

SI Forensics - Full Discipline Demo

Blood Analysis

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Forensics - Full Discipline Demo
Course	SI Forensics - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Classify each statement about bloodstain pattern analysis as true or false.

⌘ Passive stains occur after the wound has been inflicted. ⌘ Bloodstain pattern analysis is a definitive and exact science. ⌘ An impact pattern is a type of projected stain. ⌘ Bloodstains with a larger angle of impact will have a more elongated shape than those with a smaller angle of impact. ⌘ Transfer stains are the result of direct contact with a blood-bearing surface.	
True	False
1	2

Correct answers:

1 Passive stains occur after the wound has been inflicted.

An impact pattern is a type of projected stain.

Transfer stains are the result of direct contact with a blood-bearing surface.

2 Bloodstain pattern analysis is a definitive and exact science.

Bloodstains with a larger angle of impact will have a more elongated shape than those with a smaller angle of impact.

Match each term with the best description.

Parent stain	Smaller drops of blood that surround the origin of the spatter.	1
Spine	The original source from which the rest of the spatter is created.	2
Satellite stain	Pointed or curved lines that extend out from the edge of the blood drop.	3

Correct answers:

1 Satellite stain 2 Parent stain 3 Spine

Label each blood group on the image below.

⌘ Group O
⌘ Group A
⌘ Group AB
⌘ Group B

	1	2	3	4
Red blood cell type				
Antibodies present	 Anti-B	 Anti-A	None	 Anti-A & Anti-B
Antigens present	 A antigen	 B antigen	 A & B antigens	None

Correct answers:

1 Group A 2 Group B 3 Group AB 4 Group O

Exploration

Which of the following is not a category of bloodstains?

- ☐ Passive
- ☐ Transfer
- ☒ Angled
- ☐ Projected



The parent stain is the original source of the blood spatter.

- ☒ True
- ☐ False



A positive blood type match between an individual and a sample definitively proves the blood sample came from that individual.

- ☐ True
- ☒ False



Exercise 1

If you found a large bloodstain with many satellite drops but very few spines, what would you conclude about the creation of the bloodstain?

What sort of information could be gleaned from determining the height from which the blood passively dripped, as demonstrated in Part 2?

How accurate were your calculations for the angle of impact? What does this tell you about using this type of calculations in the field?

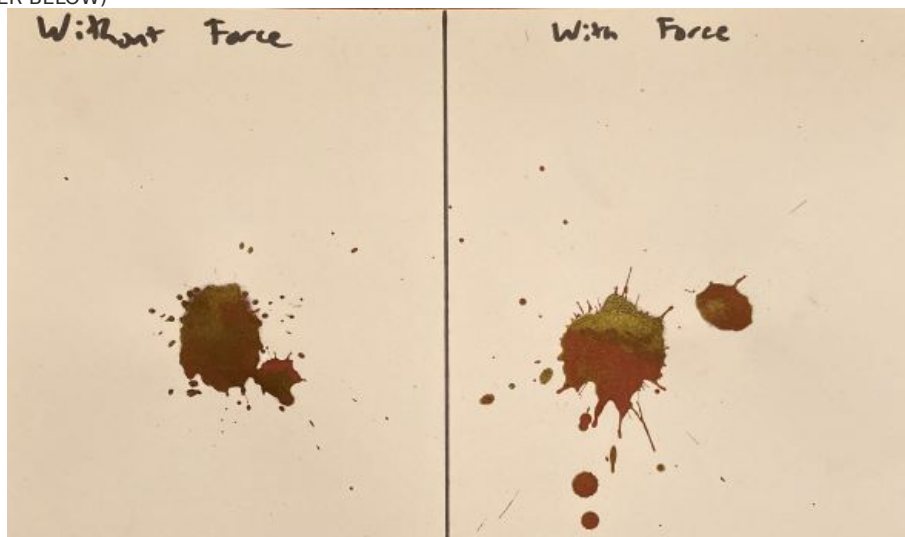
Describe the major characteristics of the impact stain produced in Part 4. What characteristic distinguishes this bloodstain pattern from the other patterns produced during this exercise?

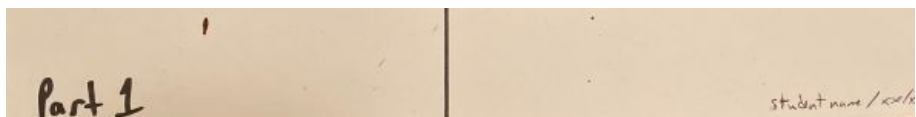
What type of bloodstain pattern was present on the head of the hammer? What characteristics distinguished this pattern from the other patterns produced during this exercise?

Data Table 1: Without and With Force
(SAMPLE ANSWER BELOW)

	Observations	Parent Stain Maximum Diameter (mm)
Without Force	Satellite drops are small and closely clustered around the parent stain with only a few short spines.	32
With Force	Satellite drops are larger and more spread out around the parent stain with many spines radiating out from the parent drop.	42

Photo 1: Bloodstain Without and With Force
(SAMPLE ANSWER BELOW)



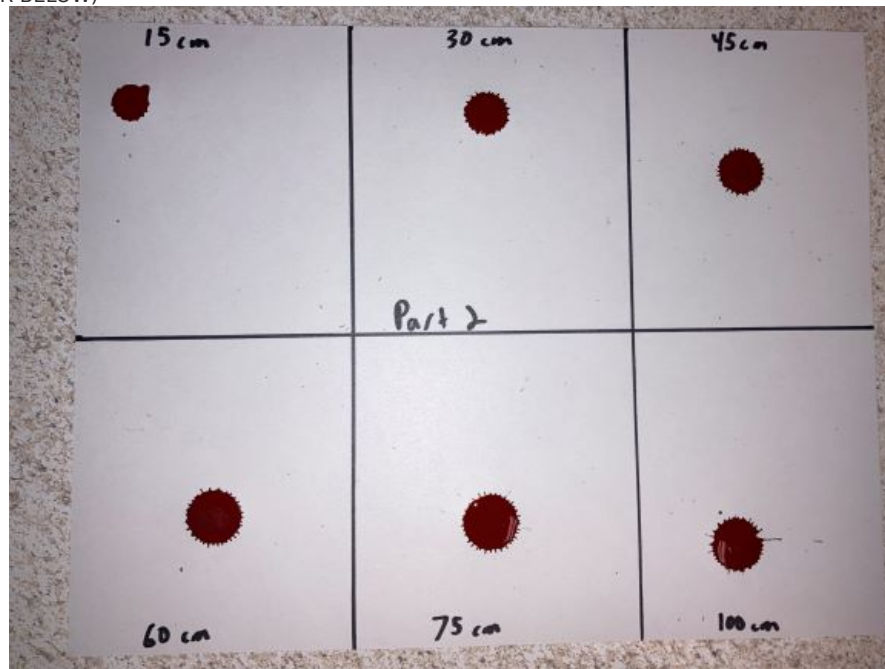


Data Table 2: Height
(SAMPLE ANSWER BELOW)

Height of Drop	Observations	Parent Stain Maximum Diameter (mm)
15 cm	Parent stain has small, uneven, but fairly uniform edges. Minute satellite drops with small spines.	13
30 cm	Parent stain has a few spines radiating out. Some satellite drops present.	16
45 cm	Parent stain has more spines radiating out. More satellite drops present with more spines further from the parent stain.	17
60 cm	Parent stain has many spines around the edge with round satellite drops at the end of some of the spines. Fewer overall satellite drops close to the parent stain.	19
75 cm	Parent stain has longer spines present. Satellite drops exhibit a more dramatic spine.	19
100 cm	Parent stain has even longer spines present. Satellite drops exhibit a more	19

dramatic spine.

Photo 2: Drip Pattern
(SAMPLE ANSWER BELOW)



Data Table 3: Angle of Impact
(SAMPLE ANSWER BELOW)

Angle of Impact	Bloodstain Maximum Length (mm)	Bloodstain Maximum Width (mm)	Calculated Angle
15°	64	5	4.47
30°	26	6	13.3
45°	13	7	32.68
60°	8	7	61

Photo 3: Angle of Impact
(SAMPLE ANSWER BELOW)

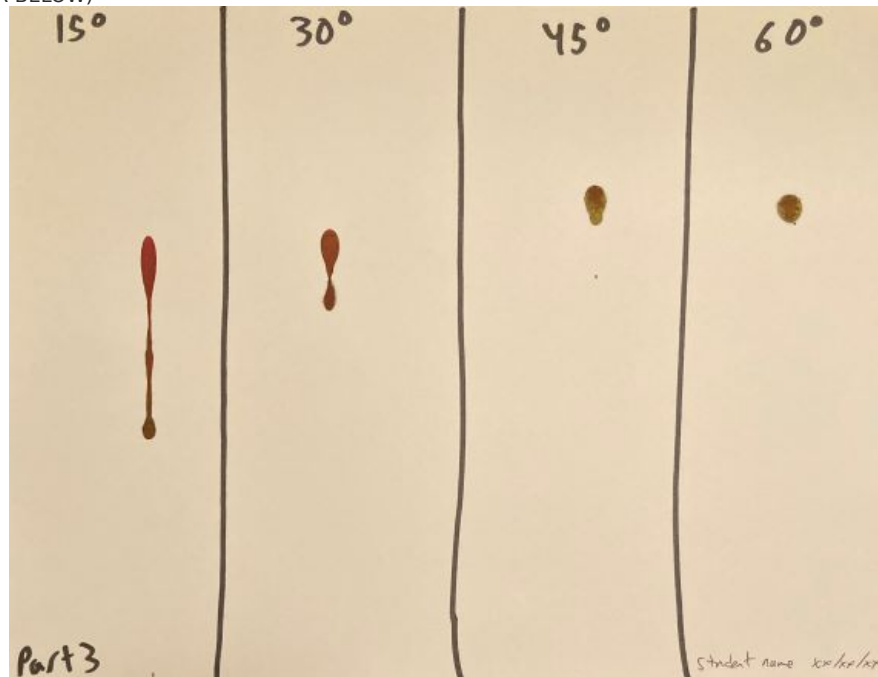


Photo 4: Impact Pattern
(SAMPLE ANSWER BELOW)



Exercise 2

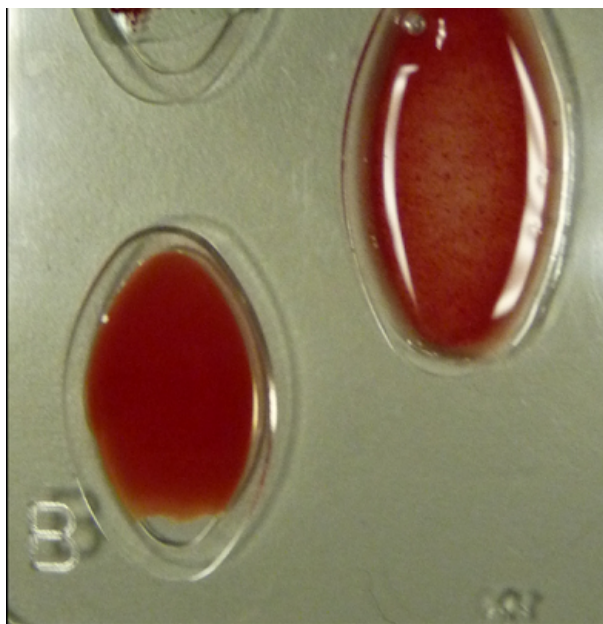
What properties of blood cells are used to determine blood type?

Describe the process of agglutination and the role agglutination plays in determining blood type.

Imagine you are a suspect in a criminal case. Blood at the crime scene is tested and discovered to agglutinate in the presence of both A and Rh anti-sera, but not in the presence of B anti-serum. Based exclusively on these results and the results of your blood test recorded in this exercise, could the blood found at the crime scene be yours?

Photo 5: Blood Typing Results
(SAMPLE ANSWER BELOW)





Observation 1: Blood Typing Results
(SAMPLE ANSWER BELOW)

This individual has A+ blood, because the anti-A serum reacted with the blood and the anti-D serum reacted with the blood.
Note that the agglutination of the Rh factor in the “Rh” well is more difficult to see in this image than the agglutination in the “A” well.

Competency Review

Which of the following types of bloodstain would not produce a spatter pattern?

- ☐ Passive
- ☒ Transfer ✓
- ☐ Projected
- ☐ Impact

What angle of blood drop impact will most likely create a circular pattern?

- ☒ 90° ✓
- ☐ 60°
- ☐ 45°
- ☐ 0°

A satellite stain consists of smaller drops of blood that originated from a parent drop.

- ☒ True ✓
- ☐ False

Blood that agglutinates in the presence of B antiserum but not A antiserum is what blood type?

- ☐ A
- ☒ B ✓
- ☐ AB
- ☐ O

Blood falling from a greater height in a drip pattern resulted in a decrease in the number of spines observed.

- ☐ True
- ☒ False ✓

What type of spatter pattern was produced on the cardstock when you hit the drop of blood with a hammer in Part 4 of Exercise 1?

- ☐ Drip
- ☐ Passive
- ☐ Transfer
- ☒ Projected

✓

The bloodstain produced with force had a larger maximum diameter than the bloodstain produced without force.

- ☒ True
- ☐ False

✓

To determine your blood type, you added serum containing antigens to your blood and observed for agglutination.

- ☐ True
- ☒ False

✓

Extension Questions

You are a bloodstain pattern analyst (BPA) examining a crime scene. At the scene, you identify a large bloodstain with many spines on the wall of the kitchen, then a trail of several smaller bloodstains with many satellite drops that contain very few spines on the floor leading to the living room couch, upon which the body was found in a pool of blood with an abdominal wound. Based on these bloodstains, recreate what happened during the crime to your best ability. Explain your reasoning. (SAMPLE ANSWER BELOW)

The abdominal wound occurred in the kitchen, as can be determined by the large number of spines on the kitchen wall indicating a projected bloodstain pattern. The victim then most likely walked from the kitchen to the couch without being wounded further, as evidence by the smaller bloodstains with very few spines on the floor, which indicate exclusively passive bloodstain patterns. The victim then likely bled to death on the couch, leading to the pooling of blood.