOSITION OF TEAMS: 1 – 2 students per team

NUMBER OF TEAMS: 3 teams per Center

SPONSOR: Nicole Patterson, UC Irvine MSP

OVERVIEW: Students will construct an original display and model of a bisected human heart and will answer questions drawn from an assigned list using reading material provided in the MESA Day curriculum.

MATERIALS: The following materials will be provided by the students:

- "items that are not perishable" with which to build the original model

RULES:

1. The display and model must be the original work of the student(s). Judges may ask questions to verify authenticity of the display/model.
2. The display and model should be clearly labeled with student name(s), school and center. ***If the display and/or model is not clearly labeled with student name(s), school and center, a 4.0 point penalty will be deducted from the total score.***
3. Designated materials that are not perishable must be used in the model's construction. Nonperishable items are those that will not rot, spoil, or decay without refrigeration. Use of any other items will result in disqualification. Commercial models may NOT be used. **Violation of this rule and only this rule will result in disqualification.** Students are encouraged to fully incorporate a variety of designated materials in the model.
4. The display and model should meet minimum and maximum size requirements. *(See JUDGING # 1a)*
5. The display should be freestanding.
6. A labeled hand-drawn diagram or student's original computer-generated diagram of the bisected heart should be attached to the front of the display.
7. A materials table should be attached to the display.
8. The structures depicted on the model of the bisected heart should be clearly labeled.

9. The competitors will attempt to answer five randomly drawn questions, plus unpublished tiebreaker questions. *(See JUDGING # 6 – 10)*

JUDGING:

The competition will be judged in two components. Judges will receive the "Score Sheet for Model Science – The Heart" from the MESA Day Host Center.

Component I: Display and Model of The Heart

1. One point will be awarded for each of the following: **(4 points maximum)**

   a. The model and display, including the stand and all of its components fits into a space that is 3 feet high by 3 feet wide by 2 feet deep. The model of the bisected heart is no larger than 2 feet high by 2 feet wide by 2 feet deep and no smaller than 1 foot high by 1 foot wide by 1 inch deep. ***The model may be attached to the display board; however, attaching the model is not required.***

   b. The model and display are freestanding at the time of judging.

   c. The display has a clearly labeled (w/14 required structures), hand-drawn or student's original computer-generated diagram of the bisected heart on the front.

   d. The display has a table of all materials utilized. A sample follows:

Model Science – The Heart – Materials Table

Structure	Material
1. Aorta	Penne Pasta
2. Left Ventricle	Red Balloon
3.	

2. One point will be awarded for each of the 14 required structures presented on the model (0.5 points if the structure is present and an additional 0.5 points if the structure is labeled, **14 points maximum**). Required structures listed below.

Structure	Present (0.5 points)	Labeled (0.5 points)
Aorta		
Left Ventricle		
Right Ventricle		
Left Atrium		
Right Atrium		
Mitral Valve		
Tricuspid Valve		
Superior Vena Cava		
Inferior Vena Cava		
Right Coronary Artery		
Left Coronary Artery		
Aortic Valve		
Pulmonary Valve		
Ventricular Septum		

3. Bonus points may be awarded for up to 4 additional structures other than the required structures listed in *JUDGING # 2*. These extra structures must be correctly placed and labeled on the model and on the hand-drawn or student's original computer-generated diagram, and listed on the materials table. (1 point per additional structure, **4 points maximum**)

4. Points will be awarded for accuracy. Is the overall model a realistic and true representation of the human heart? Is the model accurate in anatomical location and size of various structures? **(4 points maximum)**

5. Points will be awarded for creativity. Do the model and various structures display characteristics of originality and creativity in terms of overall composition? Are the different structures variable with different colors, textures, and dimensions? Is the use of materials used to depict the different structures creative? **(4 points maximum)**

Component II: Understanding the Physiology of The Human Heart

6. Students will answer five questions from an assigned list based on information provided in the MESA Day curriculum. **(10 points maximum)**

7. Judges will determine the order of teams by a random drawing.

8. Students will randomly select 5 questions.

9. Each correct answer will be awarded up to 2 points. Partial points may be awarded for partial answers.

10. There will be a set of 5 previously unpublished tiebreaker questions available on the day of the competition. Each tiebreaker question will be worth up to 2 points each. **(10 points maximum**, depending on number of tiebreaker questions used**)**

AWARDS:

Awards will be given for 1st, 2nd, and 3rd place.

MODEL SCIENCE – The Heart
Specification Checklist for Students

- ❑ **2014 – 2015** MESA Day Rules were used.
- ❑ Only items that are not perishable have been used.
- ❑ The **display and model** is clearly labeled with student name(s), school and center.
- ❑ The **model and display** fits into a space that is 3 feet x 3 feet x 2 feet.
- ❑ The **model** of the bisected human heart is no larger than 2 feet x 2 feet x 2 feet.
- ❑ The **model** of the bisected human heart is no smaller than 1 foot x 1 foot x 1 inch.
- ❑ The **model and display** are clearly labeled w/ required structures.
- ❑ A labeled (w/required structures), hand drawn diagram or student's original computer-generated diagram of the bisected human heart is attached to the display.
- ❑ A materials table is attached to the display.

ATTACHMENTS: Questions for Model Science – The Heart
Score Sheet for Model Science – The Heart

QUESTIONS FOR MODEL SCIENCE – THE HEART
2014 – 2015
High School – All Grades

Students MUST be prepared to answer each question with a complete sentence or sentences.

1. What is the size of the human heart?
2. Describe the fetal heart's developmental stages.
3. Describe the pericardium and its function.
4. What is the function of the aorta and what are the sections of the aorta?
5. Describe the pulmonary arteries and its function.
6. Name 4 risk factors for heart disease.
7. Describe the left ventricle and its function.
8. Describe the right ventricle and its function.
9. Where is the tricuspid valve located? What is its function?
10. What is the function of the superior and inferior vena cava?
11. Describe the right atrium and its function.
12. What is the purpose of the cardiovascular system?
13. What is arteriosclerosis?
14. Describe what happens in a myocardial infarction.
15. What three types of exercise are needed for a healthy heart? Describe each.
16. Name 4 differences between angina and heart attack.
17. Describe a heart-healthy diet.
18. What three major waves of electrical signals appear on the ECG/EKG? Describe each wave.
19. What regulates the rhythm of the heartbeat?
20. Describe ventricular systole.

SCORE SHEET FOR MODEL SCIENCE – THE HEART
High School – All Grades
Copies of this score sheet will be provided by the MESA Day Host Center.

Student Name(s): _____

Center & School: _____

Judges: _____

Part I: General Display/Model Criteria (4 points total)
One point for each criterion met:

Size _____ Freestanding _____ Diagram _____ Materials Table _____

Subtotal for Part I _____

Part II: Specific Model Structures (14 points, plus 0 – 4 bonus points = 18 points total)

Structure	Present = 0.5 points	Correctly Labeled = 0.5 points
Aorta		
Left Ventricle		
Right Ventricle		
Left Atrium		
Right Atrium		
Mitral Valve		
Tricuspid Valve		
Superior Vena Cava		
Inferior Vena Cava		
Right Coronary Artery		
Left Coronary Artery		
Aortic Valve		
Pulmonary Valve		
Ventricular Septum		
TOTAL		

Bonus Points: One point per additional structure present, clearly labeled and included in the diagram and materials table. (0 – 4 bonus points total)

Bonus Structure	Present = 0.5 points	Correctly Labeled = 0.5 points
TOTAL		

Subtotal for Part II _____

Part III: Overall Accuracy of Model (0 – 4 points total)
Up to 2 points for each of the below:

1. Accuracy of the overall model (realistic) _____

2. Accuracy of the individual structures (anatomically accurate in size and location) _____

Subtotal for Part III _____

Part IV: Overall Creativity of Model (0 – 4 points total)
Up to 1 point for each of the below:

1. Creativity in the use of materials to depict colors _____

2. Creativity in the use of materials to depict textures _____

3. Creativity in the use of materials to depict dimensions _____

4. Creativity in the use of materials to depict variability of the different structures _____

Subtotal for Part IV _____

Part V: Model Science Questions (10 points total)
Up to 2 points for each answer:

Question 1 _____

Question 2 _____

Question 3 _____

Question 4 _____

Question 5 _____

Subtotal for Part V _____

Labeling Penalty -_____
Deduct 4.0 points if display and/or model is not clearly labeled with student name(s), school and center.

GRAND TOTAL _____
(Add subtotals for Part I – Part V; deduct penalty if applicable)
*Maximum score is **40***

Tie Breaker Questions
Up to 2 points for each answer:

Question 1 _____ Question 2 _____ Question 3 _____

Question 4 _____ Question 5 _____

TOTAL INCLUDING TIE-BREAKER QUESTIONS _____