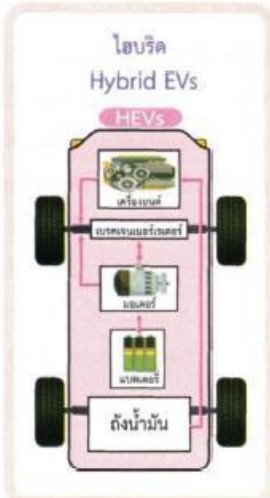
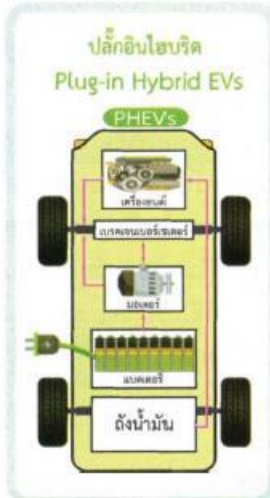
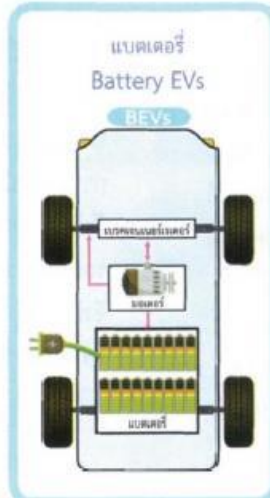
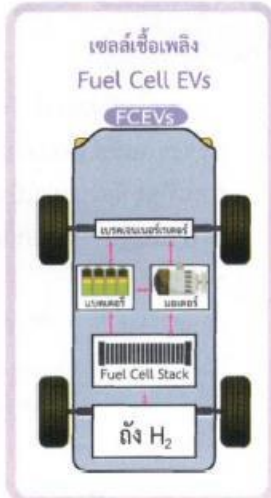


Design and Technology M3

Final Exam Short

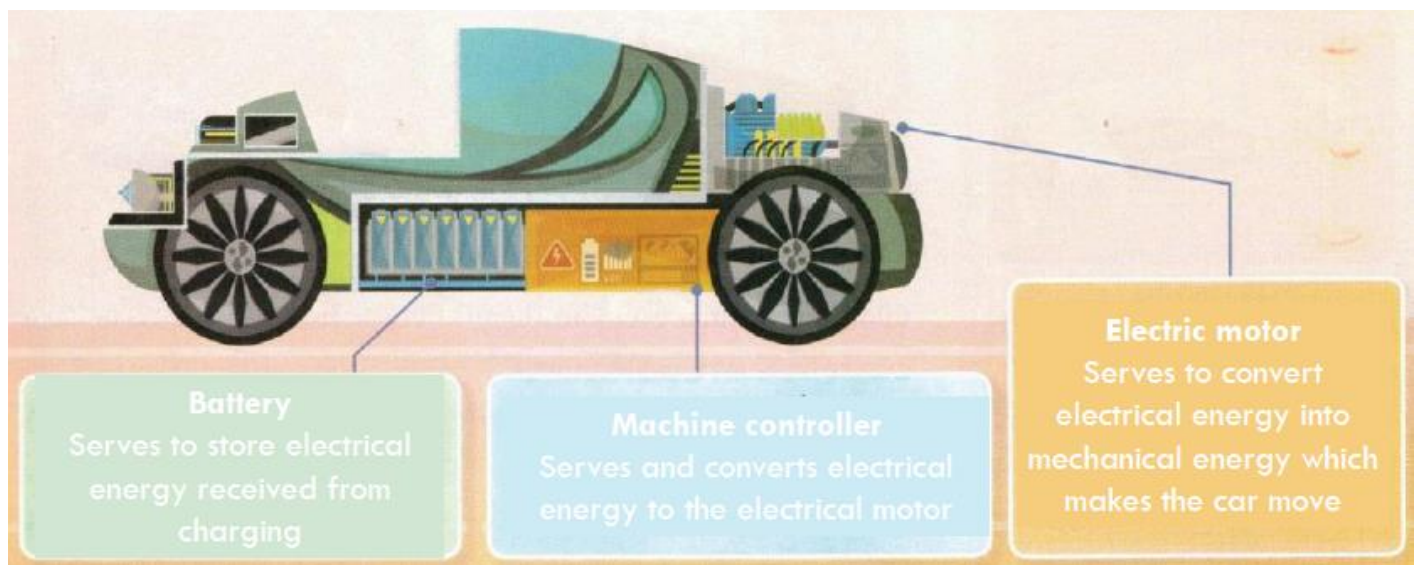
1. Electric cars

Electric car is car that uses electrical energy stored in batteries instead of fuel. There is no burning of fuel in this type of car so there is no air pollution and no noise. They are divided into 4 groups

 <p style="text-align: center;">ไฮบริด Hybrid EVs HEVs</p>	 <p style="text-align: center;">ปลั๊กอินไฮบริด Plug-in Hybrid EVs PHEVs</p>	 <p style="text-align: center;">แบตเตอรี่ Battery EVs BEVs</p>	 <p style="text-align: center;">เซลล์เชื้อเพลิง Fuel Cell EVs FCEVs</p>
<p style="text-align: center;">Hybrid Electric Vehicle (HEV)</p> <p>It uses both fuel and electricity to work but the main source is fuel. It is charged when the car is moving.</p>	<p style="text-align: center;">Plug In Hybrid Vehicle (PHEV)</p> <p>Has both fuel and electric engine so it uses both energy sources. It can be charged from an external source.</p>	<p style="text-align: center;">Battery Electric Vehicle (BEV)</p> <p>It uses electricity from batteries as the source of energy. It has to be charged from an external source</p>	<p style="text-align: center;">Fuel Cell Electric Vehicle (FCEV)</p> <p>It is an electric vehicle with a fuel cell. It generates electricity by adding hydrogen to the system</p>

Working principle of a Battery Electric Vehicle (BEV)

This type of car is powered only by a battery. It has 3 main components. The battery is the source of electrical energy and it powers the car. The battery sends DC electricity through a converter that converts it to AC. That electricity is then used for the electric motor which is the driving force of the car.

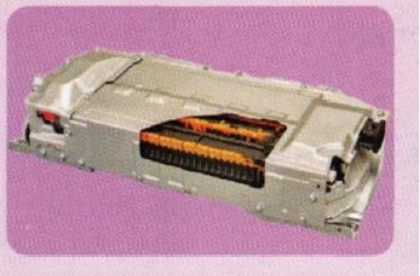
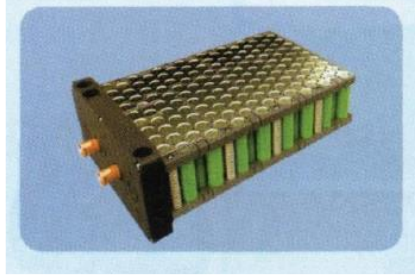
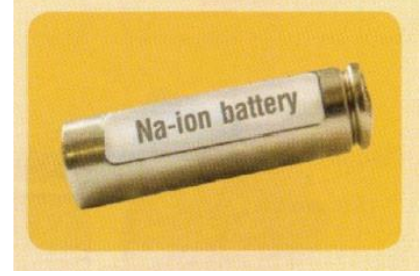


2. Battery

A **battery** is an essential component of an electric car. It is used to store electrical energy. It can affect the cost of the car in few ways such as charging time, driving distance and the developer of the battery.

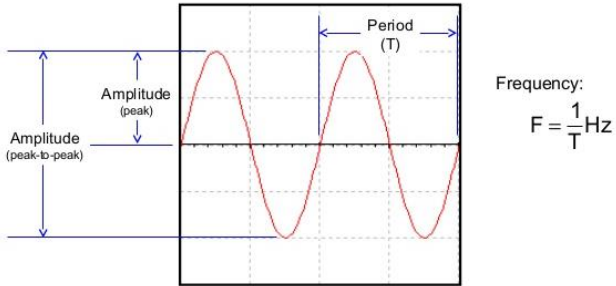
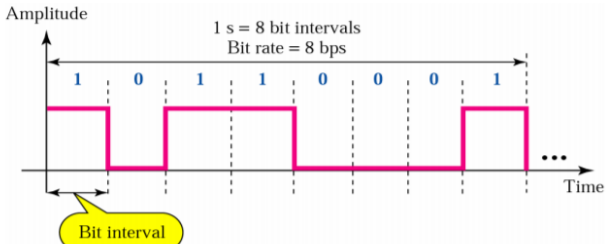
Battery technology should be developed for high efficiency and low cost in order for other people to start using electric cars and to lower the price of it.

We have 3 types of batteries:

Nickel-Metal Hydride (Ni-MH)	Lithium-Ion (Li-ion)	Sodium Ion Battery (Na-ion)
		
<ul style="list-style-type: none"> It is used in hybrid electric vehicles` It provides a high value of energy capacity Has a high efficiency and long service life Has a lot of weight 	<ul style="list-style-type: none"> Most popular battery that is currently being used Has a high energy capacity and low weight Has a long service life but more expensive 	<ul style="list-style-type: none"> Low production costs and it's safe to use It is 20% more efficient in storing electricity than lithium-ion batteries It is still under research and development

3. Signals

A **signal** is an electromagnetic or electrical current that is used for carrying data from one system or network to another. In electronics and telecommunications, it refers to an electromagnetic wave which carries information.

Types of signals	
Analog	Digital
<ul style="list-style-type: none"> An analog signal is a continuous time-varying value represents another time-based variable An analog signal is defined by 3 values <ul style="list-style-type: none"> Amplitude (A) – highest level (peak) Period (T) – time that it takes to make a full cycle Frequency (F) – How many periods per 1 sec <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Frequency: $F = \frac{1}{T} \text{ Hz}$</p> </div> </div>	<ul style="list-style-type: none"> A signal that is used to represent data as a sequence of separate values at any point in time. A digital signal is defined by 3 values <ul style="list-style-type: none"> Amplitude (A) – highest level (peak) Bit interval [sec]– time that it takes to send one bit Bit rate [bps]– How many bits are sent per one second <div style="display: flex; align-items: center;">  </div>

For more information about the signals watch the video on E-learning. On the exam you will have to draw an analog signal with given frequency and there will be a question where you have a digital signal and you need to know what information we are sending.

4. Logistic management

Logistic Management is following the product from the beginning of the production until the delivery to the customer.



Benefits of Logistic Management

- 1. Efficient production process** – bringing in the raw material and converting them into products for maximum benefit.
- 2. Competitive advantage** – optimize customer service and handle problems appropriately, deliver goods quickly and accurately
- 3. Reduce cost to increase profits** - develop a system for transporting raw materials and products to be fast, safe and economical

Logistic Management Activities:

- 1. Production management**
 - Planning to have enough raw materials for production
 - Store the product correctly and make it easy to move
 - Prepare spare parts and equipment in case the product needs to be repaired
 - Package design has to be suitable for transport and stimulate the desire to buy it
- 2. Marketing and customer service**
 - Creating maximum satisfaction for customers
 - Delivery of goods in time
 - When customer receives a broken product, the seller should be responsible for the return and replacement of the product
- 3. Supply of raw materials and equipment**
 - Communication with existing inventory partners and obtaining other raw materials
 - In order to obtain goods and raw materials all details must be communicated between all partners to reduce errors
- 4. Inventory management**
 - Supervising and controlling the amount of inventory to have an appropriate amount
 - Manage the space in warehouse
 - Maintain the equipment to be effective for use
- 5. Distribution**
 - When choosing the factory location, we must take into account the transportation of goods and services to consumers
 - Transportation of raw materials and goods has to be efficient in order for the product to be in perfect condition