
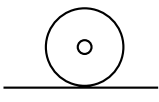

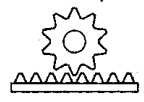
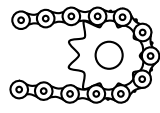


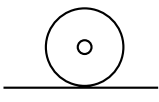
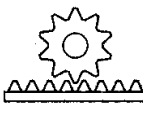
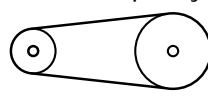
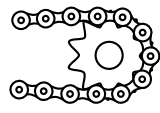
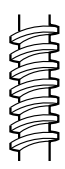

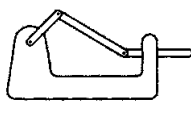
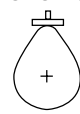
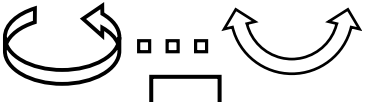
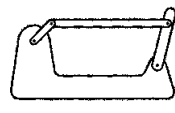
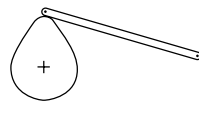
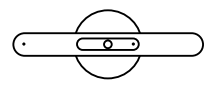
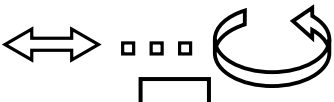
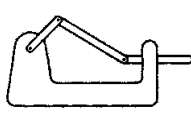
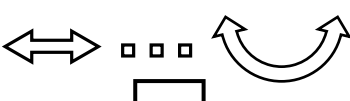
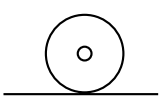
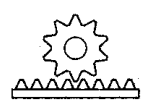
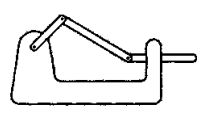
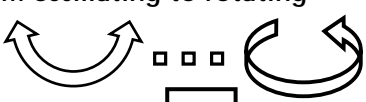
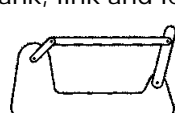
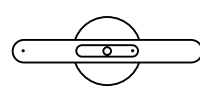
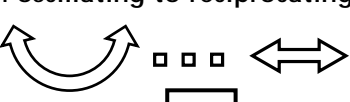


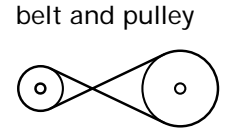
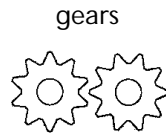
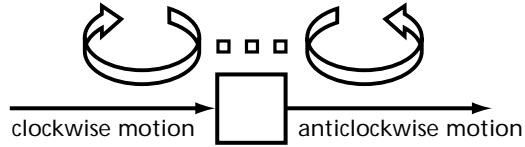


Mechanisms Chooser Chart

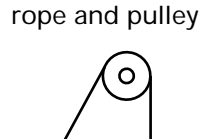
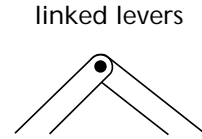
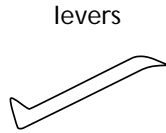
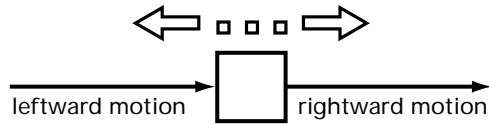
To change the type of movement	You can use:		
<p>From linear to rotating</p>  <p>linear motion → [] → rotating motion</p>	<p>wheel and axle</p>  <p>rope and pulley</p> 	<p>rack and pinion</p>  <p>chain and sprocket</p> 	<p>screw thread</p> 
<p>From rotating to linear</p>  <p>rotating motion → [] → linear motion</p>	<p>wheel and axle</p>  <p>rack and pinion</p> 	<p>belt and pulley</p>  <p>chain and sprocket</p> 	<p>screw thread</p> 
<p>From rotating to reciprocating</p>  <p>rotating motion → [] → reciprocating motion</p>	<p>crank, link and slider</p> 	<p>cam and slide follower</p> 	
<p>From rotating to oscillating</p>  <p>rotating motion → [] → oscillating motion</p>	<p>crank, link and lever</p> 	<p>cam and lever follower</p> 	<p>peg and slot</p> 
<p>From reciprocating to rotating</p>  <p>reciprocating motion → [] → rotating motion</p>	<p>crank, link and slider</p> 		
<p>From reciprocating to oscillating</p>  <p>reciprocating motion → [] → oscillating motion</p>	<p>wheel and axle</p> 	<p>rack and pinion</p> 	<p>crank, link and slider</p> 
<p>From oscillating to rotating</p>  <p>oscillating motion → [] → rotating motion</p>	<p>crank, link and lever</p> 	<p>peg and slot</p> 	
<p>From oscillating to reciprocating</p>  <p>oscillating motion → [] → reciprocating motion</p>	<p>crank, link and slider</p> 	<p>cam and slide follower</p> 	

To change the direction of movement You can use:

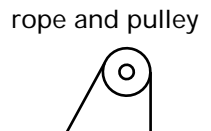
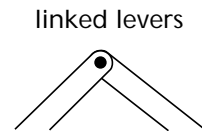
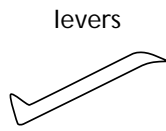
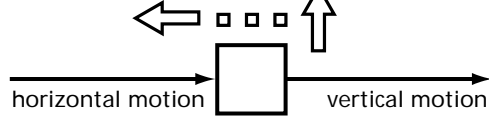
From clockwise to anticlockwise



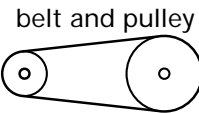
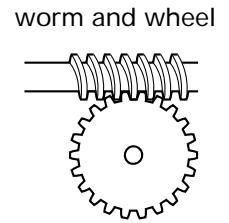
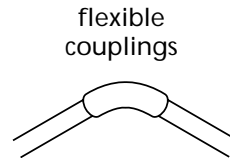
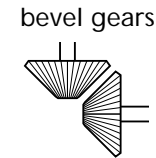
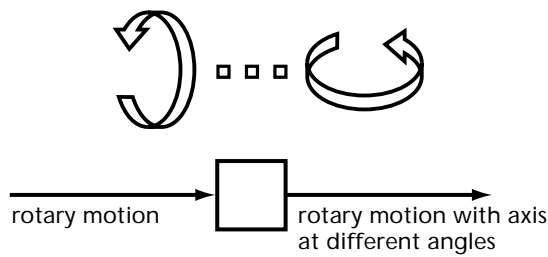
From left to right



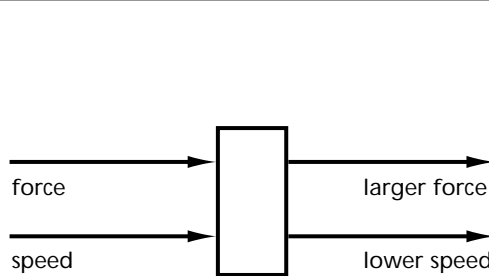
From left to right



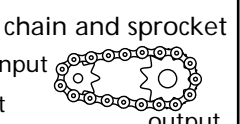
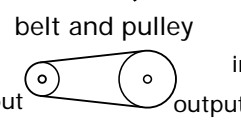
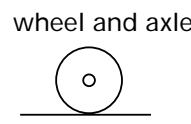
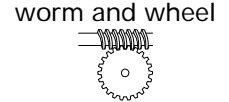
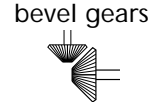
To change the axis of rotation You can use:



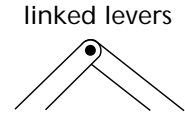
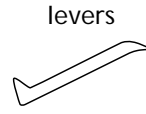
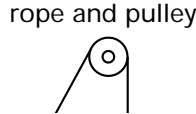
To increase output force and decrease speed You can use:



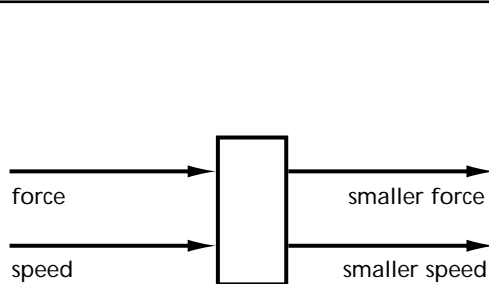
With parts rotating or oscillating



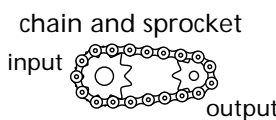
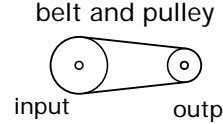
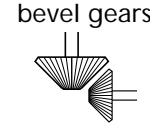
With parts reciprocating or moving in a straight line



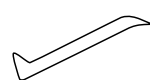
To increase output speed and decrease force You can use:



With parts rotating or oscillating



With parts reciprocating or moving in a straight line



Electric Components Chooser Chart

<i>What the components might need to do</i>	<i>Options</i>	<i>Symbols</i>	<i>Points to check</i>
To provide a power supply	batteries: <ul style="list-style-type: none"> • zinc carbon for low current, infrequent use • zinc chloride for medium current, regular use • alkaline for high current, heavy use 		Make sure voltage of battery is suitable for components in the circuit.
To make light			
To give a signal	a light-emitting diode 		Use protecting resistor. Must be correct way round.
	a flashing light-emitting diode 		Does not need protecting resistor. Must be correct way round.
To provide illumination	a light bulb 		Must match power source.
To give rotary movement	an electric motor 		Must match power source. May need 'gearing'.
To make sound	a bell 		Must match power source.
	a buzzer 		Buzzer must be correct way round.

What to do if the circuit doesn't work

Use this checklist before you ask your teacher.

Must have got something wrong ... where's that diagram?

Check carefully against your circuit diagram.

Maybe the battery isn't connected properly?

Check to be sure.

Might be a dud battery ...

Test it with a light bulb that you know works.



Perhaps it's the solder?

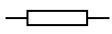



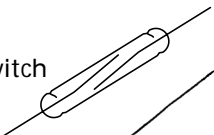
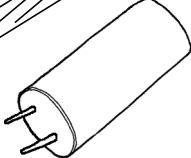
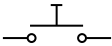
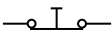
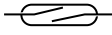



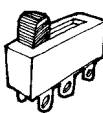

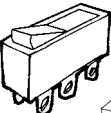
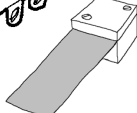
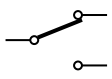

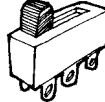

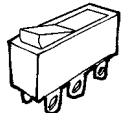
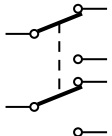
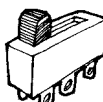
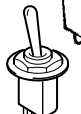
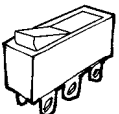
Check for any 'dry' solder joints.

Could be a loose connection somewhere ...

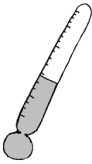


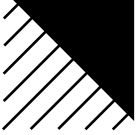
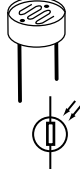
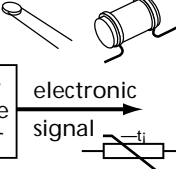
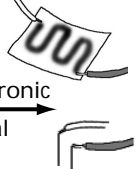
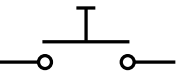
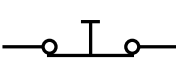
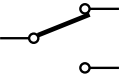



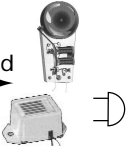
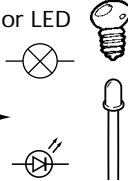
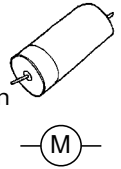
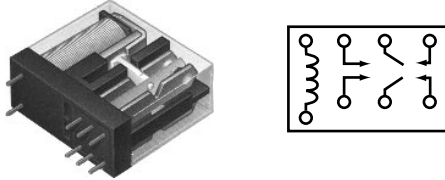
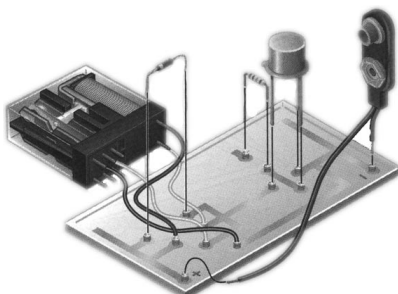
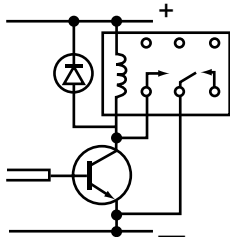
Look carefully to check.



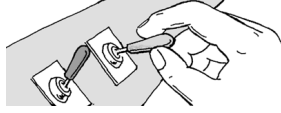
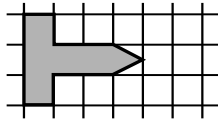
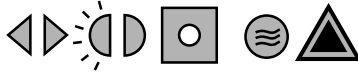

Must be something else not working?

Remove components one at a time and test them in a circuit that does work.

<i>What the components might need to do</i>	<i>Options</i>	<i>Symbols</i>	<i>Points to check</i>
To control current size			
By setting at a fixed value	a fixed resistor	 	Value provides the required current
To switch			
To hold something on or off	a push-to-make switch  a push-to-break switch  a reed switch  a tilt switch 	   	Two connections to the switch.
To set something on or off	a single-pole, single-throw switch  <ul style="list-style-type: none"> • push switch  • slide switch  • toggle switch  • rocker switch  • bimetallic switch  		Two connections to the switch. Which type will be most suitable for the user?
To turn something on and something else off	a single-pole, double-throw change-over switch  <ul style="list-style-type: none"> • micro-switch  • slide switch  • toggle switch  • rocker switch  		Three connections to the switch. Which type will be most suitable for the user?
To reverse direction	a single-pole, double-throw change-over switch  <ul style="list-style-type: none"> • slide switch  • toggle switch  • rocker switch  		Four connections to the switch. Which type will be most suitable for the user?

Sensing with Electronics Chooser Chart

When designing the INPUT ask yourself: <i>What does the system need to detect?</i>				
a change in temperature 	a change in light level 	moisture 	movement 	
What sensors could I use for this detecting?				
light-dependant resistor light → [light sensor] → electronic signal 	thermistor temperature → [temperature sensor] → electronic signal 	moisture sensor moisture → [moisture sensor] → electronic signal 		
What switches could I use for this detecting?				
push-to-make 	push-to-break 	change-over 	reed 	tilt 
When designing the PROCESSOR ask yourself: <i>Do I need to increase the signal from the sensor or switch?</i>				
no – go to <i>When designing the output</i>		yes – use a single transistor or a Darlington pair 		
When designing the OUTPUT ask yourself: <i>What does the output need to do?</i>				
make a sound – use a buzzer or bell electronic signal → [buzzer or bell] → sound 	make a light – use a bulb or LED electronic signal → [lamp or LED] → light 	make a movement – use a motor electronic signal → [motor] → motion 		
Is the output a high-current device?				
no – connect directly to processor		yes – use a relay 		
Does the system need to keep the output on after the input has ceased?				
yes – use a relay and latch 				

When designing the PRODUCT CASING AND STYLE ask yourself:		
<i>What overall shape and size would be suitable?</i>	large enough to take the contents but small enough for hand-held use – try modelling for fit	
<i>What does the user like?</i>	try using an image board	
<i>How can I get an appearance that fits in with where it will be used?</i>	try out some ideas against the image board	
When designing the USER INTERFACE ask yourself:		
<i>What switches, other controls or indicator lights will the user need?</i>	try an imaginary user trip	
<i>How can I make the layout of the controls look easy to understand?</i>	try modelling with a plan	
<i>How can I make it clear what each switch or indicator light is for?</i>	try labelling with signs or symbols	
<i>How can I position switches and other controls so they are easy to operate?</i>	try ergonomic modelling	

What if it doesn't work

Ask yourself these questions:

Is the battery working and is it the right way round?

Check to be sure.

Is everything in the right place?

Check to be sure.

Are all the components the right way round?

Check the transistors, LEDs and diodes.



Are there any loose connections?

Look carefully to check.

Are there any dry joints?

Check carefully.

Are there any cracks in the copper tracks of the PCB?

Look carefully to check.