

Name: _____

GLASS WORKSHEET

Crime Scene A: Fight in the Alley

Details: An altercation occurred in the alley behind a former Kroger grocery store. One individual, a male approximately 25 – 35 years old was found murdered. The following glass samples were collected and cataloged at the crime scene.

Evidence Collected:

- CS-1: found near doorway
- CS-2: found 10 ft from the body
- CS-3: found near a car

Task: Calculate the refractive index (RI) and density for each of the glass samples found. Determine what type of glass each piece of evidence is.

Formulas: $N_1 = (N_2 \times \sin(\text{angle } 2)) / \sin(\text{angle } 1)$

$D = m/V$

Background Information:

Reflective Index Values	Density Values
<ul style="list-style-type: none">• Tempered glass = 1.54• Leaded crystal=1.58• Pyrex glass= 1.47• Window= 1.51	<ul style="list-style-type: none">• Tempered glass= 2.59 g/mL• Leaded crystal= 2.98 g/mL• Pyrex glass= 2.27 g/mL• Window= 2.53 g/mL

Reflective Index Calculations:

Sample	Angle of Incidence (1)	Angle of Refraction (2)	N_1 (glass)	N_2 (air)
CS-1	30°	47.5°		1.0003
CS-2	30°	49°		1.0003
CS-3	30°	51°		1.0003

Density Calculations:

Sample	Mass of Glass	Volume of Glass	Density of Glass
CS-1	0.742g	0.293 mL	
CS-2	0.784g	0.263 mL	
CS-3	0.539g	0.208 mL	

Conclusion: Write the type of glass you've determined each piece of evidence to be.

CS-1: _____ CS-2: _____ CS-3: _____

Crime Scene B: Breaking and Entering

Details: Police arrived at a crime scene to find a broken garage side entry door panel with most of the panel missing but some large pieces intact in the frame. Other pieces of glass were found on the garage floor. Glass evidence was collected from the garage floor at the base of the garage door (CS – Garage Floor) and from the broken pane (CS – Garage Window). The area near the door was searched and no objects were found that could have caused the breakage.

There is also evidence of an altercation that occurred in the kitchen of the home. Glass evidence in the kitchen is as follows:

- a. transparent colorless drinking glass tipped over, but not broken
- b. colorless glass baking pan, on the kitchen floor, broken in many pieces. (CS – Baking Pan)
- c. a clear shattered wine glass on the dining table. (CS – Wine glass)

Evidence: You found one small, irregular piece of glass approximately 3mm in diameter in the cuff of a suspect's right pant leg. There is no obvious color, but it is difficult to tell due to the size of the sample. No other glass evidence was found on the suspect. The sample has been labeled CS – Suspect

The following calculations and observations were taken. Use them to determine the type of glass.

Sample	Observation of physical characteristics	RI (calculated)	Density (calculated)	Type of Glass
CS – Baking Pan	Thick, somewhat rounded edges along break, appears to have paint over the glass	1.46	2.27 g/mL	
CS – Wine Glass	Thin sample, appears to glisten or shine in the sunlight. Edges along break are very sharp.	1.59	2.98 g/mL	
CS – Garage Floor	Average thickness, glass pieces are relatively small. No color seen. Edges along break are dull.	1.53	2.59 g/mL	
CS – Garage Window	Average thickness, appears to have a greenish color along edges. Edges along break are sharp.	1.51	2.53 g/mL	
CS - Suspect	Small sample size. Average thickness. Can not determine color.	1.54	2.57 g/mL	

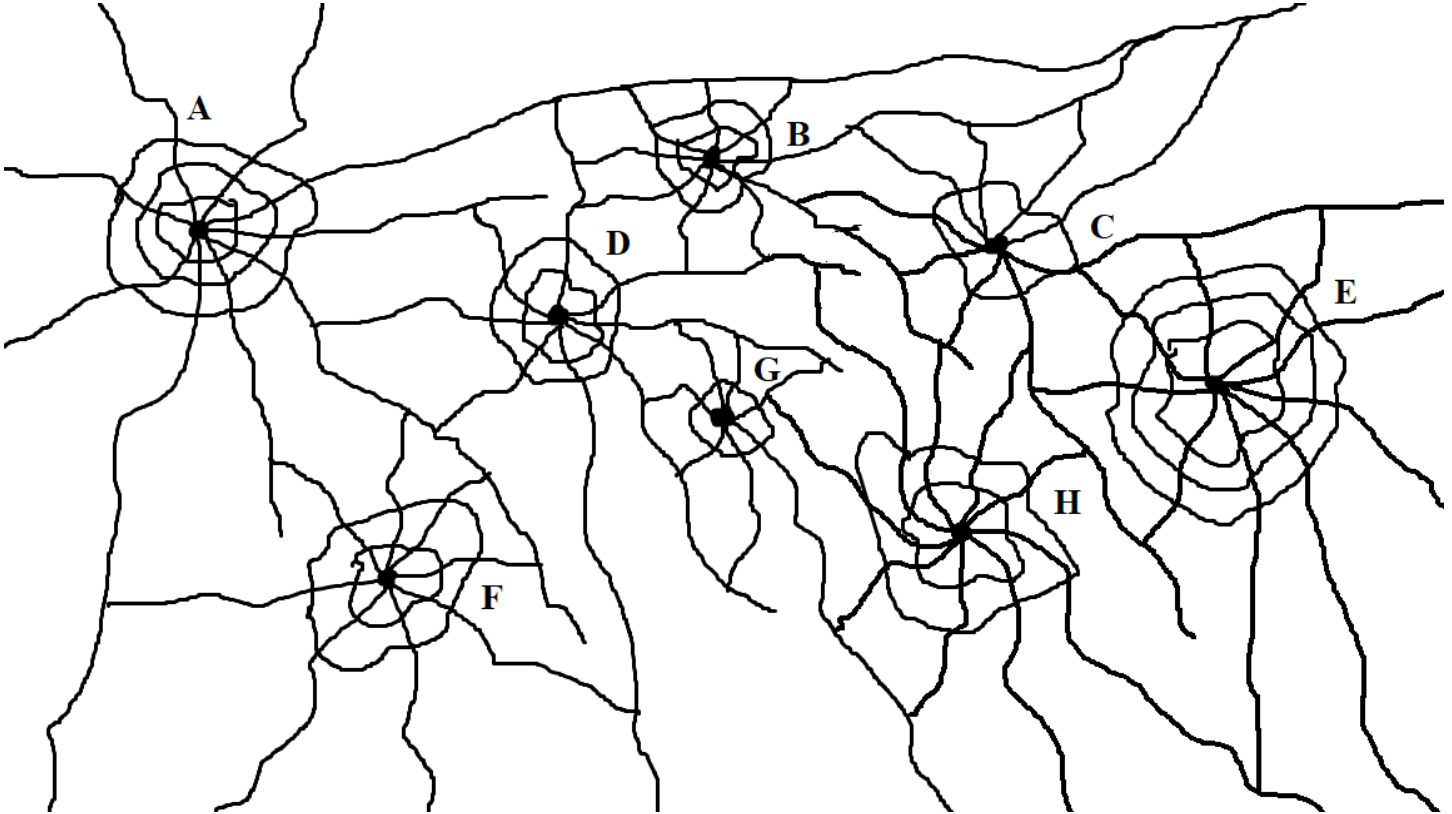
Conclusion:

1. Based on the evidence collected, do you believe the suspect was at the crime scene? Why or why not? Use complete sentences.

Crime Scene C: The Convenience Store Robbery

Details: A local convenience store was robbed at gunpoint early this morning. Authorities chased the perpetrators and gunfire was exchanged before the suspects fled the store and they got away with an undetermined amount of cash. There were two suspects involved in the robbery. You will need to analyze the evidence so the police can arrest the suspects.

Evidence Collected: The following sketch was taken of the convenience store window



Conclusion:

1. How many shots were fired? _____
2. Color all the radial fractures _____ (you pick a color)
3. Color all the concentric fractures _____ (you pick a color)
4. List all the possible orders that the shots could have occurred in:

5. What made determining the exact order the shots occurred in difficult? Use complete sentences.