

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
LEVEL 1/2**

R101/01

**CAMBRIDGE NATIONAL
AWARD/CERTIFICATE IN
PRINCIPLES IN ENGINEERING
AND ENGINEERING BUSINESS**

Engineering principles

TUESDAY 24 MAY 2016: Morning

**DURATION: 1 hour
plus your additional time allowance**

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:
None

OTHER MATERIALS REQUIRED:
A calculator may be used

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Use black ink. HB pencil may be used for graphs and diagrams only.

Complete the boxes on the front page with your name, centre number and candidate number.

Answer ALL the questions.

Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

The total number of marks for this paper is 60.

The number of marks for each question is given in brackets [] at the end of the question or part question.

Dimensions are in millimetres unless stated otherwise. Your quality of written communication will be assessed in questions marked with an asterisk (*).

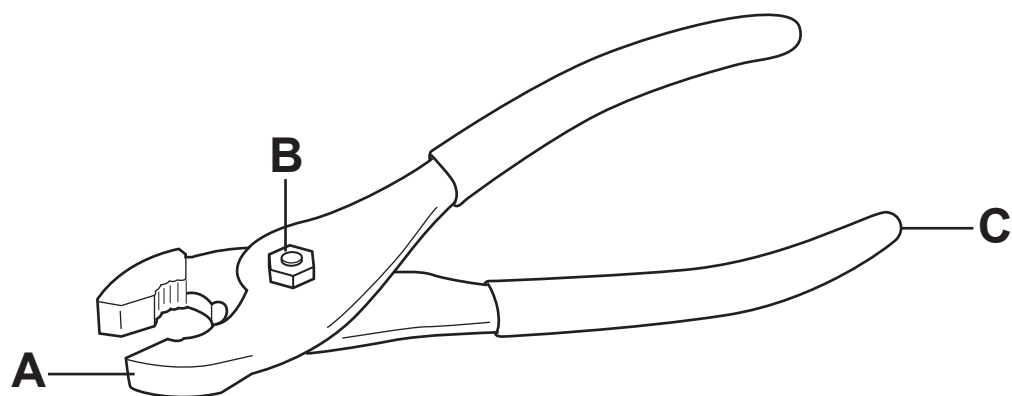
Any blank pages are indicated.

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Answer ALL the questions.

- 1 (a) Fig. 1 shows a workshop tool that uses a lever to operate.**

Fig. 1



- (i) Match the terms below to the parts identified in Fig. 1.**

Fulcrum

Load

Effort

A _____

B _____

C _____

[3]

(ii) State the class of lever shown in Fig. 1.

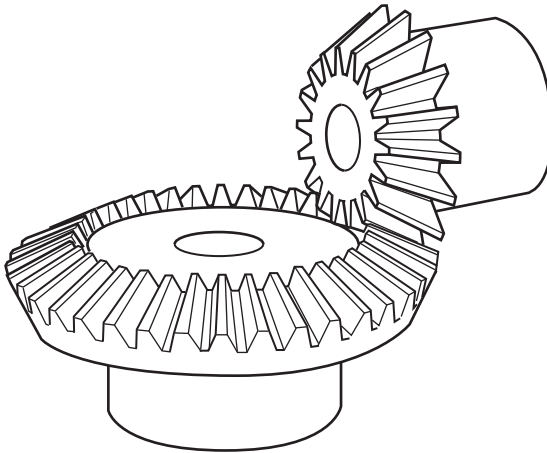
_____ **[1]**

(iii) Give ONE other example of a lever mechanism.

_____ **[1]**

(b) Fig. 2 shows a gear arrangement.

Fig. 2



(i) State the type of gears shown in Fig. 2.

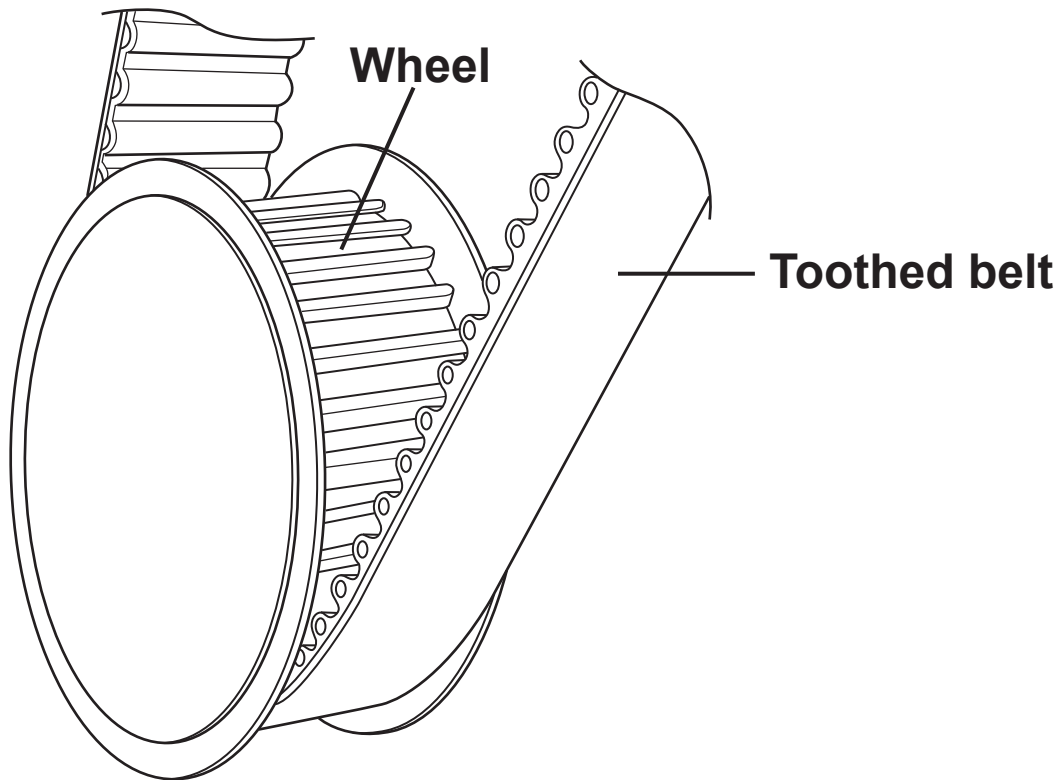
_____ [1]

(ii) State ONE practical application for this type of gear.

_____ [1]

(c) Fig. 3 shows a toothed drive belt on a pulley.

Fig. 3



(i) **State TWO benefits of using a toothed drive belt.**

1 _____

2 _____

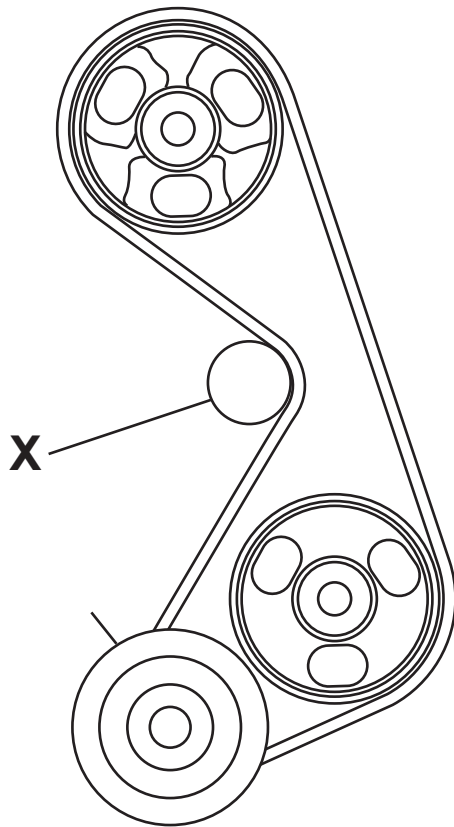
[2]

(ii) **State ONE alternative drive system other than a toothed belt.**

_____ [1]

(d) Fig. 4 shows a drive system. The position of component X is adjustable.

Fig. 4



State the purpose of component X.

[1]

2 (a) Give TWO examples of a dynamic load.

1 _____

2 _____

[2]

**(b) A vehicle travels from 0 m/s to reach a speed of 20 m/s after 4 seconds.
Calculate the acceleration.**

Use the formula:

$$a = \frac{v - u}{t}$$

_____ **[3]**

(c) Explain, using ONE example, what is meant by the term 'potential energy'.

_____ **[3]**

- 3 (a) Complete the statement below using the correct terms from the list.**

resistors

cells

voltage

watts

Voltage can be supplied to a circuit by a

battery that can be made up of one or more

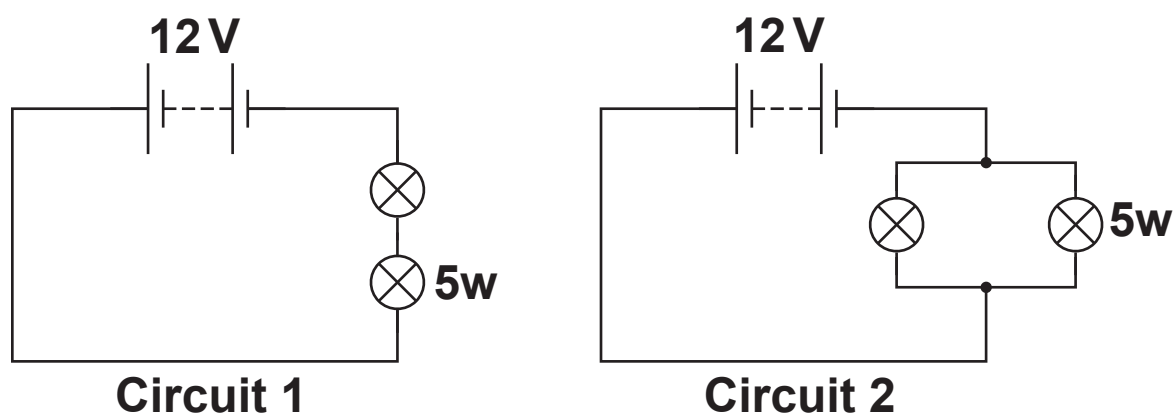
_____ . Potential difference is the

measure of _____ across a circuit

component. [2]

(b) Fig. 5 shows two circuits, each using two identical lamps.

Fig. 5



(i) State the type of arrangement used to connect the lamps in Circuit 1.

_____ [1]

(ii) Give TWO benefits of using Circuit 2 over Circuit 1.

1 _____

2 _____

[2]

(iii) Calculate the total current in Circuit 1.

Use the formula:

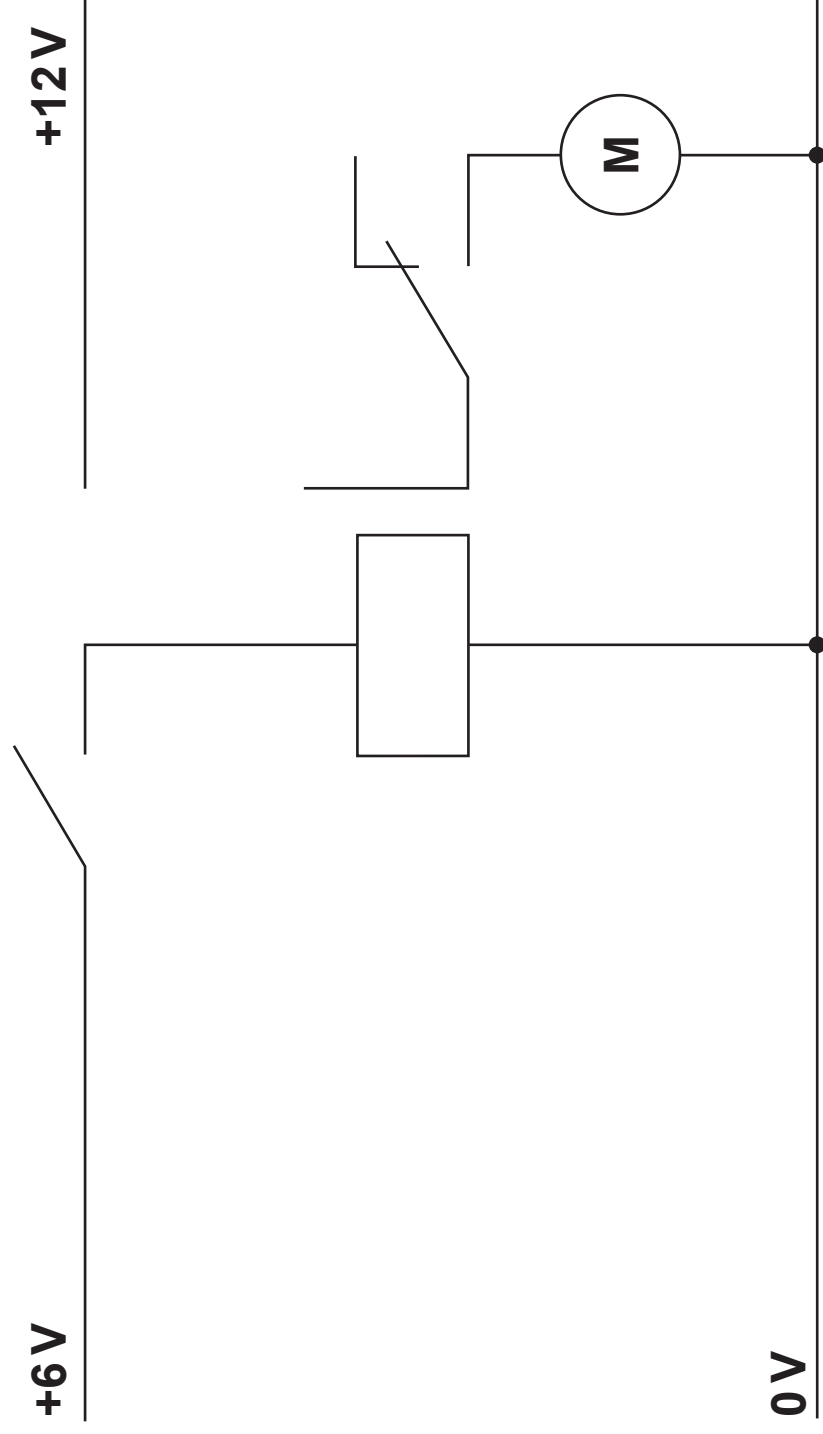
$$I = P/V$$

[2]

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(c) Fig. 6 shows a circuit used to operate a motor.

Fig. 6

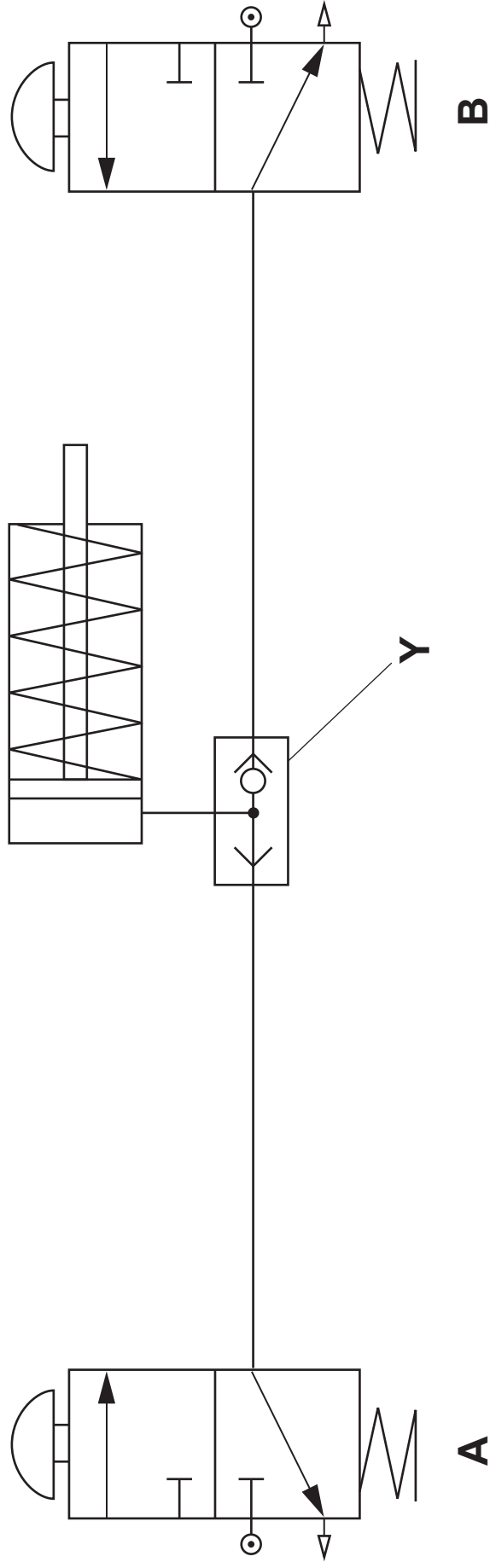


- (i) Draw an ammeter on the circuit in Fig. 6 to measure the motor current. [1]
- (ii) Draw a voltmeter on Fig. 6 to show the voltage at the motor. [2]
- (iii) Explain how the circuit in Fig. 6 operates.

[4]

4 Fig. 7 shows a pneumatic system.

Fig. 7



(a) (i) Name component Y shown in Fig. 7.

_____ **[1]**

(ii) Describe how component Y operates.

_____ **[2]**

(iii) Describe the operation of the circuit shown in Fig. 7.

_____ **[3]**

**(b) (i) Describe what is meant by the term
'compressibility' in a pneumatic circuit.**

[2]

**(ii) Describe how compressibility differs in a
hydraulic circuit.**

[2]

**(c) Compressed air is filtered before being supplied to
system components.**

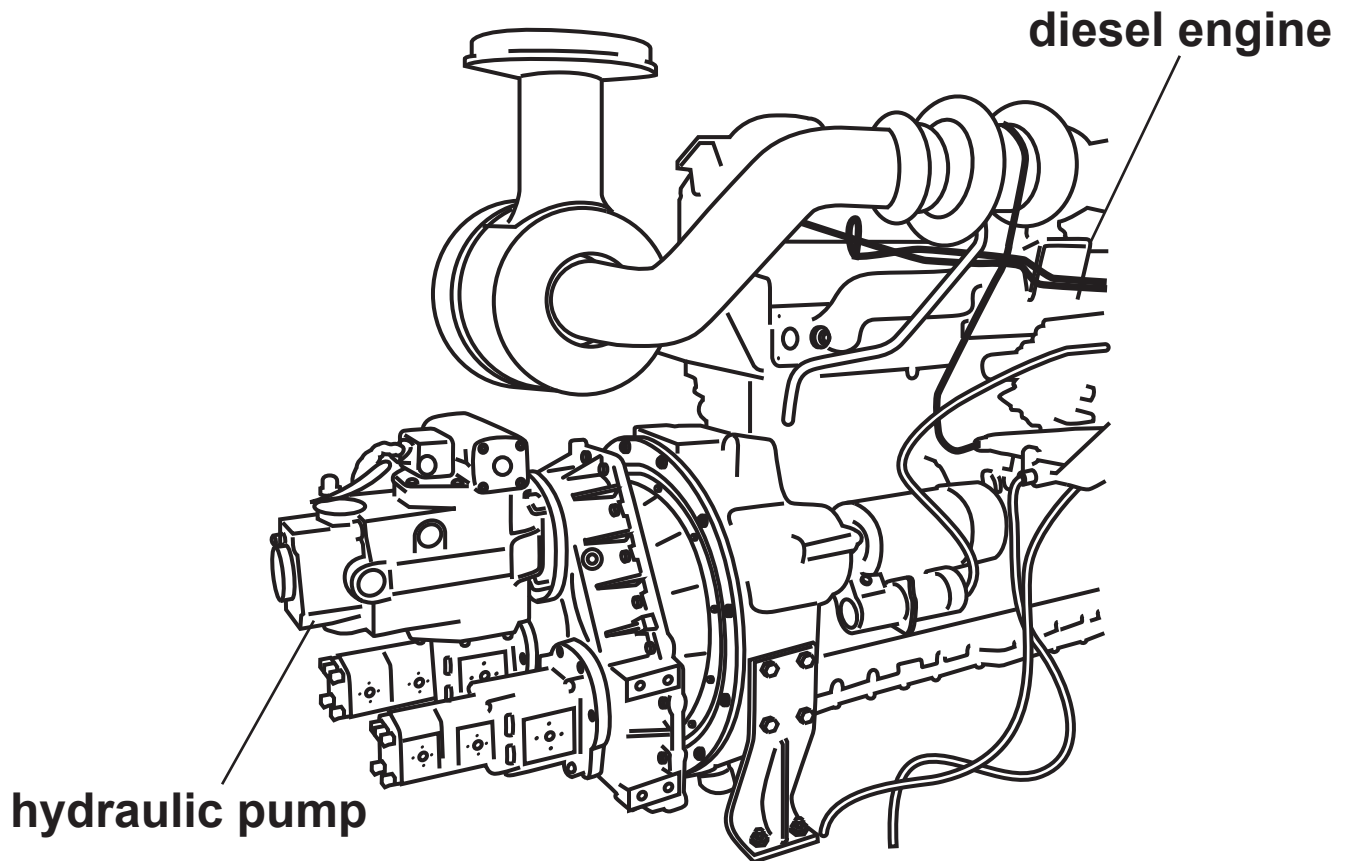
Explain the purpose of the filter.

[2]

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- 5 (a) Fig. 8 shows a hydraulic pump that is used to power a hydraulic lifting arm.

Fig. 8



- (i) Select the type of power source from the list below that is used to drive the hydraulic pump.

mechanical

electrical

pneumatic

[1]

(ii) State ONE advantage of using this type of power source to produce hydraulic power.

_____ **[1]**

(iii) Give ONE other hydraulic application different to that used in a diesel engine.

_____ **[1]**

(b) (i) Give ONE type of energy conversion.

_____ energy to

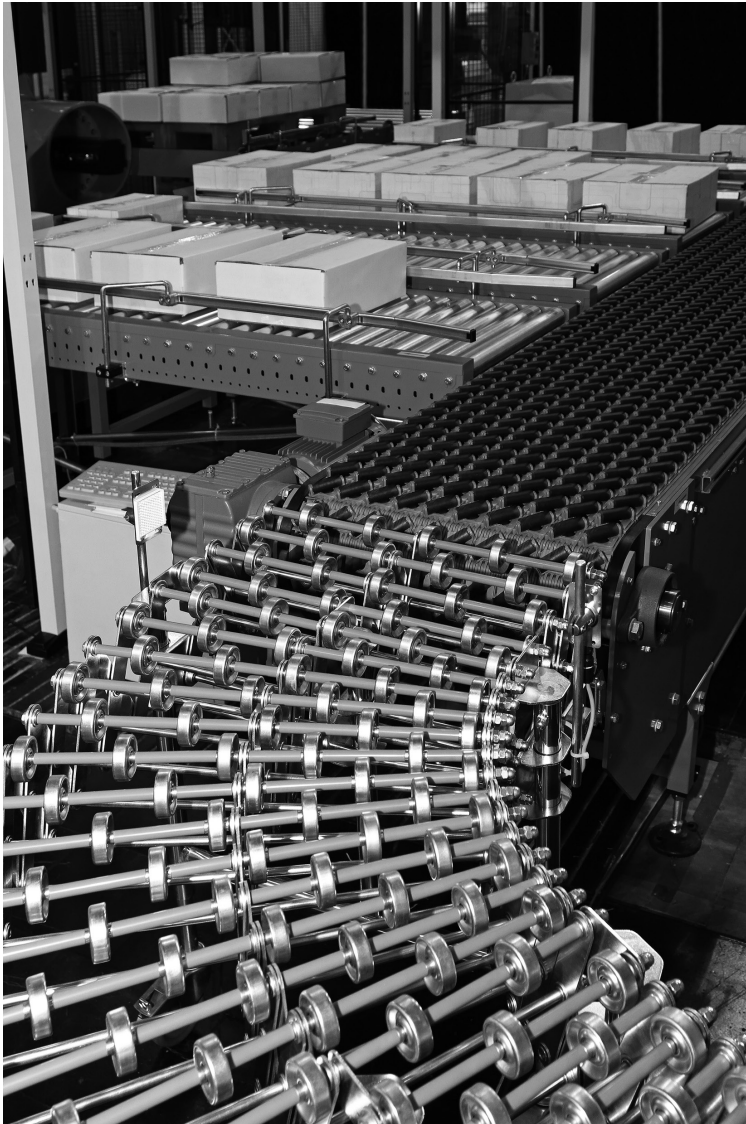
_____ energy **[1]**

(ii) Describe ONE practical application of the type of energy conversion given in part (i).

_____ **[2]**

- 6 (a) Fig. 9 shows a roller conveyor used to move products at a manufacturer's site.

Fig. 9



Describe a system that could be used to power and drive the conveyor.

[3]

[illegible]

END OF QUESTION PAPER



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