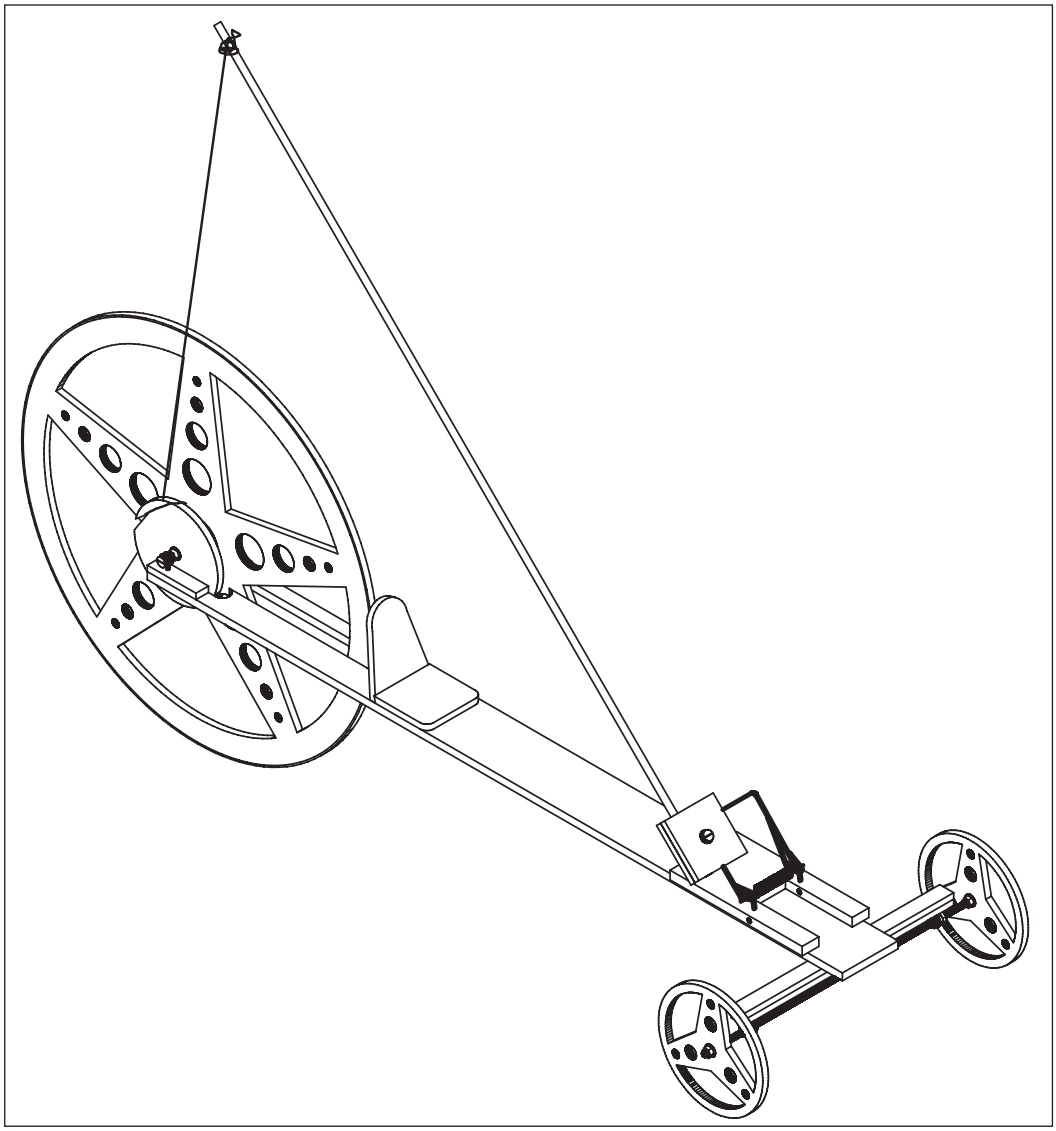
OPITEC

101.063

Mousetrap powered vehicle



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 Technolo- gy.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. Dan- ger of suffocation!

1. Product Information

Article: Functioning vehicle in project pack format.

Use: In Design Technology, Key stage 3.

2. Material

2.1 Material: Pine (Coniferous), softwood.
Beech (Deciduous), hardwood.
Wood should be relatively dry before working.

Working: The wood parts must be sawn, shaped, drilled and sanded.
Measure out according to the plans or use them as patterns.

Joining wood: Gluing (Use PVA white glue eg Ponal Express)
Use screw fixings.

Finishing: Use wax (Liquid or solid)
Wood varnish (Base coat and top coat)
Staining (Coloured, water soluable-then varnish)

2.2 Material: Plywood (Gabun), multi layered
Each layer is set with the grain in the opposite direction!!

Working: The plywood must be sawn, shaped drilled and sanded.
Measure out according to the plan or use the plan patterns.

Joining: Glue (PVA white glue)
Screws.

Finish: See above ‘ Pine’

2.3 Material: Threaded rod (Ready made part)
Steel

Working: Filing, removing burr.

Joining: Screwing together.

Finish: Use machine oil

3.Tools:

Saws: Use a Fret saw for all curved shapes and cut outs that cannot the sawn with a straight backed saw.

Note! Fret saw blades should be inserted in the bow from underneath, with the teeth facing forward.

Saw with slow even strokes turning the work as you go.

Use a fine toothed saw for slots and strip section wood.

Note! Hold the work on a bench hook whilst sawing.

Use a Puk saw for short lengths, dowels etc (See Cat)

Note! Use a bench hook!

Sanding: Use a block and glass paper for all flat surfaces and loose sheet on curves and round edges.

Shaping: Choose the correct grade of wood file or rasp according to the work in hand

Use needle files for slots and cut out shapes.

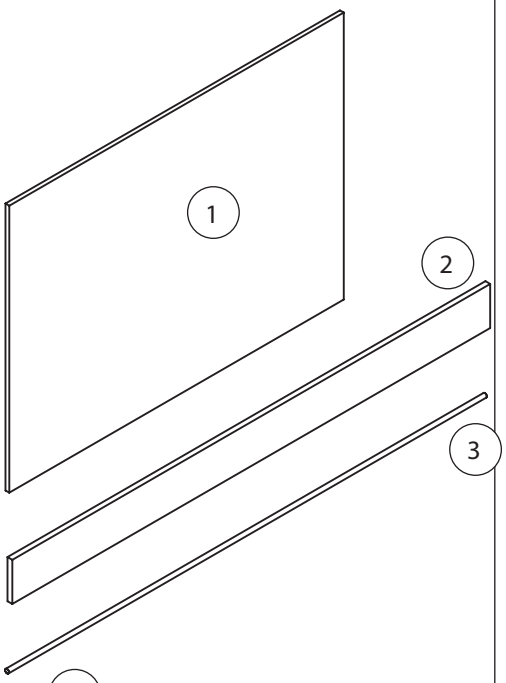
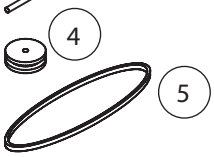
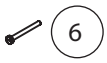
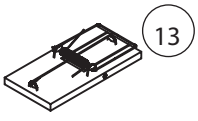
Note! Files only cut on the forward stroke.

Drilling: Use a hand drill or pillar drill

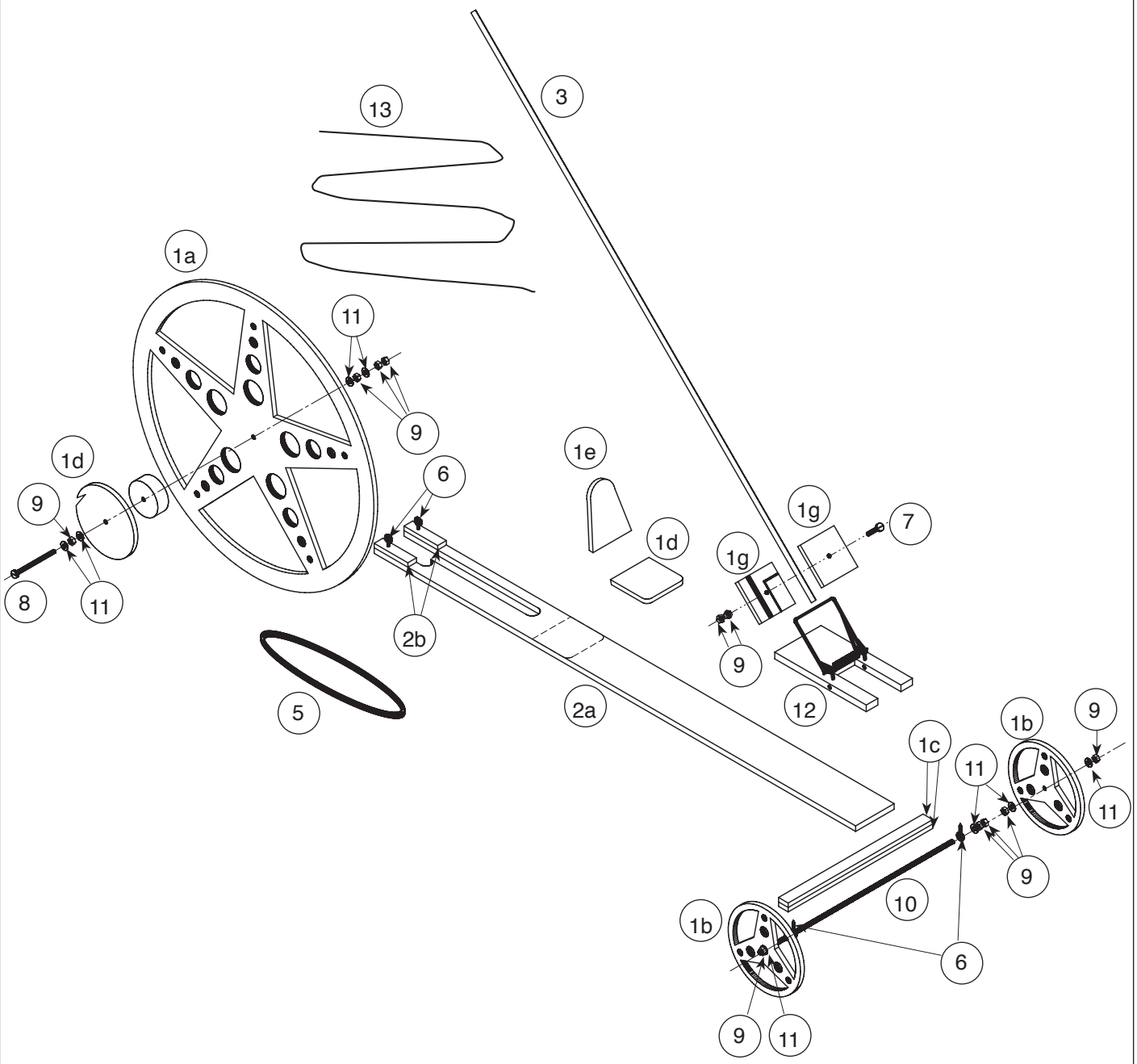
Note! Adhere to the safety rules: Tie all long hair back, remove all rings and jewellery, wear safety glasses and an apron. Hold the work to be drilled in a machine vice.

Clamping: Use modelling clamps for holding the work, whilst the glue is drying. Do not over tighten them or they will leave marks.

4. Parts list:

Part	Material	Quantity	Size	Diagram
Wheel/axle carriers holders/seat	Plywood	1	4 x 260 x 350 mm	
Body	Pine	1	5 x 40 x 500 mm	
Drive	Beech dowel	1	ø 4 x 500 mm	
	Wood disc	1	ø 30 x 11 mm	
	Rubber band	2	ø130 x app. 5 mm	
	Screw eyes	4	10 mm	
	Machine screw	1	M3 x 16 mm	
	Machine screw	1	M3 x 40 mm	
	Washers	10	ø 7 / 3,2 mm	
	Threaded rod	1	M3 x 200 mm	
	Nuts	15	M3	
	Mousetrap	1		
	Thread	1	ca. 1000 mm	   

5. Exploded diagram



6. Planning overview

6.1 Making the wheels, seat and axle carriers

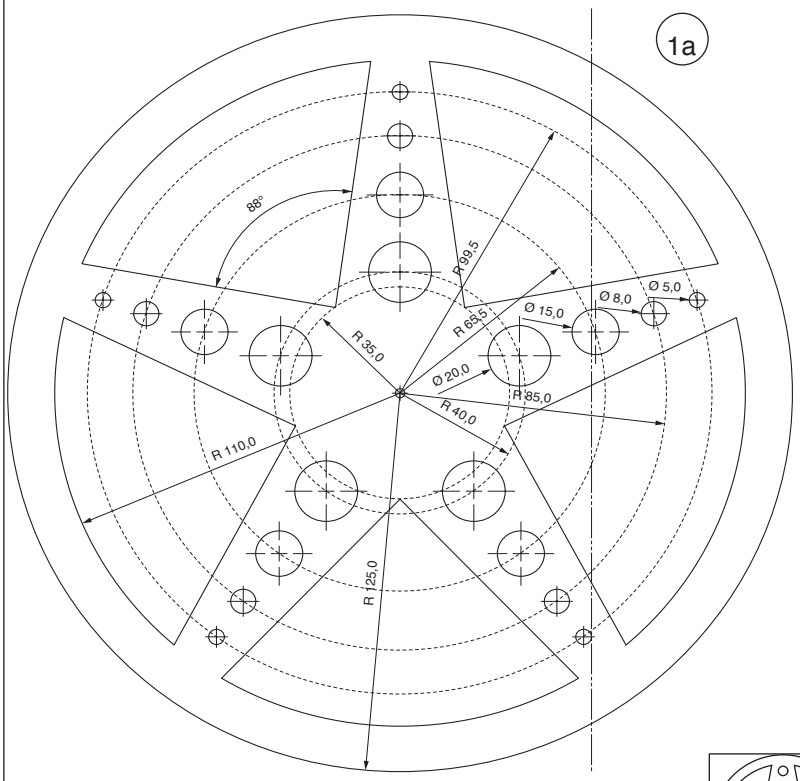
6.1.1 Cut out the paper patterns for the rear wheel (See pages 15/17) and glue them together along the broken line.

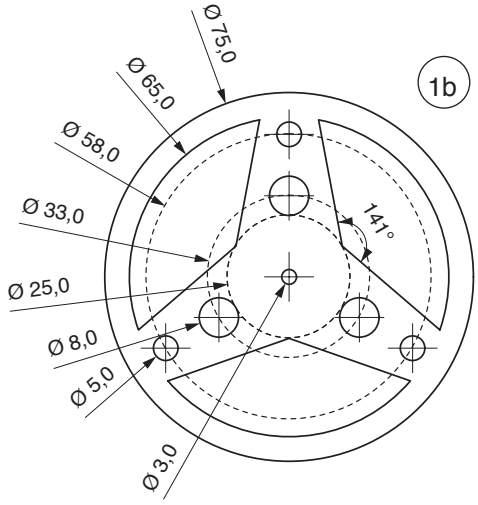
6.1.2 Use the patterns or measure out with a compass the dimensions for the rear wheel and front wheels on to the plywood sheet (1)

Note: Mark out the holders, seat, and drive wheel at the same time (Steps 6.14-6.1.7)!

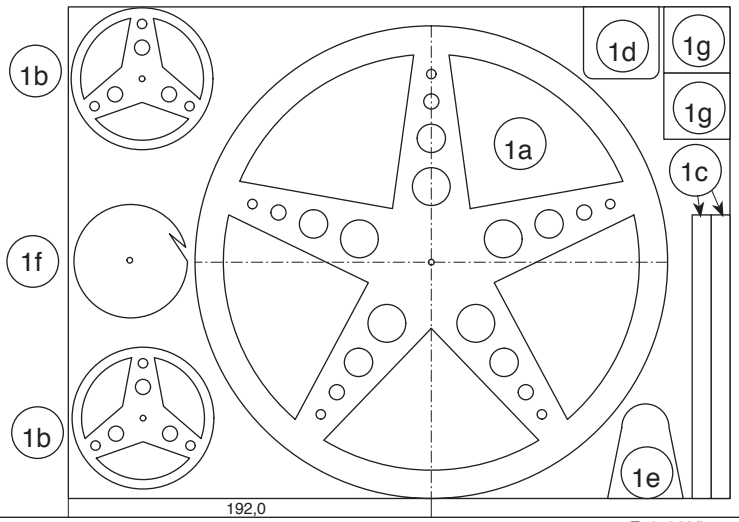
6.1.3 Firstly drill all the holes and then saw out the slots. Carefully sand all the parts

Note! Check that the wheels are as accurately round as possible so that they will run smoothly!





Cutting plan



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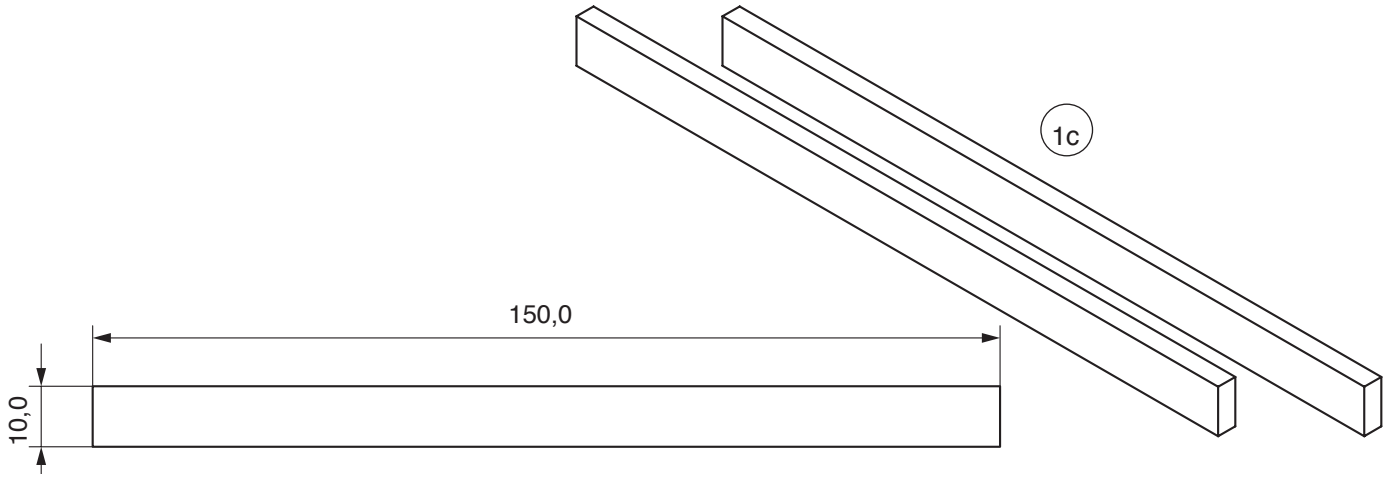
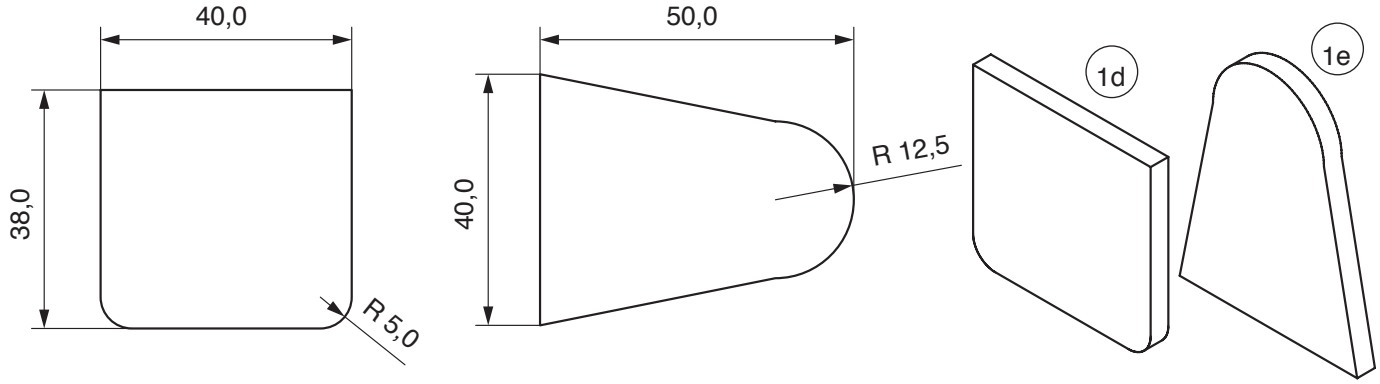
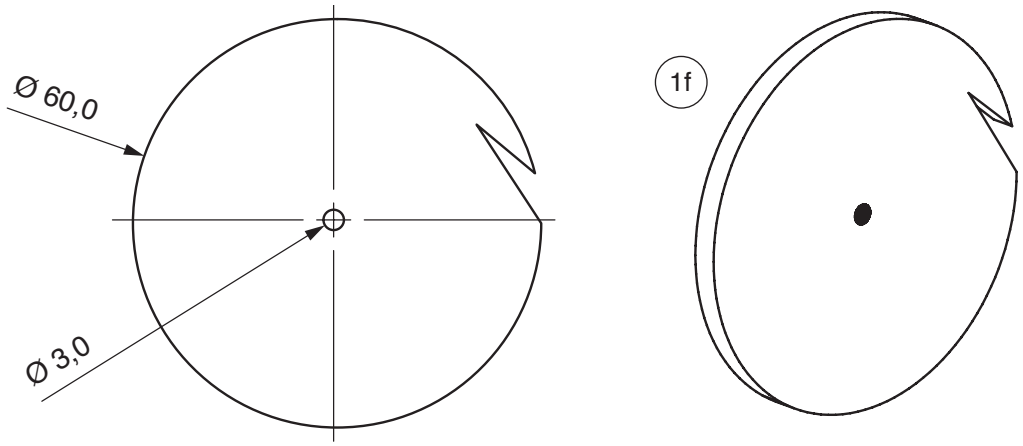
6.1.4 Mark out the axle carriers on the plywood sheet (1) saw out and sand (See cutting plan)

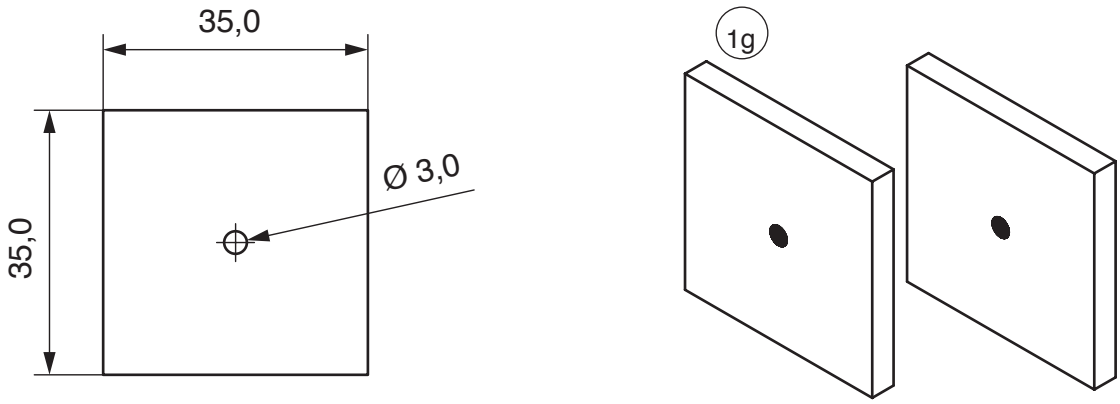


6.15 Mark out the seat (1d/e) on the plywood sheet (1) saw ot and sand to shape. (See cutting plan)

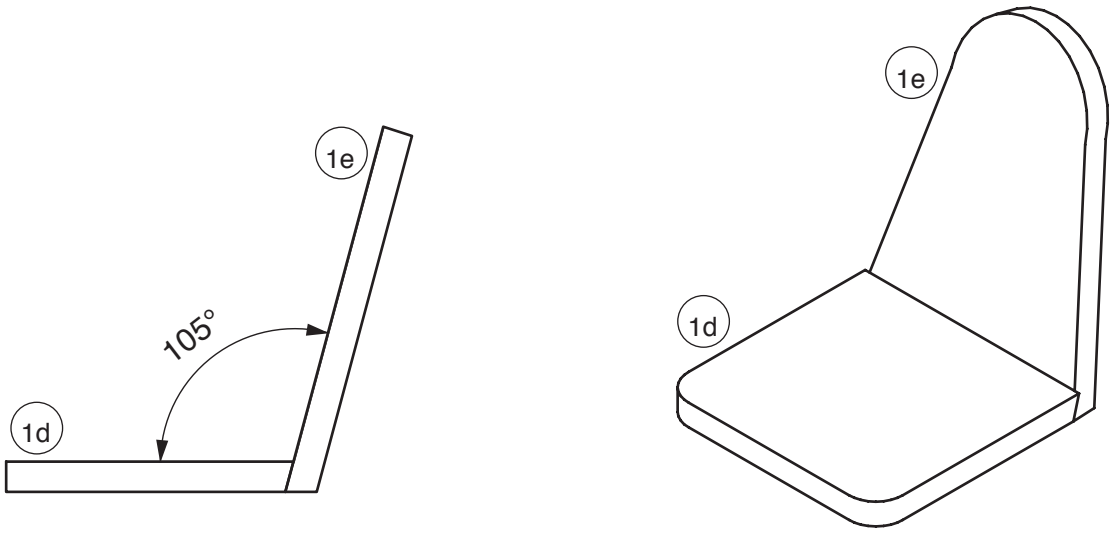


6.16 Mark out the drive wheel (1f) on the plywood sheet (1) drill (3mm dia) and then saw out and sand.

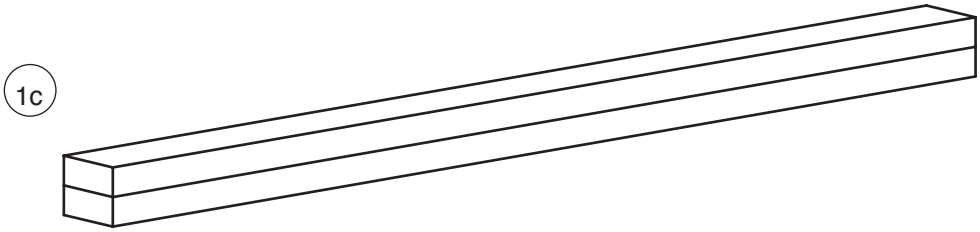




6.1.8 Glue the seat parts together as shown at an angle of 105 degrees

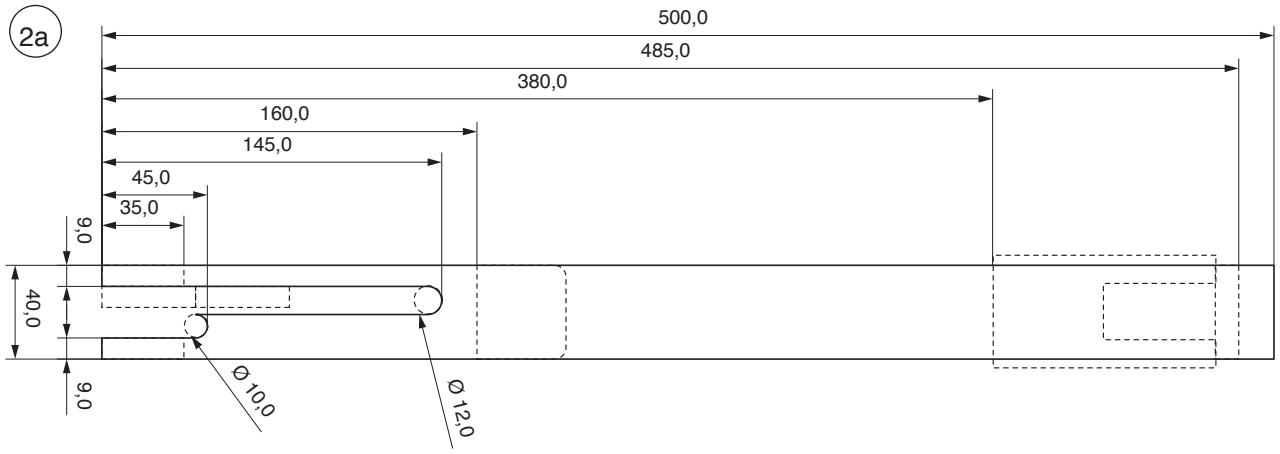


6.1.9 Glue the axle carriers (1c) on top of each other as shown

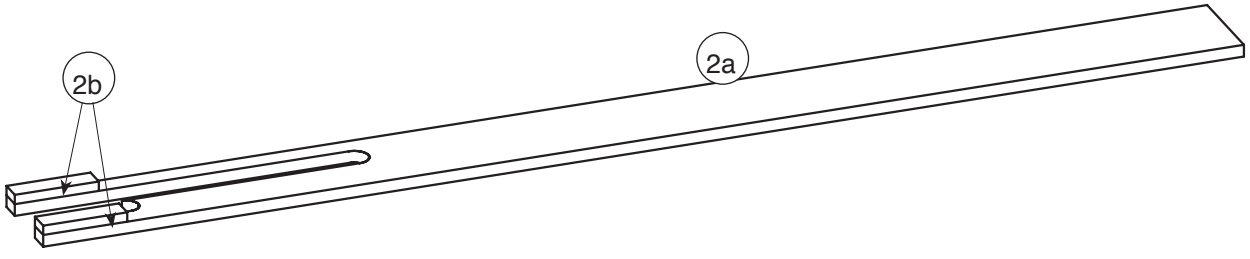


6.2 Making the chassis of the vehicle

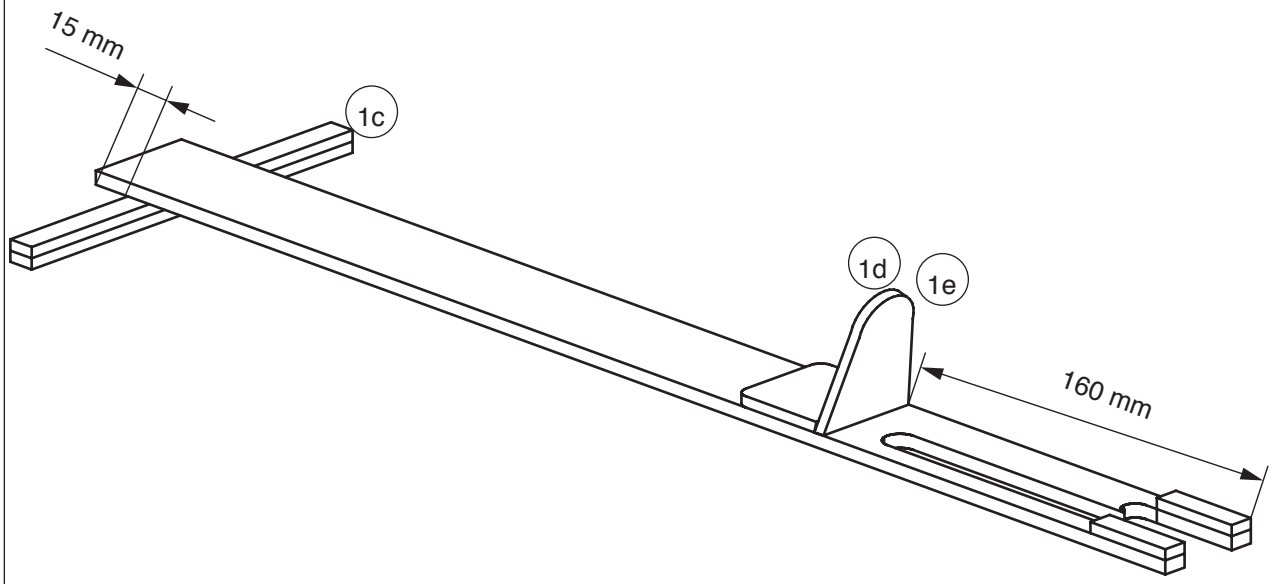
6.2.1 Measure out the chassis (See page 19) on the pine strip (2) 5 x 40 x 500mm. Drill the ends of the slots 10mm and 12mm dia and then saw out the slots (This makes a better finish) Finally carefully saw out the slots.



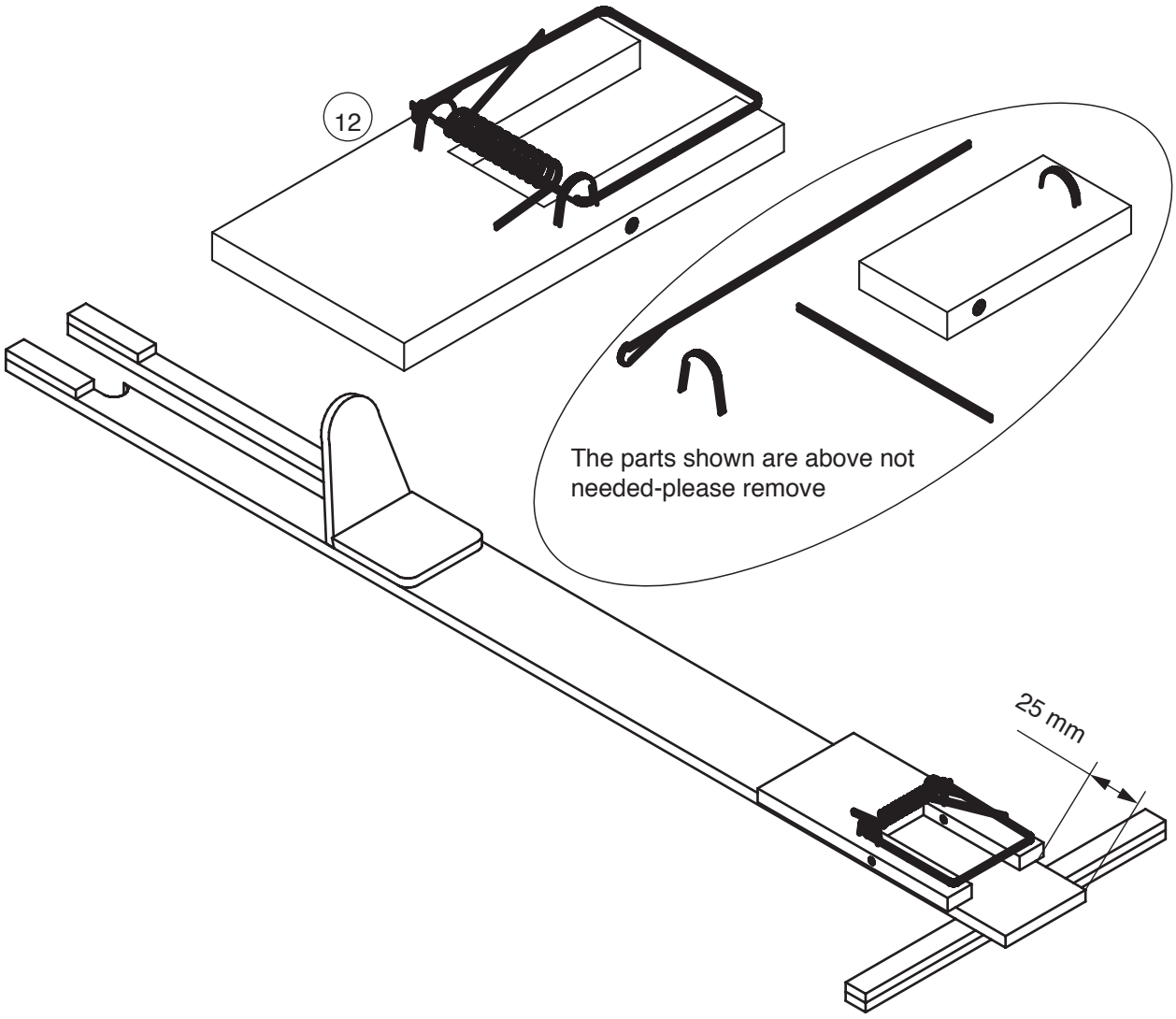
6.2.2 From the remainder of the offcuts make 2 supports (2b) 5x 9 x 40mm) and then glue them in position as shown.



6.2.3 Mount the seat (1d/1e) on the chassis 160mm from the slotted end and the axle carrier (1c) across the front 15mm in.



6.2.4 Take the mousetrap (12) and remove the moving part and the other parts as shown.



Glue the rest of the mouse trap 25mm from the front as shown

6.3 Finished colour design

The colour is left up to you but should be completed before mounting the wheels.

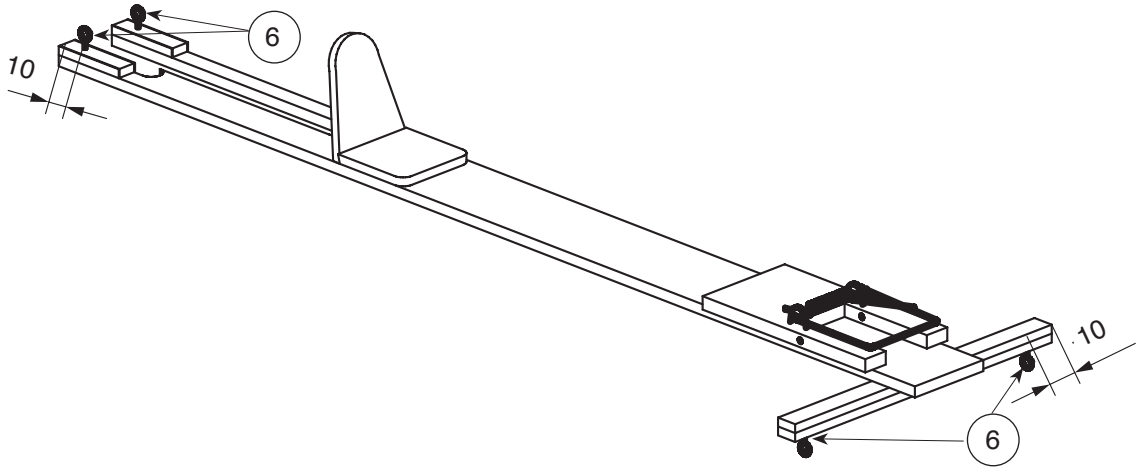
6.4. Montage der Räder

6.4.1 The rear bearing consists of 2 screw eyes (6) inserted 10mm in from each end of the axle holder

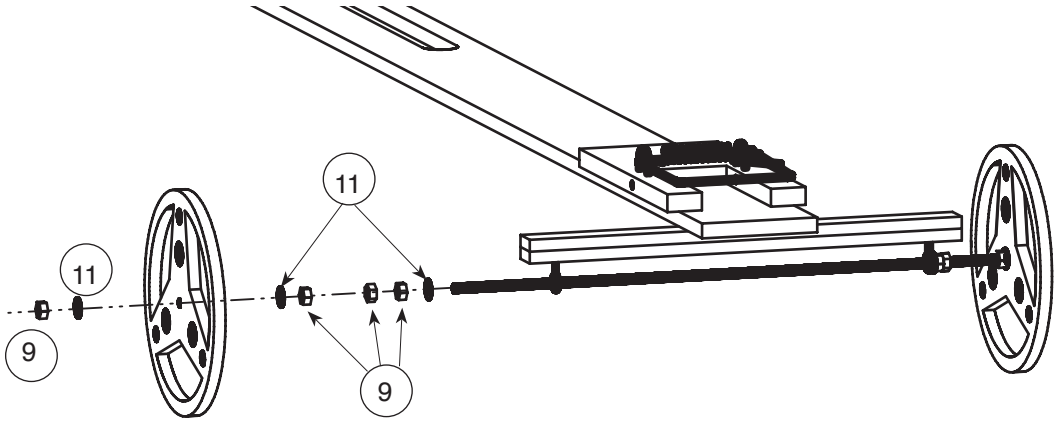
Note: The screw eyes must line up with each other !!

6.4.2 The front bearings are again made from two screw eyes (6) set in 10mm from the ends of the front axle.

Note: The screw eyes must line up with each other , check by inserting the threaded rod!!! correct if necessary.

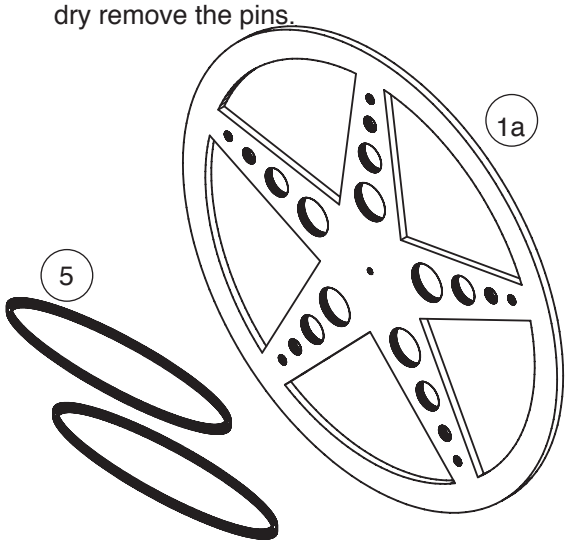


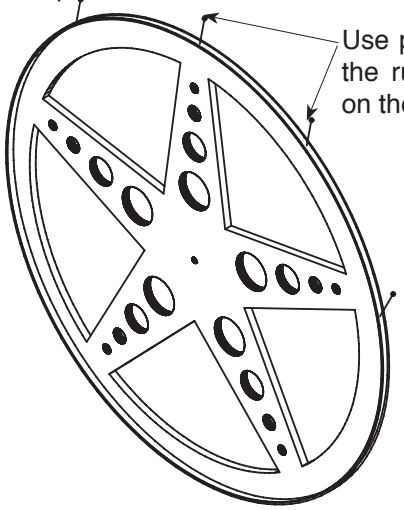
6.4.3 Use the threaded rod (10) at the front an insert it through the screw eyes, add a washer on both sides (11) and two nuts (9) adjust so that the axle is central and spins easily.



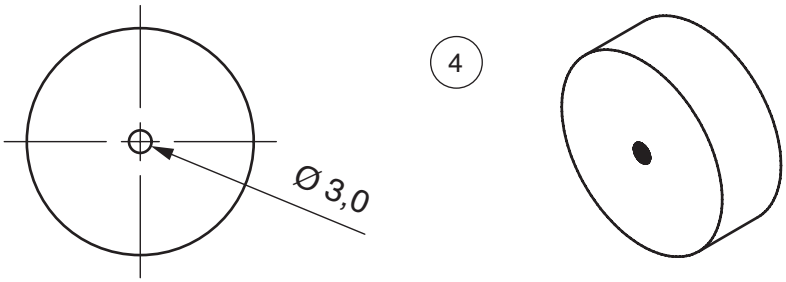
Now add another locking nut and a washer on either side.

6.4.4 Stretch a rubber band (5) (The other is as a spare) around the rear wheel. To ensure that it does not slide off hold it place with pins and the apply glue at various points around the circumference, when dry remove the pins.



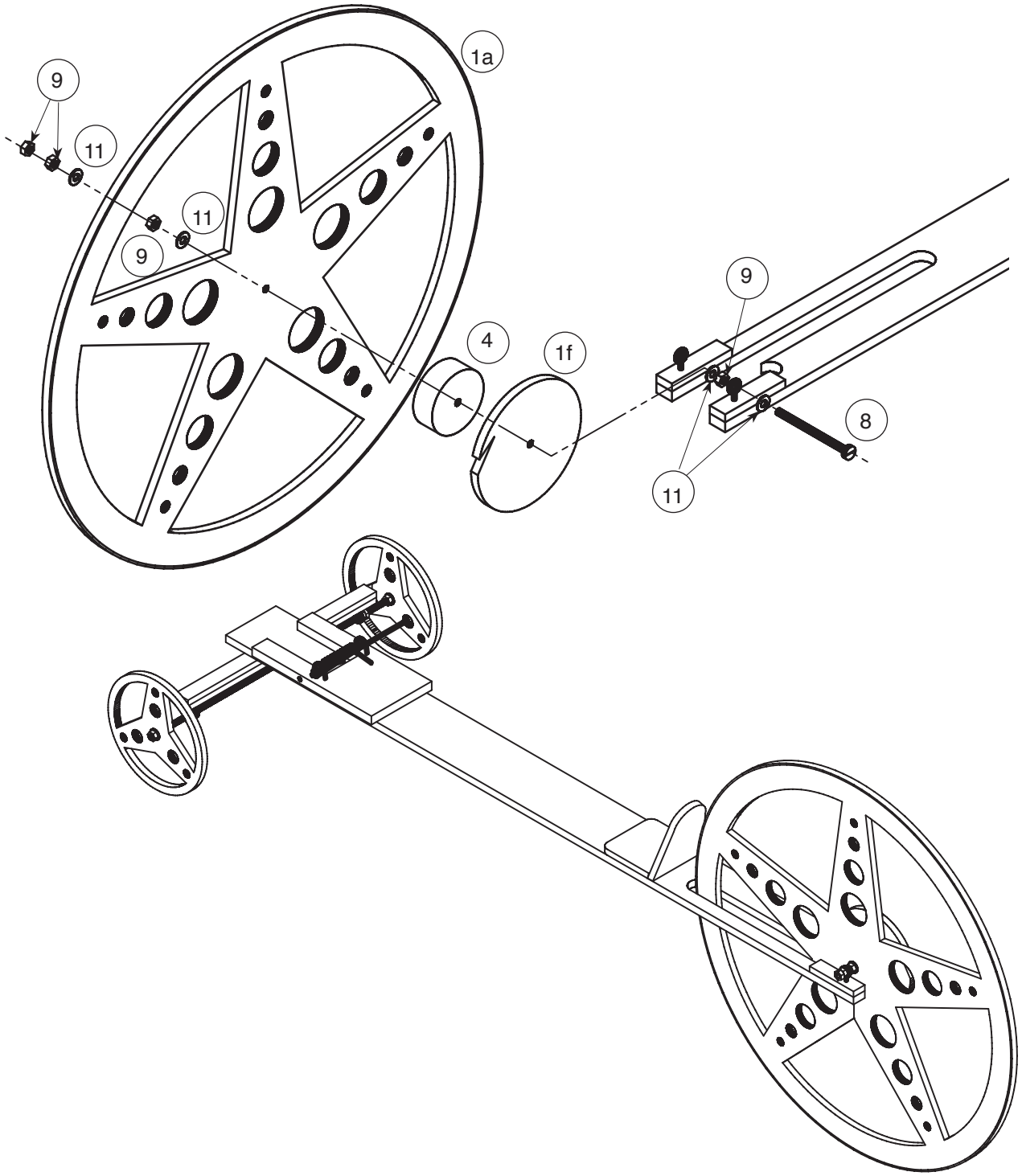


6.4.5 Drill a 3mm hole through the middle of the wood disc (4)



6.4.2 Place a washer (11) on the machine screw (8) and insert in through the rear screw eye, on the inside add a nut (9) and then a washer (11) tighten. Now add the drive wheel (1f) and the wood disc (4) and then the rear wheel (1a). Slide the machine screw through the second screw eye and on the outside add a washer (11) and two nuts (9). Adjust the system so that the wheel turns easily in the slot. Once the correct amount of play ahs been achieved, contra tighten the two nuts

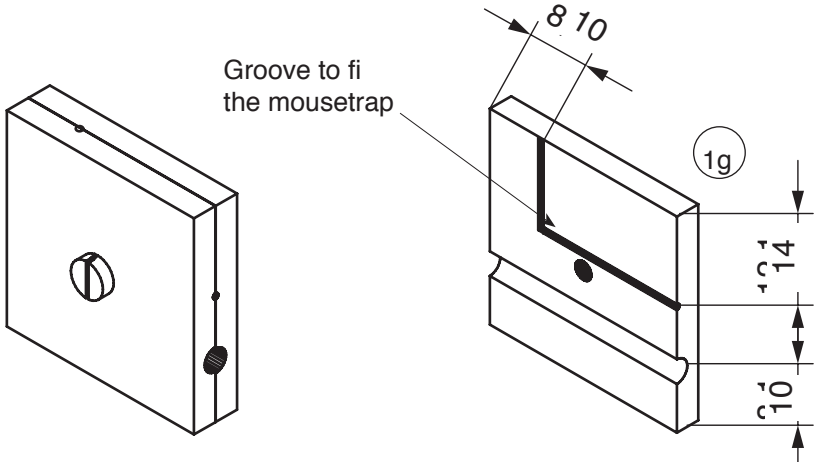
Note! Note the direction of the slot in the drive wheel (1f).



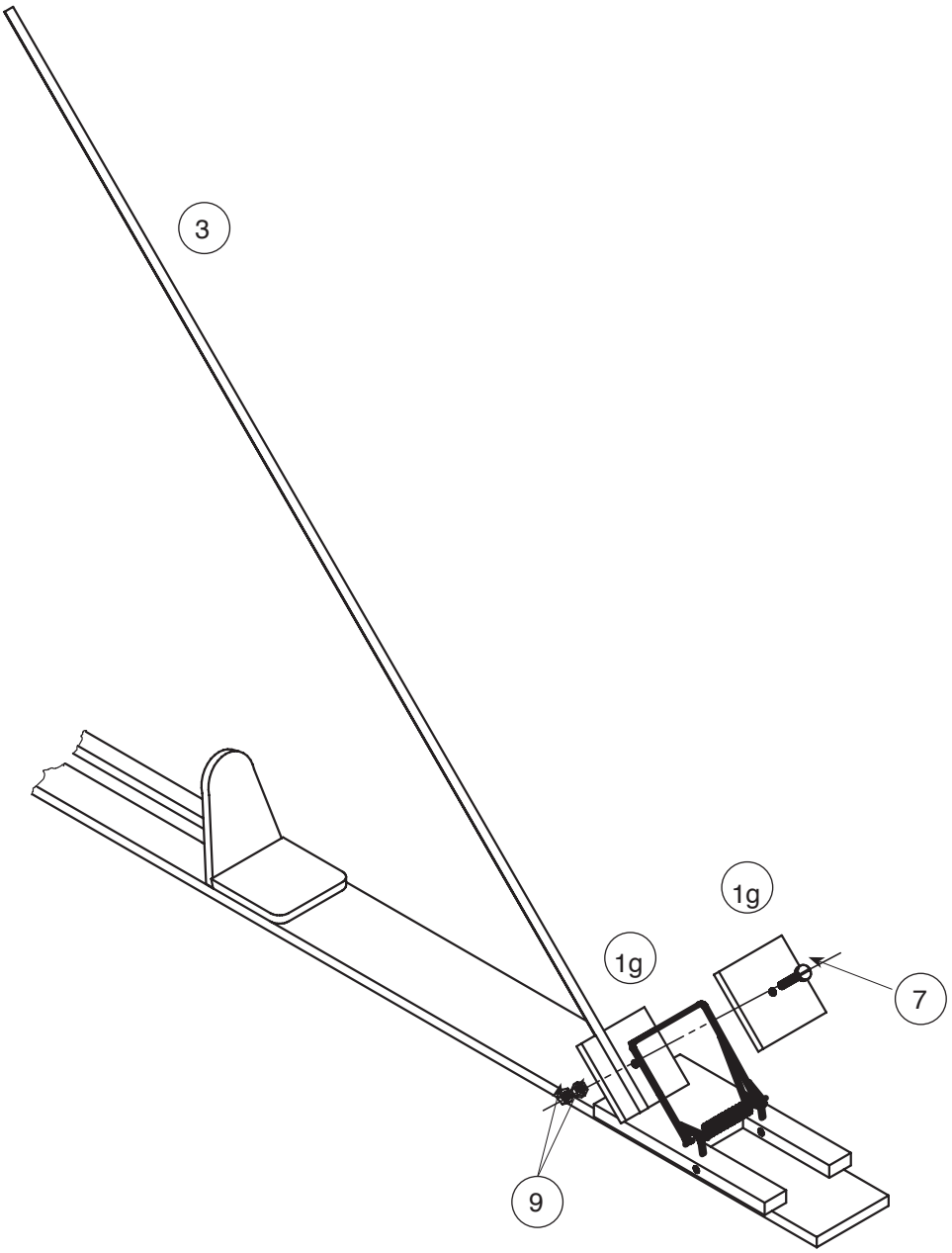
6.5 Assembling the drive system

6.5.1 Lay the two holders (1g) on top of each other and insert a screw (7) and tighten with 2 nuts

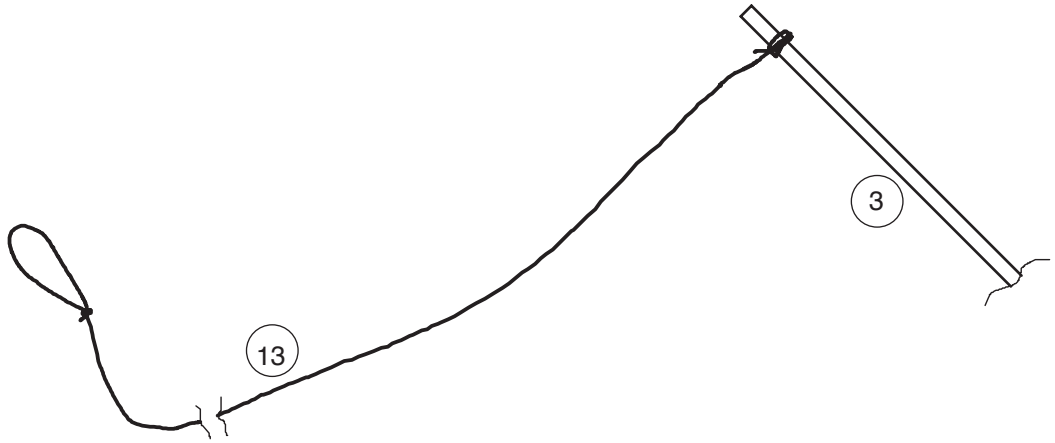
6.5.2 Then drill a 3mm or 3,5mm hole through for the dowel and the two 1mm or 1.5 mm holes for the mouse trap. Remove the central screw and test the fit of the parts. The grooves can be increased with a needle file or a 3 cornered file as necessary.



6.5.3 Trap the dowel (3) and wire mousetrap frame between the parts of the holder and clamp it in place.

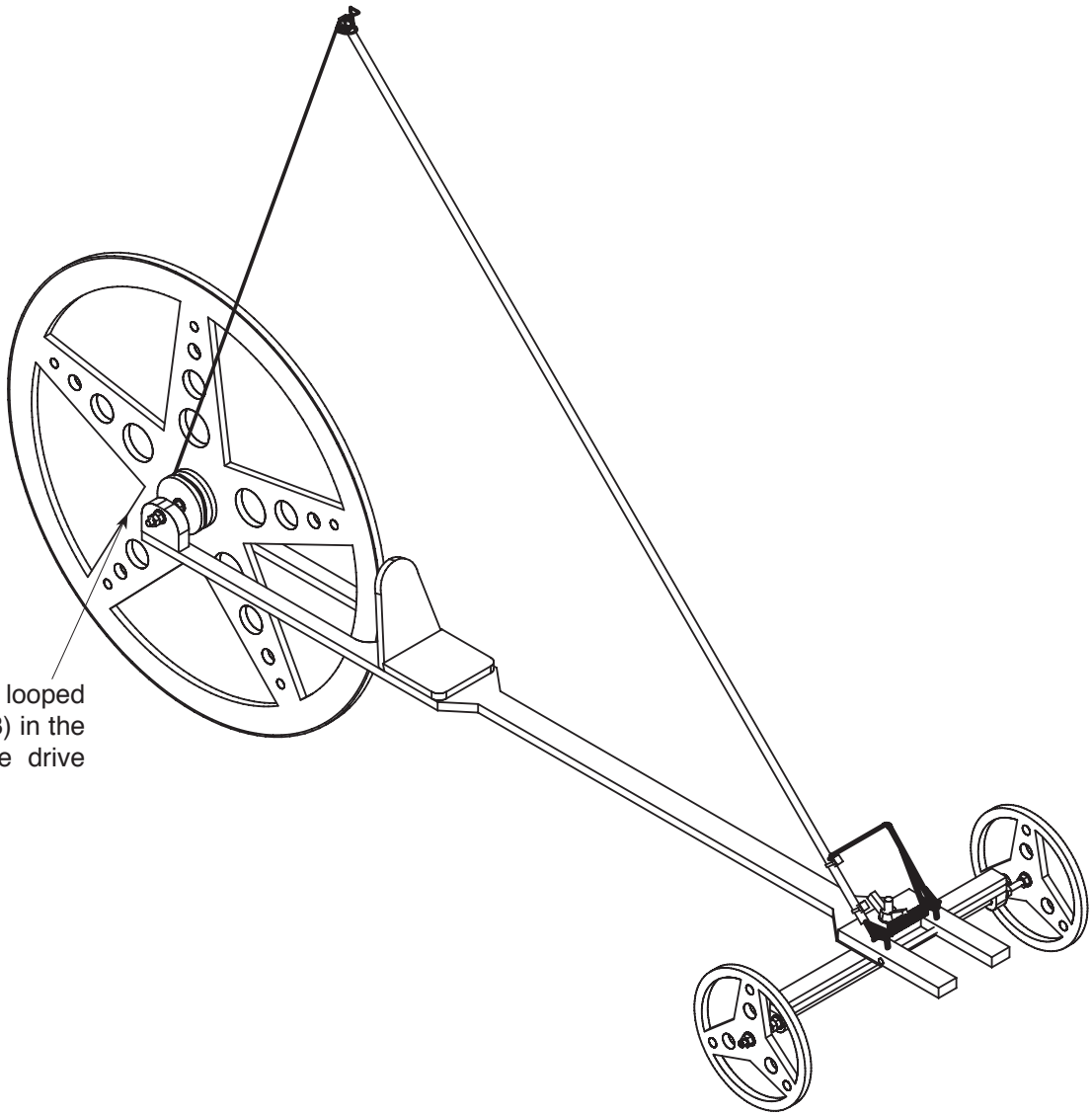


6.5.4 Tie the thread (13) to the end of dowel , glue. Tie a loop in the other end



6.6 Testing

Fit the loop around the notch in the drive wheel and turn the wheel until the mouse trap spring is wound back and under pressure.
Place the vehicle on a smooth flat surface (Not on carpet) and let it go.



Hang the looped thread (13) in the slot in the drive wheel.

Notes on Tuning the vehicle

The size of the wooden disc (4) will influence the distance travelled

Smaller diameter = larger distance

Larger diameter = smaller distance

If the dowel (3) is longer, the leverage is greater = longer distance travelled

A smaller rear wheel will make the acceleration greater but shortens the distance travelled

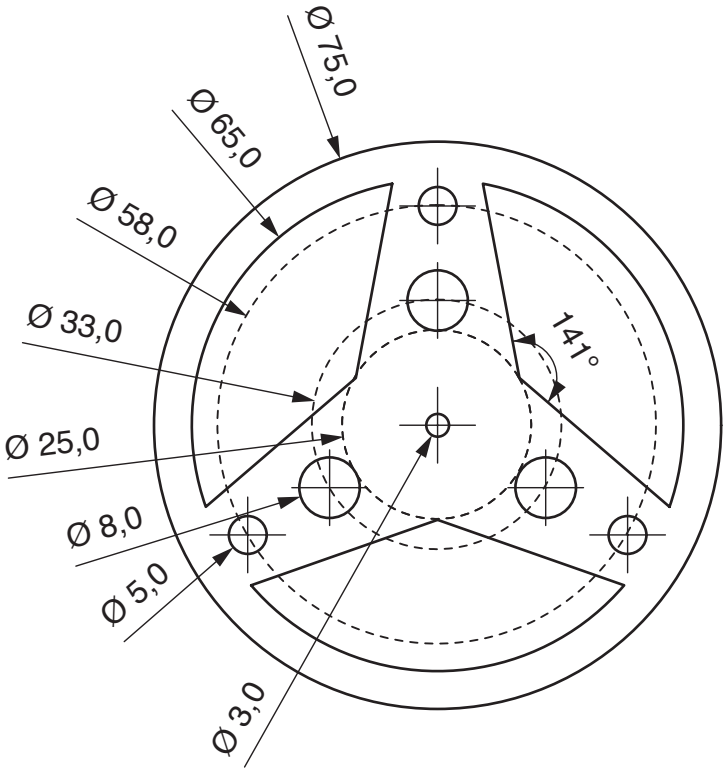
There more things that will influence the design which you can think out for yourself and experiment through trial and error

Have fun !!

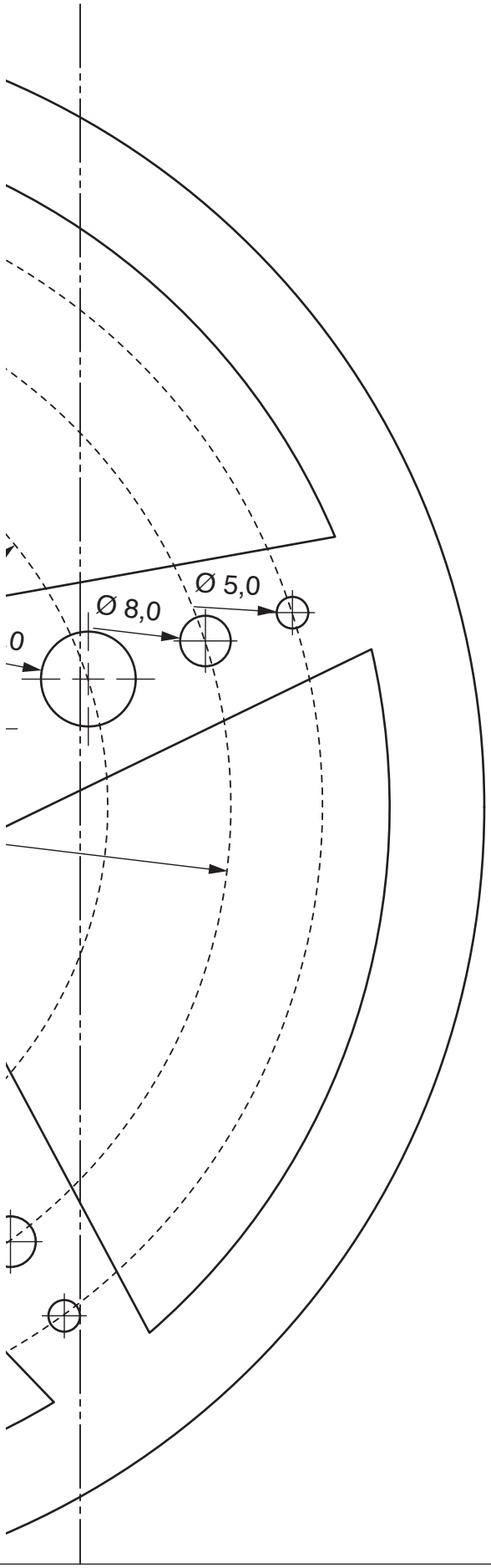
7. Patterns

Scale 1: 1

Front wheel



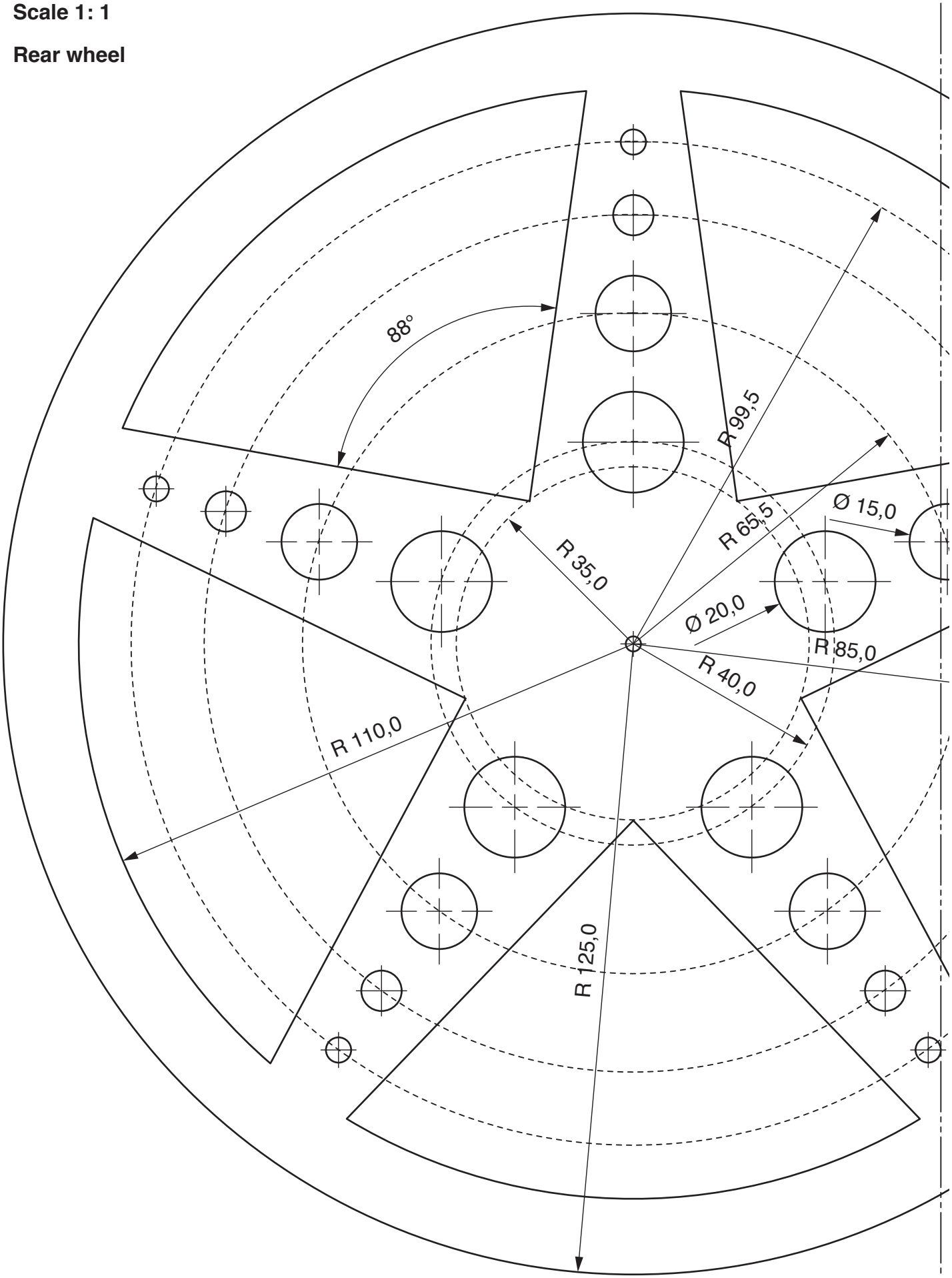
Rear wheel



7. Patterns

Scale 1: 1

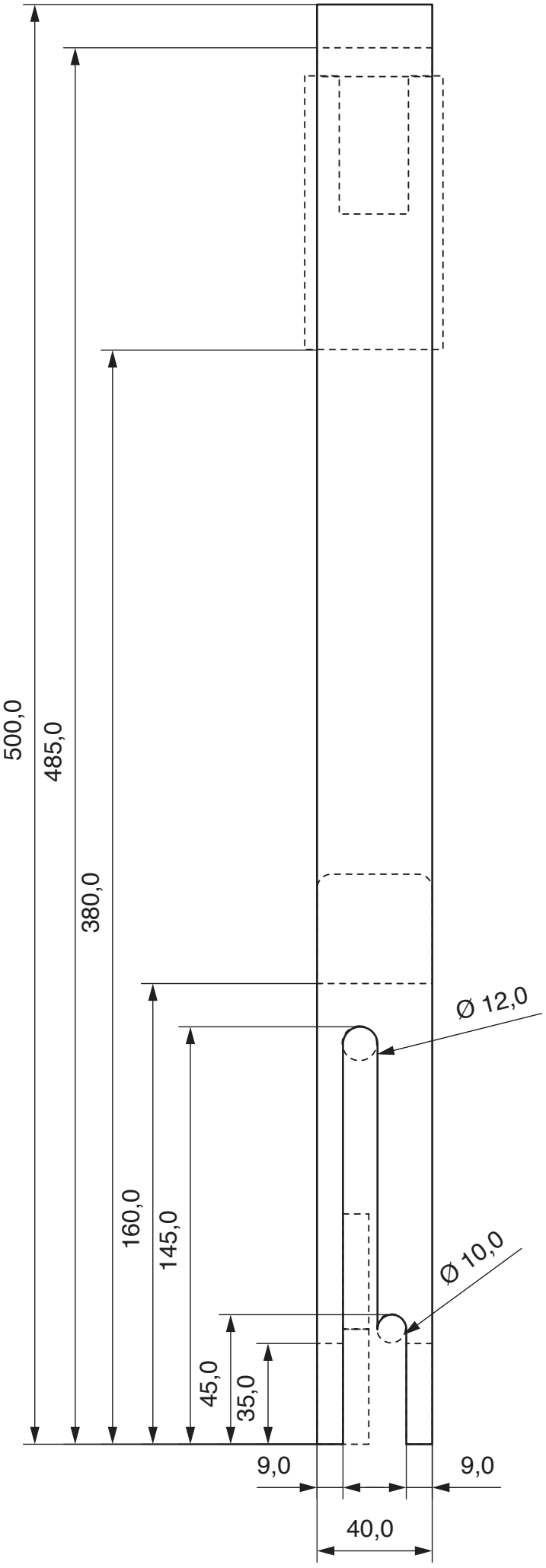
Rear wheel



7. Patterns

Scale 1: 1

Chassis



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