



## MAKING MAPS OF SCHOOLS

### INTRODUCTION

Maps really are the foundation of the sport of orienteering. Provided an area is represented on paper in some way, it can be used as a map for orienteering activities. This could be an aerial photograph, an architect's plan, a full-colour orienteering map or a hand-drawn sketch. They're all completely valid.

Maps are a two-dimensional representation of anything – it could be the objects on your desk, a child's room, a school, park, suburb or country!

Grab a square of paper and, using squares and circles, draw the objects on your desk – that's a map.

It is important to notice that:

- shapes on a map represent real objects
- shapes on a map are the correct relative distance apart (scale).

For the school environment, we're focusing on black and white hand-drawn maps. They're easy

to create, they allow for many class room and outdoor activities and they're inexpensive to photocopy.

Regular orienteering events use full colour maps drawn to specifications defined by the International Orienteering Federation. But, they're expensive to print in full colour, impractical in the school environment and learners will experience 'map fatigue' very quickly and, as such, they're unlikely to appreciate the detail of regulation orienteering maps.

If schools do have full colour orienteering maps, they should be reserved for interschool events.

It is fairly easy to create a map of your school. This can be done by you, the teacher, or your learners – depending on their ages.

To begin, there are two useful techniques to consider: pacing and using a base map.



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### PACING

This is a technique used to measure distance – on foot. It really helps when drawing a map or just adding details, to keep the proportion and to know the length of an object or the distance between them just by counting your steps.

To work out your pacing, use a rope of known length or a trundle wheel to measure a set distance of 50 metres or 100 metres – depending on the space that you have available. You can even use the length of a 25 metre or 50 metre swimming pool as a measure.

Walk this distance at a normal pace – focus on walking naturally. Count how many steps you take to cover this distance. Remember to only count every time your right (or left) foot strikes the ground, not every footfall. Do this three or four times and you should end up with similar numbers.

### BASE MAP

Another way of creating a map is by using a base map. This could

be an architectural plan for the school, an orthophoto (an aerial photograph, which is available from NGI – see references) or a Google Earth image.

Place see-through tracing paper over the image and trace lines around the features that you can see – buildings, fields, swimming pool, tennis courts, trees etc. You can fill in the details later by walking around the school grounds and using the pacing technique to get the correct positions of features.

As far as scale goes, there should be a scale on architectural plans; the scale of orthophotos is usually 1:10,000 and you can include a ‘ruler’ on your Google Earth images. If the image is bigger than an A4 sheet, reduce it on a photocopy machine.

So, are you ready to get drawing?  
Let’s go!



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### DRAWING A MAP USING A PACING TECHNIQUE

Work out your pace over a set distance by using the instructions above. A 50 metre or 100 metre distance is best.

Let's say that you walk 50 metres in 30 paces. If you walk the length of a building in 15 paces then the building will be 25 metres long. Easy!

The next aspect to consider is the scale of your map...

The length of an A4 page is 297mm and the width is 210mm. But, remember that you won't draw the block of your school to the edge of the page. Let's say then that the useable width would be around 180mm (18cm), or less, and a useable length would be 250mm (25cm).

Most urban schools are probably on a rectangular-shaped block. Primary schools are often quite small and they could only be 150 – 200 metres in length. A large high school property may be 400 metres in length.

You will need to pace the length and width of your school to determine its dimensions. Let's say that your school is 400m long and 250m wide.

A good scale would be 1:2,500 where 1cm on the map represents 25m in reality on the ground. Thus, the 400m length of your school would be 16cm and the 250m width would be 10cm. This fits nicely on an A4 page.

To map your school you'll need paper, a pencil and a ruler.

After measuring the length and width of your school block – noting the position of gates, draw in the buildings. You need to pace the distance of the buildings from the wall/fence perimeter of the school, the length and width of the buildings and the distance between them. The same applies to flower beds and fields.

Later you can add in trees, fountains, rugby posts, soccer nets, tennis courts, ponds, fountains, playground equipment boulders and other detail.



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### DRAWING A MAP USING A BASE MAP

For this exercise, an aerial photograph of the school is needed. This can either be a 1:10,000 orthophoto or a Google Earth image (black and white print is suitable). This is called a **base map**.

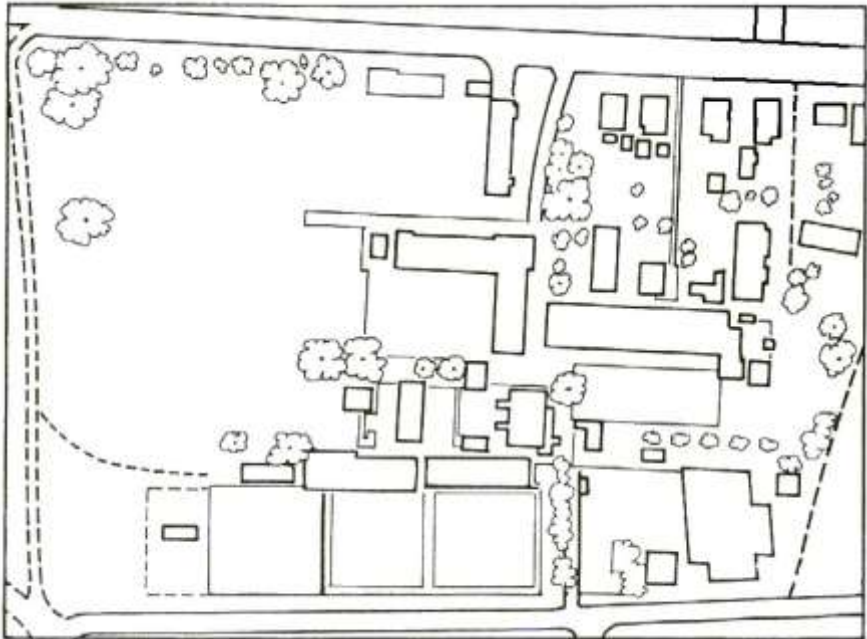
On a photocopy machine, reduce or enlarge the area so that it fits on an A4 page. If your base map is a copy of an aerial photograph, it may not photocopy well for reduction / enlargement. It is best to trace what you can see onto tracing paper and then reduce / enlarge the tracing.





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Using the base map (photograph) above, the following school map was drawn.



This sketch was made in the following way:

- Place the tracing paper over the aerial photograph and use sticky tape to fasten it in place.
- Using a sharp pencil (not pen – pen does not write properly on tracing paper), trace the shapes of buildings (use a ruler), roads, paths, sports fields, perimeter wall/fence and all other obvious features that you can see clearly.
- Once the sketch is done, photocopy this base sketch on to an A4 page and tape a



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fresh piece of tracing paper on top of it; or just tape a fresh page of tracing paper over your original trace.

- Now head outside (fieldwork) to add in less obvious features like significant trees and fountains and playground equipment.
- Once the fieldwork has been done, place another layer of tracing paper on top, tape it down, and then use a black fineliner/marker to ink in the features. Consider using different thicknesses of black pen to differentiate between small paths, wide walkways and roads.
- Photocopy this top trace on to an A4 page.

### What to map?

It really is impossible and unnecessary to put everything on the map. It is challenging to decide what to put on your map and what to leave off. A general rule is to include objects that are significant to a person – something that you'll see easily.

- Map anything that might halt or slow an orienteer's

progress, like bushes, high fences, walls or a stream.

- Map features that an orienteer might use to navigate by, such as a path across a sports field.
- Map anything that would be useful as a control site like permanent benches, jungle gyms, water fountains.

### What not to map

- Fine detail crammed into a small area is too hard to map. Just map the major features.
- Map only features that stand out; don't map detail that is lost in the noise.
- Consider the child's point of view. Drinking fountains stand out to them.
- Overhead structures are often too hard to include, unless they're power lines. Concentrate on what can be seen at ground level.
- Benches can be ignored if there are dozens of them; but if there are only one or two, include them.

You now have an orienteering map of your school!



## **MAKING MAPS OF SCHOOLS**

### **MAP SYMBOLS AND CLASS LESSONS**

There are dozens of fun map lessons that can be done in the classroom and outdoors; from drawing maps to activities using the drawn maps.

Remember to start your class with drawing maps of the classroom before progressing to drawing maps of the school.

Below we have provided some standard map symbols that you'll use in the school environment. If you have other special features, you can create your own symbols. Just remember to include it on your map legend.

We've also outlined a number of simple map-making activities that you can do as lessons in the classroom and outdoors.

Have fun!

# Map symbols

## Man-made features



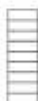
### Building

A building is a permanent structure with a roof.  
Black - solid colour.



### Canopy

A canopy is a building with a roof but no walls - like a passage, bicycle shed or shade cover for cars.  
Grey: lightly shaded with pencil.



### Stairs

Staircases are represented in a generalised manner.  
Black: thin lines.



### Footpath

A large path or paved walkway.  
Black: dashed lines.



### Small path

A track - smaller and not as clear as the footpath.  
Black: small dashed lines.



### Wall

A stone, brick wall or cement bank. This could be low enough for a runner to easily climb over.  
Black: solid line with evenly spaced small dots; or black solid line



### High wall

A stone, brick or cement wall taller than 1.5 metres. This wall is not crossable.  
Black: thick solid line with double dots; or thick solid black line



### Fence

A passable fence, usually made of posts and wire.  
Black: solid line with evenly spaced single tick marks.



### Low fence

A low fence, usually something low enough to step over (less than 0.5m high).  
Black: broken line with evenly spaced single tick marks.



### High fence

Use this symbol to show a high fence - one that is too high to cross.  
Black: thick black line with evenly spaced double tick marks.

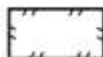


### Crossing point - gate

Use this symbol to show an access point, gate or opening in fences or walls.  
Black: two parallel black lines on either side of a gap in a fence or wall symbol.

## Special symbols for man-made features

- **Street light, flag pole, rugby post**  
Black: small circle.
- ✦ **Tower, floodlight, pylon**  
Black: small solid circle with 'target' lines.
- ↑ **Sign board, basketball / netball net**  
Black: arrow.
- **Bin, plant container, electrical box**  
Black: square.
- × **Playground equipment and other special man-made features**  
Black: x.
- ≡ **Bench**  
Black: line with bar ends.
- ▲ **Sculpture or statue**  
Black: sharp triangle.



### Tennis and netball courts, cricket nets

These sports facilities are surrounded by a high fence. If you place a control on the court, be sure to indicate the location of the gate. The lines of the court can be illustrated, but this is usually not necessary.



Black: high fence symbol.

## Vegetation



### Open ground (lawns, sports fields)

Paved areas can be lightly shaded or left open



### Rough ground (slow running)



### Dense vegetation (difficult to walk)



### Out of bounds / No entry



### Distinct vegetation boundary

This dotted line can be used to show the vegetation change from a lawn to a flowerbed or from rough ground to dense vegetation.

Black: dotted line



### Single large tree

A tree, with trunk and canopy, that you can walk underneath.

Black: wavy outline with a dot in the centre.



### Bush or small tree

Thick vegetation, like bushes, that you cannot pass through. Also for flower beds.

Black: wavy outline.

## Water features



### Area of water

An area of water like a large pond, small dam or large fountain.  
Black: outline with small dash lines to indicate water.



### Swimming pool

Black: rectangle with small dash lines to indicate water.

## Earth features

- **Boulder**

A distinct boulder/rock  
Black: small, solid circle



### Earth bank / embankment

A steep earth bank is an abrupt change in ground level that is clearly visible - often around the perimeter of sports fields. The tag lines point 'downhill'.  
Black: solid line with tags.

- v **Pit or hole**

A pit or hole with steep sides.  
Black: v.

- ∩ **Small depression**

A shallow depression or hollow (not as deep or sharp as a hole/pit).  
Black: small semicircle.



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## LESSON 1

### **MAP YOUR CLASSROOM**

*Before you start to map your school, get your learners to map the classroom. Pacing (see Lesson 2) can be used in the classroom environment too.*

#### **How it works**

- Get the learners to draw a simple map of the room on a sheet of A4 paper.
- You may need to create a symbol to represent specific features in your classroom (dustbin, single tables, chairs)

#### **Discussions and activities**

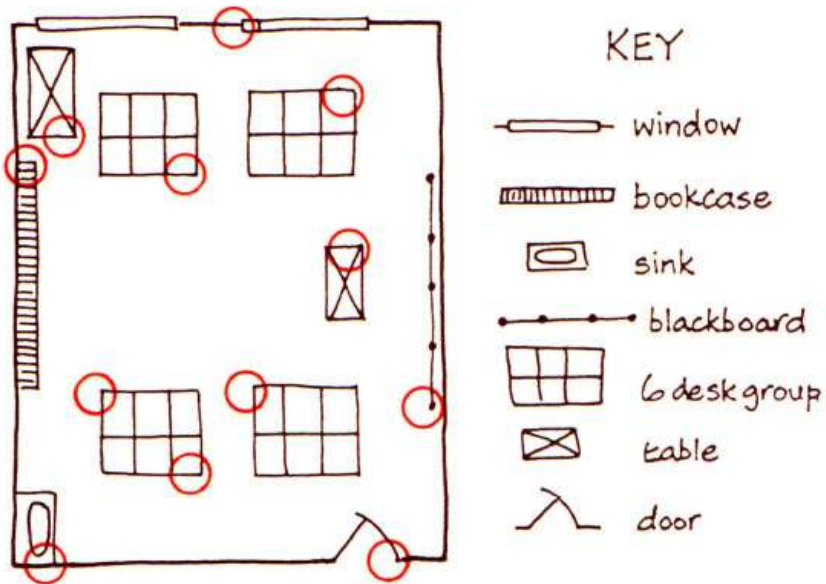
- If you have drawn the map, leave some features off the map and ask the learners to point out what objects are missing and where they should be drawn on the map. Set rules about which items are too small to be included so that the map is not cluttered with unnecessary detail.
- Draw a circle around a feature on the map, like the corner of a table, and ask a learner to place a sticker or square or paper at that location. Do this with many locations in the classroom.
- Let the children work in pairs – assign a number to each pair – 1, 2, 3.... Give each pair a few squares of paper. On one side they write their number and on their other side they must write a different letter or symbol on each square. This will be the ‘answer’. Each pair must put their squares around the classroom, marking the location on their map. They then swap maps with another pair who must find the square and write down the ‘answer’ symbol on an answer sheet. The idea is that the learners should use the map to find the squares of paper instead of just



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searching the room. After a set time limit everyone sits down and checks their answers. Have discussions about squares not being placed in the place indicated on the map and also squares being too hidden.

Below is a simple example of a classroom map.





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## LESSON 2

### **PACING ACTIVITY**

*Whether drawing a map using just pacing or from a base map, pacing is a technique that will come in handy. Even the world's best orienteering map makers use pacing to add detail on maps.*

If you're able to measure a section of field or road – a distance of 50 metres is perfect. To do this you can use a rope of known length (20 metre rope), a length of string or a trundle wheel.

### **Setting up the activity**

- Place cans or cones at the start and finish of the measured section.

### **How it works**

- Line the learners up at the start and let them walk – at a normal pace – from the start to the finish.
- Instruct them to count their paces – on the same foot (not left-right, left-right; just on the right foot).
- Repeat three or four times. The learners should get a similar number each time and remember that each individual will be different.

Then, put the learners in pairs and get them to walk around buildings, measure lengths of corridors, fields and other objects. Use pacing to measure dimensions. Use math ratios to calculate length in metres.

For example... I use 30 paces to cover the 50 metre measured distance. I pace the length of a building and find it to be 18 paces.

If 30 paces covers 50 metres, then 1 pace covers 1.67 metres and 18 paces covers 30m. The length of the building is 30 metres.

Repeat with the width.



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## LESSON 3

### SCALE AND DIMENSIONS

*Use your pacing measurements from Lesson 2 to teach scale.*

You can draw a section of your desk on an A4 page, or you can draw your whole desk on an A4 page; you can even draw your office or the school or the suburb on an A4 page. The only thing that changes is the size that the objects are drawn and the amount of detail that can be included. This is the scale of the map.

### **Setting up the activity**

- You'll need paper, pencil, a ruler and probably a calculator

### **How it works**

- Use a simple scale like 1:2,500 where 1cm on the map represents 25 metres on the ground.
- Using the pacing dimensions from Lesson 1 to draw shapes on the paper.

For example, a building is measured at 25 metres x 15 metres. If 1 cm (10mm) represents 25 metres, then 6mm represents 15 metres. The length of the building will be 1cm and the width will be 6mm.

Playing with different scales, like 1:4,000, the above example would calculate as 1cm represents 40 metres. Thus, 6.25mm represents 25m and 3.75mm represents 15m. The length of the building will be 6.25mm and the width will be 3.75mm.



Always use a sharp pencil and remember that very small measurements – like 0.25 of a millimetre - are impossible to measure. Draw as accurately as possible and remember that maps are representations of an area and they do not have to be exact.



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### LESSON 4

#### **DRAWING YOUR SCHOOL**

*To start orienteering at your school, you need a map. If your learners are old enough, get them to draw it.*

#### **Setting up the activity**

- Move on to this activity only after learners have mapped something simple, like their classroom (see Lesson 15 in the Lesson Plan booklet)
- If you have a base map, use it. If you don't, use the pacing technique.
- You'll need paper, pencils, tracing paper (if using a base map), ruler.

#### **How it works**

- Divide the school into a number of quadrants.
- Let the learners work in pairs and designate three or four pairs to each quadrant.
- It may take more than one lesson for them to map their section of the school.

Later, in the classroom, they can go over their pencil drawings with black pen.

In class, pin up the maps and discuss the merits of each. Get the class to vote on their favourite – the ones that best represent the school grounds. Join them together to make a complete map of the school.



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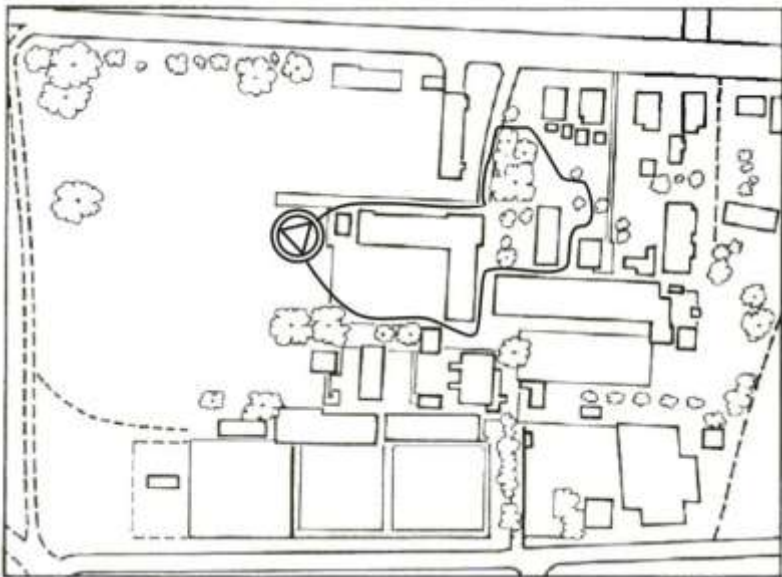
## LESSON 5

### MAP ACTIVITIES

*The number of outdoor activities that can be done using the maps is endless – you just need a little creativity and imagination.*

#### **Activity ideas**

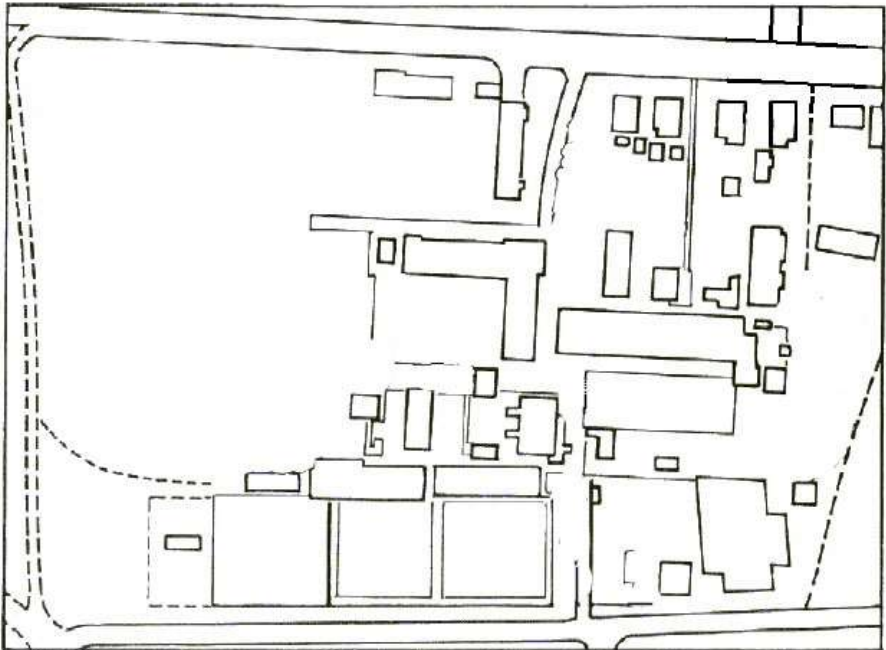
- Let the learners plan a course on their map. They can hide objects (pencils, squares of paper) at the location. They must give their map to another pair. After using each other's maps, they may have a different view about which map is better than another and what aspects make a 'good' or 'bad' map. Discuss in class.
- For a 'walking the line' activity, you (or the pairs) draw a line between and around objects. They hand their map to another pair who must 'walk the line' – aiming to walk exactly where the line is drawn. The pair who drew the line can observe the participating pair to make sure that they are doing the activity correctly.





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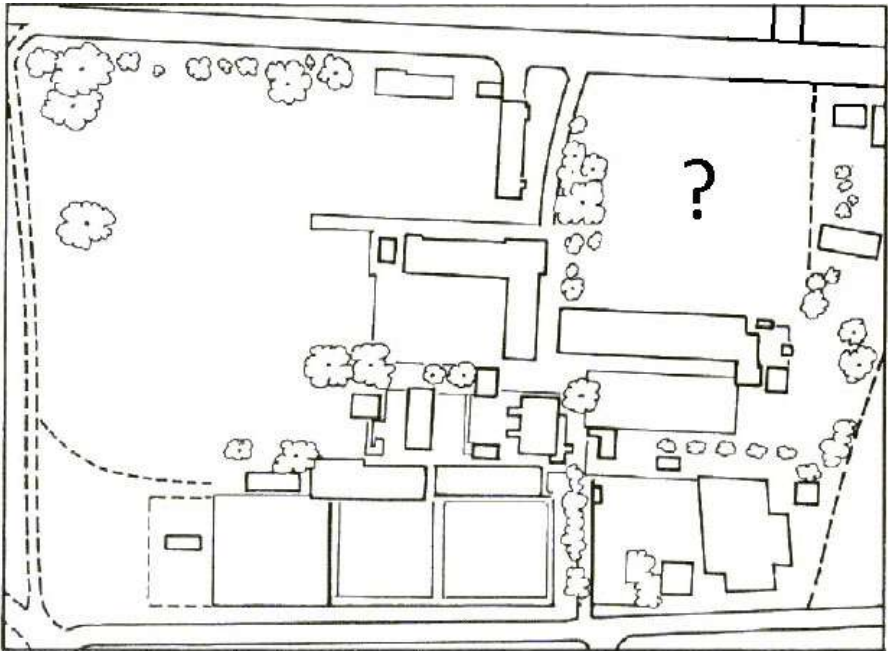
- The composite map can be used for a **standard orienteering** course or a **star relay**.
- Using a map on which only buildings, paths and roads are drawn, get the **learners to draw in the details** – trees, flower beds, play ground equipment, benches etc.





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- When you photocopy a sketch of the school grounds, **erase a section of the map**. Send the learners outside, with the maps, and get them to draw in the missing section. A variation on this theme is to let them walk around the missing area first and then when they're back in class they must fill in the missing section, with detail, from memory.





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## LESSON 6

### COLOUR-IN MAP

*The most wonderful thing about a black and white sketch map is that colouring it in makes for a fun classroom activity for all ages.*

#### Setting up the activity

- The learners will need a copy of the sketch map of their school
- They will need colouring pencils / crayons
- Put this colour legend in your classroom

#### How it works

The learners must colour in their maps, using the representative colours to transform their map from a black and white sketch to a 'full colour' map. The colours shown in the legend are similar to those used in official orienteering maps. This activity will familiarise the learners with the colours used on orienteering maps. As a basic guide:

- **Green – vegetation.** Light green can show flower beds; dark green represents dense vegetation
- **Yellow – open ground.** Light yellow is open ground, like sports fields. Darker yellow represents terrain that is more rough, like areas of long, wild grass. You can use orange for wild terrain with scattered trees.
- **Blue – water features.** Use blue to colour in swimming pools, ponds, dams, fountains, water tanks and rivers.



Remember that in orienteering, colours indicate the runability of the terrain as in: how fast can a person run across that area – runnable, slow, fight, impassable.



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### USEFUL REFERENCES

#### Google Earth

This software is free to download. You will need an internet connection.

- [earth.google.com](http://earth.google.com)

#### National Geo-Spatial Information (NGI) (formerly called Chief Directorate: Mapping and Surveys)

You can order orthophotos from them and they'll post to you. You will need to tell them where your school is located. The photograph may be old – remember to ask when the photo was taken. If your school is new it may not be shown. They have offices in Cape Town and Pretoria.

- [www.ngi.gov.za](http://www.ngi.gov.za)
- Cape Town: 021 658-4300
- Pretoria: 012 341-2682

Please email ([lisa@ar.co.za](mailto:lisa@ar.co.za)) or fax (086 551 0902) your hand drawn school map to us – we'd love to see what you and/or your learners have created. Please sms (082 936 2509) to say that you've sent the fax so that Lisa can confirm that she has received it.

#### CREDIT

- The map symbols are based on the British Orienteering Federation's 'Specifications for School Orienteering Maps'
- Hand drawn diagram of school and aerial photograph are from a NZ Schools' 'Map Making' document.
- Classroom diagram is from a NZ Schools' 'Indoor Navigation Game' activity.