



Prize Winner

Crystal Investigation

Year 3-4

**Odin Swan
Louie Cook**

Grange Primary School

0218 - 050

Student(s):

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Gender:

M
M

Patent Sought

N

App code:
5765507

Year Level: 3 - 4

Group Entry: Y

Students: 2

Category: Crystal Investigation

Project Title:



OLIPHANT SCIENCE AWARDS

CATEGORY: CRYSTAL GROWING

Supported by the SA Branch of the Royal Australian Chemical Institute
and

The RACI Chemical Education Group (S.A.)



LOG BOOK

STUDENT NAME(S): Odin Swan (partnered with Louie Cook)

YEAR LEVEL: 4 **SCHOOL:** Grange Primary School

Please note: the use of this version of a log book is not mandatory.
There will be no penalty for not using it.

However the student(s) who are preparing a crystal will need to provide evidence of their ongoing efforts by comments related to the criteria suggested in this log book model.

The competition instructions suggest that the crystal growers formulate an hypothesis that they can test while growing the crystal(s)

Examples of questions that could be expressed as a prediction or hypothesis are:


- Can my crystal grow to the required 9 mm in 3 weeks?
- Does leaving my crystal in a dark place help it to grow better?
- Does more or less attention help my crystal to be more clear and well-formed?
- Does an incubator help grow bigger crystals in a given time period?

MY HYPOTHESIS: Does a crystal grow better in the dark or light?

I think the crystal will grow better in the light because it is warmer than the dark. I am growing my crystal in the light and Louie is growing his in the dark.

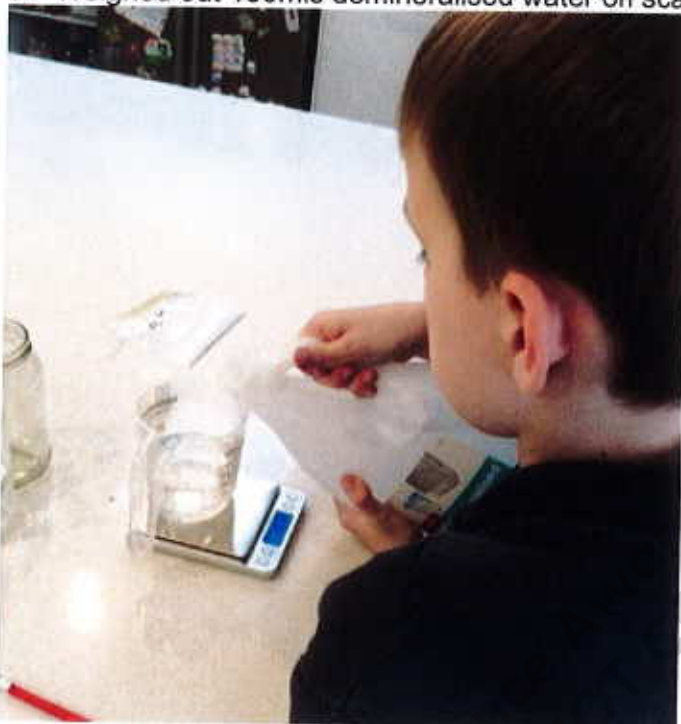
The log book in this form is only advisory but students should try to document the following:

- Date and time for each handling of the crystal procedure
- Describe exactly what they did on each occasion (should include measurements of volume and temperature made at any time)
- What has happened to the selected crystal on each viewing (changes)
- Description of the crystal characteristics – clarity, regularity (smooth faces, sharp edges), and size (can be assisted by sketches or digital photos)
- What problems were encountered and how they were solved – may include summaries of discussions with teachers/mentors
- Acknowledgment of manual assistance by others e.g. for competitors from the R-2, 3-5 age groups, what teachers or parents did.
- Acknowledgement of any crystal growing advice from books or websites

| Date/Time | Descriptions of what the student(s) did, problems encountered and solved | Crystal characteristics | signed |
|---|---|-------------------------|--------|
| 8 June 2020 | <p>Research</p> <p>In YouTube I found a video on how to make crystals it is called how to grow alum crystals By sci guys</p> <p>Mum and Dad also had instructions from raci.org.au</p> | | |
| <p>1:30pm – 1:48pm</p> <p>8 June 2020</p> | <p>Starting seed crystal</p> <p>What we used:</p>  | | |

Steps followed:

1. Weighed alum using scales – I have 25 gm given to me by school
2. Weighed out 150mls demineralised water on scales







3. Pour water into big jar. The big jar was used for more space for crystals to grow on the bottom
4. Heat up water for 1 minute until hot in microwave. Dad helped me because it was hot
5. Pour all the alum in big jar
6. Stir until dissolved
7. Put coffee filter on top to keep dust out
8. Put in a sunny position

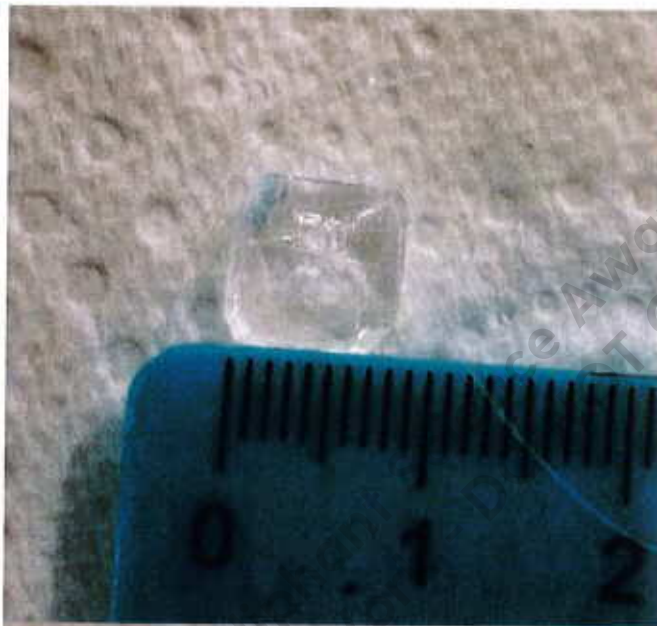


9. Wash hands

Mum and Dad helped me by taking photos and telling me the steps to follow. And helping me with the hot dangerous stuff.

| | | | |
|------------------------------------|---|--|--|
| <p>3:39pm 9 June 2020</p> | <p>I saw about 7 small crystals starting to form</p> | <p>Very small, about 2mm in size Very clear in colour</p> | |
| <p>4:45pm 9 June 2020</p> | <p>I checked again and the crystals already grew more and there are more. There are about 15 now. I can see the bigger crystals have more edges</p>  | <p>Some bigger, maybe 5mm, have more edges. They look a bit flat. There are some smaller ones too that are about 2mm. They are all very clear</p> | |
| <p>7:55am 10 June 2020</p> | <p>Checked the crystals this morning and the crystals have grown big There are two that are perfect for what I'm aiming for. They are big, clear and diamond shaped. After school we are going to choose a seed crystal and do the next part of the experiment</p>  | <p>Many large crystals but some have joined together. Most look about 1cm big. Some are more white than clear and have many edges. There are two good clear ones with a more diamond shape that are about 1cm big.</p> | |

| Date/Time | Descriptions of what the student(s) did, problems encountered and solved | Crystal characteristics | signed |
|------------------------------------|---|--|--------|
| <p>4:40pm 11 June 2020</p> | <p>Choosing seed crystal and starting to grow it</p> <p>I checked the crystals and they had not grown today. My mum said the water may not be saturated enough any more so the crystals won't grow more. They were a good size for a seed so we took them out to use as a seed for growing our big crystal.</p>  <p>These are the steps I did</p> <ol style="list-style-type: none"> 1. Poured the liquid out into an empty jar with a filter to catch the crystals  <ol style="list-style-type: none"> 2. I looked at the crystals to choose the best for the seed. Mum said the judges wanted a diamond shape one that is clear and I had two good ones. We measured them and they were about 7mm and 8mm | <p>The two best crystals look very diamond shaped, clear and perfect for what we are going to do. They are 7 and 8mm.</p> <p>The other crystals had mostly joined together and had a very white look. Also had more sides than the other crystals.</p> | |



3. Mum tied nylon thread around the bigger crystal with my help by putting my finger on top to hold down the thread while mum tied the knot. We used nylon thread so more crystals don't grow on the thread. The sci guys

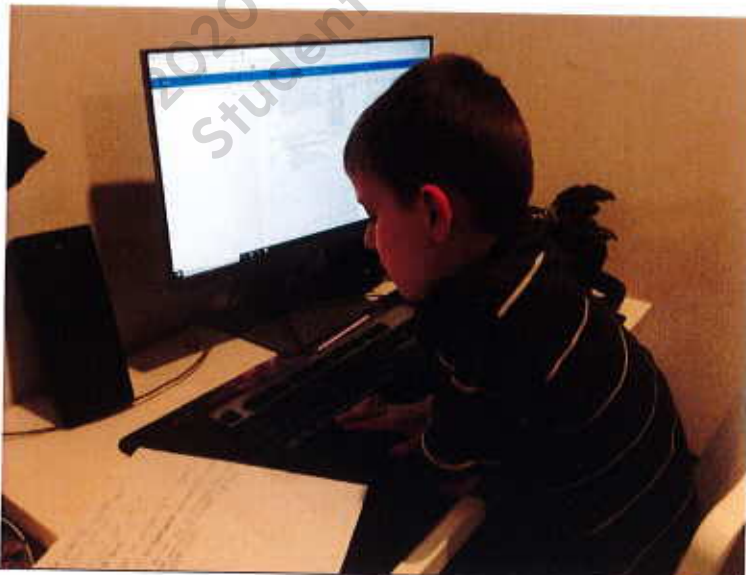
video on YouTube said to do that. We saved the smaller crystal in a plastic bag.

4. We put in the leftover crystals and the same water in the jar and put it in the microwave for 30 seconds
5. Then we took it out of the microwave and stirred it and reheated it once for it to dissolve. It took from 5:07-5:29, my mum helped stir because I was tired
6. There were tiny bits of crystals in the jar so we poured it into a bigger jar and filtered it back in, so all the little bits of crystals won't form on the bottom.



7. We need to wait for water to cool down because we don't want to heat the crystal and melt it.

My mum helped me by helping me tie the thread, and doing the hot and dangerous stuff. Mum took photos too and helped me with my log book too



11 June
7:05pm

We ran into a problem. It was crystals are growing on the bottom of the jar while we were waiting for the water to cool down. We fixed it by heating it up.

11 June
7.50pm

The tiny crystals are all growing on the bottom of the jar again. My parents are not sure what to do and I need to go to bed so we put our seed crystal in a bag and we will do it tomorrow.



13 June
12:38pm

Starting to grow seed continued

We didn't have time to do the crystal until today so we are starting again now. Lots of little tiny crystals were on the bottom of the jar still. We thought this may be because there was less water than what we put into it to start so we are going to try adding more water. Here are the steps we did

1. Weighed the water in a jar. There was 126.1mls of water



2. Added more water to 140.5 mls. We did less water than what we did to start with because there is less alum than when we started because we have two crystals that were alum before and are crystals now



3. Heated the water and alum up in the microwave for 26 seconds. We could see bubbles and heard a pop so we stopped the microwave and it was heated up enough.
4. Stirred until the alum dissolved



5. Put the jar on a towel so it's not on the cold bench so it can rise to room temperature. Hopefully the crystals won't form on the bottom and it will get to room temperature

My mum helped by helping me think what the problem could be and telling me what to do and she did the hot stuff and took photos of me.

13 June
3:23pm

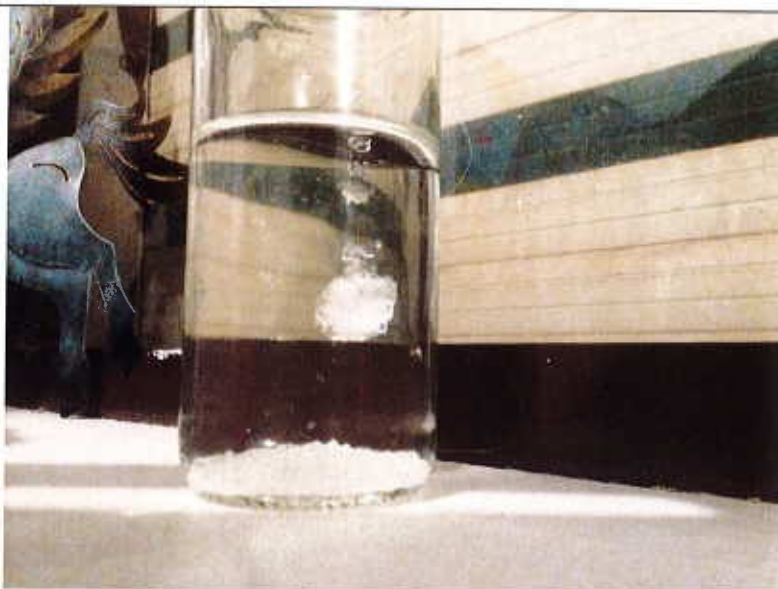
I checked the water in the jar to see if it was room temperature. It was so my mum tied the string on the crystal around the paddle pop stick because it is hard to do. I checked to see if the crystal went down deep enough into the water and it did. So we put the crystal into the water and put it in a sunny spot.



14 June
7:28am

I checked the crystal and it was larger. I have left it to see how it grows today

Big and weird shaped. Some small crystals on the string and on the bottom of the jar



14 June
5:35pm

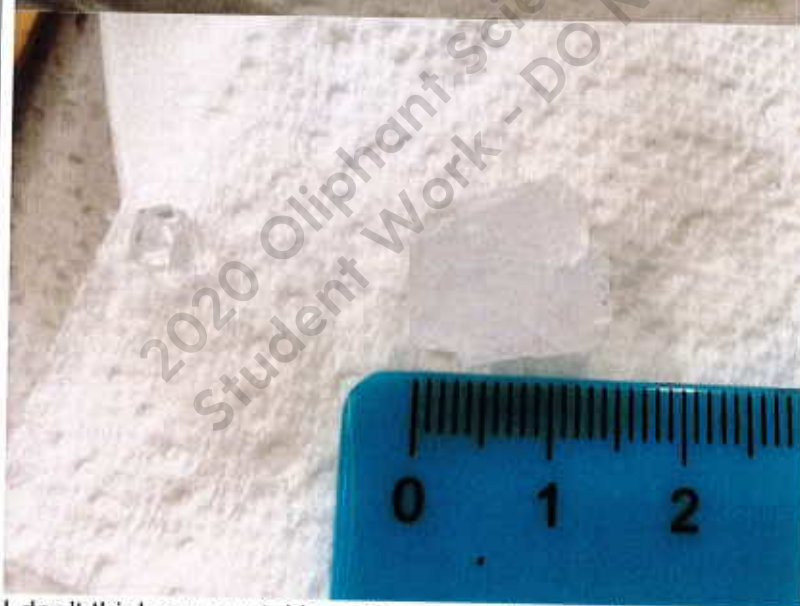
I checked the crystal again after I got home from school and the crystal it had not really changed. I wanted it to be a diamond shape and it wasn't.



We took it out to get a better look. Its kind of diamond shape but bits are growing on the crystal. Some bits fell out and now there are holes in the side. The crystal turned white too and not clear.

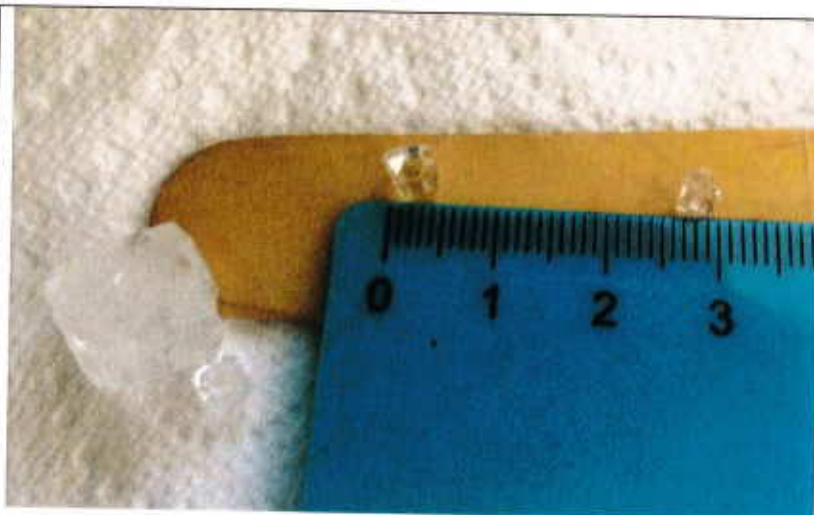
Main crystal is quite large, 14 mm at its widest. Sort of diamond shape with crystals growing on it and on the string. Some of the sides are very smooth and shiny.

New seed crystal is about 5mm and is a good shape and clear in colour.



I don't think my crystal is a winner so since we have a lot of time we will grow a second one.

There is a small crystal growing on the string that is a really good shape and it would make a good seed crystal. It is already on the string to use so we will use that for our second try which we will do tomorrow



15 June
2020

5:20pm

Attempt two for a crystal

1. Cut off the biggest crystal off the thread. Saving it to use as a back up in a bag
2. I am using the first backup crystal and my mum tied it to the string. The other small crystal on the string accidentally came off so I am using the first back up crystal because it is bigger



3. I microwaved water for 30 seconds to melt the small crystals at the bottom of the jar to reuse
4. Stirred and stirred until dissolved



5. Pour the water into another jar so I can filter the water back into the smaller jar as there were other bits floating in it

6. Clean the small jar
7. Filtered the water back into the small jar, it weighed 150.8gms



8. Let the water cool to room temperature before we put the seed in
9. Put the seed in and wait
My mum helped taking photos of me.

| Date/Time | Descriptions of what the student(s) did, problems encountered and solved | Crystal characteristics | signed |
|------------------------|--|---|--------|
| 16 June 2020 4:55pm | Checked the crystal and it has grown. Looks sort of diamond shaped. Crystals have formed on the bottom and the entire string has been covered with little baby crystals. | About 12mm on its longest side Very flat smooth sides with sharp edges Little crystals growing on the sides of it Bit foggy on the inside | |



We took it out and it looks ok. It has nice flat sides but there are little crystals growing on the sides of it again and it is a bit foggy not clear.



There is a good seed crystal on the string to try again

23 June
2020

8am

We are going to try again. I have a seed crystal from last time that grew on the string but fell off. My mum tied a new string on it for me



1. We are using the left over alum in the jar so we melted it in the microwave for 30 seconds. My mum got the hot jar out of the microwave
2. We add more alum because some was used up in the last crystal. We added 5g more



3. Stirred and stirred until the alum was dissolved



4. There was little floating bits in the water so we filtered it again by pouring it into a big jar then filtering back into the small jar with a coffee filter. And we washed the small jar before.



5. We let it cool to room temperature and then put the seed crystal in with a new coffee filter on top to stop dust getting in there

23 June
2020

4:30pm

I checked the crystal and it was looking bigger but some sides were a bit flat. Mum said the cat knocked the crystal out of the jar when I was at school. She washed it and then put it back in. I am going to leave it in to see if it grows more

Bigger and flat
sides

24 June
2020

4:55pm

Checked the crystal and it looks really clear and diamond shape in the jar. Small crystals on the string and some on the bottom of the jar.



Diamond
shape
Clear and
foggy but a bit
cracked
looking
It is very shiny
but the edges
are not sharp
like the other
crystal

We took the crystal out and it was probably a bit smaller than 9mm so we are going to try and grow it more



The crystal edges are not sharp and are sort of rounded off. My mum said it is probably because the saturated solution was not strong enough so the crystal started to melt. We need to add more alum next time



We are going to do it in the morning to grow in the sun tomorrow

25 June
2020
7:25am

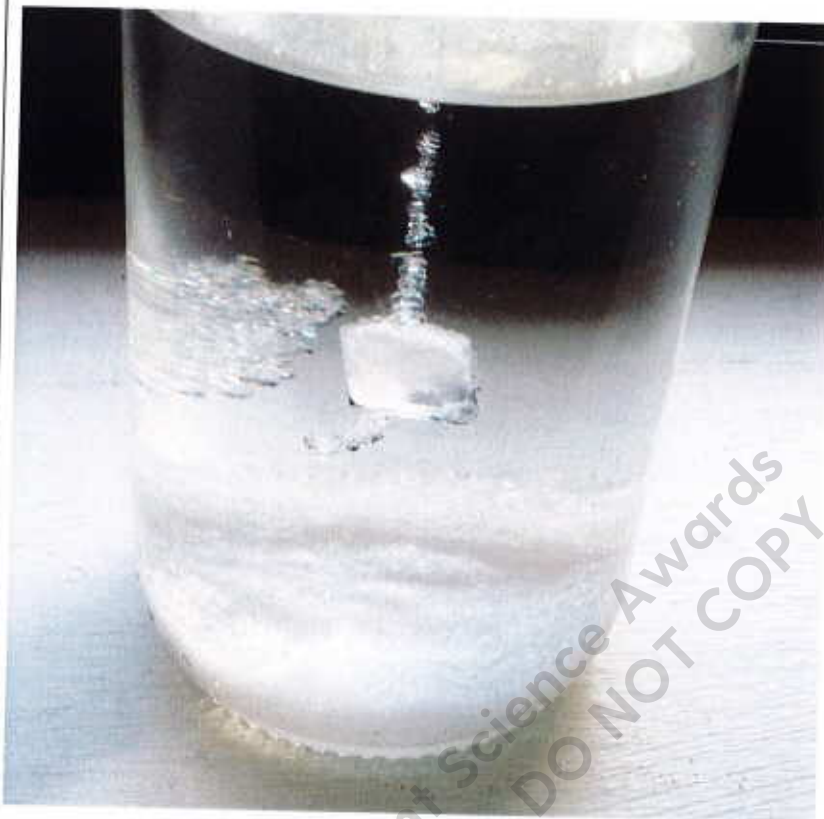
We took our crystal that wasn't 9mm and we put it back in. Here are the steps

1. Microwave the jar for 30 seconds
2. Added 5g more alum
3. Stirred it until the crystals dissolved
4. Wait to cool to room temperature
5. Put the crystal in the water

26 June
2020

8:10am

When I got home from school I found out that the cat bumped it and pushed the crystal to the side of the glass. So lots of little crystals started to form on the big crystal and the side of the jar. When I moved it back to the middle they were stuck on the big crystal.



Just over
10mm in size

Not clear but
ok, some white
parts

Got some
cracks and
damage
around the
edges that
where the mini
crystals were

The sides that
arent damaged
are pretty flat
and the edges
are very sharp

When we pulled the crystal out the little crystals were easy to get off and crumbled off. The crystal has damage from the small crystals that fell off. It would have been a perfect crystal and formed way better if that didn't happen.





27 June
2020
9:50am

We are going to grow another seed crystal into a big one. We hope this one won't turn out to be a dud, but it isn't the best diamond shape. But it is already on the string, it grew when we did another crystal earlier, so it is easy to use.

3mm crystal
Not diamond
shaped with
lots of sides
Very clear



We will grow some more seed crystals to use today too, I think.

I microwaved the small jar that had leftover alum crystals and water from last time for 30 seconds. My mum got it out of the microwave because it was hot.

I didn't need to stir it that much as it pretty much all dissolved.

We are going to wait for it to cool to room temperature and then put the crystal in it and put in a sunny window.

Date/Time

Descriptions of what the student(s) did, problems encountered and solved

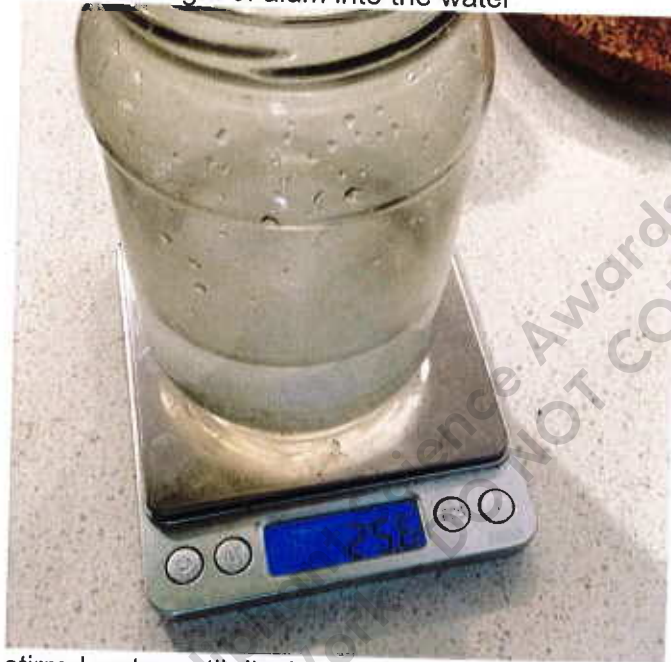
Crystal characteristics

signed

27 June
2020
10:16am

Starting seed crystal

1. Checked what we did to grow a seed the first time
2. Poured 155.4mls of demineralized water into a jar
3. Heated it up for 30 seconds
4. Poured 25.6gm of alum into the water



5. stirred water until dissolved
6. Put in a sunny window



28 June
2020

4:40pm

In the small jar we were growing a crystal and the crystal has fallen off the string. There were lots of tiny mini crystals at the bottom of the jar. I had seen it last night and it didn't look very good anyway so I don't think I lost a good one.



Many many
mini crystals in
the small glass
jar

The best new
seed crystal is
about 7mm
long and
shaped like a
pyramid
because it has
a flat bottom.
Very clear

Seed crystal jar has crystals that has formed on the bottom. One of them looks good because it's clear and it's diamond shaped. We might be able to make this one grow so we will try it



We took them out and the good one is very flat on the bottom, like a pyramid shape. But it might still be good



5 July 2020

I went over to Louie's house and I saw his crystals. His crystals were way better than mine so we decided that we were going to show his crystal instead of my crystals in the competition. His crystals grew better so crystals grow better in the dark. I think the crystals grew better in the dark because natural crystals they can get pretty big and they grow in caves which aren't exposed to the light.

This is a photo of my final three crystals that I grew



I think the crystals got better quality as we went along but they were smaller too. I think the last crystal would have been the best if the cat didn't knock it. It was the best shape without big cracks and other crystals growing on it except where it got moved to the side.