SASTA OLIPHANT SCIENCE AWARDS

SOUTH AUSTRALIAN SCIENCE TEACHERS ASSOCIATION

Prize Winner

Scientific Inquiry

Year R-2

Darcy Robson

Concordia College - St Peters Campus

Rock investigation – The Hardest Rock By Darcy Robson

The investigation:

I wanted to find out what the hardest rock I could find was from the beach and from the hilly locations. To determine this, I wanted to see if this could be measured by rock tumbling and see which rock losses the least weight.

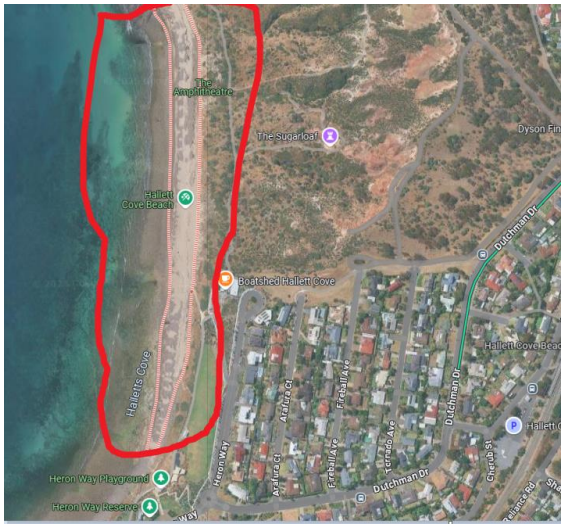
If it loses a lot of weight, it is a soft rock and if does not lose much weight then it is a hard rock.

My prediction was that the rocks in the hills would be hardest.

The locations:

1. Flinders Uni Precinct – Sturt Rd – Bedford Park:

2. Hallet Cove Beach, Hallet Cove, Sa



Steps taken:

1. Plan which locations to pick rocks
2. Collect rocks and Catalogue them
3. Weigh Rocks to determine starting weight
4. Tumbling the rocks
    a. Add rock to tumbler
    b. Add 30g of 600# Grit to tumble
    c. Add Ceramic Abrasive (5mm/350g)
    d. Add water to Rock and other material are covered
    e. Close and secure tumbler
    f. Select Days 2 and Speed 4 on the tumble
    g. Start
5. Once Tumble has finished:
    a. Open tumbler
    b. Separate the water and abrasive and rocks using sieve.
    c. Dry rocks
6. Weigh rock again and record against the catalogued number
7. Repeat Step 4 – with changes:
    a. Add Grit 30g of 800# grit
    b. Run tumble: Speed: 2 and Days : 2
8. Repeat 5
9. Repeat step 6

Cataloguing of the rocks found:

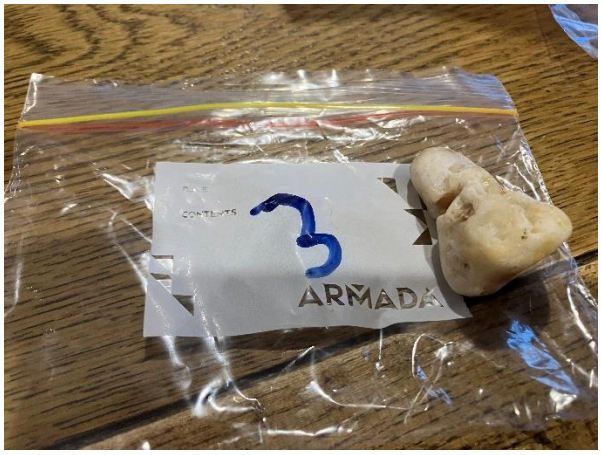
To ensure the result were recorded against the correct rocks a photo and the number were taken along with the starting weights.

Rock 1: Location found: Flinders Uni

Rock was not used as it was too big for tumble

Rock 2: Location: Hallet Cove

Rock 3: Hallet Cove



Rock 4: Location Hallet Cove

Rock 5: Location Flinders Uni

Rock 6: Location Flinders Uni

Rock 7: Location Hallet Cove

Rock 8: Location flinders Uni

Results

I recorded on paper and then add in the table below:

Results:

#	Location	Type	Start Weight (g)	Grit 1 (600#)	Time 1 (days)	Weight After 1 Tumble (g)	Loss 1 (g)	% Loss 1	Grit 2 (800#)	Time 2 (days)	Weight After 2nd Tumble	Loss 2 (g)	% Loss 2	Total Loss (g)	Total % Loss
1	**Tapa Turrungka Trail – Flinders**	Hill	94.6	600#	2d	—	—	—	Not used	Not used	Not used	Not used	Not used	Not used	Not used
2	**Hallett Cove**	Beach	20.23	600#	2d	19.34	0.89	4%	800#	2d	19	0.34	5%	1.23	5%
3	**Hallett Cove**	Beach	31.43	600#	2d	30	1.43	5%	800#	2d	27.21	2.79	4%	4.22	13.40%
4	**Hallett Cove**	Beach	30	600#	2d	28.71	1.29	4%	800#	2d	27.95	0.76	4%	2.05	6.80%
5	**Tapa Turrungka Trail – Flinders**	Hill	24.11	600#	2d	—	—	100%	Not used	Not used	Not used	Not used	Not used	Not used	Not used
6	**Tapa Turrungka Trail – Flinders**	Hill	18.11	600#	2d	17.19	0.92	5%	800#	2d	16.3	0.89	6%	1.81	10%
7	**Hallett Cove**	Beach	50.57	600#	2d	49.62	0.95	2%	800#	2d	48.65	0.97	2%	1.92	3.80%
8	**Tapa Turrungka Trail – Flinders**	Hill	60.14	600#	2d	50.19	9.95	17%	800#	2d	45.01	5.18	2%	15.13	25.10%

Rankings

Rank	Sample #	Location	Type	Total % Lost	Interpretation
1	7	Hallett Cove	Beach	**3.80%**	**Hardest (least loss)**
2	2	Hallett Cove	Beach	5.00%	Very hard
3	4	Hallett Cove	Beach	6.80%	Hard
4	6	Tapa Turrungka Trail	Hill	10.00%	Moderate
5	3	Hallett Cove	Beach	13.40%	Quite soft
6	8	Tapa Turrungka Trail	Hill	**25.10%**	**Soft**
7	5	Tapa Turrungka Trail	Hill	**100.00%**	**Very Soft (most loss)**

Summary:

- **Sample 7** is your hardest overall.
- **Hallett Cove beach rocks** (Samples 2, 4, 7,) are all in the top hardness rankings.
- **Hill rocks from Tapa Turrungka Trail** (especially Sample 5) were much softer, losing a lot more material.
- **Sample 5** was so soft it turned to mud after 1 tumble and was not able to be further tested.

Conclusion

The hardest rock was sample 7, I was really surprised because I didn't think that would be the hardest. The softest rock (sample 5) turned to mud which I was also not expecting.

I originally thought the rocks in the hills would be the hardest but the beach rocks seem to lose the least weight overall.

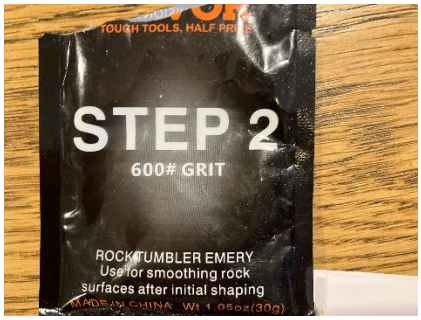
For future testing, I would like to collect a wider variety of rocks from more locations to see how they compare. I also think doing more rumbling would be a good idea to better understand how different rocks respond to the process.

Equipment and Material Used:

1. Rock tumbler: used to tumble the rocks

2. Scales: used to measure the weight of the rocks

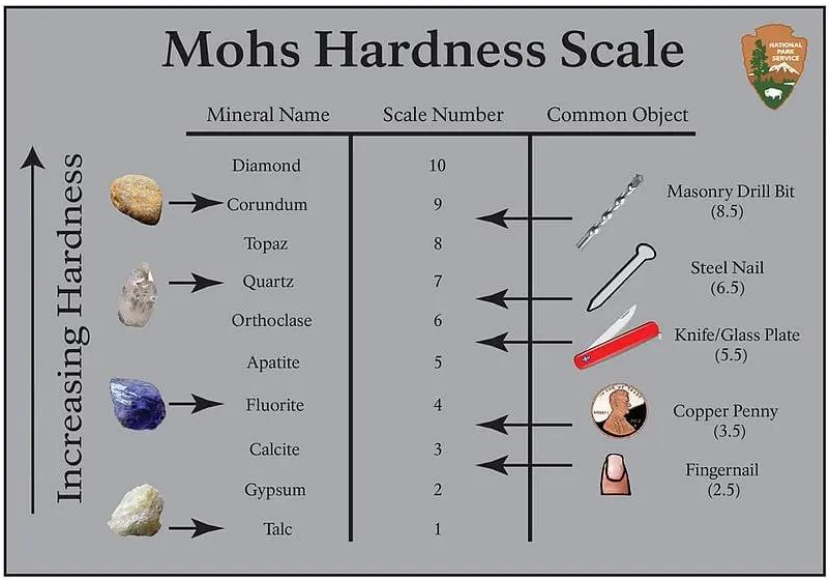
3. Grit: used to polish the rocks



4. Ceramic Abrasive: fills the voids between rocks, creating a more consistent tumbling and preventing rocks from getting damaged.

Research/Sources:

1. Mohs Hardness Scale : source: https://www.gemsociety.org/article/select-gems-ordered-mohs-hardness/



The mohs hardness scale is a scale from 1 to 10 used to determine the scratch resistance of minerals. Meaning the numbers indicate a relative order of hardness.

2. How to choose the best rocks for tumbling: a Simple and practical method. Source: https://www.rockhounding.org/blog/how-to-choose-rocks-for-tumbling/index.html

3. Grit scale for tumbling rocks: https://rocktumbler.com/blog/what-is-silicon-carbide-grit/

OSA RISK ASSESSMENT FORM

for all entries in (✓) ☐ Models & Inventions and ☑ Scientific Inquiry

This must be included with your report, log book or entry. One form per entry.

STUDENT(S) NAME: Darcy Robson ID: 0682-011

SCHOOL: Concordia College - St Peters Campus

Activity: Give a brief outline of what you are planning to do.

Source Rocks on locations, then tumble them to find out which are the hardest

Are there possible risks? Consider the following:

- Chemical risks: Are you using chemicals? If so, check with your teacher that any chemicals to be used are on the approved list for schools. Check the safety requirements for their use, such as eye protection and eyewash facilities, availability of running water, use of gloves, a well-ventilated area or fume cupboard.
- Thermal risks: Are you heating things? Could you be burnt?
- Biological risks: Are you working with micro-organisms such as mould and bacteria?
- Sharps risks: Are you cutting things, and is there a risk of injury from sharp objects?
- Electrical risks: Are you using mains (240 volt) electricity? How will you make sure that this is safe? Could you use a battery instead?
- Radiation risks: Does your entry use potentially harmful radiation such as UV or lasers?
- Other hazards.

Also, if you are using other people as subjects in an investigation you must get them to sign a note consenting to be part of your experiment.

Risks	How I will control/manage the risk
Injury on location	- Take an adult - Stick to main tracks and paths of locations

(Attach another sheet if needed.)

Risk Assessment indicates that this activity can be safely carried out

RISK ASSESSMENT COMPLETED BY (student name(s)): Darcy Robson w, parent

SIGNATURE(S): [signature]

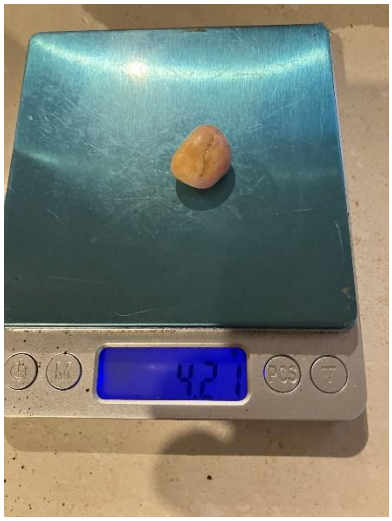
☑ By ticking this box, I/we state that my/our project adheres to the listed criteria for this Category.

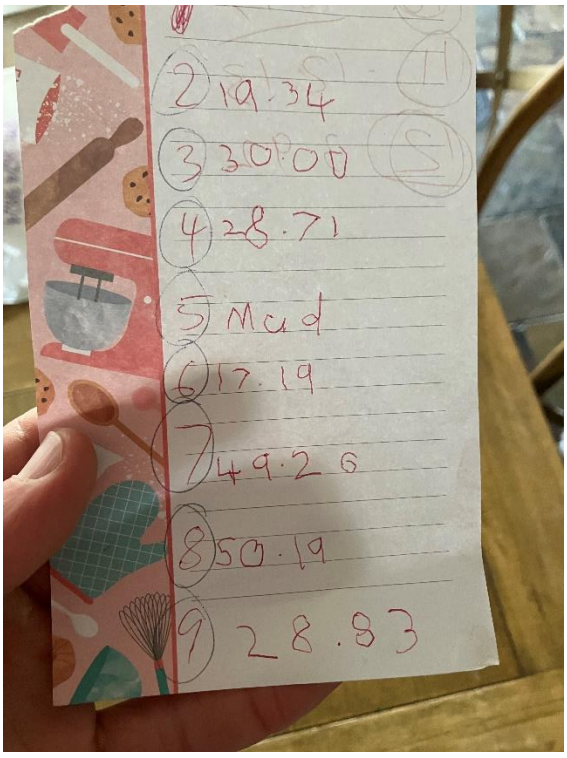
TEACHER'S NAME: Trevor Burmeister

SIGNATURE: per TB DATE: 27/6/25

Journal and progress:

Progress Photos:

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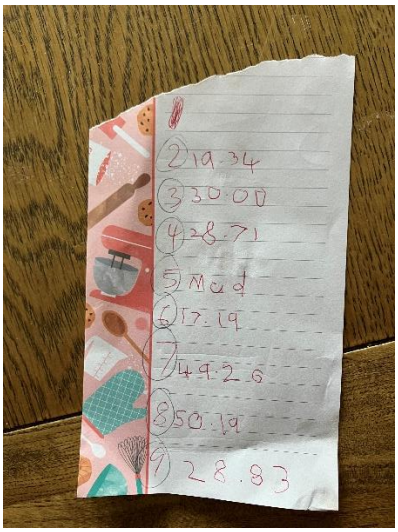
3 30.00
4 28.71
5 Mud
6 17.19
7 49.26
8 50.19
9 28.83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