

Proclamation of Challenge





History of Projectiles

Physics – Projectile Motion

Chapter 3 Section 3

supplement



History of Projectiles

- From the first human to hurl a stone, or kick a stick, to medieval archers, to modern guns and rockets, to sporting events, leisure activities, and kids jumping off a bed for fun, projectiles have played a role in human history.



History of Projectiles

- Technology (the practical application of knowledge especially in a particular area), and its improvements have allowed humans to perfect the use of projectiles in various ways.
 - Hunting – arrows, spears, guns
 - War - attack and defense
 - Sport - competition or leisure
 - Construction – demolition ball
 - Exploration - space ships and satellites



History of Projectiles

- The first projectile weapons were most likely spears and slings with stones to throw.



History of Projectiles

- We will focus on the physics of projectile motion in class, but for this specific time we will look at the history of projectiles as they relate to war, specifically medieval warfare.



History of Projectiles - Archery

- Archery, defined as the art, practice, or skill of shooting with bow and arrow, has been a staple of warfare for centuries.
- Early Egyptians are recognized as representing the earliest known people to have used the bow and arrow at least 5000 years ago, for the purpose of both hunting and war. Although older artifacts have been found as well from other cultures.

History of Projectiles - Archery

- Materials used to fabricate bows like tendon, horn and wood have changed and been adapted over time to improve both accuracy and strength.
- Arrowheads were first made of burnt wood, then stone or bone, and then metals.



History of Projectiles - Archery

- Medieval archers were the main long-range infantry in battles, and skilled archers could fire up to 12-15 arrows per minute, but would average about 6 per minute so as not to tire too quickly in battle.
- It is estimated that the English longbow could fire an arrow with a maximum range of 180 to 250 yards, but longer distances meant lower accuracy.

History of Projectiles - Archery

- Castle defense was the other primary role of archers. This was effective due to distance, and the advantage of height.



History of Projectiles - Ballista

- The Ballista or "shield piercer," is believed to be an ancient war engine which was invented by the Greeks (the Scorpion) and modified by the Romans in 400BC.
- The Ballista design was similar to a giant crossbow and worked by using tension.



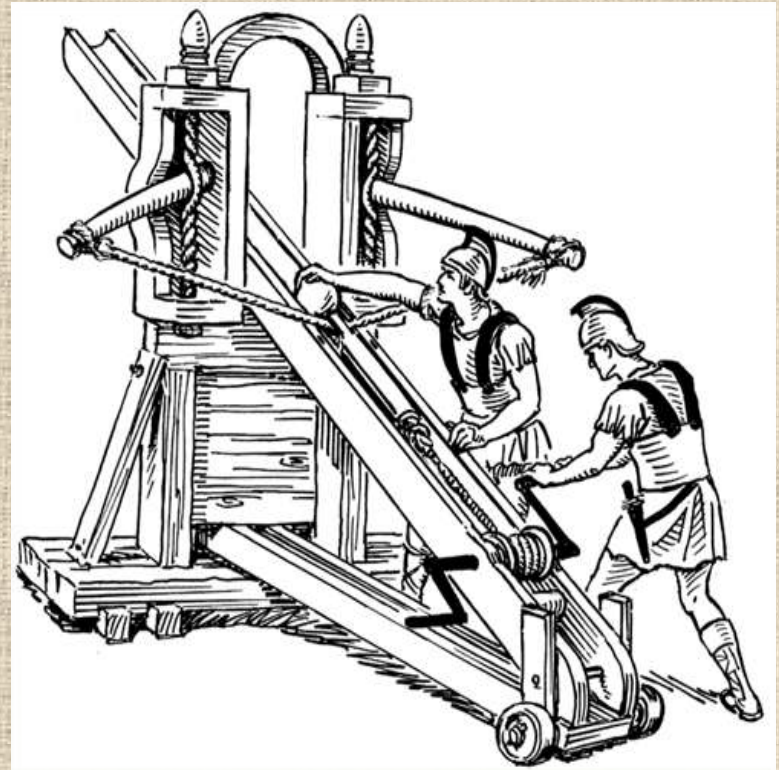
History of Projectiles - Ballista

- The Ballista was designed to aim huge wooden or iron clad darts or arrows which were powered by twisted lengths of rope, hair, or sinew along a flat trajectory.
- The maximum range was over 500 yards, but most were used at closer distances.



History of Projectiles - Ballista

- The force of the missiles launched from the Ballista was designed to have great penetration and were capable of skewering several of the enemy at one time.



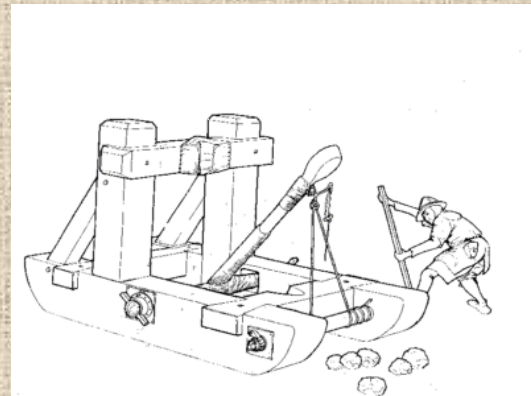
History of Projectiles – Mangonels

- A catapult is a generic term for a machine that hurls an object.
- The earliest writings of catapults were that they originated in China around the 3rd and 4th Century BC and this type of catapult was much like a big crossbow.



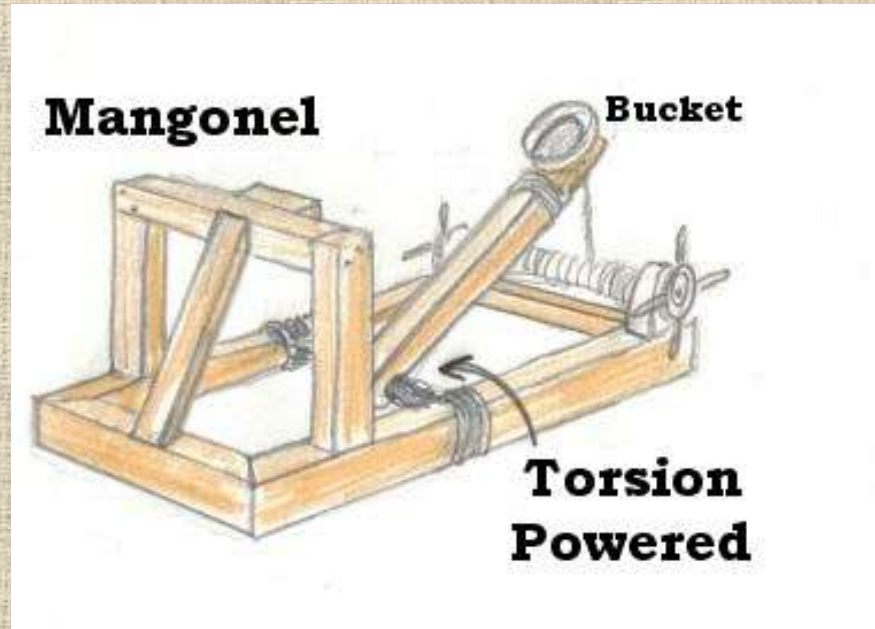
History of Projectiles – Mangonels

- The unique development that turns it into what we consider to be a catapult is the size (too big to be carried), and the swinging arm.
- One type of catapult, the Mangonel could launch missiles across long distances.
- Mangonels fired heavy projectiles from a bowl-shaped bucket at the end of its arm. The Mangonel was used for aiming various missiles at castles, fortresses and cities.
- This type of catapult was easy to construct and wheels were added to the design to ensure maneuverability. The Mangonels were capable of firing projectiles up to 1,300 feet.

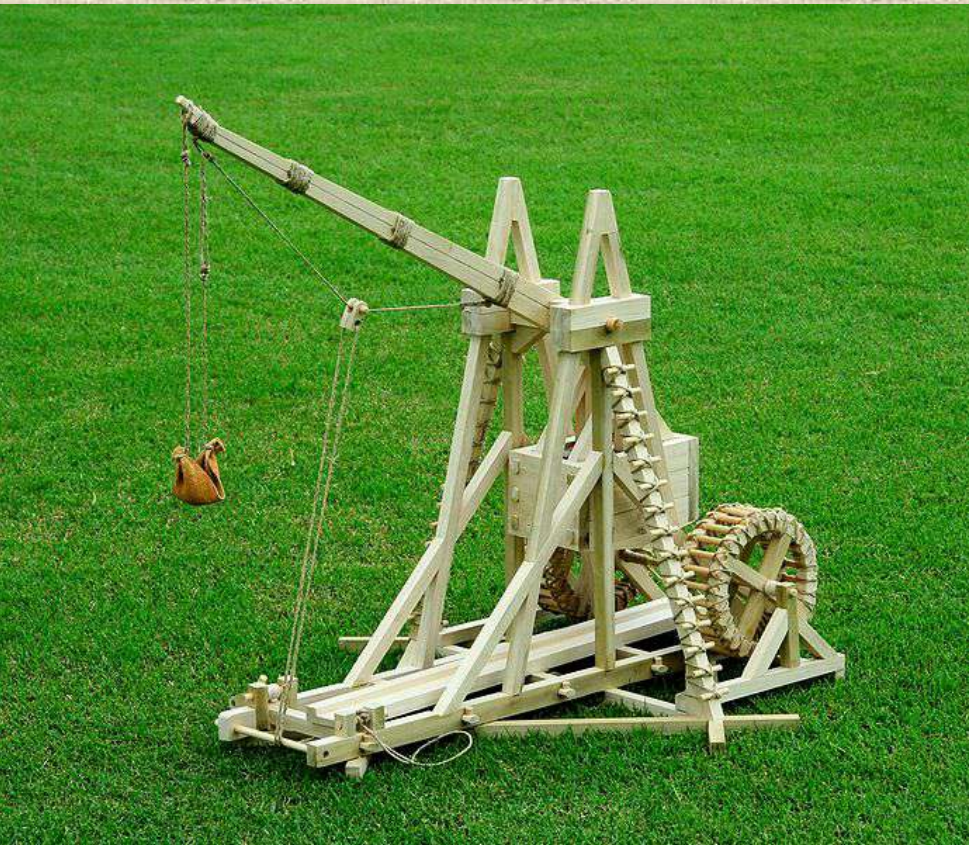


History of Projectiles – Mangonels

- Attackers used projectiles which would cause as much distress and discomfort inside the castle walls.
- These objects included: Stones, Sharp wooden poles and darts, Fire, Burning Sand (becoming trapped inside armor), Dung, Dead mutilated bodies, Disease ridden bodies, Body parts, and Dead animals



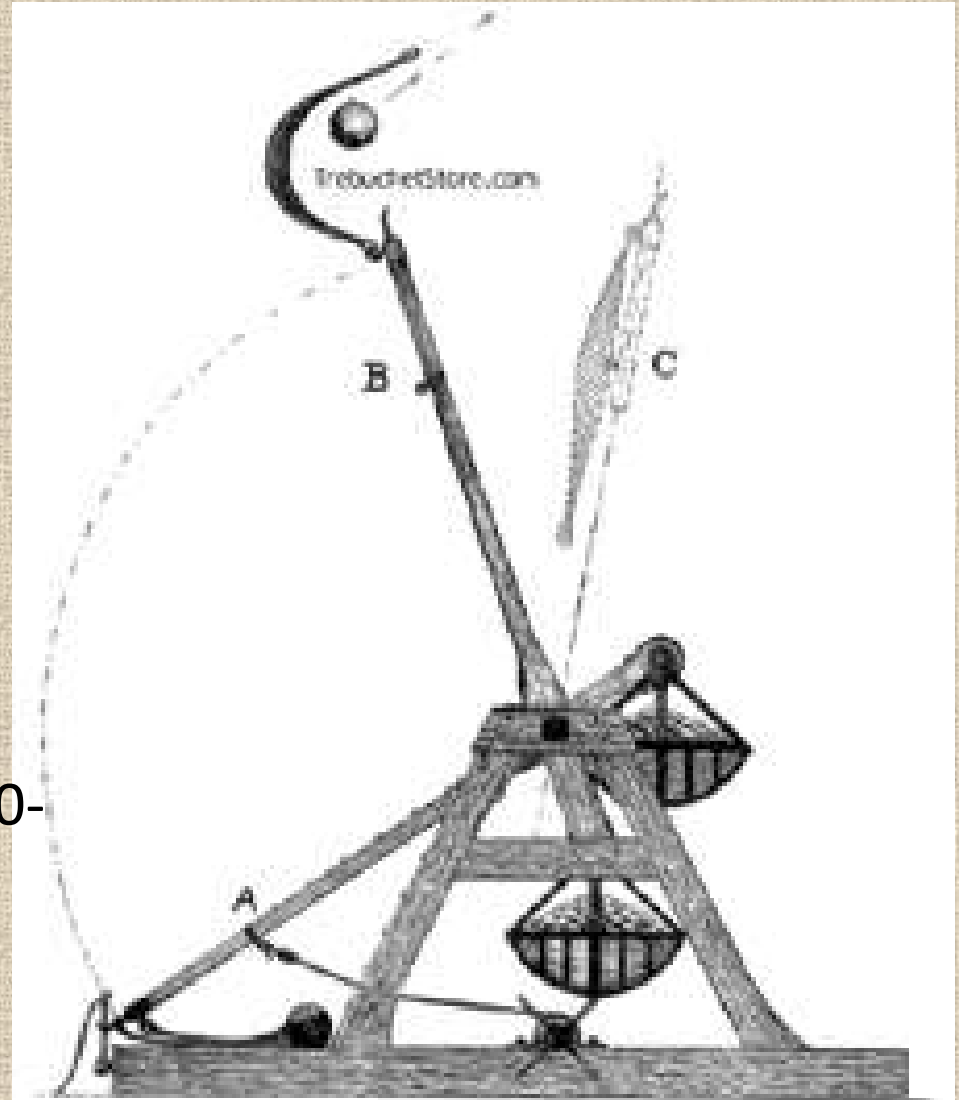
History of Projectiles - Trebuchets



- Research indicates that the first trebuchets were used in China and places near China around 2000 years ago (2nd century A.D.)
- These types of machines became popular as both siege (attack) and defense weapons.

History of Projectiles - Trebuchets

- The trebuchet is powered by gravity with a heavy weight, which is then released and swings the throwing arm and projectile.
- Depending on their size and counterweight, they could throw objects between 200-1500 pounds, at a range of 200-300 meters.



History of Projectiles - Trebuchets

- **It was the French that helped to make improvements to the trebuchet to make it the siege machine of choice in the middle ages. It was these improvements that helped to increase projectile range and accuracy in the trebuchet.**



History of Projectiles - Trebuchets

- However, the trebuchets were most well known in medieval times. These machines were well suited for attacking castles: they could be set up at a safe distance from archers on the castle walls; they could be moved to sections of the walls that had weakened, and they could throw almost anything over the walls and into the areas of the hold.



History of Projectiles

- <http://www.medieval-castle-siege-weapons.com/history-of-trebuchets.html>
- http://www.redstoneprojects.com/trebuchetstore/build_a_catapult.html
- http://www.redstoneprojects.com/trebuchetstore/trebuchet_history.html
- <http://www.medieval-castle-siege-weapons.com/history-of-catapult.html>
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- http://medieval-castles.org/index.php/archers_the_history_of_archery_bows_and
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- <http://www.middle-ages.org.uk/>
- <http://www.stormthecastle.com/catapult/the-history-of-the-catapult.htm>