

# S3 Technological Studies: Homework 6: Pneumatic Systems.

Mark:	/32
Grade:	

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

1. (a) Pneumatics are used for many reasons in industry and everyday life. Give three examples of the uses of pneumatics.

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3  
2  
1  
0

- (b) Describe some of the advantages of using pneumatics in industry.

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6  
5  
4  
3  
2  
1  
0

2. List the safety rules we must follow when operating pneumatic circuits.

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_

6. \_\_\_\_\_  
\_\_\_\_\_

7. \_\_\_\_\_  
\_\_\_\_\_

7  
6  
5  
4  
3  
2  
1  
0

3. (a) Name the type of piston shown in the diagram opposite.

\_\_\_\_\_

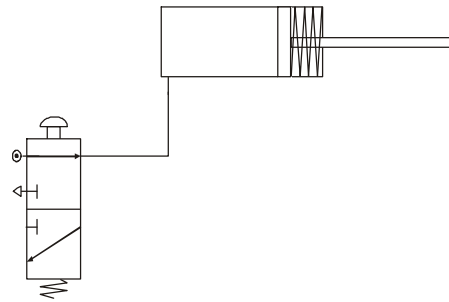
\_\_\_\_\_

(b) Name the type of valve shown in the diagram opposite.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



(c) Which two terms can be used to describe the piston in the position shown?

\_\_\_\_\_

\_\_\_\_\_

4. Name each of the following actuators.

	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____

5. Draw the symbols for both mains air and exhaust air from a valve.

Mains air

Exhaust air

1  
0

3  
2  
1  
0

2  
1  
0

8  
7  
6  
5  
4  
3  
2  
1  
0

2  
1  
0

# S3 Technological Studies: Homework 7: Pneumatic Systems.

Mark:	/ 22
Grade:	

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

1. Draw the symbols for the following components.

(a) Push button spring return 3\2 valve

3  
2  
1  
0

(b) Single-acting cylinder

2  
1  
0

(c) T-piece

1  
0

(d) The complete symbol for a pilot operated 5\2 valve

3  
2  
1  
0

(e) Double-acting cylinder

2  
1  
0

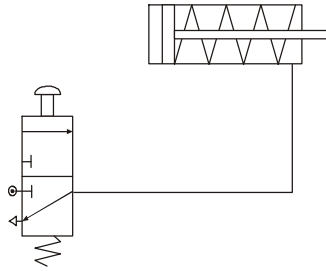
(f) Show the lines used to represent the main air and pilot air

2  
1  
0

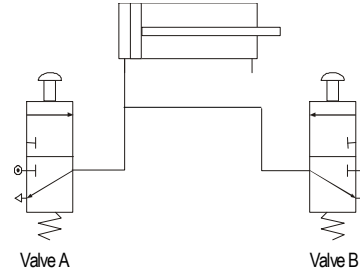
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2. The diagrams below have a basic fault. Identify this fault then redraw the diagrams properly underneath.

(a)



(b)



3. With regards to the 5\2 valve. State the names of the 5 ports.

Port 1: \_\_\_\_\_

Port 2: \_\_\_\_\_

Port 3: \_\_\_\_\_

Port 4: \_\_\_\_\_

Port 5: \_\_\_\_\_

4  
3  
2  
1  
0

5  
4  
3  
2  
1  
0

# S3 Technological Studies: Homework 8: Pneumatic Systems.

Mark:	/19
Grade:	

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

1. (a) In the space provided, draw the correct symbols for...

- (i) A unidirectional restrictor                      (ii) A restrictor.

(b) Explain the difference between a *restrictor* and a *unidirectional restrictor*.

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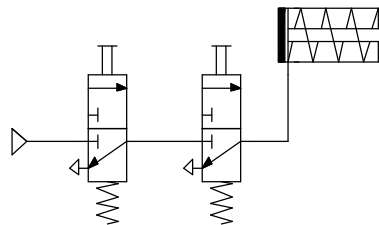
(c) When using a unidirectional restrictor, why do we only restrict the exhaust air from a cylinder?

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2. A school pupil designs the following circuit using a computer simulation package.



(a) Describe some of the advantages of using computer simulation when designing pneumatic circuits.

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3  
2  
1  
0

2  
1  
0

2  
1  
0

2  
1  
0

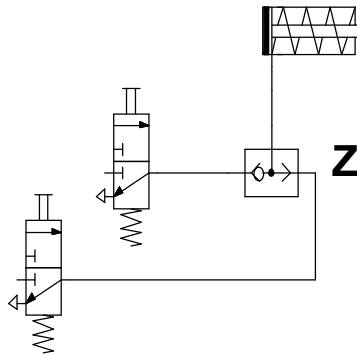
(b) (i) What type of control is achieved by the pupils circuit?

\_\_\_\_\_

(ii) Complete the truth table to describe the operation of the pneumatic system.

Valve A	Valve B	Cylinder
OFF	OFF	
OFF	ON	
ON	OFF	
ON	ON	

3. A factory uses the following system to sort and reject components on a production line.



(a) Name component Z.

\_\_\_\_\_

(b) It is decided that a small delay is required before the cylinder outstrokes. Draw a suitable system that would provide a time delay.

(c) Indicate using an X where this system should be inserted into the original circuit..

1  
0

4  
3  
2  
1  
0

1  
0

3  
2  
1  
0

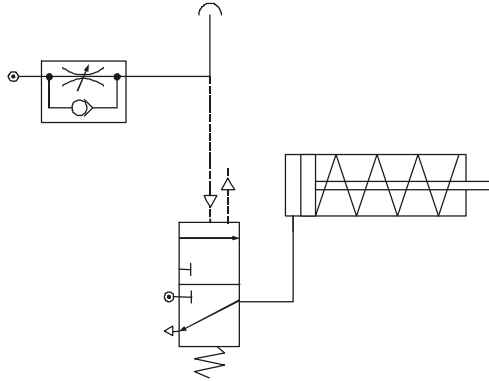
1  
0

# S3 Technological Studies: Homework 9: Pneumatic Systems.

Mark:	/24
Grade:	

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

1. An air bleed system is shown in the diagram below.



(a) State the full name of the valve used in the circuit.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(b) Describe fully the operation of the circuit shown and give an example of where it may be used.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. In industry, pneumatics are used to provide automation for various processes, these often take the form semi-automatic or fully automatic systems.

Describe the difference between semi-automatic and fully automatic.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. What name is given to the type of motion generally produced by an automatic circuit?

\_\_\_\_\_

3  
2  
1  
0

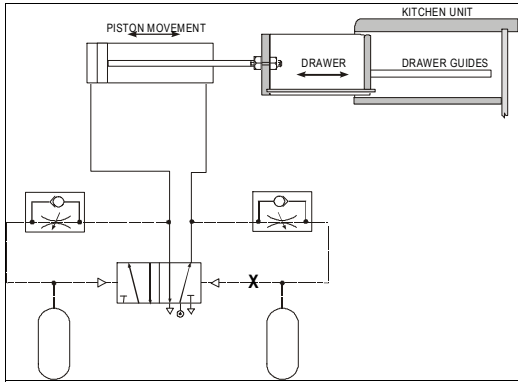
4  
3  
2  
1  
0

4  
3  
2  
1  
0

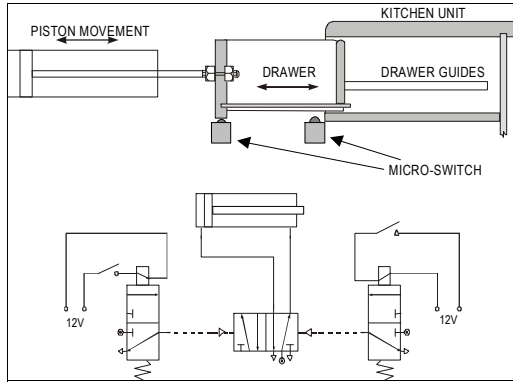
1  
0

4. A furniture manufacturer wishes to use pneumatics to test wear and tear on drawer guides in a kitchen unit. Two alternative circuits are shown below which are designed to carry out the task.

Describe how each circuit works and choose the circuit you think will perform the task best.



Circuit 1



Circuit 2

Circuit 1: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Circuit 2: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The best circuit is \_\_\_\_\_ because \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5  
4  
3  
2  
1  
0

5  
4  
3  
2  
1  
0

2  
1  
0



# S3 Technological Studies: Homework 10: Pneumatic Systems.

Mark:	/ 24
Grade:	

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

1. The force delivered by any cylinder is dependant upon its effective area.  
Describe using sketches if required why a double acting cylinder will exert less force during its instroke than its outstroke.

_____	
_____	
_____	
_____	
_____	
_____	

2. A double acting cylinder is used to open and close a greenhouse window.  
The window weighs 20 N and the piston diameter of the cylinder is 10 mm.

What is the minimum air pressure that should be supplied to this system to open the window?

*(show all working and units)*

3  
2  
1  
0

6  
5  
4  
3  
2  
1  
0

3. A force of 280 N is needed to tip over a container full of rubbish. Compressed air is supplied to a pneumatic system at a pressure of 0.7 N/mm<sup>2</sup>.

What cylinder diameter is required to complete the task?

*(show all working and units)*

7  
6  
5  
4  
3  
2  
1  
0

4. A factory uses pneumatics to dip components into a chemical solution. It is no problem for the cylinder to lower the components, but it is unable to raise them when the cylinder instrokes. The components weigh 550 N and the air is supplied to the system at a pressure of 0.7 N/mm<sup>2</sup>. The cylinder has a piston diameter of 32 mm and the piston rod is 12 mm in diameter.

Show by calculation why the system cannot lift the components.

*(show all working and units)*

8  
7  
6  
5  
4  
3  
2  
1  
0