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Keywords

Wheels, axles, pulleys, robots, control, power, voltage, balance, friction, ICT, loose fit, tight fit, frame, laminate, chassis, reversing switch.

Task

Make the Mars Rover using the instructions provided

Note - The card top provided used as provided
OR

Use the same top provided but plastic laminate to make your top look better. (you will need to use a plastic laminator and have laminating pouches (A5 size + size)

Kre8 Mars Rover



Extra Challenges

- a) Organise a game or competition using your robot
- b) Make improvements after testing and using it.
- c) You could control it using a computer instead of the hand controller (e.g. using the IQ Controller from Rapid)

Educational Benefits

Topical and Relevant -The Kre8 Mars Rover is a steerable model version of the US robots exploring Mars. It makes students think about conditions for sustainable life on Planets and on Earth. There are lots of 'what if questions' such How can a distant robot be powered? How do we communicate to with it? Is there water on Mars?

Robotics - Making and understanding a simple robot. Making a fun product that combines electrics, mechanisms, and structures.

Personal - Sharing their pride with peers and parents when taken home. Making a technical product. Co-operation and teamwork, able to follow visual making instructions, role-play, problem solving, testing and evaluating. Developing ways it can be used competitively or in an exploratory way.

Technical - steering, speed, reducing friction, wiring up the circuit, forward and reverse switching, balance, gearing down the motor speed, understanding the functional and decorative aspects.

2

Parts for Kre8[®] Mars Rover

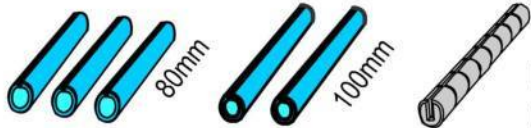
Tip - Visit www.kre8.com for movies and other support



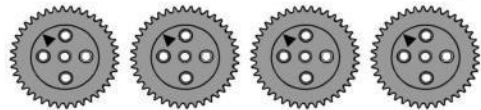
1 x Clip connector



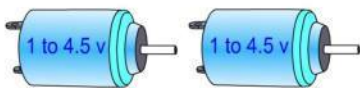
5 x Multiblocks (green) - **IMPORTANT** - Keep THREE of the blocks uncut as supplied



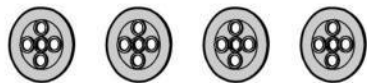
3 x slit rod
2 x slit rod
1 x 4mm snap rod
160mm long - dark grey



4 x 40mm dia. wheels (used to make the pulley wheels)

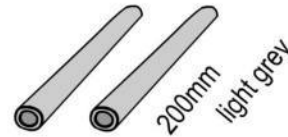


2 x standard electric motors

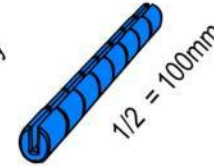


4 x 28mm dia. wheels

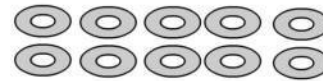
Trim all sharp edges after cutting



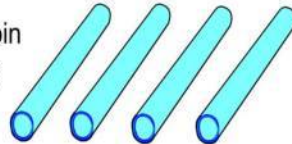
2 x 3.9mm dia. 200mm light grey



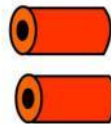
1/2 blue 5mm snap rod



10 x 4mm steel washers



4 x 200mm long 5mm dia. light blue tubes



2 - dayglow bedndy tubes 5mm dia.

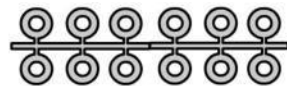
Abrasive paper



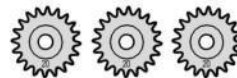
2 x blue collars



2 x 60mm and 2 x 40mm rubber bands



12 x grey collars



3 x 20mm dia gears



Bag



Card Mars Rover Top

Kre8[®] Manual Controller

and ribbon cable

There is help on 'Connecting Up' the Kre8 Manual Controller' on Kre8 website

Tools

Snips (or wire cutters and string sharp scissors)
 Use to cut Kre8 connector hinges, plastic sheet, light blue tubing (the serrated blades are better than smooth blades).

Emery Cloth
 Assembly is easier if you use fine 'emery cloth' or other 'abrasive paper' to round and smooth the slit rod or blue tube ends.

Pencil and Rule
 Use to mark lengths of blue tube or slit rods before cutting. Can also be used on plastic sheet before shapes are cut out. (FREE rule at bottom of page)

4mm dia. Drill Just in case the pulley wheel is too tight.

DRILL SAFETY
 Keep hands away from sharp edge when drilling

OTHER - Clear tape, paper punch and small screwdriver to add wires to the Kre8 manual controller.

Optional - Plastic laminator

Instructions

These can be viewed and printed out at www.Kre8.com website. Go to sitemap and find Mars Rover in Robot 1 selection

Go to www.kre8.com for free instructions

Easy Assembly

The rods are easier to insert into the connectors if twisted as they are pushed into place. Younger students should 'round off' and smooth the tube and rod ends before pushing into holes.

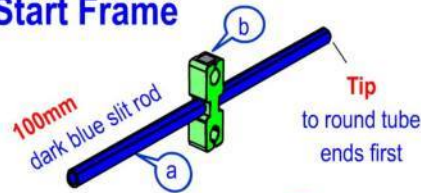
To Make

Follow the 'step-by-step' instructions provided and adapt as you want.

NOTES

- (1) ONLY cut the **connectors** up as needed.
- (2) Use a **ruler** for measuring (bottom of page)
- (3) For easy assembly - **smooth and round the rod ends with abrasive paper then push and twist the rods into the connectors.**

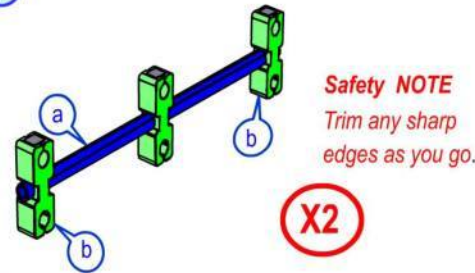
1 Start Frame



X2

Get a 100mm long slit rod (a) then slide a green multiblock (b) along as shown. **Make two of these.**

2

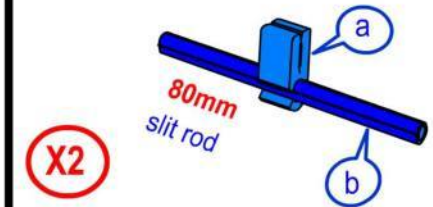


X2

Twist and push two green multiblocks (b) onto the same slit rods (a) so they are near the ends as shown.

3

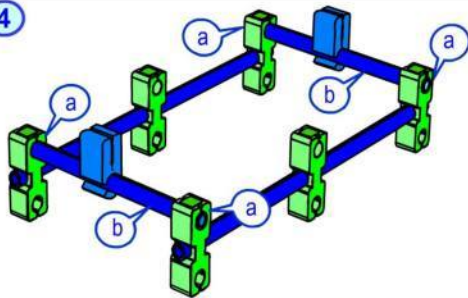
Frame Ends



X2

Make two frame ends by sliding a blue clip connector (a) to the centre of the 80mm long slit rod (b).

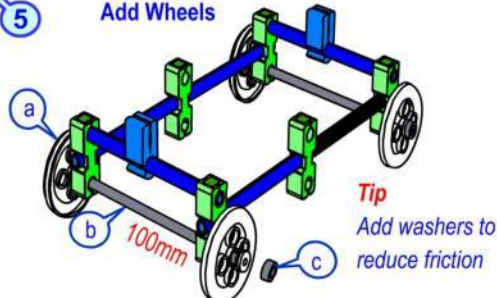
4



Join the two sides together using the top holes in the green multiblocks (a) with the part just assembled (b).

5

Add Wheels

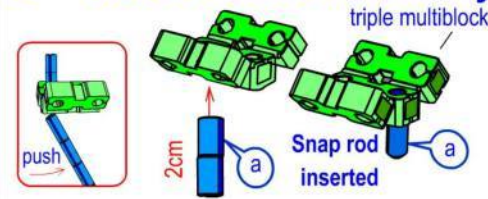


Tip
Add washers to reduce friction

Add the 28mm diameter wheels (a) using 100mm long light grey axle tubes (b) and add grey collars (c).

6

Motor Holder Assembly

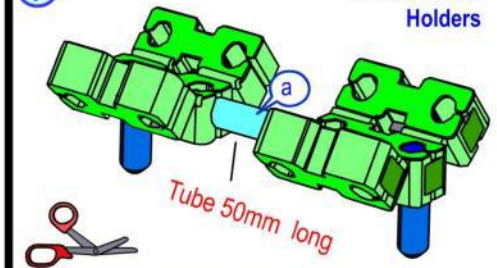


Tip - use multiblock to help 'snap' rod

Snap off two 2cm long 5mm blue dia snap rods (a) then place into the centre end of two triple multiblocks.

7

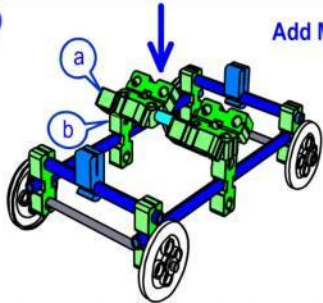
Linking Motor Holders



Cut a 50mm long light blue tube (a) then join the triple green multiblocks as shown.

8

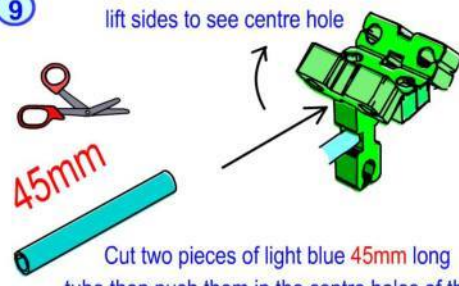
Add Motor Holder Assembly onto frame (just made)



Join the motor holder assembly (a) -just made- to the main wheel frame (b) using the 5mm snap rods.

9

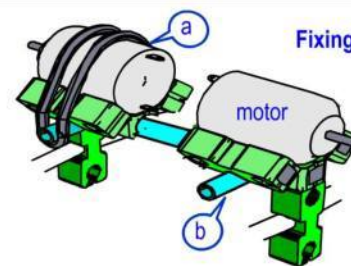
lift sides to see centre hole



Cut two pieces of light blue 45mm long tube then push them in the centre holes of the green connectors. - Lift up the sides to reveal the centre hole. (also look at next drawing)

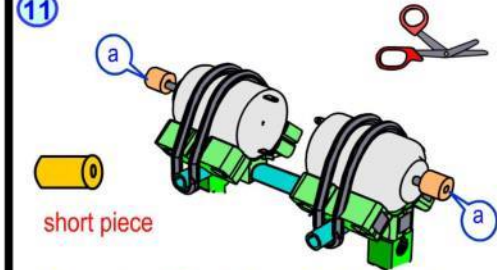
10

Fixing motors



Hook a short rubber band (a) over the light blue tubes (b) to hold the motor in place.

11



Cut two short (10mm) pieces of bendy dayglow tube (a) and then push them onto the electric motor spindles.

2- How to make the Kre8® Mars Rover Frame

Tip - Visit www.kre8.com for videos and other support pages



12 PULLEY WHEELS Making

'V' pulley groove here

X2

(1) (2)

Make by placing two wheels **face to face**, then join by:
 (1) pushing the grey 4mm snap rod into the outer holes.
 (2) snap rods off **1cm long** by bending over as shown.

13 Assembly of the pulley wheels on the axle

120mm

3.9mm diameter

3.9mm diameter

120mm

'V' groove must be in centre

This drawing shows how to assemble the 'pulley wheels' onto the **3.9mm light grey tube (a)** and adding 3 metal washers (b) and 2 grey collars (c).

14 Pulley Wheels

After making check the wheels 'spin' on the axle - if not **redrill axle holes 4mm.** testing

SAFETY If the axle hole needs enlarging, **redrill over a block of wood NOT into your hand.**

15

120mm

Add the pulley wheels (a) on a **120mm long 3.9mm light grey axle tube** using step 14 to help you. The metal washers help to reduce friction and act as spacers.

16 Add Drive Pulleys

Add two of the long rubber bands (a) linking them from the motor spindles (b) to the pulley wheels (c).

17 Now is a good time to cut out the top

Get page called **Mars Rover Top**

and add the Manual Controller see page called **Adding the Kre8 Manual Controller**

IMPORTANT NOTE
 The ribbon cable can pass through the Mars Rover wire hole

18

100mm

75mm

70mm

Insert the front (a) **100mm** and back (b) **70mm** long light blue tubes, then link them up with a **80mm** long tube (c) using two blue clip connectors (d).

19

Tops can be printed out from Kre8.com

After you have made the Mars Rover top (a) from the printout add it to your model, fixing it in place using the two blue collars (b).

20

Start adding the Mars Rover 'vision system' by adding a green multiblock (a) on the front tube (b).

21

20mm

Complete the 'vision system' by adding two 20mm bevel gears (a) on two **20mm** snap grey rods (b) held together using grey collars (c).

22

20mm

20mm long

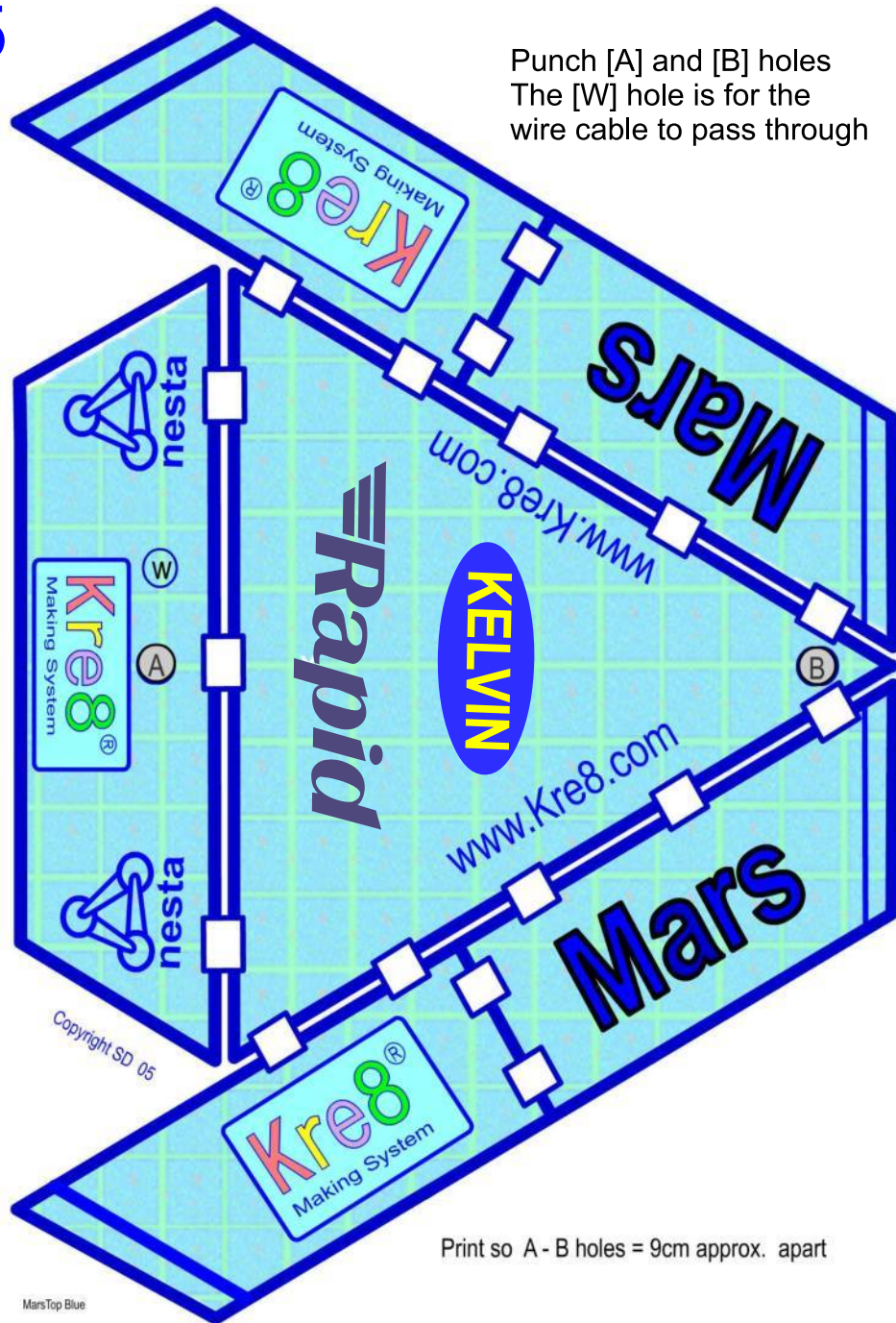
Add the Earth to Mars antenna made from a **20mm** bevel gear (a) and a 20mm long light grey rod (b).

23

ribbon cable

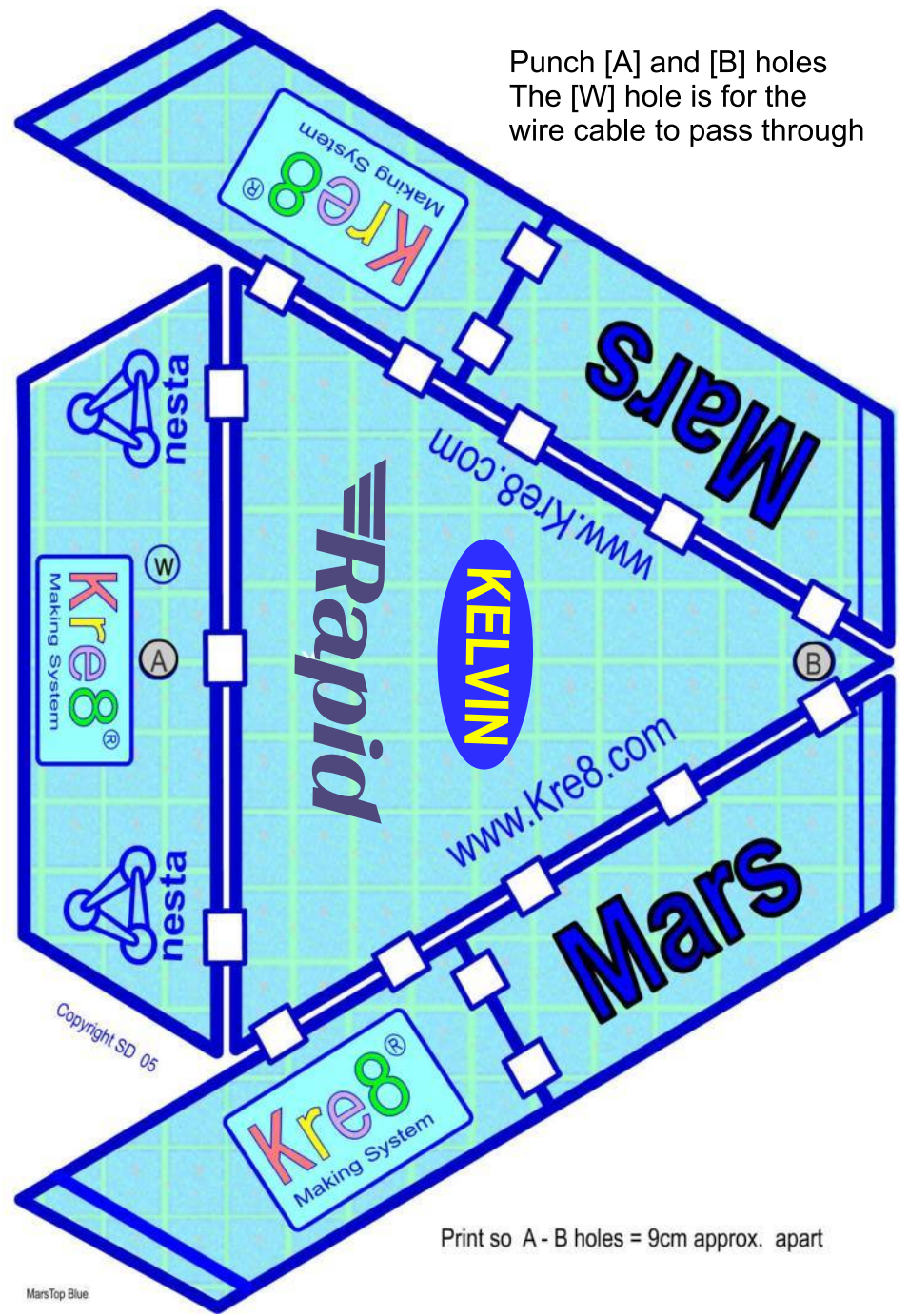
Next add Manual Controller - see **MANUAL CONTROL** sheet for help
 *To do this you will need to remove the top first
www.kre8.com select **Robot1 > ManualCcontroller**

5



Punch [A] and [B] holes
The [W] hole is for the
wire cable to pass through

Print so A - B holes = 9cm approx. apart



Punch [A] and [B] holes
The [W] hole is for the
wire cable to pass through

Print so A - B holes = 9cm approx. apart