Spirit of Innovation STEAM Resources

Maths

Year Six

Number & Measure

The Cost of Speed

Links

Number – number and place value

- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Solve number problems and practical problems that involve all of the above

Measurement

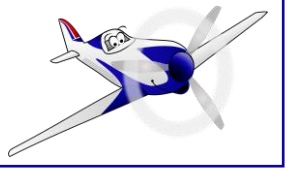
- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places
- Convert between miles and kilometres
- Recognise that shapes with the same areas can have different perimeters and vice versa
- Recognise when it is possible to use formulae for area and volume of shapes
- Calculate the area of parallelograms and triangles
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3]

Geometry – properties of shapes

- Draw 2-d shapes using given dimensions and angles
- Recognise, describe and build simple 3-d shapes, including making nets
- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Resources

- Paper plane instructions (Download)
- A4 thick paper
- Many coins (10p, 5p, 2p 1p) (cargo)
- Rulers
- Pencils
- Markers
- Sticky tape
- Weighing scales
- Masking tape
- Tape measure/metre sticks
- Clipboard
- Chalk
- Result sheet (Download)
- On paper or electrical device
- Top 10 distance travelled sheet (Download)
- Top 10 value of cargo carried sheet (Download)
- Weighing Scales
- A4 – 4 quadrant graph paper



Geometry – position and direction

- Describe positions on the full coordinate grid (all four quadrants)
- Draw and translate simple shapes on the coordinate plane and reflect them in the axes

Statistics

- Interpret and construct pie charts and line graphs and use these to solve problems
- Calculate and interpret the mean as an average

Skills

- Follow instructions
- Accurate measuring
- Distributing weight evenly
- Reading and recording numbers
- Identifying the furthest/nearest measurement
- Compare distances & weight
- Understand the reasons for a fair test
- Create a fair test
- Discuss findings using vocabulary such as; heavy, light, bigger, smaller, more, less, furthest, most coins, higher value

Questions

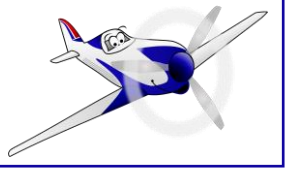
- How are you going make your plane? (Online/template/instructions/previous knowledge)
- If you want a plane to fly a long way, what do you need to consider?
- How will you distribute the cargo? (coins)
- Will you use more low value coins or less higher value coins?
- How will we make it fair?
- How will we know how far each plane has gone?
- What will we use to measure?
- Which units allow for the greatest accuracy? Why?
- (centimetres, millimetres, metres)
- How will we record the results?
- How will we identify whose plane went the furthest?
- How will we know whose travelled the furthest with the most cargo?

Activity

Activity One
Whole Class/Individual/Pairs
(40 - 60 mins)
Additional space required outside area/hall

Introduce the topic of air speed records to the pupils, inform them that there is a link between weight and speed. In an air speed record attempt, the aim is to make an extremely light aircraft. However, strong and light materials often cost more money so budget is also a contributing factor. The objective of this activity is to design and make a paper plane that will carry cargo (coins) The plane that travels the furthest and carries the most value in cargo wins *(*the prize could be the coins attached their plane!)*

Explain that there will be a 'test flight' to see which one(s) goes the furthest. Request that they need to design and make their planes using one piece of thick A4 paper. These planes can be made by individuals or as pairs; using online research, a template, instructions or from prior knowledge of paper planes. It is up to the designers where they attach their cargo and how much cargo they are going to carry. All pupils will need to remember to add their name to their plane, in order to identify them.



Bring the class together before the 'test flight' to discuss how to make it a fair test. For example: mark out a place where everyone throws from, decide if planes are going to be thrown one at a time, how many throws per plane etc.
Mark out the 'flight path' with a throwing line and then run a tape measure, or some metre sticks, along the edge of the flight path.

Once a plane is thrown, mark the ground with chalk, or masking tape if inside, with the name of the thrower. Record the distance on the result sheet (Download) (Hint: *If recording results on paper, and throwing more than once, add the pupil's names before printing the required number of copies.*)

Once all test flights have been taken, record the distance travelled, plus the value of the cargo carried. Record the top 10 planes for both furthest distance and highest value of cargo (Downloads) This data should provide the overall winner(s)

The winning plane is the one that flew the furthest with the highest value of cargo; so will appear high up on both Top 10 lists.

As a class, reflect on the most successful planes. Discuss 'why' they think these designs travelled the furthest as well as carrying the most cargo. Maybe compare it to others that were not so successful.

Extension:
Repeat Activity One using their knowledge gained in round one.
Compare the data from plane one and plane two.
Did the improvements to the design reflect in the distance travelled?
If so:
How much further did it travel? How much cargo was it carrying?
Suggest what improvements lead to plane two's success?
If not:
Why not?
What improvements do you think your plane still needs to go further?

Activity

Activity Two
Individual
(40 - 60 mins)
Additional space required outside area/hall

Using the class' plane that flew the furthest and held the most cargo, plot the design onto A4 4-quadrant graph paper.

Record each coordinate clearly so others could replicate the plane design. Once the plane has been plotted add the centre coordinates of the cargo being carried, including the value (1p, 2p etc)

Once everyone has plotted the coordinates and created their plane. Test each plane to see if the distance travelled is similar.

If all planes are made to the same pattern, they will all travel the same distance; discuss and test this statement.