Kirkcaldy High School

BGE Science

Forces and Space

Name:_____

Class:_____

Teacher:_____

Expectations and Outcomes Learner Evaluation

Topic: Forces and Space

Experience and Outcomes	Date Completed (dd/mm/yy)	Evaluation How happy are you with it? (☺ ? ☹)
I can describe what a force is.		
I can measure forces with a Newton meter.		
I can describe real life applications of forces.		
I can identify balanced and unbalanced forces from a force diagram.		
I can predict the movement of an object using force diagrams.		
I can draw or interpret a force diagram using a simulation.		
I can list forces acting on moons, planets, stars and satellites.		
I can state that day and night are caused by the Earth rotating on its axis.		
I can state that the Earth orbits the Sun once in one year.		
I can state that the Solar System consists of eight planets that orbit the Sun.		
I can list the planets in order of increasing distance from the Sun.		
I can describe the relative size and scale of the planets in the Solar System		
I can carry out an experiment to show how craters are formed on the surface of the Moon.		
I can write an experiment report with Aim, Method, Results, Graph Conclusion, Evaluation.		
I can explain what is meant by the terms: planet, moon, star, solar system, exoplanet, galaxy and universe.		
I can order space objects by size and distance to show my understanding of the scale of the universe.		
I can explain the difference between mass and weight		

I can state how to measure mass and weight		
I can plan and carry out an investigation independently.		
I can use the relationship W = mg to calculate weight.		
I can explain why weight changes on other planets.		
I can describe the effect gravitational field strength has on weight.		
I can describe what friction is and when it occurs.		
I can identify everyday examples where friction is helpful (e.g. brakes, grip) or unhelpful (e.g. slowing things down).		
I can predict and explain how different surfaces affect the amount of friction.		
I can define air resistance as a force that slows objects moving through air.		
I can identify factors that increase or decrease air resistance (e.g. shape, size, speed).		
I can predict and explain the motion of falling objects with different surface areas.		
I can investigate how air resistance affects falling speed.		
I can name different ways we observe space (e.g. telescopes, satellites).		
I can explain how space exploration has helped us understand Earth's weather, climate, or resources.		
I can name different ways we observe space (e.g. telescopes, satellites).		
I can explain how space exploration has helped us understand Earth's weather, climate, or resources.		
I can give an opinion on whether space travel is worth it, with a reason.		
I can explain what is required for life to survive on a planet.		
I can produce reasoned arguments on the likelihood of life existing elsewhere in the universe.		

Date: _____

What is a Force?

Starter

Learning Intentions

- To understand what a force is.
- To name different types of forces.

Success Criteria

- ❑ I can describe what a force is.
- ❑ I can measure forces with a Newton meter.
- ❑ I can describe real life applications of forces.

What is a Force?

A force is a _____ or a _____.

A force can change the_____, _____ or _____ of an object.

❓ Name as many forces as you can.

Contact Forces

Some forces need to touch an object to affect it.

Examples of these forces are _____, _____ and _____.

Non-contact Forces

Some forces do not need to have contact to affect an object.

Examples of these forces are _____, magnetic and electrostatic forces.

Measuring Force

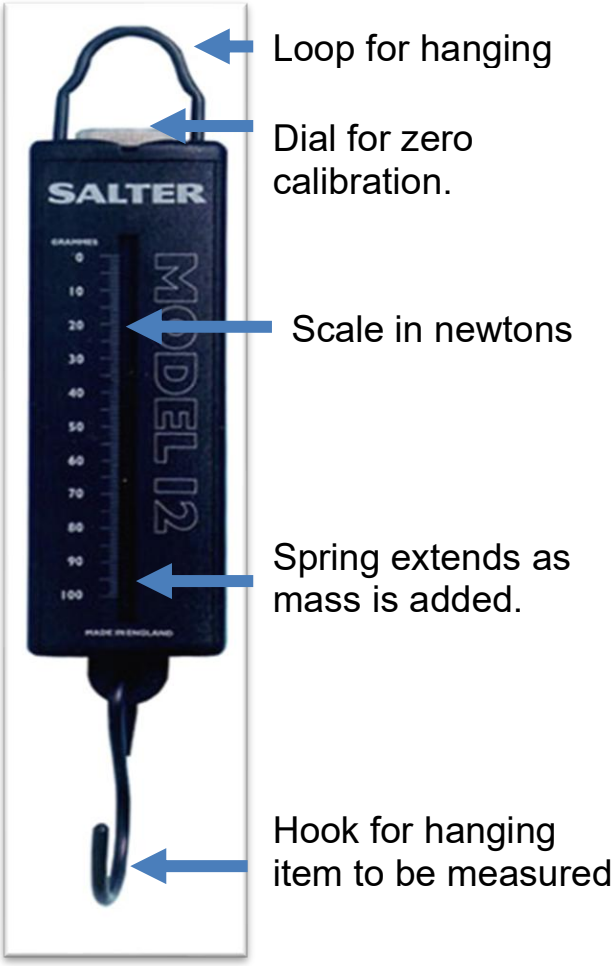
A _____ _____ (also called a force meter) is used to measure force.

The unit of measurement for force is Newtons. The letter_____ represents Newtons.

Using a Newton Balance

How to use a Newton balance

1. Check the scale
    - make sure it is zeroed (the pointer should be at 0 when nothing is hanging).
2. Hang the object
3. Hold it steady
4. Read the scale



⚠ Safety & Tips:

- Don't overload the balance – check the maximum force limit and use a suitable balance. We have 10 N or 30 N balances.
- Avoid jerky movements or bouncing the object.

Measuring forces

Aim: To estimate, and measure, the forces required to move different objects.

Method: *Describe how you will carry out your investigation. Include a labelled diagram.*

Results:

Object	Estimate of force needed (N)	Actual force needed (N)
Lift a bag		
Open the door		
Pull a stool across floor		

Conclusion: *How accurate were your estimates? What did you find out?*

_____

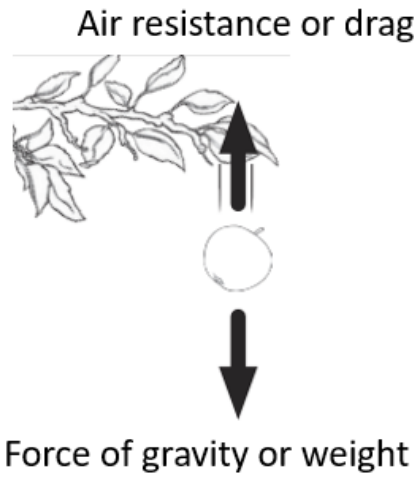
_____

_____

Challenge yourself: Naming Forces

Draw arrows on the pictures below to show the forces acting in them.

Example:



List of forces: Air resistance I Force of gravity I Push I Weight
Pull I Friction I Drag I Buoyancy I Engine force I Upthrust

Date: _____

Balanced and Unbalanced forces

Starter

Learning Intentions

- To identify balanced and unbalanced forces.
- To describe the effect a pair of forces have on an object.

Success Criteria

- ❑ I can identify balanced and unbalanced forces from a force diagram.
- ❑ I can predict the movement of an object using force diagrams.
- ❑ I can draw or interpret a force diagram using a simulation.

Balanced Force

A balanced force is two _____ forces but in _____ directions.

Balanced forces cause an object to _____ _____ (stationary) or travel at a constant speed.

Unbalanced Force

An unbalanced force is when there is one or more forces, but the overall force in one direction is _____.

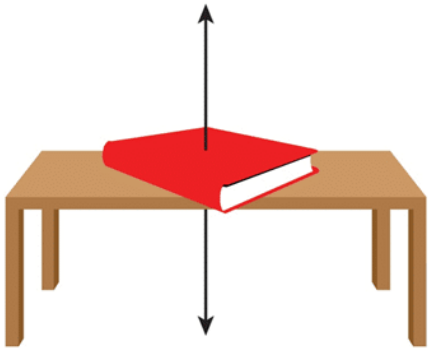
Unbalanced forces cause a change in shape, direction or _____.

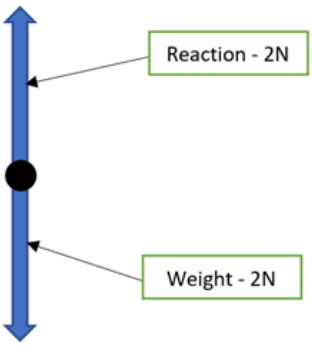
A change in speed is called acceleration**.**

An unbalanced force is when there is one or more force, but the overall force in one _____is _____.

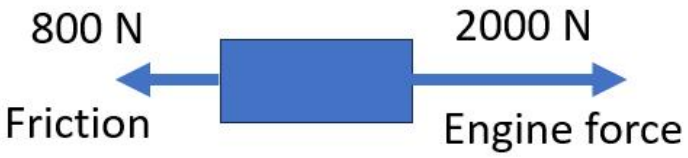
Force Diagram

A **force diagram** (sometimes called a **free-body diagram**) is a simple drawing used in science to _____ acting on an object.





Class Question 1



1. Are the forces acting on the car **balanced** or **unbalanced**?

_____

2. What direction is the car travelling in?

_____

3. Calculate the resultant force on the car

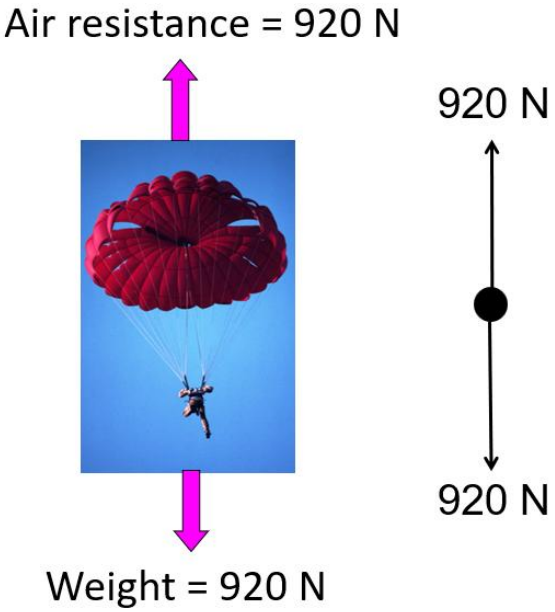
_____

Class Question 2

1. Are the forces acting on the car **balanced** or **unbalanced**?

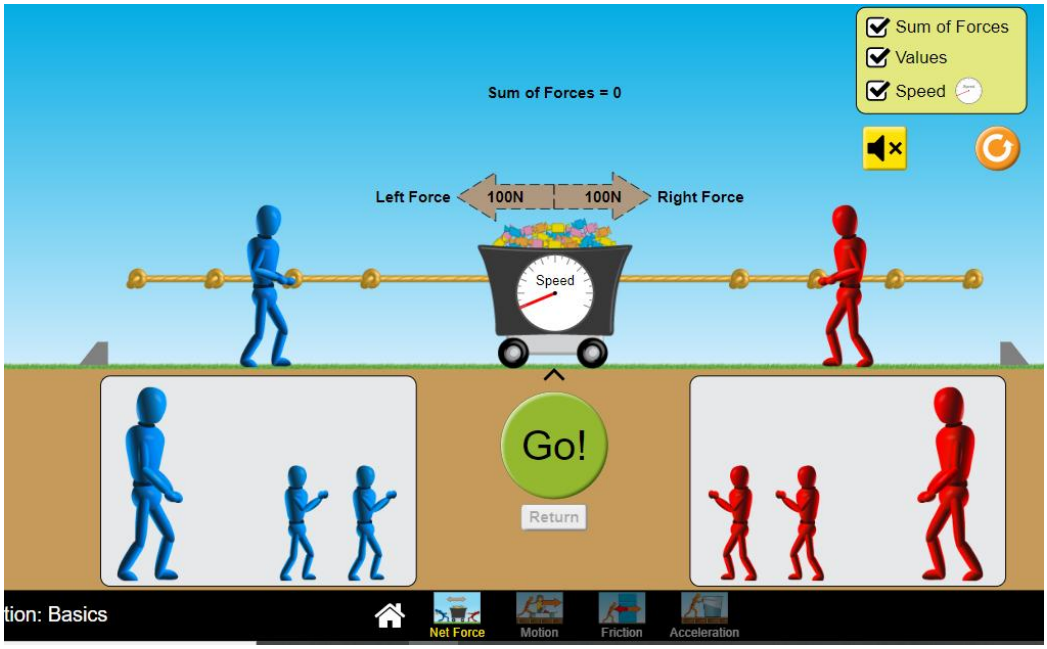
2. What direction is the car travelling in?

3. Calculate the resultant force on the car



Exploring Forces Using PhET Simulation

https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html or search for "**phet forces**".



Task 1: Playing with Forces

📝 **Questions:**

1. What happens when both sides pull with **equal force**?

2. What happens when one side pulls **harder**?

3. What do you need to do to make the blue team win?

Task 2: Force Diagrams

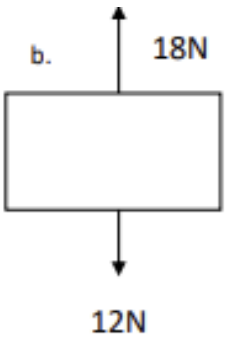
1. The object being pulled with **balanced forces**.

2. The object being pulled with **unbalanced forces**.

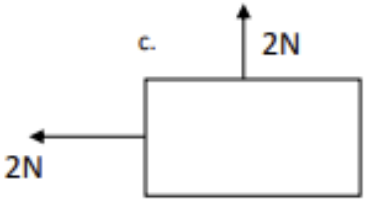
State if the forces acting on the blocks are balanced or unbalanced.

a.

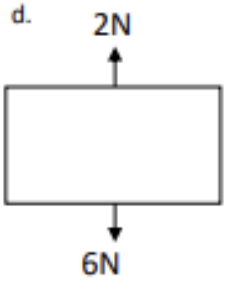
b.



c.

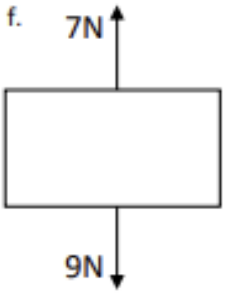


d.



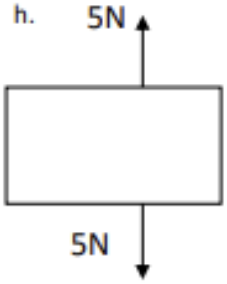
e.

f.



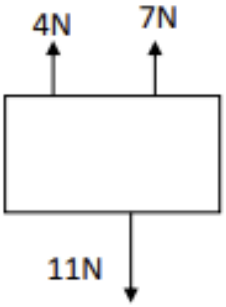
g.

h.



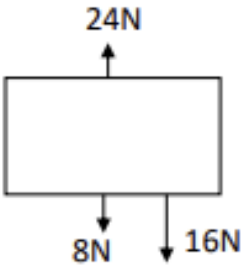
i.

j.

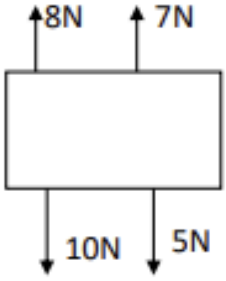


k.

l.



m.

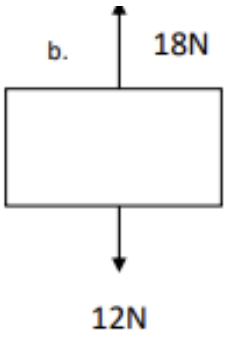


n.

Calculate the resultant force on each block

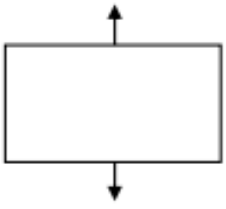
a.

b.



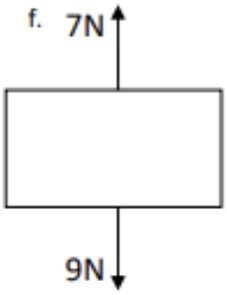
c.

d.



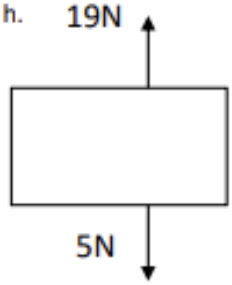
e.

f.



g.

h.



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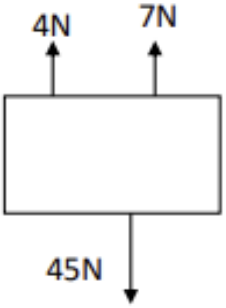
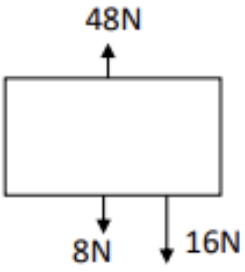
j.

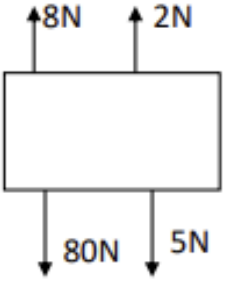


k.

l.



m.



n.

Date: _____

Forces in Space

Starter

Learning Intentions

- To understand how gravity acts as a force in space.
- To explore the movements of Earth and how they create day, night, months, and years.

Success Criteria

- ❑ I can list forces acting on moons, planets, stars and satellites.
- ❑ I can state that day and night are caused by the Earth rotating on its axis.
- ❑ I can state that the Earth orbits the Sun once in one year.

Forces in Space

Watch “How Does Gravity Work? 🍎 | Newsround” and answer the following questions

1. What force keeps a planet in orbit around the Sun? _____

   _____

2. What would happen if there was no gravitational force between the Earth and the Moon? _____

   _____

3. The Moon orbits the Earth. What other objects orbit the Earth? _____

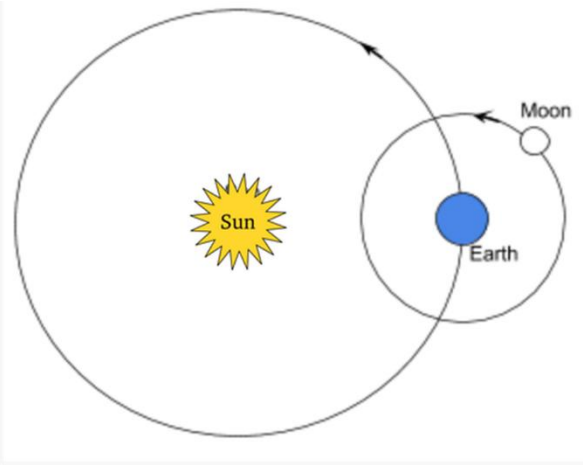
   _____

_____ is the force pulling objects together.

In space, gravity keeps:

- Moons orbiting planets
- Planets orbiting the Sun
- Satellites in orbit

Without gravity, objects would move in straight lines.



Earth, Space, and Time

Daytime Month Night-time Year Seasons Day

Terms	Definitions
	when your part of the Earth is facing the Sun, so you can see light and it is usually warm.
	when your part of the Earth is turned away from the Sun, so it becomes dark and usually cooler.
	the time it takes for the Earth to make one full spin (rotation) on its axis. This takes 24 hours.
	how long it takes the Moon to orbit the Earth once. This takes roughly 29.5 days, which is why months are about 30 days long.
	the time it takes the Earth to orbit once around the Sun. This takes about 365¼ days.
	Seasons happen because the Earth is tilted on its axis as it orbits the Sun. This tilt means different parts of Earth get more or less sunlight during the **year, creating spring, summer, autumn, and winter.**

Date: _____

The Solar System

Starter

Learning Intentions

- To identify the planets and their key features.

Success Criteria

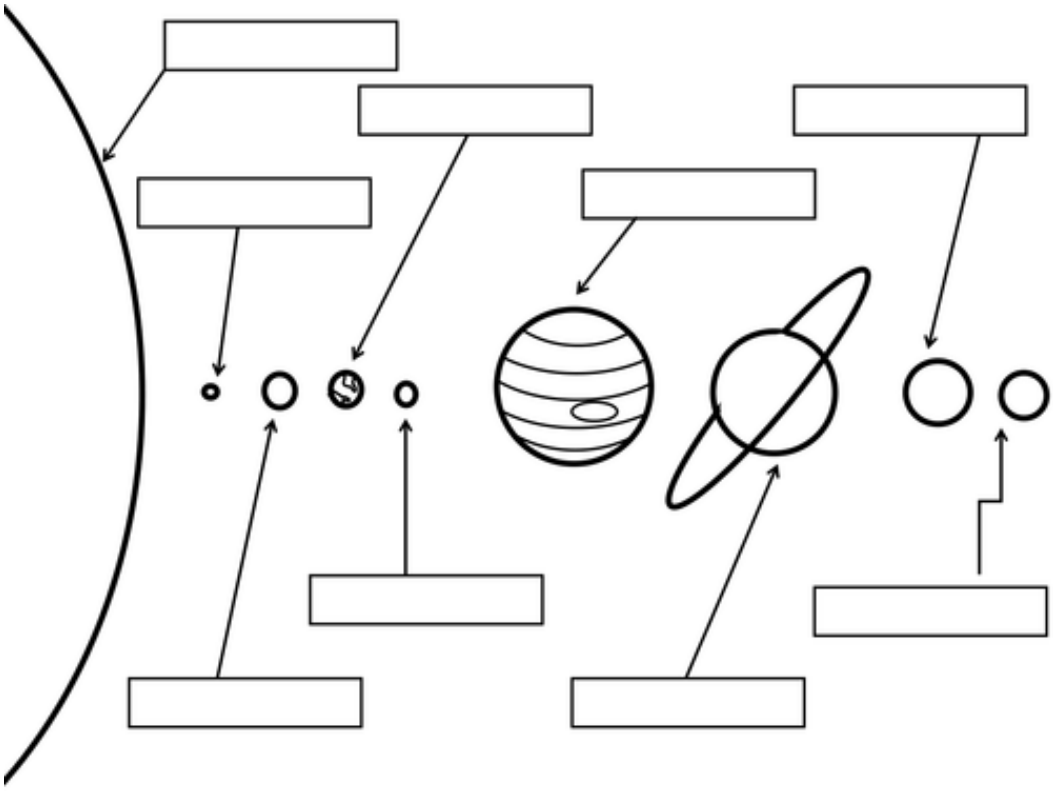
- ❑ I can state that the Solar System consists of eight planets that orbit the Sun.
- ❑ I can list the planets in order of increasing distance from the Sun.
- ❑ I can describe the relative size and scale of the planets in the Solar System.

The Solar System

The Earth is one of _____ planets which orbit the _____. Together with other objects like comets, asteroids, and dwarf planets, they make up the _____ _____.

The _____ planets (Mercury, Venus, Earth and Mars) are small and rocky.

The _____ planets (Jupiter, Saturn, Uranus and Neptune) are large gas/ice giants.



Date: _____

The Scale of the Solar System Continued ….

Starter

The Scale of the Solar System

Use this data table to help you create a map of the solar system.

Planet	Distance to the Sun (million km)	Time for 1 orbit around the Sun (Earth days)	Average surface temperature (° C)	Strength of gravity (Nkg^{-1})	Moons
Mercury	**60**	**88**	**167**	**3.7**	**0**
Venus	**110**	**225**	**464**	**8.9**	**0**
Earth	**150**	**365**	**15**	**9.8**	**1**
Mars	**230**	**687**	**-65**	**3.7**	**2**
Asteroids	**400**	**-**	**-**	**-**	**-**
Jupiter	**780**	**4330**	**-110**	**23**	**67**
Saturn	**1400**	**10800**	**-140**	**9.0**	**62**
Uranus	**2900**	**30600**	**-195**	**8.7**	**27**
Neptune	**4500**	**59800**	**-200**	**11**	**14**

Problem Solving Questions:

1. Which planet has the highest average surface temperature?

2. Which planet has the longest year?

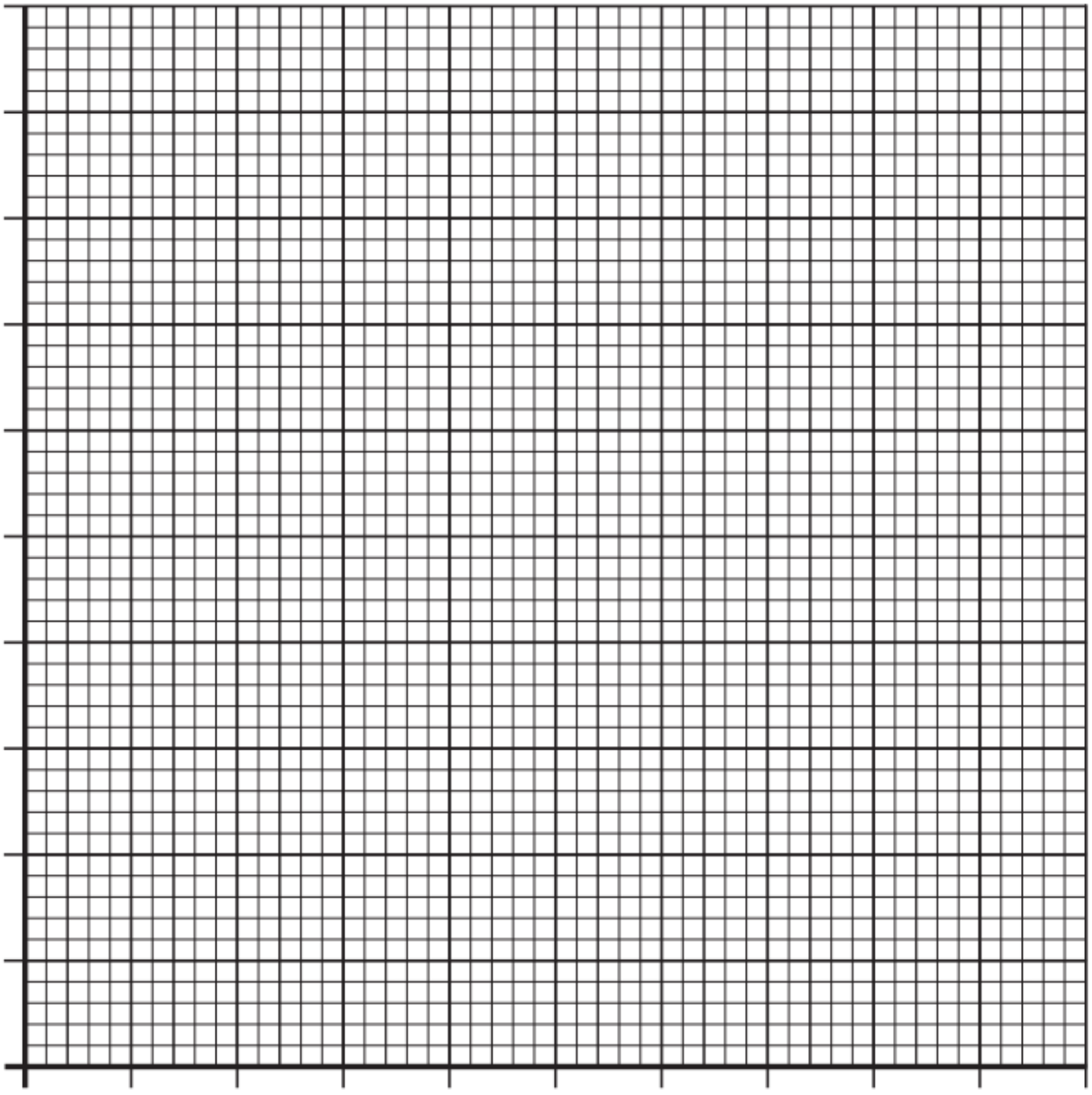
3. How many more moons does Jupiter have compared to Saturn?

4. On which two planets is the strength of gravity the same?

5. Which planet has more moons than Saturn?

Challenge Task: Bar Graph Practice

Plot a bar chart of the Distance to the Sun (million km) using the information in the table.



Name of planet

Planet Fact File

Image

Distance from the sun

_____

Time taken to orbit the sun

_____

Number of Moons

_____

Description of planet

(type of planet/average temperature/atmosphere)

_____

_____

_____

_____

_____

_____

Interesting Facts

_____

_____

_____

_____

_____

_____

Date: _____

The Surface of the Moon

Starter

Learning Intentions

- ❑ To explore how craters are formed on the surface of the Moon.

Success Criteria

- ❑ I can carry out an experiment to show how craters are formed on the surface of the Moon.
- ❑ I can write an experiment report with Aim, Method, Results, Graph Conclusion, Evaluation.

Investigating Craters

The surface of the Moon has many _____.

The craters on the Moon are caused by _____ and _____ colliding with the lunar surface.

Investigating Craters

Circle what factors you will be investigating

Independent variable - What you change or control

- diameter of the asteroid
- mass of the asteroid
- height the asteroid is dropped from

Dependent variable - what you measure

- depth of crater.
- width of crater.

Variable(s) to be kept constant - what you keep the same

- diameter of the asteroid
- mass of the asteroid
- height the asteroid is dropped from

Aim: *What are you trying to find out in your investigation?*

To investigate how the _____ affects the

_____.

Hypothesis: *What do you think will happen?*

_____

_____

_____

Method: *Describe how you will carry out your experiment. Include a labelled diagram*

Variables:

- I will change the _____ by _____

  _____

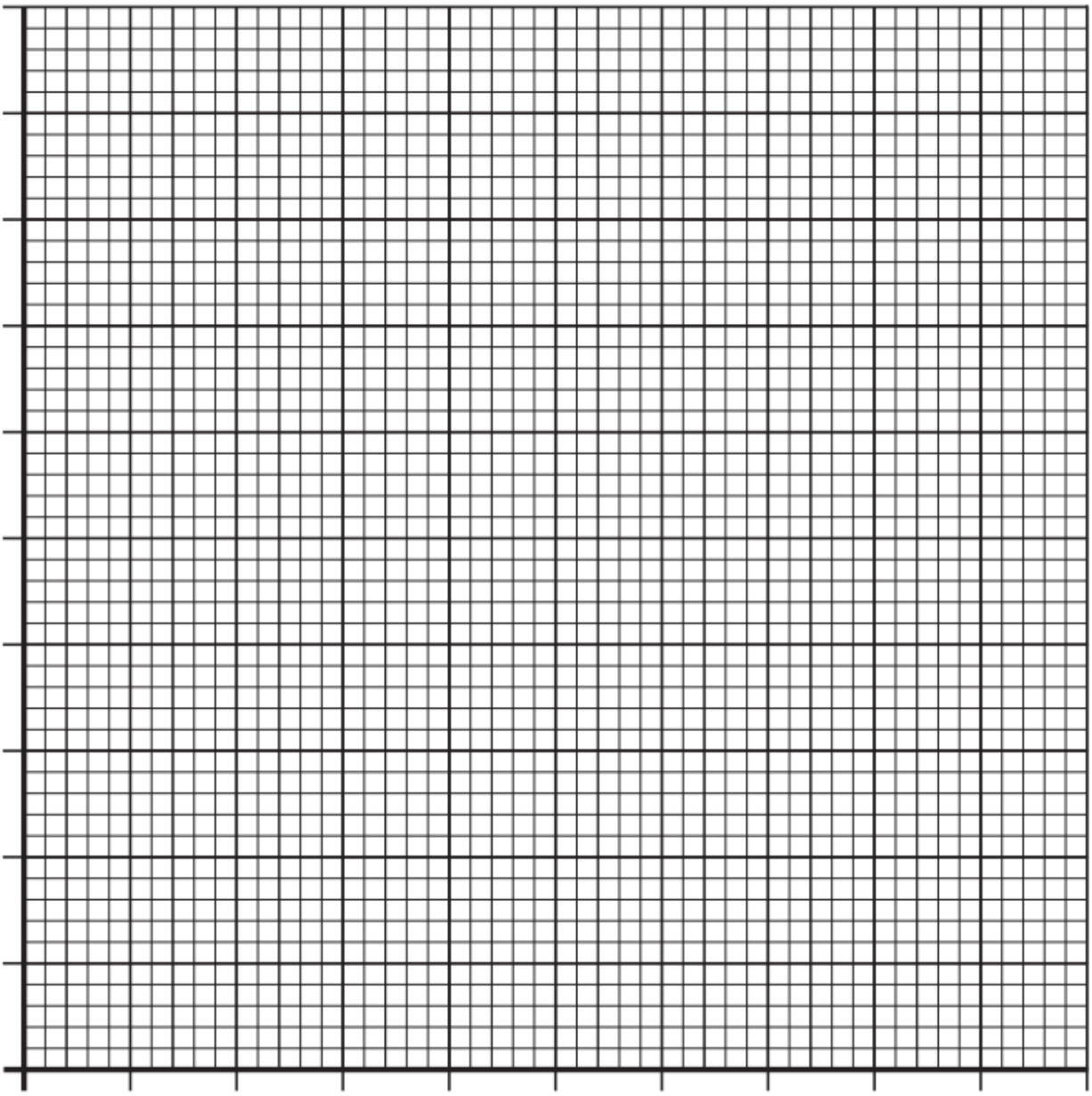
- I will measure the _____ using _____

  _____

- I will keep the _____ constant.

Results: Use table 1 or table 2

Draw a graph of your data …



Conclusion: *What did you find out? This should your aim.*

_____

_____

_____

Evaluation: *You must identify and explain a factor in your experiment that had a significant effect on the reliability, accuracy or precision of your experiment.*

_____

_____

_____

_____

_____

_____

Peer Feedback

WOW	
NOW	
HOW	

Date: _____

Beyond the Solar System

Starter

Learning Intentions

- To state what is meant by the terms: planet, moon, star, solar system, exoplanet, galaxy and universe.
- To understand the scale of the universe.

Success Criteria

- ❑ I can explain what is meant by the terms: planet, moon, star, solar system, exoplanet, galaxy and universe.
- ❑ I can order space objects by size and distance to show my understanding of the scale of the universe.

Beyond the Solar System

Video Facts:

Important Astronomical Objects

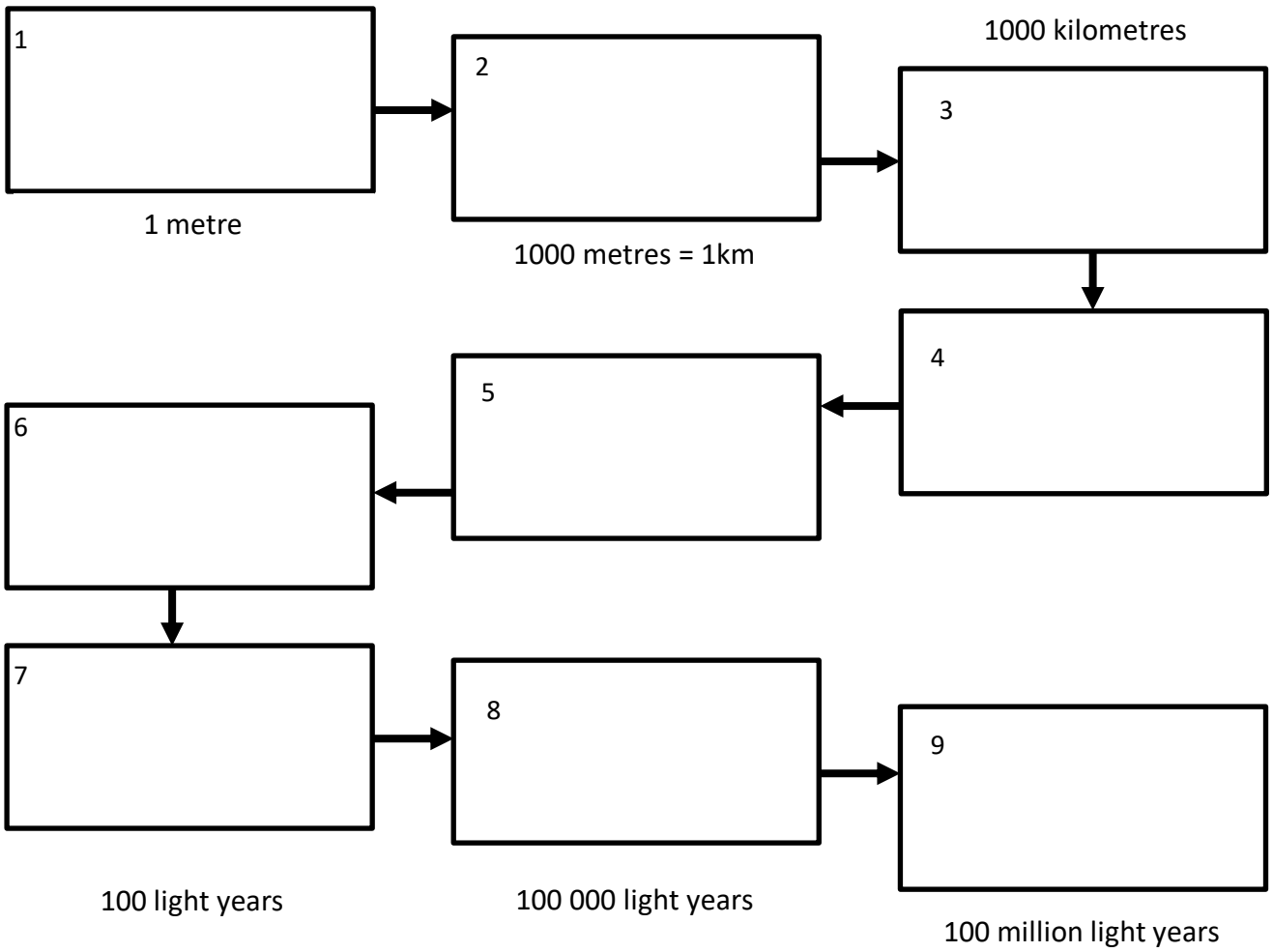
Astronomical Object	Description
	An object which orbits a star.
	A natural satellite which orbits a planet.
	A huge sphere of gas that emits light and heat.
	A star and the objects that orbit it.
	A planet outside our Solar System
	A huge collection of stars.
	Everything that exists including all matter and energy.

Planet	**Universe**	**Solar System**	**Star**
Moon	**Exoplanet**	**Galaxy**	

The Scale of the Universe

Object	Size	Fact
Moon		
Europa		
Earth		
Sun		
Sirius A		
Milky Way		

The Scale of the Universe



Challenge Activities

"Journey Through Space" Story

- Write a creative story or comic strip where you travel outward:
  Planet → Solar System → Milky Way → Universe.
- Include correct terminology and distances where possible.

Further Thinking Questions – Choose one.

- If the Earth were the size of a marble, how big would the Sun be? How far away? What size/distance would the other planets in the solar system be?
- Why do we say space is 'mostly empty'? What does that actually mean? What's in the space between?
- If galaxies are moving further apart, what does that tell us about the universe? Research evidence of the expanding universe and redshift.

Date: _____

Mass and Weight

Starter

Learning Intentions

- To describe what is meant by the terms ‘mass’ and ‘weight’.
- To investigate the relationship between mass and weight.
- To write a scientific report

Success Criteria

- ❑ I can explain the difference between mass and weight
- ❑ I can state how to measure mass and weight
- ❑ I can plan and carry out an investigation independently.

Mass

The mass of an object is a measure of the _____ in the object. It does not change if you move the object.

Mass is measured in _____ (kg) using a balance**.**

Weight

The weight of an object is a measure of the _____ exerted on the object due to _____.

Weight is measured in _____ (N) using a newton balance.

Date: _____

Calculating Weight

Starter

Learning Intentions

- To use the relationship W = mg.
- To learn that the force of gravity changes on different planets.

Success Criteria

- ❑ I can use the relationship W = mg to calculate weight.
- ❑ I can explain why weight changes on other planets.
- ❑ I can describe the effect gravitational field strength has on weight.

Mass and weight

	Unit	What does it measure?	Is it always the same?	What makes it change?
Mass				
Weight				

Calculating Weight

We can use the following relationship to calculate the weight of an object:

weight = mass x gravity

This can be written as:

W = m x g

The gravitational field strength on Earth is roughly 10 N/kg.

Name	Symbol	Unit	Unit symbol
Weight			
Mass			
Gravitational field strength			

Example of how to layout calculations:

What would be the weight of an 800 kg elephant?

W = ?
m = 800 kg
g = 10 N/kg

Identify what you know from the question and what you are being asked to find.
This can be written at the side or underlined in the question.

$W = m\ g$

Write out the equation (relationship)

$W = 800 \times 10$

Substitute in what you know

$W = 8000\ N$

Write the answer with units

Calculate the weight of the following in the space below:

SHOW ALL OF YOUR WORKING

1. A pupil whose mass is 35 kg
2. A car whose mass is 600 kg
3. A 5 kg bag of potatoes
4. A 0.5 kg bag of rice
5. A 0.1 kg bar of chocolate

Gravitational field strength

The gravitational field strength is different in space and on different planets.

1. What is the value of gravity on the Earth's Moon?

   _____

2. What happens to your weight when you travel from the Earth to the Moon?

   _____

3. What happens to your mass when you travel from the Earth to the Moon?

   _____

4. Astronauts walking on the Moon appear to "bounce" rather than walk.

   Explain why this is the case

	Gravitational field strength (N/kg)
Mercury	4
Venus	9
Earth	10
Mars	4
Jupiter	23
Saturn	9
Uranus	9
Neptune	11
Moon	1.6
Sun	270

5. Write a question for someone else to answer.

Practice Problems: Calculating Weight

weight = mass x gravity

W = m x g

1. On which planet is gravity strongest?

2. On which three other planets would your weight be similar to what it is on Earth?

3. Imagine you could travel to Mars. Your mass on Earth is 50 kg. State your mass Mars.

4. Calculate the weight of a 10 kg crate on Venus.

5. Calculate the weight of a 0.5 kg packet of cornflakes
   a. on Earth

   b. on the Moon

   c. in Space?

6. Explain why the Sun's gravitational field strength is much bigger than the gravitational field strength of a planet.

7. On which planet do you think you could jump the highest - Mars or Venus? Explain your answer.

8. A small tin of oil has a mass of 0.3 kg.
   a. Calculate the weight of the oil on Earth.

   b. What would be the mass of the tin of oil on Jupiter?

   c. Calculate the weight of the oil on Jupiter.

9. An object on the moon weighs 4.8 N. Calculate its mass.

10. An object on Venus weighs 27 N. Calculate its mass.

Date: _____

Friction

Starter

Learning Intentions

- To learn how friction affects the movement of objects and how it can be useful or a problem.

Success Criteria

- ❑ I can describe what friction is and when it occurs.
- ❑ I can identify everyday examples where friction is helpful (e.g. brakes, grip) or unhelpful (e.g. slowing things down).
- ❑ I can predict and explain how different surfaces affect the amount of friction.

What is friction?

🧠 Comprehension Questions

1. What is friction, and how does it affect moving objects?

_____

_____

2. Why is it easier to slide on ice than on a rough carpet?

_____

_____

3. Name one situation where friction is helpful and one where it's a problem?

_____

_____

What is friction?

Friction is a force between two or more objects. It happens when **t**wo objects are in _____ with each other.

Friction acts in the _____direction to movement.

A large frictional force causes an object to slow down more than a small frictional force.

Friction and Surfaces

Aim: *What are you trying to find out in your investigation?*

To investigate how different _____ affects the amount of _____ between surfaces.

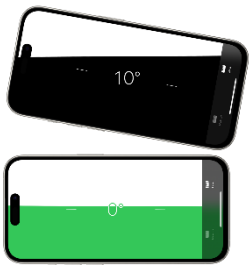
Hypothesis: *What do you think will happen?*

_____

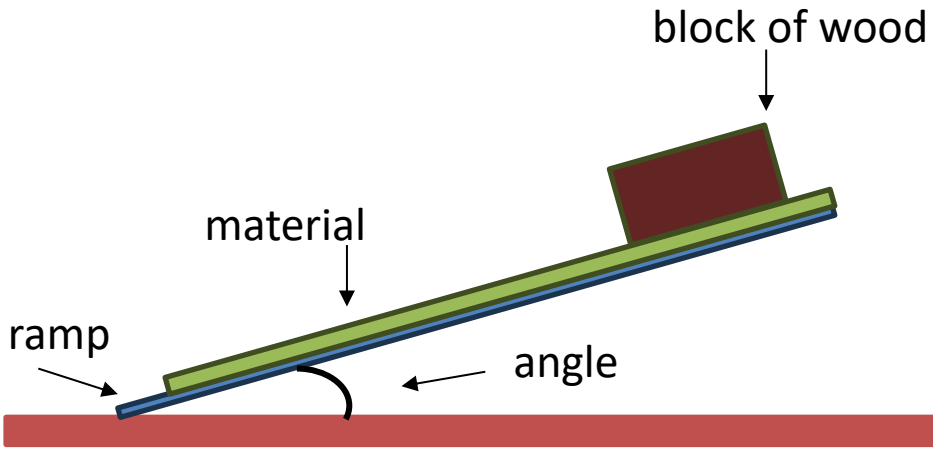
_____

_____

Method:



inclinometer



Variables: *To keep your experiment fair, everything should be kept the same except for the factor you are investigating. List the factors (variables) you will need to control throughout your experiment.*

Independent variable (what you change or control):

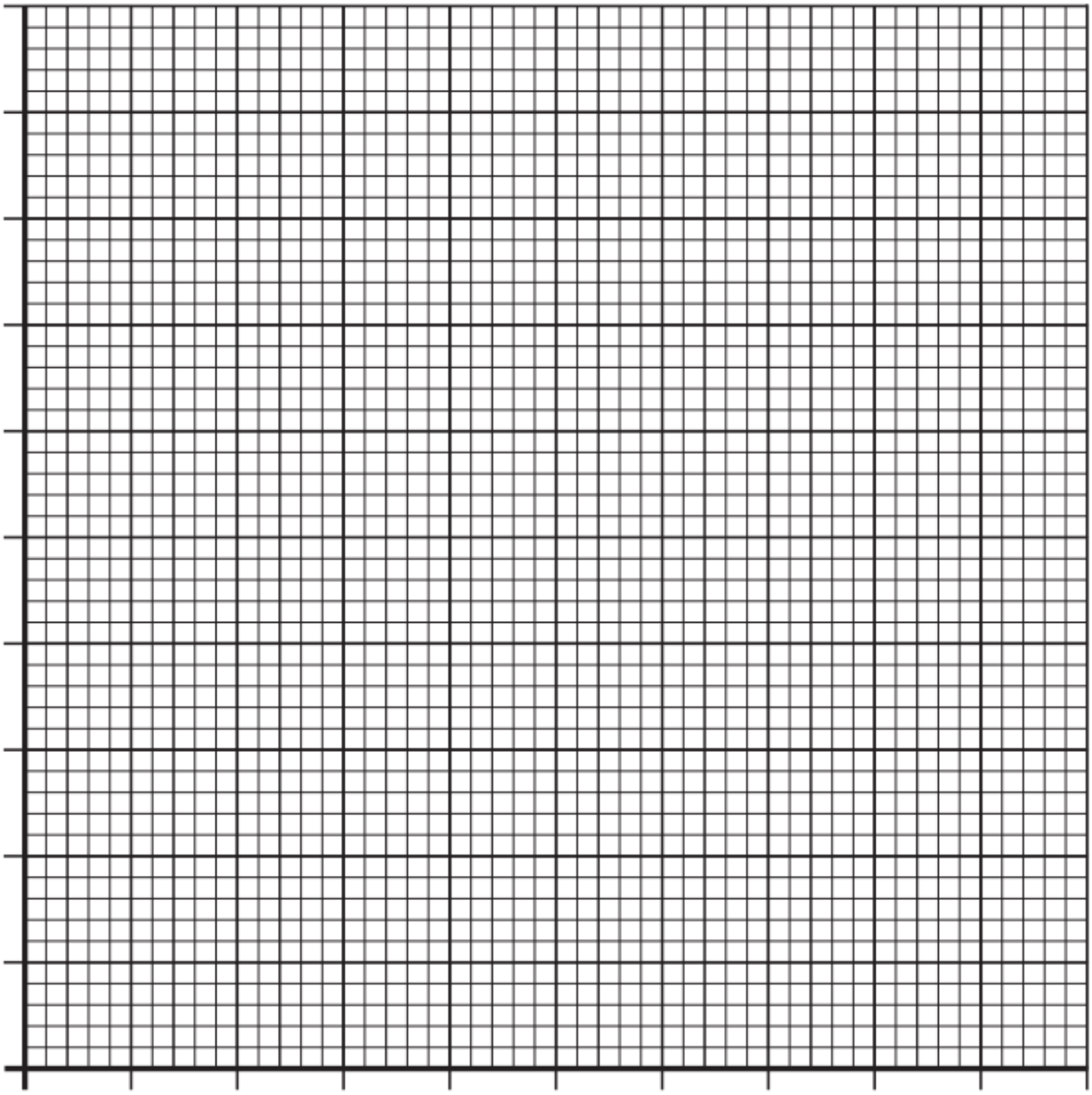
Dependent variable (what you measure):

Variable(s) to be kept constant (what you keep the same):

Results: *Record your observations/measurements in a table. Remember headings and units.*

Type of surface	**Angle of slope (°)**

Draw a bar graph using your data.



Conclusion: *What did you find out? This should answer your aim.*

_____

_____

_____

Evaluation: *You must identify and explain a factor in your experiment that had a significant effect on the reliability, accuracy or precision of your experiment.*

_____

_____

_____

_____

Summary: Friction and Surfaces

Smoother surfaces have _____ friction than rougher surfaces. Less force is needed to make the surfaces slide across each other.

Rougher surfaces have _____ friction than smoother surfaces. More force is needed to make the surfaces slide across each other.

Challenge Question

Is Friction being increased of decreased in these situations?

1. Car tyres on a wet road
2. Wearing rubber-soled shoes
3. Adding oil to a machine
4. Putting sand or grit on an icy path
5. Using brakes on a bicycle
6. Using smooth plastic on a slide

Challenge Question: Research Task

Think of real-life situations where people might want to increase friction (for more grip or control) or decrease friction (to make movement easier).

List at least three ways to increase friction and three ways to decrease friction.

☑ Ways to Increase Friction

1.

2.

3.

⬇ Ways to Decrease Friction

1.

2.

3.

Date: _____

Air Resistance and Drag

Starter

Learning Intentions

- I will learn what air resistance (drag) is and how it affects moving objects.
- I will explore how shape, surface area, and speed change the amount of air resistance.
- I will carry out an investigation to observe the effects of air resistance.

Success Criteria

- ❑ I can define air resistance as a force that slows objects moving through air.
- ❑ I can identify factors that increase or decrease air resistance (e.g. shape, size, speed).
- ❑ I can predict and explain the motion of falling objects with different surface areas.
- ❑ I can investigate how air resistance affects falling speed.

Air Resistance and Drag

Video facts

Air Resistance and Drag

Air resistance is a type of friction that happens when something moves through air. It pushes against the motion of the object, trying to _____.

_____ is another word for air resistance — they mean the same thing. However, drag can happen in _____.
The faster an object moves, the more air resistance it feels.

Investigating Drag

Aim: *What are you trying to find out in your investigation?*

_____

_____

_____

Hypothesis: *What do you think will happen?*

_____

_____

_____

Variables:

Independent variable (what you change or control):

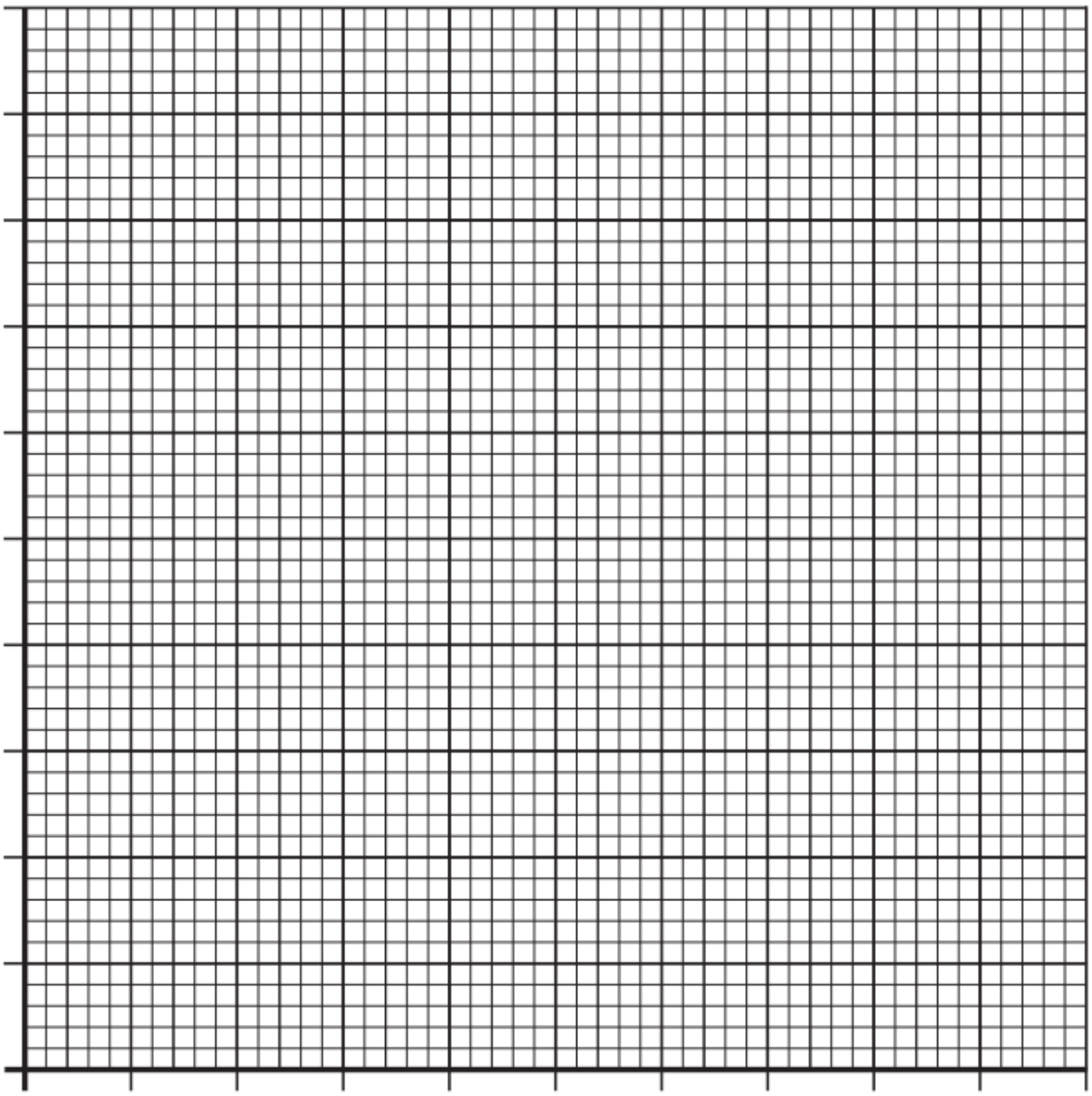
Dependent variable (what you measure):

Variable(s) to be kept constant (what you keep the same):

Method: *Describe how you will carry out your experiment. Include a labelled diagram.*

Results: *Record your observations/measurements in a table. Remember headings and units.*

Graph:



Conclusion: *What did you find out? This should your aim.*

_____

_____

_____

Evaluation: *You must identify and explain a factor in your experiment that had a significant effect on the reliability, accuracy or precision of your experiment.*

_____

_____

_____

_____

_____

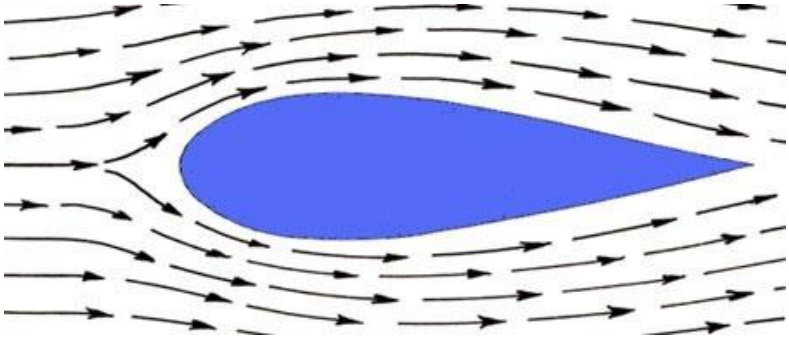
_____

Peer Feedback

WOW	
NOW	
HOW	

Streamlining

Streamlining means shaping an object to reduce air or water resistance (drag), helping it move faster.
Streamlined shapes face less friction, while wide or flat shapes (like parachutes) feel more drag and slow down.



Challenge Questions

1. What does it mean to streamline an object?

2. Why do streamlined objects move faster?

3. What is drag?

4. Which shape feels more drag: a smooth cone or a flat wide sheet?

5. Why does a parachute fall slowly?

6. How can we reduce drag on a moving object?

7. Give one example of a streamlined object in real life.

8. What forces slow an object down in air or water?

Date: _____

Space Observation and Exploration

Starter

Learning Intentions

- To state the methods used to observe and explore space.
- To describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.

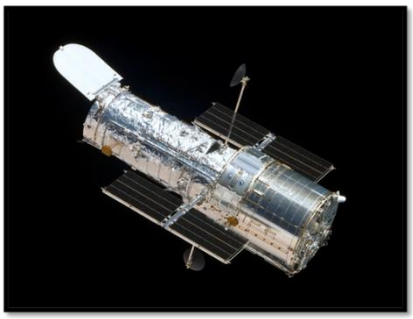
Success Criteria

- ❑ I can name different ways we observe space (e.g. telescopes, satellites).
- ❑ I can explain how space exploration has helped us understand Earth's weather, climate, or resources.

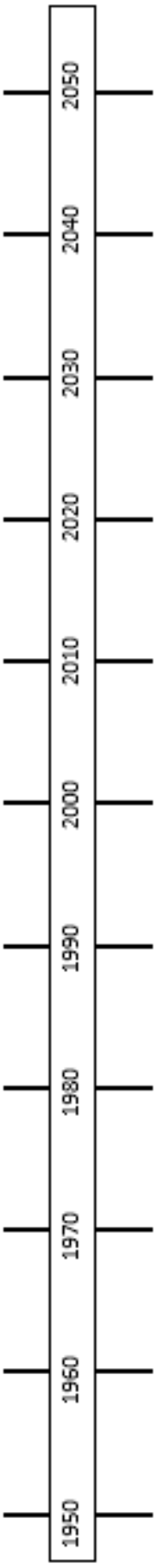
Space Observation and Exploration

Space can be explored through:

- _____ using telescopes on Earth and in space.
- _____.
- _____.



Space Exploration Timeline



Date: _____

Space Observation and Exploration (continued)

Starter

Learning Intentions

- To describe the impact that space observation and exploration has had on our understanding of the universe and planet Earth.
- To evaluate benefits and challenges of space travel.

Success Criteria

- ❑ I can name different ways we observe space (e.g. telescopes, satellites).
- ❑ I can explain how space exploration has helped us understand Earth's weather, climate, or resources.
- ❑ I can give an opinion on whether space travel is worth it, with a reason.

Challenge Question:

How has space travel improved life on Earth and changed our understanding of the universe?

Prompts to Guide Thinking:

- What everyday technologies have come from space travel?
- How has space exploration helped us understand Earth better (e.g. climate, weather)?
- What new discoveries have we made about space since the first missions?
- How has our view of the universe changed over time (e.g. from geocentric to Big Bang)?
- What have space telescopes and probes revealed about planets, stars, and galaxies?

Suggested sources:

ESA, NASA websites, BBC Bitesize, National Geographic Kids

Structure help:

Introduction: What is space travel?

Part 1: Benefits on Earth (tech, health, communication)

Part 2: Understanding of the universe (key discoveries)

Conclusion: Why this matters today

Space Probes Research - Extension

Choose one space probe. Carry out some basic research into your probe, answering at least the following:

- What is a space probe?
- What… did the probe look like?
- Who… sent it up?
- When… what date?
- Where… was it launched from?
- Why… was it sent up?
- Where … is your probe now?

Include some photographs to make your research look interesting!

List of space probes:

- Sputnik – there was more than one!
- Pioneer – there was more than one!
- Voyager - there was more than one!
- Mars Rover - there was more than one!
- Rosetta
- New Horizons
- Galileo

There are also space telescopes to go looking into space …

- Hubble Space Telescope
- Kepler Space Telescope
- James Webb Telescope

Date: _____

Introduction to AVU: Life Beyond Earth

Starter

Learning Intentions

- To produce reasoned arguments on the likelihood of life existing elsewhere in the universe.

Success Criteria

- ❑ I can explain what is required for life to survive on a planet.
- ❑ I can produce reasoned arguments on the likelihood of life existing elsewhere in the universe.

Life Beyond Earth

You will complete an Added Value Unit on Life Beyond Earth.

Use all the information in this section to explain, with reasons, whether you think there is life elsewhere. Think about the requirement for life, what is meant by life and the size of the Universe.

Question: "Is it likely that life exists elsewhere in the universe beyond Earth?"

Use the information and questions below to get started…

Humans often wonder if there is life in space.

Life does not mean human-like life. Bacteria and plants are also forms of life!
If there is life in other parts of the universe, it may not be of a similar form to life on Earth at all.

The requirements for life on Earth are:

- _____
  _____
- _____
- _____
- _____
  _____

Candidates for life in our solar system

There are very few places in the Solar System, other than on Earth, that life could have evolved and still be thriving today. A few possibilities are **Europa** (Jupiter's moon), **Titan** (Saturn's moon) and **Mars**.

Find out why these areas may support life.

There is no real evidence of life in our Solar System.

- Could there be life outside our solar system?
- Where could scientists look?

Exoplanets

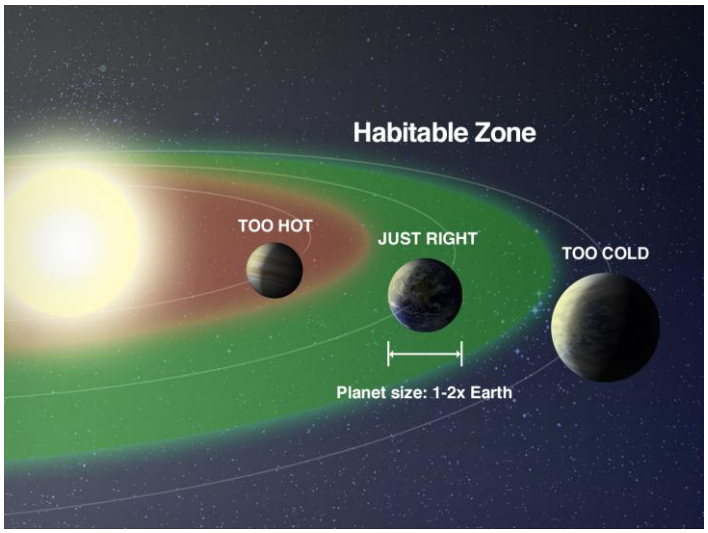
An exoplanet is a planet outside our solar system.

It is a planet which orbits a star other than our own Sun.

The Habitable Zone

The habitable zone (Goldilocks zone) is the name given to an area around a star which is ‘just right’ for life.

This area is not too hot or too cold for liquid water to exist on a planet.



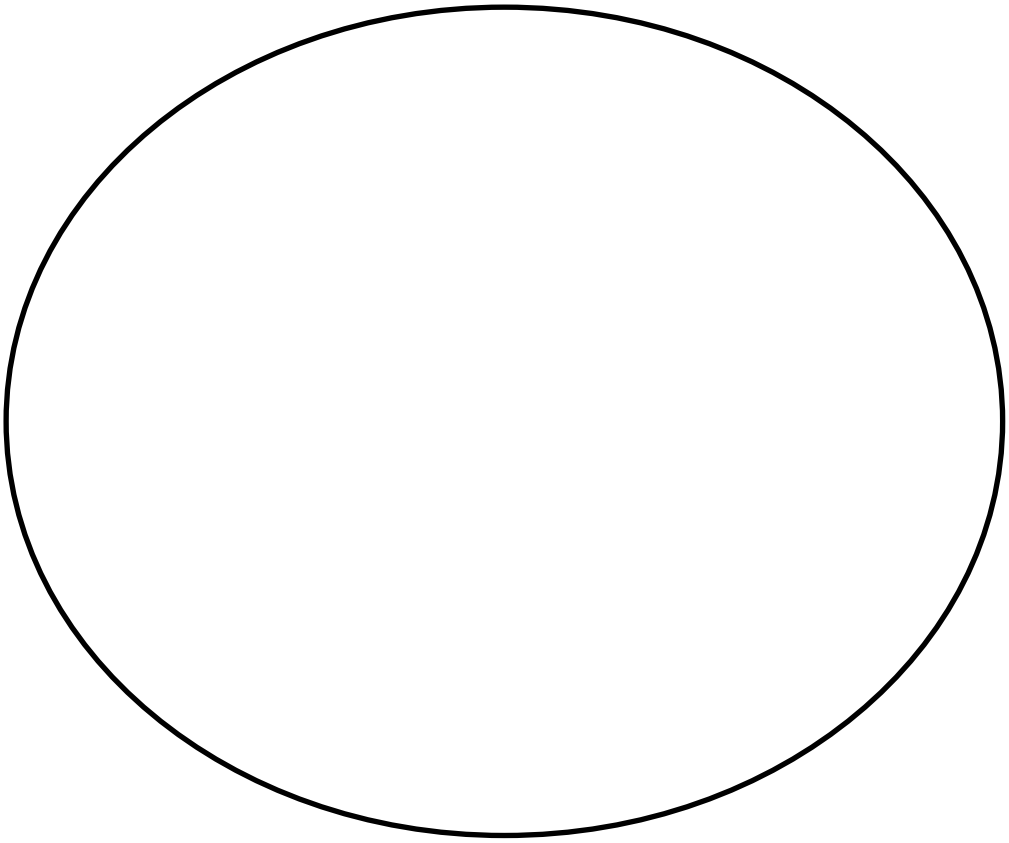
Finding Exoplanets

Exoplanets are very far away. They are also very small and faint compared to the stars that they orbit. This makes seeing them through a regular telescope difficult.

Detection Method	How it works
Direct imaging	Taking a picture of an exoplanet with a telescope
Wobble method	As the exoplanet orbits a star, the exoplanet’s gravity pulls on the star, making the star wobble.
Transit method	Astronomers detect very small changes in the brightness of stars as an exoplanet passes in front of a star and blocks out a little bit of the star's light.

A habitable exoplanet - what are we looking for?

The conditions for a habitable exoplanet are:



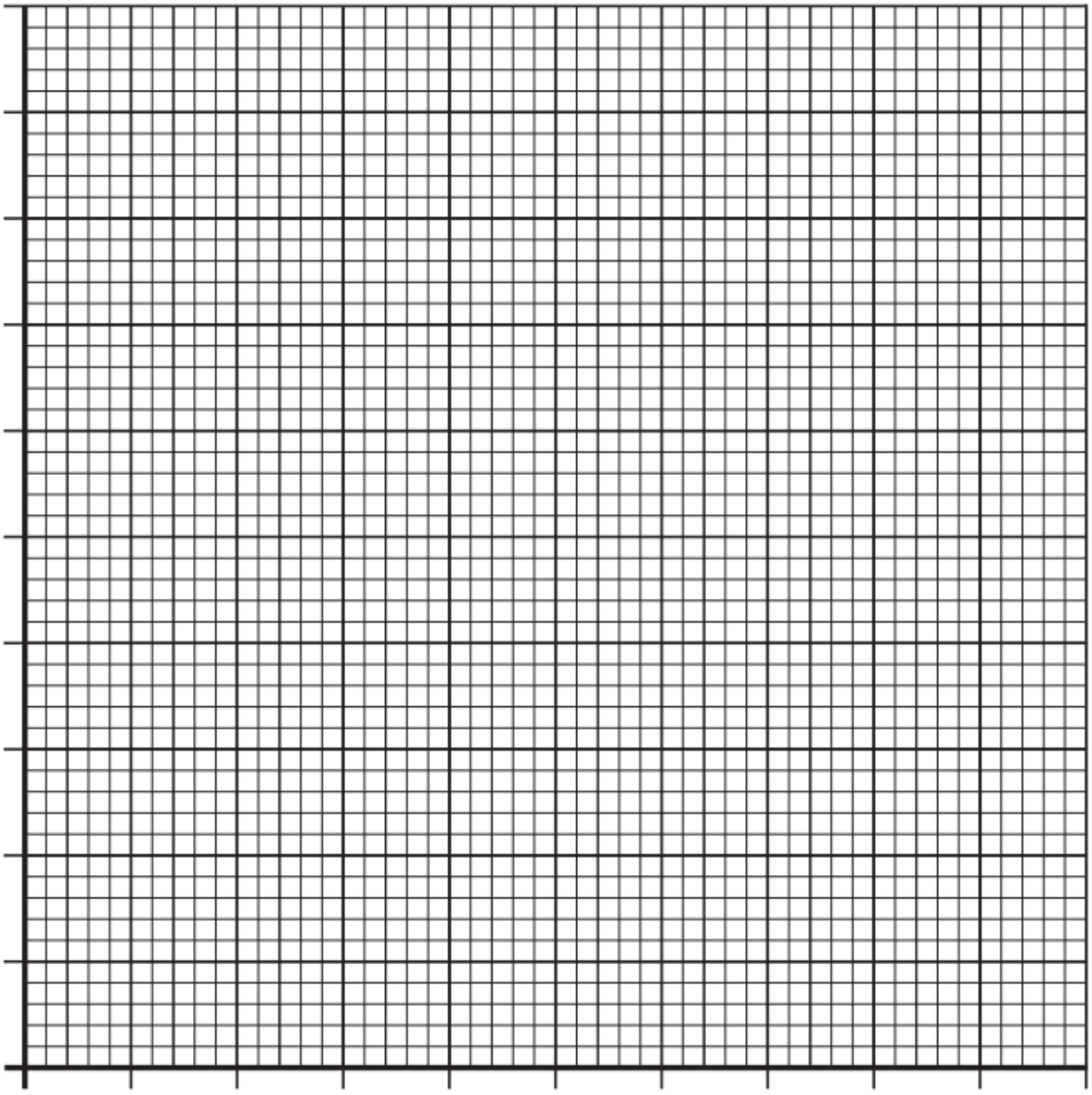
Life elsewhere in the Universe

Use all the information in this section to explain, with reasons, whether you think there is life elsewhere. Think about the requirement for life, what is meant by life and the size of the Universe**.**

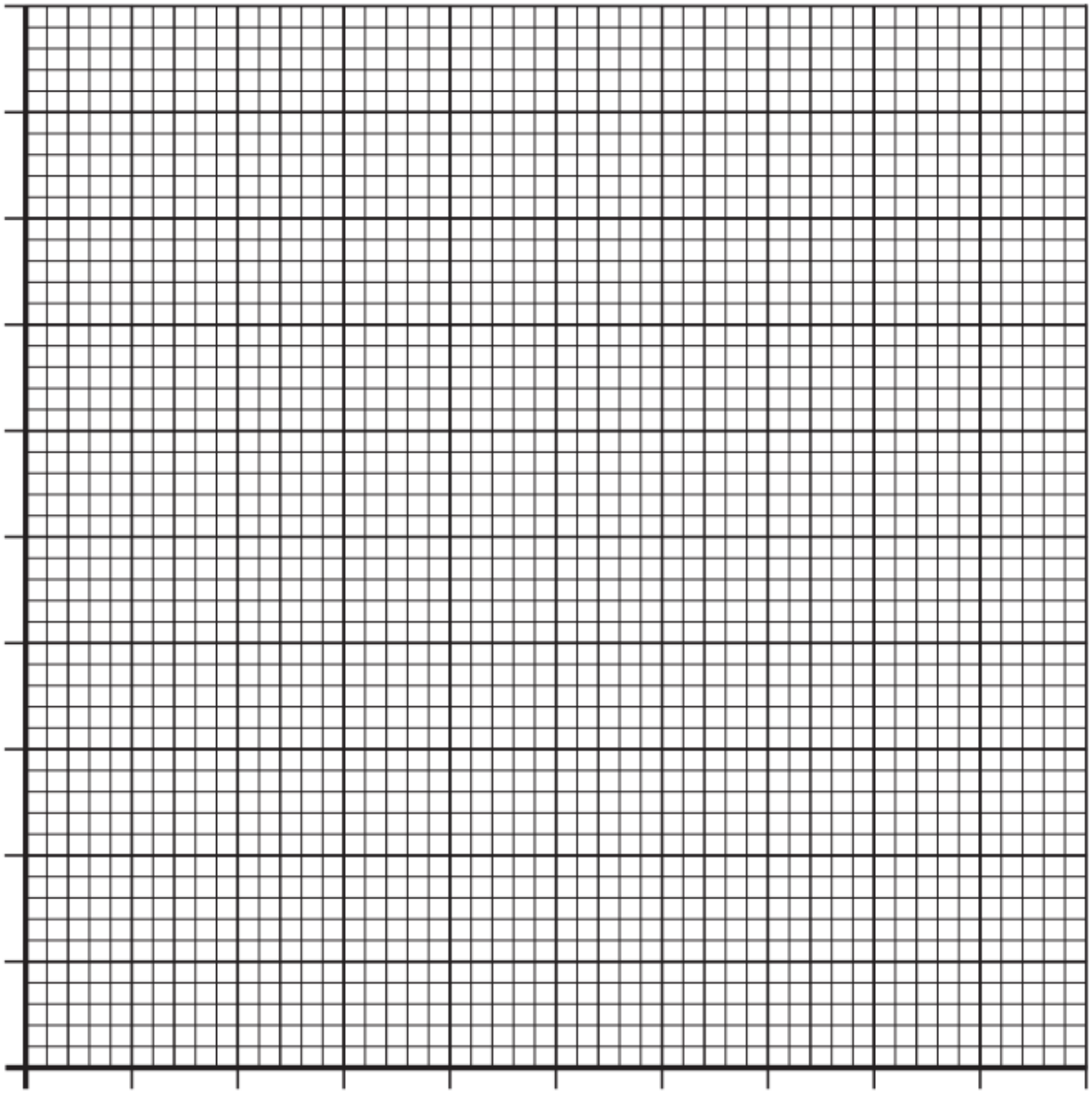
Different Exoplanets

Facts from the NASA Exoplanet series:

Additional graph paper:



Additional graph paper:



Extension Tasks

Word Search

SPACE 1

H	H	W	A	N	I	N	G	S	L	I	E	C	T
M	T	S	S	C	R	E	M	M	U	S	E	H	M
A	R	N	A	W	R	E	T	N	I	W	Q	I	W
U	A	P	O	L	L	O	A	C	E	I	U	T	A
T	E	C	R	A	T	E	R	T	Y	E	A	R	X
U	A	A	N	E	C	E	I	R	R	S	T	S	I
M	I	E	A	I	S	L	I	A	O	E	O	H	N
N	A	S	L	C	L	N	X	H	T	A	R	H	G
C	T	P	E	E	O	I	L	L	A	S	R	T	T
R	S	N	T	O	S	X	U	N	T	O	T	N	E
E	T	A	M	A	P	Y	A	D	E	N	C	O	I
O	S	A	E	G	N	I	R	P	S	S	O	M	R
G	I	B	B	O	U	S	O	O	M	S	T	I	I
I	T	E	A	N	U	S	G	S	N	I	G	H	T

SATELLITE
MONTH
DAY
SUN
AXIS
ECILPSE
SPRING
APOLLO
WAXING
SEASONS
NIGHT
YEAR
WINTER
ROTATE
AUTUMN
SUMMER
EARTH
WANING
MOON
EQUATOR
GIBBOUS
CRATER
CRESCENT

Play this puzzle online at : https://thewordsearch.com/puzzle/6240759/

Extension Tasks

Word Search

Forces

I	I	Y	F	R	I	C	T	I	O	N	T	T	A
I	N	R	A	I	N	S	W	G	A	R	D	G	K
T	R	R	K	T	E	A	O	R	D	B	O	R	I
E	E	C	E	O	W	T	E	M	A	S	S	A	L
C	I	E	T	U	T	F	A	S	A	N	C	V	O
N	T	E	L	R	O	E	O	P	A	C	D	I	G
A	A	R	N	A	N	S	N	R	R	N	T	T	R
T	O	W	I	M	S	E	R	I	C	N	B	Y	A
S	L	E	M	N	C	T	F	N	T	E	G	C	M
I	F	I	T	I	Y	A	I	G	S	I	S	E	S
S	G	G	C	O	N	T	A	C	T	C	N	T	R
E	B	H	T	U	N	B	A	L	A	N	C	E	D
R	D	T	S	S	I	N	K	Y	A	U	N	N	A
S	D	E	N	S	I	T	Y	R	I	R	O	R	N

GRAVITY
NEWTONS
MASS
FLOAT
UNBALANCED
FRICTION
DENSITY
FORCES
ELASTIC
SINK
CONTACT
KILOGRAMS
RESISTANCE
SPRING
DRAG
WEIGHT

The Moon Landing Quiz

1. What was the name of the first moon landing mission?

   _____

2. What date was the first moon landing?

   _____

3. How did the astronauts train for the mission?

   _____

4. How long was the journey from Earth to the moon?

   _____

5. Name the command module.

   _____

6. Which astronauts were on the lunar module?

   _____

7. What was the name of the landing site on the moon?

   _____

8. If an astronaut and their space suit weigh 383lbs what would their weight be on the moon?

   _____

9. What did the astronauts do on the moon?

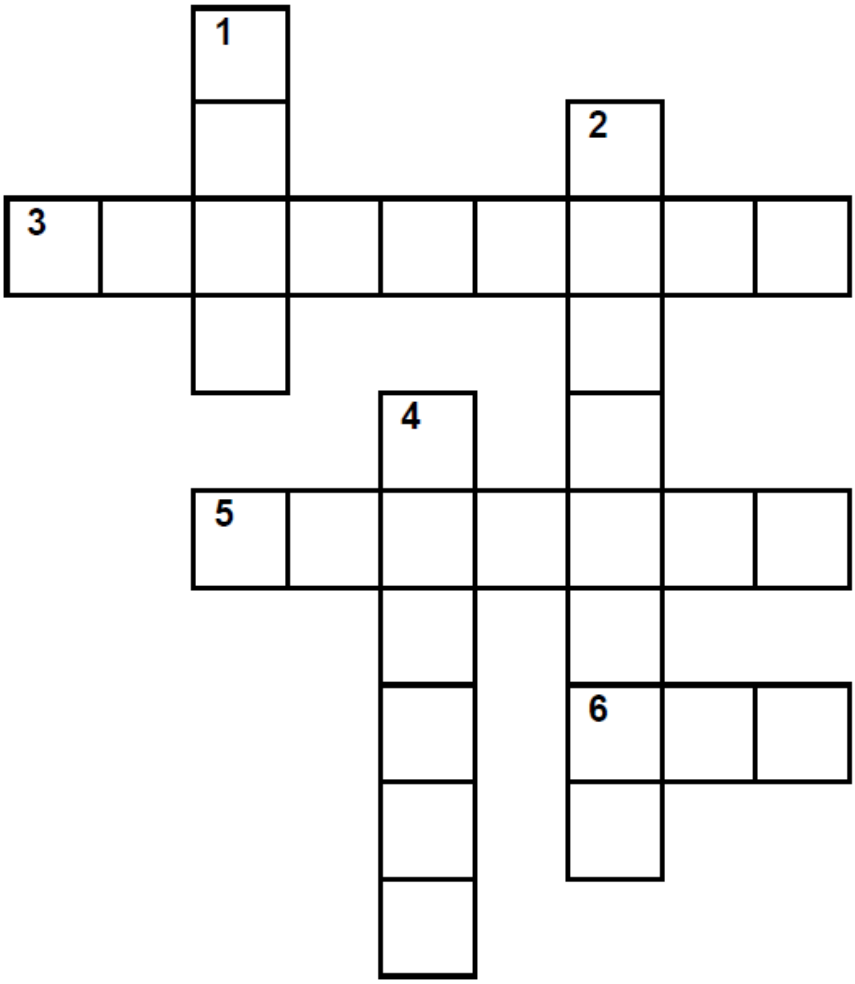
   _____

   _____

10. What date did they return to Earth?

    _____

Crossword



Clues Across

3. A planet outside our solar system.
5. These orbit a star.
6. The star in our solar system.

Clues Down

1. A natural satellite.
2. All the space we can observe.
4. Our one is called the Milky Way.

Draw a comic strip on one of the topics. Ask your teacher for ideas.

.

Extra Questions

1. What is a force, and how can it affect an object's motion?

_____

_____

2. What is the difference between balanced and unbalanced forces?

_____

_____

3. Can an object be in motion if the forces acting on it are balanced? Explain your answer.

_____

_____

4. What is friction, and how does it affect the movement of objects?

_____

_____

5. How does the surface type influence the amount of friction between two objects?

_____

_____

6. What are two ways to reduce friction between two surfaces?

_____

_____

7. What is air resistance, and how does it affect objects moving through the air?

_____

_____

8. How does an object's shape and speed influence the amount of air resistance it experiences?

_____

_____

9. Explain how a parachute uses air resistance to slow down a person's descent.

_____

_____

10. What is gravity, and how does it affect objects on Earth?

_____

_____

11. How does gravity influence the weight of an object?

_____

_____

12. What would happen if there were no friction or air resistance acting on a moving object?

_____

_____

13. Why do objects fall at the same rate due to gravity, regardless of their mass, in the absence of air resistance?

_____

_____

14. How do balanced and unbalanced forces play a role in everyday activities, such as walking or riding a bike

_____

_____