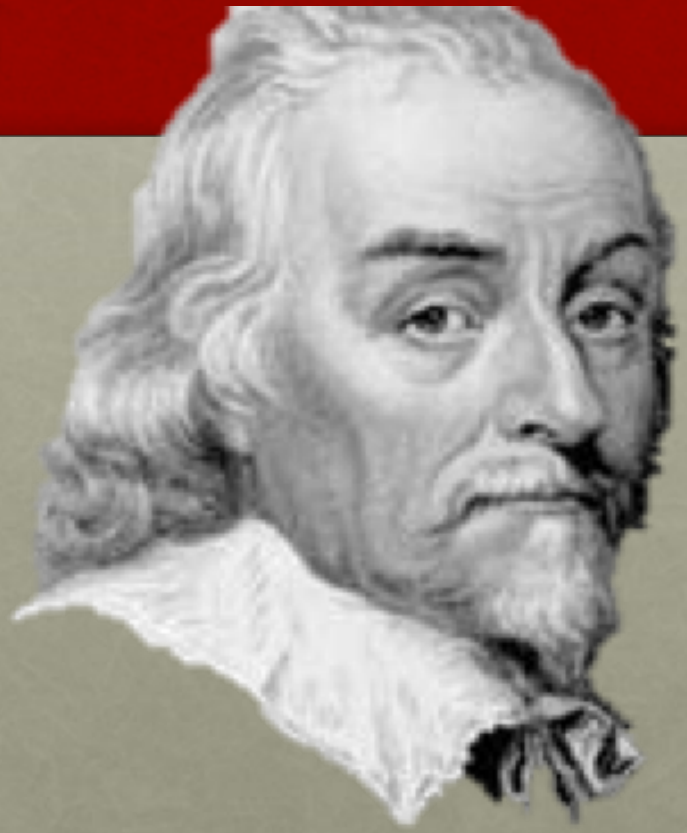
WILLIAM HARVEY

Circulation of the blood



www.stchistory.com

GCSE 9-1

BLOOD – STORY SO FAR…

- Galen said:
- New blood was constantly manufactured in the liver to replace blood burned up in the body
- The veins carried blood and air round the body
- Blood passed from one side of the heart to the other through invisible holes in the septum

Vesalius has begun finding out more, but still couldn't explain how blood moved around the body.

WHO WAS HE?

Born in Kent 1578

Died in 1657

Studied medicine at Cambridge and Padua 1615

Royal doctor to James I

Specialised in Circulation of the blood

Worked as a Doctor in London.

Worked as a lecturer in anatomy at the College of Physicians, understanding the structure and make up of the body

He encouraged his students to observe the body and believe what they saw, not the old texts, an idea followed by Thomas Sydenham

An anatomical account of the motion of the heart and blood in animals, 1628

HARVEY'S RESEARCH

- Whilst at Padua, Harvey had learnt about Vesalius's theory that veins contained valves, which was proof that the blood in those veins flowed towards the heart.

▲ A water pump being used to fight a fire in the 1600s. Pumps like this had valves to direct the flow of water.

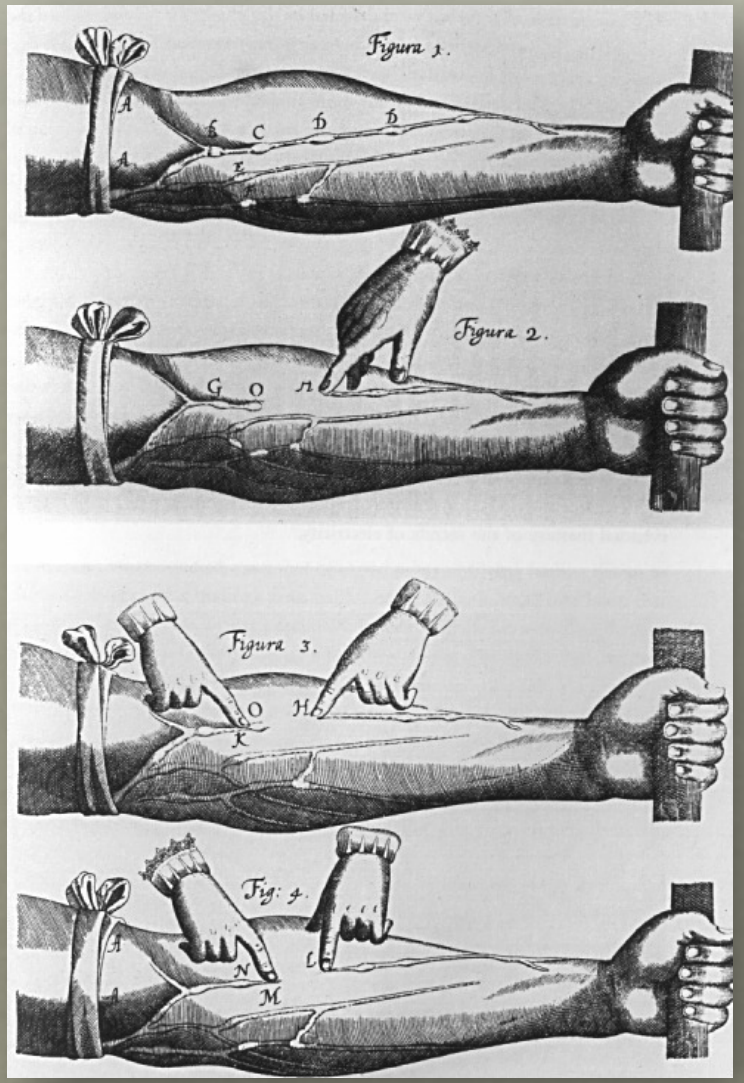
Harvey wondered if our bodies were like this newly invented fire engine.

HIS EXPERIMENTS

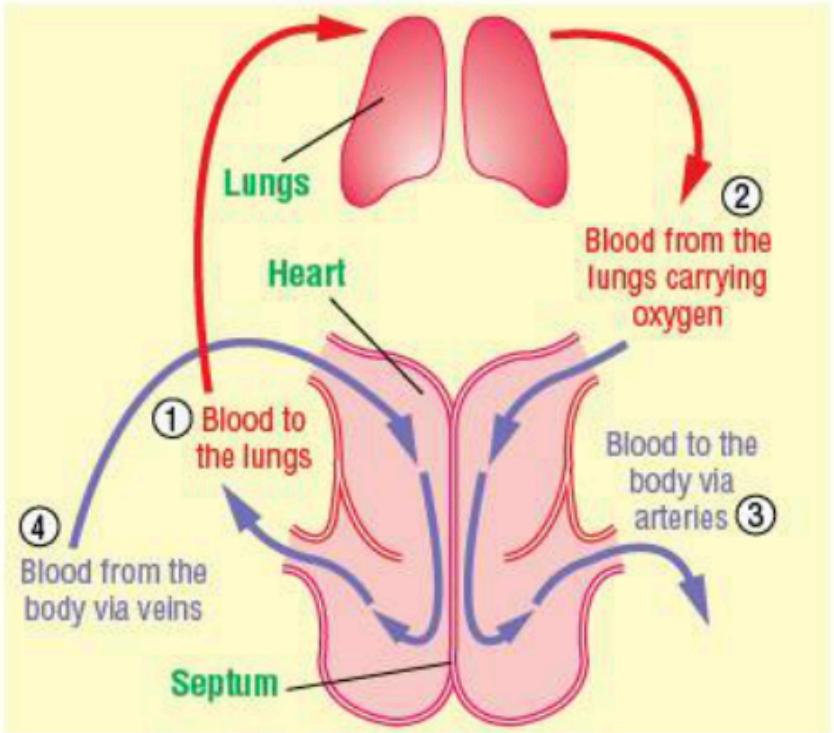
This illustration depicts one of William Harvey's experiments in his *On the Circulation of the Blood* (1628). Venal valves had already been discovered, but here Harvey shows that venal blood flows only toward the heart

Harvey proved he was right!.

He pumped liquids past the valves in the vein which proved blood flows in a one way system.



HARVEY'S DISCOVERY



▲ A simplified version of the circulation of the blood. Blood leaves the heart (1), then passes through the lungs (2) and back to the heart and then around the body along arteries (3). Then blood comes back to the heart along veins (4) before starting its circulation around the body again.

Harvey PROVED that blood flows around the body.

Harvey shows blood carried away from the heart by the arteries and returns to the heart in the veins.

No organs are needed to manufacture new blood

Harvey used cold blooded animals as their blood flow was slower allowing him to observe it more clearly

Draw & label this diagram

DISSECTION

Are you up for it?…

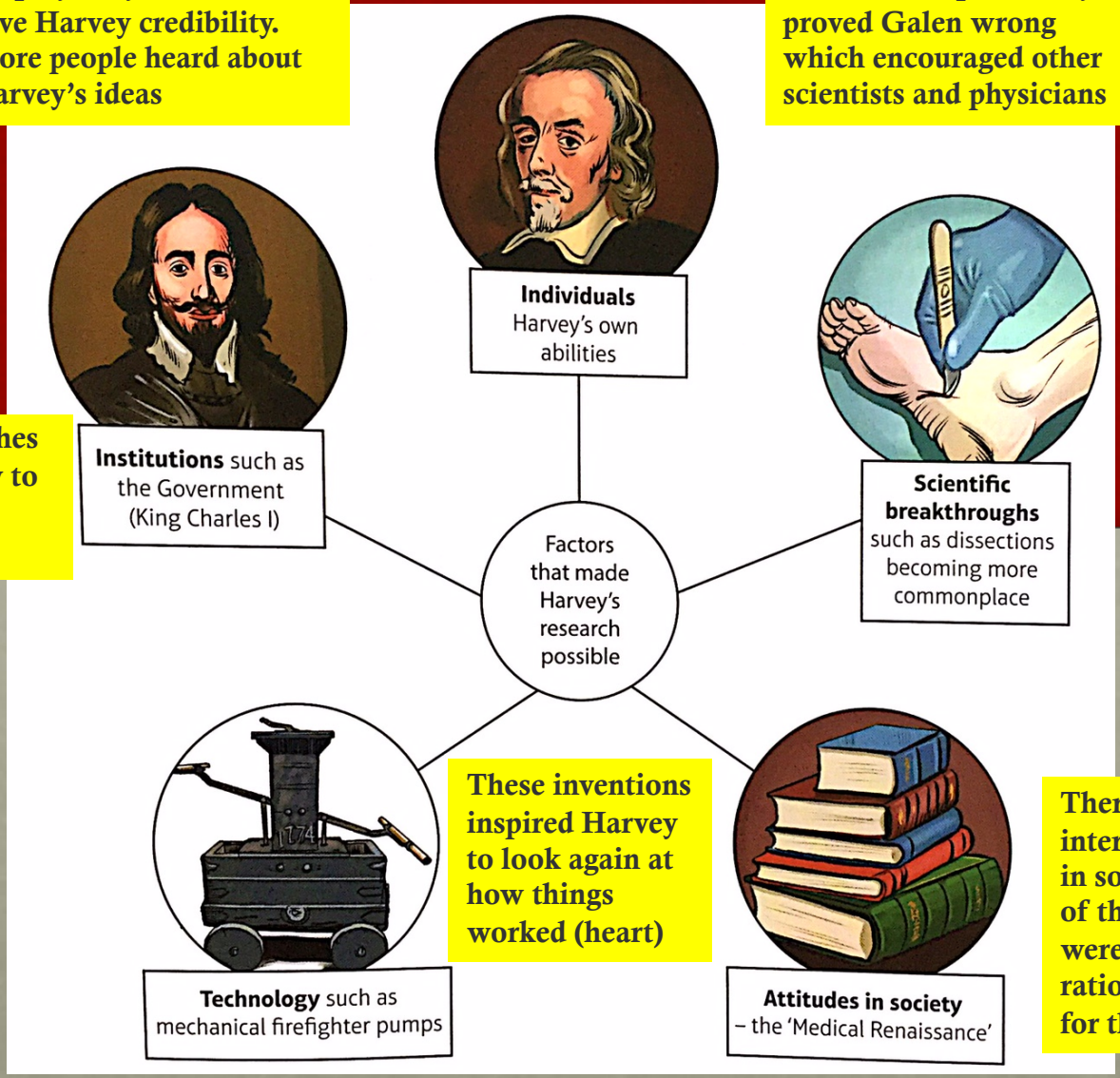
https://www.youtube.com/watch?v=tQPUODk_sIg

Stick this in your book, leave space to write around it…

Employed by Charles I gave Harvey credibility. More people heard about Harvey's ideas

Vesalius had previously proved Galen wrong which encouraged other scientists and physicians

The decline of the Churches influence allowed Harvey to be critical of Galen's teachings



These inventions inspired Harvey to look again at how things worked (heart)

There was more interest in society and in solving the puzzles of the body. People were searching for rational explanations for things

HOW DID HE DO IT?

FACTORS

Individuals

Harvey was exceptionally thorough in his work, spending many hours repeating experiments and going over every detail.

Attitudes: seeking improvement

Harvey was not satisfied to believe that Galen was correct. He tested Galen's ideas through his own experiments. Harvey said 'I prefer to learn and teach anatomy not from books but from dissections.'

Science and Technology

Mechanical water pumps in London (see Picture A) *may* have given Harvey the idea that the heart pumps blood. He used modern scientific methods, reading about other scientists' work, carrying out experiments and carefully observing the results.

Communications

Harvey had read the work of earlier doctors and used their work to build up his theory. For example, Harvey's tutor at Padua, Fabricius (1533–1619), proved there are valves in the veins. Valves control the way liquids flow.

- **Dissecting** live cold-blooded animals whose hearts beat slowly so he could see the movement of each muscle in the heart.
- Dissecting human bodies to build up detailed knowledge of the heart.
- Proving that the body has a one-way system for the blood. He tried to pump liquid past the valves in the veins but could not do so.
- Proving that the veins carry blood, not blood and air as Galen had said.
- Calculating that the amount of blood going into the arteries each hour was three times the weight of a man. This showed that the same blood is being pumped round the body by the heart.

BUT ...

1. **There was still much more to discover about the blood**. Doctors could not make blood **transfusions** until they discovered blood groups in 1901.
2. **Harvey's discovery was only gradually accepted**. Some doctors ignored his theory. Others said that he was wrong because he was contradicting Galen. It was 50 years before teachers at the University of Paris taught Harvey's ideas rather than Galen's.
3. **Harvey's discovery did not make anyone better**. The writer John Aubrey noted 'All his profession agree Dr Harvey to be an excellent anatomist, but that I never heard any that admired his treatment of the sick.' Harvey himself said that after he published his discovery fewer patients came to see him because many thought his idea mad.

SUMMARY

Summary

- William Harvey discovered that blood circulated around the body, instead of being made in the liver and absorbed into the body, as previously theorised by Galen.
- Harvey also proved that the heart acted as a pump, propelling blood around the body.
- Harvey's work had little impact at first, because it couldn't be used to improve practical medical treatments.
- Harvey inspired other scientists to carry out further experiments, building on his discoveries about blood and circulation.

Checkpoint

Strengthen

S1 Name three discoveries that Harvey made.

S2 Describe the methods Harvey used to investigate his theories.

S3 What was Harvey's biggest impact in the short term?

Challenge

C1 Think back to the factors that affect change and continuity in medicine. How many of them can you link to the history of Harvey?

C2 Who had the biggest impact on ideas about the human body – Vesalius or Harvey? Select information from this chapter to support your argument.

To help structure your answer to C2, you might find it useful to create a 'For' and 'Against' list for both individuals.