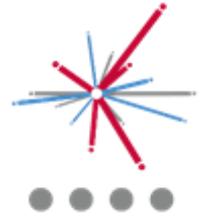# Ark Pioneer learning at Home
Core Curriculum
Science – *with Additional Support*

Work to be completed
- Day 1- Variables and apparatus questions
- Day 2- Variables and data analysis questions
- Day 3- Make predictions and collect your own data
- Day 4- Analyse your own data
- Day 5 **Optional Stretch Activity**- linked to the work set on days 3&4

Resources / links to help with work:

https://www.bbc.co.uk/bitesize/guides/zh94y9q/revision/1
https://www.bbc.co.uk/bitesize/topics/zxjj6sg/articles/z2qqj6f

How will this work be checked?
Each week you will be given 'red pen work' to carry out corrections on the learning that you are doing at home. Please make sure this work is done and that you correct all work in your exercise book.
You must also complete the weekly quiz for your core curriculum subjects online and the link to those is on our school website in the 'quizzes' drop-down option from 'Home Learning'.

How much time should I be studying and what happens if I don't finish all my work?
For core curriculum subjects you are expected to do 30min each day as a minimum. Those subjects are English language, English literature, Maths, Science, History and Geography. These subjects all have a weekly quiz and will be checked in on by your form teacher when they call each week.

All other subjects are 'Extended Curriculum' and they should be done after you have finished the Core Curriculum tasks for the day. You should plan to do work in different subjects each day. We recommend that pupils do one hour per week in each of the 'extended curriculum' subjects.
We recognise that it is not possible for all pupils to complete all work given the exceptional circumstance. Please speak with your form tutor about the work if it is becoming unmanageable.

Aim high   Have integrity   Be kind   Model determination

This week's science booklet focuses on **investigative skills** *(skills used when doing and analysing experiments).*

Investigative skills are **linked to lots of different science topics** rather than one specific unit.

You will practice identifying variables and analysing different sets of data.

To help you some key words and pieces of apparatus have been included below:

| Independent Variable	The factor that you change during an investigation.
Dependent Variable	The factor that you measure in an investigation to get a result.
Control Variables	The factors that are kept the same so that only the independent variable affects the dependent variable (to keep it a fair test).
Trends in data	The relationship between the independent variable and dependent variable- as the independent variable changes what happens to the dependent variable? Eg as **temperature increases** sugar dissolves in water **faster.**
Appropriate apparatus	The piece of equipment which is most suited to the job you want to do. For example a small 10ml measuring cylinder is more appropriate than a 100ml beaker for measuring out 6ml of water, the most appropriate piece of apparatus will allow you to do the job more accurately.
Conclusion	Describing what the data shows, this could then be linked to any hypothesis or prediction that was made before the experiment started.

Apparatus	Photo	Description and function
Beaker		A glass container with a pouring lip. Used to hold, mix or heat substances.
Balance		Scales used to measure mass.
Measuring cylinder		A cylindrical container used to measure the volume of liquid.
Test tube		A thin, cylindrical container, usually made of glass. Used to hold chemical and biological substances.
Thermometer		A device that measures temperature.
Funnel		A tube that is wide at one end and narrow at the other. Used to move liquids or particles through a narrow opening.
Bunsen burner		A device used to heat things
Timer / stopwatch		Used to measure the duration of an event. Usually hand-held and operated by buttons.

https://www.bbc.co.uk/bitesize/guides/zh94y9q/revision/1 is a link to BBC bitesize where they talk about planning science investigations.

Day One
Answer the following questions in your workbook in full sentences.

Q1. The diagram below shows six pieces of equipment.
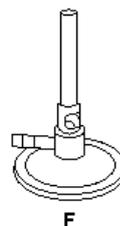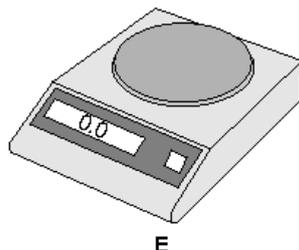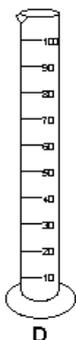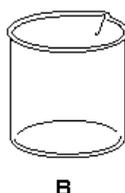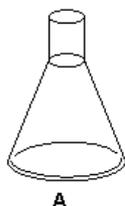
(a)   Linda investigates **how quickly sugar dissolves in water.**

    (i)   Which piece of equipment should she use to **weigh** 5 g of sugar?

    (ii)   What is the name of this piece of equipment?

(b)   Linda **heats the water in a beaker**.

    (i)   Which piece of equipment shown is a beaker?

    (ii)   Which piece of equipment shown is used to heat water?

    (iii)   What is the name of this piece of equipment?

(c)   Linda adds **5 g of sugar to the hot water**.

    (i)   She measures the time it takes for the sugar to dissolve. *The equipment used for timing is **not** shown in the diagram*. **What piece of equipment is used to measure the time taken?**

Q2. Two pupils investigated the effect of temperature on how fast oil flows through a funnel. They used the equipment in the photograph below.

(a)   They measured the time taken for all the oil to flow through the funnel.

What equipment did they use to measure the time?

(b)   Complete the table below to show what they should do with each factor in their investigation. Tick **one** box for each factor.
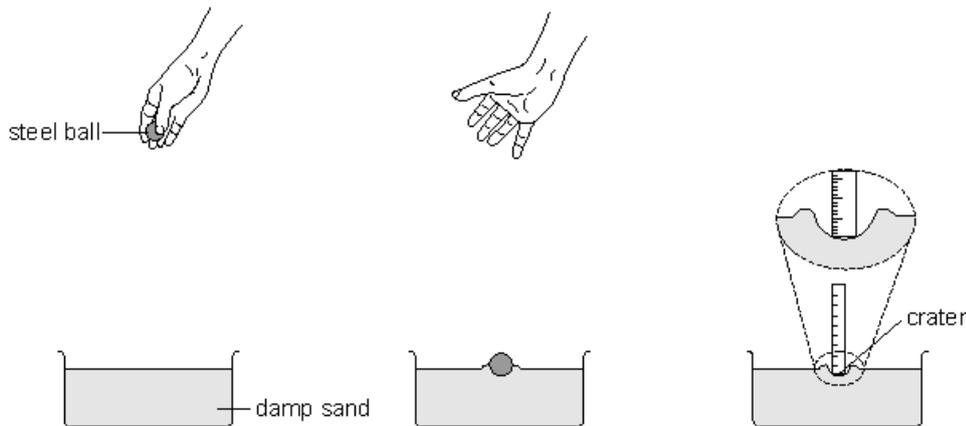
One has been done for you

Factor	Change It	Keep It The Same	Measure It
temperature of the oil			
type of oil			
volume of oil		✓	
time taken for all the oil to flow through the funnel			

Answer the following questions in your workbook in full sentences.

Q1. Jack and Aneesa dropped a steel ball into trays of damp sand. They measured the depth of the craters made by the steel ball.

not to scale

Their results are shown in the table below.

height the ball was dropped from (cm)	depth of crater (cm)		
	Jack's results		Aneesa's results
10	1.1	1.2	0.8
20	1.4	1.5	1.4
30	1.6	1.6	1.5
40	1.8	1.7	1.8
50	2.0	2.1	2.1

(a)   Use information in the table to answer the questions below.

What was the **independent variable** that Jack and Aneesa changed in their investigation?

The independent variable Jack and Aneesa changed was…

(b)   Look at the results in the table. **What is the relationship between the height the ball was dropped from and the depth of the crater?**

The _____ the height, the _____ the crater.

> Key vocab you may use in this answer:
> *greater*
> *lesser*
> *deeper*

(c)   Aneesa said that they made sure the investigation was fair. Suggest **one** variable they must have kept the same to make their investigation fair.

One variable Jack and Aneesa had to keep the same to make sure their investigation was far was the…

Q2. Neera and Tom dissolved different masses of salt in 500 cm³ of water. They measured the temperature at which each salt solution boiled.
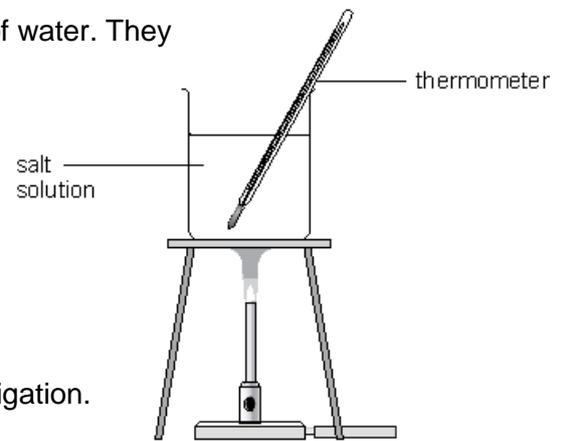
(a)   They wrote down the variables that might affect the investigation.

temperature of the laboratory	mass of salt dissolved in water	starting temperature of the water
boiling point of salt solution	volume of water	type of salt used

(i)   What is the **independent variable** (the variable they changed) in their investigation?

(ii)   What is the **dependent variable** (the variable they measured) in their investigation?

(iii)   Which variable above would affect the experiment **the least?**

Day Three

Make some predictions

Do you think there is any connection between a person's eye colour and their height? What about a connection between someone's height and their arm span?

Write a prediction for these two questions, after this you will collect the data to test your predictions.

*I think that there **is / is no** connection between eye colour and height…....*

I think that the taller someone is…...
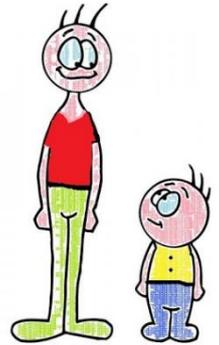
Collect some data of your own.

Copy the table below and collect the required data for **at least 5 people (you can include yourself) the more people you collect data from the better**.

These can be people that live in your house, friends that can tell you the information over the phone or a combination of both.

You can choose to measure the height and arm span in centimetres (as in the example), metres or feet and inches.
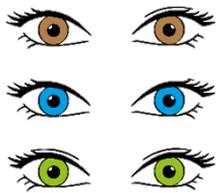
Just make sure that the unit you use is **consistent for everyone that you measure** (eg if you measure the first person's height in metres you should measure everyone's height in metres).

Name	Eye Colour	Height	Arm Span
Example *Miss Pick*	*Blue*	*182cm*	*185cm*

Day Four

Analyse your collected data- answer the following questions in your work book in full sentences.

1. Do your results show any link between a person's eye colour and height?

   *My results show there **is / is no** link between….*

2. Why do you think this is?

   I think this is because…

3. Why is it important that you measured everyone's height and arm span using the same unit each time?

   It was important I measured everyone's height and arm span using the same unit so…

4. What piece of equipment did you use to measure the height and arm span? Do you think this was the appropriate piece of apparatus that could have been used? Why / why not?
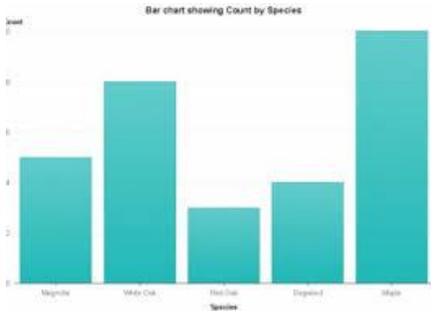
   I used a _____ to measure the height and arm span. I think / do not think this was the most appropriate piece of apparatus to use because…
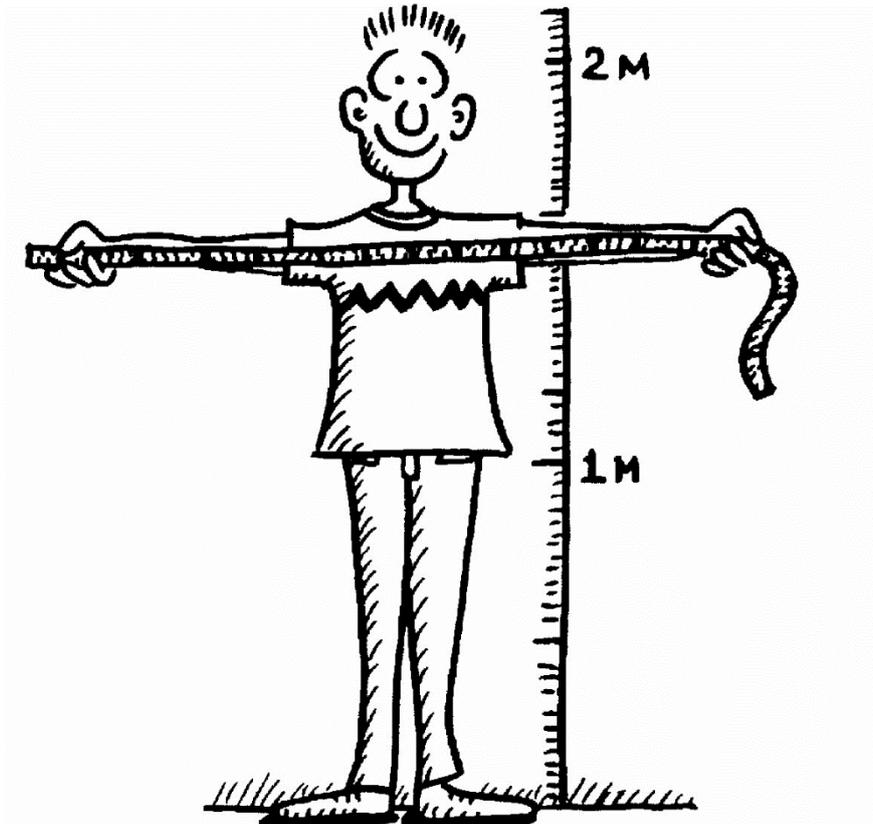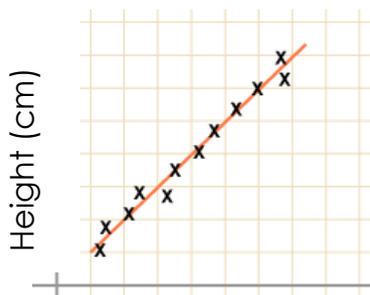
You could draw some graphs to represent your data, I would suggest:

- A **bar graph** to show people's height, arm span or the number of people with each eye colour.

This is what a **bar graph** should look like, remember to label your axis

- A **line graph** to show the relationship between height and arm span.

Line graphs look like this, remember to plot the points with a pencil cross and label your axis with units. You can draw a line of best fit which is one straight line that goes though the majority of the points to show the trend of the data.
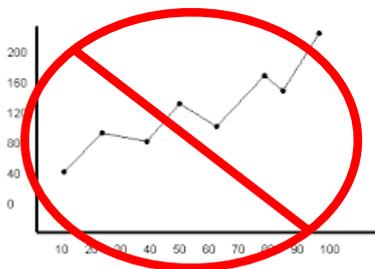
DO NOT CONNECT ALL YOUR POINTS!

Mark Schemes

Day One

Q1.

(a) (i) • E ✓

   Balance

(b) (i) • B ✓

   (ii) • F ✓

   Bunsen burner

(c) (i) • stop watch **or** stop clock

   *accept 'watch' **or** 'clock'*
   'timer' is insufficient

   (ii) • thermometer

   accept 'temperature sensor'
   'sensor' is insufficient

Q2.

(a) any **one** from

   • stopclock

   'clock' is insufficient

   • stopwatch

   'watch' is insufficient
   accept 'timer'

(b)

factor	change it	keep it the same	measure it
temperature of the oil	✓		
type of oil		✓	
volume of oil		✓	
time taken for all the oil to flow through the funnel			✓

Q1.

(a) • the height the ball was dropped from

     accept 'height'

     *do **not** accept 'depth'*

     accept 'height in cm'

     'cm' is insufficient

(b) • the greater the height, the deeper the crater

     accept the converse

     accept 'there is a positive correlation (between the variables)'

     accept 'bigger' for 'deeper' only when it refers to the crater size

     a comparative answer is required for the mark

     'when the ball was dropped from a high height, a larger crater formed' is insufficient

     'the bigger, the deeper' is insufficient as 'bigger' is ambiguous

(c) any **one** from

  • (use the same) ball

     *accept 'the size **or** mass **or** weight **or** volume **or** material of the ball'*

     *do **not** accept 'density of ball'*

  • depth of sand

     *accept 'same amount of sand' **or** 'the (same) sand'*

  • the conditions of the sand

     *accept 'how damp the sand was' **or** 'the type of sand'*

     accept 'how flat the sand surface is'

     'the sand tray' is insufficient

  • where **or** how the depth is measured

     accept 'keep the ruler in the same position'

     'use the same ruler' is insufficient

  • the way the ball is released

     accept 'release the ball with the same force'

     'same person' is insufficient

(d) (i) • there is less disturbance to the sand

     accept 'he might push the ball further in'

     accept 'your finger could push it further in, but the magnet lifts it'

     'it would be more accurate' is insufficient

     accept 'it lifts the ball out cleanly'

     'it lifts the ball out' is insufficient

  (ii) any **one** from

   • less chance of human error

     accept 'the ball would fall the same way each time'

*do **not** accept 'there is less chance of something going wrong'*

- the electromagnet would drop it cleanly
    accept 'the ball would not be dropped differently'
    'it lands in the same place' is insufficient
    accept 'it drops at the same angle'
    'it is easier to adjust height' is insufficient
    accept 'the ball would be released from the same height each time'

- the height would be more accurate
    'it is more accurate' is insufficient
    'so it is a fair test' is insufficient
    accept 'they could push the ball (slightly) if they use their hands'
    *do **not** accept 'he can change the force of the electromagnet'*
    'it stays steady' is insufficient

Q2.

(a) (i) • mass of salt dissolved in water
    *accept 'the mass **or** amount of salt'*
    'salt' is insufficient
    *do **not** accept 'the type of salt used'*

(ii) • boiling point of salt solution
    accept 'boiling point'

(iii) any **one** from

- starting temperature of the water

- temperature of the laboratory
    'temperature' is insufficient