PINHOLE CAMERA PROJECT OVERVIEW

Science 8: Science Expo 2016-2017

You will be given the opportunity to construct your own pinhole camera and develop your own photos from scratch. Your goal is to explore variables that affect pinhole photography by taking a series of photos and then creating a picture book which you will then showcase at the Science Expo: January 30th – February 3rd. There are several components/stages to this project: **Camera construction, Photo Challenge, and Presentation.**

Some videos:

- **Illuminating Photography - https://goo.gl/U0OF7V**
- **How to make a pinhole camera: https://goo.gl/YGdZxR**

Group Formation

Find a partner from your class. Observe the list of materials to bring to build your camera. Split responsibilities for bringing the required materials.

Camera Construction

Construct camera according to provided instructions.

Photo Challenge

You and your partner will be tasked with taking two of the *same* picture each week. You will then compare how changing variables affected the quality of your picture. You must take a photo that falls into one of the below categories. Consider taking pictures from different angles (high angle, low angle) and distances (from a distance, close-up).

- Selfie
- Transport
- Strike a pose
- "What It Means to Be a Cavalier" (Respect, Integrity, Curiosity, Unity, Passion, Resilience)
- Logo
- Pair
- Environment
- S is for…
- "Play"
- One of the Four Strands (Arts, Athletics, Academics, Service)
- Something I Care About
- House colours

Independent and Dependent Variables

Three independent variables have been identified to be the most important to consider when taking a photo with your pinhole camera. They are **exposure time**, **light intensity**, and **light conditions** (indoor vs. outdoor). Link these three variables to specific image qualities (dependent variables) that these variables will affect in your photo. Explain how the independent variable affects the dependent variable.

Photobook Questions

During the Pinhole Camera Project, you will not only be answering questions each week pertaining to a certain independent variable and how that variable has affected your image quality, you will also be answering research questions that will further your knowledge and understanding of how photography, our eye, and light work to produce an image.

Parts and functions of a camera, draw a diagram showing light rays entering camera, image quality?

- Provide a labelled diagram of how the pinhole camera works. You must draw this diagram not print one from the internet. Be sure to use a ruler when necessary.
- What is the function of the pinhole?
- Why do we have to spray the inside of the container black?
- When the picture is taken, is it inverted or right side up on the photo paper that you have inserted into your camera? Why?
- Why does a pinhole camera not need a lens?
- Does the diameter of the can matters when taking a picture? Why or Why not?

Questions relating to exposure

- What does “exposure time” mean?
- Identify two differences between your photos.
- Why do you think these differences occurred?
- In one sentence explain the connection between exposure time and picture quality.
- What would happen to exposure time and image quality if you decreased the size of the pinhole?

Questions relating to light levels

- What is the Vernier Light sensor measuring?
- What unit does the Vernier Light sensor use? Provide some information about the unit.
- What do you notice about the readings from the Vernier sensor and the image quality?
- In one sentence explain the relationship between light levels and picture quality.

Questions relating to indoor vs outdoor photography

- Research recommended exposure times for different conditions (ex. Outdoor - bright sunlight, overcast, etc. Indoor)
- Identify two differences between your photos?
- Which condition needs a longer exposure time? Why?
- Research two reasons for these differences
- In one sentence explain the relationship between light conditions and picture quality.

Final photo questions

- Justify your choice of specifications for this photo. You must talk about all of the variables mentioned in this project (ie. Exposure time, light conditions etc.)

Project Summary questions

- What is the most important thing you learned?
- How successful was your group at taking photos?
- What would you do differently next time?

Photobook Construction

Over the course of the project your group will be creating a photobook, which will be your presentation piece during the Science Expo. Your photobook will include all pictures you have taken as well as all research and answers to how the different variables affected your images. Each week will focus on a different variable and your photobook will highlight this.

Pinhole Camera Rubric 2016-2017

Part A: Camera Construction (10 marks)

	1-2	3-4	5
Quality of construction and use of materials	Poorly made, flimsy, inappropriate choice of materials, easily falls apart		Excellent construction, good function/operation. A wise, creative use of materials
Success of device to demonstrate desired goal	Camera was not successful at taking photographs - one photo is included		Camera was successful at taking a minimum of three types of photographs

Part B: Camera Research (15 marks)

	1-2	3-4	5
Diagram of Camera	The diagram of the camera is inaccurate or incomplete.		The diagram of the camera is accurate, complete and of high quality. A ruler was used when necessary.
	1-4	**5-7**	**8-10**
Questions answered and completed. Each question is worth two marks. Please ensure you include sufficient detail for each question to achieve full marks.	Explanations regarding the five questions about how pinhole cameras work are not completed, are inaccurate or are lacking detail.		The function of the pinhole was well-explained (2). The reasoning to spray the inside of the camera black was well- detailed (2). Explanation of the photo (inverted or not) was thorough (2). Explanation of why a lens is not needed is clear (2). Explanation of the diameter of the can is thorough and complete (2).

Part C: Photo Pages (45 marks)

Exposure			
	1-2	**3-4**	**5**
Photos Comparing Different Exposure Times	Photos comparing different exposure may be missing		Photos comparing different exposures are present in their original and their inverted form.
	1-4	**5-7**	**8-10**
Questions answered and completed.	Explanations regarding the questions about exposure time and how it affects the image quality are not completed, are inaccurate or are lacking detail.		Explanations regarding the questions about exposure time and how it affects image quality are complete, accurate and well-detailed.

Light Levels			
	1-2	**3-4**	**5**
Photos Comparing Different Light Levels	Photos comparing different light levels may be missing		Photos comparing different light levels are present in their original and their inverted form.
	1-4	**5-7**	**8-10**
Questions answered and completed.	Explanations regarding the questions about different light levels and how it affects the image quality are not completed, are inaccurate or are lacking detail.		Explanations regarding the questions about different light levels and how it affects image quality are complete, accurate and well-detailed.

Indoor vs. Outdoor			
	1-2	**3-4**	**5**
Photos Comparing Indoor and Outdoor Conditions	Photos comparing indoor and outdoor lighting may be missing		Photos comparing indoor and outdoor lighting are present in their original and their inverted form.
	1-4	**5-7**	**8-10**
Questions answered and completed.	Explanations regarding the questions about indoor and outdoor lighting and how it affects the image quality are not completed, are inaccurate or are lacking detail.		Explanations regarding the questions about indoor and outdoor lighting and how it affects image quality are complete, accurate and well-detailed.

Part D: Final Photo & Project Summary (15 marks)

	1-2	3-4	5
Final Photo	Final photo is missing.		Final photo demonstrates an understanding of the effects of exposure time, light conditions and indoor and outdoor lighting. Photo is creative.
Final Photo Questions	Justification regarding what exposure time was used based on lighting conditions and location of where photo was taken (indoor or outdoor) is missing, inaccurate or lacking detail.		Justification regarding what exposure time was used based on lighting conditions and location of where photo was taken (indoor or outdoor) is complete, accurate and well-detailed.
Project Summary Questions (Conclusion)	Project summary is lacking depth of thought and accuracy when answering the three questions		Project summary demonstrates depth of thought and accuracy when answering the three questions.

Part E: References (5 marks)

	1-2	3-4	5
References	References are not in APA format or incomplete. At least one reference is given.		Full APA style reference for your sources. At least one reference is provided for exposure, light levels and indoor/outdoor conditions.

Part F: Group Collaboration (10 marks)

	1-4	5-7	8-10
Group Collaboration	Group did not work well together when building the camera, taking pictures, researching and completing write-up for each section		Group collaborated well. Each individual took part and played an equal role in building the camera, taking pictures and the written components for each section.

* Note: The collaboration mark may be different for groups members if there is a clear lack of effort and work input by particular group members. This would result in a different overall mark for the group members.

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