AIR+WATER POWER

THAMES & KOSMOS

AIR+WATER POWER | Contents

RECOMMENDATIONS

Please read these instructions, follow the safety rules, and keep them for reference. We recommend that you build the models in the order in which they are presented. You will then better understand the assembly and operation of each model.

⚠ WARNING TO PARENTS

• This is a toy that has been designed for children over 8 years of age. It is not suitable for children under 3 years of age. It contains small parts that a child could swallow. It must be kept out of the reach of very young children.

• Discuss the safety warnings and possible risks involved with the children before allowing them to build these models.

Renewable Energy

No	PARTS NAMES	PCS	No	PARTS NAMES	PCS	No	PARTS NAMES	PCS
1	PRESSURIZED AIR+WATER TANK	1	14	LONG FRAME	5	27	LARGE PULLEY	2
2	WATER STORAGE TANK	1	15	LONG AXLE	2	28	SQUARE FRAME	1
3	WHEEL AND TIRE	2	16	EXTRA LONG AXLE	2	29	SMALL SPROCKET	2
4	SHORT FRAME	3	17	ONE-WAY SWITCH	1	30	SMALL GEAR	2
5	PUMP	1	18	CURVED ELBOW ROD	4	31	MEDIUM SPROCKET	2
6	AIR+WATER TURBINE	1	19	90 DEGREE CONVERTER - R	2	32	BASE PLATE	1
7	CAP FOR AIR+WATER TANK	1	20	LARGE (L) SECURITY NUT	2	33	LONG ROD	1
8	NOZZLE FOR AIR+WATER TANK	1	21	AXLE LOCK	4	34	PART SEPARATOR TOOL	1
9	WASHER	1	22	5-HOLE ROD	2	35	TUBE B, 120 CM	1
10	CHAIN UNIT	80	23	7-HOLE DUAL ROD	2	36	MEDIUM GEAR	2
11	90 DEGREE CONVERTER - L	2	24	SMALL (S) SECURITY NUT	2	37	LAUNCHER	1
12	SHORT AXLE	1	25	ANCHOR PIN	20	38	LARGE SPROCKET	2
13	11-HOLE ROD	1	26	O RING LARGE	2	39	TUBE A, 200 CM	1
						TOTAL		165
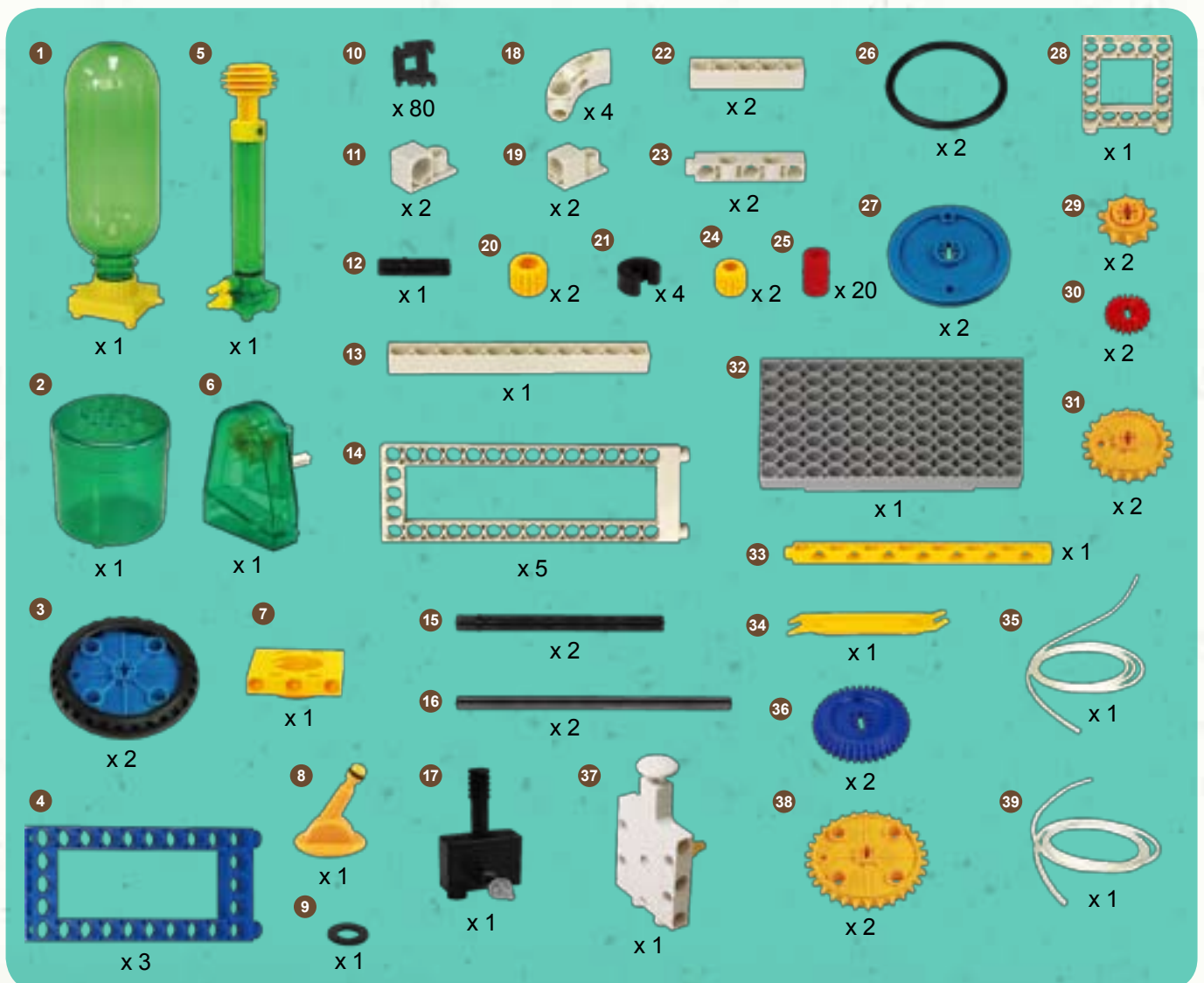
1 atmospheric pressure (atm)

$= 760$ mmHg (torr) $= 76$ cmHg

$= 76 \cdot 13.6$ g/cm^3 (density of mercury)

$= 1033.6$ g/cm$^2 = 1.0336$ kg/cm^2

Therefore, 3.5 kg/cm^2 of compressed air is equal to 3.4 atm. To grasp the potential energy of this pressure, you have to realize that mercury is 13 times denser than water. So, a pressure of 3.4 atm equates to the pressure of a 1-by-1 cm column of mercury that is 76 cm tall, or a 1-by-1 cm column of water that is 35 meters tall! That is the height of a 10-story building! This is why you can power your models with the energy created by simply pumping air into the air+water tank.

HOW TO OPERATE THE AIR+WATER TURBINE

1. Pump the pump about 10 times to get all water from water storage tank into the pressurized air+water tank, and keep pumping another 40 times to compress the air and build up the pressure in the air+water tank.

2. Move the level of the one-way switch to open it.

3. The released water will spray out and strike the blades of the water wheel to activate the air+water turbine, and drive the geared mechanism behind it. The water then flows out through the exit nozzle and returns to the water storage tank for repeated use.

Front View

The entrance

The exit

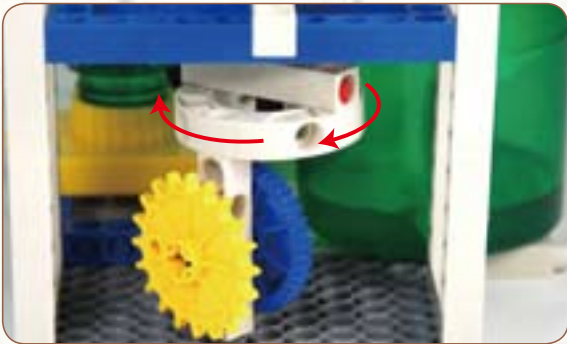**Step 1**   Pump 50 times.

Step 2   Turn on the switch...

Step 3   ...to spin the turbine...

Back View

...which drives the geared mechanism behind it.

The model begins to move!

Cutting Machine

Parts Needed

x 1 | x 4 | x 1 | x 1 | x 1 | x 2 | x 2 | x 2 | x 1 | x 1 | x 2 | x 1 | x 16 | x 1 | x 1 | x 1 | x 2 | x 1 | x 2 | x 2 | x 36 | x 1 | x 1 | x 3 | x 2 | x 1 | x 1 | x 4 | x 1

Assembly Notes

1. The gears should mesh well with each other in order to operate smoothly.
2. Note that the sprockets must be aligned in order for the chain to operate smoothly.
3. Cut Tube A and Tube B to get tubes of the following lengths for this model.
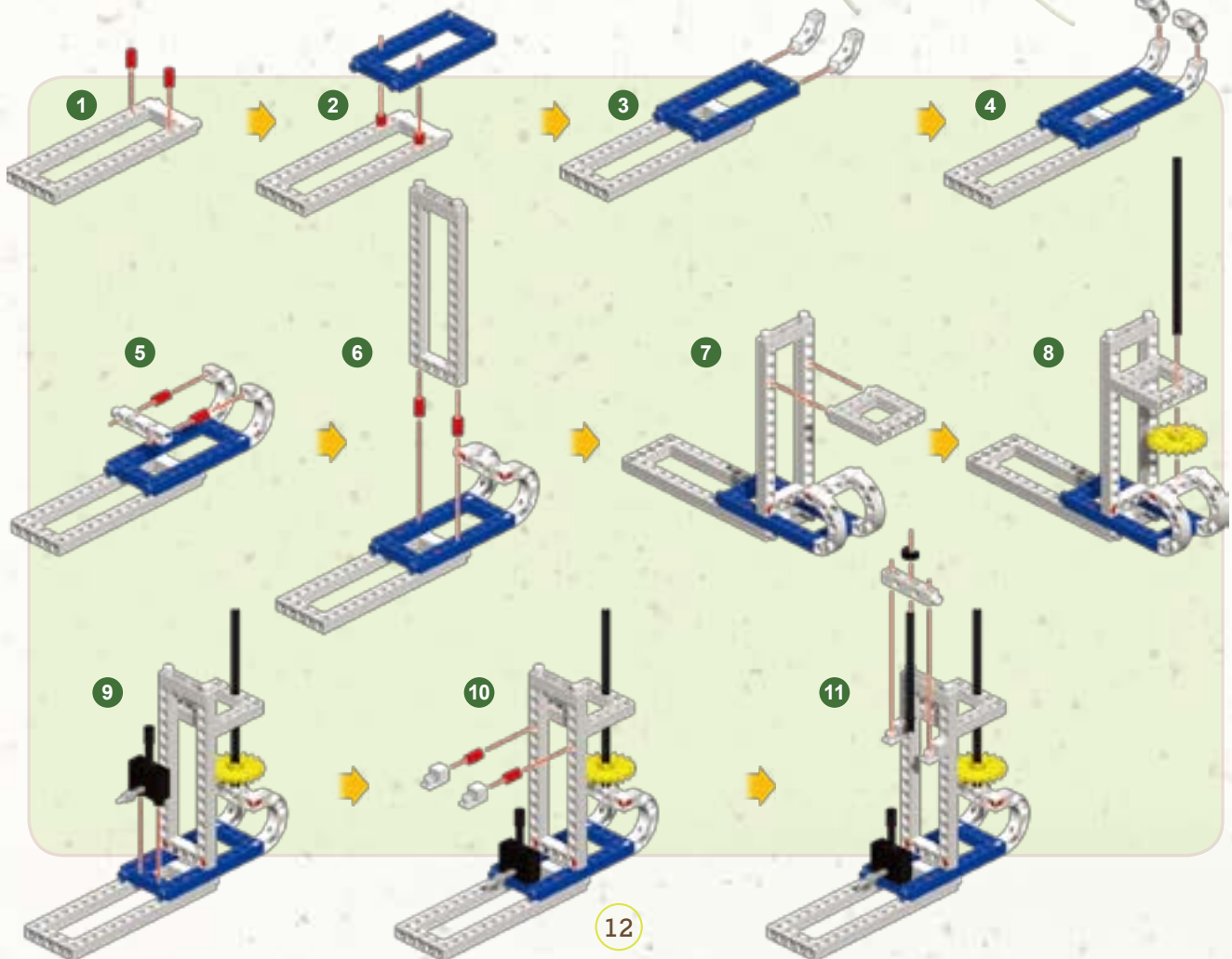
   Tube A : 9.5 cm x 1, 30 cm x 1, 37 cm x 1, 44 cm x 1
   Tube B : 25 cm x 1, 35 cm x 1

1

2

3

Tube A   Tube B

1 → **2** → **3** → **4**

5 → **6** → **7** → **8**

9 → **10** → **11**

Renewable Energy

12 13 14 16 15 17 18 19

20 21 22 23 24

25 26

cut diagonally
Tube A : 9.5 cm

27 28

Tube A : 30 cm

29

Tube B : 35 cm

30

Tube B : 25 cm

Connecting the Security Nut

S SECURITY NUT X 2

31

Tube A : 37 cm

L SECURITY NUT X 2

32

Tube A : 44 cm

Completed