

K.S.3 Physics Teacher's Guide - Machines and Energy

This teacher's guide is to help you find your way around the museum. Before your visit you can use the powerpoint presentation as an introduction to the museum and the forces/simple machines concepts that the students will be looking at.

The walk is intended to take about 45 minutes, but the Museum can distract you!

The worksheet at the museum is intended to follow on from the pre-visit presentation and possibly the pre-visit worksheet. It is designed to cover a wide age range, so it is very simple in places and harder in others. The worksheets have been developed so you can print off the pages relevant to you depending on the group you are bringing and the topics you have covered.

The work in the Vehicle and Implement Gallery on sizes of wheels could be turned into an investigation back at school.

There are additional stops mentioned at the end of this guide for those schools who want a longer experience. You can extend the walk by visiting all of the areas listed rather than selecting one or two relevant places.

The overall aim is to show the development of simple machines from the Treadmill to the Watermill using forces, but there could be another theme about ways to supply water, if you wanted a project.

Route Instructions (map on last page)

You will be starting at the **Treadwheel** (map ref D2). The idea is to get them thinking about gravity and friction. Some may suggest making it bigger as a way to increase efficiency, but that increases both weight and friction. There are lots of viable ideas for improvements, for example construction material, making the pole by the bucket wider, etc. With regards to health and safety, the Treadwheel has no brake. A story is told that a boy once slipped in a similar wheel when the full bucket neared the top, the weight of the bucket reversed the wheel and whirled him round and round at increasing speed until it reached the water again.

Next continue walking along the top path, away from the entrance, towards the **Woodyard** (map ref W1). The **Clapper Stile** is on your right as you enter the woodyard. While you are there it is worth having a look at the **Timber Crane** and pointing out that despite its size and weight it can be operated by one person due to the gearing. It will be good to refer back to the crane as an example of gearing when you look at this later.

From the Woodyard walk straight down the hill towards **Cowfold Barn** (map ref B3). The building is on your right as the path bends round the corner at the bottom of the hill. Here you can see examples of Tudor machines along the side of the barn and, if you look inside the barn, there should be a plough and a levered press which helps to breaking the flax for linen production. These are all good examples of the 'six simple machines' in use and offer a chance to discuss these in more detail.

There is an optional walk here to see some of the animals if your group needs a break. The oxen are housed just the other side of the barn and the chickens can often be found a little further along the path. Otherwise with your back towards the barn you will see a courtyard on your right with a signpost to the toilets. Inside the courtyard you will find the **Cattle sheds from Goodwood and Kirdford** (map refs. S6 & S7). Again there is a wide range of machines on display here from shepherd's shears, metal ploughs through to more complicated agricultural machines. Several of these can be used to illustrate the idea of compound machines.

Walk past the toilets, down the little lane to the right of the block which gives you great views of the Downs, West Dean and possibly the cattle and Shire Horses. Along this path is the **Hay Barn** (map ref S5) which contains a threshing machine; this separates the corn from the rest of the wheat crop. It just needs the rotating cutters at the front and an engine to make it a combined harvester.

Continue past the Hay Barn and follow the path around the edge of the field. At the end of the lane turn right up past the stables and back towards the **Horse Whim** (map ref S1) and the **Charlwood Shed** (map ref S2) which will be on your right as you near the crossroads. Here you can see another example of a machine for supplying water and a wide variety of other machines. The main safety improvement on the Horse Whim is that, unlike the Treadwheel, it has a brake.

Return to the path leading up to the crossroads and, with the Horse Whim on your left, follow the path straight ahead so that you are heading towards the Market Square.

Just before getting to the Market Square you will spot the levered water pump on your left outside of Whittakers Cottages (map ref V1). Turn towards this and go past it towards the field. On your left you will see the **Vehicle and Implement Gallery** (map ref C16). Here you will find the large carts and wagons which could be used as inspiration for some science investigations on your return to school.

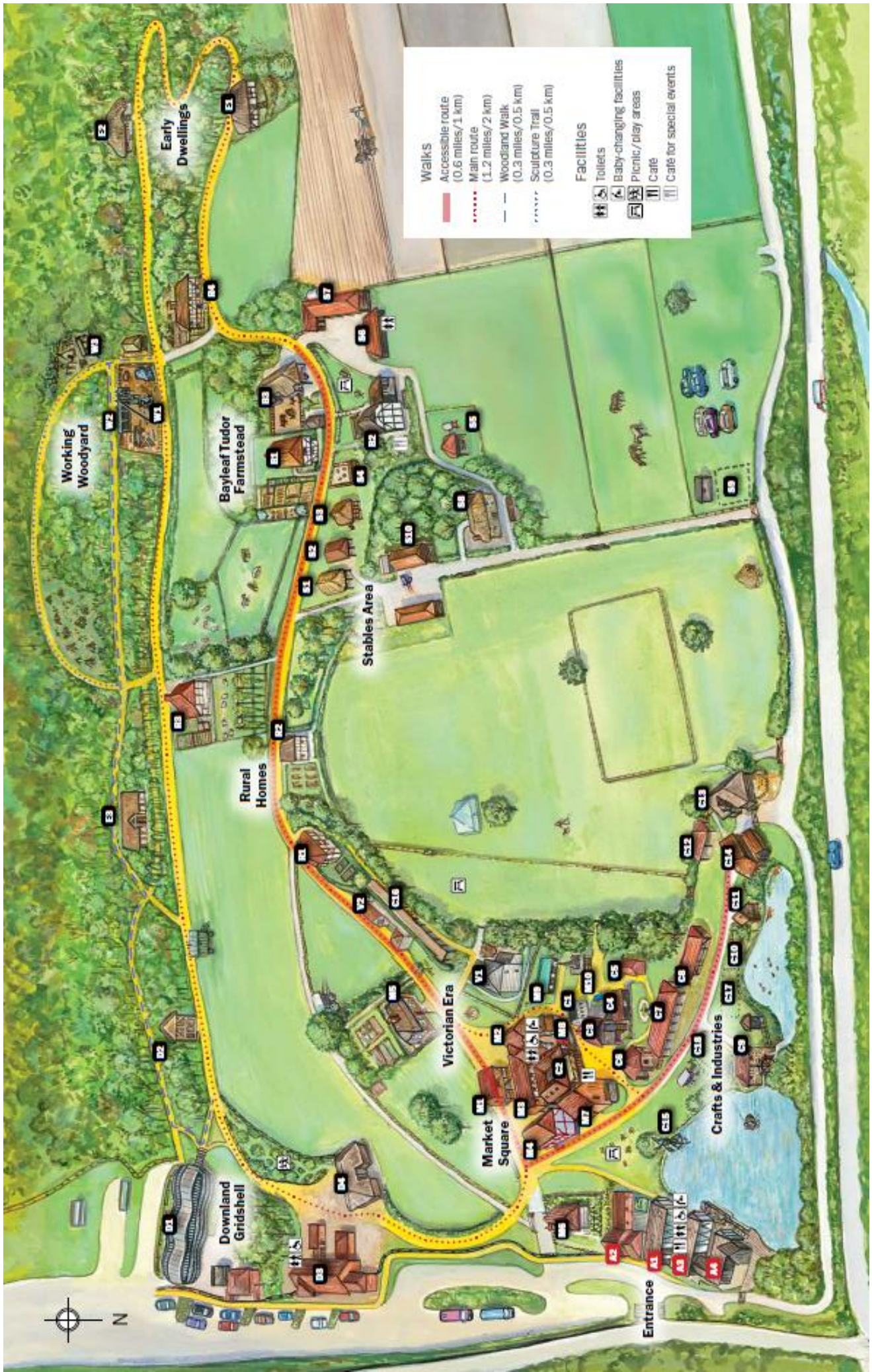
The way to find the mechanical advantage of a wheel and axle is to find the ratio of the radius of the wheel to the radius of the axle. You could take photos of various wheels and get them to measure them back at school for a full investigation.

As you return to the Market Square take the path that runs to the left along the side of the Horsham Shop. This will take you to the **Plumbers Workshop** (map ref C1), the **Carpenters Shop** (map ref C4) and also the **Building Crafts Gallery** (map ref C2). As you come out of the Carpenters Shop you will see the **Pugmill** (map ref C6) and also the geared Victorian water pump called the **Horse Gin** on your left. Time might be against going into all of these areas and you may just want to focus on the worksheet questions.

*(Further information on the Horse Gin and how it works, along with other information about water, can be found in **Court Barn** (map ref C13). As you exit this building, on the left just before the blacksmith, is another Horse Gin and all the gear movement from start to finish are clear to work out.)*

As you pass the Pugmill follow the path round to the left; the **Windpump** (map ref C15) is across the grass on your right, as is the **Watermill** (map ref C9) a little further along the path. The Windpump was used to pump water out of a clay pit. The main focus here is renewable energy and to look at those energy transfers in action, particularly in the Watermill.

We hope you have an interesting and enjoyable walk.



Walks

- Accessible route (0.6 miles/1 km)
- - - - - Main route (1.2 miles/2 km)
- - - - - Woodland Walk (0.3 miles/0.5 km)
- - - - - Sculpture Trail (0.3 miles/0.5 km)

Facilities

- Toilets
- Baby-changing facilities
- Picnic/play areas
- Cafe
- Cafe for special events



Entrance