

Challenge 1 - Air Powered Car

Aim:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

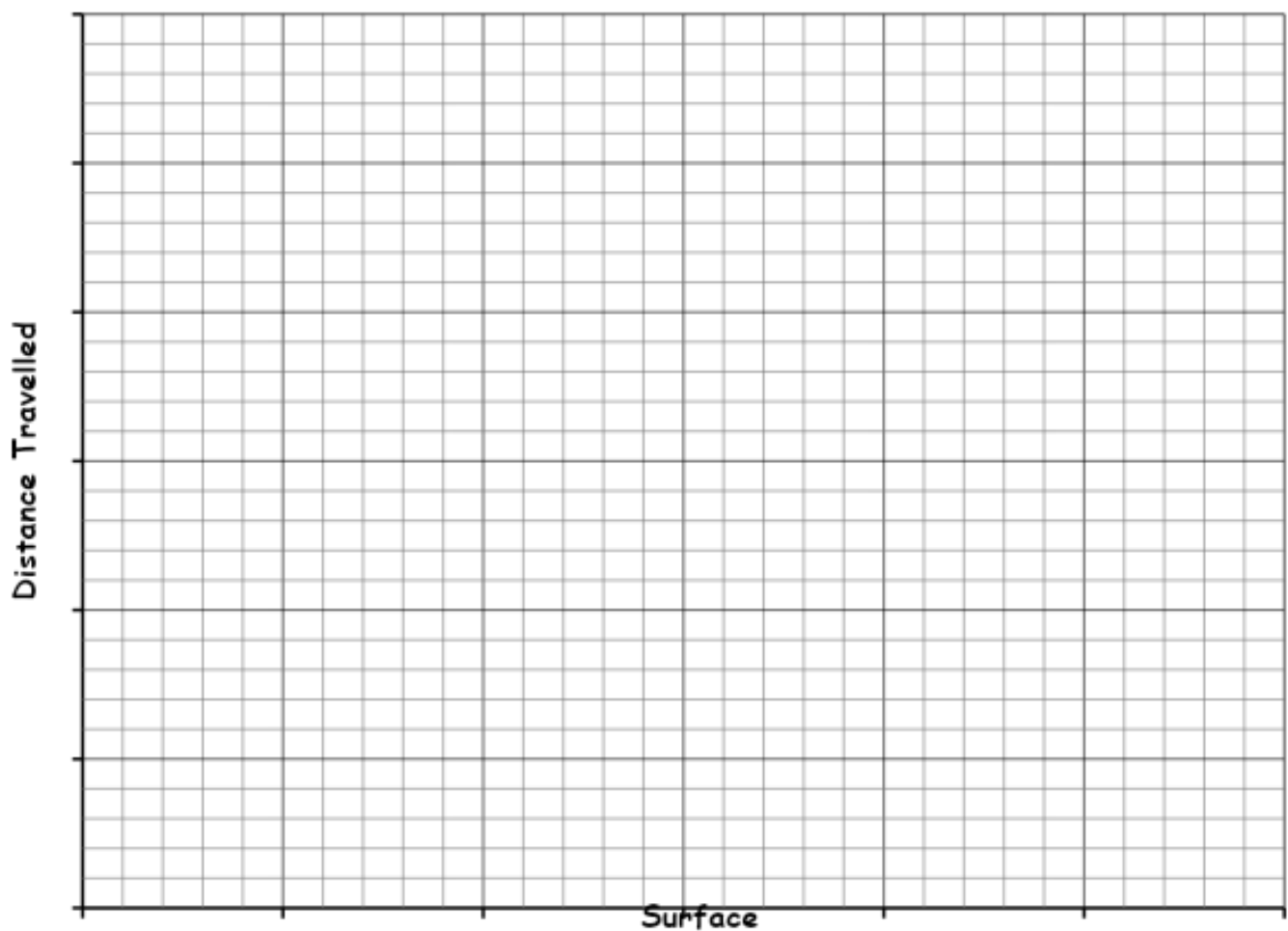
[illegible]

3. How I/we solved the challenges:

[illegible]

7. On which surface did your car travel furthest? Why do you think this was?

8. Record your results as a _____ graph below:



9. What I/we found out or learned:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

10. Skills developed

11. Key vocabulary

Challenge 2 - Arctic Engineering

Aim:

1. What I/we had to do:

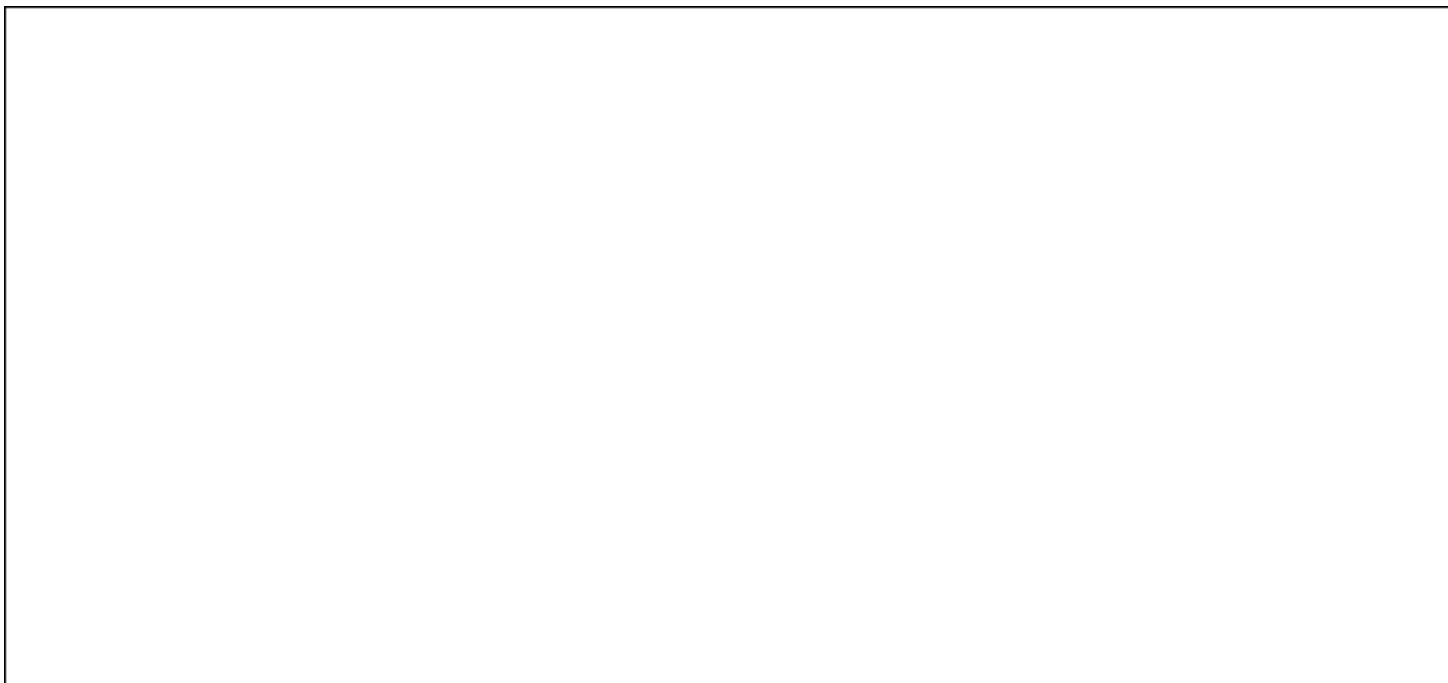
This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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4. What I/we found out or learned:

Diagram



5. Skills developed

6. Key vocabulary

Challenge 3 - Bubble Geometry

Aim:

1. What I/we had to do:

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This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

6. Skills developed

7. Key vocabulary

Challenge 4 - Catapult Challenge

Aim:

1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Distance the projectile travelled first time:_____

5. How could you improve your catapult to make your projectile travel further?

6. What's the best launch angle?

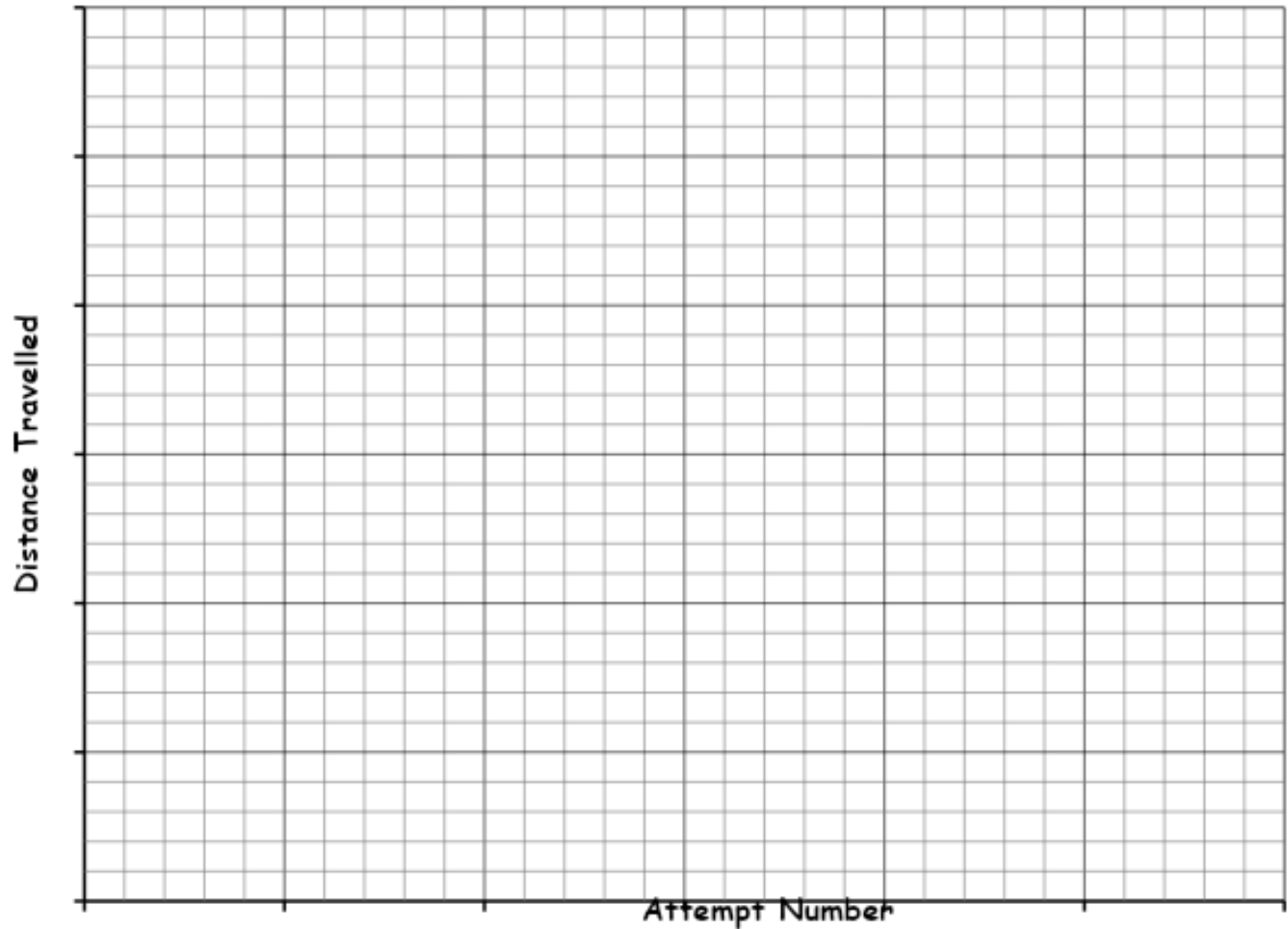
7. Diagram

<u>First Catapult</u>	<u>Improved Catapult</u>

8. Try again...

<u>Attempt</u>	<u>Distance travelled</u>

9. Record your results as a _____ graph:



10. What I/we found out or learned:

11. Skills developed

12. Key vocabulary

Challenge 5 - Chasing Shadows

Aim:

1. What I/we had to do:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

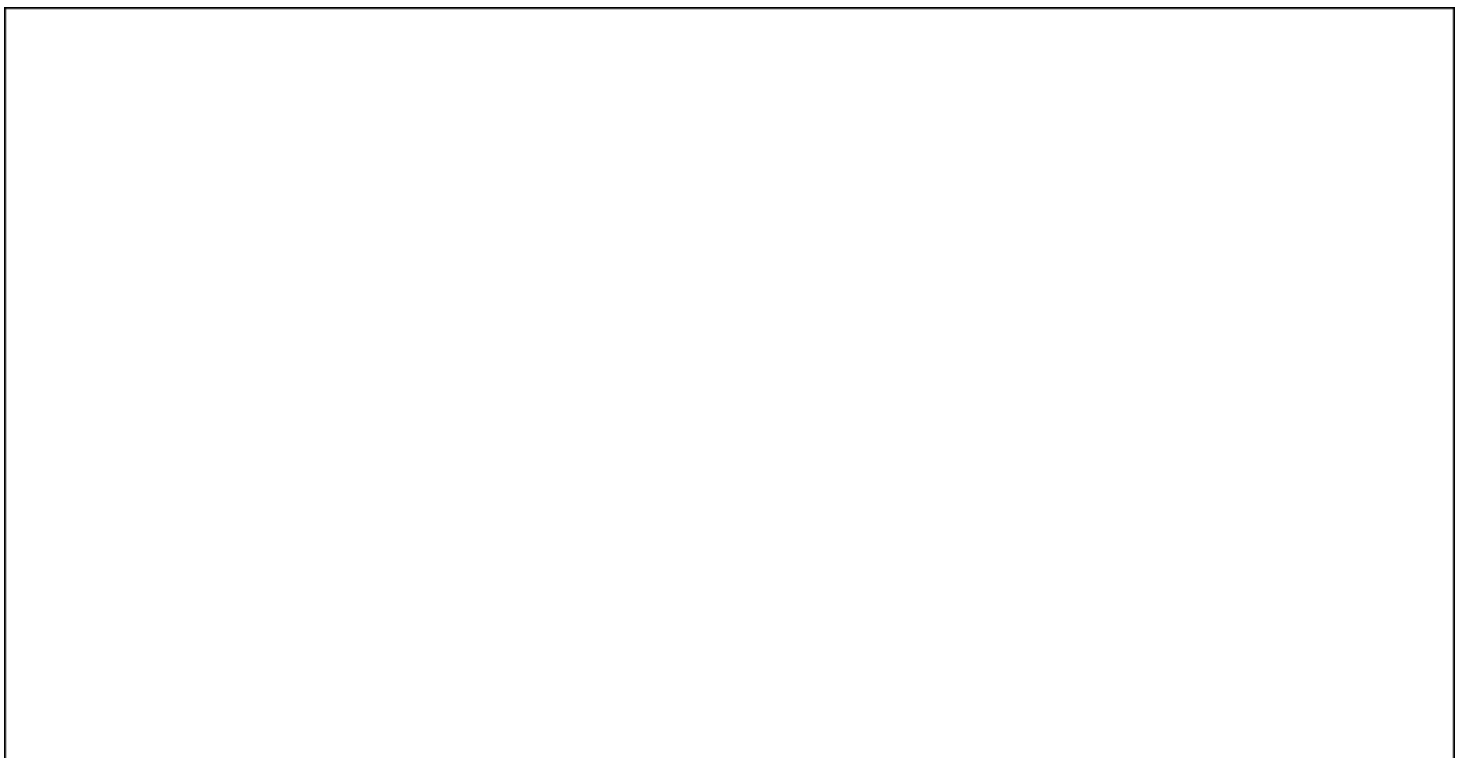
2. Any challenges I/we had:

3. How I/we solved the challenges:

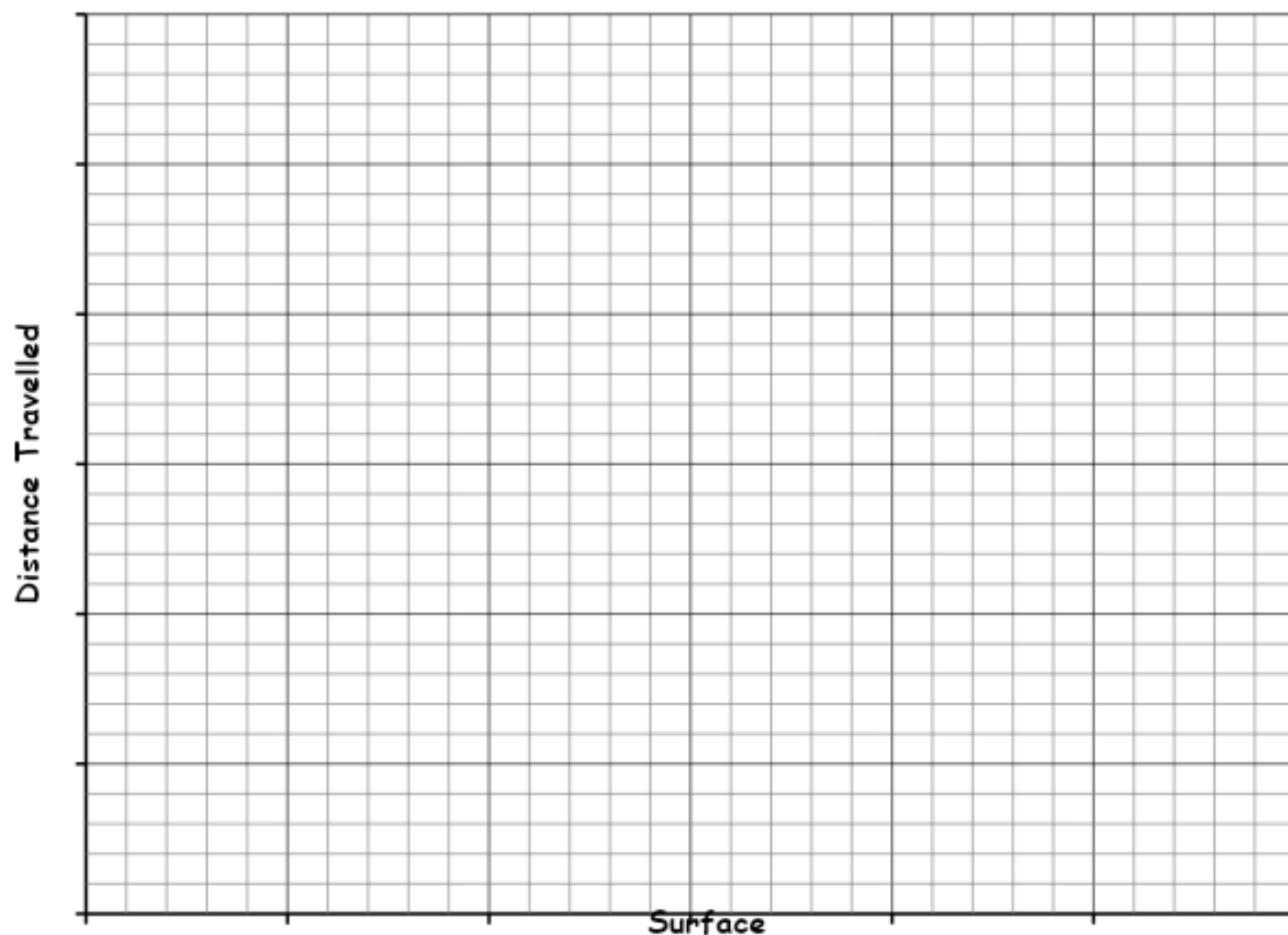
4. Record your results in the table below:

<u>Time</u>	<u>Shadow Measurement</u>	<u>Shadow Position</u>

5. Diagram



6. Record your results as a _____ graph below:



7. What I/we found out:

8. Skills developed

9. Key vocabulary

Challenge 6 - Dancing Salt

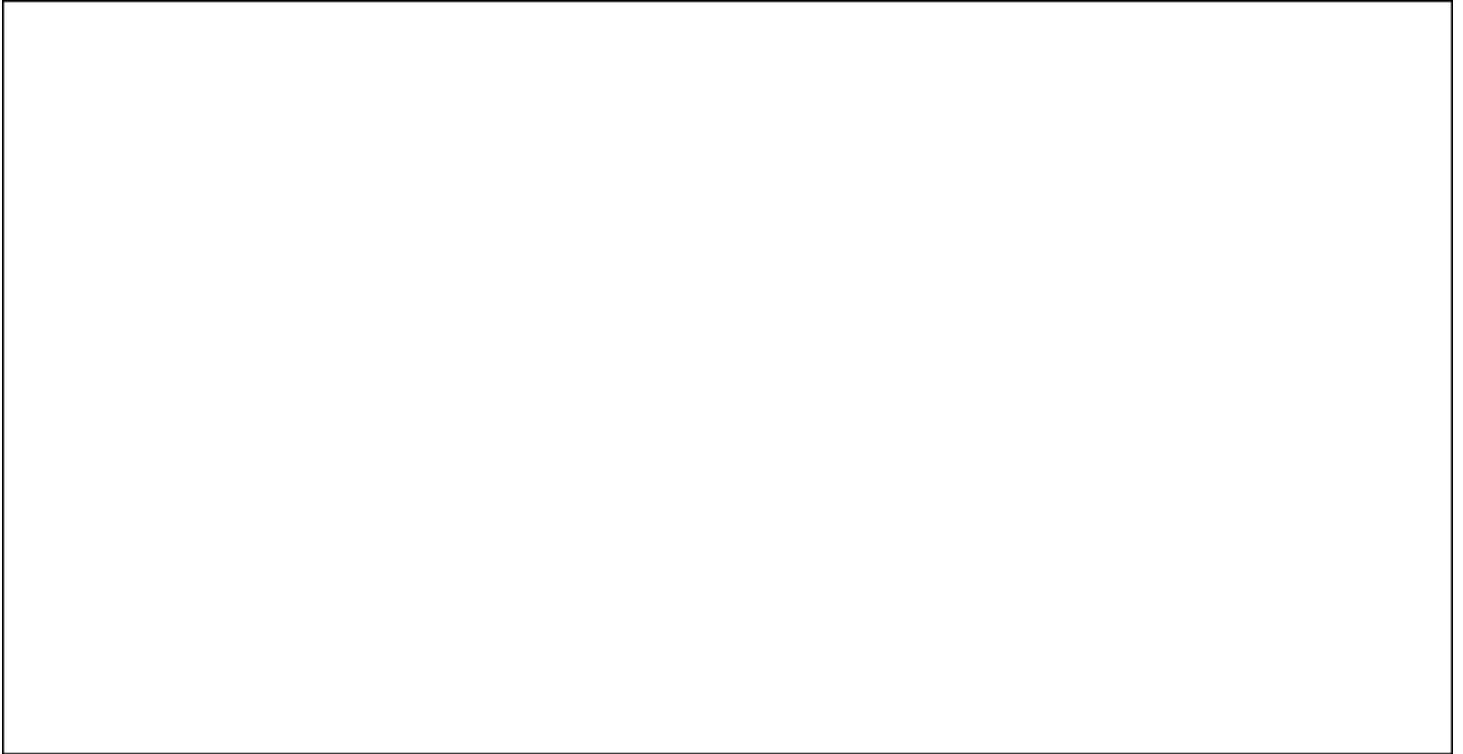
Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram



5. What happens to the salt as you change the volume of the music?

6. What kind of music makes the salt dance best?

7. What patterns does the salt make?

8. Now try placing ingredients with different-sized particles on the cling film (e.g. rice, granulated sugar and caster sugar). Do you notice a difference in the way the different-sized particles vibrate?

<u>Ingredients</u>	<u>Differences</u>

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9. What I/we found out or learned:

10. Skills developed

11. Key vocabulary

Challenge 7 - Decoding Nature's Patterns

Aim:

1. What I/we had to do:

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2. Any challenges I/we had:

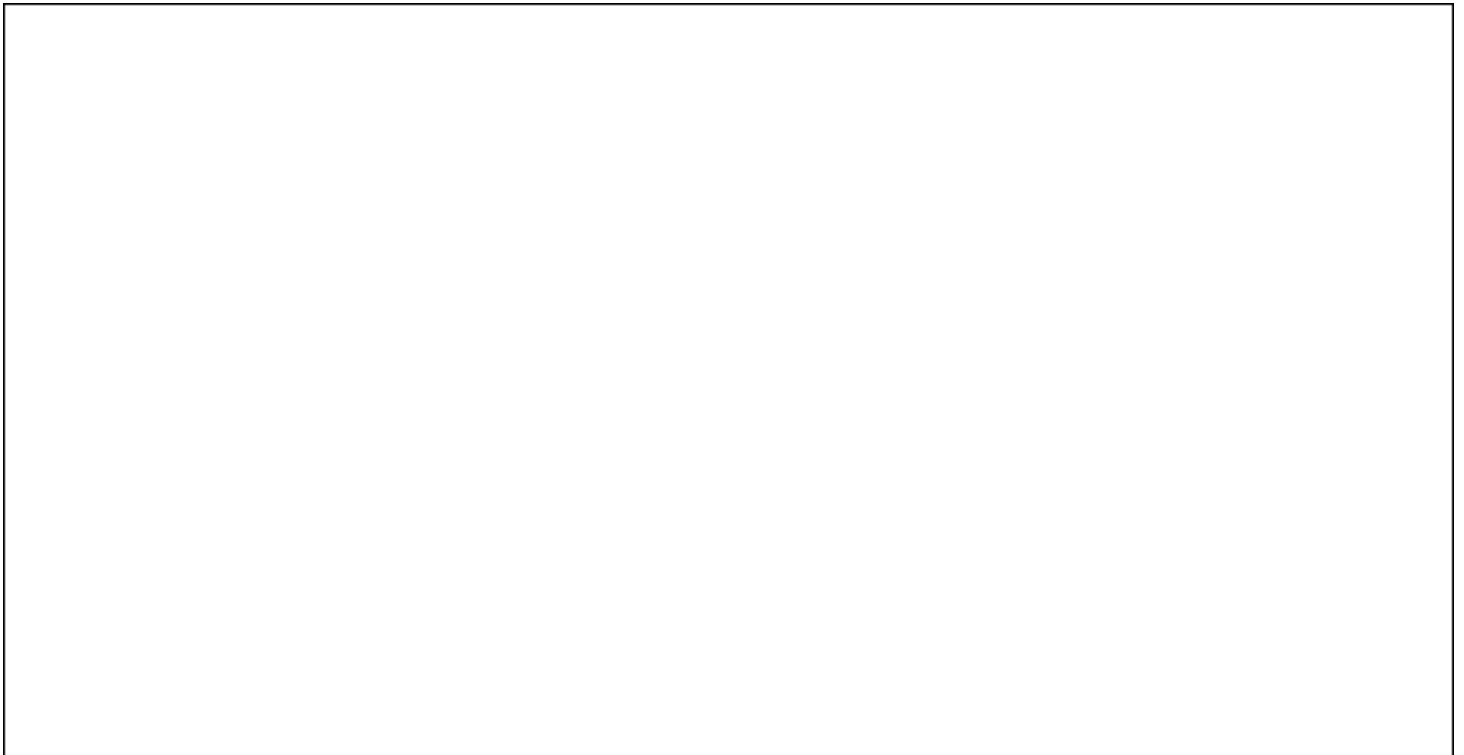
3. How I/we solved the challenges:

4. Write down any examples that you find.

<u>Symmetry</u>	
<u>Spirals</u>	

<u>Tessellation</u>	

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 8 - Desert Island Rafts

Aim:

1. Imagine you were stuck on a desert island. What natural resources could you use to help you escape?

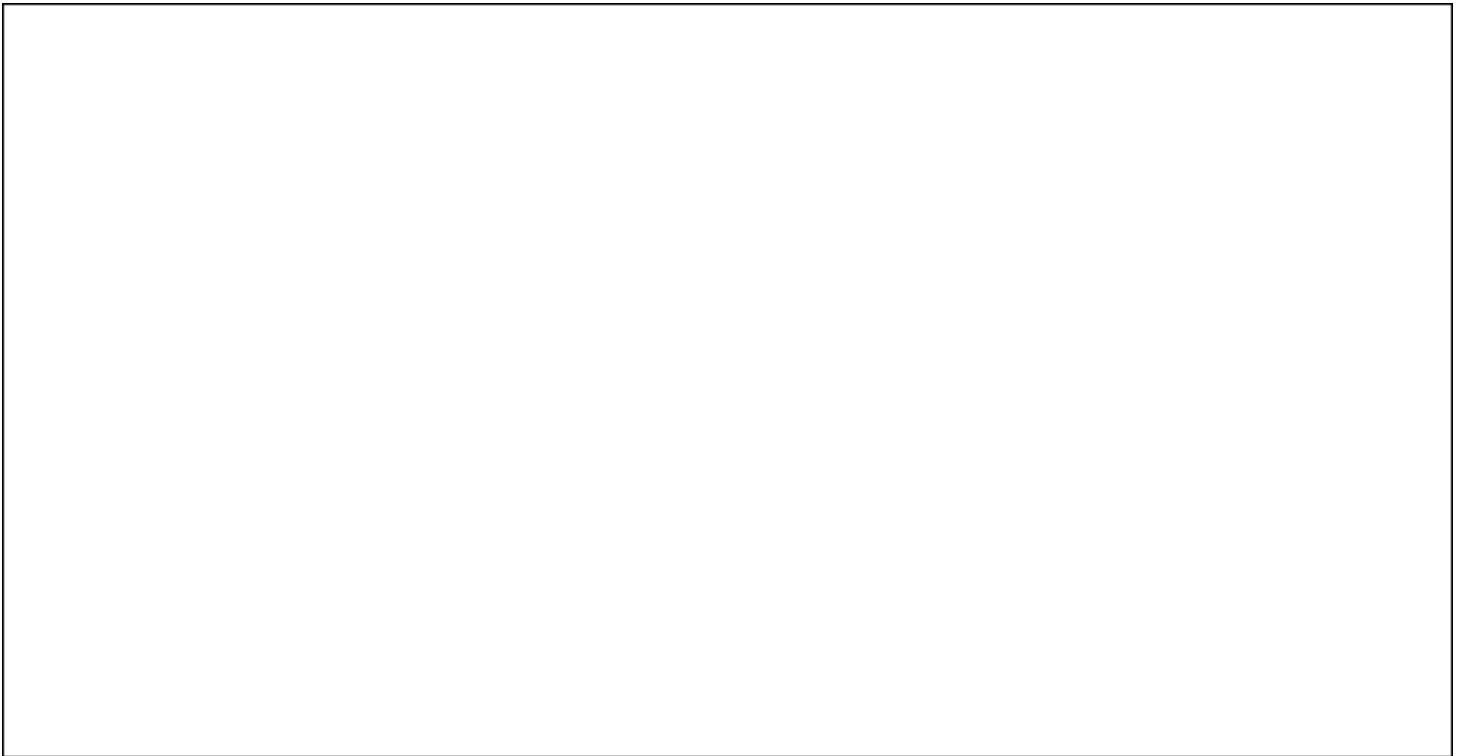
2. What I/we had to do:

[illegible]

This image shows a blank sheet of white paper with ten horizontal black lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

5. How does adding a decorative mast using a stick and a leaf affect the balance of your raft?

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 9 - Drops on a Penny

Aim:

1. Predict how many drops of water you think you will be able to fit on a penny.

2. How many drops of water did your penny hold?

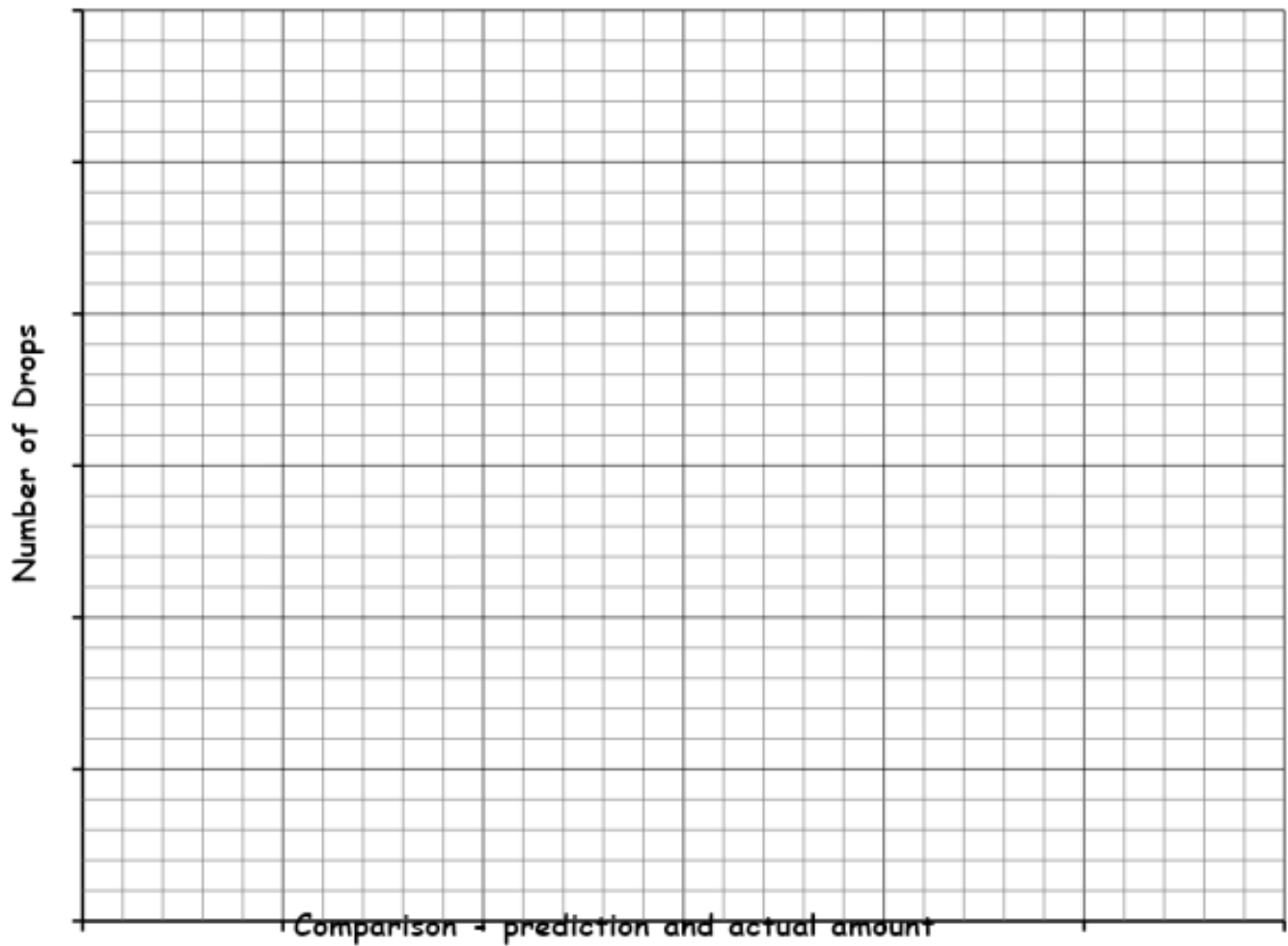
3. What I/we had to do:

4. Any challenges I/we had:

5. How I/we solved the challenges:

6. Diagram

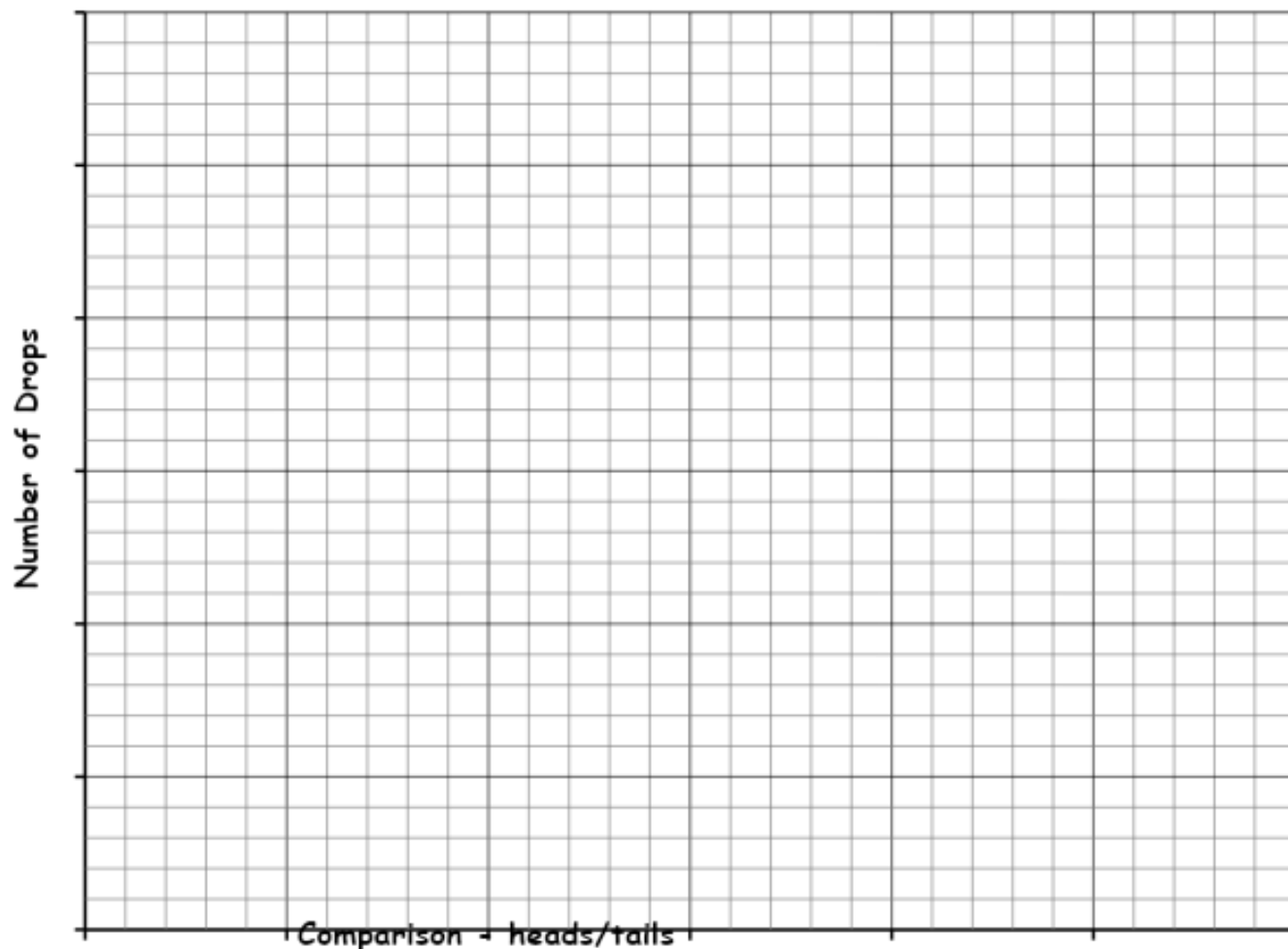
7. Record your results as a _____ graph below:



8. Which side of the penny holds water best? Heads or tails

<u>Coin</u>	<u>Number of Drops</u>
Heads	
Tails	

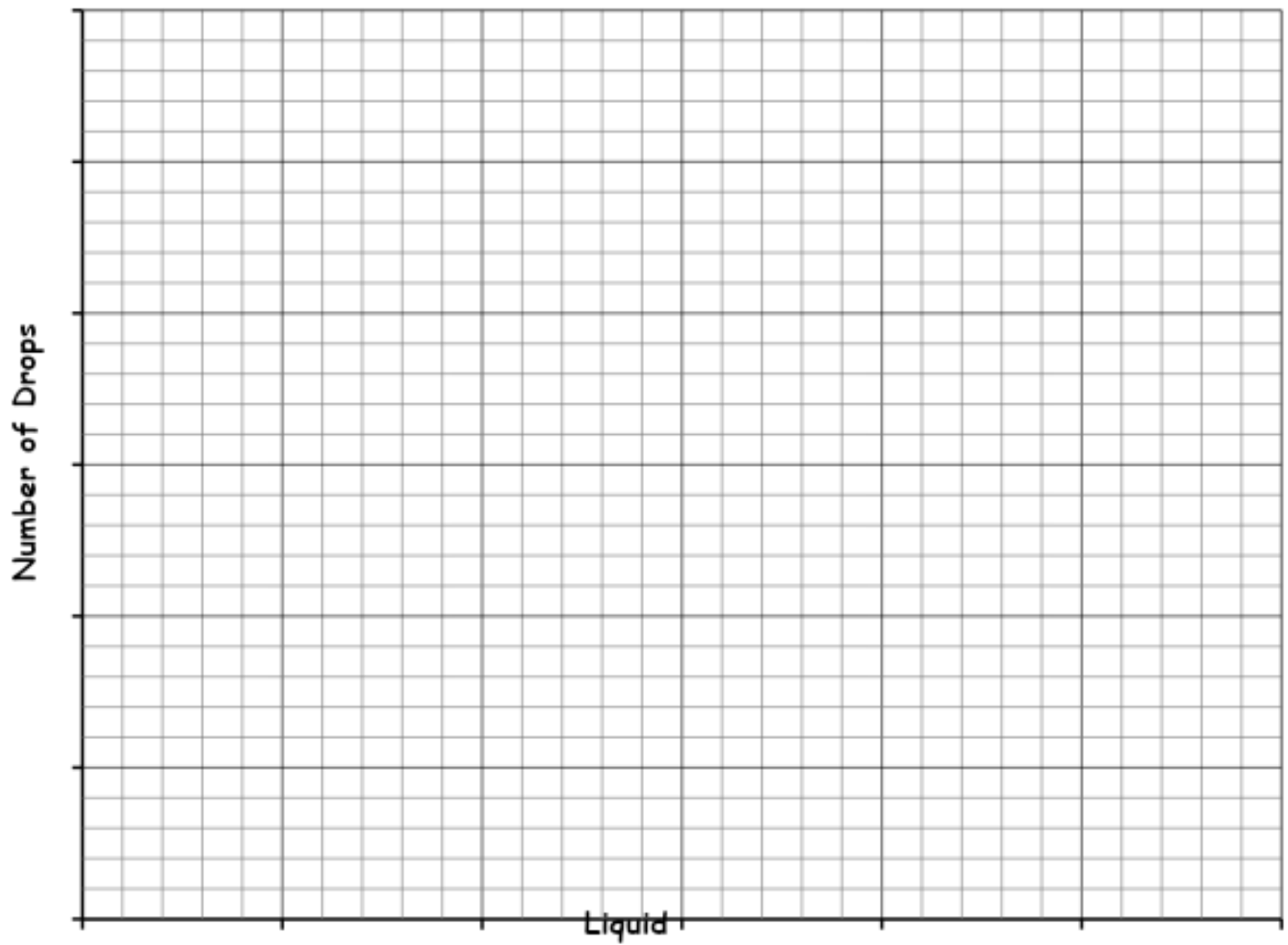
9. Record your results as a _____ graph below:



10. Do we get the same result (number of drops) if we use a different liquid such as cooking oil?

<u>Coin</u>	<u>Number of cooking oil drops</u>
Heads	
Tails	

11. Record your results as a _____ graph below:



12. What I/we found out or learned:

13. Skills developed

14. Key vocabulary

Challenge 10 - Egg Parachutes

Aim:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

3. How I/we solved the challenges:

4.

<u>Design</u>	<u>Success Rate</u>

5. Which was the most successful design? Why do you think this was?

6. Diagram

7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 11 - Fireworks in a Jar

Aim:

1. What I/we had to do:

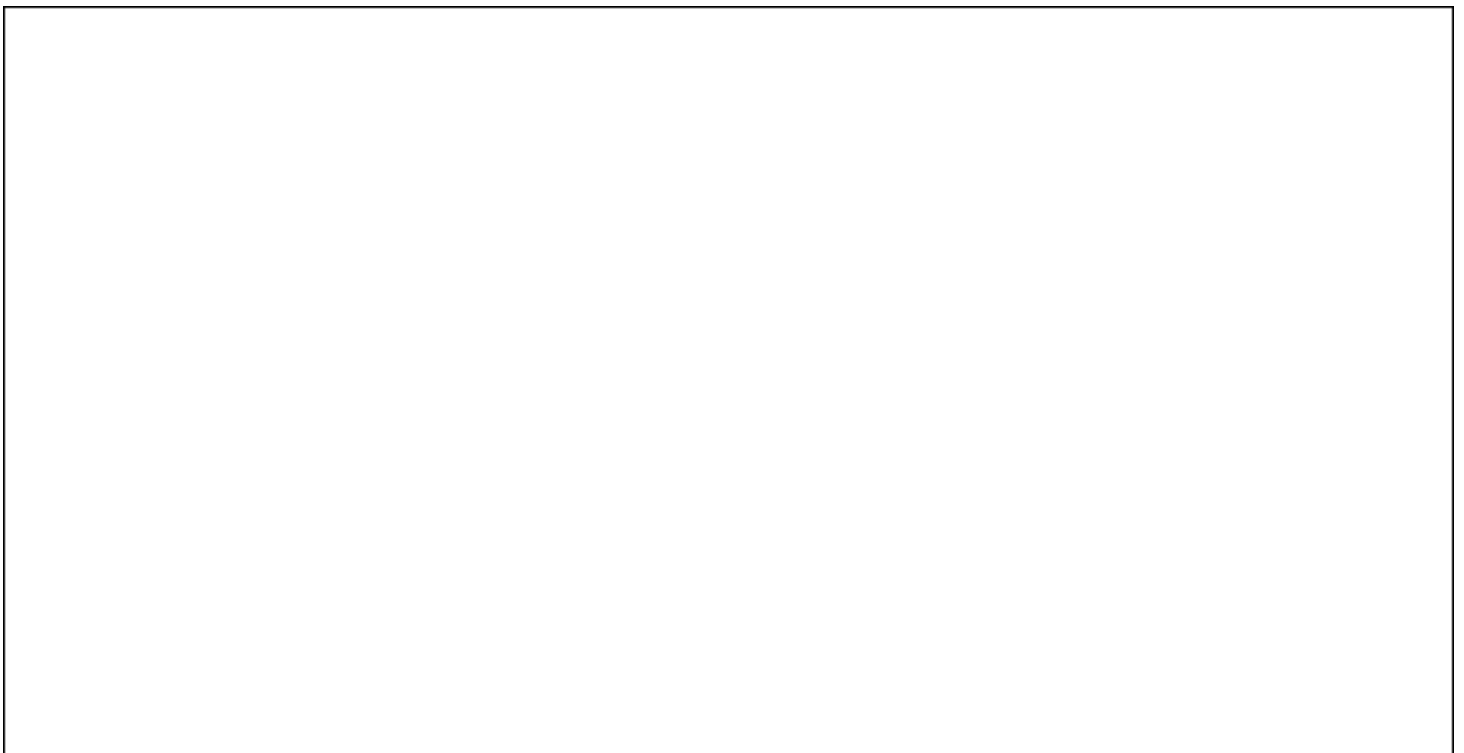
This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

[illegible]

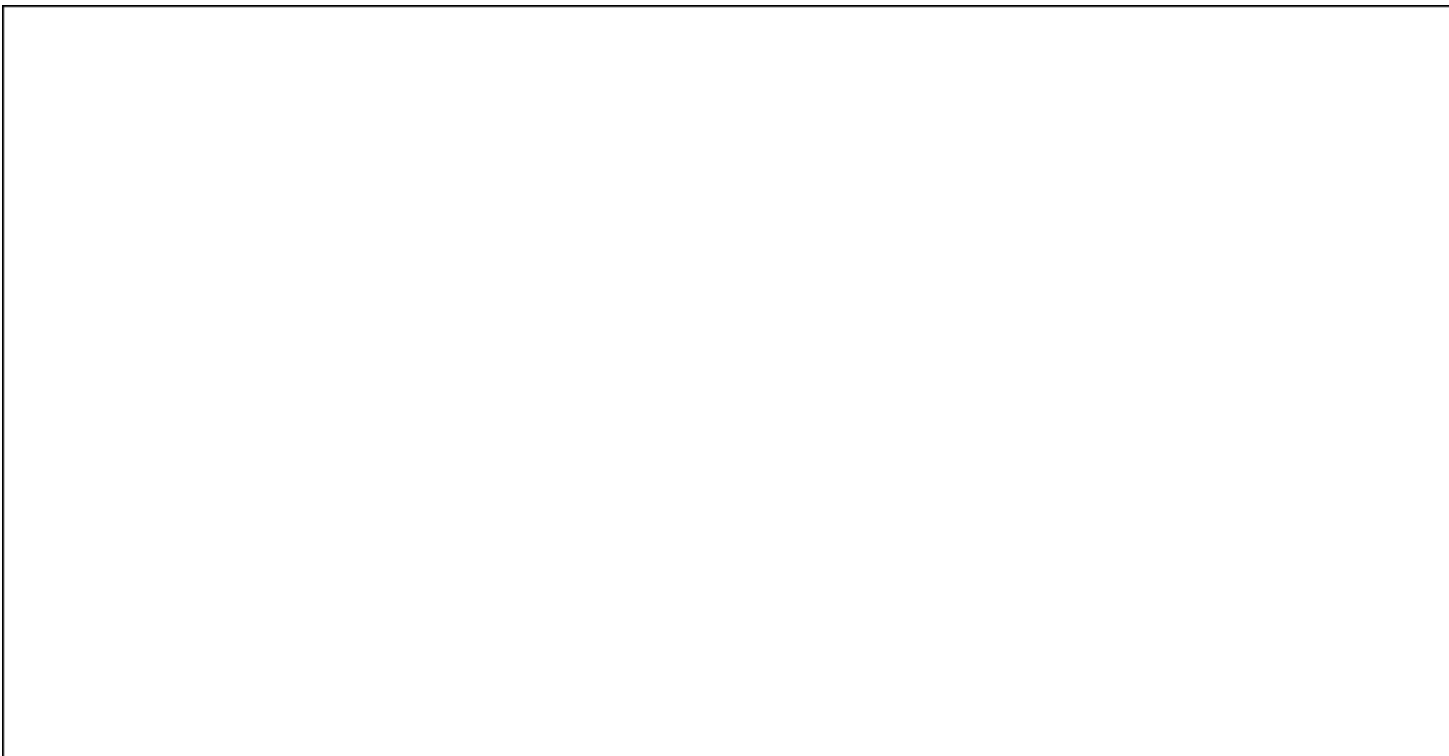
3. How I/we solved the challenges:

4. Diagram

A large, empty rectangular box with a thin black border, intended for drawing a diagram. It occupies the bottom half of the page.

5. Try adding other fluids to your jar such as honey or milk. How do their densities compare to the water and vegetable oil?

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 12 - Green Coins

Aim:

1. What I/we had to do:

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2. Any challenges I/we had:

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3. How I/we solved the challenges:

4. After 10 minutes

<u>Liquid</u>	<u>What do you notice?</u>
Lemon Juice	
Vinegar	
Cola	

--	--

5. After

Which liquid was most effective at making coins shiny?

<u>Liquid</u>	<u>Effectiveness ranking (1st, 2nd, 3rd)</u>
Lemon Juice	
Vinegar	
Cola	

6. Try the experiment using vinegar again, but this time add a small amount of salt.
What happens to the speed of the reaction?

7. Diagram



8. What I/we found out or learned:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

9. Skills developed

10. Key vocabulary

Challenge 13 - Leaf Shape Sorting

Aim:

1. What did you find?

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Skills developed

3. Key vocabulary

Challenge 14 - Lolly Stick Bridges

Aim:

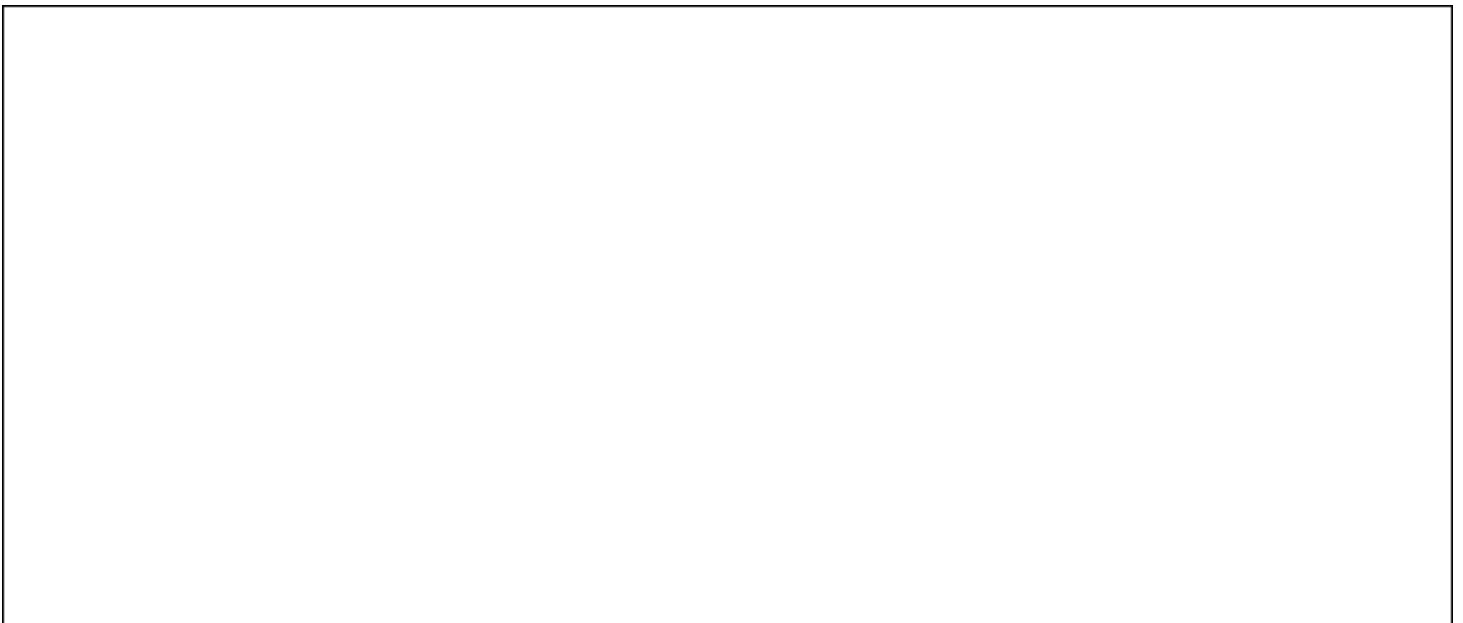
1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Think of any bridges you have seen. What do they look like? What are they made of?
How are they designed?

5. Diagram - Bridge Design



6. Test the bridge using toy cars to see how much weight it can hold.

Number of cars the bridge can hold: _____

7. Was your bridge successful? If not, how could you improve it? Could a different design hold more toy cars?

8. What I/we found out or learned:

9. Skills developed

10. Key vocabulary

Challenge 15 - Magic Milk

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Try the experiment again, but this time using semi-skimmed milk. Does the reaction change? Why might this be?

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 16 - Marble Run Mayhem

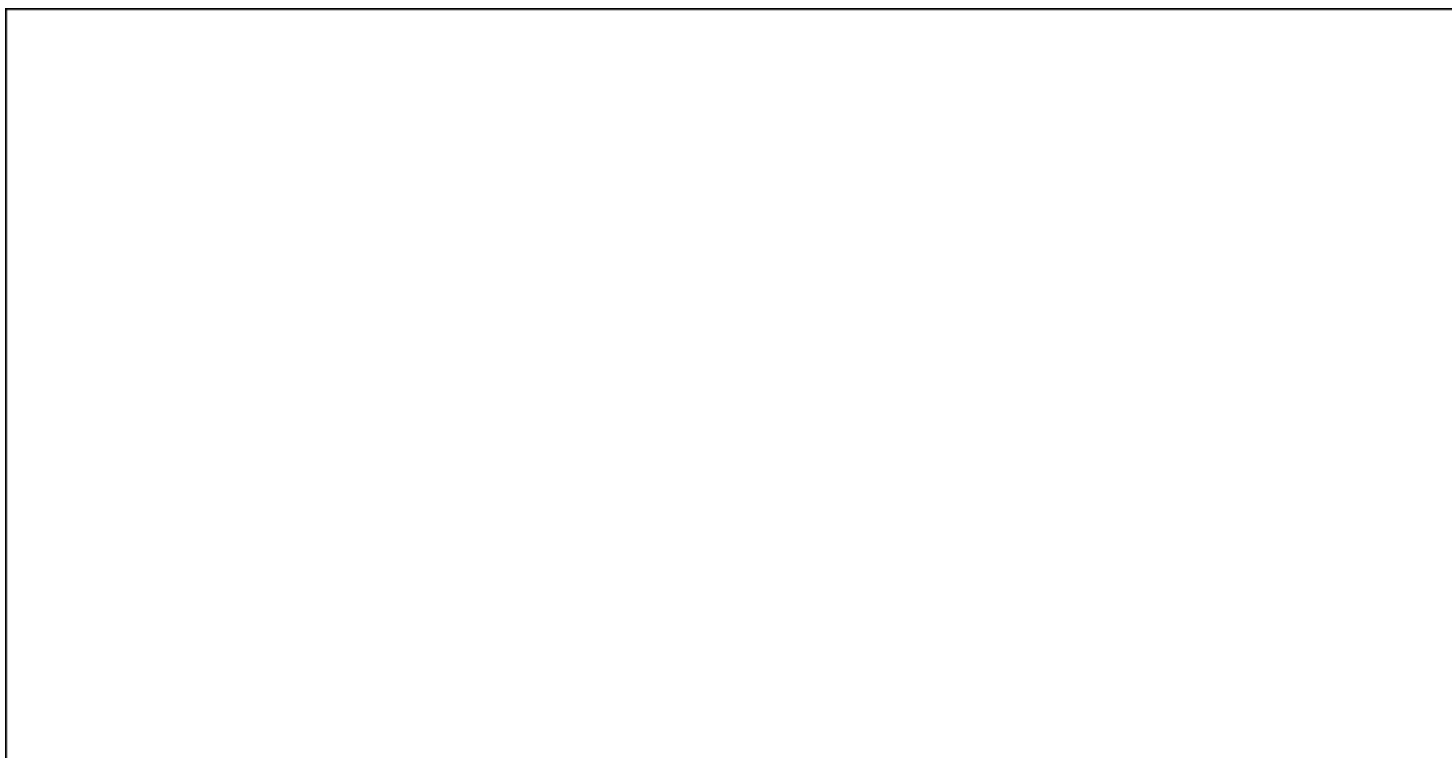
Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram



5. What I/we found out or learned:

6. Skills developed

7. Key vocabulary

Challenge 17 - Marshmallow Challenge

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. How tall is your tower? _____

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 18 - Minibeast Mapping

Aim:

1. What I/we had to do:

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2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram - Draw and label the different habitats you will be exploring



5. Habitat: _____

How many minibeasts are here?

<u>Minibeast</u>	<u>Number</u>

6. Habitat: _____

How many minibeasts are here?

<u>Minibeast</u>	<u>Number</u>

7. Habitat: _____

How many minibeasts are here?

<u>Minibeast</u>	<u>Number</u>

--	--

8. Habitat: _____

How many minibeasts are here?

<u>Minibeast</u>	<u>Number</u>

9. Which habitats are most popular with each type of minibeast? Why do you think this is?

10. Draw some of the minibeasts that you found.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

13. Key vocabulary

Challenge 19 - Musical Milk Bottles

Aim:

1. What I/we had to do:

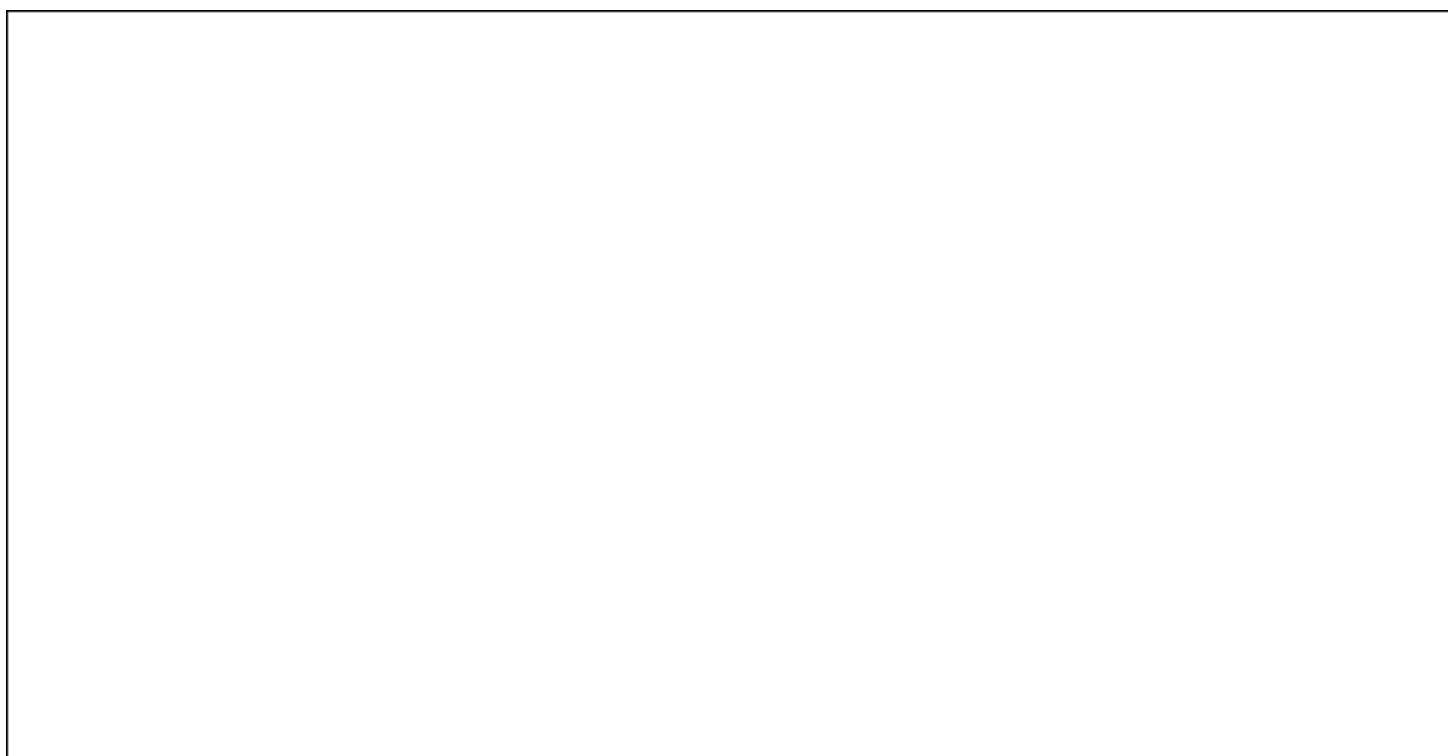
2. Any challenges I/we had:

3. How I/we solved the challenges:

4. What do you notice about the pitch of the sound and the volume of water in each bottle?

5. Order the bottles from lowest to highest pitched. What do you notice?

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 20 - Newspaper Towers

Aim:

1. What I/we had to do:

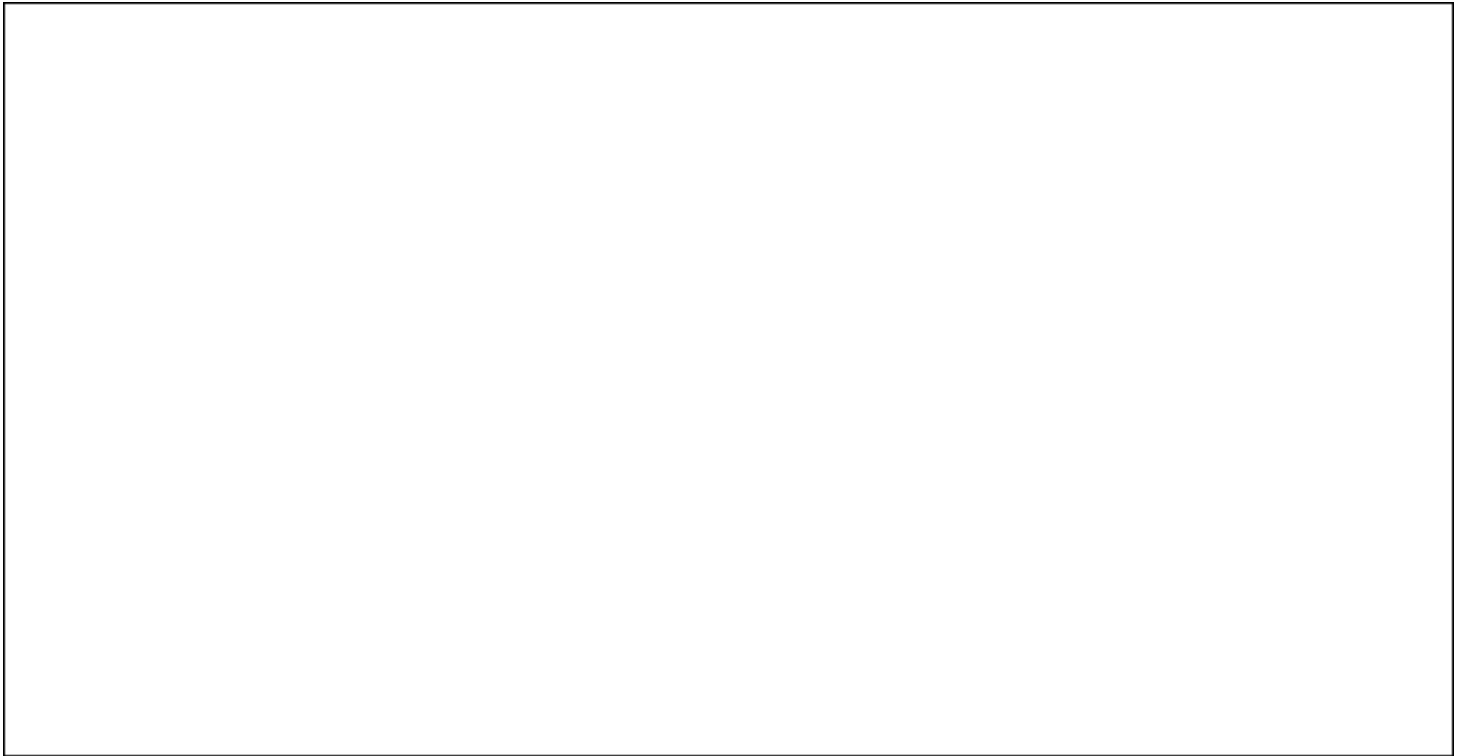
This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. How tall is your tower? _____

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 21 - Oil Spill Clean-Up

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Measure how much oil is in the plastic cup. _____

5. How many feathers have been cleaned? _____

6. How successful was the clean-up challenge? Why?

7. Diagram

8. What I/we found out or learned:

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9. Skills developed

10. Key vocabulary

Challenge 22 – Paper Plane Bullseye

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram - Plane 1 - Labelled drawing

A large empty rectangular box with a thin black border, intended for a diagram or drawing.

5. Short-range (5 metres)

<u>Attempt</u>	<u>Measurement</u>	<u>Changes Made to Plane</u>
<u>1</u>		
<u>2</u>		
<u>3</u>		
<u>4</u>		
<u>5</u>		
<u>6</u>		

6. Long-range (10 metres)

<u>Attempt</u>	<u>Measurement</u>	<u>Changes Made to Plane</u>
<u>1</u>		

<u>2</u>		
<u>3</u>		
<u>4</u>		
<u>5</u>		
<u>6</u>		

7. Look at the most successful designs for each target. Why did they work best? How do the short and long-range designs differ?

8. What I/we found out:

9. Skills developed

10. Key vocabulary

Challenge 23 - Paper Cup Phones

Aim:

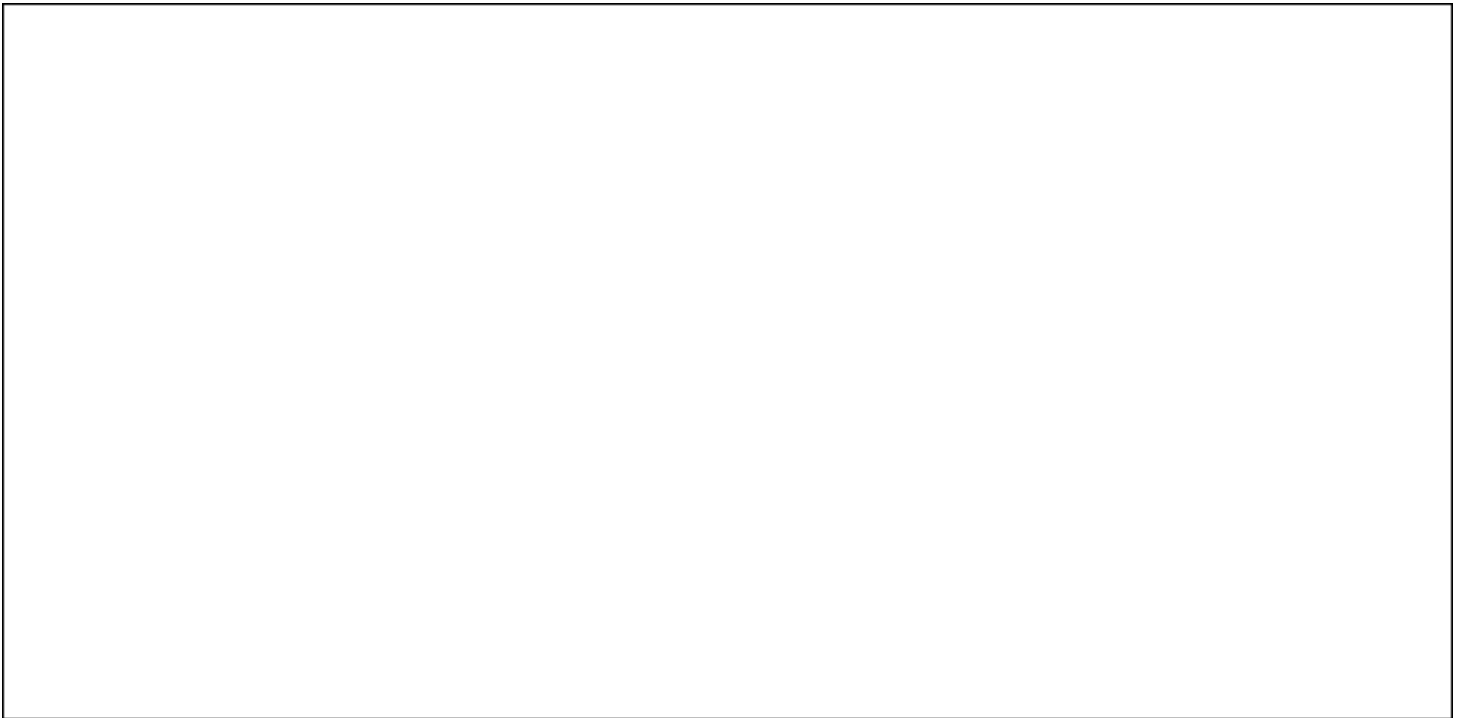
1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. How does changing the length of string between the two cups affect the sound?

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 24 - Photo Scavenger Hunt

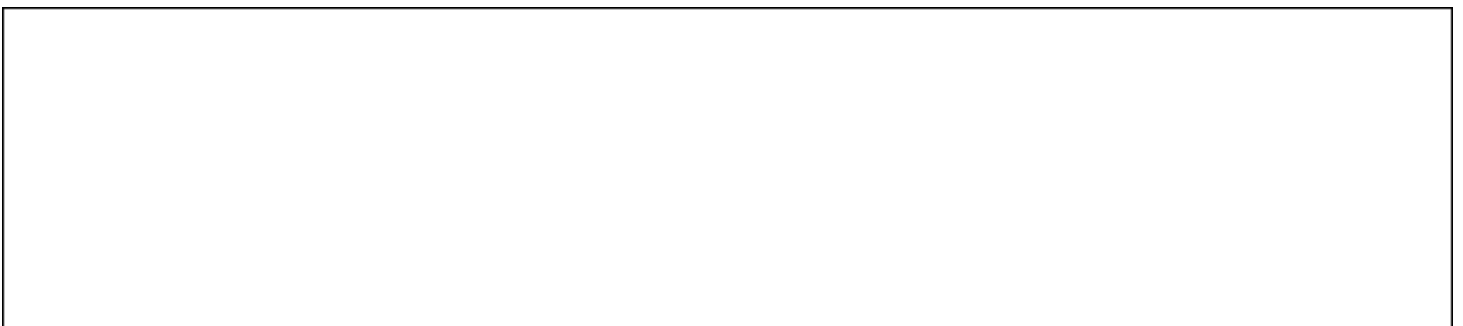
Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram



5. What I/we found out or learned:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

6. Skills developed

7. Key vocabulary

Challenge 25 - Playing with Puddles

Aim:

1. What I/we had to do:

[illegible]

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Two experiments - 1. Pour water in one place
2. Spread water more thinly over a larger area

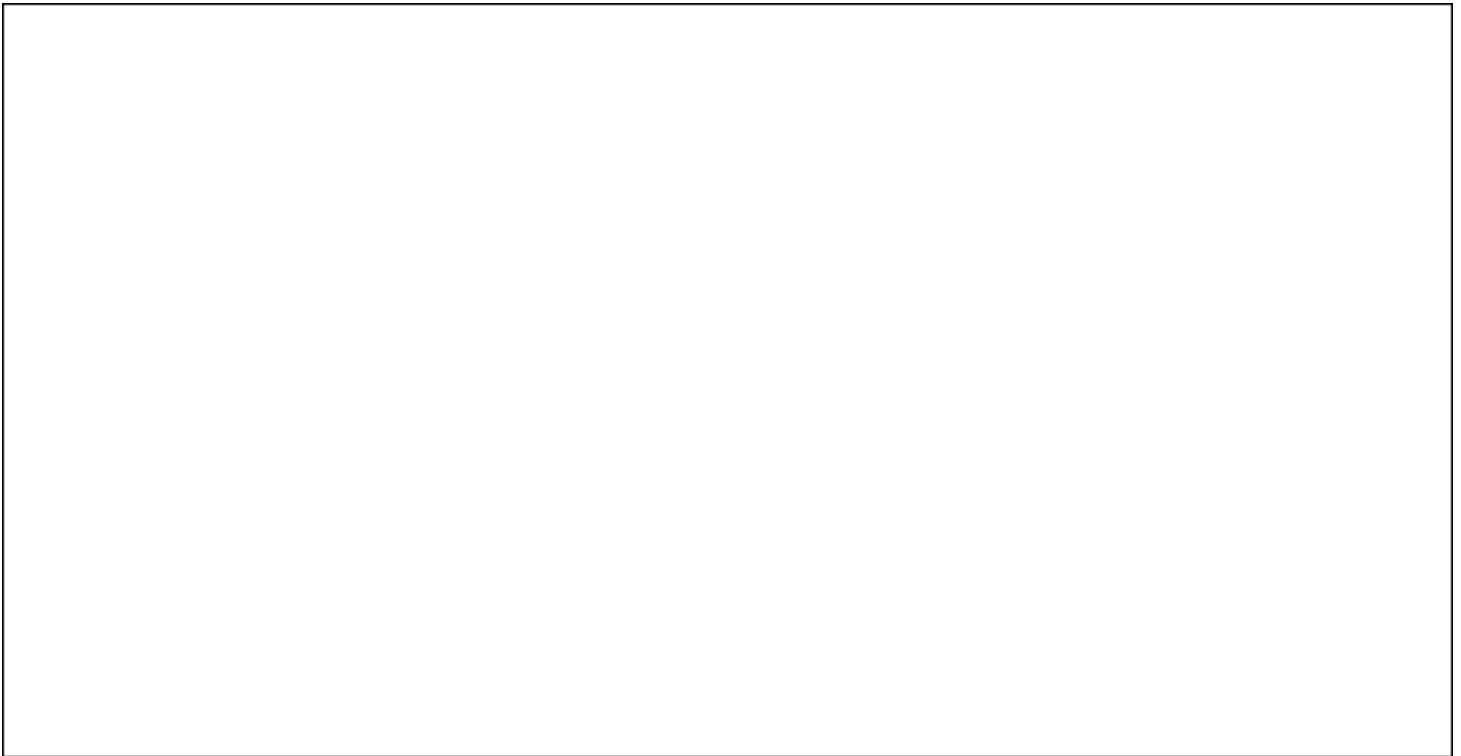
Measure the perimeter (distance around the outside) of your puddles by placing string around the chalk outline. Then measure the string against the measuring tape.

[illegible]

(Put a tick (✓) for evaporated or a cross (x) for not evaporated)

5. Which puddle evaporated quickest, the one with the largest or smallest perimeter?
Why do you think this was?

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 26 - Plugging Pipelines

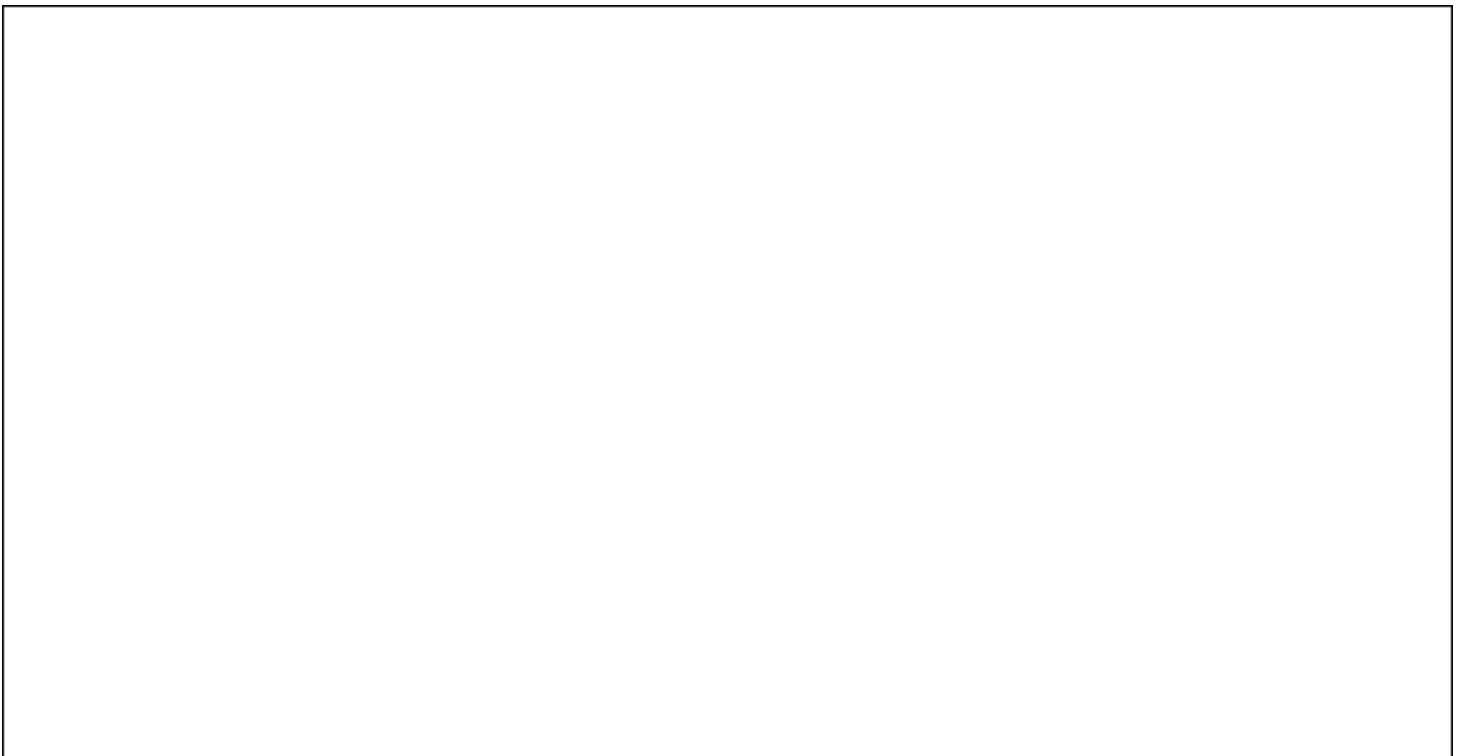
Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram



5. What I/we found out or learned:

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6. Skills developed

7. Key vocabulary

Challenge 27 - Racing Hearts

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Resting heart rate (after 1 minute) _____

5. Heart rate after jogging for 30 seconds _____

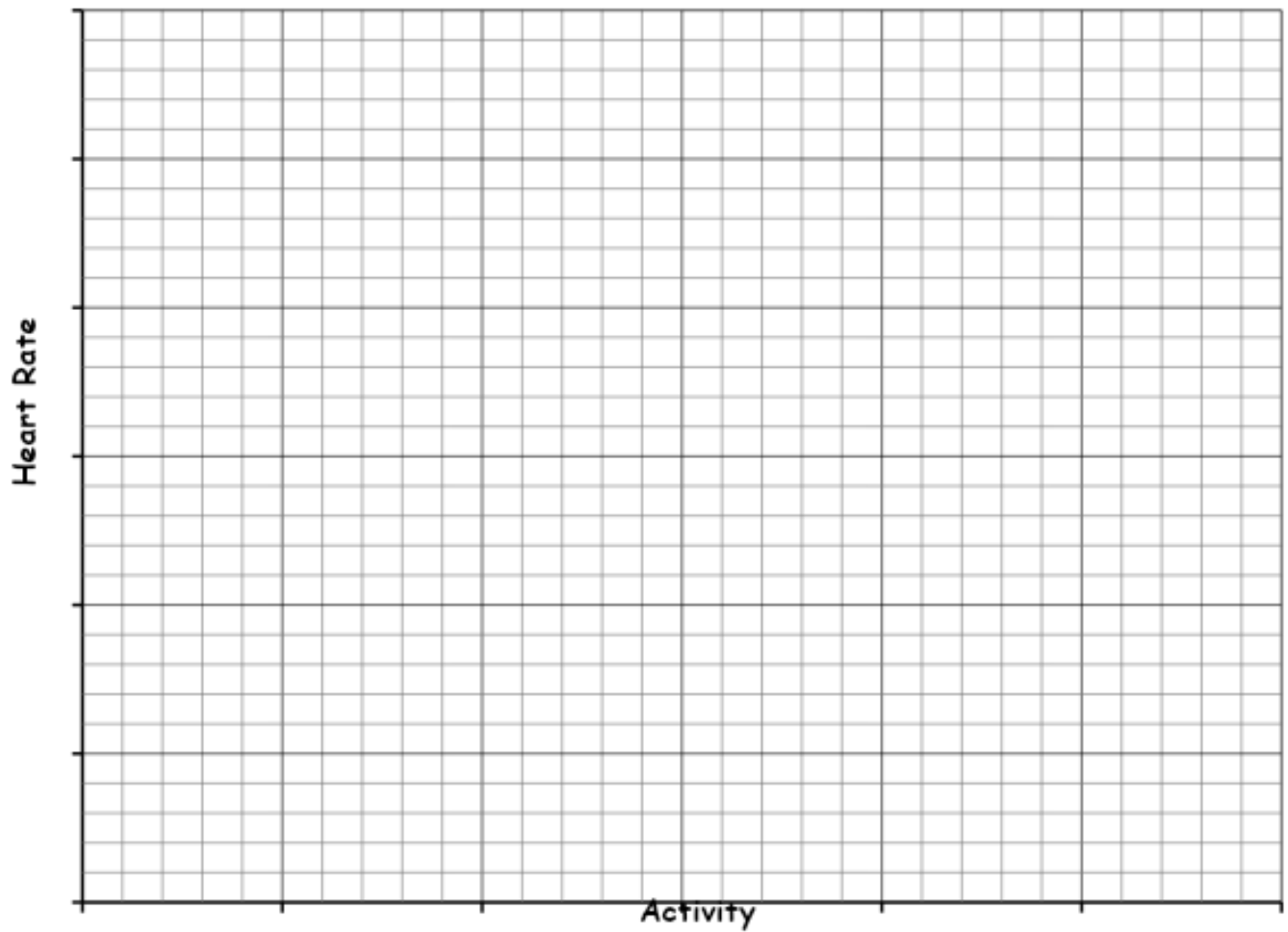
6. Heart rate after sprinting _____

7. What happened to your heart rate when your level of exercise increased?

8. Diagram



9. Record your results as a _____ graph below:



10. What I/we found out or learned:

11. Skills developed

12. Key vocabulary

Challenge 28 - Rainbow Walking Water

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Record what you see throughout the day

<u>Time</u>	<u>Observations</u>

5. Diagram

6. What I/we found out:

7. Skills developed

8. Key vocabulary

Challenge 29 - Robot Obstacle Course

Aim:

1. What I/we had to do:

[illegible]

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram of obstacle course (labelled)



5. What I/we found out:

6. Skills developed

7. Key vocabulary

Challenge 30 - Rock Rummage

Aim:

1. What I/we had to do:

[illegible]

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. List the ways you could sort your rocks. For example, smallest to largest.

5. Now sort your rocks in the ways you listed and take a photo of them.

6. Print the photos or draw a picture of your rocks and place them in the correct place on the tables.

<u>Igneous</u>	<u>Sedimentary</u>

--	--

<u>Metamorphic</u>	<u>Permeable</u>	<u>Impermeable</u>

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7. What I/we found out or learned:

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8. Skills developed

9. Key vocabulary

Challenge 31 - Rocket Racers

Aim:

1. What I/we had to do:

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2. Any challenges I/we had:

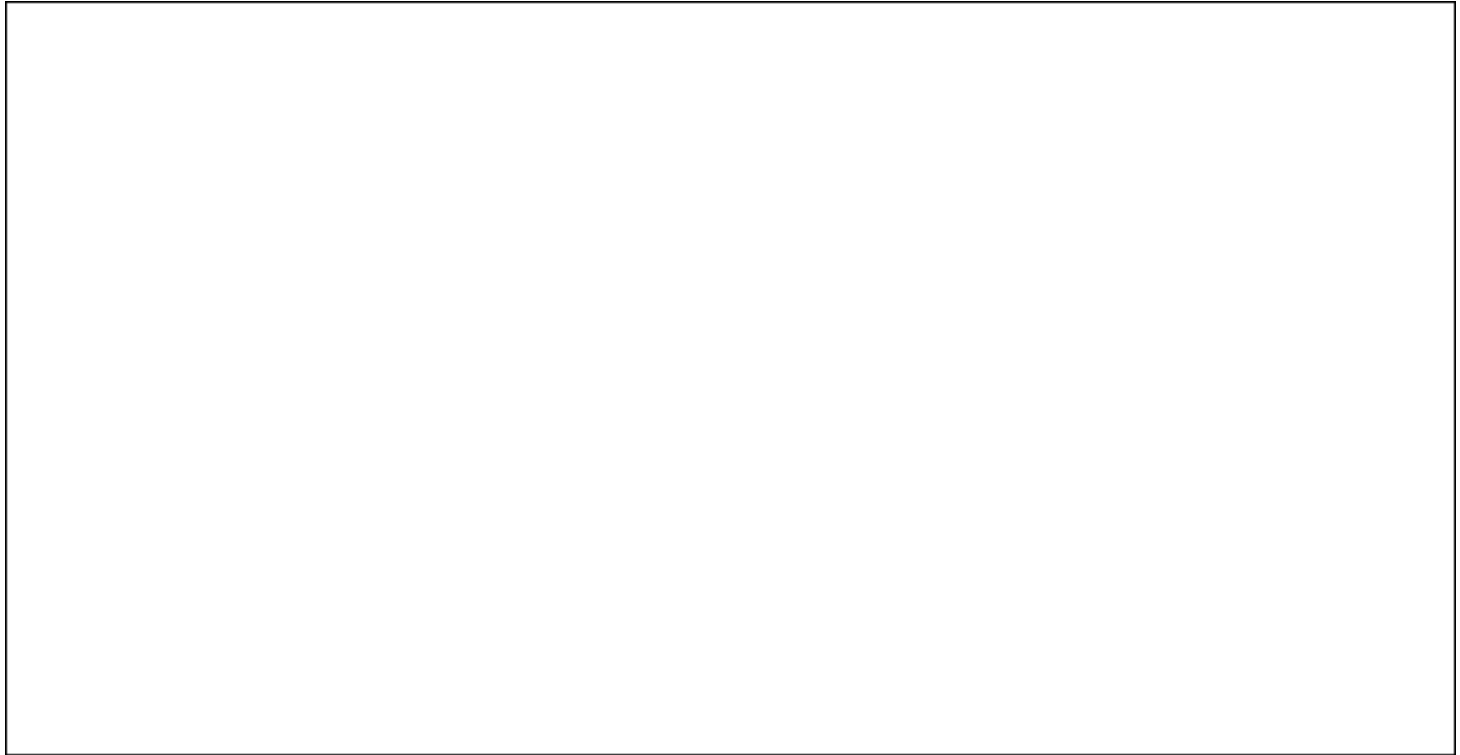
3. How I/we solved the challenges:

4. Complete the table

<u>Racer</u>	<u>Time</u>

5. Who had the rocket that got to the other end quickest? Why do you think this was?

6. Diagram



7. Now try experimenting with different sized balloons or by adding more or less air.
You could also angle the string upwards or downwards slightly. What do you notice?

8. What I/we found out or learned:

9. Skills developed

10. Key vocabulary

Challenge 32 - Shape Strength

Aim:

1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Before you test your columns, predict which one you think will hold the greatest weight. Why do you think this?

5. Test one column at a time by slowly stacking books on top of it. Record how many books it holds before collapsing.

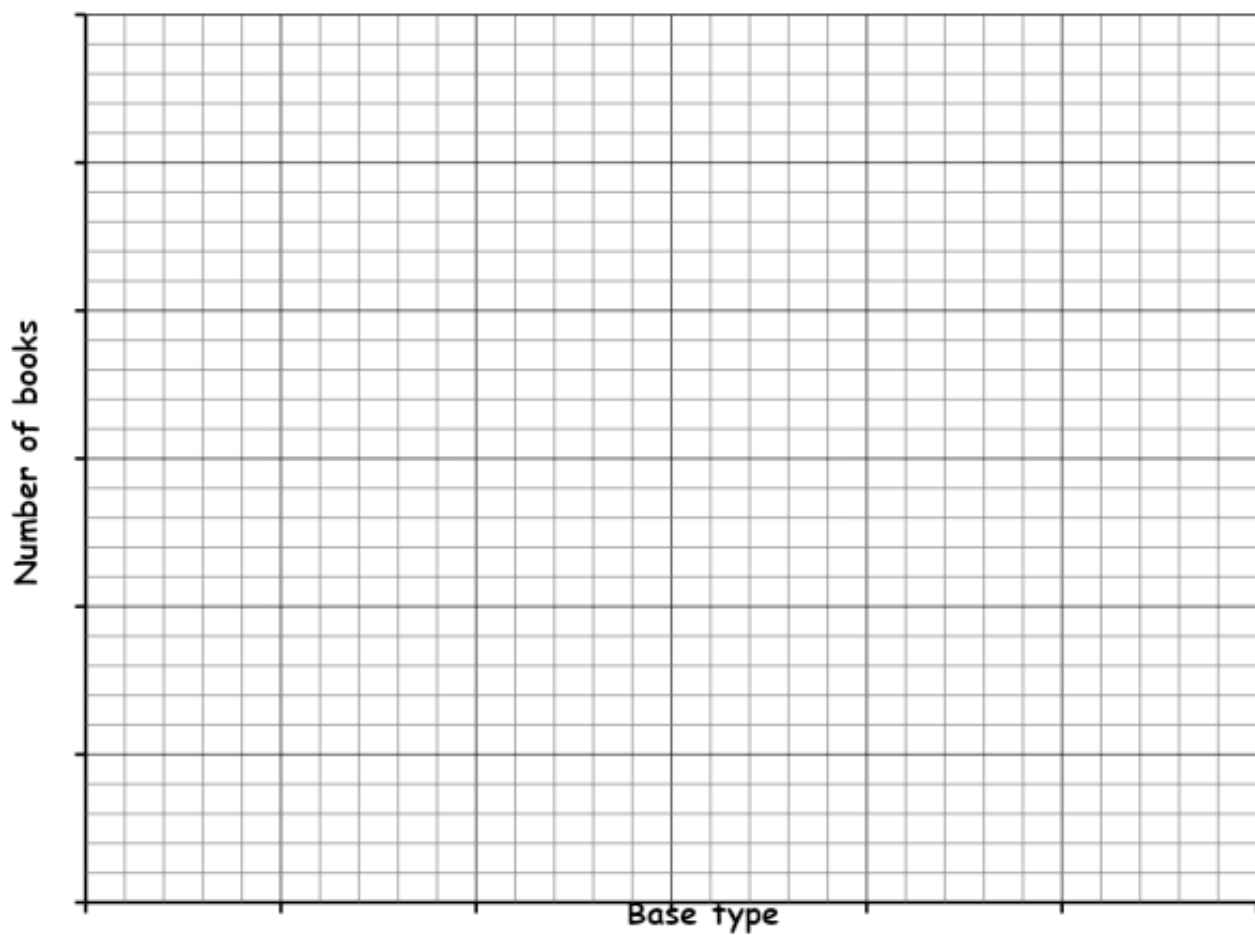
<u>Base</u>	<u>Number of Books</u>
Square	

Circular	
Triangular	

6. Which shape base held the most books? Why do you think this was?

7. Diagram

8. Record your results as a _____ graph below:



9. What I/we found out or learned:

10. Skills developed

11. Key vocabulary

Challenge 33 - Sweetie Symmetry

Aim:

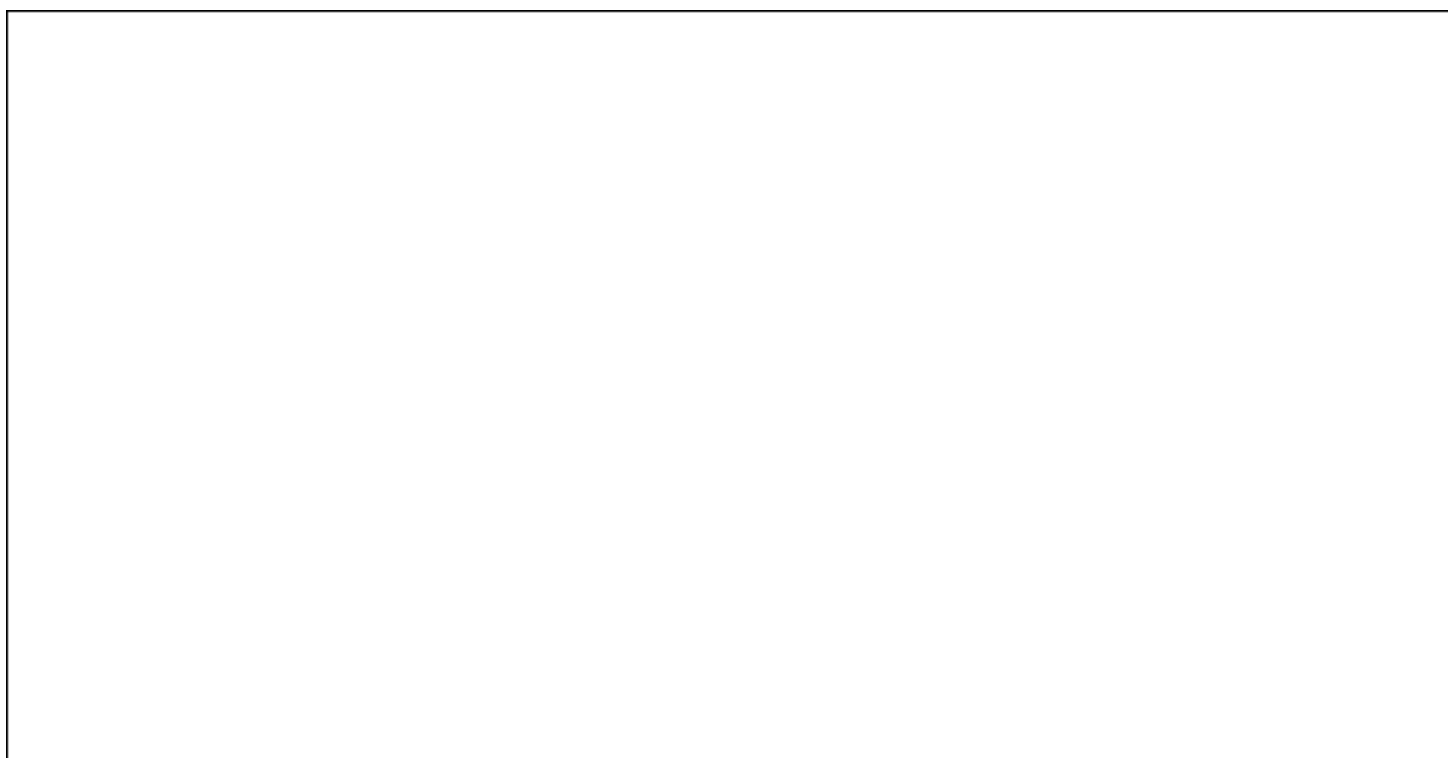
1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Diagram



5. What I/we found out or learned:

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6. Skills developed

7. Key vocabulary

Challenge 34 - Special Snowflakes

Aim:

1. What I/we had to do:

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2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Where are you dropping your snowflake from?

5. Complete the table

<u>Attempt</u>	<u>Time to reach ground</u>	<u>Adaptation made</u>
1		
2		

3		
4		
5		

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 35 - Spinning Helicopters

Aim:

1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. Any challenges I/we had:

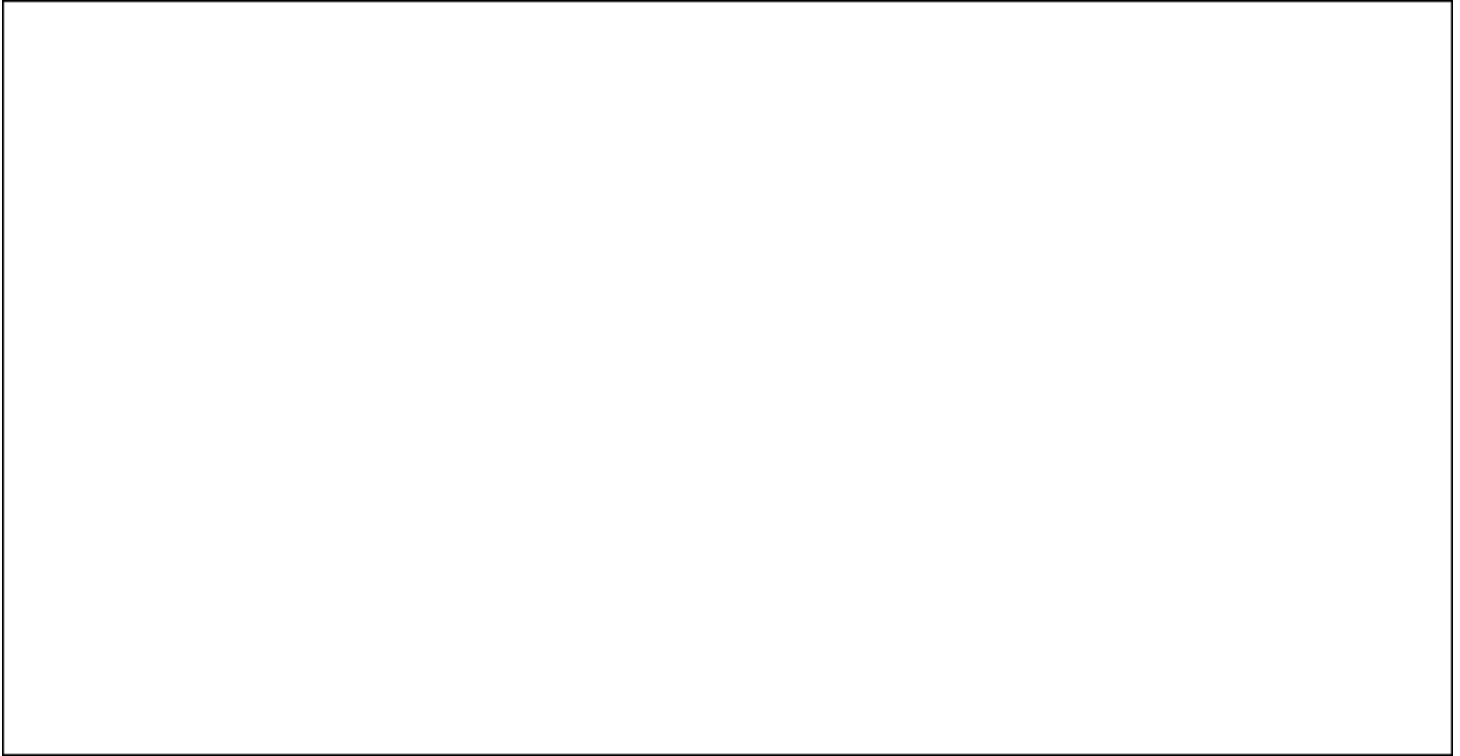
3. How I/we solved the challenges:

4. Complete the table

<u>Attempt</u>	<u>Number of paperclips</u>	<u>Number of spins</u>
1		
2		
3		
4		

5		
---	--	--

5. Diagram



6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 36 - Spoon Sound Waves

Aim:

1. What I/we had to do:

[illegible]

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Is it true that the harder you hit the spoon, the louder the sound?

5. Experiment with adjusting the string to different lengths. Does this change the sound? How?

6. Diagram



7. Try using different sized spoons. Does this affect the sound? If so, why might this be?

8. What I/we found out or learned:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

9. Skills developed

10. Key vocabulary

Challenge 37 - Static Salt 'n' Pepper

Aim:

1. What I/we had to do:

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

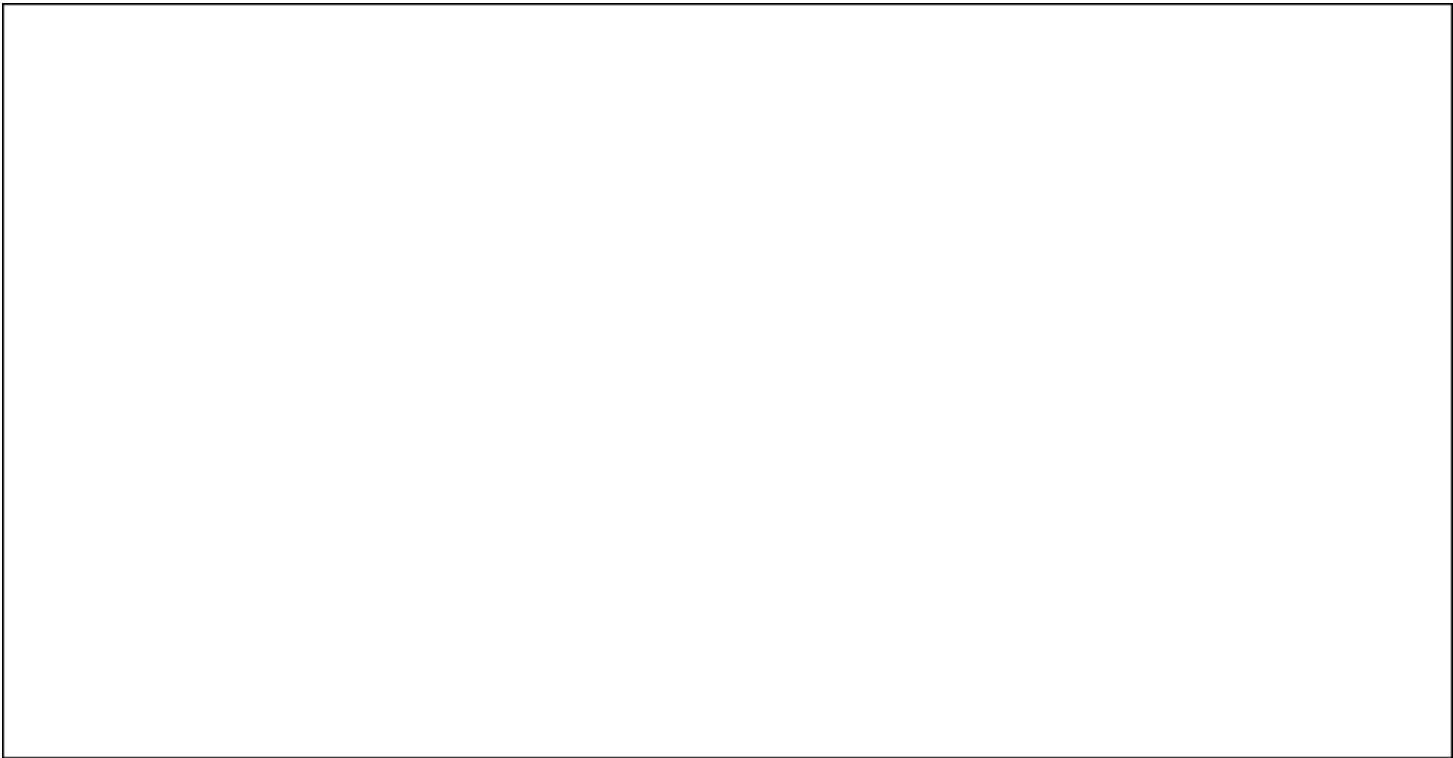
2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Hold the spoon above the salt and pepper to watch them separate. What do you notice?

5. What happens when you move the spoon further away from the plate?

6. Diagram



7. What I/we found out or learned:

8. Skills developed

9. Key vocabulary

Challenge 38 - Tinfoil Cargo Boats

Aim:

1. What I/we had to do:

[illegible]

2. Any challenges I/we had:

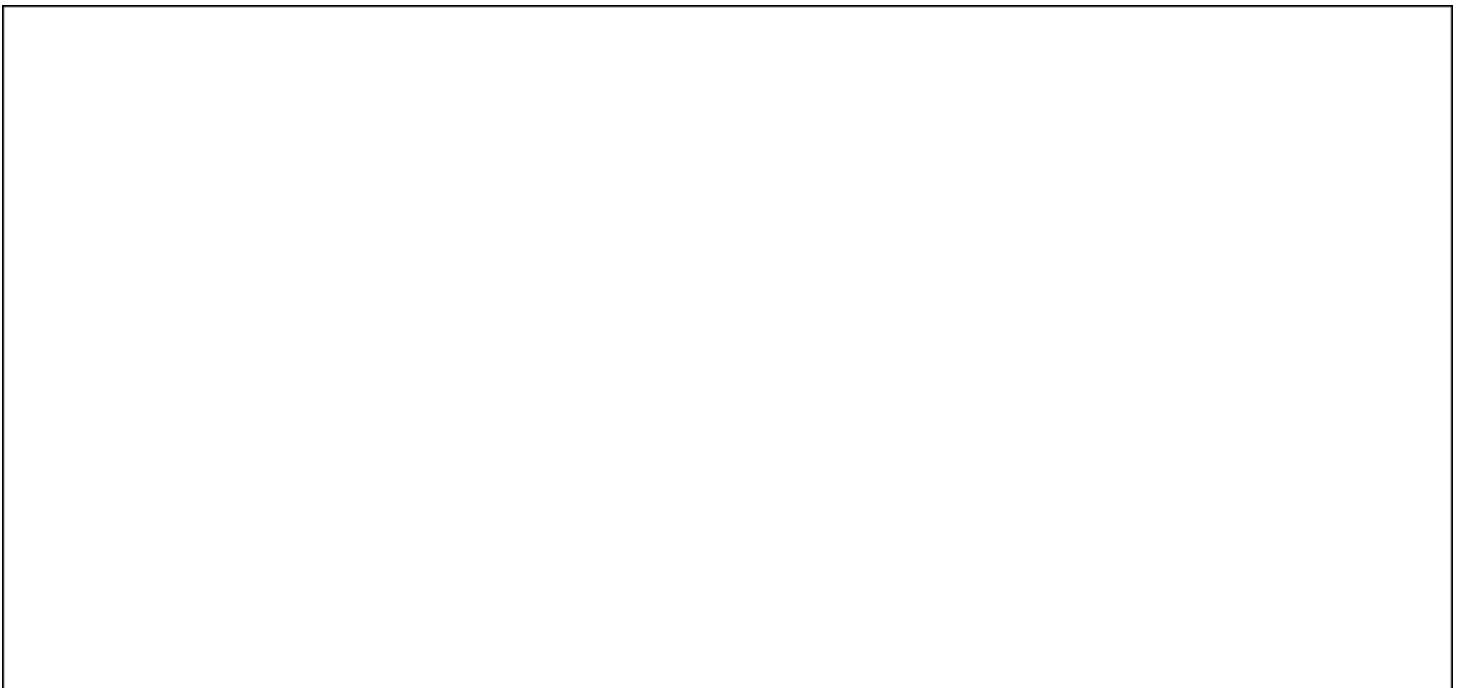
3. How I/we solved the challenges:

4. Number of coins: _____

Weight of coins: _____

5. How could you improve your design to make it hold more?

6. Diagram



7. Now create smaller and larger tinfoil boats shaped like canoes, squares and rectangles. Explore how the different shapes and sizes affect the weight they can hold.

8. What I/we found out or learned:

9. Skills developed

10. Key vocabulary

Challenge 39 - Water Colour Carnival

Aim:

1. What I/we had to do:

2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Complete the table (Colour 1 + Colour 2 = Colour 3)

<u>Colour 1</u>	<u>Colour 2</u>	<u>Colour 3</u>

5. Diagram

6. What I/we found out or learned:

7. Skills developed

8. Key vocabulary

Challenge 40 - Water Filter Challenge

Aim:

1. What I/we had to do:

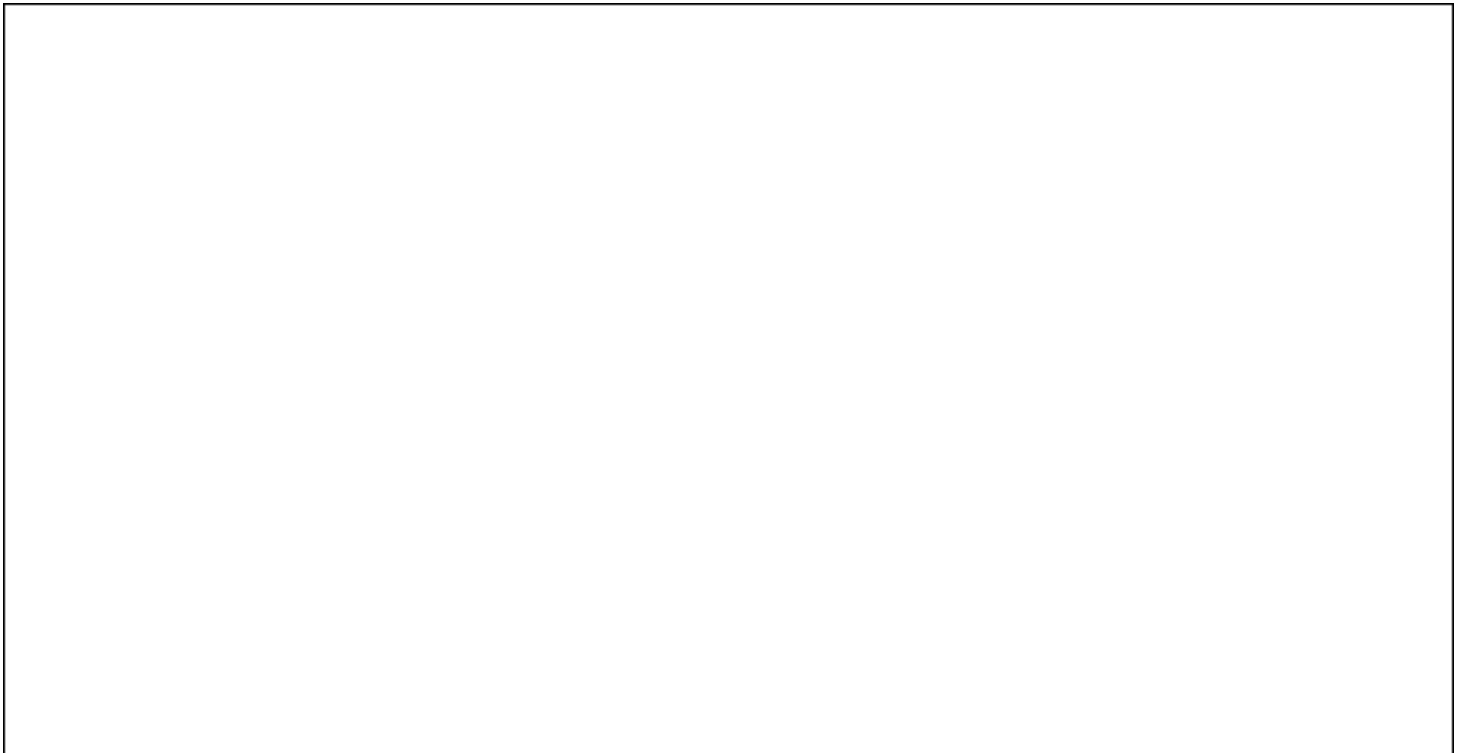
2. Any challenges I/we had:

3. How I/we solved the challenges:

4. Complete the table

<u>Natural material used and amount (in grams)</u>	<u>Volume of muddy water used</u>	<u>Time taken for muddy water to filter through into the plastic cup</u>
--	---------------------------------------	--

5. Diagram



6. What I/we found out or learned:

[illegible]

7. Skills developed

8. Key vocabulary