

Roman Arches-Strength investigation



The Romans did not invent the arch but they developed it. They were the first people to use arches for very large buildings and to use concrete in their construction. Your task today is to investigate how arches can add strength to a structure.



The Colosseum in Rome, which is constructed with many arches.

Roman Aqueduct at Nimes in France



So why is an arch so strong?



Task 1: Investigate and record

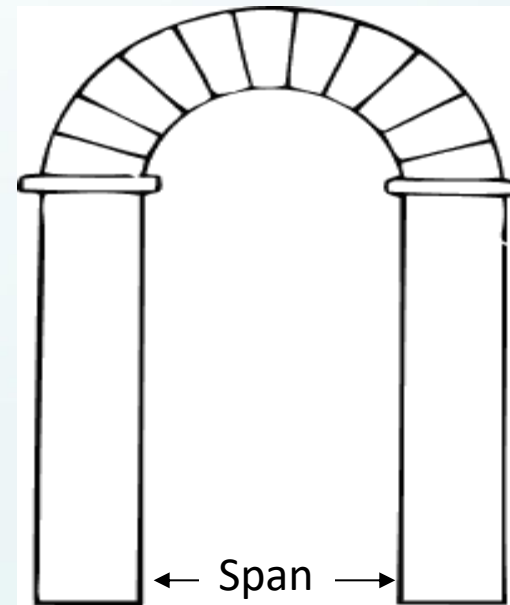
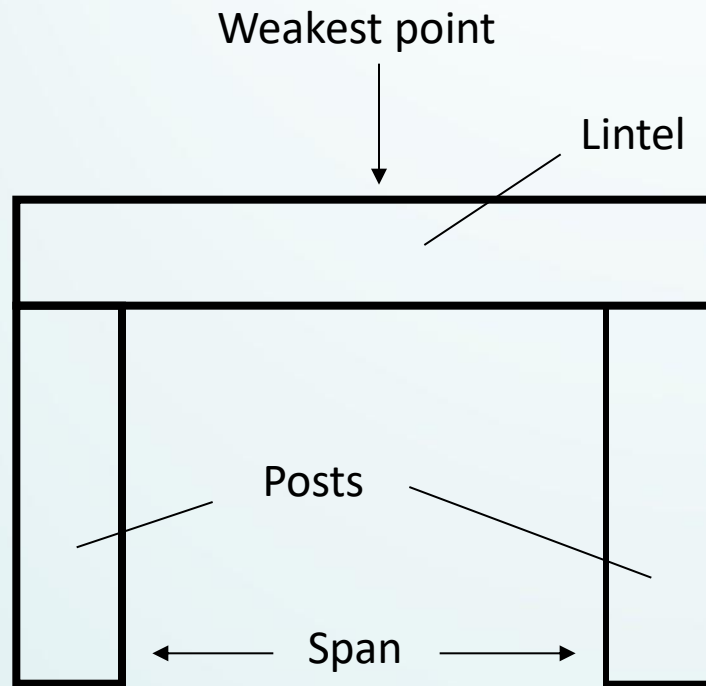


Make 2 equal piles of books about 15cm apart (the span) and about 10cm high. Put 2 sheets of A3 card on top of the books to bridge the gap. Carefully add weights to the top. Count how many you can have on the bridge before it collapses.



Now put one piece of card into the gap as a curved arch so it touches the ground between the books in two places. Lay the second piece of card across the top as before. Once again, carefully add weights to the bridge and count how many it can take.

Why is the arch stronger?



Engineers will tell you that the cross bar (or lintel) is weakest in the centre where it is furthest away from the posts, but the weight on an arch is evenly distributed across the span. Each brick is pushing against all the others so the structure is very strong.

Task 2: Bridge Engineering Investigation

What shape arch is the strongest? Shape your paper to explore which of the following shapes are best for holding weight.



A tall narrow arch



A wide low arch



A arch of
medium
height and
width