**MAKE A BOLT FOR IT!**

**Description:**

Pupils will take measurements and collect data to discover relationships between size and speed.

**Outcomes:**

- **MNU2-20b:** Working with others I have used different methods to investigate, survey and collate information and communicate this to others appropriately.
- **MNU 2-10b:** Carry out investigational tasks timing events with correct units.

**What you need from your Maths Week box:**

- Playground or field.
- Measuring tapes.
- Stop watches.
- Whiteboards and pens.

**Instructions:**

- In groups of 3, ideally pupils of different heights, measure pupil height and record it in the mini-whiteboard table.
- Tip: To reduce time working in close proximity, use chalk to mark height on the wall or lying on the floor, and then measure it after the pupil steps away.
- Measure the natural stride length of each member of the group (heel to heel). Record results in the table.
- Measure the size of your shoe in centimetres. Record this in the table.
- Each group should time each of their teammates running as fast as they can over a set distance, using the stopwatch to record how long it took.

**Discussion (prior to collecting data):**

- Is there a relationship between shoe size and speed, stride length and speed, or height and speed?
- Can pupils predict who will be the fastest? Is that pupil the tallest, or not?

**Graphs, Glorious Graphs:**

- What kind of graph is used to evaluate whether two data sets have a relationship? [A scattergraph]
- Is it possible to show all of the data from their table on one graph? [Yes]
- How can they make the different data sets clear? [Use symbols and colour]
- What will the y axis show? [Time in seconds]
- What will the x axis show? [distance in cm]
- What scale can be used to fit all of the data onto one graph?

**Once the data has been collected, discuss these questions in groups:**

- Is there a relationship between height and speed?
- Is there a relationship between stride length and speed?
- Is there a relationship between shoe size and speed?

**Class discussion:**

- Do we think that the tallest person is always the fastest?
- What can we do to improve our running performance today?
- What can we do to improve our running performance over time?

If you have time, groups can try to improve on their times, recording and comparing subsequent results. Do they always get faster? If not, why not.

**Progression**

- In the classroom, make a table which includes all the data gathered by the whole class.
- Redraw the graph.
- Does having more data help when trying to answer the questions?
- Watch a video of a top athlete Usain Bolt running 100m or Jessica Enness-Hill winning the 800m at the 2012 Olympics.
- Are they the tallest in their race? Do we think they have the longest stride or largest feet?

**Number crunching:**

- What is the ratio of shoe size to stride length?
- Does it vary from pupil to pupil?
HOPSCOTCH MUDDLE

**Description:**
Pupils will play Hopscotch to gather data, using the stopwatch to record the time taken for different scenarios.

**Outcomes:**

- **MNU 2–10b:** I can carry out practical tasks and investigations involving timed events and can explain which unit of time would be most appropriate to use.
- **MNU 2–01a:** I can use my knowledge of rounding to routinely estimate the answer to a problem, then, after calculating, decide if my answer is reasonable, sharing my solution with others.

**What you need from your Maths Week box:**
- Chalk.
- Whiteboard table.
- Stopwatch.
- Each pupil should find their own ‘marker’ outside such as a small stick, a stone, a conker, pinecone or a shell.

**Instructions:**
- In groups of 4, mark up a traditional hopscotch grid with chalk.
- In teams, take turns at placing a marker and hopping, whilst teammates record the time taken.

**Traditional hopscotch game rules:**
- The first player stands behind the starting line to toss his or her marker into square one.
- Hop over square one to square two and then continue hopping to square eight, turn around, and hop back again.
- Pause in square two to pick up the marker, hop into square one, and then back over the starting line.
- Continue by tossing the stone into square two.
- All hopping is done on one foot unless the hopscotch design is such that two squares are side-by-side.
- Then two feet can be placed down with one in each square.
- A player must always hop over any square where a marker has been placed.
- Each pupil takes a turn and their time is recorded, throwing their marker into squares 1, 2, 3, and 4. Write down the results.
- Work out the average time it takes to throw the marker into square 1 and square 4.

**In groups, answer these questions:**
- Does picking up the marker from square 4 take more or less time than square 1?
- How is the average worked out?
- Why is working out the average a useful tool in maths?

**Progression:**
- Use a different Hopscotch set up
- How does this affect the times?
- Groups can repeat the game with the marker at the same place. Can they complete it faster with practice? Why is this?

**Hopscotch ideas:**
- Calculator hopscotch: Hopscotch can also be used to practice mental maths. Draw the hopscotch board, writing addition, subtraction, division or multiplication questions in the boxes. Pupils will answer the question they throw their marker to, and have until they get back over the start line to give the answer.

Hopscotch times tables: Write out a times table in the grid. Pupils can call out the table as they hop and scotch. To increase the difficulty, the times table sum can be written in the box and pupils call out the answer as they hop either to all the boxes or just the one where the marker lands.

Fraction hopscotch: Draw out traditional hopscotch but use fractions. Pupils throw the marker and have until they get back across the start line to call out the percentage or decimal equivalent.