GCSE Design and Technology Unit 1 4121-01

All Candidates' performance across questions

Question Title	N	Mean	S D	Max Mark	F F	Attempt %
1	623	9.3	2.8	15	61.7	100
2	623	6.9	2.2	10	69.1	100
3	623	6.1	1.6	10	60.8	100
4	623	14	4.8	25	56.1	100
5	623	4.8	2.6	10	48.3	100
6	623	8.2	3.2	15	54.4	100
7	623	12.3	3.7	20	61.7	100
8	623	8.1	2.9	15	54.1	100

GCSE Design and Technology Unit 1 4121-01

(Bar chart — Facility Factor % by Question)

Question	Facility Factor %
8	54.1
7	61.7
6	54.4
5	48.3
4	56.1
3	60.8
2	69.1
1	61.7

Section B

Marked out of 60   60 minutes

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

(a) Study the images of a wave soldering machine shown below.
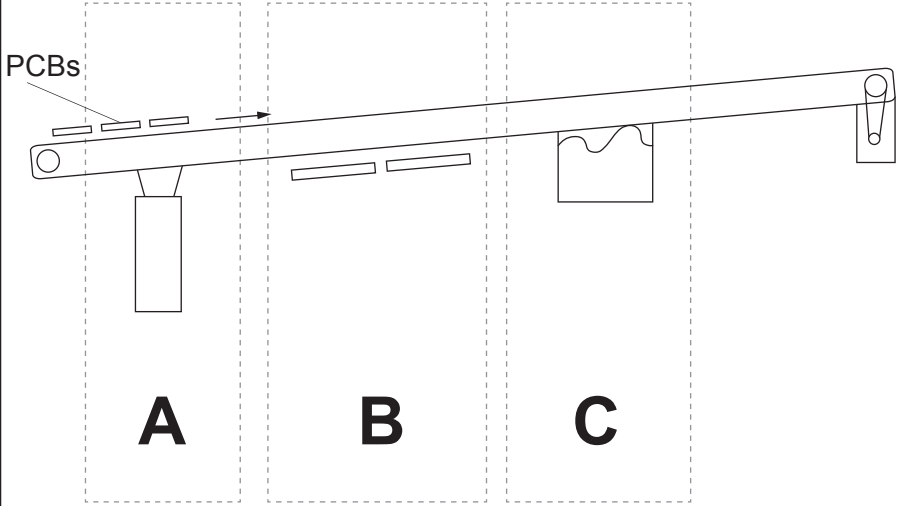
Wave Soldering Machine	Diagram of Wave Soldering Machine
	PCBs **A** **B** **C**

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.

Stage	Description
A	.... [2] ....
B	.... [2] ....
C	.... [2] ....

(b) Explain why quality control checks are important to the manufacturer when producing products. [2]

....

....

....

(c) The image below shows an automated final function test being carried out at the end of the assembly process.

Explain how automating the test procedure benefits the manufacturer. [2]

....

....

....

4121
010011

Section B

Marked out of 60   60 minutes

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

   (a) Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine
	PCBs A B C

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.

Stage	Description
A	PcB's with components [2] are enterd into the machine on the con vea belt
B	flux is apltied to clean the [2] conection on th curcuit boared
C	Solder is applied to all [2] the compenents on the curcuit boared

(b) Explain why quality control checks are important to the manufacturer when producing products. [2]

It ~~ensures~~ *ensures* that all the parts of the product will fit together. It also ensures the product will work and therfore not harm a user.

(c) The image below shows an automated final function test being carried out at the end of the assembly process.

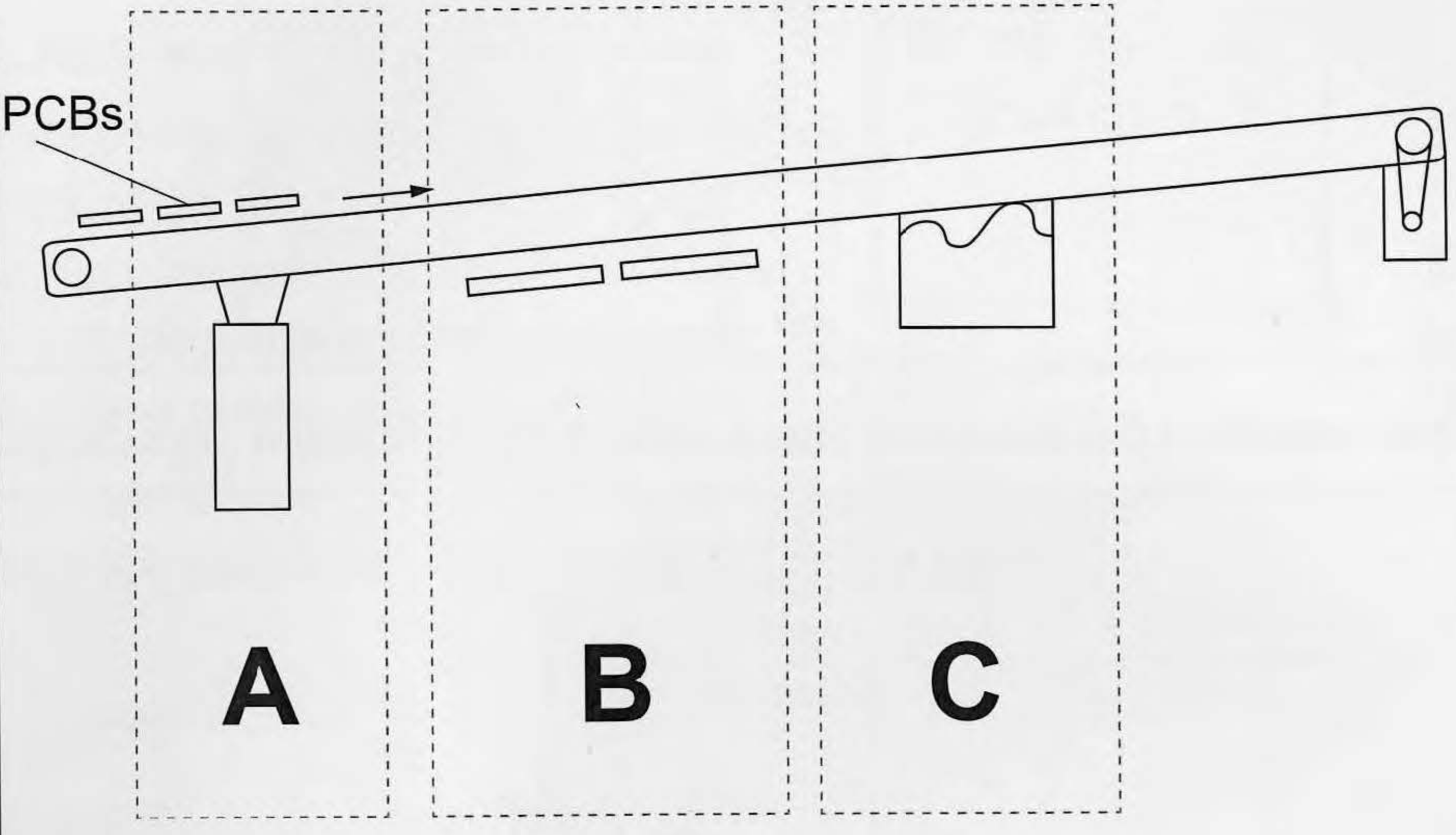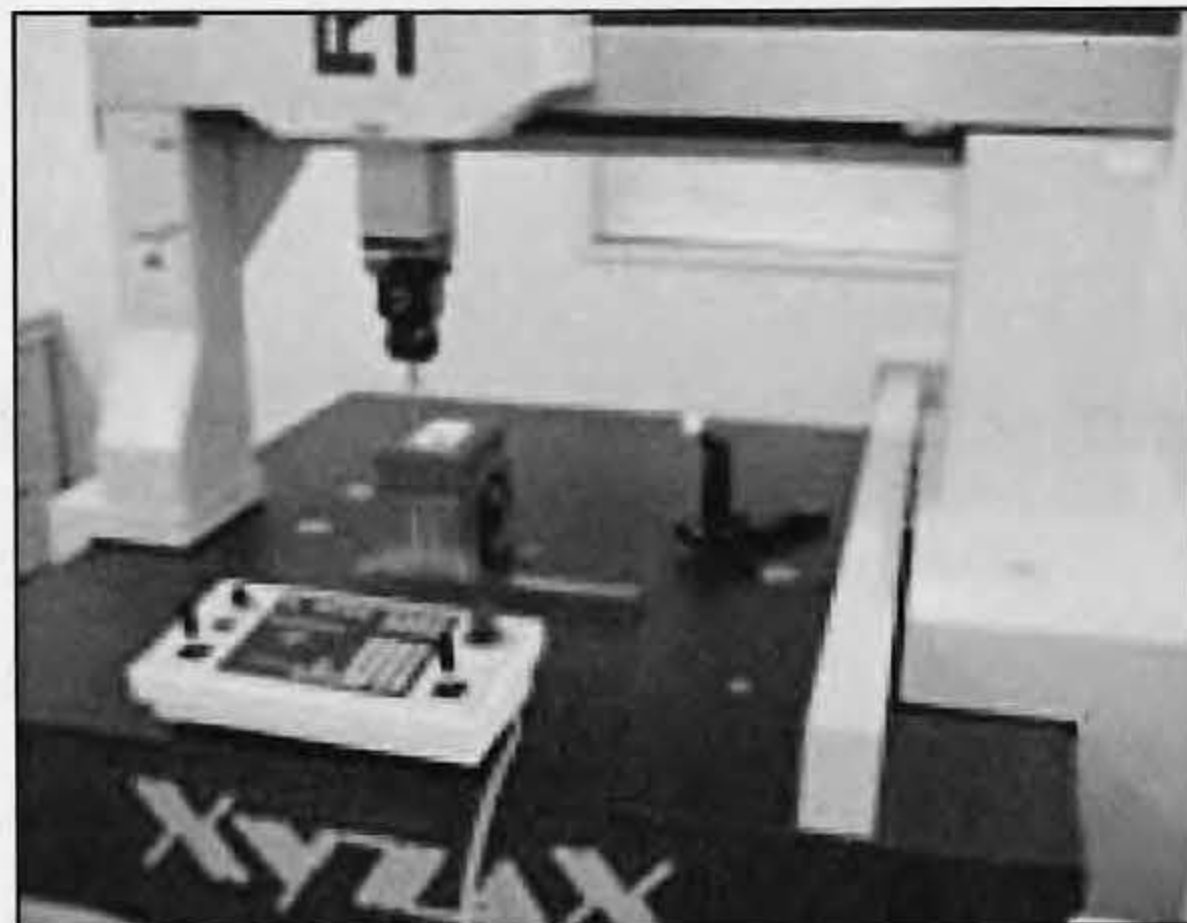Explain how automating the test procedure benefits the manufacturer. [2]

It is more accurate to test ~~things~~ things with a pre programmed machine. ~~so~~ This way is quicker and cheaper than using a human. Also data can be checked so any default is easily picked up.

Section B

Marked out of 60   60 minutes

5.   This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

(a)   Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.

Stage	Description
A	PCB's with components [2] are enterd into the machine on the Con vea belt
B	flux is aplied to clean the [2] conection on th curcuit boared
C	Solder is applied to all [2] the compenents on the carcuit boared

(b) Explain why quality control checks are important to the manufacturer when producing products. [2]

It ensures that all the parts of the product will fit together. It also ensures the product will work and therfore not harm a user.

(c) The image below shows an automated final function test being carried out at the end of the assembly process.

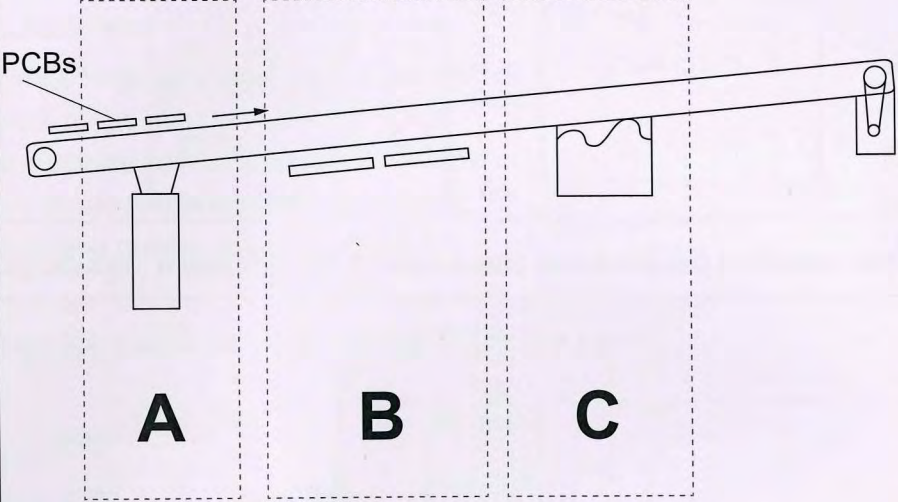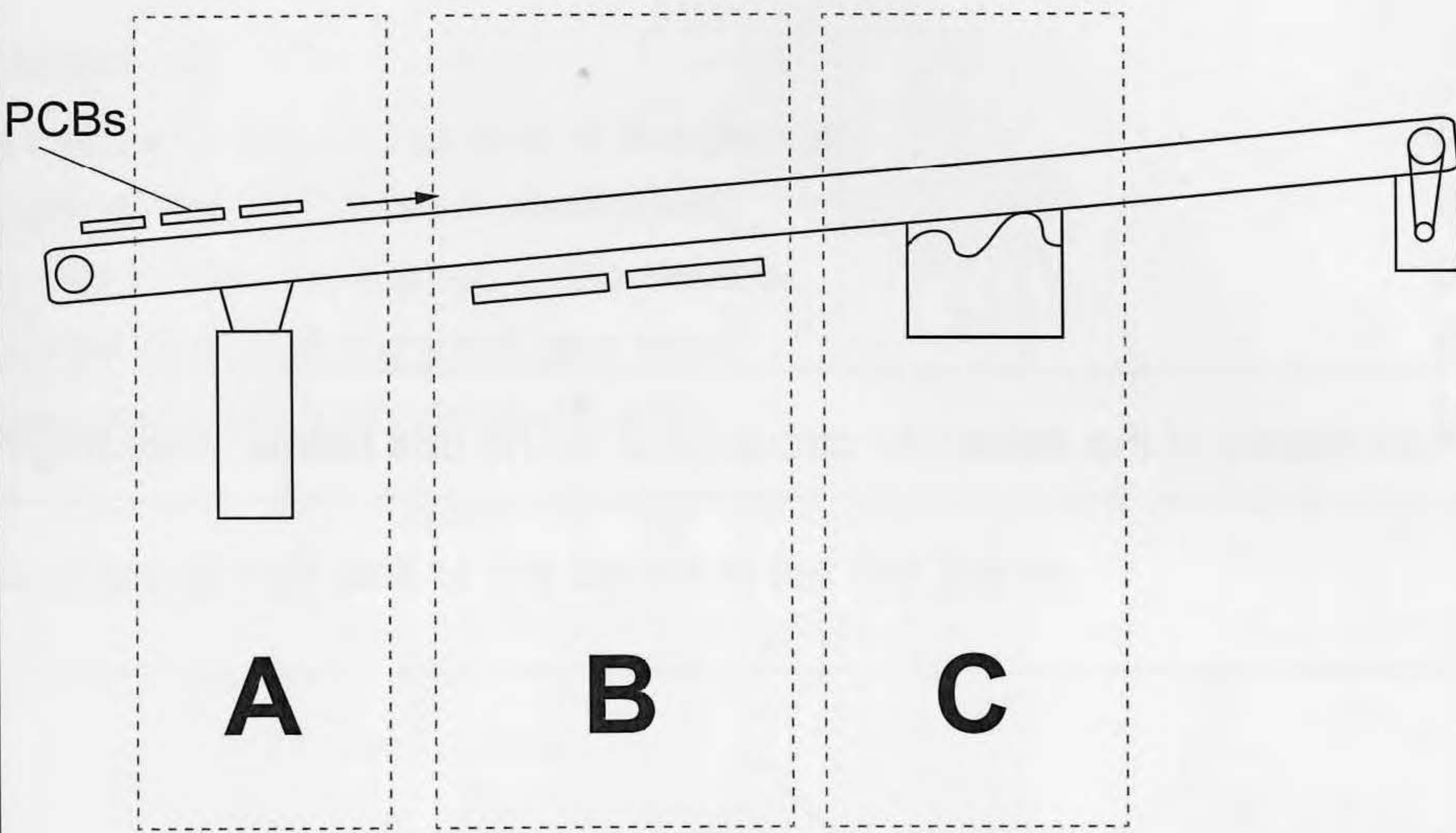Explain how automating the test procedure benefits the manufacturer. [2]

It is more accurate to test things things with a pre programmed machine. So This way is quicker and cheaper than using a human. Also data can be checked so any default is easily picked up.

4121 010011

Section B

Marked out of 60   *60 minutes*

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

   (a) Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine

PCBs

A   B   C

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.

Stage	Description
A	PCB's are moved along the Convayer ~~bes~~ belt [2]
B	The PCB's are heated by heaters [2]
C	Solder is Applyed to the PCB's [2]

(b) Explain why quality control checks are important to the manufacturer when producing
products.   [2]

To make sure the product works correctly and that they can carry on £ making the product at a good Quality

(c) The image below shows an automated final function test being carried out at the end of
the assembly process.

Explain how automating the test procedure benefits the manufacturer.   Pay   [2]

So that they don't have to Fely on a workers and is done at a constant high Quality.

Section B

Marked out of 60   60 minutes

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

    (a) Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine
	PCBs **A** **B** **C**

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.
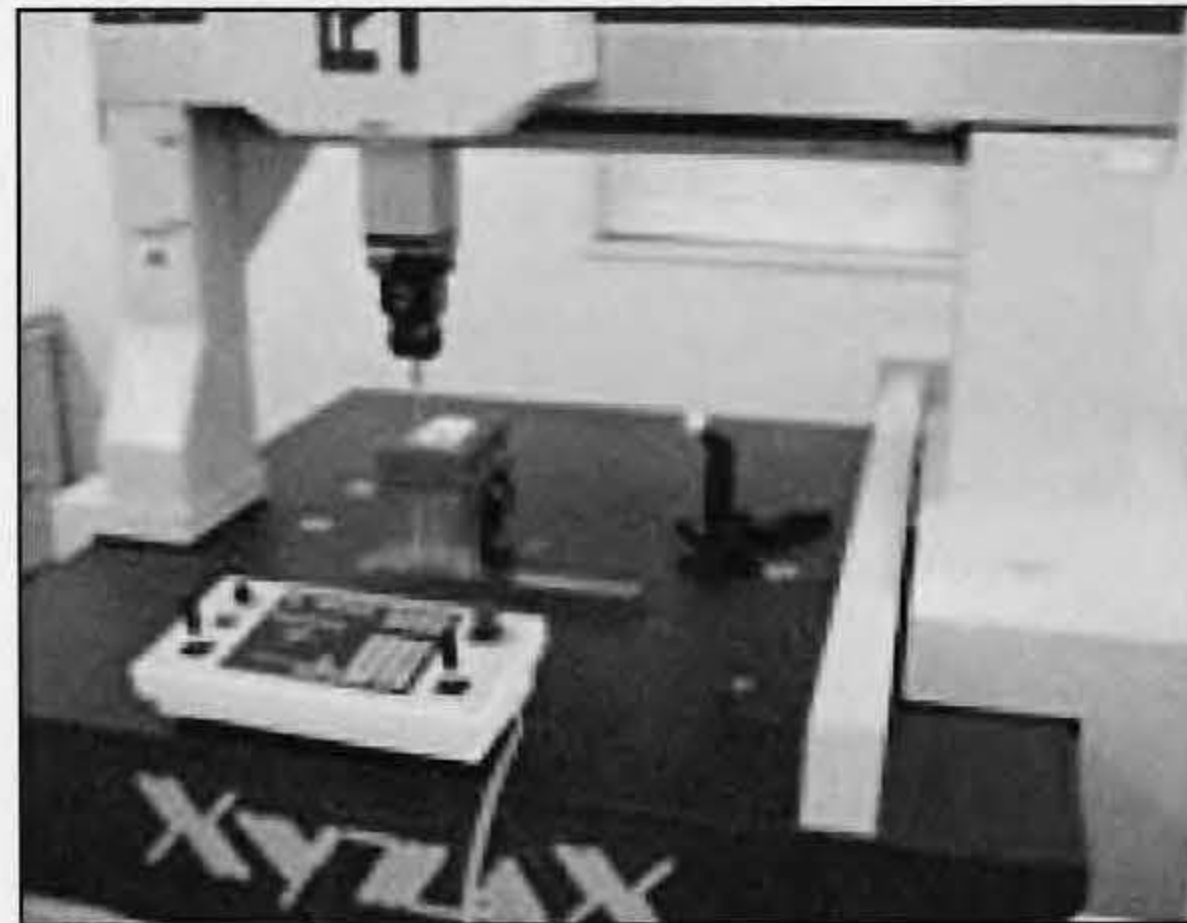
Stage	Description
A	PCB's are moved along the Convayer bes belt [2]
B	The PCB's are heated by heaters [2]
C	Solder is Applyed to the PCB's [2]

(b) Explain why quality control checks are important to the manufacturer when producing products. [2]

To make sure the product works correctly and that they can carry on & making the product at a good Quality

(c) The image below shows an automated final function test being carried out at the end of the assembly process.

Explain how automating the test procedure benefits the manufacturer. [2]

So that they don't have to Pay Pty ~~on~~ a workers and is done at a constant high Quality.

Section B

Marked out of 60   60 minutes

5. This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

    (a) Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine

Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.

Rhase

Stage	Description
A	PCB will be populated with components [2]
B	PCB components will be soldered [2]
C	PCB will be left to cool [2]

(b) Explain why quality control checks are important to the manufacturer when producing products. [2]

They need to ensure that their product is safe so the company does not have bad reputation and to prevent people ~~know~~ from insuries.

(c) The image below shows an automated final function test being carried out at the end of the assembly process.

Explain how automating the test procedure benefits the manufacturer. [2]

The products design will be more accurate than by hand. manufacturer doesn't have to employ people to do it.

4121
010011

Section B

Marked out of 60   60 minutes

5.   This question is about Commercial Manufacturing Processes. It is worth a total of 10 marks.

   (a)   Study the images of a wave soldering machine shown below.

Wave Soldering Machine	Diagram of Wave Soldering Machine
	PCBs **A B C**

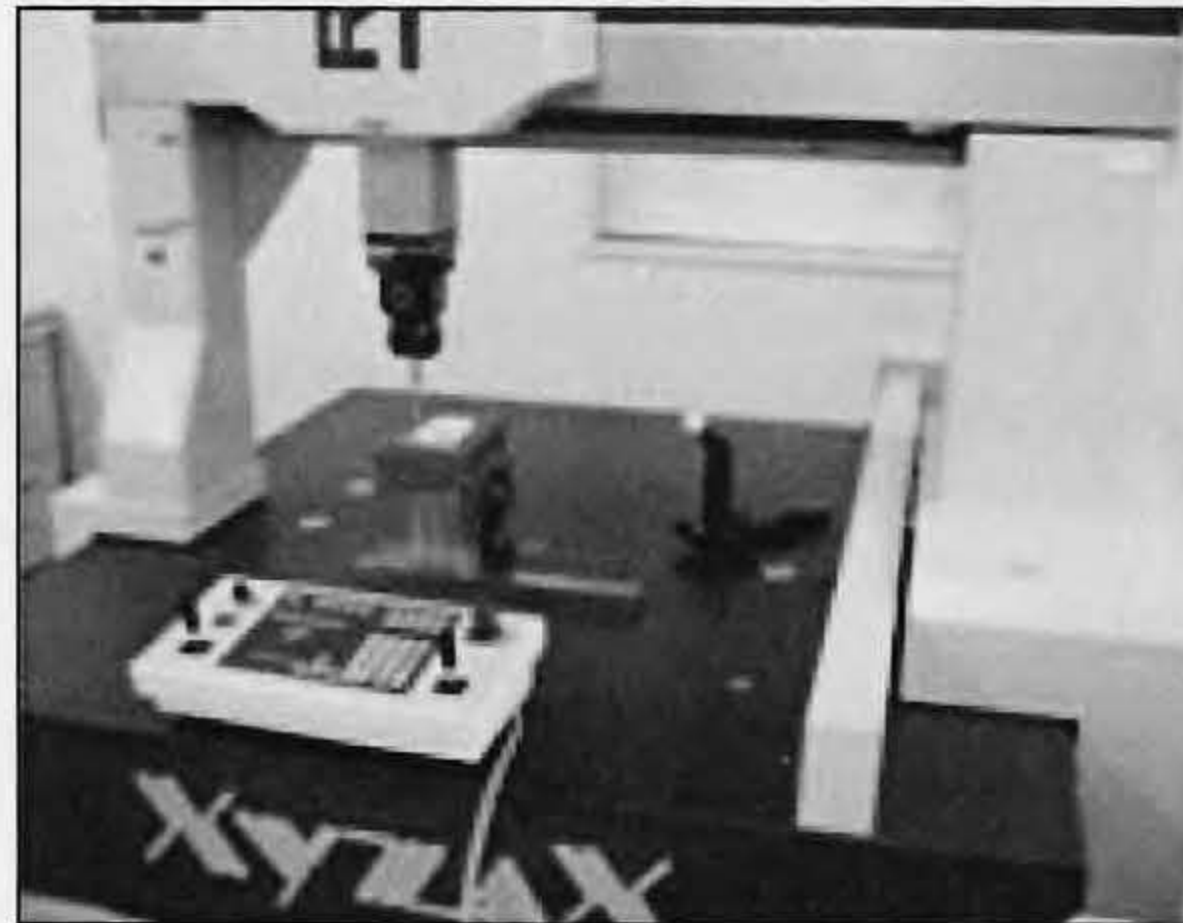Complete the table below by describing what happens to a PCB during the wave soldering process at stages **A**, **B** and **C**.   Rhase

Stage	Description
A	PCB will be populated with Components [2]
B	PCB components will be Soldered [2]
C	PCB will be left to Cool [2]

0

6

0

(b)   Explain why quality control checks are important to the manufacturer when producing products.   [2]

They need to ensure that their product is safe so the company does not have bad reputation and to prevent people ~~from~~ from insuries.

(c)   The image below shows an automated final function test being carried out at the end of the assembly process.

Explain how automating the test procedure benefits the manufacturer.   [2]

The products design will be more accurate than by hand, manufacturer doesn't have to employ people to do it.

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.

(i) **Circle** the correct name for this mechanism. [1]

Pawl and ratchet   **Cam and follower**   **Crank and slider**

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts .... motion to .... motion.

(b) The gear system shown below is used to power a toy train.
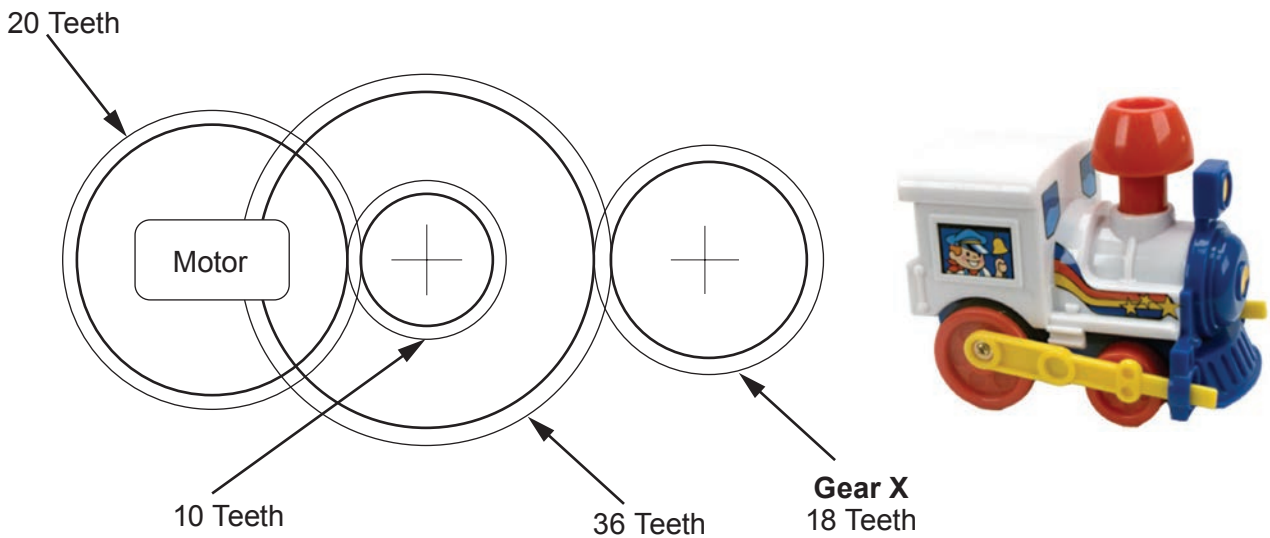
20 Teeth

Motor

10 Teeth   36 Teeth

Gear X
18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]

Statement	True	False
The train uses a compound gear system.		
Gear X will go slower than the 36 Teeth Gear.		

(ii)   Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm.
        (Show all your workings.)   [3]

....

....

....

(c)   Components are soldered onto the PCB to construct circuits. Study the soldered joints below.
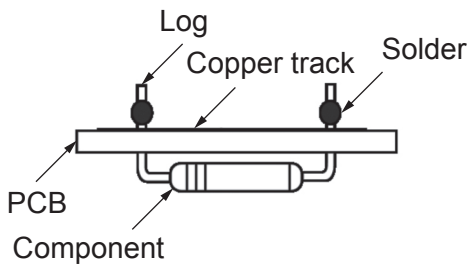
Soldered joint A   Soldered joint B   Soldered joint C

(i)   State which joint is soldered correctly: ....   [1]

(ii)   Describe what has caused the solder to take the shape shown in joint A.   [2]

....

....

(d)   Complete the table by sketching the correct symbol for **each** electronic component.   [3]

(e) Complete the truth table for the logic gate shown. [1]

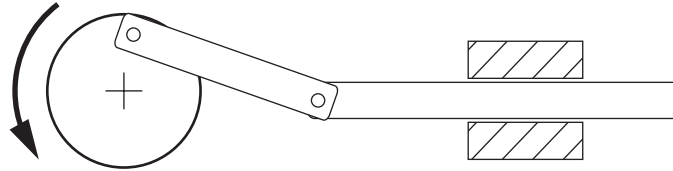| A	B	OUT
0	0	0
1	0	
0	1	
1	1	

(4121-01)

6. This question is about Materials and Components. It is worth a total of 15 marks.
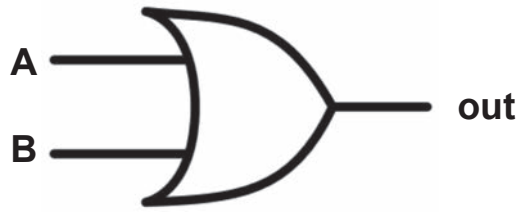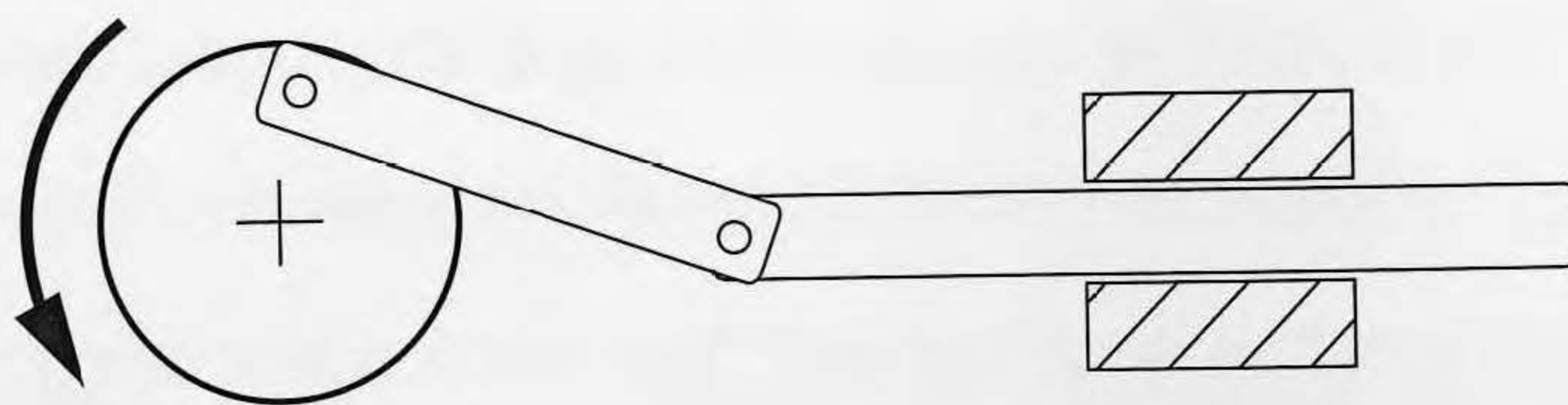
(a) Study the mechanism shown below.

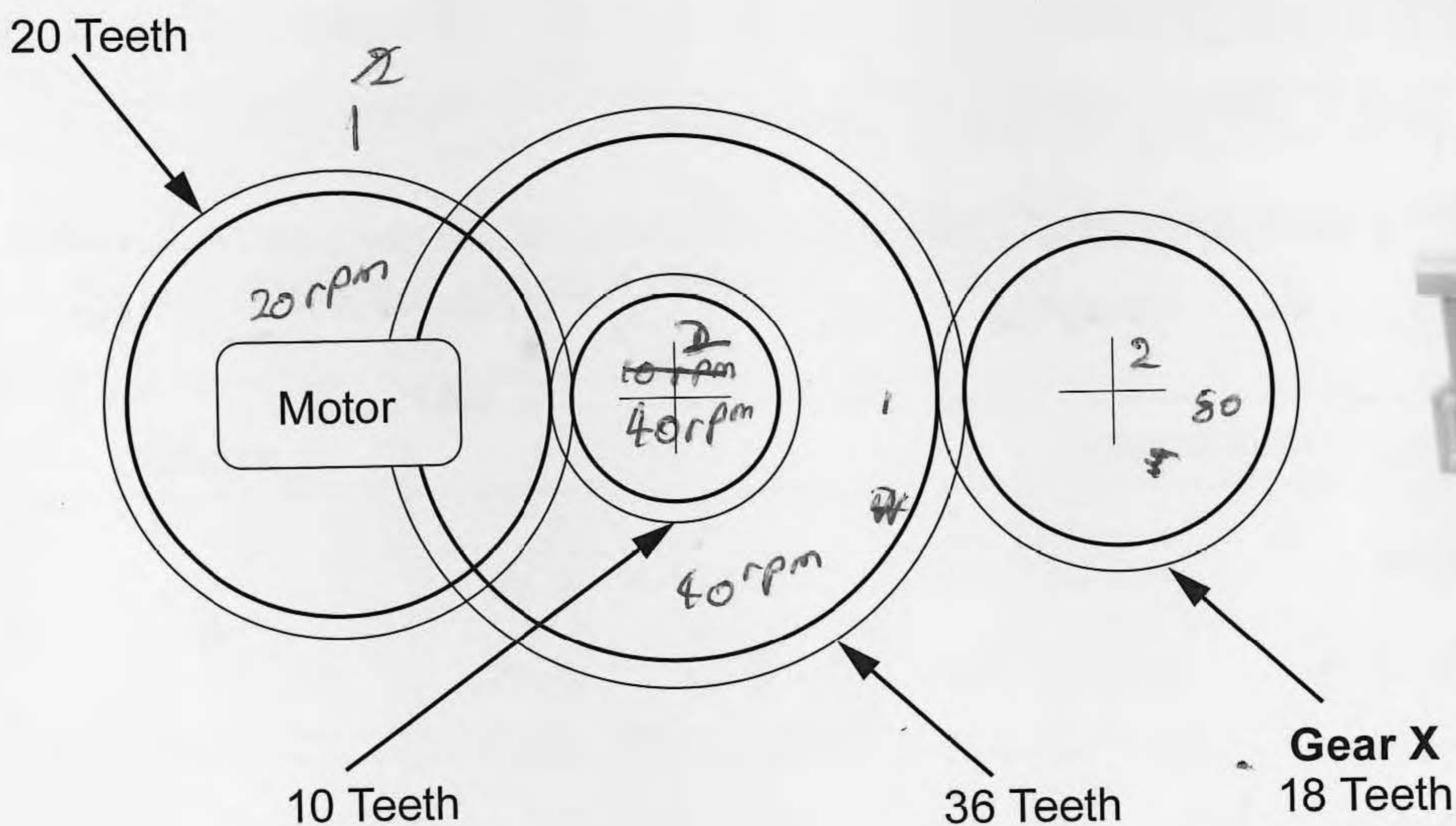(i) **Circle** the correct name for this mechanism. [1]

Pawl and ratchet   **Cam and follower**   ~~Crank and slider~~

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts ....*rotary*.................... motion to ....*linear*........................
motion.

(b) The gear system shown below is used to power a toy train.

20 Teeth

20 rpm

Motor

40 rpm

40 rpm

10 Teeth   36 Teeth   **Gear X**
18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is
true or false. [2]

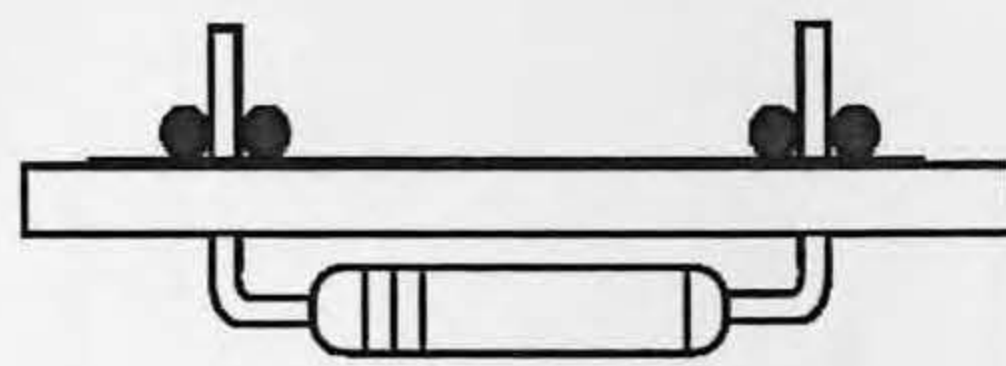| Statement	True	False
The train uses a compound gear system.	✓	
Gear X will go slower than the 36 Teeth Gear.		✓

(ii) Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm. *(Show all your workings.)* [3]

~~10 x 3.6 x 18~~

20 x10 x3 6 x18

80 rpm

(c) Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB
Component
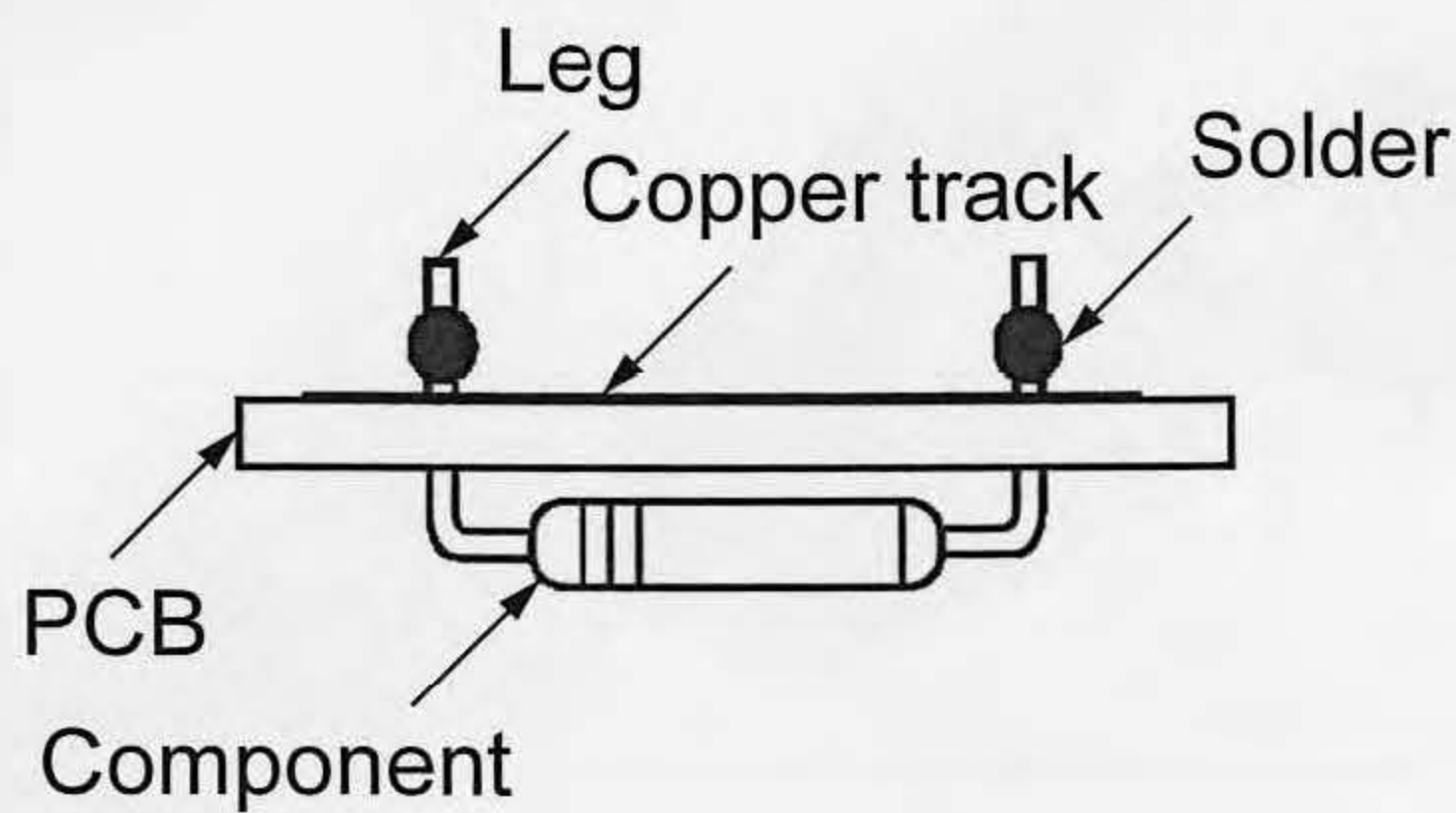
Soldered joint A   Soldered joint B   Soldered joint C

(i) State which joint is soldered correctly: _C_ [1]

(ii) Describe what has caused the solder to take the shape shown in joint A. [2]

there is a dry solder joint this is
caused by no copper track or dart blocking
the copper getting to the track

(d) Complete the table by sketching the correct symbol for **each** electronic component. [3]

⊕	—┤├—	—⊤—

(e) Complete the truth table for the logic gate shown.
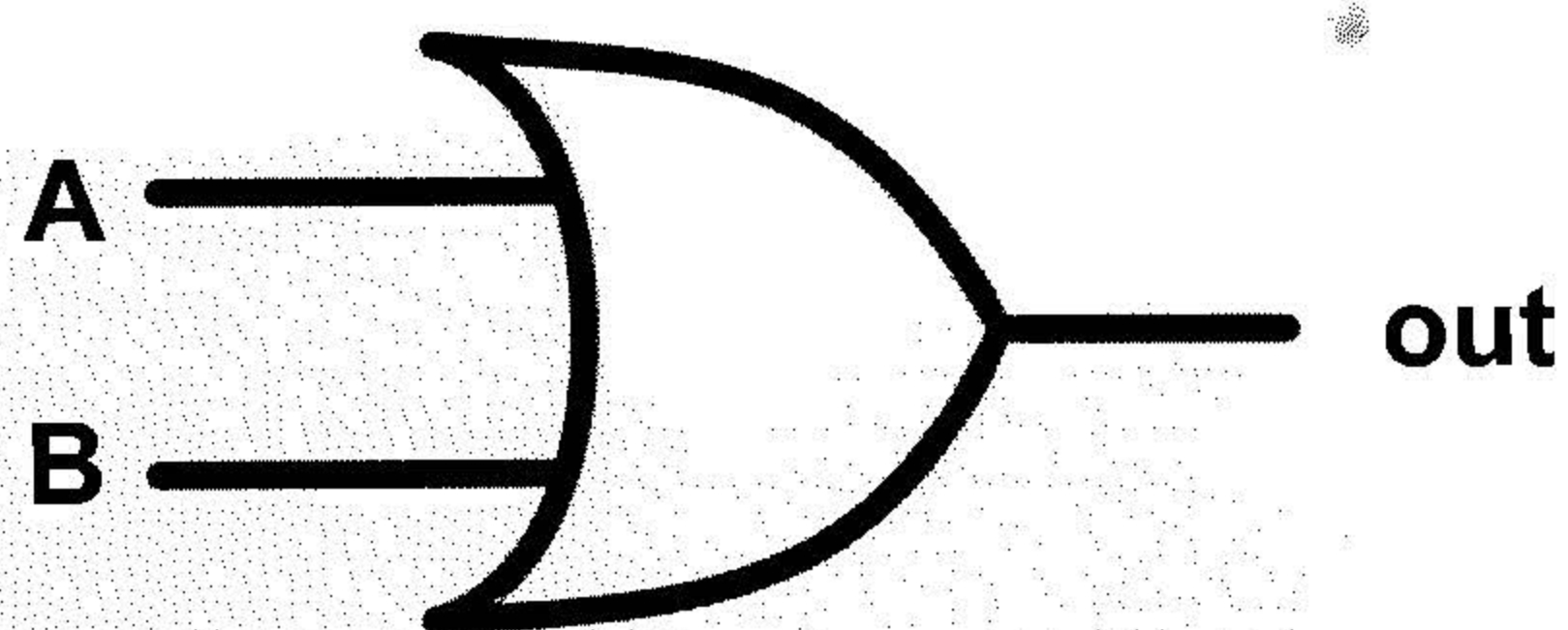
[1]

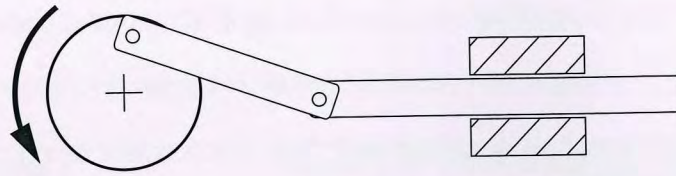| A	B	OUT
0	0	0
1	0	0
0	1	0
1	1	1

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.

(i) **Circle** the correct name for this mechanism. [1]

Pawl and ratchet **Cam and follower** (**Crank and slider**)

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts ...*rotary*... motion to ...*linear*...... motion.

(b) The gear system shown below is used to power a toy train.

20 Teeth

Motor

20 rpm

40 rpm

40 rpm

10 Teeth   36 Teeth   Gear X 18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]

Statement	True	False
The train uses a compound gear system.	✓	
Gear X will go slower than the 36 Teeth Gear.		✓

(ii)   Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm.
(*Show all your workings.*)   [3]

~~10~~ ~~×36~~ ~~×18~~

20 ×10   ×3.6 ~~×8~~

80 rpm

3

(c)   Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB

Component

Soldered joint A   Soldered joint B   Soldered joint C

(i)   State which joint is soldered correctly: ......C.......................   [1]

(ii)   Describe what has caused the solder to take the shape shown in joint A.   [2]

there is a dry solder joint this is
caused by no copper track or dart blacking
the copper getting to the track

1

1

(d)   Complete the table by sketching the correct symbol for **each** electronic component.   [3]

1

⋏⋏ (symbol)	—||—	—⊤—

(e)   Complete the truth table for the logic gate shown.   [1]

A	B	OUT
0	0	0
1	0	0
0	1	0
1	1	1

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.

(i) **Circle** the correct name for this mechanism. [1]
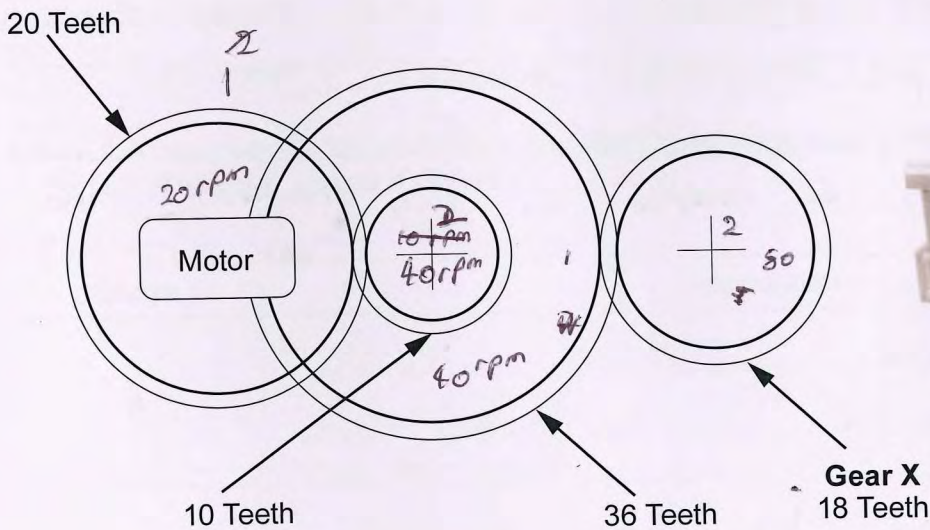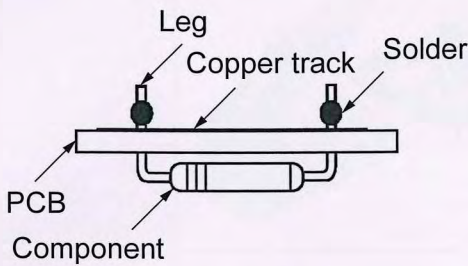
Pawl and ratchet   **Cam and follower**   **Crank and slider**

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts ....*rotary*.... motion to ...*Ocillary*... motion.

(b) The gear system shown below is used to power a toy train.

20 Teeth

Motor

10 Teeth   36 Teeth   **Gear X** 18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]

Statement	True	False
The train uses a compound gear system.	✓	
Gear X will go slower than the 36 Teeth Gear.		✓

(ii) Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm.
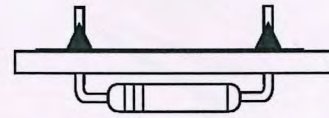*(Show all your workings.)* [3]

$$36 \div 18 = 2rv$$

(c) Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB

Component

Soldered joint A   Soldered joint B   Soldered joint C
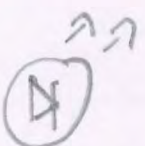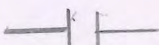
(i) State which joint is soldered correctly: ......C.......... [1]

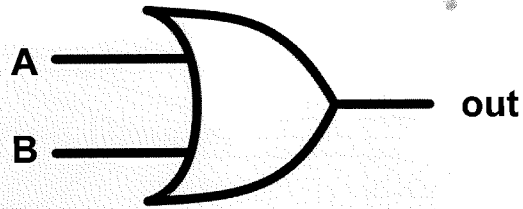(ii) Describe what has caused the solder to take the shape shown in joint A. [2]

the Solder being Placed to high
on the components without.

(d) Complete the table by sketching the correct symbol for **each** electronic component. [3]

(e) Complete the truth table for the logic gate shown. [1]

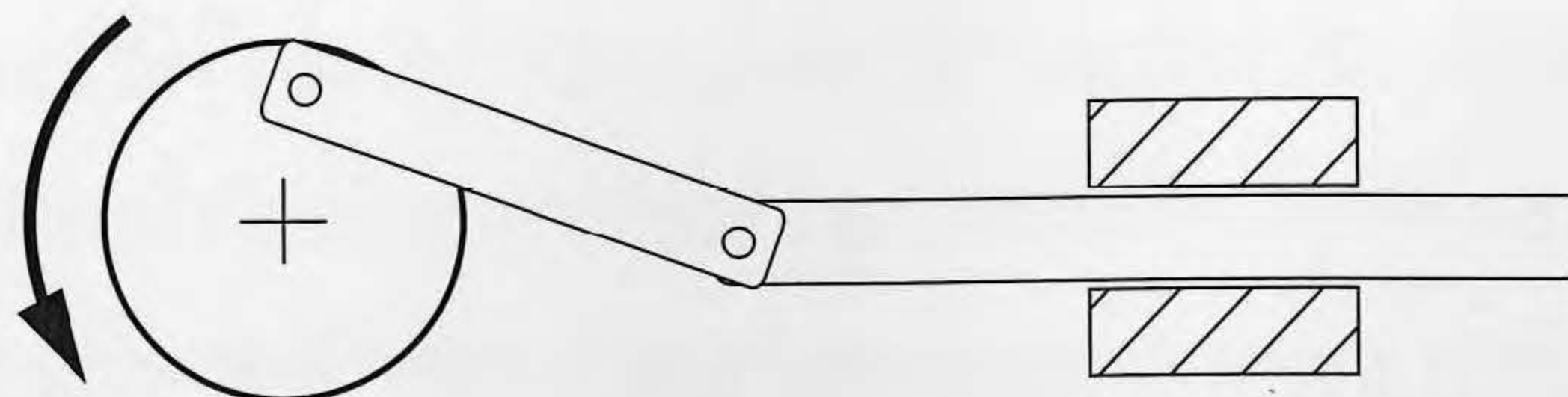| A	B	OUT
0	0	0
1	0	1
0	1	1
1	1	2

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.

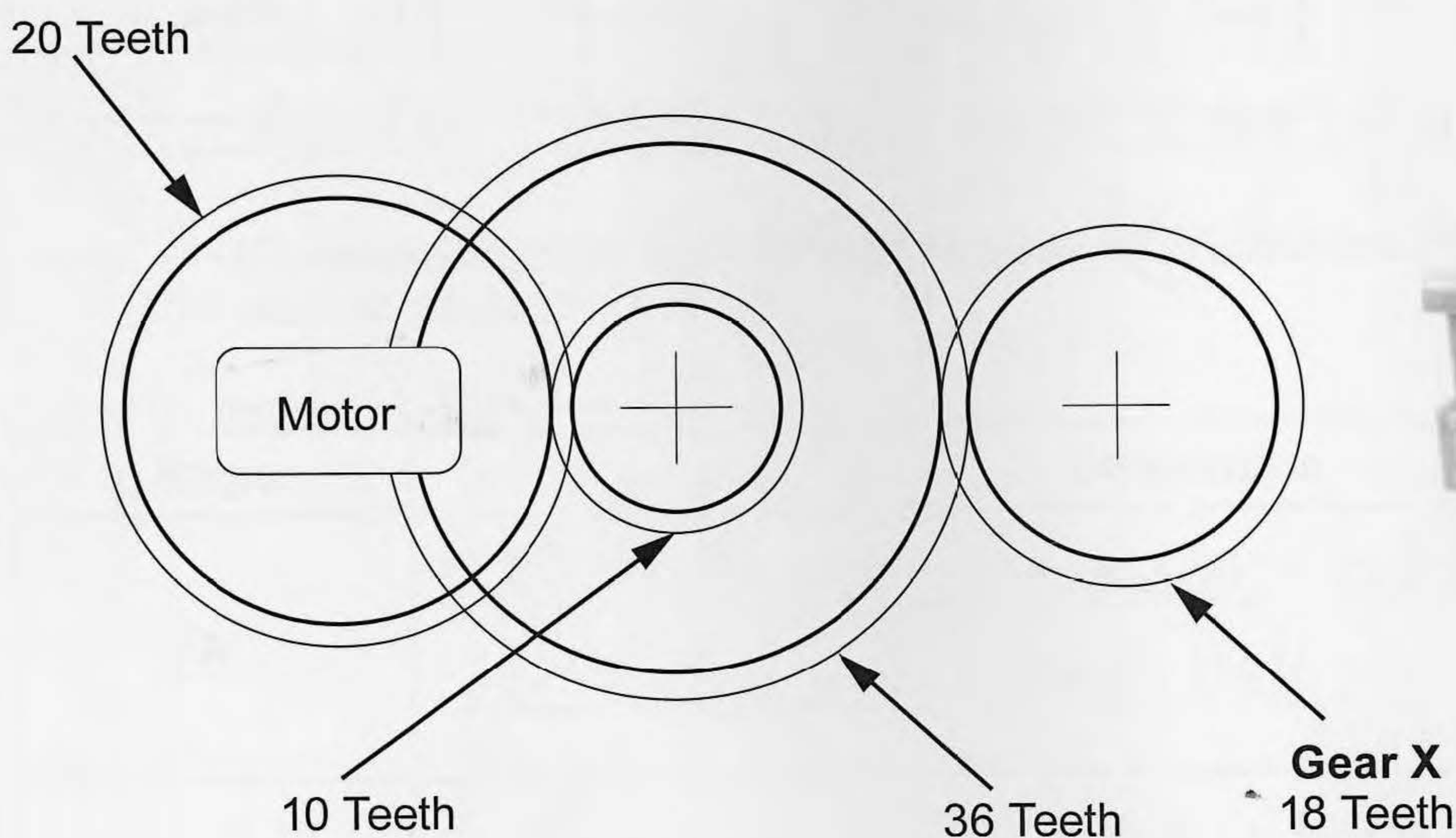(i) **Circle** the correct name for this mechanism. [1]

Pawl and ratchet   **Cam and follower**   **Crank and slider**

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts _rotary_ motion to _Ocillary_ motion.

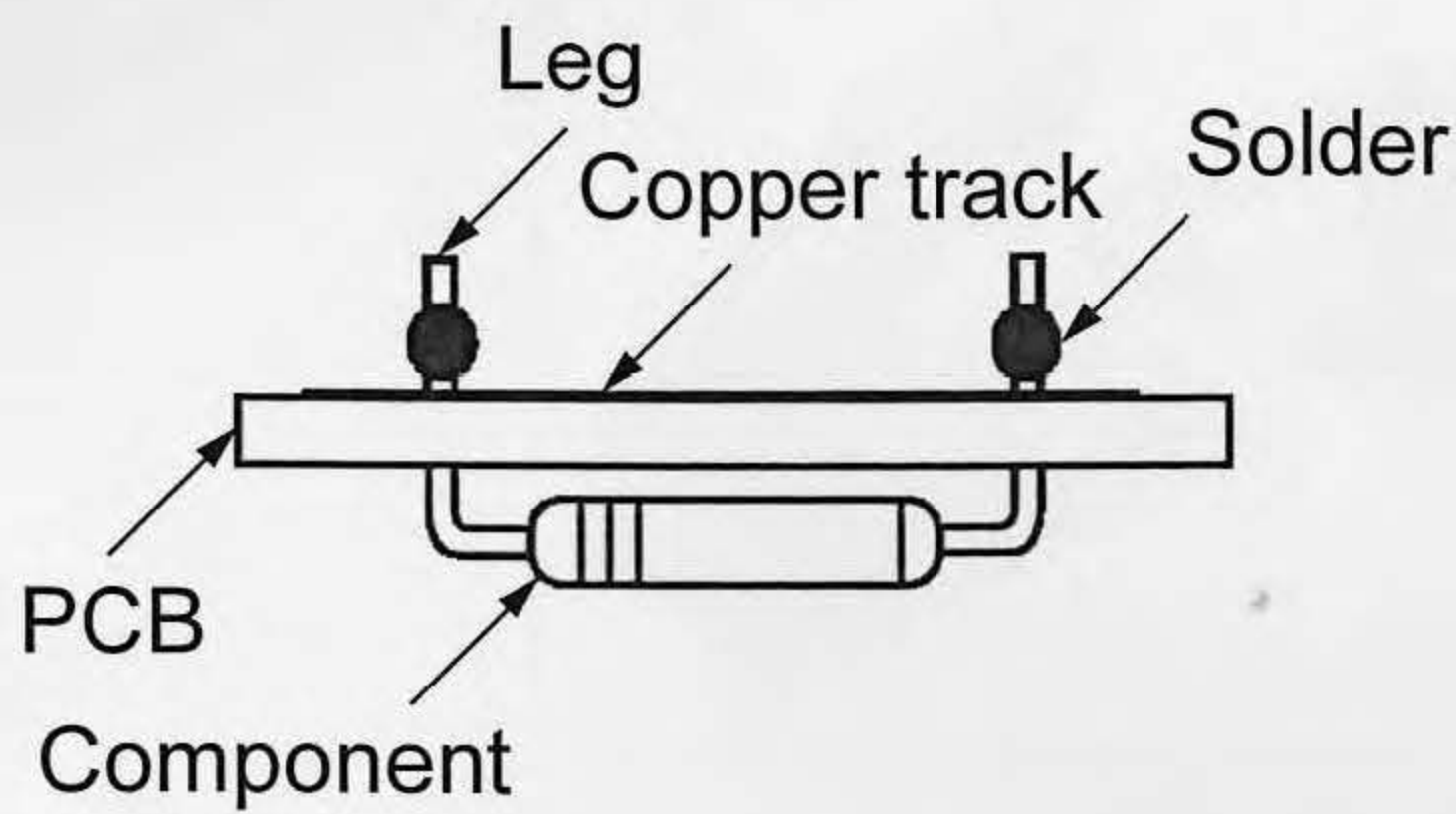(b) The gear system shown below is used to power a toy train.

20 Teeth

Motor

10 Teeth   36 Teeth   **Gear X**
                                     18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]

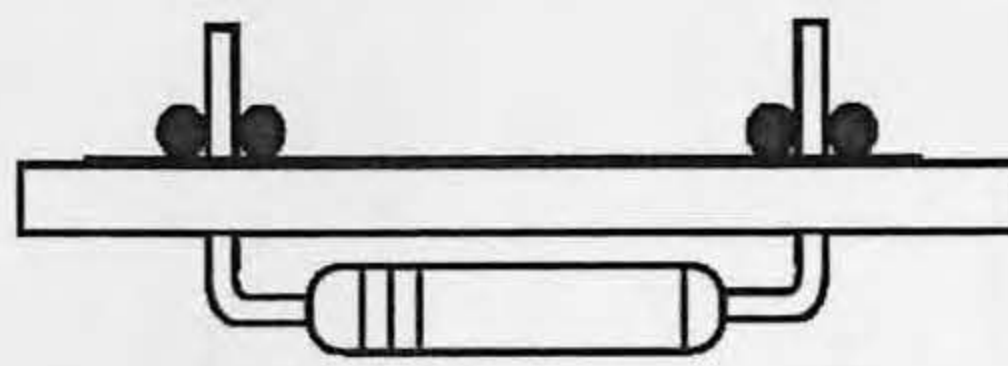| Statement	True	False
The train uses a compound gear system.	✓	
Gear X will go slower than the 36 Teeth Gear.		✓

(ii) Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm. *(Show all your workings.)* [3]
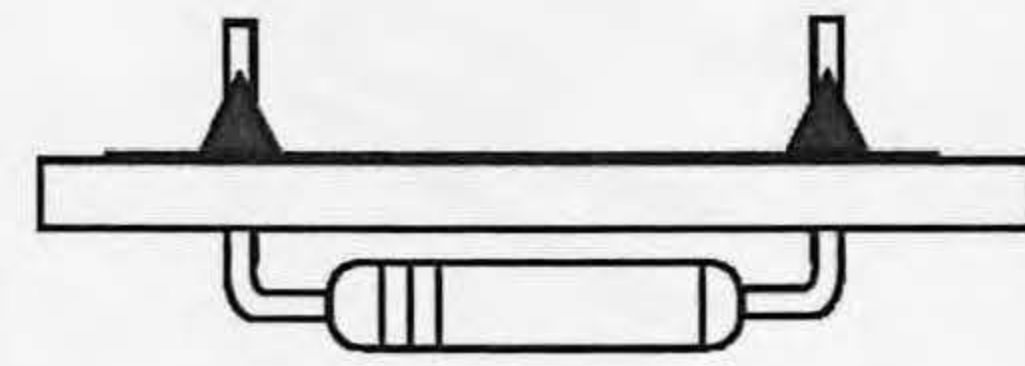
$$36 \div 18 = 2rv$$

(c) Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB

Component

Soldered joint A   Soldered joint B   Soldered joint C

(i) State which joint is soldered correctly: .... C .... [1]

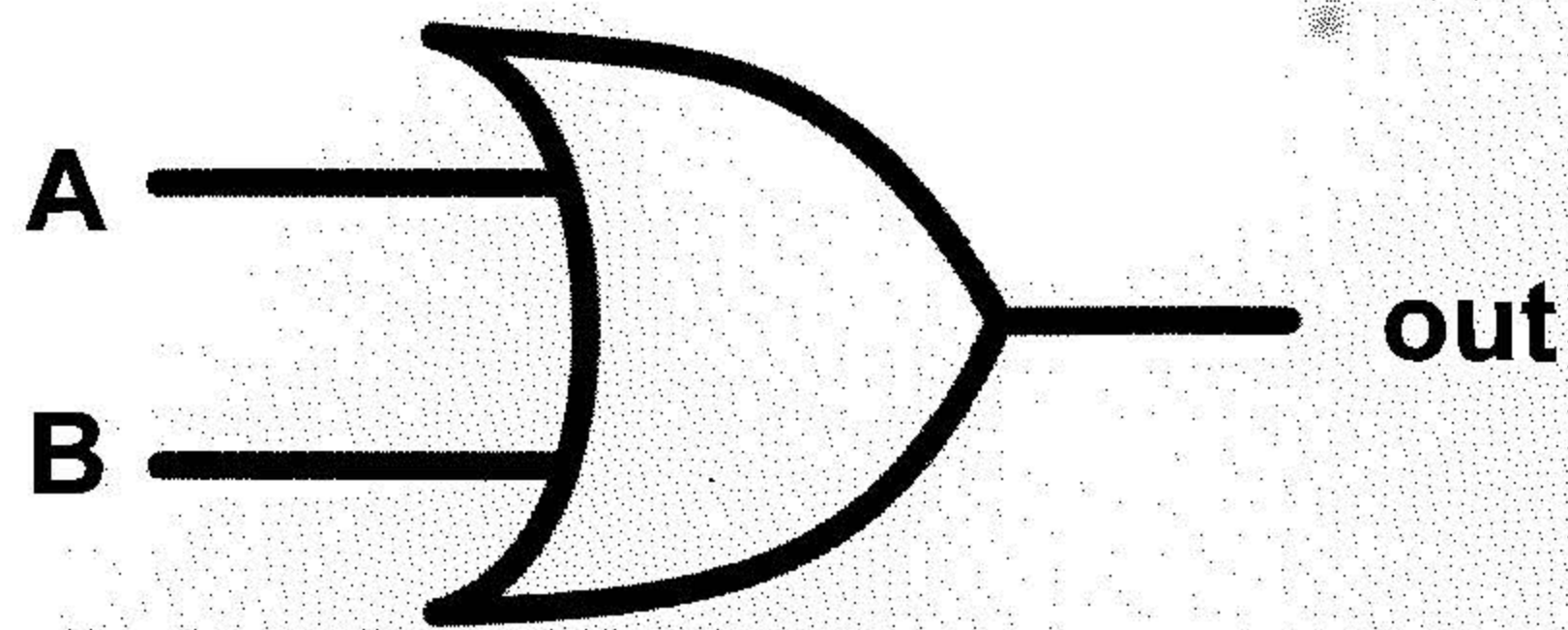(ii) Describe what has caused the solder to take the shape shown in joint A. [2]

the Solder being placed to high
on the components without.

(d) Complete the table by sketching the correct symbol for **each** electronic component. [3]

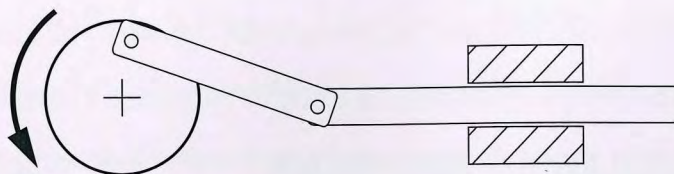*(e)* Complete the truth table for the logic gate shown.

A	B	OUT
0	0	0
1	0	1
0	1	1
1	1	2

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.

rotary
linear

(i) **Circle** the correct name for this mechanism. [1]

Pawl and ratchet   **Cam and follower**   **Crank and slider**

(ii) Complete the statement below by adding the correct type of motion. [2]

This mechanism converts ......*linear*...... motion to ...*rotary*...... motion.

(b) The gear system shown below is used to power a toy train.
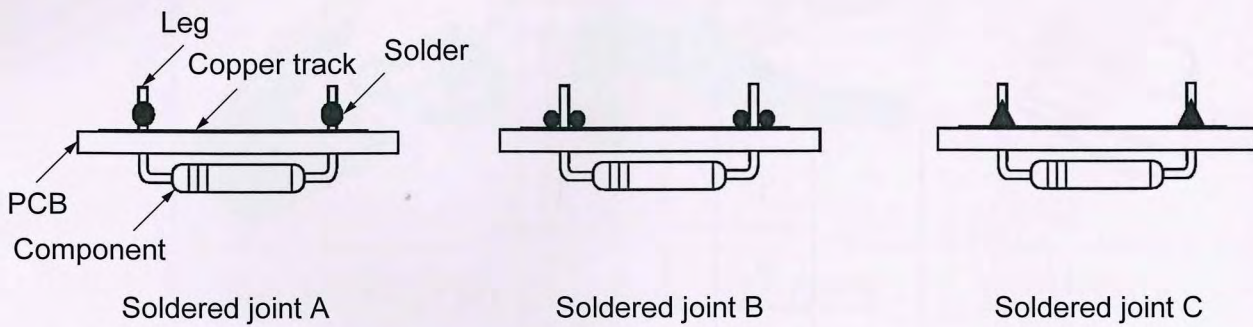
20 Teeth

10 Teeth   36 Teeth   **Gear X** 18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]

Statement	True	False
The train uses a compound gear system.		✓
Gear X will go slower than the 36 Teeth Gear.		✓

(ii) Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm. *(Show all your workings.)* [3]

18 x 20 x 36 =

18 x 20 = 360

(c) Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB
Component

Soldered joint A   Soldered joint B   Soldered joint C

(i) State which joint is soldered correctly: .... C .... [1]

(ii) Describe what has caused the solder to take the shape shown in joint A. [2]

The Solder has not been

(d) Complete the table by sketching the correct symbol for **each** electronic component. [3]

L.E.D.

Transistor

Push to make

(e) Complete the truth table for the logic gate shown.

[1]

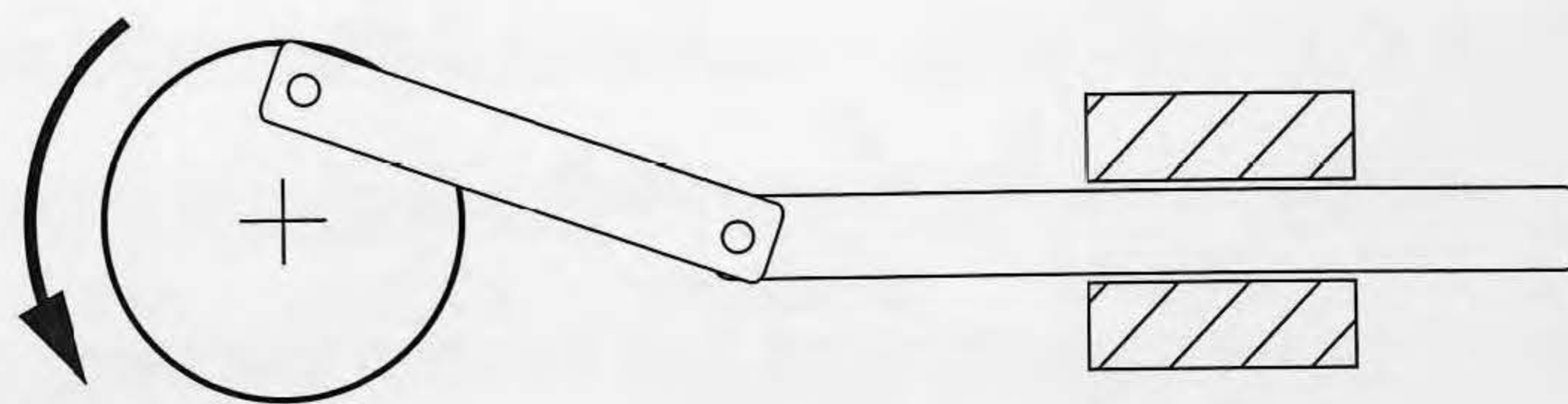
A	B	OUT
0	0	0
1	0	1
0	1	1
1	1	1

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) Study the mechanism shown below.
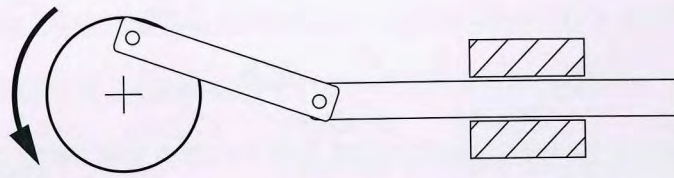
rotary
linear

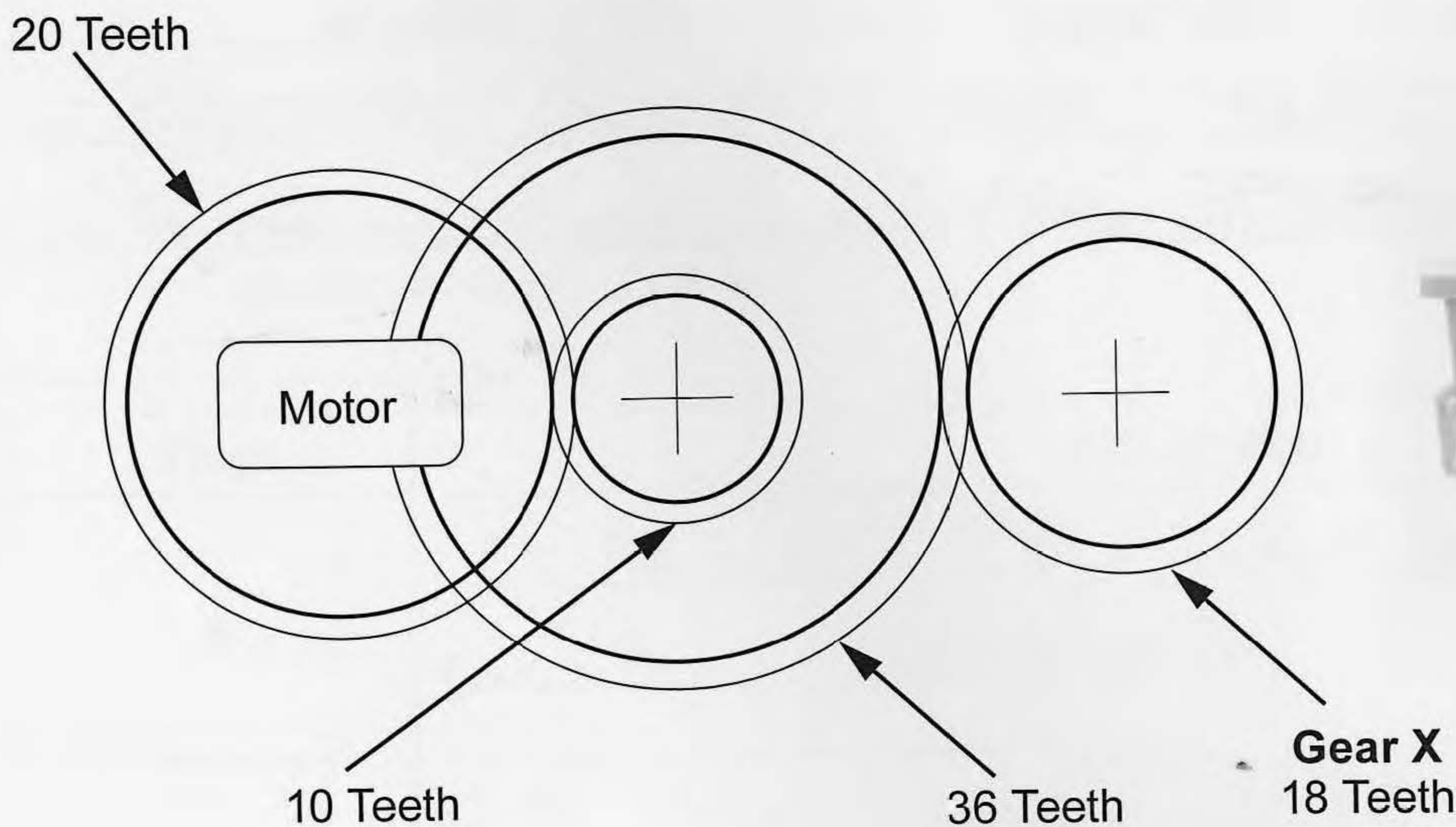(i) **Circle** the correct name for this mechanism. [1] 0

Pawl and ratchet   **Cam and follower**   **Crank and slider**

(ii) Complete the statement below by adding the correct type of motion. [2] 1

This mechanism converts ....*linear* X..... motion to ...*rotary*...........
motion.

(b) The gear system shown below is used to power a toy train.

20 Teeth

Motor

10 Teeth   36 Teeth   Gear X
                                    18 Teeth

(i) Complete the table below by placing a **tick** (✓) to show whether each statement is true or false. [2]
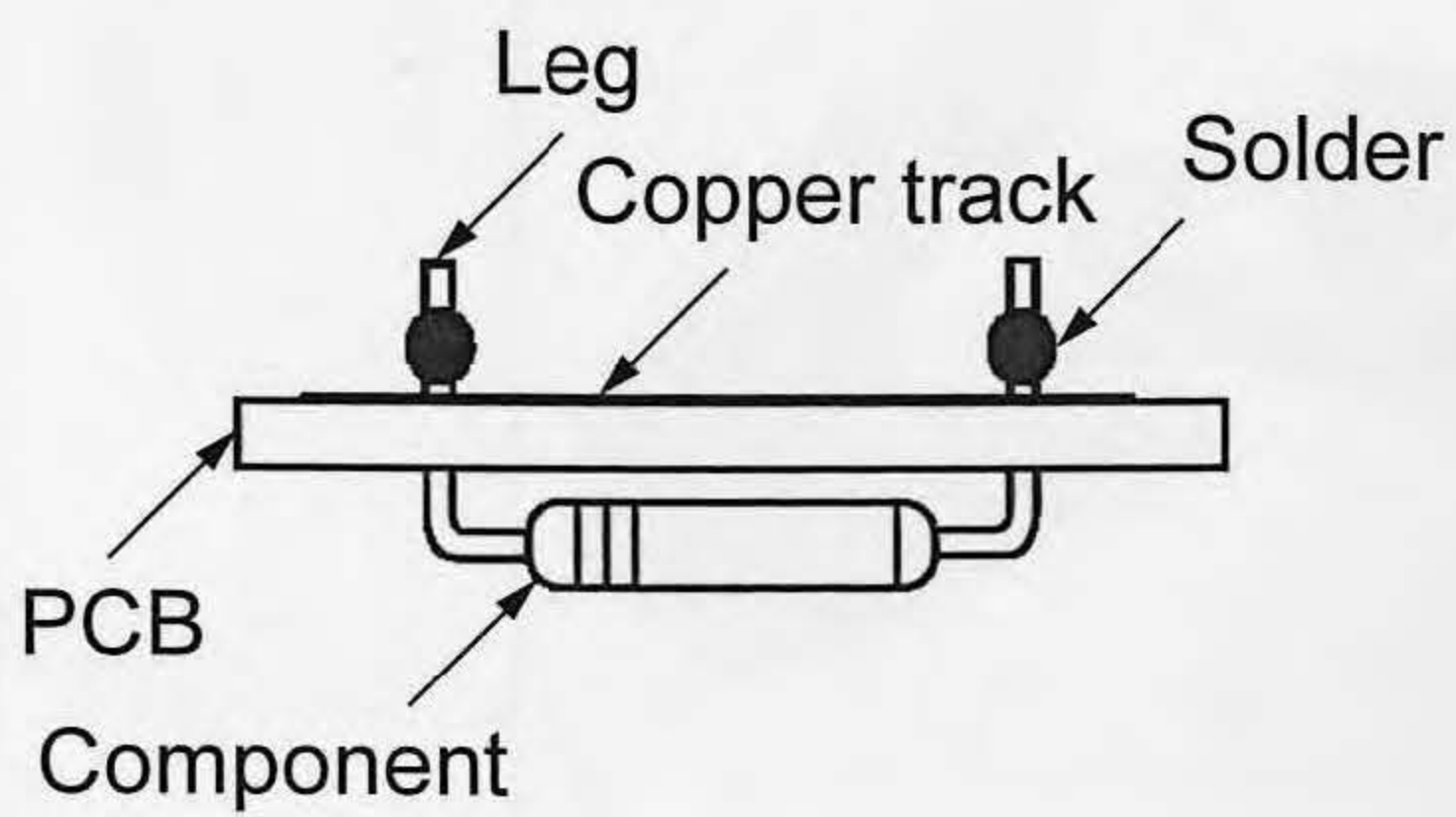
Statement	True	False
The train uses a compound gear system.		✓ x
Gear X will go slower than the 36 Teeth Gear.		✓

(ii) Calculate the rotational velocity (RV) of **Gear X** when the motor rotates at 20rpm.
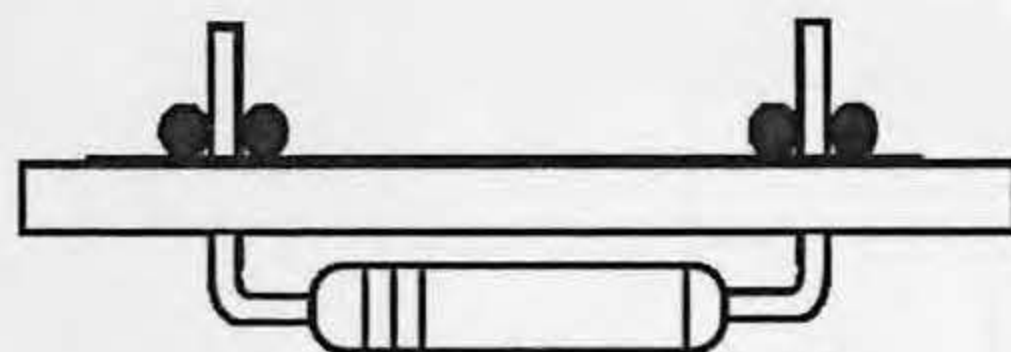*(Show all your workings.)* [3]

18 x 20 x 36 =

18 x 20 = 360

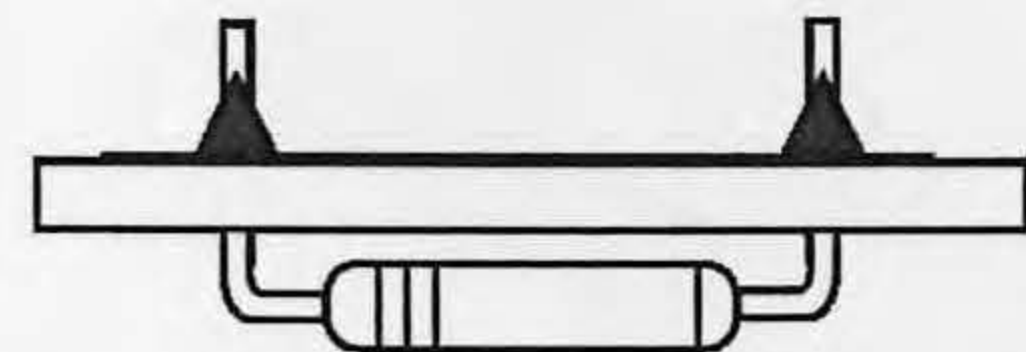(c) Components are soldered onto the PCB to construct circuits. Study the soldered joints below.

Leg
Copper track   Solder

PCB

Component

Soldered joint A   Soldered joint B   Soldered joint C

(i) State which joint is soldered correctly: .... C .... [1]

(ii) Describe what has caused the solder to take the shape shown in joint A. [2]

The Solder has not been

(d) Complete the table by sketching the correct symbol for **each** electronic component. [3]

LEND.	Transistor	Push to make

(e) Complete the truth table for the logic gate shown. [1]

A	B	OUT
0	0	0
1	0	1
0	1	1
1	1	1

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit
with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i) Name **one** input to the garage door system. [1]

....

(ii) Name **one** output to the garage door system. [1]

....

(iii) Describe the reason for the courtesy light on the Control Unit. [2]

....

....

(b) The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops. [7]

Note: Motor forwards opens the door, assume the door is closed at the start.

Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop
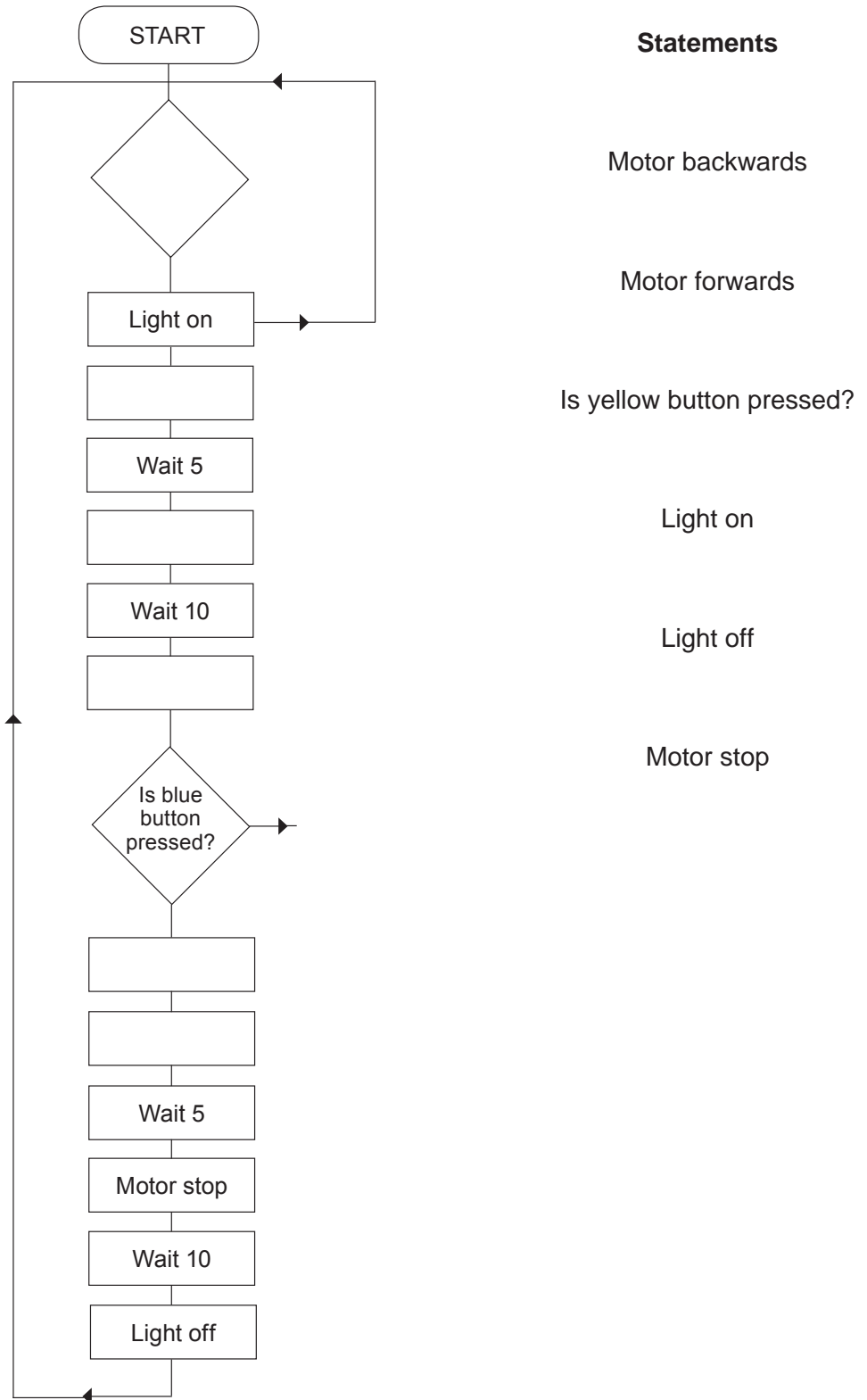
(c) The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.

Reason 1: .... [2]

....

Reason 2: .... [2]

....

END OF PAPER

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i) Name **one** input to the garage door system. [1]
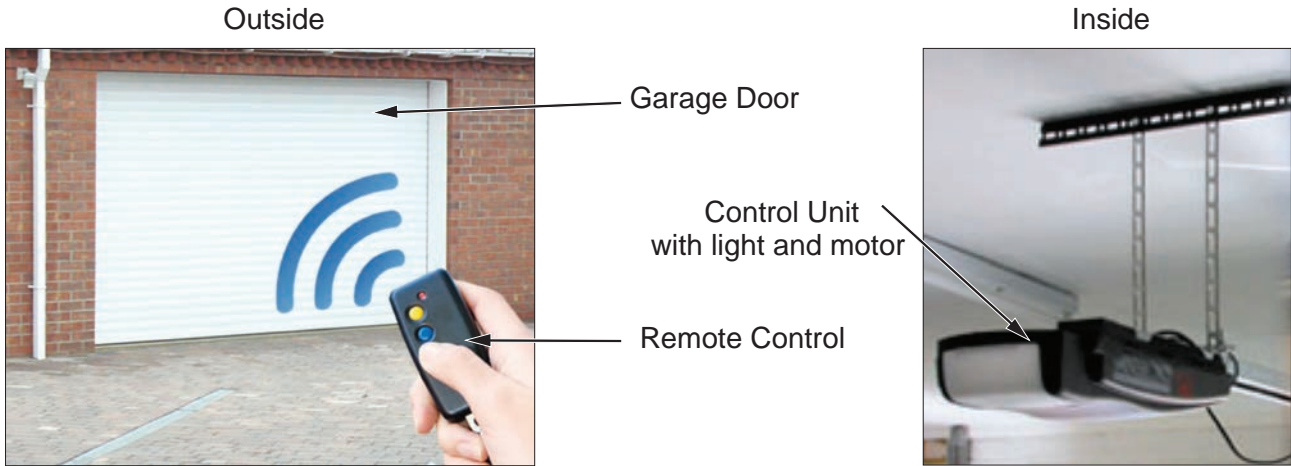
Remote ~~con~~ the buttons on the remote

(ii) Name **one** output to the garage door system. [1]

the motor opening the door

(iii) Describe the reason for the courtesy light on the Control Unit. [2]

This allows the user to see since the units are mounted in the middle of the garage and this is where the light usually is. This also helps to save power since the light will only be on when needed
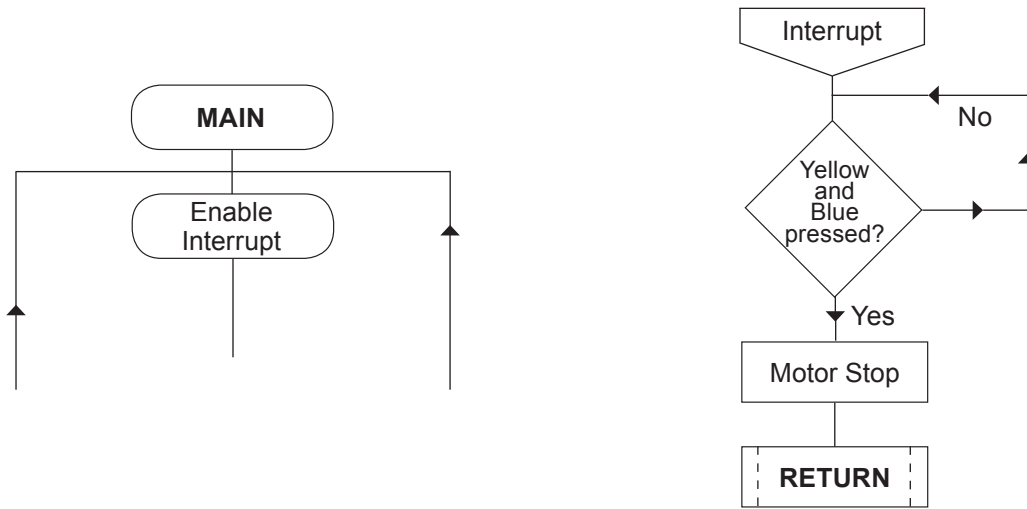
(b)   The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops.   [7]

Note: Motor forwards opens the door, assume the door is closed at the start.
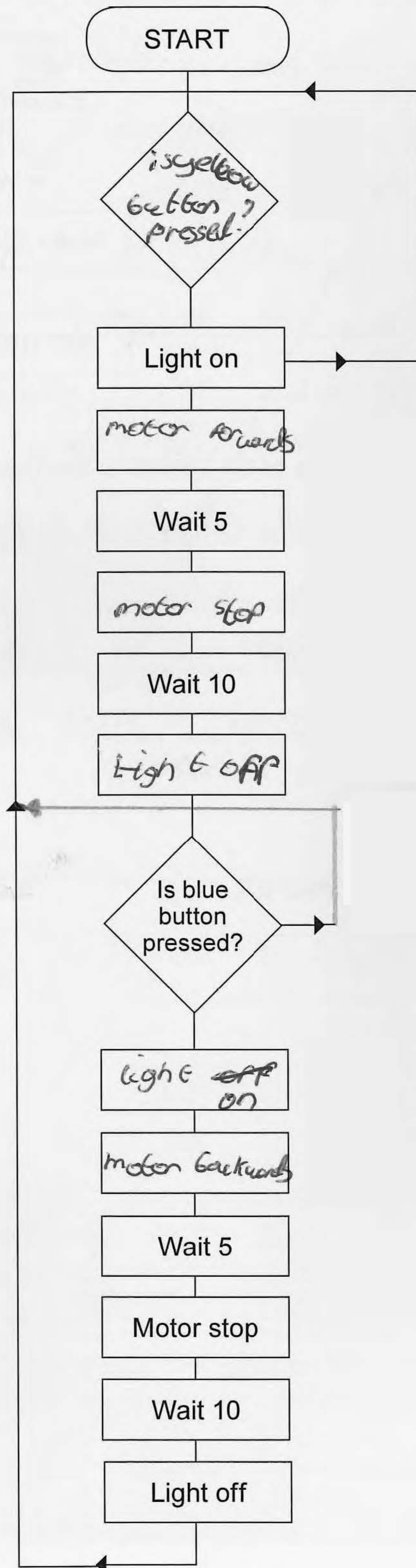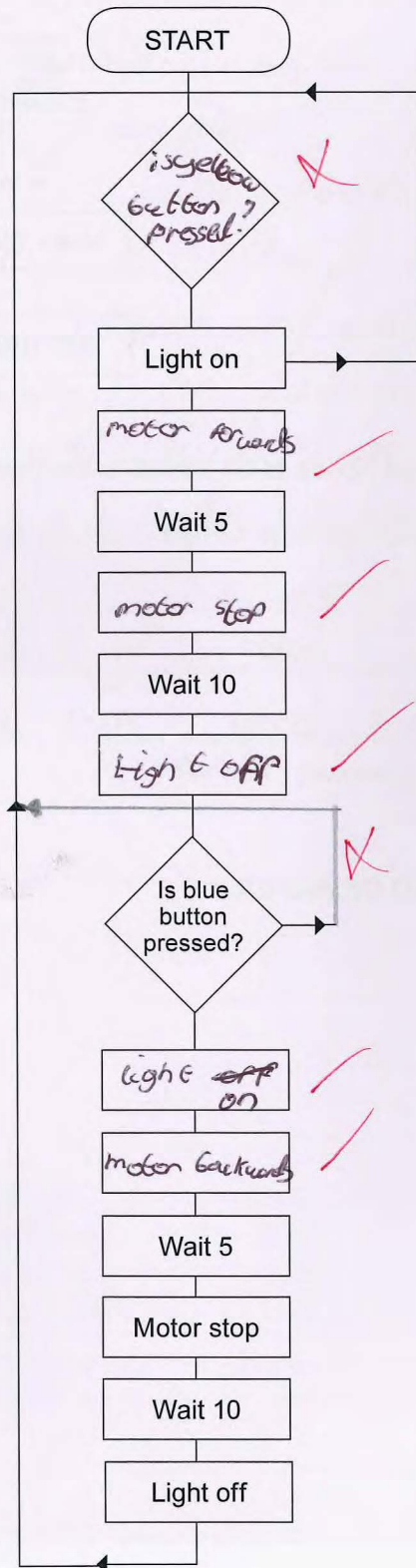
Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

(c)   The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.
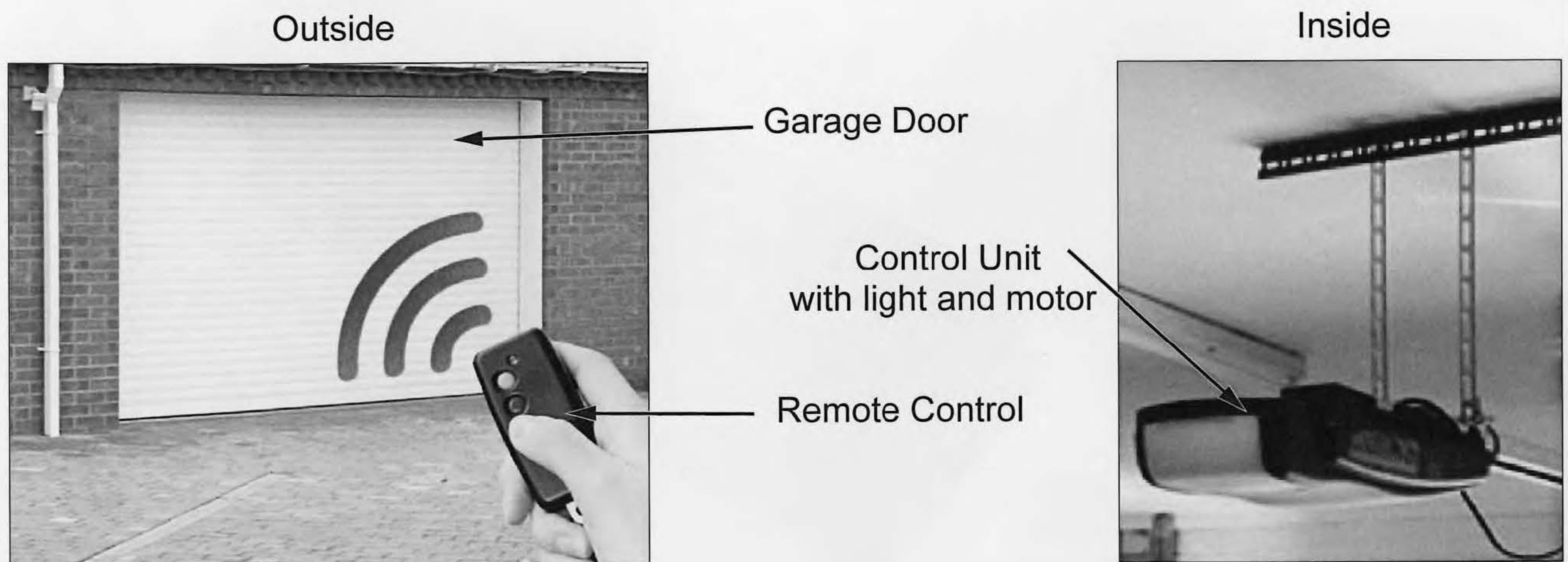
Reason 1: it shows the functions for if both [2]
buttons are pressed.

Reason 2: it allows the motor to stop and [2]
stops this from being part of the main
loop since it is not a common function.

END OF PAPER

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

—— Garage Door

Control Unit
with light and motor

—— Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i) Name **one** input to the garage door system. [1]

Remote con: the buttons on the remote

(ii) Name **one** output to the garage door system. [1]

the motor opening the door

(iii) Describe the reason for the courtesy light on the Control Unit. [2]

This allows the user to see since
the units are mounted in the middle
of the garage and this is where the light
usually is. This he also helps to save power since
the light will only be on when needed

(b) The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops. [7]
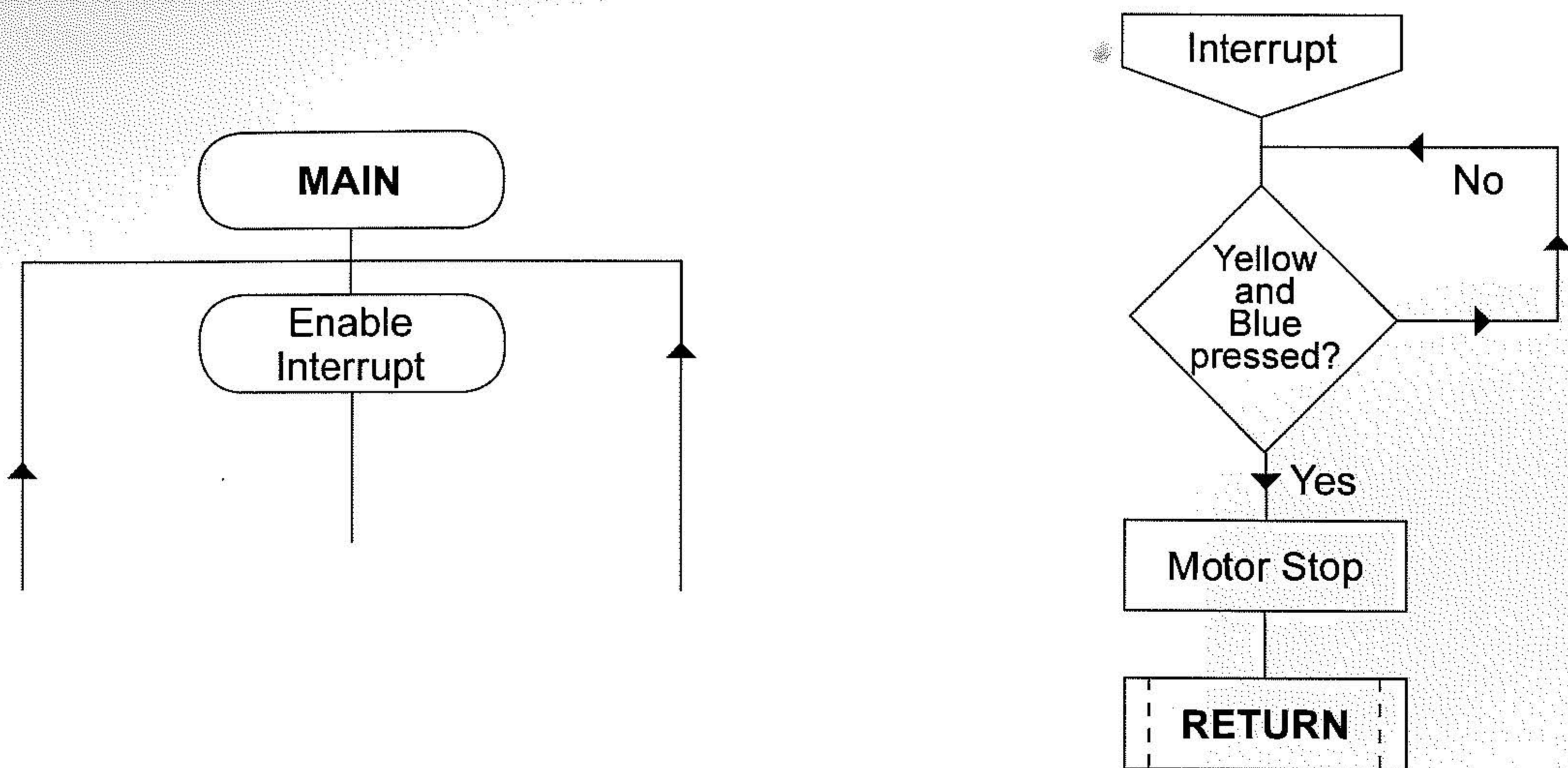
Note: Motor forwards opens the door, assume the door is closed at the start.

Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

```
        START
          |
     is yellow
     button ?
     pressed          X
          |
      Light on  →
          |
    motor forwards  /
          |
       Wait 5
          |
      motor stop  /
          |
       Wait 10
          |
      light off  /
          |
      Is blue
      button     →  X
     pressed?
          |
    light off on  /
          |
    motor backwards  /
          |
       Wait 5
          |
     Motor stop
          |
       Wait 10
          |
      Light off
```

Turn over.

(c) The flowchart could be modified to include an interrupt system.

MAIN

Enable
Interrupt

Interrupt

Yellow
and
Blue
pressed?

No

Yes

Motor Stop

RETURN

Give **two** reasons why this interrupt needs to be added to the flowchart.

Reason 1: it shows the funtions for if both [2]
buttons are pressed.

Reason 2: to allows the motor to stop and [2]
stops this from being part of the main
loop since it is not a common function.

END OF PAPER

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i) Name **one** input to the garage door system. [1]

remote

(ii) Name **one** output to the garage door system. [1]

Gara Control unit illuminates

(iii) Describe the reason for the courtesy light on the Control Unit. [2]

To tell you if it is on or not

(b) The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops. [7]

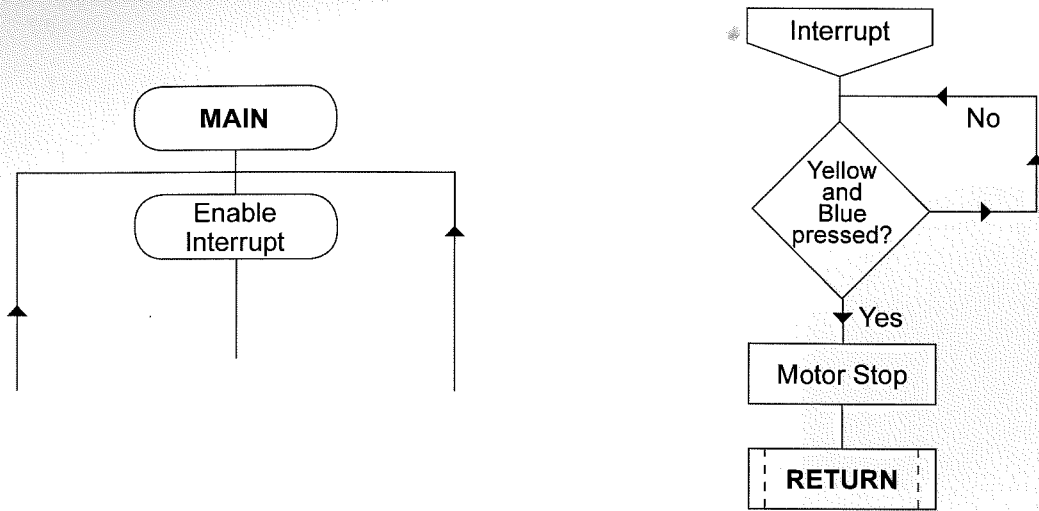*Note: Motor forwards opens the door, assume the door is closed at the start.*

Statements

START

is the yellow button Pressed?

Light on

motor ~~forwards~~ Backwards

Wait 5

Motor stop

Wait 10

light on

Is blue button pressed?

light off

Motor ~~backwards~~ Forwards

Wait 5

Motor stop

Wait 10

Light off

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

(c) The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.

Reason 1: Too stop anything from going [2]
wrong

Reason 2: Too allow change in the [2]
circuit.

END OF PAPER

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

    (a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit
with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

    (i) Name **one** input to the garage door system.   [1]

    remote

    (ii) Name **one** output to the garage door system.   [1]
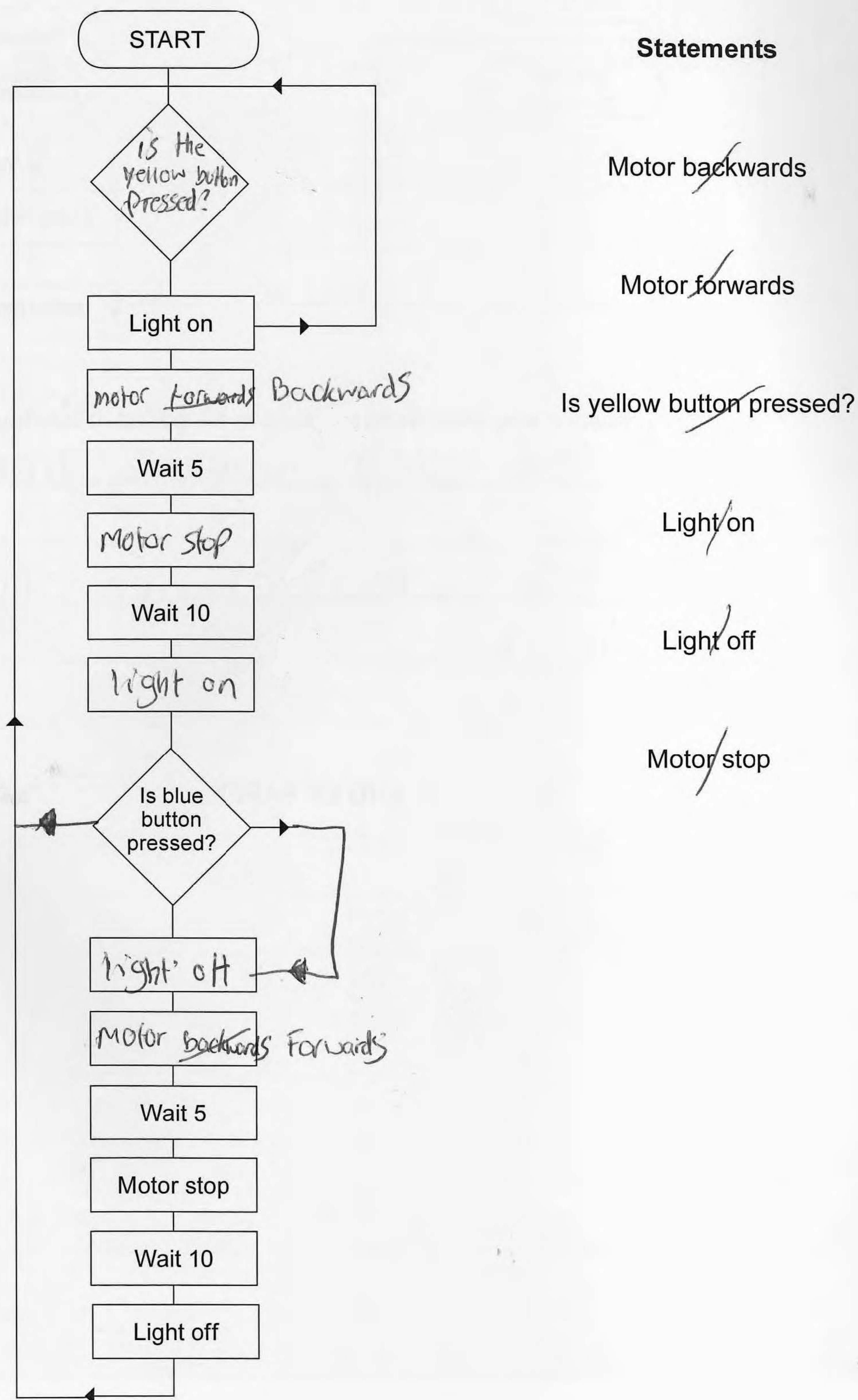
    Gara Control unit illuminates

    (iii) Describe the reason for the courtesy light on the Control Unit.   [2]

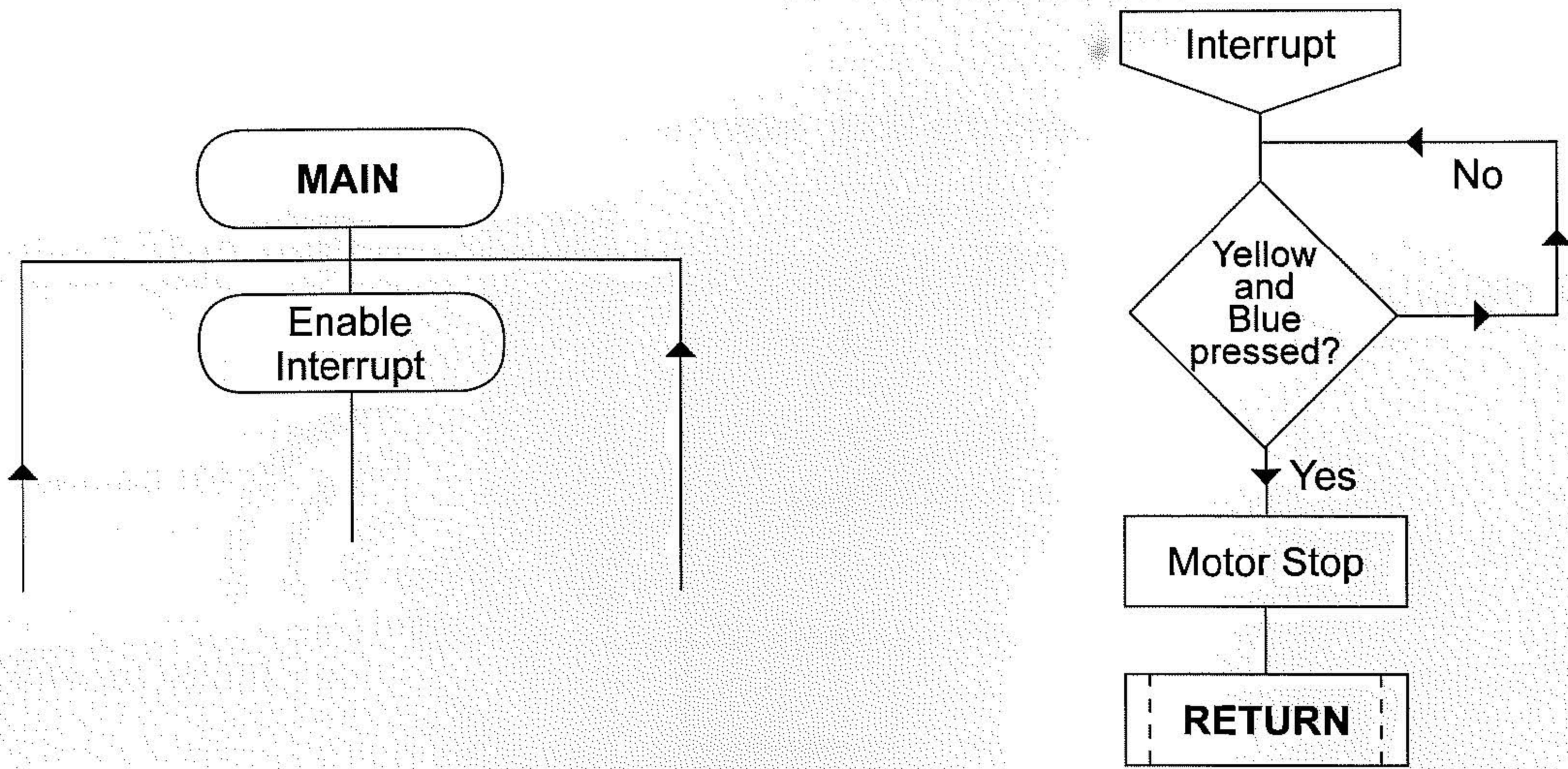   To tell you if it is on or
    not

(4121-01)

(b)   The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops.   [7]

Note: Motor forwards opens the door, assume the door is closed at the start.

Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

(c)   The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.
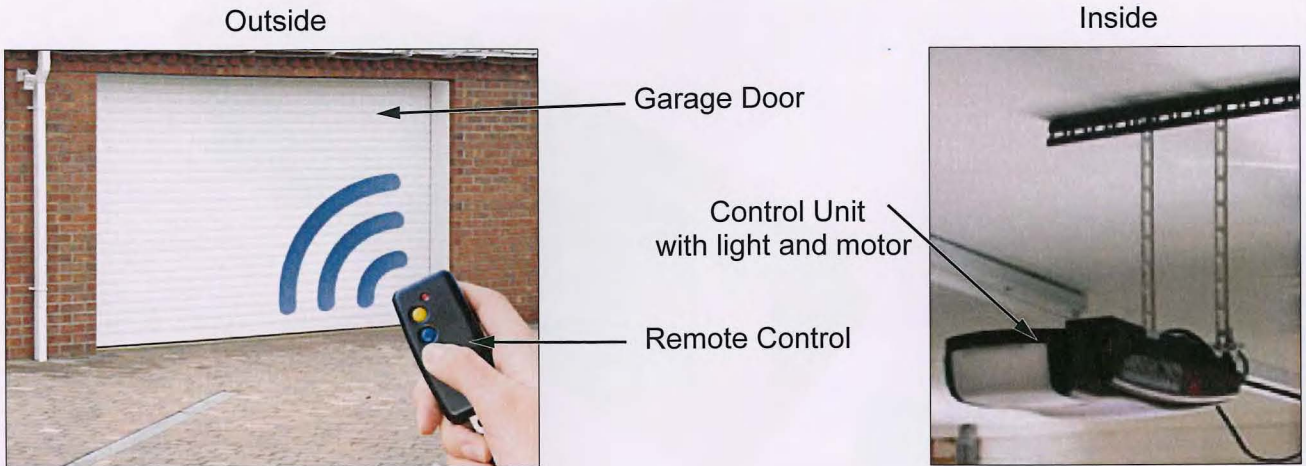
Reason 1: .....Too stop anything from going..... [2]
...wrong...

Reason 2: .....Too allow change in the..... [2]
...circuit....

END OF PAPER

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i) Name **one** input to the garage door system. [1]

Remote Control button pressed

(ii) Name **one** output to the garage door system. [1]

Garage door opens Light turns on

(iii) Describe the reason for the courtesy light on the Control Unit. [2]

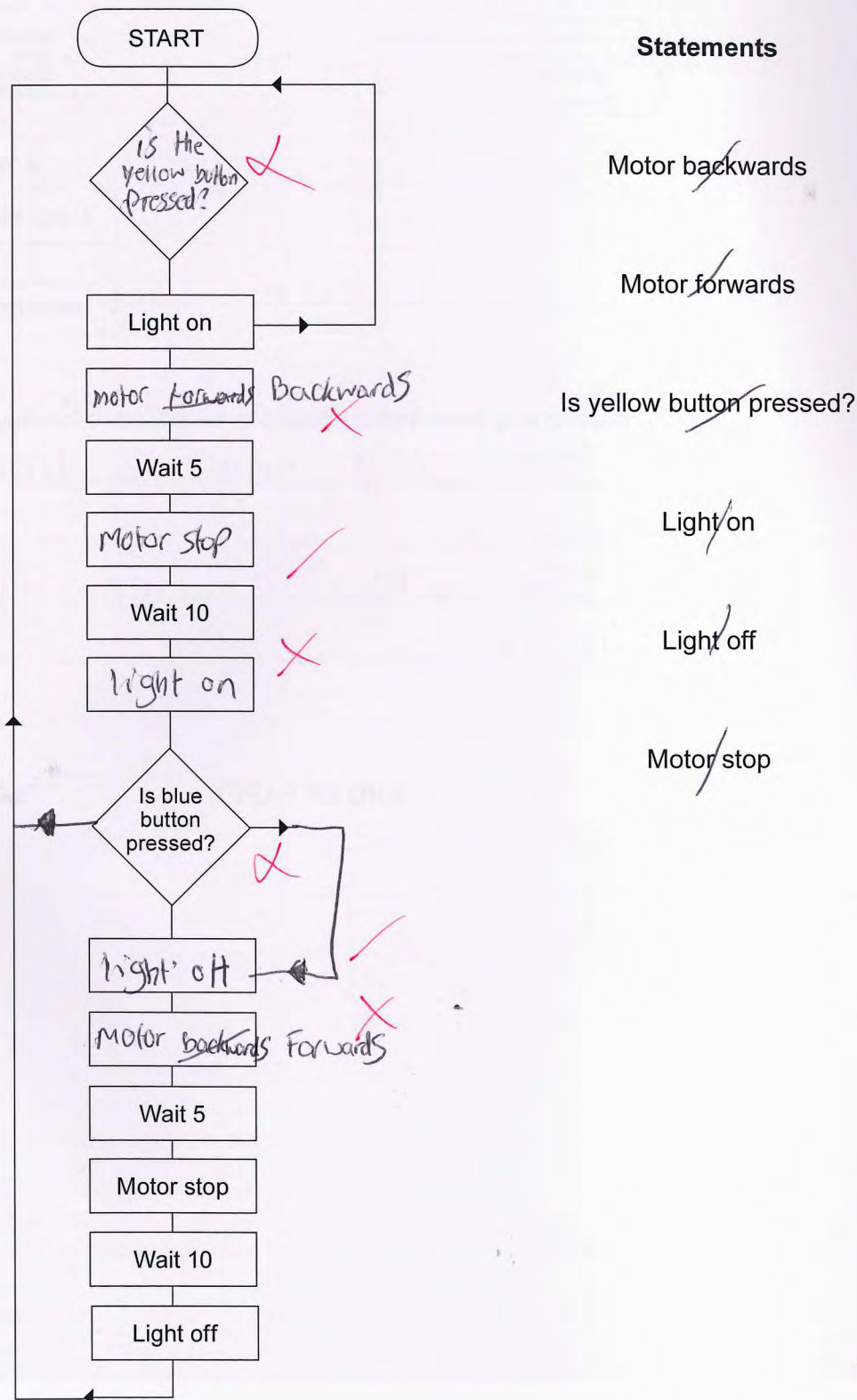to show if there is any faults or flaws To light up when th a button has been pressed.

(b) The flowchart below shows how the garage door system is controlled.
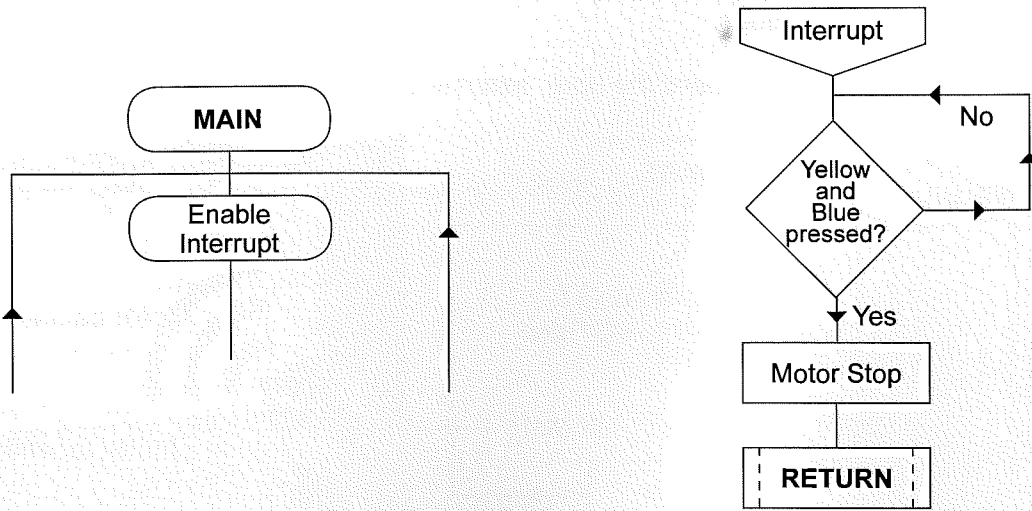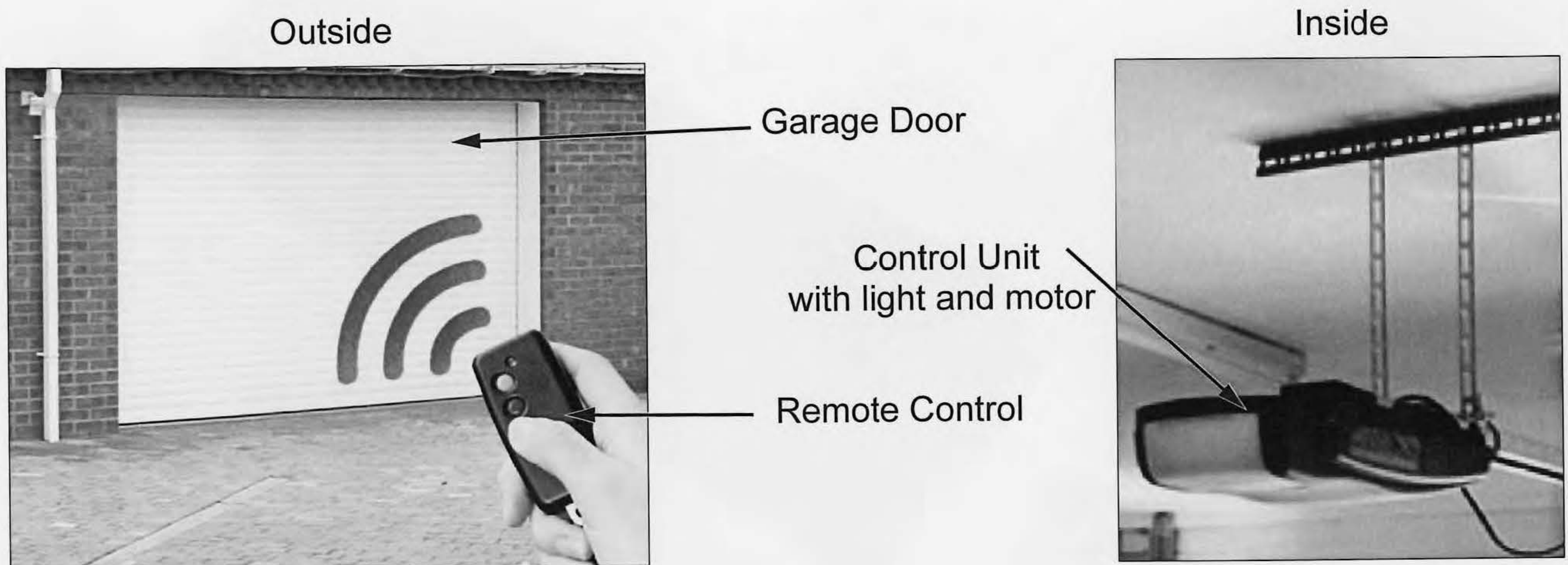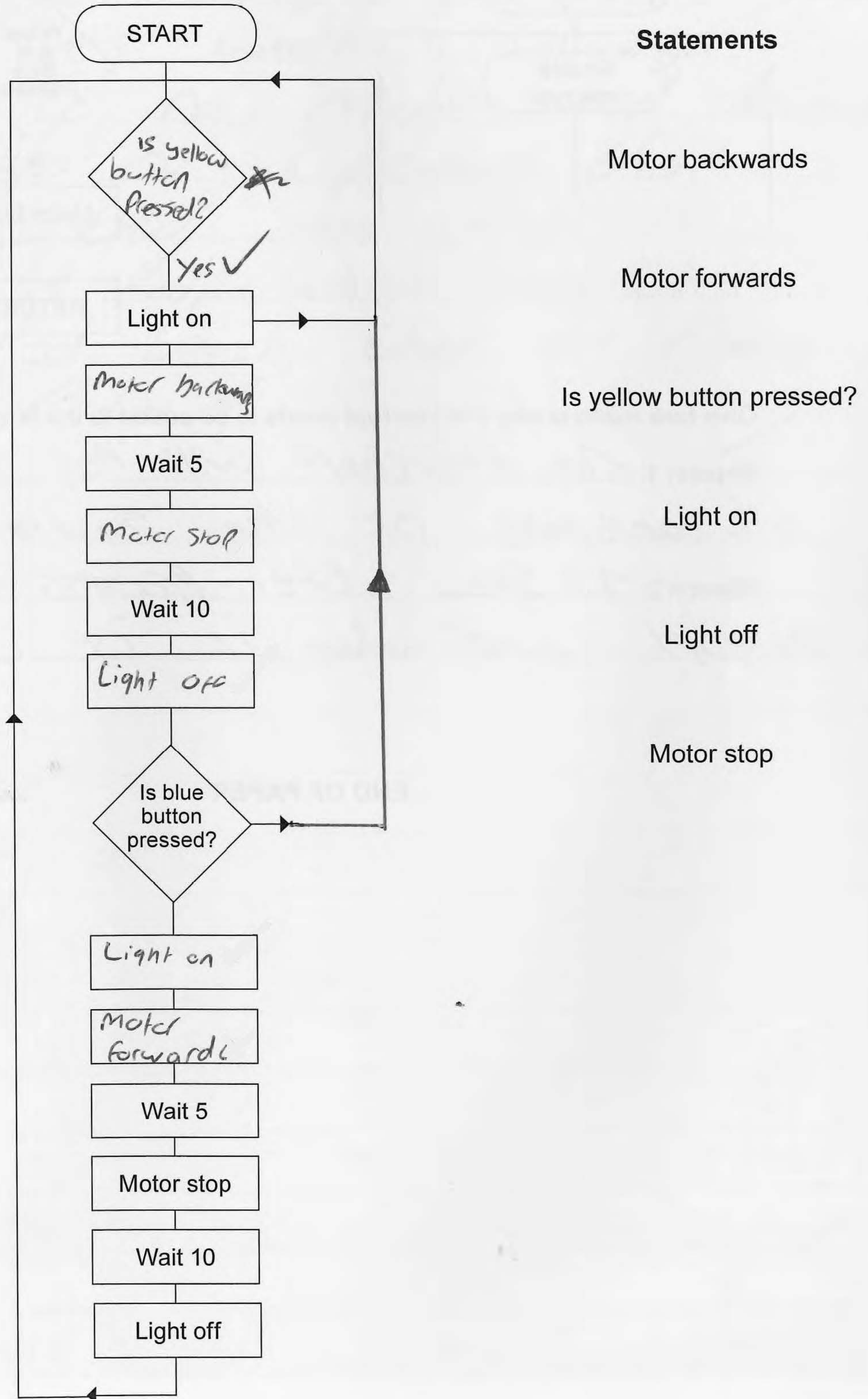
Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops. [7]

Note: Motor forwards opens the door, assume the door is closed at the start.

Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

Flowchart:

START → Is yellow button pressed? (No → loops back to start) / Yes ✓ → Light on → Motor backwards → Wait 5 → Motor stop → Wait 10 → Light off → Is blue button pressed? (Yes → loops back) / No → Light on → Motor forwards → Wait 5 → Motor stop → Wait 10 → Light off → loops back to START

(c) The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.

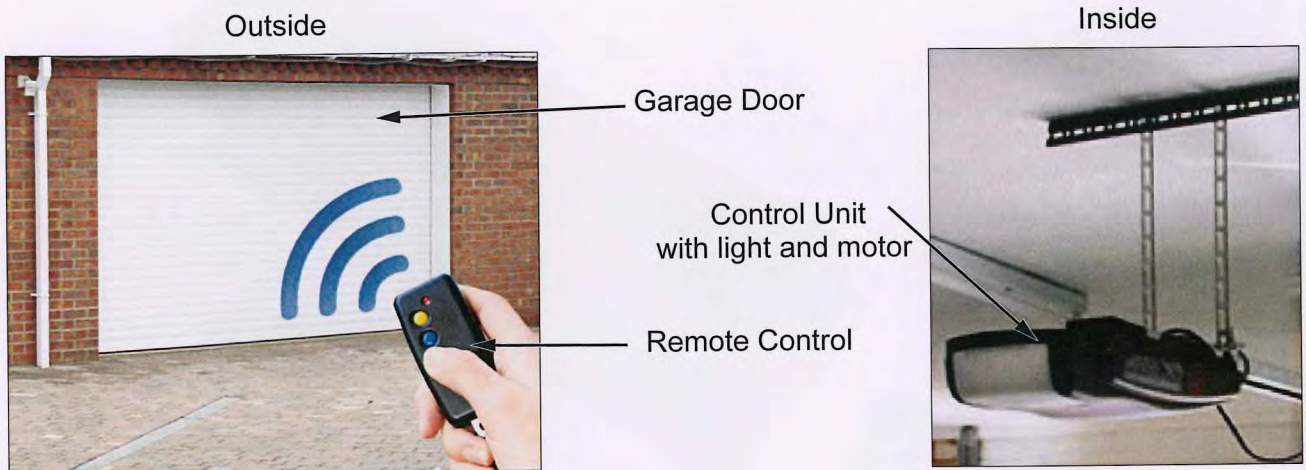Reason 1: _The flowchart will not show_ [2]
all components of the system.

Reason 2: _To show the process of the_ [2]
interrupt and when it is used.

END OF PAPER

8.   This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a)   The remote controlled automatic garage door below operates when a remote control is used.

Outside   Inside

Garage Door

Control Unit
with light and motor

Remote Control

When the user presses the yellow button the garage door opens, when the blue button is pressed the door closes. During operation a courtesy light on the Control Unit inside the garage illuminates.

(i)   Name **one** input to the garage door system.   [1]

Remote Control button pressed

(ii)   Name **one** output to the garage door system.   [1]

Garage door opens Light turns on

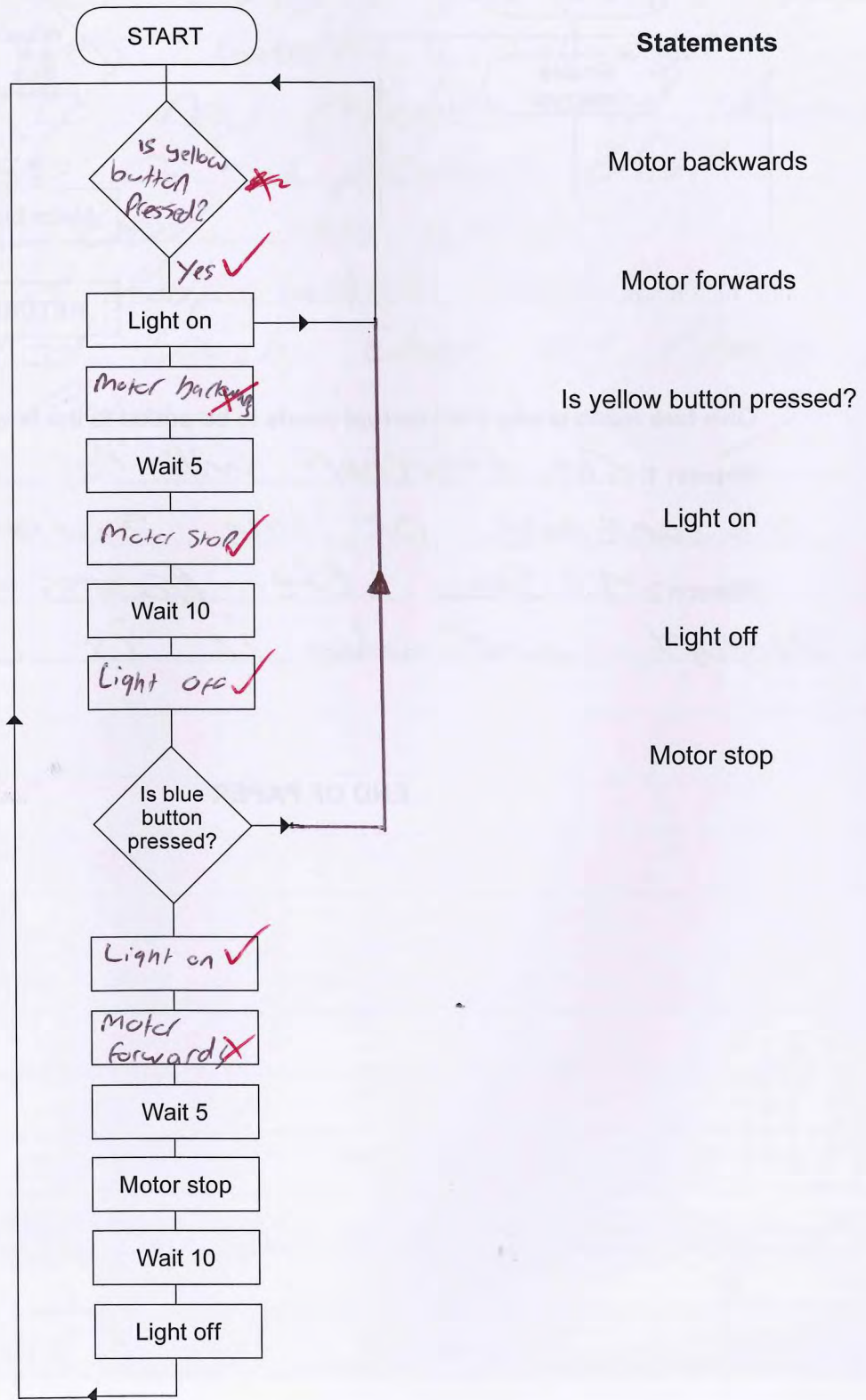(iii)   Describe the reason for the courtesy light on the Control Unit.   [2]

to shown if there is any faults
or flaws To light up when
th a button has been pressed.

(b)   The flowchart below shows how the garage door system is controlled.

Complete the flowchart by placing the statements in the correct positions and adding any missing feedback loops.   [7]
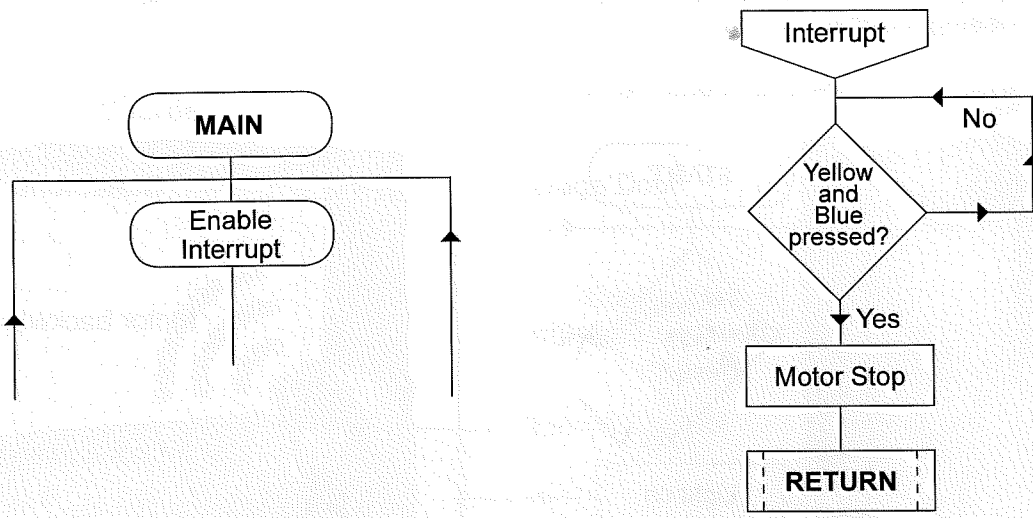
Note: Motor forwards opens the door, assume the door is closed at the start.

START

Statements

Motor backwards

Motor forwards

Is yellow button pressed?

Light on

Light off

Motor stop

Flowchart (handwritten answers):
- Is yellow button pressed?
- Yes
- Light on
- Motor backwards
- Wait 5
- Motor stop
- Wait 10
- Light off
- Is blue button pressed?
- Light on
- Motor forward
- Wait 5
- Motor stop
- Wait 10
- Light off

(c)   The flowchart could be modified to include an interrupt system.

Give **two** reasons why this interrupt needs to be added to the flowchart.

Reason 1: *The flowchart will not show* [2]
all components of the system.

Reason 2: *To show the process of the* [2]
interrupt and when it is used.

END OF PAPER