



Rome Unit Study

Engineering, Emperors
and Monuments



Engineering Feats

- Roads
- Bridges
- Tunnels
- Water Systems
- Sewer Systems
- Heated Baths
- Villas



Keys to Roman Engineering

- Concrete
 - Volcanic Ash
 - Limestone
 - Sand
 - Water
- Arches
 - Bridges
 - Aqua ducts
 - Theaters
 - Housing
 - Baths
 - Domes



- Image source
<http://highhillhomeschool.blogspot.com/>

Roads

- All Roman Roads were straight
- Built level and at right angles
- Built by Slaves who worked for private construction companies
- Used for transportation of goods and troops
- Appian Way was the main road,

How Roads Were Built

- Groma - surveying tool
- Dug a Trench
- Filled it with sand and boulders
- Layer of gravel mixed with clay
- Compacted
- Paving stones for top
- Sloped for water drain-off
- Miles marked with stones



Image source

http://www.etab.ac-caen.fr/college-lefavrais/latin/5eme/latintec/la_groma.html

Aqua Ducts

- 900,000,000 liters fresh water were brought into the city
- Engineers Studied Water Quality,
- Water was purified
- The Emperor Trajan had a Water Engineer,
- Trajan built a steady supply of ducts
- In the city there were three water tanks
 - Public
 - Baths
 - Private House Holds

How Aqua Ducts Were Built

- Built using Bricks and Concrete,
- Slope Angle brought Water from Source to City
- Arch Bridges were Built
- Water was brought through valleys using a Siphon System with Tanks on Each Side



Emperors and Monuments

- 55 BC - Theater of Pompey
- 46 BC – Forum of Caesar
- 21 BC – Arch of Augustus
- 19 BC – Baths of Agrippa
- 17 BC – Theater of Marcellus
- 2 BC – Forum of Augustus
- 52 AD – Claudius completed an aqua duct begun by Caligula, 40 miles long
- 79 AD – Colosseum
- 103 AD – City of Ostia built by Claudius
- 112 AD – Trajan’s Forum
- 128 AD – Hadrian’s Pantheon
- 126 to 134 AD – Hadrian’s Villa at Tivoli
- 203 AD – Arch of Septimius Severus – war of Parthians and Arabs
- 216 AD – Baths of Caracalla
- 300 AD – Arch of Constantine



- Image source
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Colosseum

- Built in 79 AD by Vespasian
- Stadium to Entertain the Public
- 16 stories
- Seated 80,000
- 76 entrances
- 32 animal pens
- Vaulted tunnels
- Concrete faced with brick
- Seats assigned according to Status
 - emperor, senators, noblemen, soldiers and citizens, slaves, women
- Financed with Money from Rome's sacking of Jews in Jerusalem and built by the Jews slave labor
- Opened by Titus with 100 day entertainment event



- Image source
<http://highhillhomeschool.blogspot.com/>

Circus Maximus

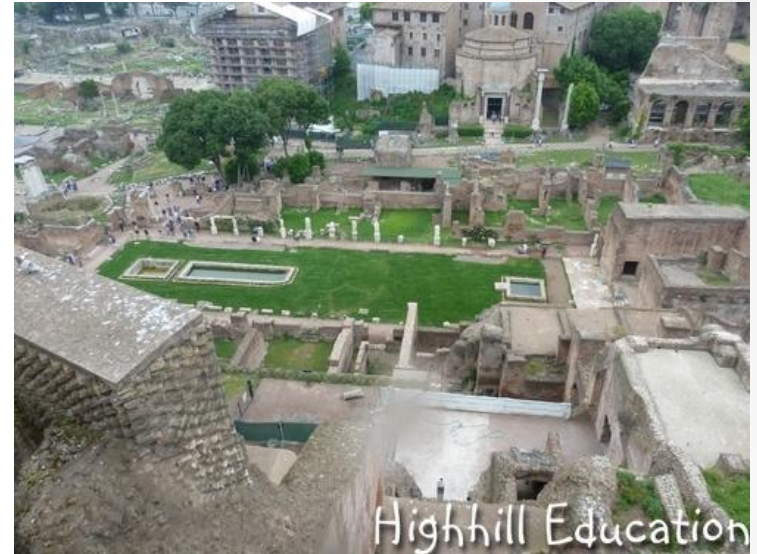
- Used for Chariot Races
- Built 100 AD by Trajan
- Largest Stadium ever constructed
- 1/2 km long
- 30 m high, 4 rows of seats
- Built from concrete
- Excellent Political Tool
- Could Entertain 1/3 of Rome's population
- Center Piece contained monuments taken during conquests



- Image source
<http://www.circusmaximus.us/rome-screens.html>

Trajan's Forum

- *Grocery Store and Mall*
 - Market
 - Library
 - Law Courts
 - 150 shops on 5 floors
 - Restaurants and bars
- *Built in 112 AD by Trajan*
- Funded with Money taken from Dacia Wars
- Walls were Brick filled with Concrete
- Free rations handed out (Food Stamps)
- Destroyed by a 9th century Earthquake



- Image source <http://www.magisterwhitchurch.net/SlaveryIndex.htm>

Hadrian's Wall

- Built in 120 AD
- 17 military forts
- 60 Military Houses Every Mile
- Towns Sprung up Near Forts
 - Soldiers wanted needles, shoes, bars, women,
- Took 5 years to build
- Secured NW Boarder
- Gave Soldiers something to do so they weren't busy causing trouble
- Kept people out and people



Pantheon

- Built in 125 AD by Hadrian
- Temple Dedicated to the Gods
- 43 m (150 ft) Across Dome
- For 18 centuries it was the largest unsupported span
- Huge bronze doors



Pantheon – How Does Dome Stay Up?

- Dome wants to Push out at bottom
- 20 foot Thick wall bases act as Buttresses
- Built inside a buttressed wall
- Columns around the base of the dome
- Composition of the dome is made out of lighter material as the dome gets higher
- Hollow jugs were mixed in with the concrete to lighten the load
- Arches hidden inside the dome
- Square cuts reduced weight (coffers)
- 30 ft wide oculus Reduces Weight



- Image source
<http://highhillhomeschool.blogspot.com/>

Baths of Caracalla

- Built in 216 AD
- Swimming Pool Complex
 - Gymnasium
 - Pools
 - Libraries
 - Restaurants
 - Hair Dresser
- Bigger than the Vatican
- 1800 Decorators
- Service Quarter
 - Dark
 - Water pumped below the building
 - Heated with wood fires
 - 50 fire places,
 - Tera cotta tubes



Image source

<http://commons.wikimedia.org/wiki/File:BathsOfCaracalla.jpg>

Writing Assignment

