Example CBA Science CBA 1

Extended Experimental Investigation

Student Name: Sofia Church **Teacher: Mr. Goodison**

Topic of Investigation: The Affect of Temperature on Magnetism **Date: 25/3/20**

My Aim/What I am going to investigate:

For my Science CBA I will be investigating the impact of temperature on magnets. I will heat/cool the magnets to different temperatures and see how many paperclips the magnet picks up at each temperature.

My Research:

Source	What I learned	Author/Website etc
Internet	I learned that increasing the temperature of a magnet causes magnetism to be lost. This is because what heat is added to a magnet the particles move at a faster rate which causes them to misalign and to somewhat lose their magnetism and in some cases a magnet can be permanently lost.	Apexmagnets.com Youtube.com

My Hypothesis: (If … then … because):

If I heat up the magnet then the magnet will not pick up as many paperclips because when a magnet is heated the particles begin to move at a much faster speed which cause the particles to be misaligned which means some magnetism is lost.

My Prediction:

I predict that the hotter the magnet is, the less paperclips it will pick up.

My Variables:

What I will change? Cause variable	What will I measure? Effect variable	What will I keep the same? Control variables
The temperature of the magnet	The number of paperclips the magnet picks up	-The quantity of paperclips in the bowl -The magnet -Type of paperclips

My Experiment:

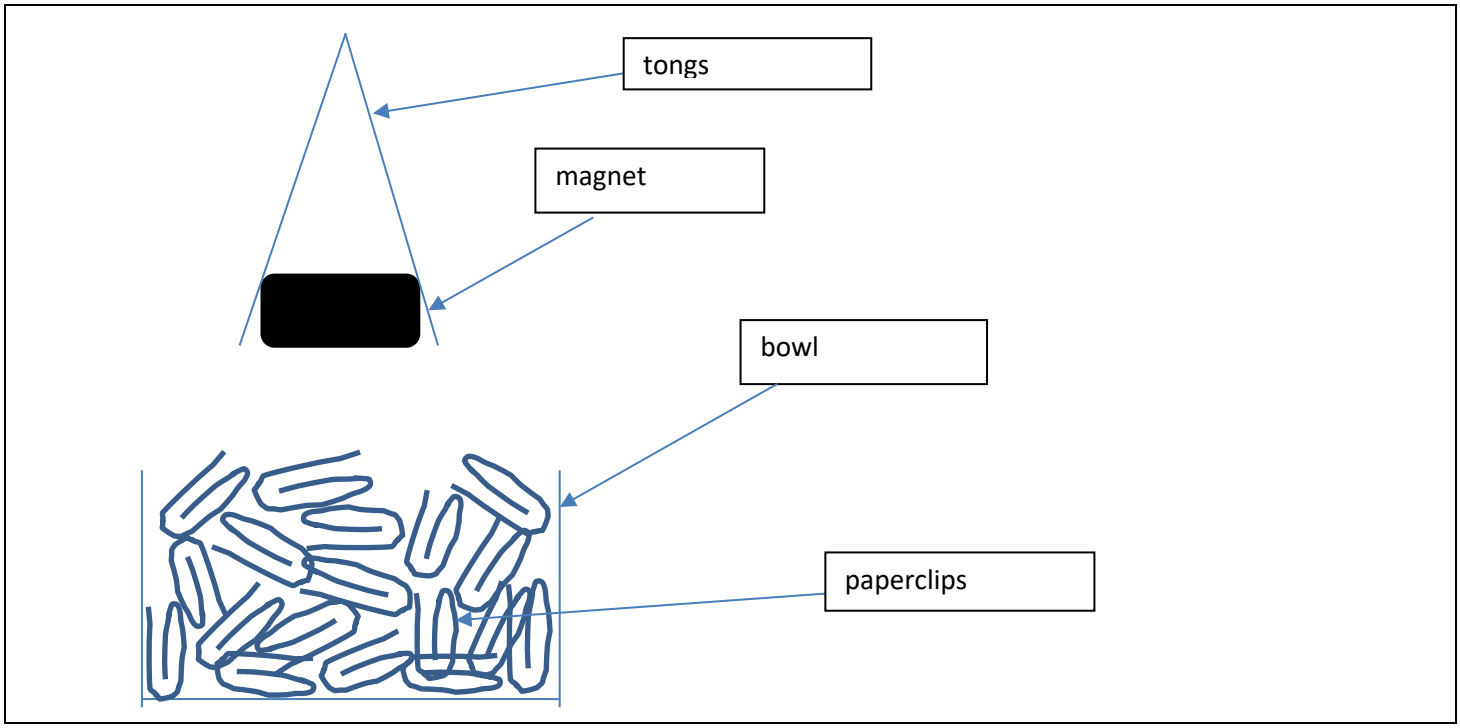
To make my experiment Fair	To make my experiment Accurate	To make my experiment Reliable	To make my experiment Safe
I will use the same magnet and paperclips each time.	I will carefully count the number of paperclips the magnet picks up each time	I will repeat the experiment 3 times for each temperature and	I will tie up my hair, wear safety goggles and gloves, use a tongs while picking up the hot magnet and I

	and record it on my results table.	**get the average temperature.**	**will clear everything out of my way.**

My Equipment: (List the apparatus you will use):

-tongs -kettle
-magnet -water
-paperclips -freezer
-bowl

My Diagram: (How you will set up your apparatus. Remember - Pencil, Ruler, Labels)



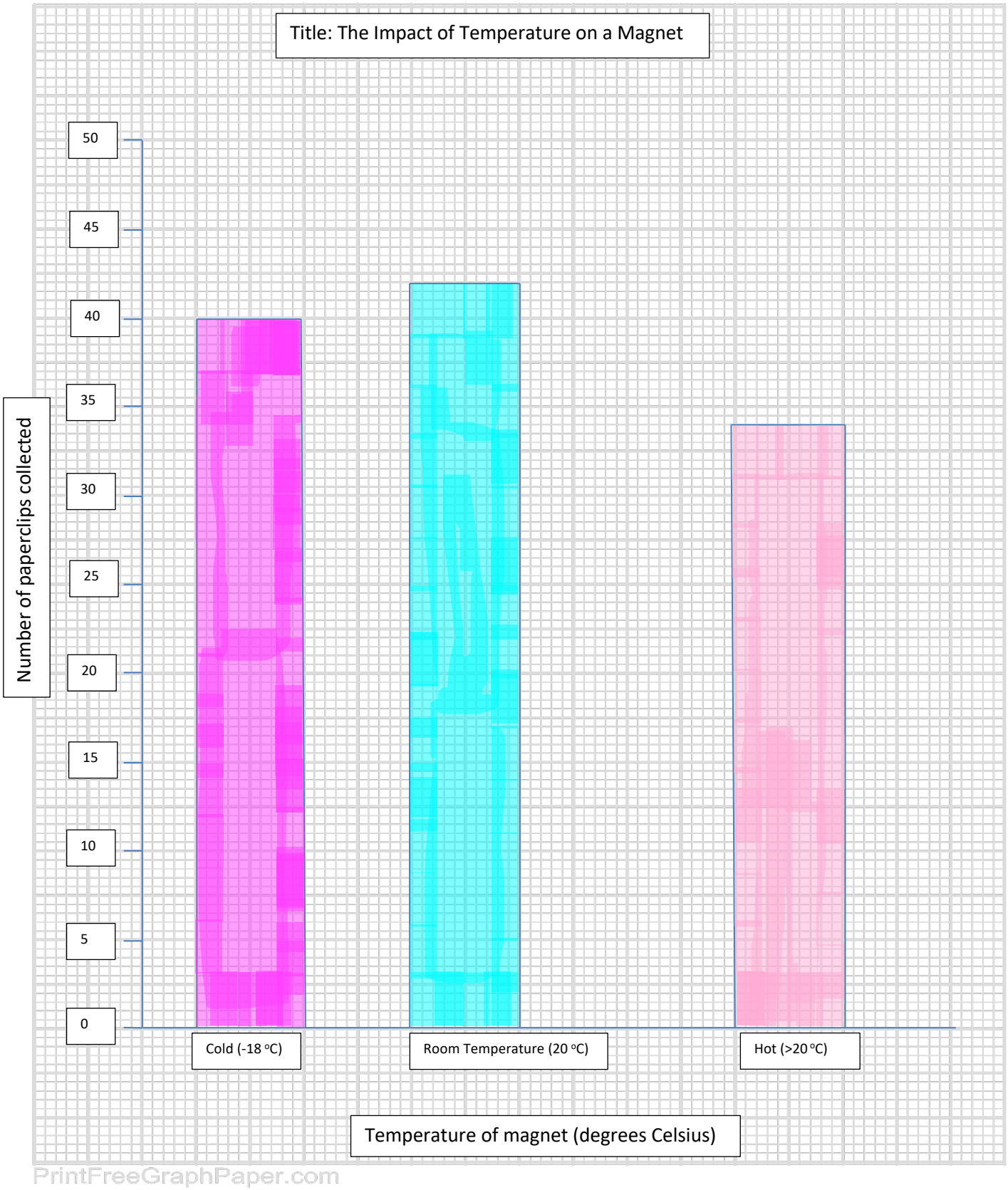
My Method: (Write a step by step plan of how you will carry out this investigation):

1. Clear your work area and carry out necessary safety procedures (tie up hair, safety goggles and gloves).
2. Gather all the equipment needed.
3. Count 130 paperclips out and place them into a bowl.
4. Place the magnet into the bowl and move it around until it will no longer pick up anymore paperclips.
5. Take the magnet out of the bowl and remove all the paperclips from the magnet.
6. Count the paperclips and record it in your results table.
7. Put the paperclips back in the bowl.
8. Repeat the experiment twice more and get an average amount of paperclips.
9. Repeat steps 1-9 using a magnet left in the freezer for approximately 2 hours to become cold and a magnet left in boiling water for approximately 5 minutes to become hot.

My Results: (Use the space below to construct a results table. Remember - include headings and units)

	Amount of Paperclips			
Temperature (°C)	**Trial 1**	**Trial 2**	**Trial 3**	**Average amount**
Cold (-18 °C)	40	40	39	40
Room Temperature (20 °C)	43	41	40	42
Hot (>20 °C)	34	35	32	34

My Graph: (Draw a suitable graph your results. Remember – title, suitable scale, labelled axes, accurate plots):



My Conclusion: (Describe any patterns in your results, use your research and knowledge to explain why this pattern occurred, do you have any anomalous (odd) results that don't seem to fit the pattern, is your Hypothesis supported):
My hypothesis was correct because as the temperature of the magnet increased, the less paperclips it picked up. There was one part of my results, however, that I was surprised by. Since all of the information I found about this topic said that the higher the temperature of the magnet, the less paperclips it will pick up, so I assumed that if the temperature of the magnet was decreased that it would pick up more but this was not the case. The magnet actually picked up less paperclips when it was colder than it did when it was at room temperature. I looked up about this result online and it said that magnets' magnetic property is enhanced when the temperature is decreased but there was one exception

which was ferrite magnets. It says that ferrite or ceramic magnets are harder to demagnetise at a high temperature and easier to demagnetise at a low temperature. I have no way to determine what type of magnet I used since I used a magnet with a piece of plastic on top which therefore means that I cannot accurately get the density of it. Even though this seems like a good explanation for my results, I do not think this is the case because when I increased the temperature of the magnet it still lost some of its magnetic properties.

My Evaluation:

(A good investigation should achieve results that are Reliable and Valid - Fair & Accurate. Comment on your investigation in terms of these things)

Are My Results Valid?	Are My Results Reliable?
I think that my results are valid because I did all I could to make them accurate such as repeating the experiment 3 times for each temperature, but since I did not have a thermometer I could not get exact temperatures.	**I think that my results are reliable because I used the same magnet and paperclips each time and I used the same amount of paperclips each time.**

How could I make my Investiagtion better/more accurate?	What further Investigations would you like to carry out?
To make my investigation more accurate I would measure the temperature of the magnet with a thermometer to make sure they were the same temperature each time I did the experiment. I would also like to try this experiment with a bigger and stronger magnet and a lot more paperclips as I think this would also make it more accurate. I would have liked to try this experiment with other varying temperatures but since I did not have a thermometer this was not possible.	**On the topic of magnets some other investigations I would like to carry out are:** **-the difference in magnetism between different types of magnets** **-the impact of surface area on magnetism**

Student Signature: Sofia Church **Date: 20/4/20**