

Registration form

Basic Plumbing CEU Training Course \$75.00
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You will have 90 days from this date in order to complete this course

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Your certificate will be mailed to you in about two weeks.

Please circle which certification you are applying the course CEU's.

Water Treatment Water Distribution Wastewater Collection Wastewater Treatment

Driller Pump Installer Onsite Installer Other _____

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**Plumbing Assignment
Answer Sheet**

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BASIC PLUMBING CEU COURSE CUSTOMER SERVICE RESPONSE CARD

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PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.

1. Please rate the difficulty of your course.

Very Easy 0 1 2 3 4 5 Very Difficult

2. Please rate the difficulty of the testing process.

Very Easy 0 1 2 3 4 5 Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.

Very Similar 0 1 2 3 4 5 Very Different

4. How did you hear about this Course? _____

5. What would you do to improve the Course?

Any other concerns or comments.

Basic Plumbing CEU Training Course Assignment

This assignment is available to you on TLC's Website. If you need any assistance, utilize the Search function in Adobe Acrobat. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

When you are finished, please e mail info@tlch2o.com or fax the answer sheet along with your registration to TLC Western Campus (928) 272-0747.

True or False

1. The atmosphere is the entire mass of air that surrounds the earth. While it extends upward for about 300 miles, the section of primary interest is the portion that rests on the earth's surface and extends upward for about 7 1/2 miles. This layer is called the Ozone layer.
 - A. True
 - B. False
2. If a column of air 1-inch square extending all the way to the "top" of the atmosphere could be weighed, this column of air would weigh approximately .0433 pounds at sea level. Thus, atmospheric pressure at sea level is approximately 2.31 psi.
 - A. True
 - B. False
3. As one ascends, the atmospheric pressure decreases by approximately 1.0 psi for every 2,343 feet. However, below sea level, in excavations and depressions, atmospheric pressure increases.
 - A. True
 - B. False
4. Pressures under water differ from those under air only because the weight of the water must be added to the pressure of the air.
 - A. True
 - B. False
5. Atmospheric pressure can be measured by any of several methods. The common laboratory method uses the Campos Method or DPD.
 - A. True
 - B. False
6. The height of the mercury column serves as an indicator of atmospheric pressure. At sea level and at a temperature of 0° Celsius (C), the height of the mercury column is approximately 30 inches, or 76 centimeters. This represents a pressure of approximately 14.7 psi.
 - A. True
 - B. False

7. Another device used to measure atmospheric pressure is the aneroid barometer. The aneroid barometer uses the change in shape of an evacuated metal cell to measure variations in atmospheric pressure. The thin metal of the aneroid cell moves in or out with the variation of pressure on its external surface. This movement is transmitted through a system of levers to a pointer, which indicates the pressure.
 - A. True
 - B. False
8. The atmospheric pressure does vary uniformly with altitude.
 - A. True
 - B. False
9. Pressure may be referred to using an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psig). Absolute pressure and gage pressure are related. Absolute pressure is equal to gauge pressure plus the atmospheric pressure. At sea level, the atmospheric pressure is 14.7 psia.
 - A. True
 - B. False
10. Absolute pressure is the total pressure minus the free pressure.
 - A. True
 - B. False
11. Gauge pressure is simply the pressure read on the gauge.
 - A. True
 - B. False
12. If there is no pressure on the gauge other than atmospheric, the gauge will read one. Then the absolute pressure would be equal to 14.7 psi, which is the atmospheric pressure.
 - A. True
 - B. False
13. The term vacuum indicates that the absolute pressure is less than the atmospheric pressure and that the gauge pressure is negative. A complete or total vacuum would mean a pressure of 0 psia or -14.7 psig.
 - A. True
 - B. False
14. Since it is impossible to produce a total vacuum, the term vacuum, will mean all degrees of partial vacuum.
 - A. True
 - B. False
15. In a partial vacuum, the pressure would range from slightly less than 14.7 psia (0 psig) to slightly greater than 0 psia (-14.7 psig).
 - A. True
 - B. False

16. Backpressure results from atmospheric pressure exerted on a liquid forcing it toward a supply system that is under a vacuum.
- A. True
 - B. False
17. The weight of a cubic foot of water is 8.34 pounds per square foot. The base can be subdivided into 144-square inches with each subdivision being subjected to a pressure of 2.31 psig.
- A. True
 - B. False
18. Hydraulics is a branch of engineering concerned mainly with moving liquids. The term is applied commonly to the study of the mechanical properties of water, other liquids, and even gases when the effects of compressibility are small.
- A. True
 - B. False
19. Hydraulics can be divided into two areas, hydrostatics and hydrokinetics.
- A. True
 - B. False
20. Hydrostatics, the consideration of liquids at rest, involves problems of buoyancy and flotation, pressure on dams and submerged devices, and hydraulic presses.
- A. True
 - B. False
21. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through nozzles, and the use of hydraulic pressure in machinery.
- A. True
 - B. False
22. The Egyptians and the ancient people of Persia, India, and China conveyed water along channels for irrigation and domestic purposes, using dams and sluice gates to control the flow.
- A. True
 - B. False
23. Hippocrates studied the laws of floating and submerged bodies.
- A. True
 - B. False
24. Liquids are compressible.
- A. True
 - B. False

25. Another characteristic of a liquid is the tendency to keep its free surface level. If the surface is not level, liquids will flow in the direction which will tend to make the surface level.
- A. True
 - B. False
26. In studying fluids at rest, we are concerned with the transmission of force and the factors which affect the forces in liquids. Additionally, pressure in and on liquids and factors affecting pressure are of great importance.
- A. True
 - B. False
27. C Factor is the force that pushes water through pipes.
- A. True
 - B. False
28. Water pressure determines the flow of water from the tap.
- A. True
 - B. False
29. Force means a total push or pull. It is the push or pull exerted against the total area of a particular surface and is expressed in pounds or grams.
- A. True
 - B. False
30. Pressure means the amount of push or pull (force) applied to each unit area of the surface and is expressed in pounds per square inch (lb/in^2) or grams per square centimeter (gm/cm^2).
- A. True
 - B. False
31. Pressure maybe exerted in one direction, in several directions, or in all directions.
- A. True
 - B. False
32. We can say that pressure in a liquid is totally dependent of direction.
- A. True
 - B. False
33. Pressure due to the weight of a liquid, at any level, depends on the depth of the fluid from the surface. If the exposed face of the pressure gauges are moved closer to the surface of the liquid, the indicated pressure will be less. When the depth is doubled, the indicated pressure is doubled. Thus the pressure in a liquid is directly proportional to the depth.
- A. True
 - B. False

34. Thus, the pressure at any depth in a liquid is equal to the weight of the column of liquid at that depth divided by the cross-sectional area of the column at that depth.
- A. True
 - B. False
35. The volume of a liquid that produces the pressure is referred to as the fluid head of the liquid. The pressure of a liquid due to its fluid head is also dependent on the density of the liquid.
- A. True
 - B. False
36. Gravity is not one of the ten forces of nature.
- A. True
 - B. False
37. The strength of the gravitational force between two objects depends on the elevation.
- A. True
 - B. False
38. The more massive the objects are, the stronger the gravitational attraction.
- A. True
 - B. False
39. Static pressure exists in addition to any dynamic factors that may also be present at the same time.
- A. True
 - B. False
40. Pascal's law states that a pressure set up in a fluid acts separately in all directions and at right angles to the containing surfaces.
- A. True
 - B. False
41. This covers the situation only for fluids at rest or practically at rest. It is true only for the factors making up static head. Obviously, when velocity becomes a factor it must have a direction, and as previously explained, the force related to the velocity must also have a direction, so that Pascal's law alone does not apply to the dynamic factors of fluid power.
- A. True
 - B. False
42. The dynamic factors of inertia and gravity are related to Pascal's factors.
- A. True
 - B. False
43. Velocity head and friction head are obtained at the expense of static head.
- A. True
 - B. False

44. A portion of the velocity head can always be reconverted to static head.
A. True
B. False
45. The volume of a liquid passing a point in a given time is known as its volume of flow or flow rate.
A. True
B. False
46. The volume of flow is usually expressed in gallons per minute (gpm) and is associated with relative pressures of the liquid, such as 5 gpm at 40 psi.
A. True
B. False
47. The velocity of flow or velocity of the fluid is defined as the average speed at which the fluid moves past a given point. It is usually expressed in feet per second (fps) or feet per minute (fpm).
A. True
B. False
48. Pressure of flow is an important consideration in sizing the hydraulic lines.
A. True
B. False
49. Volume and velocity of flow are often considered together.
A. True
B. False
50. Bernoulli's principle thus says that a rise (fall) in pressure in a flowing fluid must always be accompanied by a decrease (increase) in the speed, and conversely, an increase (decrease) in the speed of the fluid results in a decrease (increase) in the pressure.
A. True
B. False
51. Bacteria, viruses and protozoans that cause disease are known as Ploughes.
A. True
B. False
52. Most pathogens are generally associated with diseases that cause intestinal illness and affect people in a relatively short amount of time, generally a few days to two weeks.
A. True
B. False
53. Pathogens that may cause waterborne outbreaks through drinking water have one thing in common, they are spread by the fecal-oral, or feces-to-mouth, route.
A. True
B. False

54. Pathogens may get into water and spread when infected humans or animals pass the bacteria, viruses and protozoa in their stool.
- A. True
 - B. False
55. For another person to become infected, he or she must take that pathogen in through the mouth.
- A. True
 - B. False
56. Waterborne pathogens are different from other types of pathogens such as the viruses that cause influenza (the flu) or the bacteria that cause tuberculosis.
- A. True
 - B. False
57. Influenza virus and tuberculosis bacteria are spread by secretions that are coughed or sneezed into the air by an infected person.
- A. True
 - B. False
58. Only proper treatment will ensure eliminating the spread of disease.
- A. True
 - B. False
59. Gas Service Stations are another common source for spreading pathogens by the fecal-oral route.
- A. True
 - B. False
60. The pathogens must survive in the water. This depends on the temperature of the water and the length of time the pathogens are in the water. Some pathogens will survive for a long time in water, others, such as Giardia or Cryptosporidium, may survive for years.
- A. True
 - B. False
61. The pathogens in the water must enter the water system's intake and in numbers sufficient to infect people. The water is either not treated or inadequately treated for the pathogens present. A susceptible person must drink the water that contains the pathogen. Illness (disease) will occur.
- A. True
 - B. False
62. A chain of events must occur for the transmission of disease via drinking water. By breaking the chain at any point, the transmission of disease will be prevented.
- A. True
 - B. False

63. Cretenex is the most common diarrheal illness caused by bacteria. These organisms are also an important cause of "travelers' diarrhea."
A. True
B. False
64. Medical treatment generally is prescribed for campylobacteriosis because recovery is usually slow.
A. True
B. False
65. Cholera, Legionellosis, salmonellosis, shigellosis, and yersiniosis, are other bacterial diseases that can be transmitted through water.
A. True
B. False
66. Bacteria in water are activated with chlorine or other disinfectants.
A. True
B. False
67. Apollo, the "**Father of Medicine**" who lived around 350 B.C., recommended boiling water to filter out impurities - those particles that pollute its sweet taste, mar its clarity or poison the palate.
A. True
B. False
68. The Vikings built huge aqueducts conveying millions of gallons of water daily, magnificent public baths and remarkable sewer systems-one of which, the Cloaca Maxmia, is still in use.
A. True
B. False
69. Poland spread its plumbing technology throughout many of its far-flung territories as well.
A. True
B. False
70. Yet, while we may rightfully marvel at the Roman legacy in plumbing, it should be noted that they were motivated by concerns of esthetics, comfort and convenience.
A. True
B. False
71. They understood very well that bringing fresh water to the masses and disposing of waste made for a more pleasant way of life, but there is little evidence they understood the connection with disease control.
A. True
B. False

72. In fact, the magnificence of the great city-state diminishes quite a bit when its plumbing systems come under closer scrutiny. Rome sprang up in haphazard fashion, a town of crooked, narrow streets and squalid houses. In its heyday, Rome had a population of over one million, and waste disposal was a definite problem.
- A. True
 - B. False
73. The water supply of Rome was obtained from ground water and rain water, and in many cases these mixed together. The lowlands of the countryside were swampy marshes which developed into malarial wastelands.
- A. True
 - B. False
74. The Romans developed underground channels to fill the natural swamps and secure water for irrigation and drinking. Nonetheless, a particular region known as the Pontine Marshes were habitable during the summertime, until drained during the regime of Benito Mussolini. (Some 4,000 Italians died in a 16th century malaria epidemic.)
- A. True
 - B. False
75. A luxury toilet in the private houses of the well-to-do was a small, oblong hole in the floor, without a seat - similar to toilets that prevailed in the Far East and other sections of the world even today. A vertical drain connected the toilet to a cesspool below.
- A. True
 - B. False
76. The great Roman spas accommodated hundreds and even thousands of bathers at a time. But without filtration or circulation systems, the bathers basked in germ-ridden water and the huge pools had to be emptied and refilled daily.
- A. True
 - B. False
77. In public latrines, a communal bucket of soda ash stood close by in which rested a long stick with a sponge tied to one end. The user would cleanse his person with the spongy end and return the stick to the water for the next one to use. The stick later evolved into the shape of a hockey stick, and the source for the expression "**getting hold of the wrong end of the stick.**" It also provided an excellent medium for passing along bacteria and the assorted diseases they engendered.
- A. True
 - B. False
78. One of the characteristic Imperial Roman building types is the giant bath complex which could house not only bathing facilities but lecture halls, gymnasia, libraries and gardens. Roman bathing establishments usually provided three kinds of baths, i.e., hot, tepid and cold.
- A. True
 - B. False

79. Running water for the latrine either was supplied by stone water tanks or else by an aqueduct patterned after the graceful, curved arches made famous by the Roman engineers. Those water experts knew that covering water keeps it warm and helps the spread of algae.
- A. True
 - B. False
80. Imperfect though their plumbing knowledge may have been, the Roman Empire still did an admirable job assuring public cleanliness and, inadvertently, health.
- A. True
 - B. False
81. Rome employed administrators known as aediles to oversee various public works, including coliseum games and the police. They also were in charge of seeing that streets were swept of garbage and streams cleared of visible pollution and debris.
- A. True
 - B. False
82. Though the Roman Empire would last until the 6th century A.D., its fall was preceded by centuries of gradual decay, conflict and unrest. Ironically, some historians suggest that the Roman plumberi (plumbers) may have played a significant role in the downfall due to their extensive use of copper.
- A. True
 - B. False
83. So prized was the craftsmanship of these plumberi that in lieu of present - day status symbols like a Rolls Royce or Porsche, our Roman ancestors boasted of copper pipes in their houses, especially those imprinted with the plumber's name (usually female, by the way), and that of the building owner.
- A. True
 - B. False
84. Lead poisoning is at least a plausible explanation for the dementia of Roman emperors such as Caligula and Nero, and for a general weakening and demoralization of the populace at large. However, the case for massive lead poisoning is far from proven, and water piping was hardly the only source of lead contamination. The widespread use of lead cooking utensils and goblets probably was more harmful than its use in plumbing.
- A. True
 - B. False
85. Whatever the causes, over time there was a noticeable deterioration in the moral values, dignity and physical character of Roman society. Symbolic of this general decline, by the time of Augustus Caesar in 14 A.D., the once authoritative aediles collected the waste only at state-sponsored events.
- A. True
 - B. False

86. During the final century of Roman domination, there was a succession of earthquakes, volcanic eruptions and disease epidemics. Soon afterwards, rampaging Vandals and other barbaric tribes completed the breakdown of Western civilization, as they systematically leveled and defiled the great Roman cities and their water systems.
- A. True
 - B. False
87. Then came a thousand years of medieval squalor. A thousand years of sicknesses and plague of unbridled virulence, fanned by fleas and mosquitoes, excrement and filth, stagnant and contaminated water of every description.
- A. True
 - B. False
88. The typical peasant family of the aptly-named 20th century lived in a one-room, dirt-floor hovel, with a hole in the thatched roof to let out the smoke of the central fire. The floor was strewn with hay or rushes, easy havens for lice and vermin. Garbage accumulated within. If they were lucky, the family had a chamber pot, though more likely they relieved themselves in the corner of the hovel or in the mire and muck outside.
- A. True
 - B. False
89. Water was too precious to use for anything except drinking and cooking, so people rarely bathed. Heck, they barely changed clothes from one season to another, wearing the same set every day, perhaps piling on more rags for warmth.
- A. True
 - B. False
90. These are the conditions which spawned the infamous Hepatitis A , killing an estimated one third of the European population. Although not directly related to bad plumbing, Hepatitis A serves as the most striking example of misery caused by poor sanitation in general, and the ignorance of people in controlling the outbreak.
- A. True
 - B. False
91. The first of several waves hit England in 1348, caused by flea bites spread by lice that dwelled on host black rats. They, in turn, fed on the garbage and excrement of the masses. London became largely deserted. The King and Queen and other rich people fled to the countryside. The poor were the greatest sufferers.
- A. True
 - B. False

92. Panic, death and despair followed the abandonment of farms and towns. Wrote William of Dene, a monk of Rochester in Kent, England, Men and women carried their own children on their shoulders to the church and threw them into a common pit. From these pits such an appalling stench was given off that scarcely anyone dared to walk beside the cemeteries, so marked a deficiency of labors and workmen that more than a third of the land in the whole realm was left to."
- A. True
 - B. False
93. So bad was the "**Black Death**," the Great Fire of London in 1666 can be viewed as a blessing in disguise. Though it killed thousands of people, the holocaust also consumed garbage, muck and black rats, effectively ending the plague.
- A. True
 - B. False
94. Bad plumbing was merely one of many sanitation factors that gave rise to the Black Death. Other scourges are more directly related to human waste. Dysentery is one that has left an indelible mark on history.
- A. True
 - B. False
95. Characterized by painful diarrhea, dysentery is often called an army's "fifth column." Identified as far back as the time of Hippocrates and before, it comes in various forms of infectious disorders and is said to have contributed to the defeat of the Crusaders. Wrote the eminent English historian, Charles Creighton: "*The Crusaders of the 11th - 13th centuries were not defeated so much by the scimitars of the Saracens as by the hostile bacteria of dysentery and other epidemics.*"
- A. True
 - B. False
96. Hepatitis A hit the women and children first, and then the troops. More than 100,000 died plus almost 2,500 German reinforcements whose bodies remained unburied.
- A. True
 - B. False
97. Typhus fever is another disease born of bad sanitation. It has come under many headings, including "**jail fever**" or "**ship fever**," because it is so common among men in pent-up, putrid surroundings. Transmitted by lice that dwell in human feces, the disease is highly contagious.
- A. True
 - B. False
98. Hitler lost thousands of his men to typhus in Russia - as did the Russians who caught it from the enemy. Many historians believe that Hitler would have won were it not for the might of his opponents "**General Winter, General Famine and General Typhus.**"
- A. True
 - B. False

99. French ships were notorious for their filthy and fever-ridden sailors. One such French squadron left its soiled clothing and blankets behind near Halifax, Nova Scotia, when they returned to Europe in 1746, thinking they could dispel their own plague. Their infected blankets wiped out a nation of Indians.
- A. True
 - B. False
100. Black Plague is an example of a common viral disease that may be transmitted through water.
- A. True
 - B. False
101. Aseptic meningitis outbreaks are usually abrupt with fever, malaise, loss of appetite, nausea and abdominal discomfort, followed within a few days by jaundice. The disease varies in severity from a mild illness lasting one to two weeks, to a severely disabling disease lasting several months (rare).
- A. True
 - B. False
102. Hepatitis A outbreaks have been related to fecally contaminated water; food contaminated by infected food handlers, including sandwiches and salads that are not cooked or are handled after cooking; and raw or undercooked mollusks harvested from contaminated waters.
- A. True
 - B. False
103. Aseptic meningitis, polio and viral gastroenteritis (Norwalk agent) are other viral diseases that can be transmitted through water.
- A. True
 - B. False
104. Most viruses in drinking water can be inactivated by chlorine or other disinfectants.
- A. True
 - B. False
105. Some parasites enter the environment in a dormant form, with a protective cell wall, called a "cyst." The cyst can survive in the environment for long periods of time and be extremely resistant to conventional disinfectants such as chlorine. Effective filtration treatment is therefore critical to removing these organisms from water sources.
- A. True
 - B. False
106. Aseptic meningitis is a commonly reported protozoan-caused disease.
- A. True
 - B. False

107. Giardiasis occurs worldwide. Waterborne outbreaks in the United States occur most often in communities receiving their drinking water from streams or rivers without adequate disinfection or a filtration system.
- A. True
 - B. False
108. The organism, Giardiasis, has been responsible for more community-wide outbreaks of disease in the U.S. than any other pathogen. Drugs are available for treatment but these are not 100% effective.
- A. True
 - B. False
109. Giardiasis is an example of a protozoan disease that is common worldwide but was only recently recognized as causing human disease.
- A. True
 - B. False
110. Giardiasis organisms have been identified in human fecal specimens from more than 50 countries on six continents. The mode of transmission is fecal-oral, either by person-to-person or animal-to-person. There is no specific treatment for Giardiasis infections.
- A. True
 - B. False
111. By understanding the nature of waterborne diseases, the importance of properly constructed, operated and maintained public water systems becomes obvious. While water treatment cannot achieve sterile water (no microorganisms), the goal of treatment must clearly be to produce drinking water that is as pathogen-free as possible at all times.
- A. True
 - B. False
112. "Sweating" pipes and plumbing fixtures in summer-time or during seasonal changes are not a sign of faulty plumbing. Due to condensation of water vapor in the air, beads of moisture will form in warm weather on any pipes and fixtures containing cold water.
- A. True
 - B. False
113. Normally, when not in use, the water and fixtures will warm rapidly to room temperature and the condensation will stop. When a closet tank or other fixture continues to sweat for hours after it has been used, it is a sign that cold water is continuing to flow through it, possibly due to an improper adjustment of the tank valve or a leak.
- A. True
 - B. False

114. Sweating pipes can be wrapped with an insulation material which prevents the condensation and formation of moisture.
- A. True
 - B. False
115. There are several types of copper pipe. Soft and rigid, A-Green, B-Blue, C-Red, and DWV-yellow.
- A. True
 - B. False
116. You can use lead solder for potable water.
- A. True
 - B. False
117. Cut plastic pipe to length with a hacksaw, or abrasive disk of a miter saw/chop saw. After each cut, clean out the small burrs/shavings that remain inside the pipe with a knife, rag or emery cloth.
- A. True
 - B. False
118. Heat the entire run of pipe you're installing before gluing pipe and fittings together.
- A. True
 - B. False
119. Check small pipes and fittings for plumb/level with a torpedo level. Also, double check the drain flow; about 1/4" per 1' as a general guide.
- A. True
 - B. False
120. A fitting that's glued crooked can sometimes throw off the whole run and/or won't fit properly with the next piece. Discover these problems during the dry fit rather than after the pipe is glued.
- A. True
 - B. False
121. Plastic pipe joints are connected with glue that actually melts the pieces together. The joints for both PVC and ABS are glued the same way, but the types are changeable and only a special fitting can connect them together.
- A. True
 - B. False
122. To glue ABS pipe, check that any cut ends are fairly straight. Remove any burrs with a knife or emery cloth and clean both pieces with a rag. Apply ABS glue to both the pipe and fitting.
- A. True
 - B. False

123. Push the joints together with a twisting motion to spread the glue. Hold the joints together for a few seconds so they won't push apart while the fast-drying glue sets.
- A. True
 - B. False
124. Gluing PVC pipe is a similar process, but a cleaning chemical (primer) that prepares the plastic goes on before the glue. CPVC pipe also has its own type of glue so be sure to purchase the glue that matches the plastic you're working with.
- A. True
 - B. False
125. Once the joint is primed, apply the glue to your hands, push and twist the pipe or fitting and hold them in place for a few hours.
- A. True
 - B. False

You are finished with your assignment; please complete the Registration page and the Customer Survey sheet on the rear page. You can fax this information to us.

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Always call an hour later to make sure we've received it.

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If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of \$40.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line.

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