1. Nov/2021/Paper_11/No.6

A washing machine uses sensors and a microprocessor to control the washing cycle of clothes.

(a) A sensor is used in each of the given tasks.

Identify **one** suitable sensor that would be used for each task.

Each sensor given must be different.

Task	Sensor
checking the water is 30 °C	
checking the water acidity level after detergent is added	
checking the weight of the clothes to make sure that the machine is **not** overloaded	

[3]

(b) Describe how the sensor and the microprocessor are used to make sure the water remains at 30 °C.

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2. Nov/2021/Paper_12/No.8

An electronic game has **three** square mats that are coloured red, green and blue.

The player will see a colour displayed on a screen and has 1 second to hit the mat that matches the colour. If the player hits the correct mat, within 1 second, a counter is incremented. When a player hits an incorrect mat, the game ends.

The game uses sensors and a microprocessor to determine if the player hits the correct mat within 1 second.

Explain how the game uses sensors and a microprocessor to count the number of times a player hits a correct mat within 1 second.

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3. Nov/2021/Paper_13/No.2d

A sports stadium has an electronic counter that counts each person that enters the stadium.

The count is stored as binary in a 16-bit register.

A denary value of the count is displayed on a screen at the entrance.

(a) The screen currently displays:

0	0	7	1

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

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[2]

(b) More people enter the sports stadium and the screen now displays:

0	2	5	7

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

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[2]

(c) After everyone has entered the stadium, the register stores the binary value:

0000001000000100

Show what the screen will display when this binary value is stored.

Display:

[1]

Working space

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(d) Sensors are used at the entrance to count the number of people entering the stadium.

(i) Identify **two** sensors that could be used to count the number of people entering the stadium.

Sensor 1 .....

Sensor 2 .....

[2]

(ii) Tick (✓) **one** box to show if a sensor is an example of an input device, storage device or output device.

Device	Tick (✓)
input	
storage	
output	

[1]

4. June/2021/Paper_11/No.5

Jamelia has a greenhouse that she uses to grow fruit and vegetables. She needs to make sure the temperature in the greenhouse stays between 25 °C and 30 °C (inclusive).

A system that has a temperature sensor and a microprocessor is used to maintain the temperature in the greenhouse. The system will:

- open a window and turn a heater off if it gets too hot
- close a window and turn a heater on if it gets too cold.

Describe how the system uses the temperature sensor and the microprocessor to maintain the temperature in the greenhouse.

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5. June/2021/Paper_12/No.5

A security light system is used by a factory. The light only comes on when it is dark and when movement is detected. The light will stay on for 1 minute before switching off.

Sensors and a microprocessor are used to control the security light system.

(a) Identify **two** sensors that would be used in the security light system.

Sensor 1 .....

Sensor 2 .....

[2]

(b) Describe how the sensors and the microprocessor control the security light system.

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6. June/2021/Paper_13/No.9

An underground car park has a system that checks the height of vehicles. A vehicle can be no higher than 1.8 metres to enter the car park.

The system also counts the number of vehicles that have entered the car park, so that it can display how many parking spaces are still available.

Each parking space has a red and a green light above it. If a car is parked in the parking space only the red light is on, otherwise only the green light is on.

Sensors and a microprocessor are used to control the system.

(a) Complete the table to identify a suitable sensor for each part of the system.

Task	Sensor
check if a vehicle is too high	
count the vehicles entering the car park	
check if a vehicle is parked in a parking space	

[3]

(b) Describe how the sensor and the microprocessor are used to display the red or green light above the parking space.

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