Unit 3 Electric motors

Vocabulary
Match the words with their Polish equivalents.

1. armature	a) cewka, zezwój
2. axle	b) wirnik
3. coil	c) bocznik
4. field winding	d) uzwojenie wzbudzające
5. induced voltage	e) wał
6. permanent magnet	f) moment obrotowy
7. resistor	g) stojan
8. rotor	h) napięcie indukowane
9. shaft	i) twornik
10. shunt	j) magnes trwały
11. stator	k) uzwojenie
12. torque	l) oś
13. winding	m) opornik

Lead-in
In groups list applications of electric motors in common household.

Electric motors quiz

1. The basis of an electric motor is:

a) a spark plug
b) magnets
c) a battery

2. A motor's motion comes from which property of magnets?

a) Like poles repel each other.
b) Opposite poles attract each other.
c) both A and B

3. The six basic parts of a simple two-pole motor are:

a) the armature, the commutator, the brushes, the axle, a field magnet and a DC power supply
b) the armature, the brushes, the battery, the axle, the anchor and a field magnet
c) the commutator, the brushes, the casing, a DC power supply and the wires

4. A motor's armature acts as:

a) a rotor
b) an anchor
c) an axle

5. When a small motor turns on, the armature spins because of:

a) gravity
b) magnetism
c) inertia

By Justyna Plezia and Magdalena Potręć (AGH UST)

6. What two parts of an electric motor are responsible for changing the direction of the current?

a) the commutator and the rotor
b) the axle and the brushes
c) the commutator and the brushes

7. Which part of the motor holds the armature and commutator in place?

a) wires
b) battery
c) axle

8. What part of the motor transfers power from the battery to the commutator?

a) wires
b) brushes
c) poles

9. Why do most rotors in an electric motor have three poles instead of two?

a) It prevents the motor from getting stuck.
b) It prevents the commutator from shorting out the battery.
c) both a and b

10. Which of these kitchen appliances does not have an electric motor?

a) blender
b) water filter
c) refrigerator

Adapted from http://www.howstuffworks.com/

Task 1

Read the text and find words which mean:

1. a flow of electricity through a wire (para 1)
2. to use some power to operate (para 1)
3. a shape like a curve (para 2)
4. to have a magnetic field which pushes away something with a similar magnetic field (para 3)
5. the part of a generator, motor etc that turns around to produce electricity, movement etc (para 4)
6. a magnet used to produce a magnetic field in an electrical device (para 4)
7. one of two points at the ends of a magnet where its power is the strongest; or one of the two points at which wires can be attached to a battery in order to use its electricity (para 5)
8. a device used in some types of electric motors to change the direction in which an electric current is flowing (para 6)

para

In an electric motor an electric current and magnetic field produce a turning movement. This can drive all sorts of machines, from wrist-watches to trains. The motor shown in Fig. 1 is for a washing machine. It is a universal motor, which can run on direct current or alternating current. 1

An electric current running through a wire produces a magnetic field around the wire. If an electric current flows around a loop of wire with a bar of iron through it, the iron becomes magnetized. It is called an electromagnet; one end becomes a north pole and the other a south pole, depending on which way the current is flowing around the loop. 2

If you put two magnets close together, like poles – for example, two north poles – repel each other, and unlike poles attract each other. 3

In a simple electric motor, like the one shown in Fig. 2, a piece of iron with loops of wire round it, called an armature, is placed between the north and south poles of a stationary magnet, known as the field magnet. When electricity flows around the armature wire, the iron becomes an electromagnet. 4

The attraction and repulsion between the poles of this armature magnet and the poles of the field magnet make the armature turn. As a result, its north pole is close to the south pole of the field magnet. Then the current is reversed so the north pole of the armature magnet becomes the south pole. Once again, the attraction and repulsion between it and the field magnet make it turn. The armature continues turning as long as the direction of the current, and therefore its magnetic poles, keeps being reversed. 5

To reverse the direction of the current, the ends of the armature wire are connected to different halves of a split ring called a commutator. Current flows to and from the commutator through small carbon blocks called brushes. As the armature turns, first one half of the commutator comes into contact with the brush delivering the current, and then the other, so the direction of the current keeps being reversed. 6

Adapted from Oxford English for Electrical and Mechanical Engineering

Task 2

Look at the motors shown below and label their parts *(bearings x2, field windings, electrical supply, armature, brush, drive shaft, motor frame, commutator)*

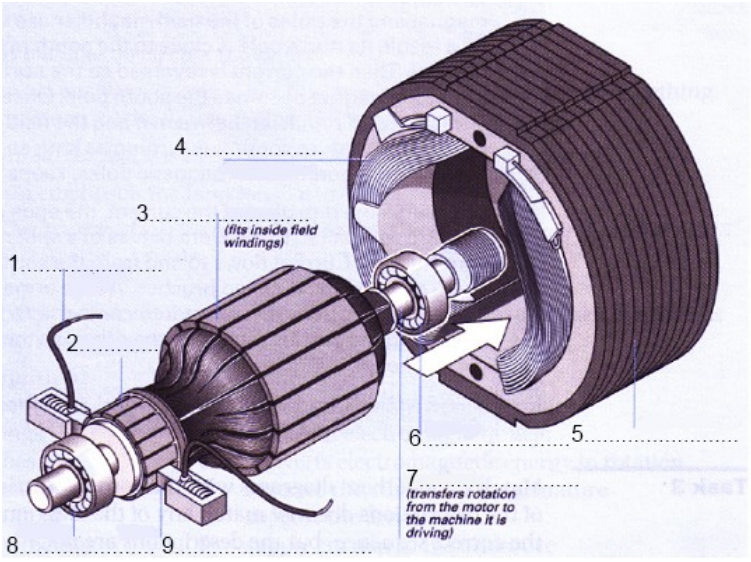
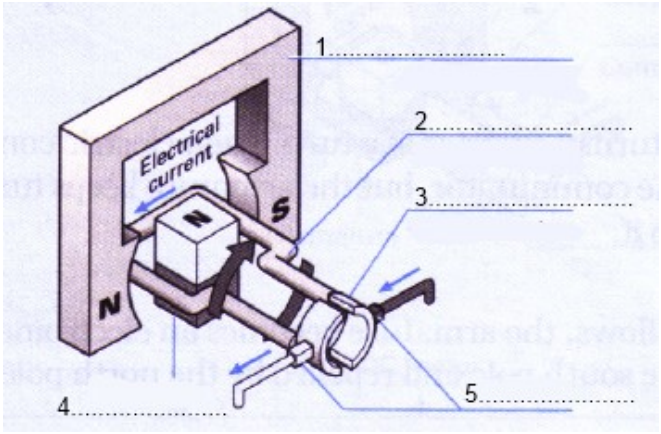


Fig. 1

(commutator, armature, field magnet, brushes, loop of wire)



Adapted from Oxford English for Electrical and Mechanical Engineering

Fig. 2

Task 3

a) Complete the table with appropriate forms.

verb	*noun*	*adjective*
1	attraction	2
3	conversion 4	5
generate	6	7
8	9	magnetic
operate	10 operator	11 12
13	14	repellent
repulse	15	16

b) Use the words from the table in the following sentences.

1. A plastic entry card needs to be …… before it is given to a worker.

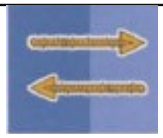
2. Similar poles of magnets …… each other, and opposite poles …….
3. A machine or device that changes something into a different form is a …….
4. Repairs have already begun and we expect the factory to be fully …… again with six months.

Task 4

Describing motion

Match the adjectives with the diagrams and adverbs.

anticlockwise, clockwise, linear, oscillating, reciprocating, rotary

Movement	Adjective	Adverb
A 		
B 		Up and down; backwards and forwards
C 		In s straight line
D 		From side to side
E 		Clockwise
F 		Anticlockwise

Adapted from Oxford English for Careers Technology

Task 5

a) Watch the video about Siemens energy efficient drive technology and make a list of the steps that can be taken to cut energy costs.

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Recording from http://www.youtube.com/

b) Match the phrases to make complete expressions.

1. to eat up	a) the peak load
2. to put the break on	b) will pay off
3. energy-saving	c) power
4. to reduce	d) motor
5. to rely on	e) automation
6. integrated	f) costs
7. investment	g) variable speed drives