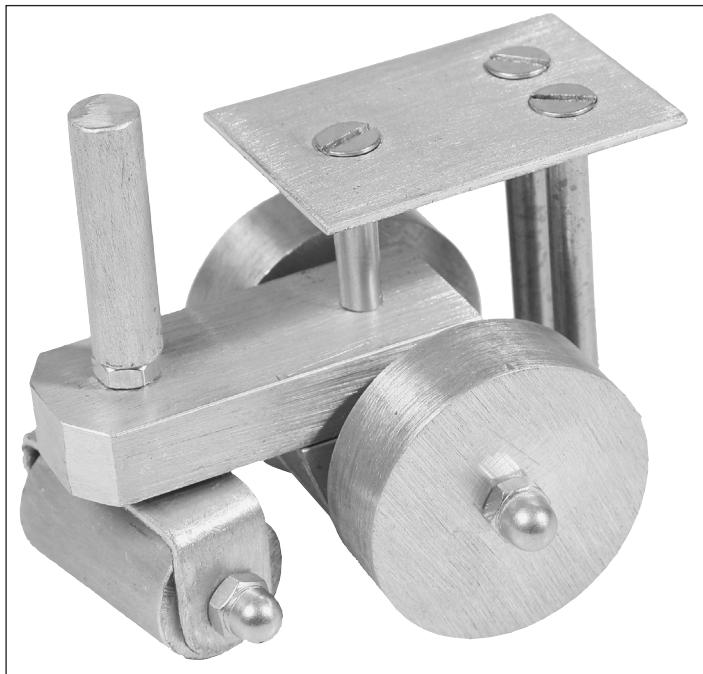


1 0 6 . 3 1 5

*M e t a l   s t e a m   r o l l e r*



***Please Note***

The OPITEC range of projects is not intended as play toys for young children. They are teaching aids for young people learning the skills of Craft, Design and Technology. These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Danger of suffocation!

## Parts list

- 1 x Aluminium sheet (1) 1.5 x 40B x 120mm
- 1 x Aluminium rod (2) 18dia x 30mm
- 1 x Aluminium rod (3) 8dia x 35mm
- 2 x Aluminium rod (4) 35mm x 12mm
- 1 x Aluminium section (5) 10 x 20 75mm
- 10 x Nuts (6) M4mm
- 4 x Countersink set screws (7) M4 x 50mm
- 2 x Domed nuts (8) M4 mm
- 1 x Flat section with long hole (10) 10 x 60mm
- 1 x Pine block (11) 30 x 30 x 30 mm
- 2 x Brass tube (12) 5 x 0,5 x 45mm
- 1 x Brass tube (13) 5 x 0,5 x 25mm

## Necessary tools

- Pencil, ruler, centre finder + Try square
- Drills 3,3mm, 4mm, 8mm diameter
- Centre punch
- Screw driver
- Allen key 7mm (M4)
- Metal saw
- File
- Vice
- Pillar drill

## Construction

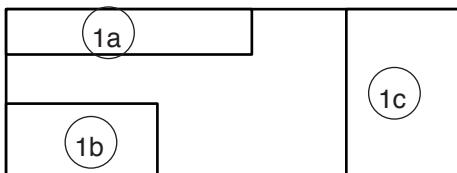
### General:

Before starting file away any burr from the edges of the metal pieces !!!

1. Mark out the pieces (1a,1b+1c) on the aluminium sheet as stated in the plan .Use metal shears for cutting and clean up the edges

**Note !** Use a pencil and not a scriber when marking out on aluminium sheet , as this will make a groove in the metal making it prone to snapping.!

Cutting plan

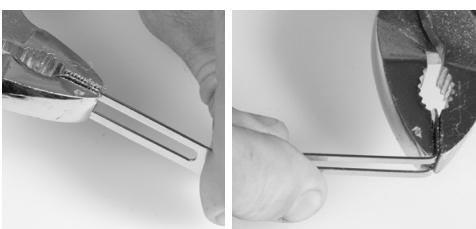
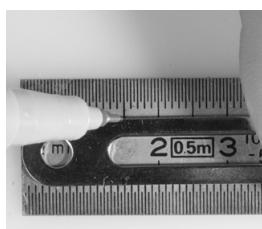
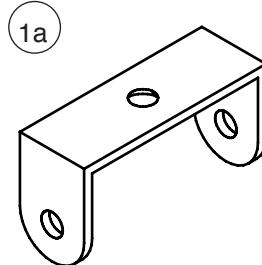
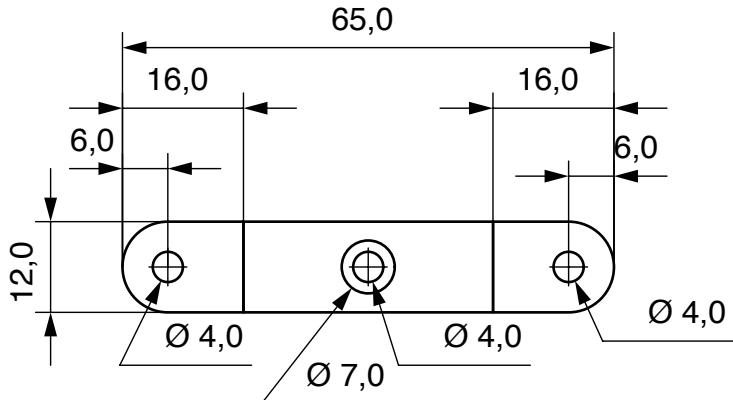


2. The front axle assembly can be made in two variations from aluminium (1a) harder version.

Variation (11) from flat sheet (10) simpler version

Variation 1: Part (1a) as shown in the drawing, mark out bend and then drill  
The middle hole is countersunk on the inside up to 7mm!

**Note:** To check the measurements use the wooden block provided !



Ver-  
Make  
h o l -  
from  
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in the

sion 2:  
the axle  
der (10)  
the flat  
as shown  
p h o -  
graphs



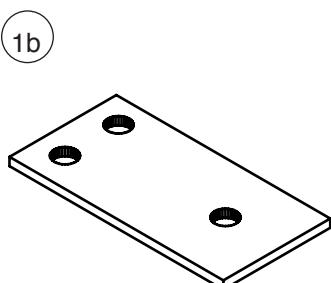
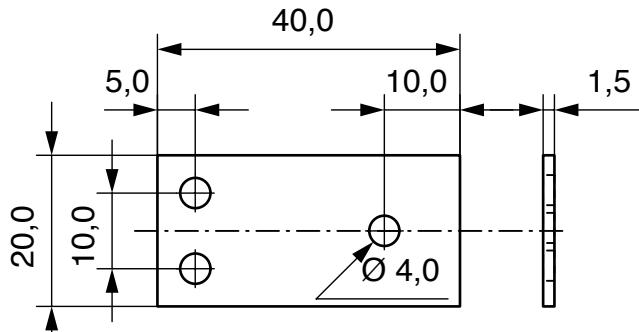
Mark out 15mm

Use a pair of pliers or a vice to  
bend the 90 degrees angle

Use the wooden block to bend  
the second side of the axle  
bearing

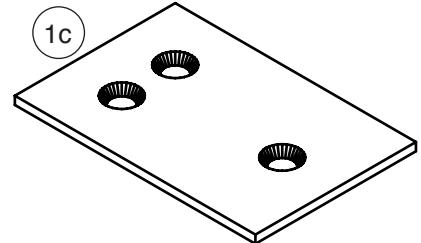
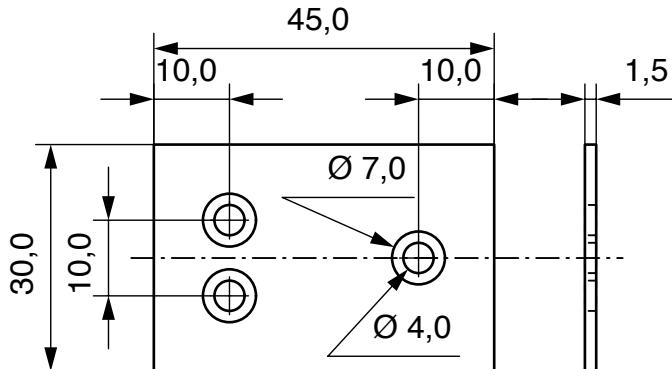
Finished axle  
holder

3. Part (1b) mark out according to the drawing and then drill the 4mm diameter holes



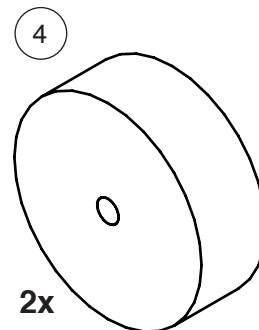
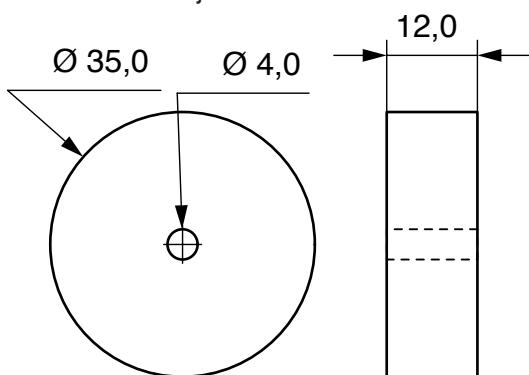
## Construction

4. Part (1c) roof, mark out according to the drawing and drill countersink



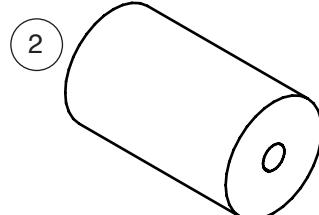
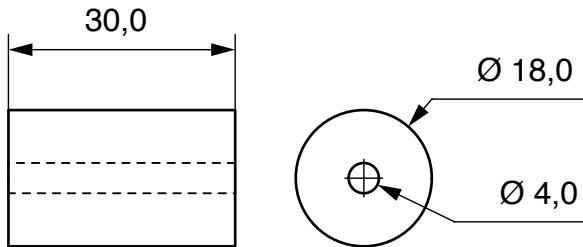
5. The wheels (4) 30 x 12mm mark out the centres and drill the 4mm diameter holes  
Lightly countersink.

**Note !** Use vice soft jaws !



6. Find and mark out exactly the middle of the roller ((2) 18dia x 30mm . Drill out with a 4mm diameter bit and lightly countersink the hole.

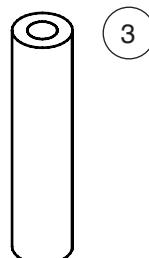
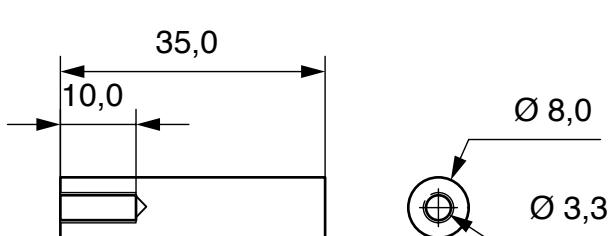
**Note:** The hole in the roller is very deep. It must be placed in a machine vice and measured exactly with a try square. For best results drill from one side of the middle and then turn the roller over. Use protective vice jaws to stop marking the roller !!



7. Measure the middle of the chimney 8mm dia x 35mm and drill a hole 3.3mm dia at 10mm deep

**Note!** Place this piece in a machine vice checking its vertical position with a try square. Now tap an M4 internal thread

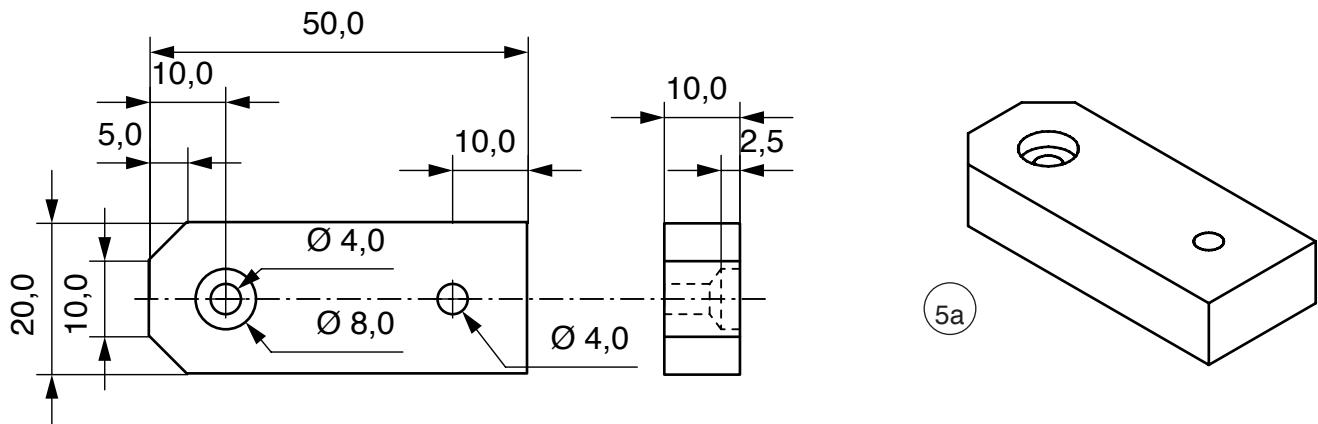
**Note!** Make sure that the thread tap is upright, make 3 turns forward and one back to cut the metal swarf free. Use soft jaws in the machine vice !



## Construction

8. Cut the Motorblock (5a and 5b) from the aluminium section (5) 10 x 20 x 75 mm with an hacksaw.

**Note:** Use vice jaws!



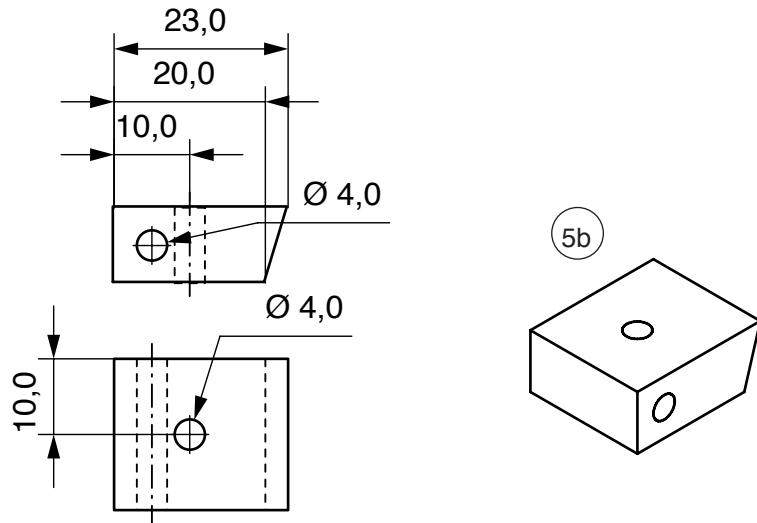
With part (5a) 10 x 20 x 50mm file the corners at 45 degrees ( Or saw first then file) mark out the holes, centre punch the frill 4mm dia. Drill the blind hole 8mm x 2.5mm deep

**Note !** The blind hoe is drilled on the angled end!

Rear axle carrier (5b) 10 x 20 x 23mm – chamfer one end with a file as shown  
Finally mark out the holes and drill 4mm diameter

**Note !** Drill this part in a machine vice to ensure that it is square. Use vice protectors!

9. Remove the burr from all the parts with a file then emery cloth smoot



10. Cut from the treaded rod (9) M4 x 150mm a piece 44 mm long ( 9a front axle ) and 60mm ( 9b rear axle )

11. Cut a countersink screw (7) to 24mm long and remove burr

12. Polish and varnish all the parts – leave to dry

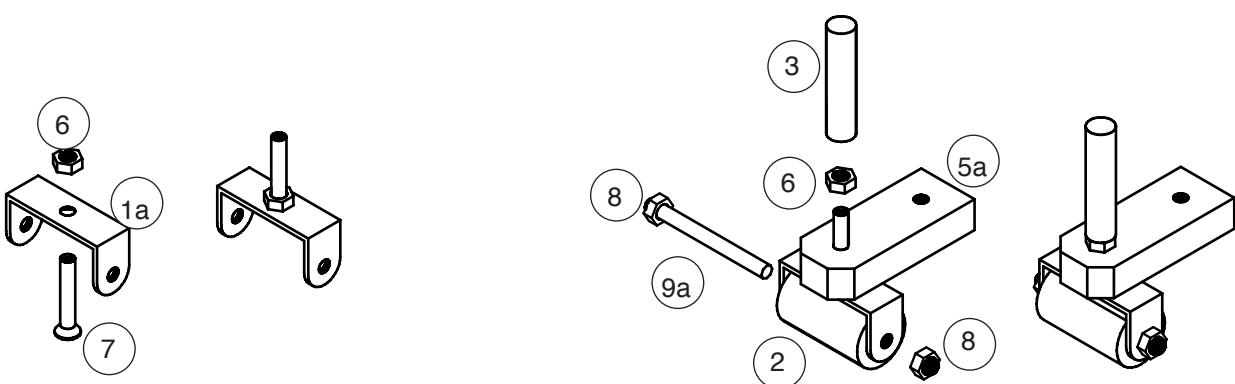
## Construction

### 13. Assembling the front axle and steering

Take the countersink screw ( 7) insert from underneath the axle holder (1a) add a nut

Place the roller (2) in with the axle ( 9a) and a two domed nuts (8) check that the roller can rotate easily.

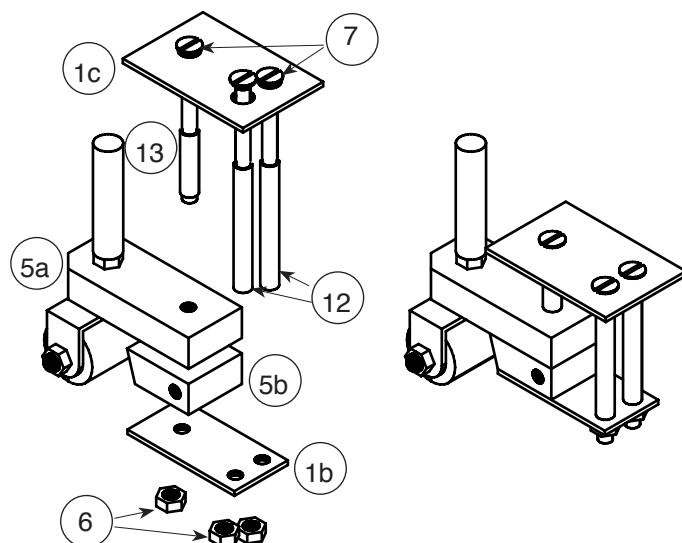
Insert the axle holder machine screw up through the motorblock (5a) screw on a nut , tighten so the axle holder can turn, now screw on the chimney from above ( Steering /3) and tighten it so that it still allows the steering to move.



### 14. Assembling the roof and the rear axle carrier

Insert in the roof (1c) using 3 countersink screws (7) through the 3 brass tubes ( 12 +13)

Insert the front screw with shorter tube into the motor block (5a) and the rear axle carrier (5b) and the floor pan (1b) add the nuts and tighten the assembly.



### 15. assembling the rear wheels

Place one wheel (4) on the rear axle (9b) fix with a domed nut

Insert the axle through the carrier and add on the second wheel nut and domed nut , tighten in position

**Note!** the finished axles should be able to turn freely!

