Forensic Bloodstain Activity

Objective:

To explore the physical properties of liquids and investigate bloodstain patterns using simple items found at home or in the classroom.

Overview:

Each student group will design and create their own fake blood and use it to create “bloodstains” under varied conditions. All required materials can be found in the kitchen, grocery store, or at school.

Materials and Tools:

- Water
- Corn Syrup / Honey / Molasses / Powdered Sugar
- Flour / Cocoa Powder / Corn Starch
- Food Colouring (red + blue makes a realistic colour, but any colour will work!)
- Beaker / Plastic Cup
- Graduated Cylinder / Measuring Spoons
- Popsicle stick
- Pipette / Eye Dropper
- 5 Sheets Blank Paper
- Meter Stick
- Ruler

Method

Fake Blood Preparation

1. Get 50 mL of water in your beaker/cup.

2. Make a plan for what you will add to your water. Consider the properties of each component you can add and how real blood is different than water.

3. Mix the components well.

4. If necessary, add additional components or more water to make your mixture behave more like real blood. (Keep track of what you're adding and how much!)

5. Make sure that your fake blood has enough colour that drops of it will be visible on paper.

6. Record your recipe.

Creating Bloodstains

1. Write your name(s) on each of 5 sheets of paper. On each page, add one of the following measurements: 20cm, 40cm, 60cm, 80cm, 100cm.

2. Place the 20cm piece of paper on the floor.

3. Measure 20cm straight upward from the paper.

4. Using your pipette or eye dropper, drop a single drop of fake blood straight down onto the scrap paper from your measured height.

5. Repeat step 4 until you have 5 bloodstains from drops released at the same height.

6. Put the fake bloodstained paper aside to dry fully.

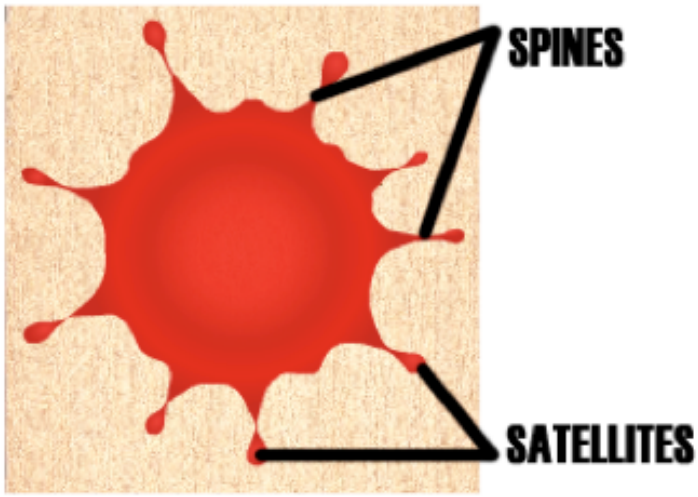
7. Repeat steps 2 through 6 for each of the 4 remaining heights (40cm, 60cm, 80cm, 100cm).

8. When the fake bloodstains are dry, use the ruler to measure the diameter of each stain. Record your measurements.

9. Look for spines and satellite drops. Record your observations.

10. Calculate the average bloodstain diameter for each height and record the values.

11. Create a graph of your average results. (Height on the x-axis, bloodstain diameter on the y-axis.)



Forensic Bloodstain Activity

Name(s): _____

Fake Blood Recipe:

Height (cm)	Bloodstain Size (cm)					
	Trial 1	**Trial 2**	**Trial 3**	**Trial 4**	**Trial 5**	**Average**
20 cm						
40 cm						
60 cm						
80 cm						
100 cm						

Height (cm)	Observations (Yes/No)									
	Trial 1		**Trial 2**		**Trial 3**		**Trial 4**		**Trial 5**	
	Spine	Sattellite	Spine	Sattellite	Spine	Sattellite	Spine	Sattellite	Spine	Sattellite
20 cm										
40 cm										
60 cm										
80 cm										
100 cm										

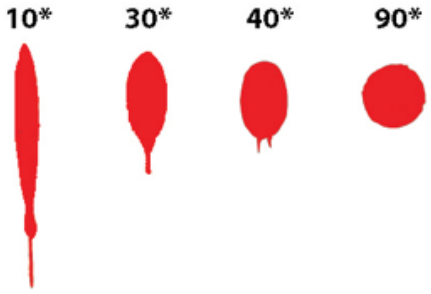
How does the height at which you release the drop relate to the size and pattern of the resulting bloodstain?

Alternatives & Further Experiments:

- Try keeping the drop height constant and vary the:
  - Material used for the bloodstain (i.e. coarse paper, fabric, whiteboard, etc.)
  - Angle of the paper (the original activity is 90 degrees)
- Investigate how movement affects the bloodstains
  - Use a roll of paper on the floor instead of single sheets
  - Hold the dropper out to the side of your body (over the paper) and travel along beside the paper while squeezing out one drop at a time.
  - Try walking slowly, normally, and quickly

Additional Information:

Bloodstain Patterns



As a blood droplet travels through the air it retains a spherical shape due to surface tension. When a droplet of blood strikes a horizontal surface at 90º, it produces a circular stain. When a drop hits at an angle other than 90º, it will produce a teardrop shaped stain and the narrow end of a blood drop will point in the direction of travel. The smaller the angle, the longer and narrower the drop will be.

The type of surface the blood strikes affects the amount of resulting spatter, including the size and appearance of the blood drops.

- Blood droplets that strike a hard smooth surface, like a piece of glass, will have little or no distortion around the edge because the surface tension will hold the droplet in the circular pattern.
- Blood droplets that strike linoleum flooring take on a slightly different appearance. There may be distortion (scalloping) around the edge of the blood droplets.
- Hard surfaces such as wood or concrete lead to patterns that are distorted to a larger extent. (i.e. spines and secondary spatter)

Fake Blood Recipes

If you want to skip the investigation into liquids and mixtures so you can focus on the bloodstains, here are two fake blood recipes. For best results, use a blender and 2 tablespoons red food colouring. (Recipes c/o Steve Spangler Science: https://www.stevespanglerscience.com/lab/experiments/fake-blood-recipes)

- 1 Cup Corn Syrup
- 1 Tablespoon Water
- 2 Tablespoons Cornstarch
- Food Colouring

Or

- 1 Cup Water
- 500g Powdered/Icing Sugar
- 1 Tablespoon Cocoa Powder
- Food Colouring