RELAY EXAMINATION QUESTION

On behalf of The World Association of Technology Teachers

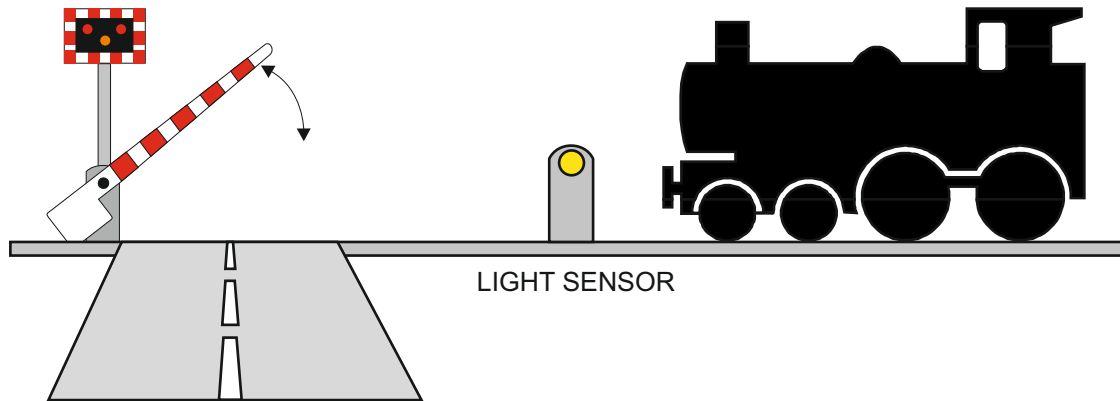# W.A.T.T.
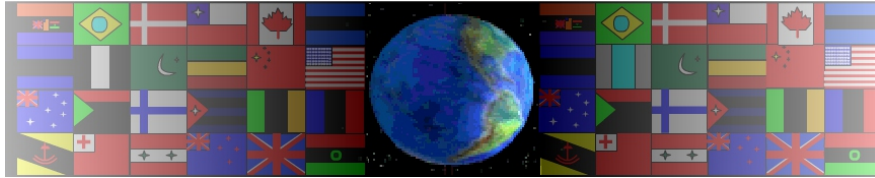
World Association of Technology Teachers

This exercise can be printed and used by teachers and students. It is recommended that you view the website (www.technologystudent.com) before attempting the design sheet .
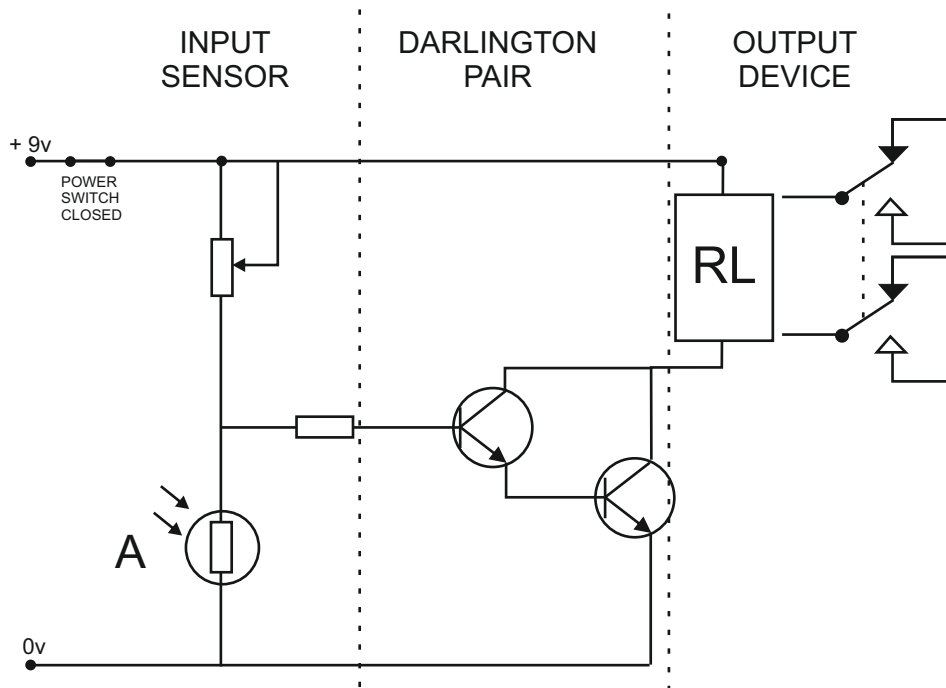
RELAY EXAMINATION QUESTION

As part of a GCSE project a student has designed a barrier system for a crossing. The specification drawn up by the student says - As a train approaches the crossing it breaks a light beam and the barrier is lowered, stopping cars and pedestrians. When the train has passed, the barrier should lift allowing cars and pedestrians to cross the railway line safely.

LIGHT SENSOR

The student's prototype control circuit can be seen below.

INPUT SENSOR | DARLINGTON PAIR | OUTPUT DEVICE

+ 9v

POWER SWITCH CLOSED

RL

A

0v

Name component 'A'.

_____

Give one reason why the circuit shown above will not meet the specification.

_____

_____

Write a modification that would solve the problem with the specification

_____

_____

Why is a darlington pair positioned between the sensor and the relay?

_____

_____

The darlington pair circuit has been tested but it regularly fails. Draw a modification on the circuit diagram below that will ensure that the circuit works without problems.
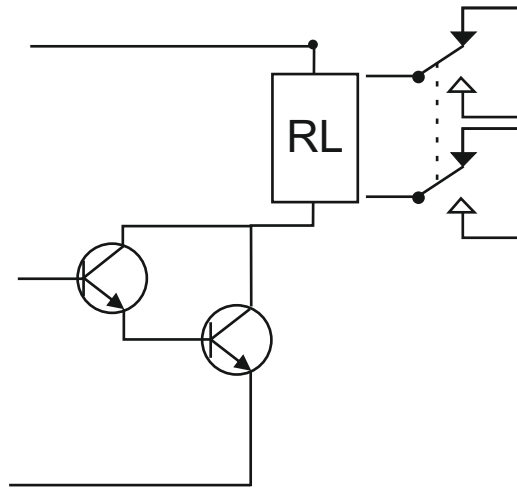

Explain how your modification works.

_____

_____

_____

The student has decided to use a PIC microcontroller to control the motor that raises and lowers the barrier. The student uses outputs 1 and 2 to control the motor. Output 1 will turn the motor on and off. Output 2 changes the direction of the motor.
Complete the circuit below to show how the control of the motor can be achieved.

OUTPUT 1 ○———

OUTPUT 2 ○———
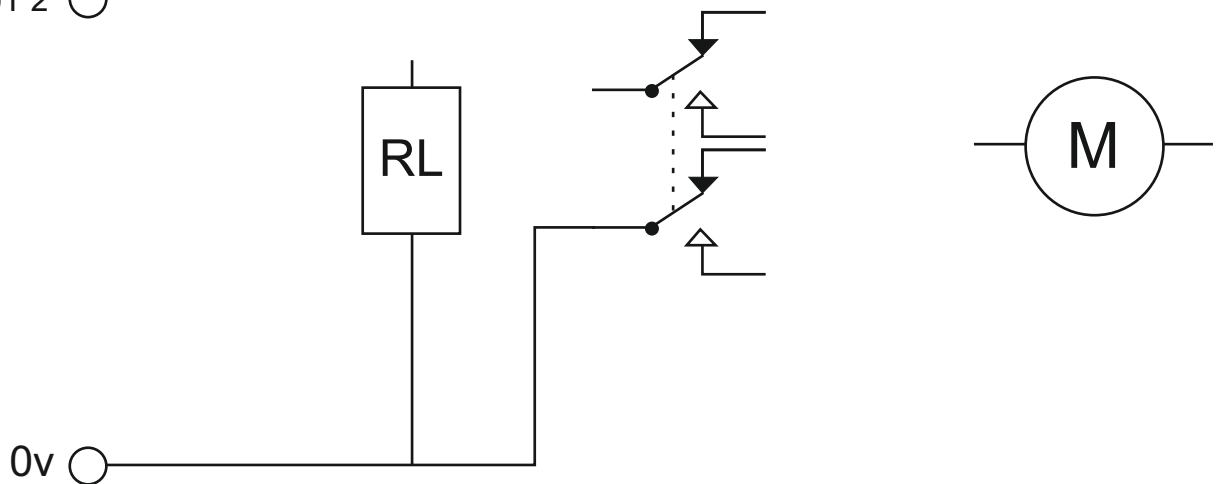
The student decides to use one of the inputs to detect when the barrier has completely opened.

Name a suitable sensor: _____

Explain how the sensor would be used.

_____

_____

_____