Exploring the Dambusters story at the RAF Museum

Teacher Information and Answer Pack

KS2: Science, Maths and History

ROYAL AIR FORCE museum

Keywords Glossary

Chronological Order The order in which things happened, arranged from earliest to most recent

Dam A barrier that traps water in a particular area by stopping it from flowing

Detonate To make something explode

Hydroelectric Power Electricity created using the power of fast-flowing water

Industry The making of products in factories. In war time, industry was mostly used for making weapons and equipment needed for war, e.g. planes.

Morale Having confidence and hope

Operation Chastise The official name for the Dambusters Raid

Reservoir A large natural or man-made lake

The Story of the Dambusters Raid

Background

As soon as war with Germany seemed likely, the British government began trying to find ways to stop Germany's **industry**. They thought that if they could stop Germany from making supplies, their army would be weaker.

What kind of products might have been made in German factories in the lead-up to the Second World War? Record three ideas.

Possible student answers include: planes/plane parts, guns, bombs, cars, tanks, ammunition e.g. bullets, food, uniforms (accept any appropriate answers).

What was the plan?

In February 1943, Dr Barnes Wallis shared his idea for 'air attacks on **dams**' to try and stop factories in Germany's Ruhr Valley area from making supplies. These factories used **hydroelectric** power from **reservoirs**.

Barnes Wallis' plan became known as '**Operation Chastise**' or the 'Dambusters raid' and would go down in history.

Target map and photo of the Eder **dam**, one of the three **dams** targeted during the mission.

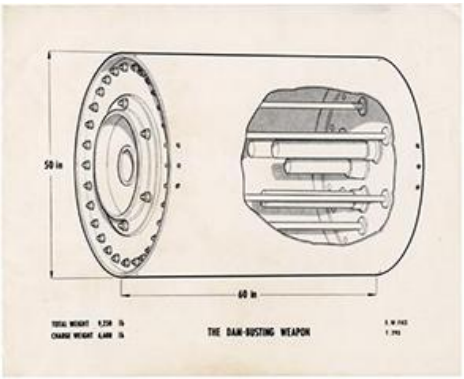
What might be the result of bombing a dam? Record your ideas.

Possible student answer: The dam would be weakened or destroyed. This would mean that it would stop holding back the water in the reservoir, causing flooding in the area.

How did Barnes Wallis design the 'bouncing bomb'?

Wallis worked as an engineer and designer. This meant he had the knowledge and experience to develop new technology in weapons.

When Barnes Wallis began designing a bomb that could skip across water before hitting its target, he started by experimenting with simple objects. Wallis began skimming marbles across a water tub in his back garden using a catapult. His children helped by counting each 'bounce' of the marble across the water.



Barnes Wallis' 'bouncing bomb' diagram

After lots of experiments, Wallis finally finished his design for 'bouncing bombs'. These were cylinder shaped (like a big tin can). They needed to be spun backwards at a speed of 500 rotations (spins) per minute inside the aircraft, before being dropped on to water at a precise height and speed. The bombs would then bounce over the strong nets in the **reservoir** before spinning down the dam and exploding.

Why did the bombs need to bounce? Hint: what was hidden under the water to protect the dams?

Student answer: strong nets

What might make a 'bouncing bomb' difficult to detonate? Record your ideas.

Possible student answer: It had to be dropped at a precise height and speed. If anything went wrong it's likely the bomb wouldn't explode (accept other similar answers).

Who led the mission?

RAF 617 Squadron was set up to carry out Operation Chastise. The squadron was made up of aircrew from Britain, Canada, Australia, New Zealand and the USA. They were led by Wing Commander Guy Gibson. He was only 24 years old at the time of the mission, but was chosen as he had already flown over 170 missions.


Wing Commander Guy Gibson

617 Squadron flew Avro Lancaster bomber aircraft for the mission, which had been adapted (changed) so they could carry and release the 'bouncing bombs'. The squadron had to do lots of dangerous low-level flying training as the bombs had to be [illegible]3 metres above the water.

617 Squadron badge

The motto for 617 Squadron is 'Apres moi le deluge'. Can you work out what this means in English?

Student answer: 'After me the deluge' (flood)

How does the picture in 617 Squadron badge link to their famous mission?

Possible student answer: The picture shows a damaged dam with water flooding out of it. The lightning bolts could represent the bombs that 617 Squadron dropped (accept other similar answers).

Was the mission a success for the RAF?

Flooding of the Möhne Dam four hours after it was hit
© IWM HU 4594 www.iwm.org.uk/collections/item/object/205188037

The mission took place on the night of 16-17 May 1943. 133 airmen of 617 Squadron set off from RAF Scrampton in Lincolnshire in 19 Lancaster Bomber aircraft. They travelled in three 'waves' to bomb the dams. The first 'wave' successfully bombed the Möhne and Eder Dam, whilst the second and third waves focussed on the Sorpe Dam, although this final dam stood strong.

The mission was partly successful for the RAF. 617 Squadron destroyed two of the **dams** and lightly damaged the third. This came at a great cost however, as eight of their aircraft were shot down during the mission and 53 of the 133 airmen were killed.

Why do you think the Squadron carried out the mission at night?

Possible student answer: They carried out the mission at night so it would be more difficult for their enemy to spot them. They could carry out the mission in secret (accept similar answers).

What was the impact of Operation Chastise?

The destruction of the dams caused flooding which slowed down the factories of the Ruhr, but sadly injured and killed many ordinary people who lived and worked in the area. This included Prisoners of War who had been captured by the German Army and put to work in the Ruhr area.

The disruption to factories didn't last as long as the RAF had hoped. They had expected months of delays, but it only took a few weeks to make the repairs.

Even though the disruption didn't last very long, the news of **Operation Chastise** was celebrated by the people of Britain, and provided a much-needed **morale** boost in the middle of the Second World War.

Wing Commander Guy Gibson with members of his crew
© IWM TR 1127
www.iwm.org.uk/collections/item/object/205123900

The surviving members of 617 Squadron became celebrities who were treated as great heroes.

What happened to Squadron 617 after the Dambusters raid?

The Tirpitz following an attack by Squadron 617
Image credit: www.thehistorypress.co.uk/articles/the-sinking-of-hitler-s-battleship-tirpitz/

In autumn 1944, members of 617 Squadron joined together with 9 Squadron to attack a German battleship known as Tirpitz. This ship was a threat to the British war effort as it could block and destroy any supplies (such as food) being brought into the country.

The squadrons flew Lancaster bombers (as Squadron 617 had during the Dambusters raid) which were loaded with huge 'Tallboy' bombs. These bombs had been designed by Barnes Wallis, just like the famous 'bouncing bombs' of Dambusters.

The mission took several tries, but on 12 November they were successful. After two direct hits the ship was badly damaged and capsized (turned upside down), meaning it could no longer be used.

Reflection

Even though it wasn't a complete success, Operation Chastise is one of the most well-known events of the Second World War. Why do you think this is?
Discuss with a partner/or explain your ideas below.

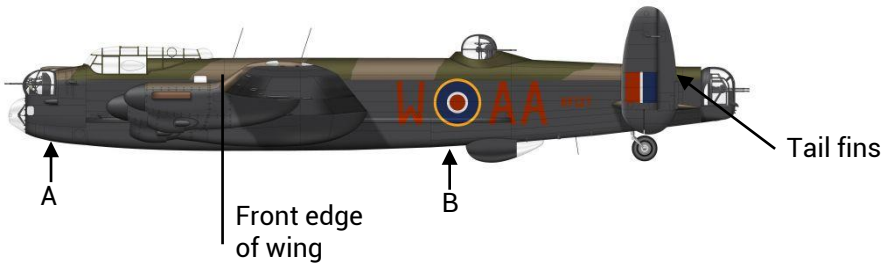
Students could consider:

- The mission involved new technology being developed and used
- The mission gave Britain a small victory during a difficult time in the war
- The way the surviving members of 617 Squadron were thought of afterwards (as celebrity heroes)
- It gave the people of Britain hope that they could win the war and boosted morale
- The mission was widely publicised after its completion (talked about in newspapers, books, etc).

Pilot's Brief

1. Your job is to fly the Lancaster at 60 feet above the ground.
2. To do this you will need to change the angle of the lamps (A and B) so that their beams of light meet at 60 feet below the front edge of the wing.

Important: The scale of the Lancaster is 1 cm to 7 feet



Pilot's Calculations

1. Draw a straight vertical down from the front edge of the wing to the ground.
2. Now draw a straight horizonal line to represent ground level.

Remember the scale is 1 cm to 7 feet, and your Lancaster is flying at 60 feet.
Hint: To begin, you will need to divide 60 by 7 to get your cm measurement.

Now fill in the answers for each question. **Tip:** You can round your cm measurements to the nearest whole number before multiplying to get feet measurements.

1. The Lancaster is **70** feet long
2. The tail fins are **14** feet high
3. The lamps are **38.5** feet apart

Lamp Angles

1. Draw two lines, one between Lamp A and the ground, and one between Lamp B and the same point on the ground. This should look like an upside-down triangle.
2. Imagine that each of the lines that you have just drawn is a beam of light. Measure the angle of each beam from the line representing the front edge of the wing.
3. Lamp A is angled at **16**°
4. Lamp B is angled at **21**°

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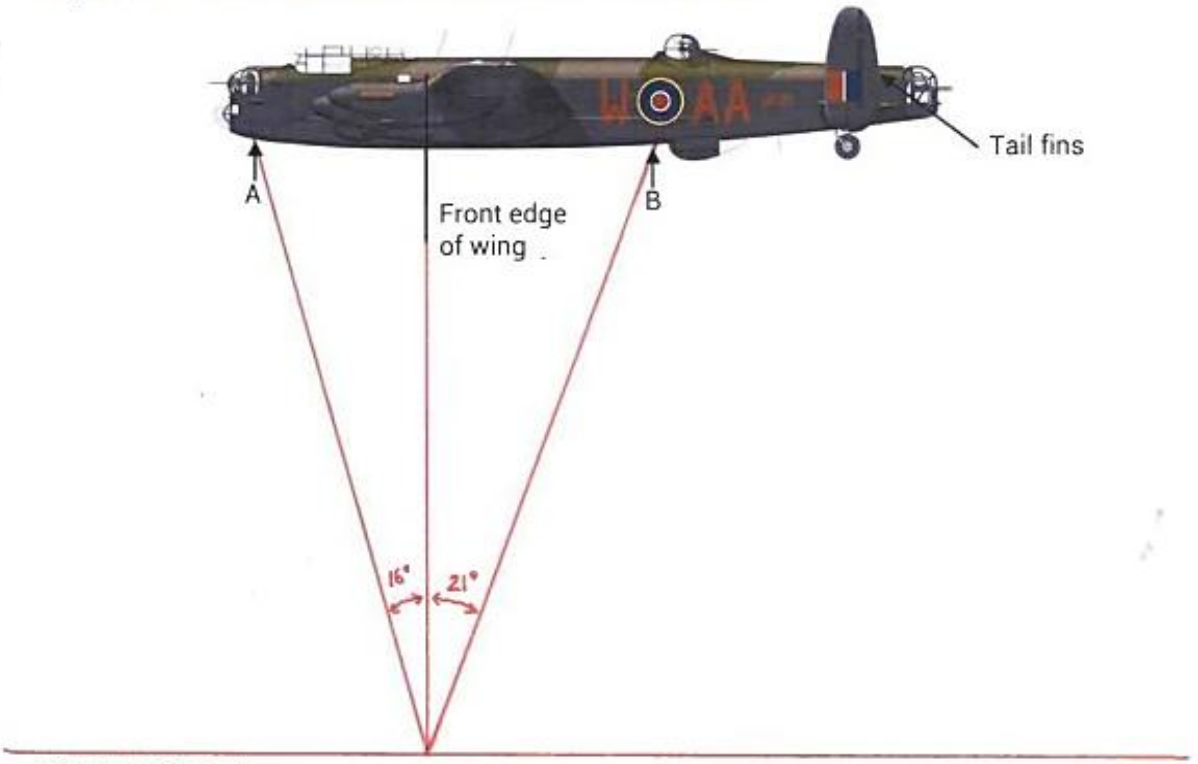

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Bomb Aimer's Brief
Your job is to plot the position of the Lancaster Bomber aircraft when the bouncing bomb is to be dropped. This will help you to aim.

It should be 450 yards from the dam, at an equal distance between each tower.

The Mohne Dam Image credit: The National Archives, catalogue reference: AIR 20/4367

Important
1 yard = 3 feet
The scale of this plan is 1cm to 100 feet

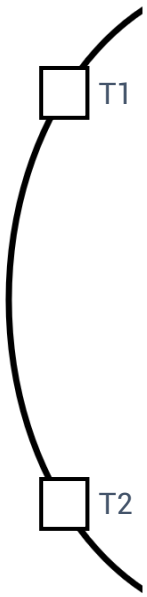
Fill in the answers for each question. **Tip:** You can round your cm measurements to the nearest whole number before multiplying to get feet measurements.

1. The distance between the towers (T1 and T2) is **500** feet

2. The dam is **800** feet wide.

Now plot the position of the Lancaster Bomber when the bouncing bomb is to be released. Follow these steps:
1. Find the centre of the dam by measuring with a ruler. Draw a horizonal line to mark this middle point
2. Your Lancaster Bomber needs to be positioned 450 **yards** from the dam when the bomb is dropped. You need to convert 450 yards into feet. 450 yards = **1350** feet
3. Now convert the feet into centimetres (divide by 100) **1350** feet = **13.5** cm
4. Plot the position of the Lancaster Bomber along the horizonal line you drew in step 1 with an X

Optional: Draw a plane silhouette over the top of your X (making sure the X sits in the middle of your plane).



Can you find these things in the Museum?

In Hangar 5 there are objects and aircraft linked to Operation Chastise (the Dambusters Raid). Try to find each one and answer the questions alongside them.

Avro Lancaster MK1

Location: **Hangar 5**

Why might the Lancaster have been chosen as the aircraft to carry the 'bouncing bombs' for the Dambusters Raid?
Hint: Take a look at the size of the anti-dam mine in the 'Precision Strikes' area

It is large enough to carry several anti-dam mines (bouncing bombs)

How many operational sorties did the Lancaster complete?

137

What was the average number of operational sorties carried about by Lancasters?

21

Harold 'Micky' Martin's Medal Bar

Location: **Hangar 5 (Precision Strikes)**

Which four aircraft did Micky fly during his time in RAF Bomber Command?

Hampdens, Manchesters, Lancasters and Mosquitos

Which medal did Micky receive for 'gallant conduct' (being brave) in the Dambusters Raid?

Distinguished Service Order (DSO)

Benny Goodman's Medal Bar

Location: **Hangar 5 (Precision Strikes)**

How many operations did Benny Goodman complete during his time in RAF 617 Squadron?

30

Why was Benny at greater risk than most pilots during the Second World War?

He was Jewish

Challenge: Explain <u>why</u> this put him at risk

Possible student answer: Hitler/The Nazis were in power in Germany (where Benny would have been to carry our missions). Hitler/the Nazis didn't like Jewish people and persecuted them.

Anti-Dam Mine

Location: **Hangar 5 (Precision Strikes)**

What is the anti-dam mine more famously called?

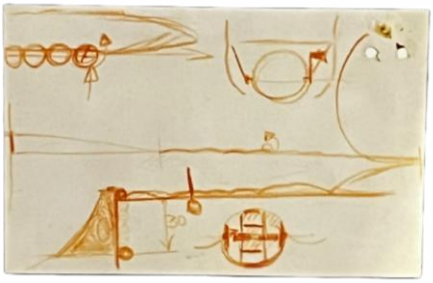
The bouncing bomb

After hitting the wall of the dam, how deep would the mine have sank?

30 feet (9 metres)

What kind of explosive was the anti-dam mine filled with?

Torpex



Barnes Wallis Sketch

Location: **Hangar 5 (Precision Strikes)**

What is shown in this sketch by Barnes Wallis?

Possible student answer: The sketch shows how
Barnes Wallis' bomb would skip over the surface
of a reservoir and over torpedo nets using backspin.

Set of Spheres

Location: **Hangar 5 (Precision Strikes)**

Who owned this set of spheres?

Barnes Wallis

What were they used for?

Possible student answer: The spheres were used to test the best height, speed and distance for the bouncing bomb to be released at.

Why might the owner have chosen spheres made of different types of materials, and with different textures?

Possible student answer: It would be good for the spheres to be made of different materials and with different textures so that Barnes Wallis could work out which weight and texture create the best skim/bounce across the water before hitting the dam wall.

Barnes Wallis Silhouette

Location: **Hangar 5 (Precision Strikes)**

What is Barnes Wallis 'regarded as' (thought of as)?

'a genius'

Which three bombs did he design during the Second World War?

Bouncing Bomb/Anti Dam Mine, Tallboy, Grand Slam

Who said this about Barnes Wallis' bouncing bomb design in 1943?

'...yours is the finest individual technical achievement of the war'

Sir Henry Tizard