**Multi Touch Activity – Gears – Teacher’s notes**

This activity is designed to be used in the week(s) following your visit. It has been devised to generate recall of the trip whilst also promoting higher order thinking. To this end it can take a few minutes to deliver at the start or end of the school day but could be expanded as an extended task or project. Please do provide feedback to tell us how you used it and its level of impact.

**Summary:**

**Slide 1-2** introduces the activity, which involves looking at different ways the gears could be set-up and working out which way the adjoining items would turn. Begin with a discussion about how this exhibit worked and what they could do on this table:

* The gear attachments are magnetic, so could be moved anywhere on the metal table top
* The gears could be pushed together, to connect the pink handled gear to one or all the items against the wall – including the robots, clock and bells.
* They could then turn the handle and make the linked items turn.

Each slide shows a different ball run and some prompt questions. Get your class to think-pair-share their thoughts on each of the photos, and provide rationale for their answers. There are four different scenarios, starting relatively simple but getting progressively harder.

**Slide 3** shows three different sized gears, individually linked to the handle gear.

* Questions: If we turned the handle…(i) which way would the gears turn? (ii) would the gears all turn in the same direction?
* Answers: the gears *do* all turn in the same direction. They are all directly linked to the handle gear and the size of them does not make a difference to the direction they turn.

**Slide 4** shows gears that separately connect the handle to the clock and one of the robots.

* Questions: If we turned the handle, which way would (i) the clock turn? (ii) the robot turn?
* Answers: the clock will turn clockwise (like it is going forward in time) and the robot will also turn in the same direction/to the left (robot will turn away to the left and turn to face forward from the right). They both have an odd number of gears between the moving items and the handle, so both move in the same direction.

Slide 5shows the handle joined to one of the robots, with some spare gears also in view.

* Questions: If we turned the handle, which way would the Robot turn? How could we make the Robot turn the other way? How many ways are there to make the Robot turn the other way?
* Answers: the robot will turn to the right (anti-clockwise). To make it turn the other way, you could (i) turn the handle the other way, (ii) add/remove just one gear, (iii) add all three extra gears. Both (ii) and (iii) just change the number of gears from an even number to an odd number. *Please note, changing the size of the gears will not make a difference to the direction they turn*]

**Slide 6** shows a set-up that joins the handle to the clock.

* Questions: What time does the clock show? If it takes two full turns of the handle to change the time to 12:00, how many turns do we need, to make the clock show 3:00?
* Answers: the clock shows the time 9:00 (nine o’clock). It will take 4 turns to make the clock go from 9:00 to 3:00. *Please note, a possible extension question here could be: if we turned the handle five times instead, what time would it show? (Answer – 4:30)*