MESA DAY CONTEST RULES 2025-2026

(DRAFT)

Crime Scene Science

LEVEL: Middle School (MS)

DIVISION(S): Grade 6 and Grades 7/8

COMPOSITION OF TEAM: 2-3 students per team

NUMBER OF TEAMS: Preliminary – Determined by your local MESA center
Regional – # of teams per division at the discretion of each region (Northern, Central, LA/Central Coast, and Southern)

SPONSORS: University of California San Francisco MESA College Prep
University of Southern California MESA College Prep

OVERVIEW: Changes, if any, from "DRAFT" rules are highlighted in "yellow." Are you interested in science and solving mysteries? Are you able to showcase your knowledge of forensic science? This is your opportunity! Your team is invited to collaborate using your knowledge of science to solve this new mystery working your way through a crime scene using your knowledge of life sciences and forensics, sketching a microscope, and designing and constructing a DNA model that tests your science skills! **Participation logistics, limits, and competition facilities may vary by host site. Advisors and students are responsible for verifying this information with their local MESA center.**

RESOURCES: Crime Scene Science 2025-26 Online Training Modules

SCIENCE JOURNAL: A science journal is a required component of this competition. The purpose of the Science Journal is not only to help guide students through some of the information surrounding the competition, but to also align with the process that scientists follow while completing research. MESA projects are not designed to be completed in a single class period or day, but to be the result of thoughtful research, planning, analysis and evaluation. Keeping a science journal throughout the process will help to keep a designer on track, using a logical progression of planning, in order to develop their project efficiently.

For the Science Journal, **electronic submissions will be required**. Teams should use an electronic portal/application such as Google Docs to keep and maintain a science journal. Access and permission to the science journal is then given to MESA Day staff and judges OR science journal is submitted electronically (e.g.,

PDF file) for review. **Please check with your local MESA center for the deadline and submission platform to submit your team's science journal for local events.** See "MSCrime-Scene-Science-Journal-Template-Google-Doc-2025-26" at https://mesa.ucop.edu/.

MATERIALS:

For the DNA Model:

- All materials are legal, with the exception of food, hazardous materials, or unsafe energy. The use of recycled and repurposed materials is highly encouraged.
- No kits allowed.

The Host Center will provide the following:

- Answer Sheet
- A series of questions will be given to each team
- Pencils
- Any materials/tools required by the challenge
- Stop watch
- Microscope
- Table

GENERAL RULES:

1) The students' full name, grade level, school name, and MESA center must be clearly labeled on the DNA model. A 10% penalty in the score will be assessed for failing to properly label.
2) Each team members' full name, grade level, school name, and MESA center must be completely filled out on the answer sheet.
3) Teams must consist of 2 to 3 students. Teams consisting of 1 student will not be allowed to compete.
4) Teams will be required to submit a science journal with the following requirements:
    a) The students' full name, grade level, school name and MESA center must be clearly labeled/identified in the Science Journal. A 10% penalty in the score will be assessed for failing to properly label.
    b) Using one to two sentences, answer the following questions:
        i) What are the 6 major steps to solving a crime scene?
        ii) What are the 3 basic fingerprint pattern types, and how are they described?
        iii) Lift your own fingerprint using a pencil and tape. Please attach a photo of the tape with your fingerprint, and identify and label the fingerprint pattern in your electronic science journal.
    c) Sketch of DNA with labeled parts (sketches can be hand-drawn or computer-generated):
        i) Adenine
        ii) Thymine
        iii) Guanine
        iv) Cytosine
        v) Sugar phosphate backbone
    d) Define the forensics terms and provide **ONE (1) example** for each of the following:
        i) Trace evidence
        ii) Locard's Exchange Principle
        iii) Testimonial evidence versus Physical evidence
    e) Measurements & Analysis in Forensics

i) When measuring a footprint, what tools would you use?
ii) If a footprint is 28 centimeters long, approximately how tall is the person?
iii) How can hairs or fibers be identified under a microscope?

f) Sketch of Microscope with labeled parts (sketches can be hand drawn or computer generated):
i) Arm
ii) Head
iii) Ocular Lens/Eyepiece
iv) Objective Lens
v) Slide Holder Clips
vi) Focus adjustment knob
vii) On/Off Switch
viii) Illuminator/Light Source
ix) Base
x) Stage

5) Teams will be required to submit a DNA model. **All parts on** the DNA model must be CLEARLY labeled and bonds placed correctly to display the double helix. **(Students MUST create a DNA model in order to compete.)**
a) Required and labeled parts to be included for **DNA Model**:
i) Adenine
ii) Thymine
iii) Guanine
iv) Cytosine
v) Sugar phosphate backbone
6) The DNA model must have a **MINIMUM** width/length of 26 cm by 26 cm and **MAXIMUM** width/length of 38 cm by 38 cm with a **HEIGHT** minimum of 26 cm and maximum 38 cm.
a) If the model does NOT meet minimum and/or maximum width, length, and height requirements, the team will receive ZERO points for their model.
i) Teams are still eligible to compete and place with an incorrectly sized model.
b) All materials are legal with the exception of food and hazardous materials.
c) No kits allowed.
7) The model and science journal must be the original work of the students.
8) Teams will be allotted 30 minutes to solve a staged crime scene.
9) Cell phones, laptops, iPads, smart watches, or any other electronic devices are strictly prohibited.
10) Digital media (e.g., photos, video recordings, etc.) will not be accepted for judging purposes. **All judging decisions are final.**

JUDGING:

1) Lead contest judge will assemble all teams and review the event guidelines and judging criteria.
2) Teams will be assigned a random number to determine the order teams will compete in.
3) Teams will be asked to wait outside of the room. One team will enter the room for competition (hosts may choose to have more than one team to compete at a time).
4) A crime scene will be set up.
5) Materials needed for the competition will be placed on other tables for competing teams.
6) Once the lead judge has signaled the beginning of the competition, teams may begin to analyze and solve their crime scene.

7) Teams will have 30 minutes to analyze and solve a crime scene. Once the 30 minutes are over, teams will be asked to stop and to place materials down and will not be allowed to enter answers on the answer sheet.
8) Proctors will record the time for completion (i.e., the total time the team used to complete all of the clues); this recorded time will be used in the tie-breaker process.

SCORING:

1) DNA Model = up to 50 points
2) Science Journal = up to 50 points
3) Crime Scene Analysis = up to 100 points
4) Tiebreaker: if there is a tie, the team that completes the competition in the least amount of time will be the winner.

AWARDS:

- Teams who do not submit a Science Journal will NOT be eligible for any awards.
- Awards will be given per division: Grade 6 and Grades 7/8.
- Medals will be awarded for 1st, 2nd, and 3rd place based on the highest Final Team Score.
- Ribbons will be awarded for Creative Model Design.
- Only teams that place in Overall Score will advance to Regional MESA Day; please check with your MESA center to determine the # of teams that advance to Regional MESA Day.

ATTACHMENTS/APPENDIX:

- Crime Scene Science 2025-26 Online Training Modules
  - Learn about the project, get clarifications on competition rules, and consider important Life Science and Forensic Science concepts (includes Judging Resources)
- Next Generation Science Standards
- DNA Model Labeling Example
- Science Concept Resources
- Suggested Microscope and Materials
- Crime Scene Science Specification Checklist
- Score Sheet for Crime Scene Science

Next Generation Science Standards

The specific Next Generation Science Standard link this competition covers is below:

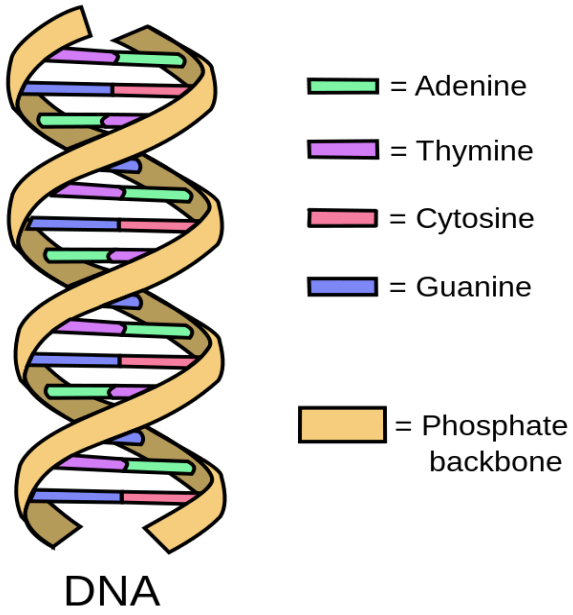
- MS-PS1-2 – Matter and Its Interactions
  - Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrochloric acid.]

- MS-PS1-3 – Matter and Its Interactions
  - Gather and make sense of information to describe how synthetic materials come from natural resources and impact society. [Clarification Statement: Emphasis is on natural resources, chemical processes, and the uses of synthetic materials in everyday life.]
- MS-LS1-1 – From Molecules to Organisms: Structures and Processes

  - Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on distinguishing living from nonliving things and recognizing that living things may be made of one or many cells.]
- MS-ETS1-2 – Engineering Design
  - Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. [Clarification Statement: Emphasis is on evaluating how different solutions address a common problem using scientific reasoning and evidence.]

DNA Model Labeling Example

This picture functions as a reference for labeling DNA models.



Science Concept Resources

The following science concepts can be used in any variation in the challenges:

- Microscope: Parts and how to use it
- Pattern identification (fingerprints, fibers)
- Fingerprint types: arches, loops, whorls
- Fiber types: natural vs. synthetic
- Measurement skills: using a ruler or caliper
- Properties of materials: color, texture, shape
- Using evidence to support a claim

Vocabulary:

- Trace evidence
- Latent print
- Locard's Exchange Principle
- Chain of custody
- Fiber
- Sketch
- Scale
- Testimonial vs. Physical Evidence

Suggested Microscope and Materials

Recommendations: Please coordinate with your school's Life Sciences/Biology department to arrange for loaner microscopes. If this is not feasible, you can find microscope purchase recommendations at the following link:

- Microscope

Crime Scene Science Specification Checklist

This checklist is provided **ONLY** as a reference for teams to "pre-inspect" their Crime Scene Science DNA models and Science Journals to ensure they meet the rules specifications. Teams may check-off each of the following items after comparing their competition-ready DNA models and Science Journals with the rules. **This checklist will NOT be used by judges.**

- ☐ 2025-2026 rules are used.
- ☐ Science Journal is properly labeled with team members' names, grade level, school name, and MESA Center.
- ☐ DNA model is properly labeled with team members' names, grade level, school name, and MESA Center.
- ☐ DNA model meets size requirements of **MINIMUM** width/length of 26 cm by 26 cm and **MAXIMUM** width/length of 38 cm by 38 cm with a **HEIGHT** minimum of 26 cm and maximum 38 cm.
- ☐ Know and understand the forensic investigation process.
- ☐ Know how to operate a microscope and analyze/differentiate fibers using a microscope.
- ☐ Know how to lift a fingerprint and analyze it under a microscope.

SCORE SHEET FOR INVESTIGATIVE SCIENCE

Middle School - Grade 6 and Grades 7/8

Copies of this score sheet will be provided by the MESA Day Host Center.

Student Names: _____. Grade: **6** or **7/8** (circle one)

SCHOOL:_____ MS CENTER:_____

DNA MODEL RUBRIC						TOTAL
MODEL LABELING	Adenine __/5	Thymine __/5	Guanine __/5	Cytosine __/5	Sugar Phosphate Backbone __/10	
	Correct Adenine + Thymine bond ___/10		Correct Guanine + Cytosine bond ___/10			___/50

***** *If the model does not meet size requirements, 0 points will be awarded for the model.*

SCIENCE JOURNAL						TOTAL
What are the 6 major steps to solving a crime scene? ____/6	What are the 3 basic fingerprint pattern types? _____/6	Lift your fingerprint using a pencil, tape & identify the fingerprint pattern: ____/3	Sketch of DNA with correctly labeled parts: ____/10	Trace evidence Definition & Example: _____/2	Locard's Exchange Principle Definition & Example: ____/2	
Testimonial evidence vs Physical evidence Definition & Examples: _____/5	Measurement & Analysis in Forensics: ____/6	Sketch of microscope with correctly labeled parts: ___/10				____/50

CRIME SCENE ANALYSIS RUBRIC		
Intro: What is the crime you are solving?	/ 5 pts	
Clue # 1:	/ 15 pts	
Clue # 2:	/ 15 pts	
Clue # 3:	/ 15 pts	
Clue # 4:	/ 15 pts	
Final Suspect:	/ 15 pts	
Written Defense & Overall Justification	/ 20 pts	
Recorded Time:		
TOTAL Question Set (max of 100 pts)		

OVERALL SCORE
SCIENCE JOURNAL TOTAL(X/50):___/50
SCIENCE JOURNAL LABELING DEDUCTION(-10%): YES/NO:
Science Journal SUBTOTAL: _____.
DNA MODEL SCORE (X/50):____/50
MODEL LABELING DEDUCTION(-10%): YES/NO:
Model SUBTOTAL: _____.
CRIME SCENE ANALYSIS TOTAL(X/100 POINTS): _____/100
OVERALL SCORE = science journal + model + question set (X/200 POINTS): _____/200

Science Journal Submitted: ☐ Yes ☐ No

Teams who do not submit a Science Journal will NOT be eligible for any awards.