



# Crime Scene Investigation Laboratory Manual



Marilyn T. Miller, Ed.D.



# CRIME SCENE INVESTIGATION LABORATORY MANUAL

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Activities for the student to use triangulation, base line, and other measurement techniques are presented, as well as examples of the use of 3-D laser scanners at crime scenes as critical thinking exercises.

### Objective

To practice techniques of measurement as a component of crime scene documentation and apply them to mock crime scenes.

The final component of crime scene documentation is the preparation of the crime scene sketch or diagram. Sketching at the crime scene is not about drawing; it is about *measuring*. Still photography is a two-dimensional representation of three-dimensional areas and items. It will, therefore, inherently result in some distortion of the spatial relationship of objects in the photographs. Common examples of the distortions are found in the reconstruction of shooting trajectories or bloodshed points of origin.

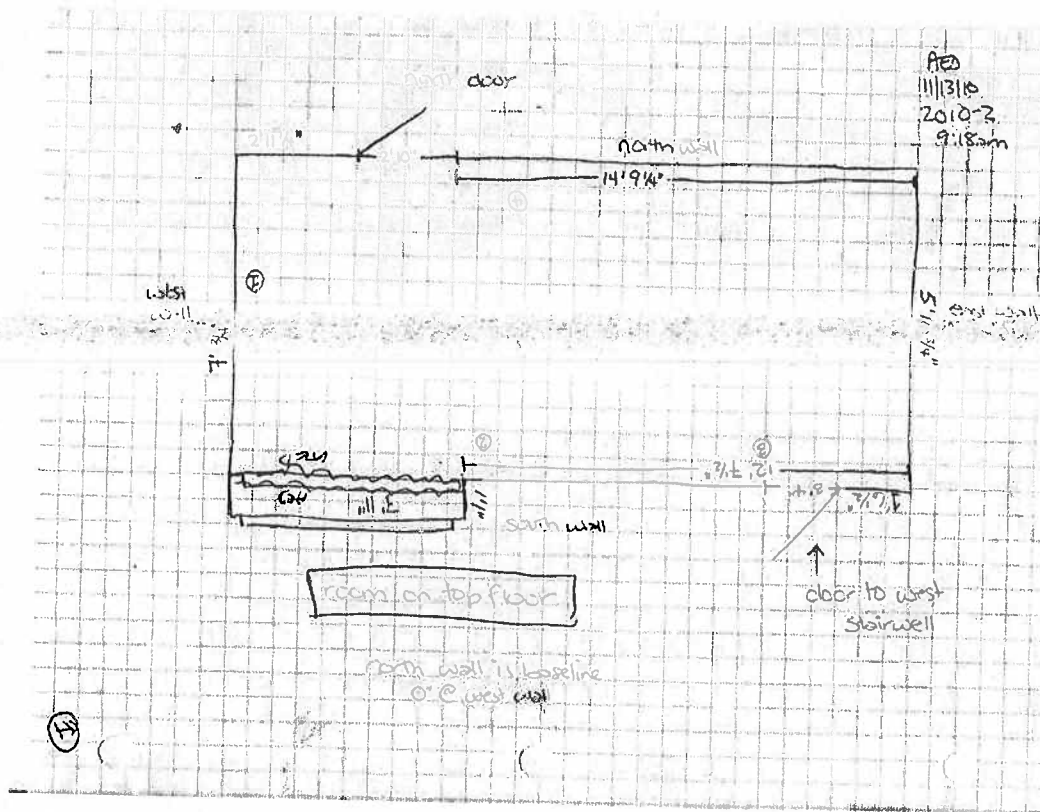
The crime scene sketch is the permanent record of the actual size and distance relationships between the crime scene and its physical evidence. The sketch must correlate and supplement the still photographs taken at the scene. The sketch further supports the relevancy, reliability, and validity of physical evidence found at the crime scene.

Crime scene sketch preparation requires some planning and organizational skills by the crime scene investigator. There are two basic types of crime scene sketches that are part of a crime scene investigation: a *rough sketch* and a *to-scale, finished, or final sketch* (see Figure J.1). There are two basic types of perspectives that are used for crime scene sketches: the *overhead* or "bird's-eye view" and the *elevation* or "side view" (see Figure J.2).

A *rough sketch* is made at the crime scene before evidence collection. It shows all the evidence to be collected, major structures present in the crime scene, and other relevant structures in or near the crime scene. The rough sketch will show all the measurements taken to determine the size and distance relationships at the crime scene. A *final or finished sketch*, drawn to scale, is prepared from the rough sketch. The final sketch is normally prepared for courtroom presentation. It will show the relevant structures within the crime scene and all items of evidence. It should never show any measurements. It has a clean, uncluttered appearance.

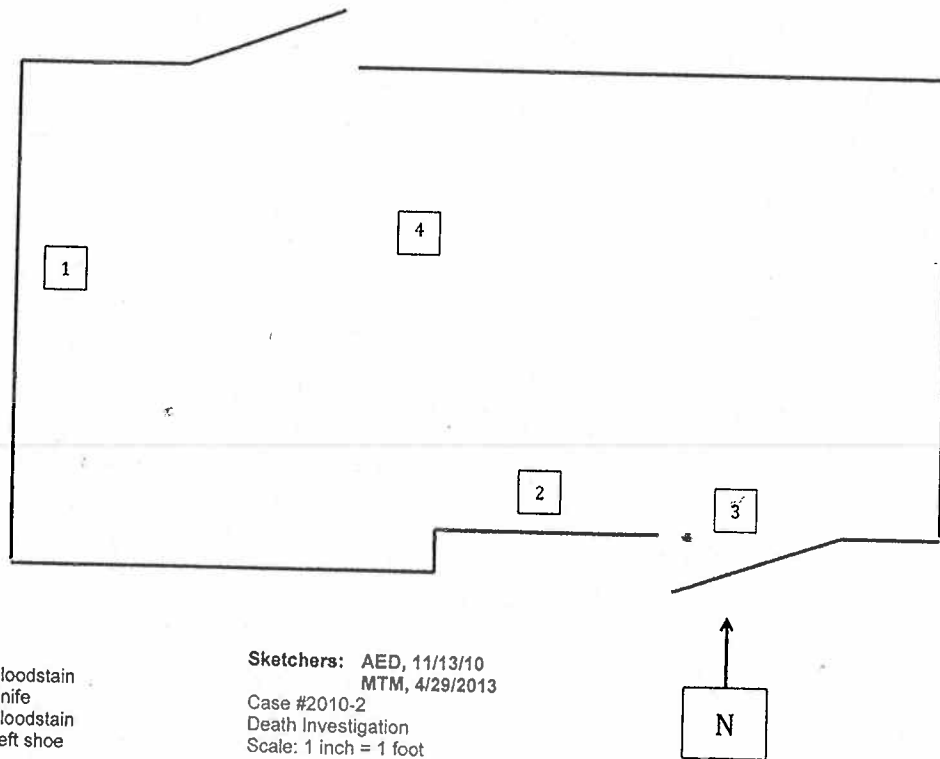
A crime scene sketch is usually drawn from a looking-down or *overhead* perspective. This type of perspective is the most common type and is most recognizable by other investigators and juries. The *side-view* sketch can be used for supplementing the still photography documentation. The crime scene sketcher should be prepared to combine sketch types and

Rough Sketch: (Courtesy of Ashley Dumbrill)



Final Sketch:

FINAL SKETCH: Room on Top Floor  
1020 Main Street, Richmond, VA

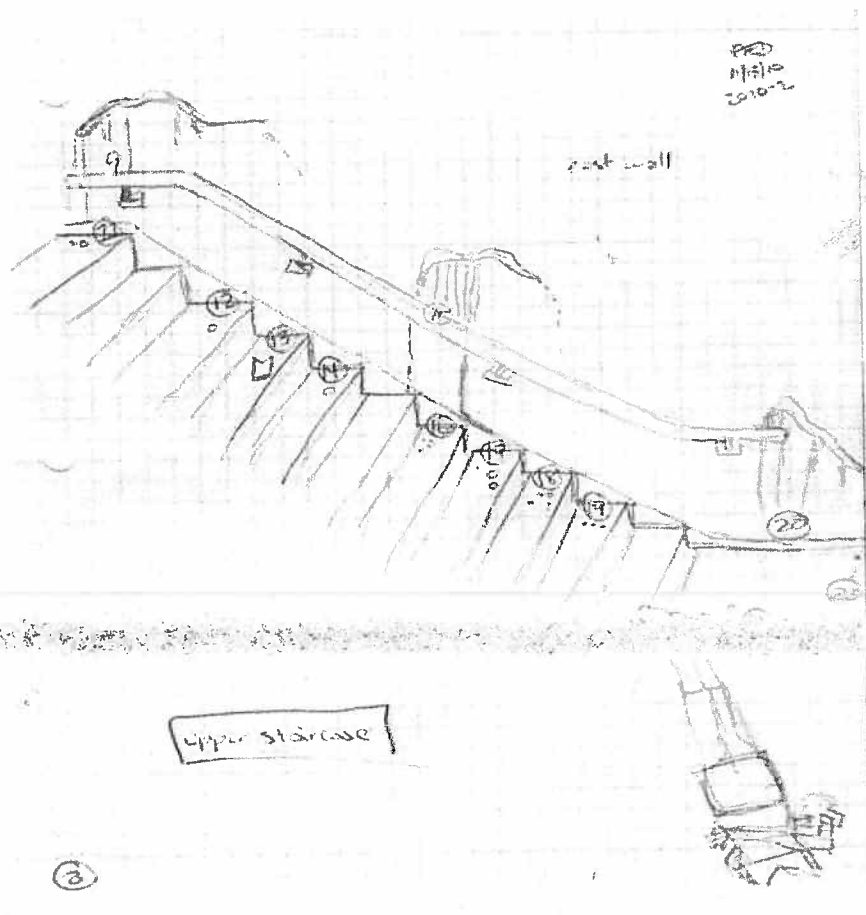
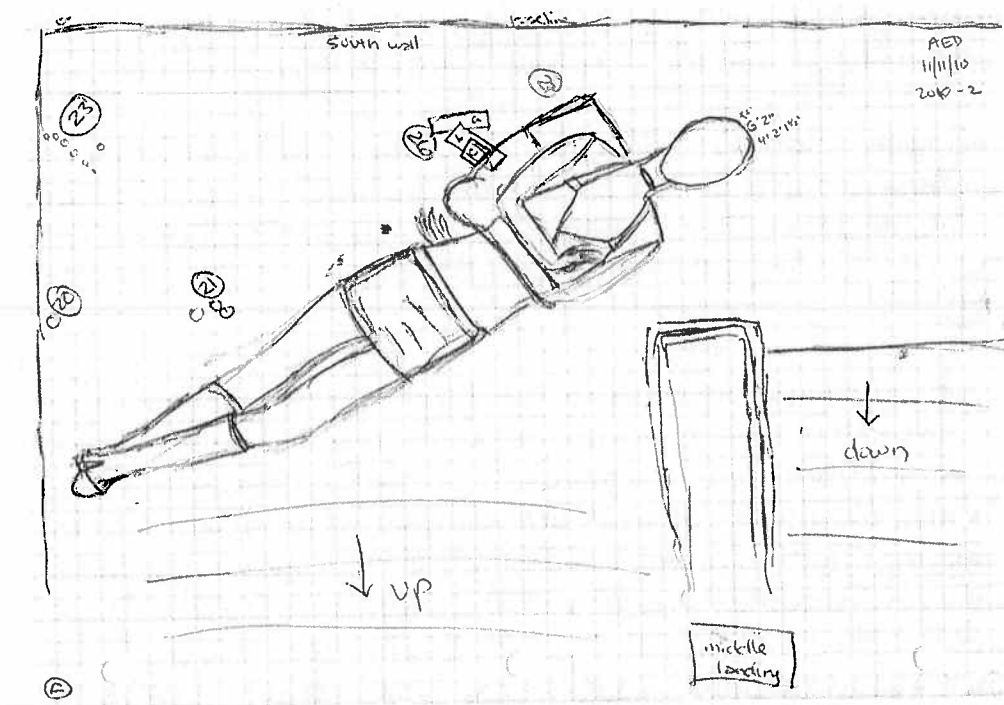


- LEGEND**
- 1=Bloodstain
  - 2=Knife
  - 3=Bloodstain
  - 4=Left shoe

Sketchers: AED, 11/13/10  
 MTM, 4/29/2013  
 Case #2010-2  
 Death Investigation  
 Scale: 1 inch = 1 foot

FIGURE J.1 Rough and final sketches.

Overhead Sketch:



Projected View Sketch

FIGURE J.2 Overhead sketch and projected view sketch.

add photographs to supplement the documentation. Digital drawing programs along with digital images make this an easily accomplished task. Three-dimensional sketching is not normally done, but measurements can be used in a number of computer-aided drawing programs and can occasionally be used for 3-D model construction (see Figure J.3).

There are three measuring techniques for sketching the crime scene and evidence: triangulation, polar coordinates, and base line or fixed line. All three measurement techniques (see Figure J.4) are based upon the determination of fixed, or known, starting points. The fixed points should be permanent; however, the name "fixed" indicates a known location, not necessarily permanency.

1. *Triangulation*—Select two fixed points, measure the distance between them, and prepare a basic layout sketch of the scene with the points included. Every item of evidence is then measured from these two points.
2. *Polar coordinates*—From a fixed point, all evidence is measured for distance from the point and is measured for direction or angle. The angle is measured by the use of a protractor or other survey instruments (laser transit equipment is frequently used).
3. *Base line or fixed line*—Establish a straight line or base line between two fixed points. The items of evidence will be measured along the fixed line and at perpendiculars to the line. A variation of this technique uses two perpendicular lines (three fixed points). The evidence is measured from these perpendicular lines.

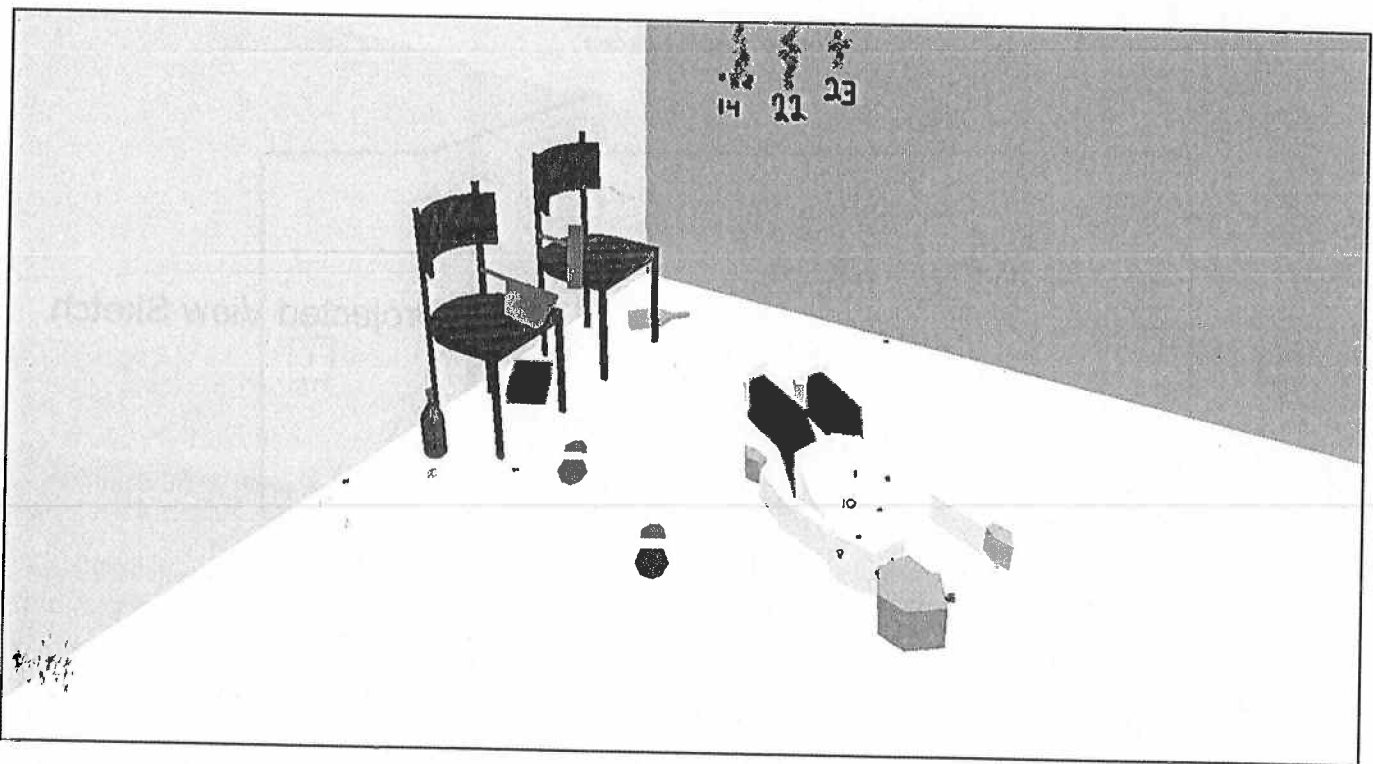
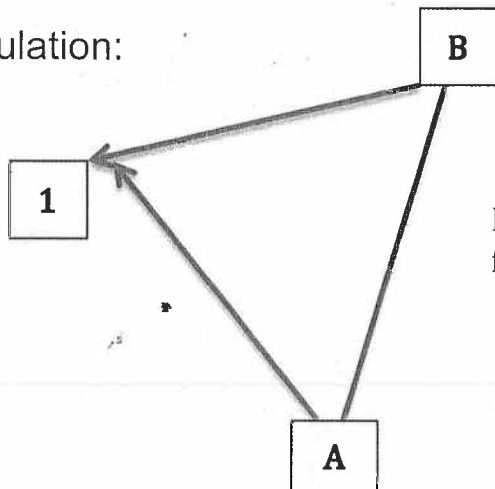


FIGURE J.3 Three-dimensional sketch.

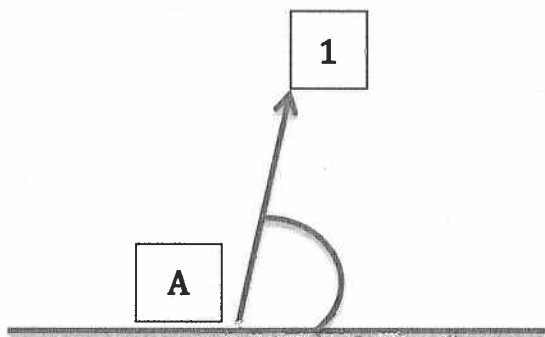


Triangulation:



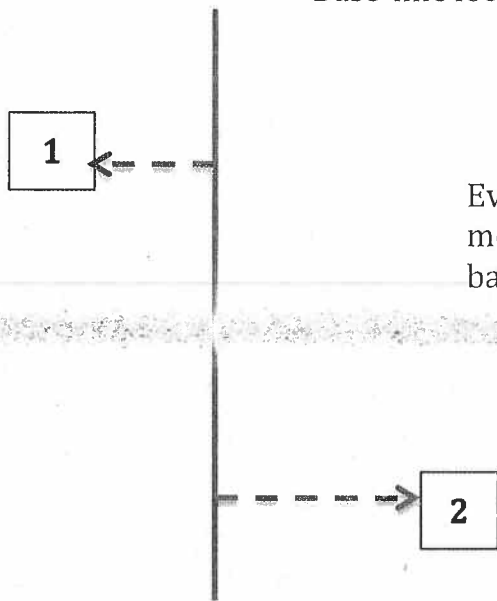
Evidence #1 is measured from fixed points A and B.

Polar coordinates:



Evidence #1 is measured from fixed point A and the angle of incident.

Base line:



Base-line location is fixed.

Evidence items #1 and #2 are measured perpendicular to the base line.

FIGURE J.4 Crime scene measurement techniques.

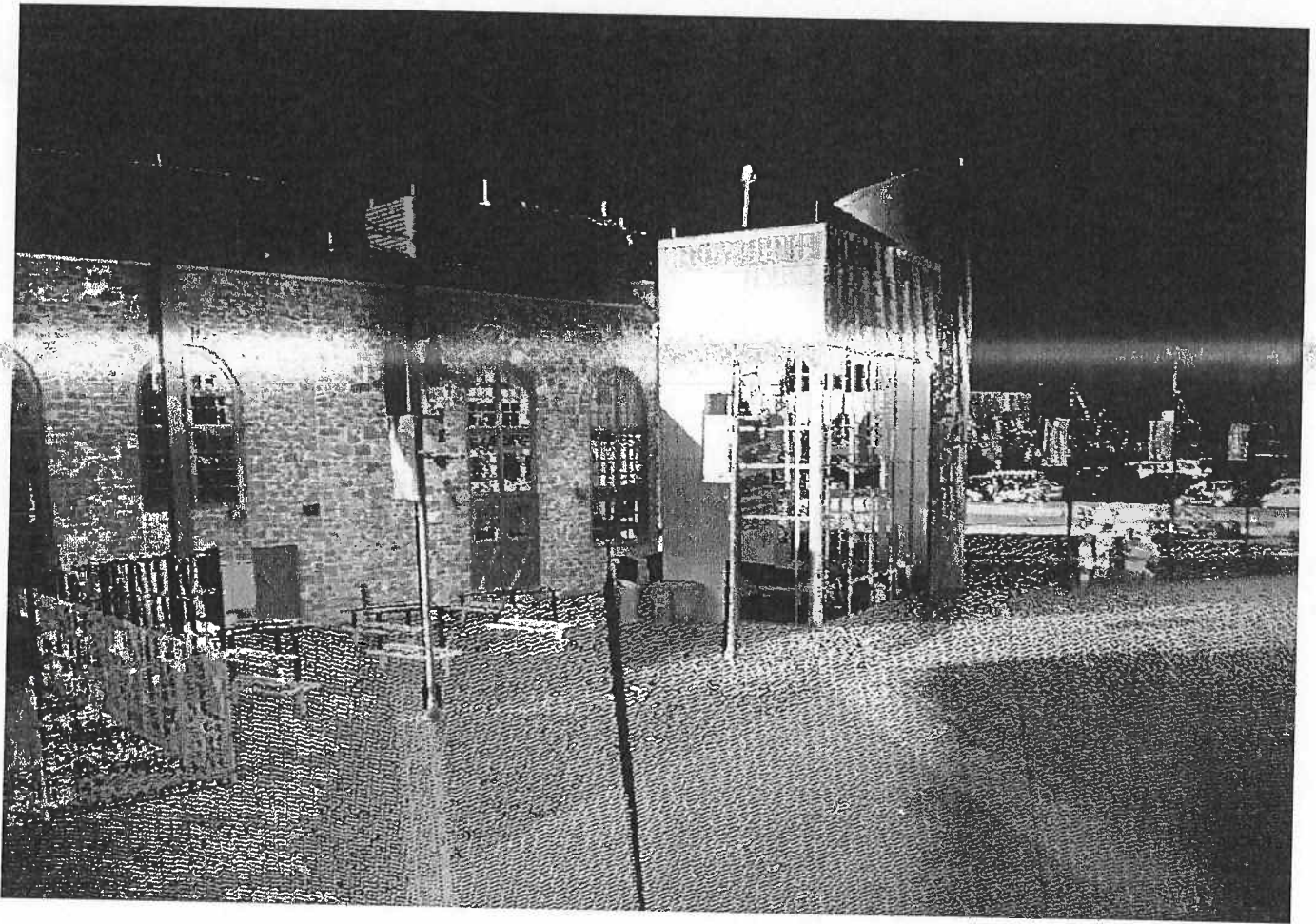


FIGURE J.5 Laser-scanner sketch of crime scene.

The crime scene sketch must include not only the measurements of the crime scene and the physical evidence but also other important documentation information. The information to be included in this portion of the sketch is as follows:

1. Agency case number
2. Offense or incident type (death investigation, burglary, etc.)
3. Victim(s) name(s): never place a suspect's name on the sketch
4. Address or location
5. Scene describer (interior of house, outdoor area of scene, room 222, etc.) including weather and lighting conditions
6. Date and time the sketch was started
7. Sketcher's name, assistant sketcher's name, or verifier's name
8. Scale used (for example, 1 mm = 1 inch)
9. Legend (# = item of evidence) of physical evidence



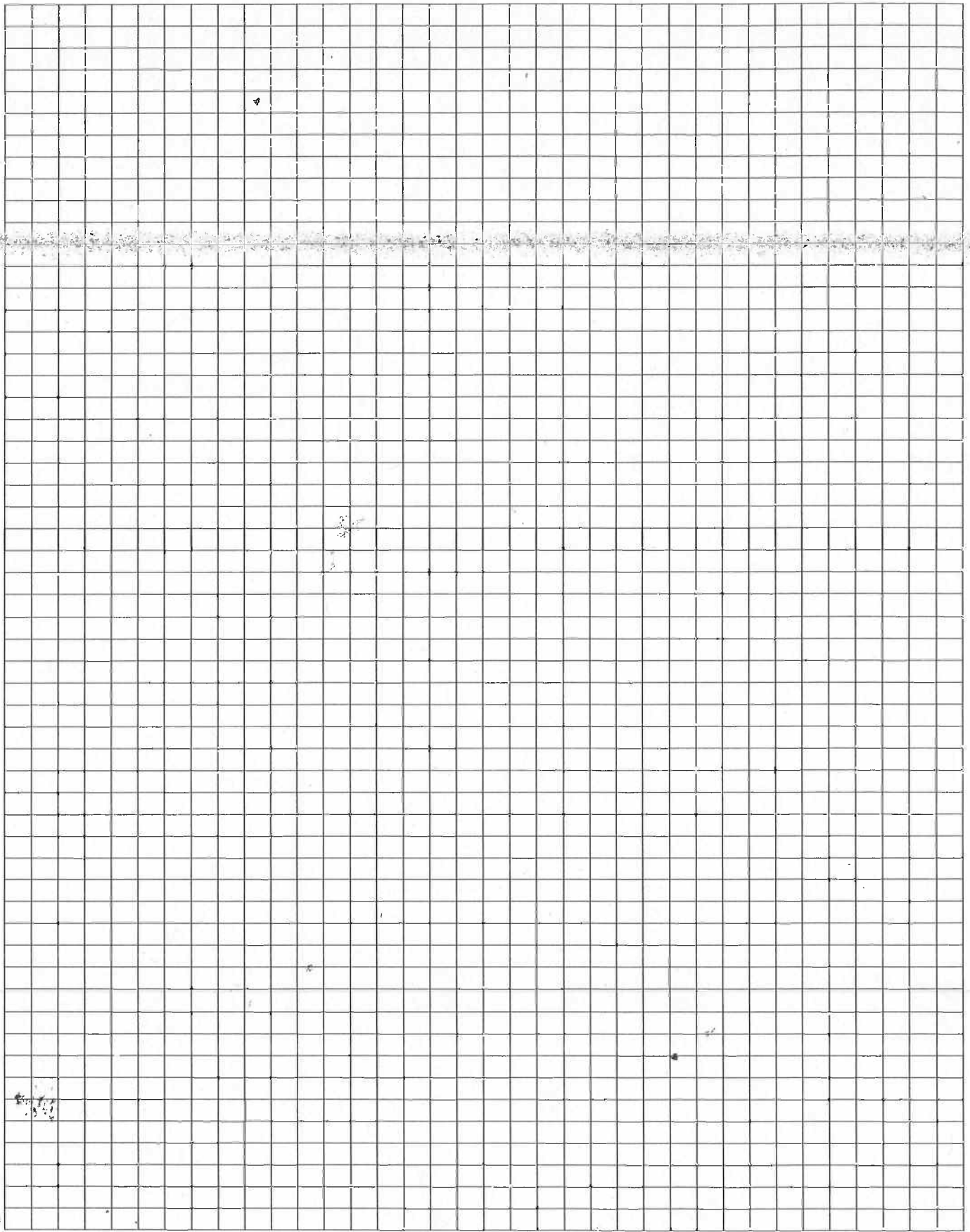
A tool added to the sketching documentation function at the crime scene is a laser-scanning, measuring and sketching system. This tool uses laser scanners with software programs to replace bulky or cumbersome tapes and sketch pads. The system will generate to-scale images at the crime scene and allow for integration with videography and photography. Figure J.5 shows a scanning-laser-generated 3-D sketch.

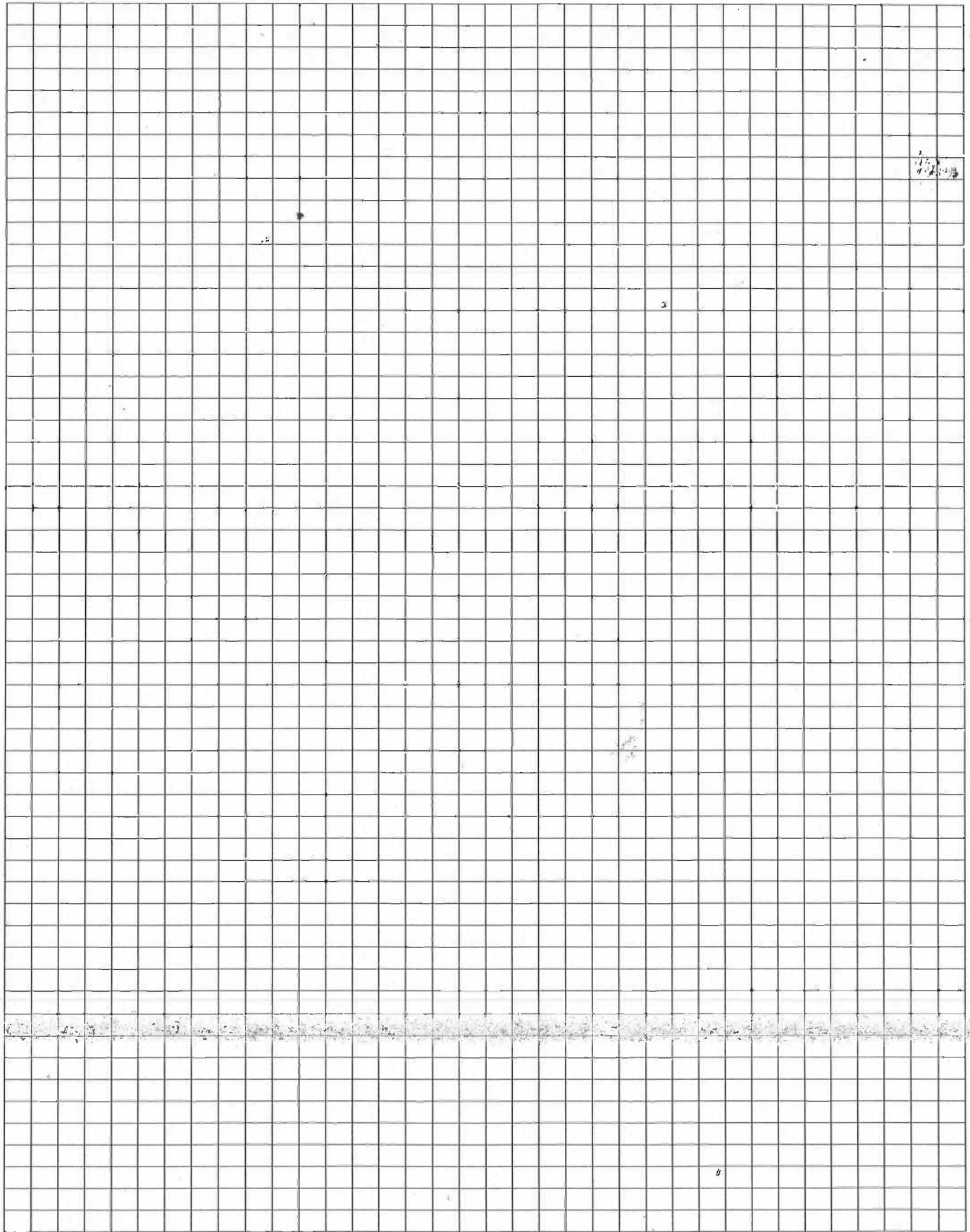
An additional form of crime scene sketching documentation is the use of to-scale crime scene models. The use of scale models necessitates the taking of many detailed measurements, is time consuming, and requires the use of photographs, drawings, and, often, structural blueprints. Scale models are very useful for presenting reconstructions to juries. Computer animations have gained some popularity in crime scene investigations and can be aided by the use of the digital documentation in general.

## LABORATORY DATA SHEET

Set up a mock crime scene in a medium-sized room. Put at least five pieces of evidence in your scene. Use case number 012345, and consider yourself to be dispatched by an agency of your choice. You are the team's crime scene sketcher. Using the graph paper forms provided, measure and create a rough sketch of your scene using the following parameters:

1. Use an overhead view, and measure using the triangulation measurement technique.
2. Use an overhead view, and measure using the base-line measurement technique.
3. Use one or both of the rough sketches you created in steps 1 or 2 to prepare a finished sketch on a separate sheet of paper.





III. CRIME SCENE DOCUMENTATION

