

# Outdoor Education Worksheets

## MATHS OUTDOORS



### You will need:

- First Aid Kit
- Appropriate clothing for whole group (sunny/wet weather)
- Charged mobile phones and appropriate numbers of adult helpers in case of group splitting up
- Bin bag and gloves for clearing any unforeseen litter from your working area

### Tree Statistics

- Pencils
- Clipboards
- Tape measures

### Maps and Trails

- Marker pens
- Rub off laminated map
- Rub off laminated cards

### Woodland Master Chef

- Box of cooking things
- Rub off laminated cards
- Laminated recipe cards
- Container with water
- Marker pens

### General

- Collecting bags
- Scissors
- String
- Cleaning wipes

### Keep it safe:

- When handling natural materials warn children about splinters. Examine a piece of wood from the floor together to see how the grain lies and explain what a splinter is. If someone gets a splinter it's not a disaster! You should have tweezers in your first aid kit for really big ones. Small ones will work their own way out.
- There may be litter in the woodland in spite of our best efforts so warn children and staff to look at what they are picking up and to let you know if they come across a big piece of rubbish. We can supply gloves and bin bags for you to take out with you in case you need to dispose of some rubbish.
- Explain the boundaries of your working area to the group before you begin. Sometimes it helps to do a boundary walk all together so everyone is clear about where they are allowed to go. Once everyone is clear the children can enjoy a great deal of freedom in exploring their site for the day.
- Trips, slips and tumbles! The outdoors is a bumpy place. You should expect at least a few tumbles each session. This is part of the exploration and children learning to manoeuvre on uneven ground, leap across ditches and pick themselves up after a tree root jumps out on them. Give a general warning to watch where they're walking and then let them roam.

In case of emergencies you can also contact our main office on: 01423 541000 for assistance.

The OS grid reference for our grounds in case of calling emergency services is: SE 32909 54249

## TREE STATISTICS- Approx 45-60 minutes

### Materials

- Pencils
- Clipboards
- Tape measures

1. Introduce the topic of measuring trees by asking the children to think about how they would describe a person. Maybe they would describe their height, hair colour and style? They might guess at their age and if they were measuring someone for clothes they'd want to know their waist size too! How could they measure these same things for the trees around them? Do they think it can be done without chopping the tree down to have a closer look?

### HEIGHT

2. The children should work in pairs. Each pair chooses a tree. Then, person A waits at the base of the tree while person B walks away from the tree until they think they have gone as far on the ground as the tree is high. When they get there they should stand with their back to the tree and bend over so that their head is nearly touching the ground. If, looking through their legs, they can see the top of the tree lined up with the top of their legs they are in the right place. If they can see lots of sky above they have gone too far. If the top of the tree is still hidden they have not gone far enough. When they have reached the right place they will stand upright and walk back with giant steps towards the tree. The number of steps is approximately the number of meters and this is approximately the height of the tree. Person B writes this down on the clipboard without person A seeing.

3. Person B now waits by the tree and person A walks away from the tree in a straight line until they think they are the same distance on the ground as the tree is high. They now turn and face the tree and hold their pencil out at arm's length at shoulder height with the tip pointing straight up to the sky. They need to move a little backwards or forwards to adjust their position until the whole tree is lined up with the pencil so that it looks exactly the same size as the pencil. Person A now walks back to the base of the tree with giant steps. The number of steps is approximately the number of meters and this number PLUS ONE is approximately the height of the tree. Person A writes down their number and then both partners compare their numbers. They can get an average estimate by adding their two answers together and then dividing by two.

4. Bring all of the children back together and discuss their estimates. Did any of them get the same number? Were any of them very different from each other? What else would alter the results they got (flexibility of individual children, size of paces etc)? Who's tree was the tallest? Who's was the shortest?

### TREE CANOPY and LEAVES

1. Children should work in pairs again. Person A walks to the edge of the canopy and stands directly under the outermost leaves, holding one end of the tape measure. Person B walks with the tape measure to the far side of the tree on the opposite side of the trunk, until they

are under their outermost leaves.

**2.** Now they measure the distance between the two. This is the diameter of the tree space. Assuming the tree has a roughly circular shape, the area can be calculated from this diameter using the following equation:

$$\text{Area} = \pi \times \text{diameter}$$

NB:  $\pi$  (Pi) is approximately 3.14 (use 3 for an easier calculation)

So if the tree's diameter is 5.30 metres, the area of ground its canopy covers is:

$$3.14 \times 5.3 = 16.6 \text{ m}^2 \quad \text{OR} \quad 3 \times 5.3 = 15.9 \text{ m}^2$$

**3.** As an extension ask the children to divide the circle of the canopy above into 4 quarters, by marking the hours of the clock around the outer edge at 12, 3, 6 and 9 o'clock with a stick driven into the ground at each point. From each of the four sticks they should draw a line along the ground back to the tree trunk- thus creating the four quarters. If you have string you could use this too, although it may create some extra trip hazards.

**4.** Next the children should mark out a small circle on the ground near the tree trunk and also divide this into quarters, marking the central point which represents the tree trunk.

**5.** Ask the children to stand in each quarter and estimate the amount of leaf cover in each section, seeing where there are gaps and where it is very dense. Ask them to give a percentage value of between 0 and 100% cover.

**6.** Now ask them to show this on their floor diagram, matching each quarter to a quarter of the canopy above them and filling the circle with leaves where there is dense cover but leaving it empty where there are gaps in the canopy. You can take photographs of these floor diagrams to take back to school where the activity can be developed into a detailed area measurement. Ask the children to make sure they use leaves from the floor which match those on the tree above when filling in their canopy diagram by paying attention to their shape and size (although they will be drier and a different colour).

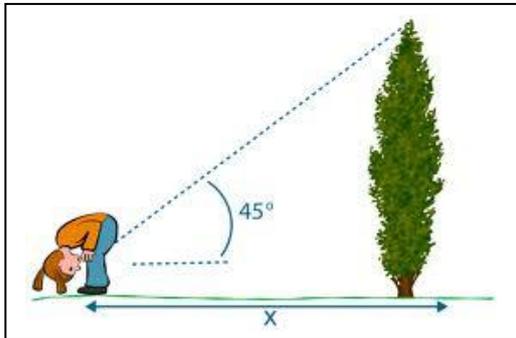
## AGE

**1.** Before starting this measurement ask the children to guess the age of the tree they have been working on. You can give them an idea by finding a fallen tree or exposed stump and counting the rings on it together. This will give them a clue as to the sorts of sizes they should associate with different ages.

**2.** Next ask the children to put their arms around the tree at chest height. When they have done this ask them to do the same thing with a tape measure and find out how big the circumference of the trunk is in centimeters.

**3.** Now ask the children to divide the answer they got by 2.5. (girth  $\div$  2.5 = age)  
To do this without a calculator multiply the girth by 2, by 2 again and then knock off the last digit- moving the decimal place once to the left. (girth  $\times$  2  $\times$  2 remove last digit = age)

You can explain that this calculation gives a good estimate of the tree's age because on average a tree's girth grows 2.5cm each year. Ask them when they think it might not be such a good method- for instance, when a tree is very young or old or in the tropics when trees grow very fast and therefore might reach their maximum girth at 30 years but remain living for another 100!



## MAPS AND TRAILS- Approx 45-60 minutes

### Materials

- Marker pens
- Rub off laminated map (The map should show the area of the woodland, the education building and some of the landmarks in the surrounding area. You can draw these on before starting the activity or alternatively use a site map which we can provide).
- Rub off laminated cards

1. This activity encourages children to explore space and relate to distances, directions and geographical orientation within the activity site.
2. Split the children into four groups. Each group will need a map, 4 cards and a marker pen. They will also have to choose a piece of treasure, gathered from the surrounding area, that they want to hide for another team.
3. Each team needs to decide on a place to hide their treasure. Once they have decided they should go and hide it and come back to the starting point.
4. Using the four cards each team needs to write four clues to guide one of the other teams around the map until they find the treasure.
5. Depending on the age of the children encourage them to use maths and geography terminology when writing their clues such as: turn  $90^\circ$  to the right or; walk 50 paces west. They do not have to lead to places marked on the map but can hide their treasure at any point within the marked out area. To add a further degree of difficulty ask each team to come up with a code and write their

clues in this code (eg: A=1, B=2, C=3). This will add code breaking and deciphering into the activity. To simplify the activity ask the children to write directions to places marked on the map and to use the map to find their way.

**6.** When each team has finished laying out their clues bring all of the children back to the middle. Swap the groups so that each team is following a trail laid by a different group.

Give each team their first clue (which should lead them away from a previously agreed starting point). Each subsequent clue should lead the playing team to the next clue which will be hidden and will in turn lead the team to the next clue. The fourth clue will lead the team to the treasure.

**7.** When all the teams have found the treasure bring the group back to the starting point and have a discussion about the maps and trails. How easy was it? How could they make it harder? How could they make it easier? What did they think of the treasure?

**8.** Finally take a photograph of the maps and cards for development activities back at school. Then ask each team to clean their clue cards with the removal wipes and put them back cleaned off.



## WOODLAND MASTERCHEF- Approx 30-45 minutes.

### Materials

- Box of bowls and jugs
- Laminated rub off cards
- Laminated recipe cards
- Container with water

**1.** This activity introduces measurements and quantities. You can choose to be as precise or as approximate as you like. Children will really enjoy getting their hands dirty, mixing and creating. Try to allow them to get mucky as this increases their enjoyment but also consolidates their

memory of the activity. Hand washing is available on site before you stop for lunch and wet wipes can be used for any immediate cleaning!

**2.** Divide the children in to small groups of 3 or 4. Each group will then be given one of the woodland recipe cards. Their task is to go and find the ingredients for their recipe and then prepare the food or drink described using the mixing bowls, jugs and other cooking items. They can use sticks as spoons, stirrers and knives. They can create a clean space on the forest floor or on a fallen tree to present their creations. You might put them all together like a banquet. NB: some of the recipes specify measurements by weight. Others may ask for one cup or two sprigs. Try to allocate a recipe suitable to the level your children are at with measurements.

**3.** Now call all the children back together to look at the banquet, ask them to think of something else that would go well with this meal. It might be a pudding to follow the main dish or it could be a cocktail to drink alongside the starter.

**4.** Each group now comes up with one more recipe to create the food or drink that they want to add to the banquet. Give them each a clean rub-off card with a marker pen and ask them to write down the recipe, being careful to say how much is needed of each ingredient so that someone else could follow it too. (The pens are permanent so they can use one side of the card as rough and one side to show the finished recipe).

**5.** Ask each group to make their second dish or drink and then bring it back to the banquet display along with their menu card.

**6.** Call all the groups together again and give them five minutes to look at the different meals, then ask someone to go around the group and take orders for lunch!

