HIGH SCHOOL

Social Studies, Language Arts, Science
History, Primary Source, Literacy, Earth Science

High School Lesson Plan 1: Pliny's Point of View

Teacher Instructions

By 79 A.D., Pompeii was an ancient city with a thriving commercial center. Long before Vesuvius froze everything in time, centuries of carts rolling by carved deep ruts in the stone streets—and they are still visible today. Pompeii and its neighboring towns were home to thousands of people, from the wealthiest Roman citizens to the poorest slaves. Their places in society meant nothing, however, the day Vesuvius erupted.

Some settlements buried by the eruption in 79 A.D. are still unexcavated and, with little written record available, it is difficult to know how many people escaped the destruction from Vesuvius. There was a brief window of time in the hours between when the volcano showered the area with ash, pumice, and stone in the early afternoon and when the super-heated pyroclastic surges rolled down the mountain early the next morning.

Many people left right away either on one of the roads leading away from the city or by boat, through the Bay of Naples. Others stayed, thinking it would be better to hide out in their homes or shops until the rain of debris ended. They did not know that by the next day, even without the waves of heated gases and ash obliterating everything in their path, all signs of civilization would be buried under several meters of volcanic deposits. Within 48 hours, Pompeii was transformed forever by the catastrophic eruption of Mount Vesuvius.

The remains of those who stayed behind or tried to leave too late help us understand first-century life in Pompeii. Some of these are the people whose body casts and possessions you and your students see in Pompeii: The Exhibition. Little is known about what became of the people who escaped Vesuvius' destruction nor exactly what they experienced that day. Even though the eruption could be seen for hundreds of miles, there is only one surviving primary source describing what happened, a pair of letters written by Pliny the Younger.

Pliny the Younger was 18 years old when Vesuvius erupted. He lived with his mother and uncle, Pliny the Elder, in Misenum. Pliny the Elder was an officer in the imperial Roman army, stationed there with the naval fleet. Misenum was located across the Bay of Naples from Pompeii and provided an excellent view of Mount Vesuvius. A few years after the eruption, Pliny the Younger wrote to his friend Tacitus, a historian, and described what it looked like from afar, how his uncle tried to rescue people, and what he and his mother did as the scope of the disaster became apparent.

Many of the basic facts of the golden age of the Roman Empire and the eruption of Mt. Vesuvius come from Pliny's writings. In the three activities below, your students will read, analyze, and re-create Pliny's words for themselves.

ANSWER KEY

Part 1

1. No, because of the distance
2. A tree, "an umbrella pine"
3. "the amount of soil and ashes it carried with it"
4. Answers will vary but should mention it being based on Pliny's description of the eruption
5. He preferred to go on with his studies
6. Rectina, the wife of his friend Tascus. She asked Pliny to come rescue her
7. She lived at the foot of the mountain
8. Yes, "this lovely stretch of coast was thickly populated"
9. ashes, pumice, and blackened stones
10. it was blocked by debris from the mountain

Part 2

Answers will vary, but there should be 10 tweets, with 140 characters each, for each event in the timeline.

Part 3

Answers will vary, but should include at least three aspects the two tragedies have in common.

Name Class Date

Pliny's Point of View

Student Activity

By 79 A.D., Pompeii was an ancient city with a thriving commercial center. Long before Vesuvius froze everything in time, centuries of carts rolling by had carved deep ruts in the stone streets—and they are still visible today. Pompeii and its neighboring towns were home to thousands of people, from the wealthiest Roman citizens to the poorest slaves. Their places in society meant nothing, however, the day Vesuvius erupted.

Some settlements buried by the eruption in 79 A.D. are still unexcavated and, with little written record available, it is difficult to know how many people escaped the destruction from Vesuvius. There was a brief window of time in the hours between when the volcano showered the area with ash, pumice, and stone in the early afternoon and when the super-heated pyroclastic surges rolled down the mountain early the next morning.

Many people left right away either on one of the roads leading away from the city or by boat, through the Bay of Naples. Others stayed, thinking it would be better to hide out in their homes or shops until the rain of debris ended. They did not know that by the next day, even without the waves of heated gases and ash obliterating everything in their path, all signs of civilization would be buried under several meters of volcanic deposits.

In 79 A.D., Pompeii was a busting metropolis still recovering from an earthquake in 62 A.D.—a precursor for what was to come 17 years later.

Within 48 hours, Pompeii was transformed forever by the catastrophic eruption of Mount Vesuvius.

The remains of those who stayed behind or tried to leave too late help us understand first-century life in Pompeii. Some of these are the people whose body casts and possessions you see in Pompeii: The Exhibition. But little is known about what became of the people who escaped Vesuvius' destruction nor exactly what they experienced that day. Even though the eruption could be seen for hundreds of miles, there is only one surviving primary source describing what happened, a pair of letters written by Pliny the Younger.

Pliny the Younger

Pliny the Younger was 18 years old when Vesuvius erupted. He lived with his mother and uncle, Pliny the Elder, in Misenum. Pliny the Elder was an officer in the imperial Roman army, stationed there with the naval fleet. Misenum was located across the Bay of Naples from Pompeii and provided an excellent view of Mount Vesuvius. A few years after the eruption, Pliny the Younger wrote to his friend Tacitus, a historian, and described what it looked like from afar, how his uncle tried to rescue people, and what he and his mother did as the scope of the disaster became apparent.

Many of the basic facts of the golden age of the Roman Empire and the eruption of Mt. Vesuvius as you experience in Pompeii: The Exhibition come from Pliny's writings. In the activities below, you will read, analyze, and re-create Pliny's words for yourself.

Terms to Know: acumen, borne, dispersed, implore, lapilli, pumice, porous, pyroclastic, seismic, subside, villa

Name Class Date

Part 1

Read the excerpt below in which Pliny describes the eruption and then answer the 10 questions that follow.

> *It was not clear at that distance from which mountain the cloud was rising (it was afterwards known to be Vesuvius); its general appearance can best be expressed as being like an umbrella pine, for it rose to a great height on a sort of trunk and then split off into branches, I imagine because it was thrust upwards by the first blast and then left unsupported as the pressure subsided, or else it was borne down by its own weight so that it spread out and gradually dispersed. In places it looked white, elsewhere blotched and dirty, according to the amount of soil and ashes it carried with it.*
>
> *My uncle's scholarly acumen saw at once that it was important enough for a closer inspection, and he ordered a boat to be made ready, telling me I could come with him if I wished. I replied that I preferred to go on with my studies, and as it happened he had himself given me some writing to do. As he was leaving the house he was handed a message from Rectina, wife of Tascus [a friend], whose house was at the foot of the mountain, so that escape was impossible except by boat. She was terrified by the danger threatening her and implored him to rescue her from her fate. … He gave orders for the warships to be launched and went on board himself with the intention of bringing help to many more people besides Rectina, for this lovely stretch of coast was thickly populated.*
>
> *He hurried to the place which everyone else was hastily leaving, steering his course straight for the danger zone. … Ashes were already falling, hotter and thicker as the ships drew near, followed by bits of pumice and blackened stones, charred and cracked by the flames: then suddenly they were in shallow water, and the shore was blocked by the debris from the mountain….*

1. At first, was Pliny able to tell which mountain was erupting? Why or why not?

2. To what does Pliny compare the shape of the cloud from the eruption?

3. Why do you think volcanic eruptions similar to Vesuvius' in 79 A.D. are often called "Plinian" by scientists?

4. What determined the color of the cloud?

Name Class Date

5. Pliny the Elder did not survive the disaster, but Pliny the Younger does. Why did Pliny the Younger remain at Misenum instead of accompanying his uncle?

6. Who sent Pliny's uncle a letter? Why?

7. Where did Rectina?

8. Were there many people living on the coast near Vesuvius?

9. What three things were falling from the sky?

10. Why were the ships unable to reach the shore?

Name Class Date

Part 2

Below is the approximate timeline of the eruption of Mt. Vesuvius, including excerpts from Pliny's letters. After you have read through the 10 entries below, recreate the timeline on separate paper as a series of posts Pliny the Younger might have put on Twitter. Remember, tweets are limited to 140 characters!

24 August A.D. 79

8 a.m.: A series of small emissions from Mt. Vesuvius.

> "For several days past there had been earth tremors which were not particularly alarming because they are frequent in Campania; but that night the shocks were so violent that everything felt as if were not only shaken but overturned. "

1 p.m.: Mt. Vesuvius erupts suddenly and with great force. A cloud of volcanic materials soars high above the mountain, spreading out in the shape of a flat-topped pine tree. Within 30 minutes, the surging dark cloud rises some 14 km above Mt. Vesuvius. Ash drifts over Pompeii.

> "...being like an umbrella pine, for it rose to a great height on a sort of trunk and then split off into branches... "

3 p.m.: Mt. Vesuvius spews its contents higher and higher. As it rises, the volcanic material (mostly fragments of lapilli) cools and hails down on Pompeii. Most residents flee, although some seek shelter or stay behind to guard their property. Volcanic debris begins to clog the Sarno River and the port, making them impassable to ships. Seismic shockwaves shake the area.

> "...there was a danger from falling pumice stones ...as a protection against falling objects they put pillows on their heads tied down with cloths... We also saw the sea sucked away...so that quantities of sea creatures were left stranded on dry sand. "

5 – 6 p.m.: Chunks of pumice, as big as 50cm, plummet from the cloud. Streets and roads are buried deep under the accumulated pumice, lapilli and ash, and the roofs of buildings begin to collapse under the weight. The dense cloud now rises about 25km above Mt. Vesuvius, obliterating the sun. Darkness, broken only by flashes of lightning, adds to the terror of fleeing inhabitants.

The village of Misenum was far enough from the volcano to avoid destruction, but close enough for Pliny the Younger to witness the eruption.

POMPEII
THE EXHIBITION

Name Class Date

25 August A.D. 79

1 – 2 a.m.: Scalding mudflows of volcanic debris mixed with steam spill from the volcano and down the slopes, choking the town of Herculaneum. Ash, lapilli, and pumice continue to rain down on Pompeii; the debris is now as high as the upper floors of buildings. It bursts through windows, doors, and roofs, trapping and suffocating those hiding within.

> "Soon great flames and vast fires shone from many points on Mt. Vesuvius; the gleam and light made more vivid by the night time shadows."

4 a.m.: The volcanic plume above Mt. Vesuvius, now 30 km high, grows too heavy and begins to collapse. The column cascades to Earth, sending superheated ash and gases roaring in turbulent waves, called pyroclastic flows, down the volcano's slopes. The first flow reaches Herculaneum, killing any inhabitants who still remained.

5 a.m.: Strong earthquakes continue to shake the whole area. A second, even hotter surge further buries Herculaneum. At Pompeii, the rain of pumice eases, but darkness prevails as the massive ash cloud hides the rising sun. Some survivors try to flee their hiding places and escape the town. But it is hard to breathe in the ash-clogged air, or to walk – or even crawl – over the deep layer of volcanic fallout.

> "We were followed by a panic-stricken mob of people wanting to act on someone else's decision."

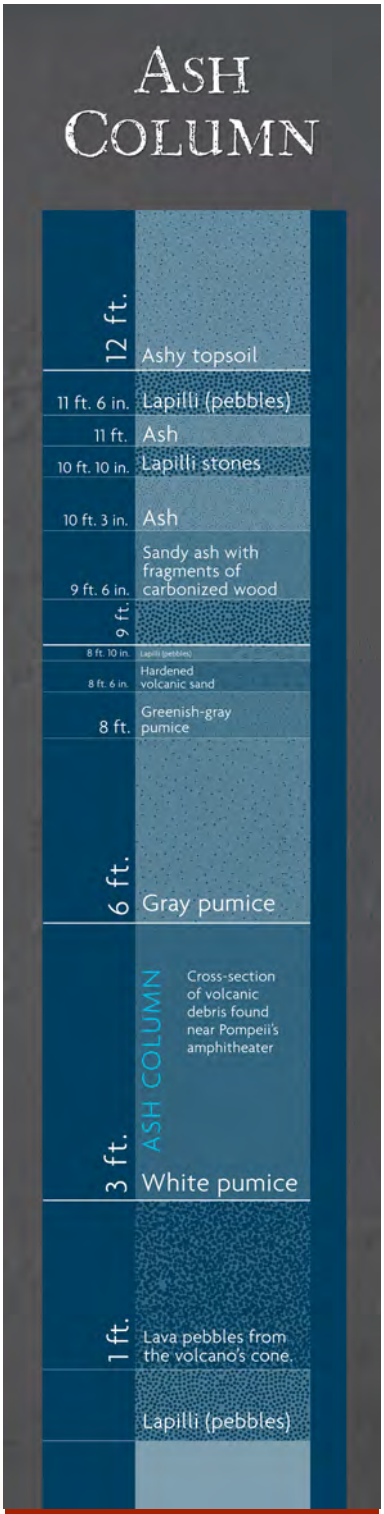
6:30 a.m.: The third pyroclastic surge, the strongest yet, reaches Pompeii from the north but is held back by the town's wall.

6.30 – 7:30 a.m.: Powerful surges overcome the walls and sweep over the town in massive waves of toxic gas and burning, smothering ash. Pompeii's remaining inhabitants are killed instantly and the city is buried. Most people who die at Pompeii perish in this phase of the eruption.

> "...my mother implored...me to escape...I refused to save myself without her, and grasping her hand forced her to quicken her pace."

8 a.m.: The most destructive surge hits Pompeii, preceded by a storm of fire and lightning. The town's tallest structures are burned, toppled, and buried. The same surge reaches Stabiae and even as far as Naples. Luckily for Pliny the Younger, the surge loses momentum before it reaches Misenum, though the town is engulfed in a dense cloud of ash. Volcanic activity, electrical storms, and mudslides continue for several days. By the time the eruption ends, the summit of Mt. Vesuvius has collapsed, leaving a crater 200m lower. The entire region is annihilated — towns, vegetation, livestock, people. Only the tops of the highest walls remain unburied to show where Pompeii stood.

> "Finally, the cloud lifted and vanished in a sort of smoke or fog...the sun even reappeared, but pale, as when there is an eclipse...the landscape looked changed and covered by a thick blanket of ash, as if it had snowed."



Pliny the Younger's description of the volcanic materials created by the eruption matches what scientists have found in the ash column.

Name Class Date

Part 3

Read the selection below by Pliny in which he explains what his mother and he did after the eruption. Next, write a brief essay comparing Pliny's experience to the moments following the destruction of the Twin Towers in New York City on 9/11/01. Although they are separated by centuries and continents, what do these two events have in common? Your written account should include at least three comparisons.

You will find first-hand accounts of 9/11 here:

- September 11 News **www.september11news.com/USAWebArchives.htm**
- The September 11 Digital Archive **www.911digitalarchive.org**
- TeachersFirst: September 11 Resources **www.teachersfirst.com/spectopics/september.cfm**

Ashes were already falling, not as yet very thickly. I looked round: a dense black cloud was coming up behind us, spreading over the Earth like a flood. 'Let us leave the road while we can still see,' I said, 'or we shall be knocked down and trampled underfoot in the dark by the crowd behind.' We had scarcely sat down to rest when darkness fell, not the dark of a moonless or cloudy night, but as if the lamp had been put out in a closed room.

You could hear the shrieks of women, the wailing of infants, and the shouting of men; some were calling their parents, others their children or their wives, trying to recognize them by their voices. People bewailed their own fate or that of their relatives, and there were some who prayed for death in their terror of dying. Many besought the aid of the gods, but still more imagined there were no gods left, and that the universe was plunged into eternal darkness for evermore.

There were people, too, who added to the real perils by inventing fictitious dangers: some reported that part of Misenum had collapsed or another part was on fire, and though their tales were false they found others to believe them. A gleam of light returned, but we took this to be a warning of the approaching flames rather than daylight. However, the flames remained some distance off; then darkness came on once more and ashes began to fall again, this time in heavy showers. We rose from time to time and shook them off; otherwise, we should have been buried and crushed beneath their weight.

High School Lesson Plan 2: Business in Pompeii

Teacher Instructions

Units of measurement in ancient Rome were consistent throughout the Empire. In fact, the Mensa Ponderaria, the public office that regulated weights and measures, was located near the market in Pompeii. To prevent merchants from cheating customers and suppliers, they had to check their weights and measuring devices against official samples. The main Roman unit of weight, the libra, weighed 12 unicae—roughly 12 ounces. The abbreviation we use today for a pound (lb.) is derived from libra. The pes, equivalent to about 11.6 inches, was used to measure length. Pes is the Latin word for foot, so you can see how our modern-day measurement of a foot got its name.

Liquids were measured in a uniquely-shaped pottery container called an amphora. Each amphora could hold one cubic pes, or about seven gallons of liquid. Amphorae (the plural of amphora) were used to transport and store wine, oil, soup, and other commodities. The tapered bottom of the amphora allowed it to be set upright securely in sand or dirt or fit into slots and holes in counters at shops and restaurants.

With an excellent climate and fertile growing season, Pompeii was renowned for its vineyards. One of the amphora you see in Pompeii: The Exhibition once held wine. Hundreds of amphorae survived the eruption, as did other containers made of terra cotta, glass, and bronze. In Part 1 below, students will use geometric formulas to calculate the volumes of some of the historic vessels seen first-hand on your field trip. The source for the figures provided in question #4 is Life, Death, and Entertainment in the Roman Empire edited by D.S. Potter and D.J. Mattingly (University of Michigan Press, 1999).

By 79 A.D., Pompeii was a sophisticated town with a noisy, thriving center of business. Local garum (a fish sauce), olive oils, wines, and millstones cut from volcanic rock were shipped from Pompeii to the far corners of the Roman Empire. City merchants imported lamps from northern Italy, pottery from Gaul, and oil and wines from Spain, Sicily, and Crete. The thriving import/export trade supported many successful enterprises including bakeries, textile workshops, bars, and restaurants. In the second activity, your class will be challenged to design a blueprint for an insula, a block in a Roman city plan, featuring businesses and buildings excavated in Pompeii.

Answer Key

Part 1

1. 4734.59 in3
2. 720.97 in3
3. 5674.31 in3
4. (a.) 70 liters/amphora; (b.) 25 liters/amphora; (c.) oil
5. Because the objects are irregularly shaped and not perfect cylinders
6. 43.57 in3; answers will vary but should be consistent with something along the lines of a soup or cereal bowl

Part 2

There are 18 locations or businesses on the list. Assess students' work based on how many of the 18 they included in their designs.

Name Class Date

Business in Pompeii

Student Activity

Units of measurement in ancient Rome were consistent throughout the Empire. In fact, the Mensa Ponderaria, the public office that regulated weights and measures, was located near the market in Pompeii. To prevent merchants from cheating customers and suppliers, they had to check their weights and measuring devices against official samples. The main Roman unit of weight, the libra, weighed 12 unicae—roughly 12 ounces. The abbreviation we use today for a pound (lb.) is derived from libra. The pes, equivalent to about 11.6 inches, was used to measure length. Pes is the Latin word for foot, so you can see how our modern-day measurement of a foot got its name.

Liquids were measured in a uniquely-shaped pottery container called an amphora. Each amphora could hold one cubic pes, or about seven gallons of liquid. Amphorae (the plural of amphora) were used to transport and store wine, oil, soup, and other commodities. The tapered bottom of the amphora allowed it to be set upright securely in sand or dirt or fit into slots and holes in counters at shops and restaurants.

With an excellent climate and fertile growing season, Pompeii was renowned for its vineyards. One of the amphora you see in Pompeii: The Exhibition once held wine. Hundreds of amphorae survived the eruption, as did other containers made of terra cotta, glass, and bronze. In Part 1 below, you will use geometric formulas to calculate the volumes of some of the historic vessels you see first-hand on your field trip.

By 79 A.D., Pompeii was a sophisticated town with a noisy, thriving center of business. Local garum (a fish sauce), olive oils, wines, and millstones cut from volcanic rock were shipped from Pompeii to the far corners of the Roman Empire. City merchants imported lamps from northern Italy, pottery from Gaul, and oil and wines from Spain, Sicily, and Crete. The thriving import/export trade supported many successful enterprises including bakeries, textile workshops, bars, and restaurants. In the second activity, you will be challenged to design a blueprint for an insula, a block in a Roman city plan, featuring businesses and buildings excavated in Pompeii.

Oil amphora

The glirarium was used to raise edible dormice. The cage has spiral shelves on the interior, two food tanks, and multiple air holes. These conditions urged dormice to hibernate in captivity where they fattened up until they became a savory and luxurious snack.

The garum amphora has a distinctive pear-shape and elongated base. Typically, the name of the merchant was painted on the side of the container.

Terms to Know: barracks, commodities, dormouse, fermented, granaries, hemisphere, piazza, tannery, tiers, vessel

Name Class Date

Part 1: Measure Up

The formula for the volume of a right cylinder (□=□□2h) can be used to model the amount of liquid held in the amphorae and other containers you see during your field trip.

1. The oil amphora featured in *Pompeii: The Exhibition* is 34.65 inches high and has a diameter of 13.19 inches. What is its volume?

2. Another amphora you will see at *Pompeii: The Exhibition* was for garum, a sauce made from the fermented, crushed, and salted intestines of fresh fish such as tuna and moray eels. The owner of one of the largest and most beautiful villas in Pompeii, Asulus Umbricius Scaurus, amassed his great fortune from producing and selling it. Garum amphorae were smaller than those used for wine and oils. Calculate the volume of the garum amphora you see at *Pompeii: The Exhibition* which is 23.5 inches high with a diameter of 6.25 inches.

3. An unusual cylindrical object found in the kitchens of Pompeii is the glirarium. This container was used to raise edible dormice, considered to be a delicacy for wealthy Roman families. The glirarium in the Kitchen gallery of *Pompeii: The Exhibition* is 19.5 inches in diameter and 19 inches tall. What is its volume?

4. One historian estimated that a year's supply of oil for just the city of Rome would be about 20,000,000 liters, or 285,714 amphorae. For wine, 100,000,000 liters of wine would require 4,000,000 amphorae. (a.) How many liters did these oil amphorae hold? (b.) How many liters did the wine amphorae hold? (c.) Which one, oil or wine, was held in a larger amphora?

5. Look at the images of the amphorae from *Pompeii: The Exhibition*. Why does using the formula for volume of cylinder only provide an approximation for the volumes of these containers and not a precise amount?

6. The formula for the volume of a hemisphere □=23□□3 can be used to measure the cups, bowls, and glasses uncovered in Pompeii. Calculate the volume for the glass dish on display in the Triclinium gallery. It is 5.5 inches in diameter. Based on its size, for what do you think this object could have been used?

Amphorae like this one were used to transport and store wine.

POMPEII
THE EXHIBITION

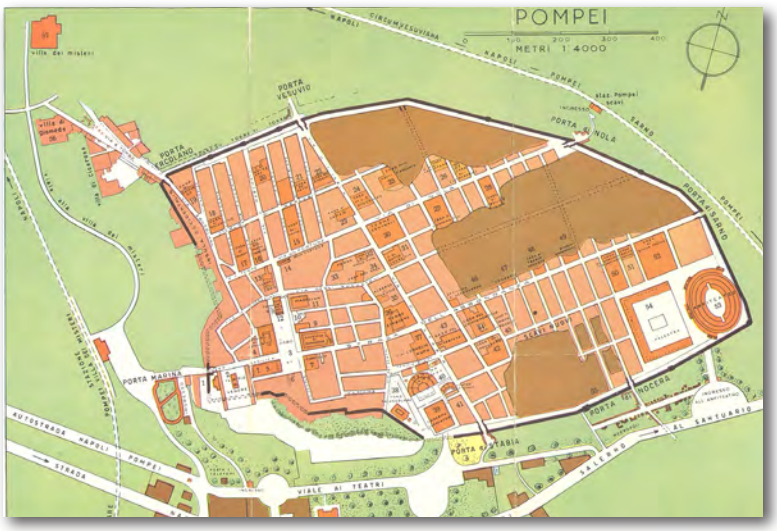
Name Class Date

Pompeii had two theaters, one larger than the other. Both were circular with banked tiers to maximize sound quality.

Part 2: Design Challenge

The Forum was the commercial and social center of all Roman cities. Administrative and religious public buildings surrounded a piazza where public events and ceremonies were held. In Pompeii, the city hall, legal courts, and offices sat on the south side of the Forum. Food markets, including the fish market and the weights and measures office, lined the west side.

Based on the public buildings and professions listed below, design the layout for your city center on separate paper. Your insula should be anchored by the Forum and include as many of the businesses and buildings on this list below. Incorporating all of them on your blueprint will earn a perfect score! Use the map of Pompeii's streets as a guideline for your design.



Map of Pompeii

This small box was used to store medicines, organized by category in different compartments. The Romans developed many medical procedures and tools, including surgical instruments, that are still used today.

Name Class Date

Part 2: Design Challenge

Temple: the Temple of Jupiter was the main temple in Pompeii, although others have been identified for Apollo, Isis, and Venus

Amphitheater: the site of gladiator battles; the amphitheater at Pompeii had a capacity of 20,000—a huge number of people in ancient times

Public baths: Pompeii had at least four throughout the city

Theatres: the Odeon was a small theatre with a roof; Pompeii also had a larger, outdoor theater next to the Odeon

Basilica: a large building for business transactions and legal matters

Gladiatorial barracks: the gladiators, Pompeii's elite athletes, were housed and trained together, where they received the best healthcare and finest foods

Macellum: an indoor marketplace; located by the Forum in Pompeii

Pistrinium: bakery

Fullonica: laundry

Officina coriariorum: tannery

Thermopolia: cafés or snack bars; Pompeii alone had almost 200 thermopolia

Caupona: small restaurants, or inns and taverns, that served hot meals

Palaestra: gymnasium; the one in Pompeii included a natatorium (swimming pool)

Mensa Ponderaria: the official office for standardizing weights and measures

Horrea: public warehouses and granaries

Negotiator aerarius: merchant dealing in metalworks, like a coppersmith or bronzesmith

Chirurgus: surgeon; the surgeon would have most likely performed his medical duties in an area of his own domus, or home

Argentarius: banker; archaeologists identified the house of one of Pompeii's bankers, Lucius Caecilius Iucundus, who also conducted business from his domus

The highest concentration of bakeries in Pompeii were east of the Forum. Archaeologists discovered carbonized bread inside the oven of one pistrinum.

The Forum was the commercial and social center of all Roman cities. Administrative and religious public buildings surrounded a piazza where public events and ceremonies were held.