DIGITAL LOGIC CIRCUITS

V.Ryan © 2000 - 2009

DIGITAL LOGIC EXAMINATION QUESTION

An electronics company has developed a baby sitting device which warns parents when their child turns on a lamp next to the bed or when the temperature of the room falls.

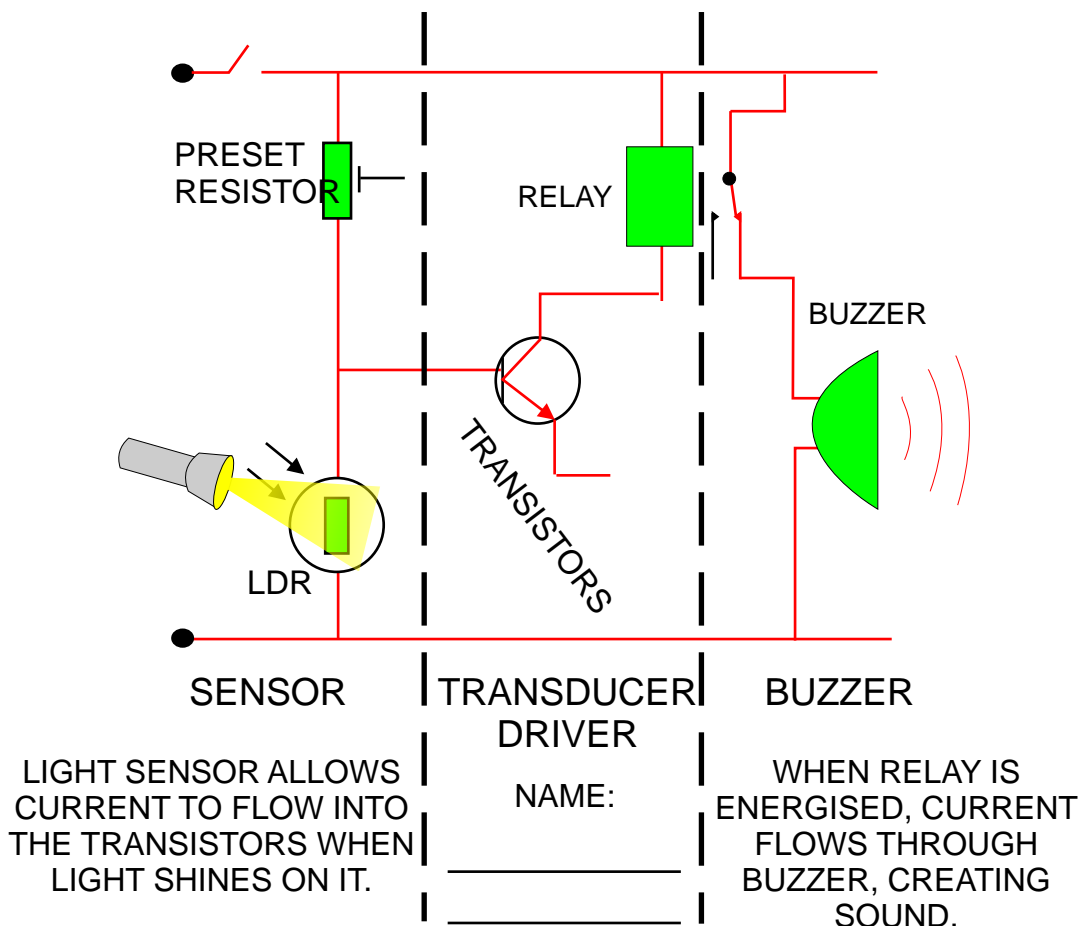Sensor A is a temperature sensor which outputs false(0, low, off) when the room temperature falls below a set level.

Sensor B is a light sensor and is attached to a lamp. The sensor outputs true (1, high, on) when the lamp is switched on.
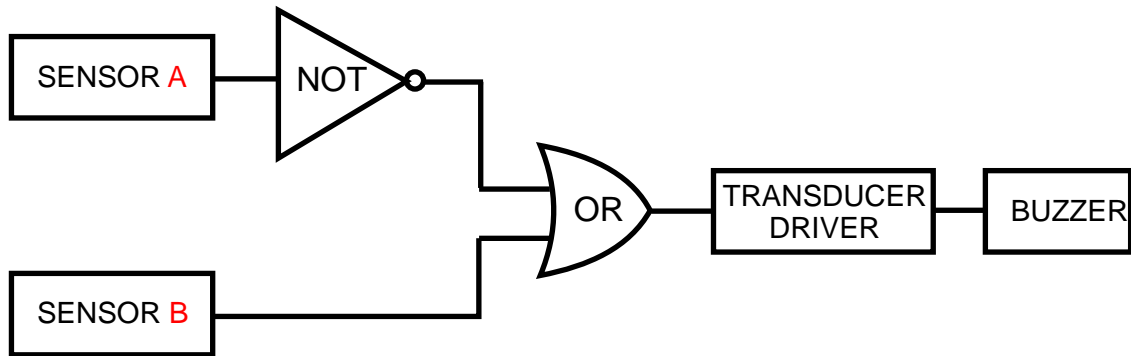
1. What is a transducer driver and what is its function?

A transducer driver is normally a circuit that amplifies a weak signal (current). In this case current from the OR gate is amplified by the transducer driver which in turn energises a relaying - activating the buzzer. A signal (current) from any gate is usually too weak to directly activate a buzzer.

On the circuit diagram complete the transducer driver and name it.

SENSOR

LIGHT SENSOR ALLOWS
CURRENT TO FLOW INTO
THE TRANSISTORS WHEN
LIGHT SHINES ON IT.

TRANSDUCER
DRIVER

NAME:

_____

_____

BUZZER

WHEN RELAY IS
ENERGISED, CURRENT
FLOWS THROUGH
BUZZER, CREATING
SOUND.

DIGITAL LOGIC EXAMINATION QUESTION

2. The young child awakes and turns on a lamp next to her bed, changing the logic states of the outputs / inputs of the sensors and logic gates. On the logic circuit below, write the logic state of inputs / outputs of the sensors and gates.
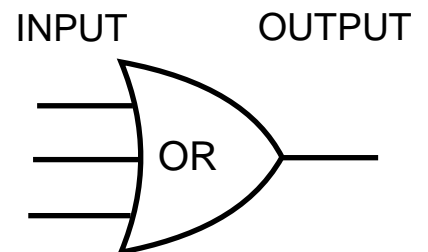
SENSOR A — NOT

SENSOR B

OR — TRANSDUCER DRIVER — BUZZER SOUNDS
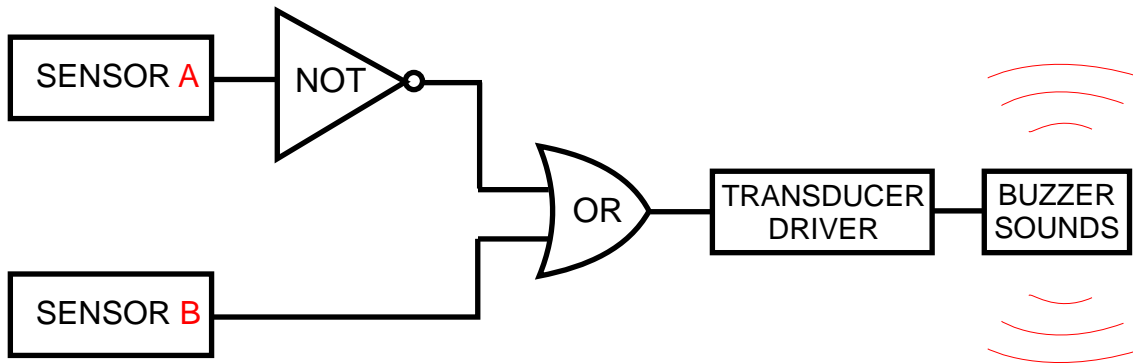
3. As the child grows older she regularly gets out of bed and moves around during the night. A new sensor needs to be connected to the system to detect this movement. A micro-switch (SENSOR C) has been added to the system so that when the child opens her bedroom door the buzzer is activated. Complete the circuit below by adding the necessary gate.

SENSOR A — **1** NOT **0**

SENSOR B **0**

SENSOR C **1**

OR

1 TRANSDUCER DRIVER — BUZZER SOUNDS
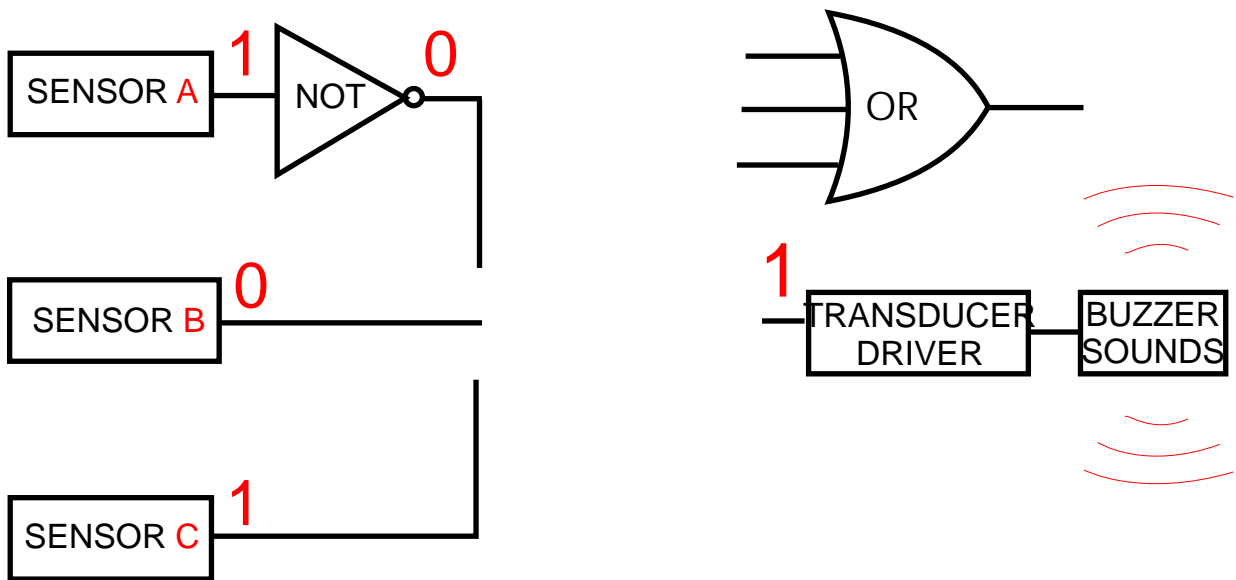
4. In the space opposite write/draw the logic table for your chosen gate.

THREE INPUT OR GATE

A	B	C	Q

INPUT   OUTPUT

OR

5. The electronics company has decided to add a circuit that will pulse the buzzer on and off. Name a circuit that could be used.