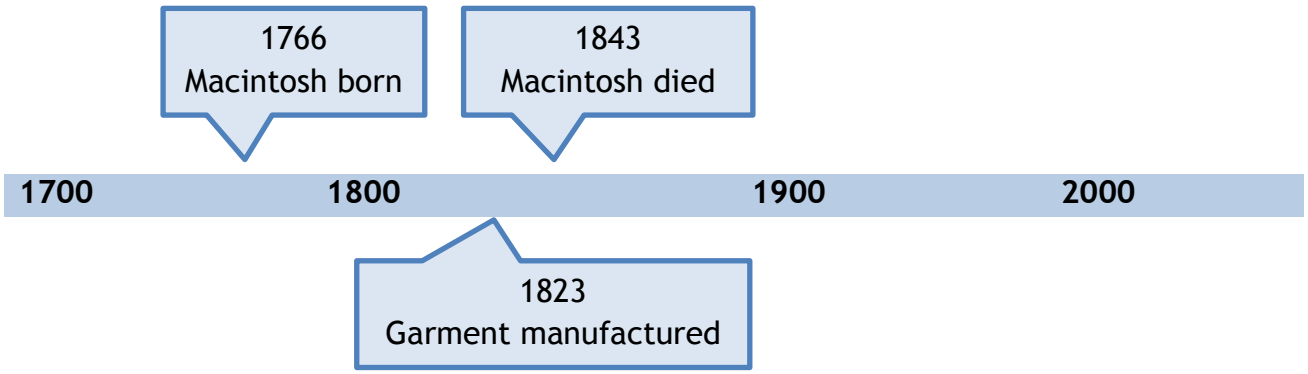
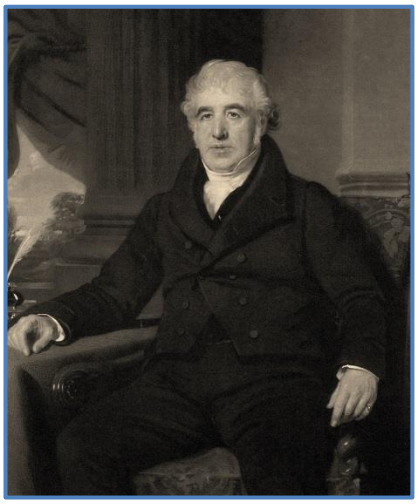
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A biography of Charles Macintosh – Scientist and Inventor – text A





Charles Macintosh was born in 1766 in Glasgow, Scotland. To this day, his breakthrough invention has helped to keep us dry in our intemperate weather conditions. As his name suggests, Charles Macintosh invented the eponymous raincoat, commonly known as the mac (or mack), properly titled, the Macintosh – although these days, it is spelled like this: Mackintosh (a mistake that has stuck over time!) and even the company uses this spelling now.

In his late teens, Charles' first employment was as a clerk, a desk job that involved paper work. This was a pastime Charles did not enjoy – his real passion was for science. In his spare time, he experimented with a chemical made from tar called naphtha. Quite by accident, he discovered that rubber turned into a liquid when mixed with naphtha. This liquid rubber could be painted onto fabrics and when it solidified, it became a waterproof layer. Charles experimented for many years to perfect his rubberised cloth, collaborating with other scientists to improve the process of manufacturing it in large amounts.



At first, the waterproof clothes did not fare well when being worn in different weather conditions. The fabric became sticky, smelly or melted in hot weather! But Charles was not put off. He worked tirelessly to find the perfect material combination. His unique solution was to have a rubber layer on the outside combined with a layer of wool and then a rubber coating on the inside.



The most famous design of the Macintosh is a waterproof long-coat with a belt at the midriff and deep pockets. It was worn by the British Army in World War I to protect horse-back riders. In World War II motorbike messengers wore the waterproof coat and used its copious pockets to carry vital papers to senior officers. Throughout the world, the military, police and people who worked outdoors for a living were issued with their own forms of the original Mackintosh coat. Originally, the Macintosh had a shoulder cape to help deflect rainwater – this evolved into a shoulder vent, which can still be seen on a modern version of the coat. These days, this apparel is regarded as stylish, smart and a symbol of both good taste and success. The design has been copied by many, but people who can afford it know that the original mac is unrivalled in quality - and it still uses a similar process of manufacture to that used over 200 years ago.

Charles died in 1843. This was the year that saw the perfection of rubber-coated fabrics. Charles had merged his company with another Manchester clothing manufacturer, owned by Thomas Hancock, in 1830. Hancock discovered a way to solve the problems mentioned earlier with the material.

Whenever you go out in the rain or snow in your waterproof, you have Charles Macintosh to thank. His hobbyist experiments, ability to collaborate and self-belief all played a part in helping keep us protected from the unpredictable elements.

Charles Macintosh – comprehension questions: text A

1. Scan through the text. Highlight words or phrases that you are unsure of. List three and define them using a dictionary.

Word	Definition

2. When was Charles Mackintosh born, and how old was he when he died?

.....

.....

3. Describe how he turned rubber into a liquid and how it was used to make waterproof cloth.

.....

.....

4. What were **three** problems with the first coats?

.....

.....

.....

5. Find **two** alternative words for the Mackintosh coat used in the text:

.....

6. Why do you think the police and the military were issued with Mackintosh coats? Give **two** reasons.

.....

.....

Charles Macintosh – comprehension answers: text A

1. Scan through the text. Highlight words or phrases that you are unsure of.
   List three and define them using a dictionary.
   Encourage efficient dictionary skills.

2. When was Charles Mackintosh born, and how old was he when he died?
   Born 1766
   Dies 1843. 1843-1766 = 77 years old when he died

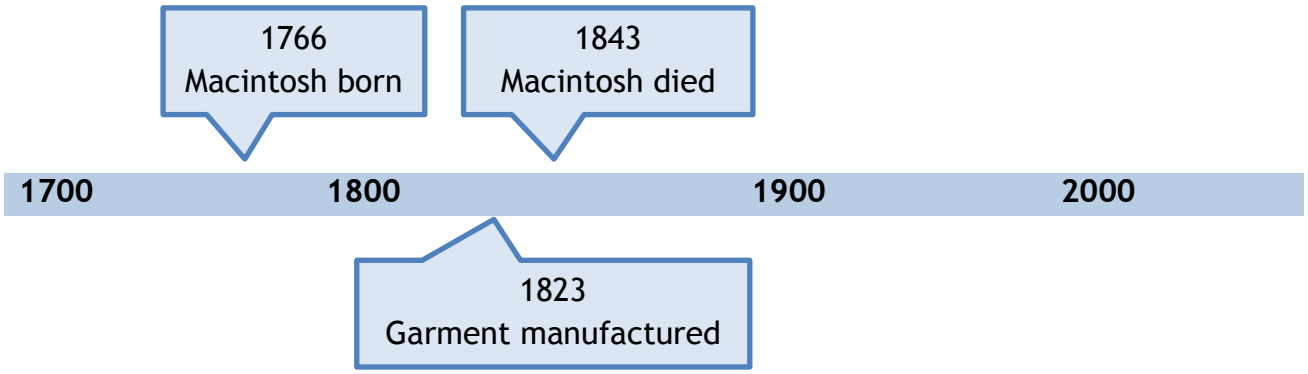
3. Describe how he turned rubber into a liquid and how it was used to make waterproof cloth.
   mixed rubber with naphtha
   'a rubber layer on the outside combined with a layer of wool and then a rubber coating on the inside'

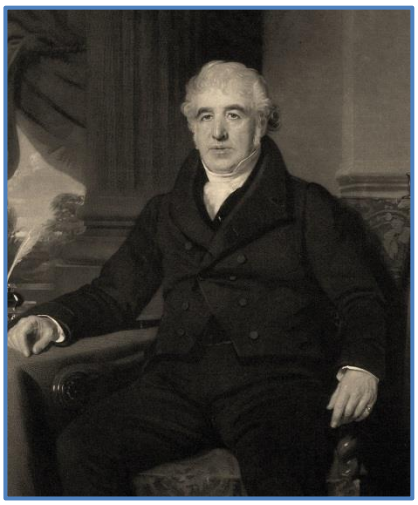
4. What were **three** problems with the first coats?
   the cloth/coat became *sticky*, *smelly*, *melted in the sun*

5. Find **two** alternative words for the Mackintosh coat used in the text:
   mac or mack, garment, apparel

6. Why do you think the police and the military were issued with Mackintosh coats? Give **two** reasons.
   Any of these two:
   themes of **protection, weather, practical use…**
   They work outside a lot and need protection from the weather.
   The coats are warm, well designed and hard wearing.
   The coats are waterproof.
   The coats have useful pockets for carrying important information.
   The information in the pockets stayed dry – was also protected from the weather.

A biography of Charles Macintosh – Scientist and Inventor – text B





Charles Macintosh was born in 1766 in Glasgow, Scotland. To this day, his breakthrough invention has helped to keep us dry in our often wet weather conditions. As his name suggests, Charles Macintosh invented the raincoat. There are a few ways to spell this waterproof coat's name… mac, mack and these days, it is called a Mackintosh.

In his late teens, Charles' first employment was as a clerk. This was a desk job that involved lots of paper work. This was a pastime Charles did not enjoy – his real interest was in science. In his spare time, he experimented with a chemical made from tar called naphtha. By accident, he discovered that rubber turned into a liquid when mixed with naphtha. This liquid rubber could be painted onto fabrics and when it turned back into a solid, it became a waterproof layer. Charles experimented for many years to perfect his rubberised cloth. He worked with other scientists to improve the process of making it in large amounts.

At first, the waterproof clothes did not work well. In some weather, the fabric became sticky and smelly. It could melt in very hot weather! But Charles was not put off. He worked hard to find the perfect material combination. His answer was to have a rubber layer on the outside, with a layer of wool, then a rubber coating on the inside.



The most famous design of the Macintosh is a waterproof long-coat with a belt at the waist. It was worn by the British Army in World War I to protect horse-back riders. In World War II motorbike messengers wore the waterproof coat and used its large pockets to carry important papers to commanders. Throughout the world, the military, police and people who worked outdoors wore their own forms of the original Mackintosh coat.

These days, the mac is seen as stylish, smart and a symbol of success. The design has been copied by many, but people know that the original mac is the best you can buy.

Charles Macintosh died in 1843. This was the year that rubber-coated fabrics were greatly improved. Charles had joined his company with another Manchester clothing maker called Thomas Hancock (in 1830). Hancock discovered a way to solve the problems with the material being sticky, smelly and melting.

Whenever you go out in the rain or snow in your waterproof, you have Charles Macintosh to thank. His experiments, his ability to work with others and his self-belief all played a part in helping keep us protected from the unpredictable weather!

Charles Macintosh – comprehension questions: text B

1. Find three important dates in Charles Macintosh's life. List them here.

Date	Event

2. When was Charles Mackintosh born, and how old was he when he died?

.....

.....

3. Describe how he turned rubber into a liquid.

.....

4. What were **three** problems with the first coats?

.....

.....

.....

5. How did Thomas Hancock help Charles?

.....

.....

6. Tick **two** reasons why the police and the military were issued with Mackintosh coats.

- ☐ They are very stylish
- ☐ They protect you from wet weather
- ☐ They are expensive
- ☐ They have useful pockets
- ☐ They have a belt

Charles Macintosh – comprehension answers: text B

1. Find three important dates in Charles Macintosh's life. List them here. **Any of these:**

Date	Event
1766	Born in Glasgow (encourage to list detail in the event, not just 'born')
1823	First Mackintosh coats were made
1830	Started working with Thomas Hancock on improving the material / solving problems with the rubber
1843	Macintosh died

2. When was Charles Mackintosh born, and how old was he when he died?

   Born 1766
   Dies 1843. 1843-1766 = 77 years old when he died

3. Describe how he turned rubber into a liquid.

   mixed rubber with naphtha

4. What were **three** problems with the first coats?

   the cloth/coat became *sticky*, *smelly*, *melted in the sun*

5. How did Thomas Hancock help Charles?

   he solved the problems with the rubber / material / cloth
   he stopped the rubber being (any one of these) sticky, smelly, melting
   they worked together to solve problems with the material / rubber / cloth

6. Tick **two** reasons why the police and the military were issued with Mackintosh coats.

- [ ] They are very stylish
- [x] They protect you from wet weather
- [ ] They are expensive
- [x] They have useful pockets
- [ ] They have a belt

Activity one – Eponymous inventions

An eponym is a name given to an object, which is the same name as its inventor. For example, the Mackintosh coat is named after Charles Macintosh. Use the Internet to search for more eponyms and find out about the inventor, invention and the biography of one that interests you. Make notes and present your findings to an audience.

Inventor Biography Planner:

Inventor's name:	**Name and description of invention:**
.....	.....
Timeline:	
Three interesting facts to share with your audience:	
.....	
.....	
.....	

Activity two: An investigation to find saturation point

Saturation point is where a material cannot absorb any more liquid. When it reaches saturation point, the material lets the liquid through. This fact is what inspired the Mackintosh! In this investigation, you will pick three different brands of absorbent kitchen towel. Try to get hold of cheaper, medium priced and higher priced kitchen towels.

Investigation question:

Does a more expensive paper towel absorb the most water before reaching saturation point?

Equipment:

- A clear beaker or glass.
- A pipette. Coloured water.
- Three types of kitchen towel.
- Elastic band.

Method:

1. Put one layer of kitchen towel over the top of a **dry** beaker. Fix tightly with the elastic band.
2. Using coloured water, use the pipette to deliver **one drop** at a time to the middle of the paper towel. Wait 30 seconds between each drop of water to allow it to absorb.
3. Continue to add water, counting the drops. Stop when the first drop goes through and lands in the bottom of the glass.
4. Repeat for all three papers.
5. Share results as a class and work out how many drops in total the papers could absorb before reaching saturation point.

