

Registration form

**Pump Primer 1 CEU Training Course \$100.00 Plus Tax
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

Start and Finish Dates: _____
You will have 90 days from this date in order to complete this course

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List hours worked on assignment must match State Requirement. _____

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

Water Treatment _____ Distribution _____ Collection _____

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AFFIDAVIT OF EXAM COMPLETION

I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Thank you...

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Pump Primer 1 Answer Key

Name _____

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You are solely responsible in ensuring that this course is accepted for credit by your State. Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

Website ___ Telephone Call ___ Email ___ Spoke to _____

Did you receive the approval number if Applicable? _____

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You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it.

You can use Adobe Acrobat DC Program to complete the assignment.

Please circle, underline, bold or X only one correct answer

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47. A B C D E F 69. A B C D E F 91. A B C D E F
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188. A B C D E F

**Please fax the answer key to TLC Western Campus
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Always call us after faxing the paperwork to ensure that we've received it.

Rush Grading Service

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 \$50.00. 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.

Grading Information

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Please e-mail or fax this survey along with your final exam

PUMP PRIMER 1 CEU TRAINING 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

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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.
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4. How did you hear about this Course? _____

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Any other concerns or comments.

Pump Primer 1 CEU Training Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e- mail it back to TLC.

You'll have 90 days from the start of this course to complete in order to receive your Professional Development Hours (**PDHs**) or Continuing Education Unit (**CEU**). A score of 70 % is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your manual and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.**

Common Hydraulic Terms, Identify the term for each statement.

- A pressure applied to a confined fluid at rest is transmitted with equal intensity throughout the fluid.
A. Hydraulics
B. Pressure, Absolute
C. Pascal's Law
D. Pressure, Gauge
E. Head, Friction
F. None of the Above
- The application of continuous force by one body upon another that it is touching; compression. Force per unit area, usually expressed in pounds per square inch (Pascal or bar).
A. Pressure
B. Head, static
C. Hydrokinetics
D. Pressure, Atmospheric
E. Pressure, Static
F. None of the Above
- The pressure above zone absolute, i.e. the sum of atmospheric and gauge pressure. In vacuum related work it is usually expressed in millimeters of mercury. (mmHg).
A. Hydraulics
B. Pressure, Absolute
C. Pascal's Law
D. Pressure, Gauge
E. Head, Friction
F. None of the Above
- Engineering science pertaining to liquid pressure and flow.
A. Hydraulics
B. Pressure, Absolute
C. Pascal's Law
D. Pressure, Gauge
E. Head, Friction
F. None of the Above
- Pressure differential above or below ambient atmospheric pressure.
A. Hydraulics
B. Pressure, Absolute
C. Pascal's Law
D. Pressure, Gauge
E. Head, Friction
F. None of the Above
- The pressure in a fluid at rest.
A. Pressure
B. Head, static
C. Hydrokinetics
D. Pressure, Atmospheric
E. Pressure, Static
F. None of the Above

7. The height of a column or body of fluid above a given point expressed in linear units.
 A. Head D. Pressure, Atmospheric
 B. Head, static E. Pressure, Static
 C. Hydrokinetics F. None of the Above
8. Head is often used to indicate gauge pressure. Pressure is equal to the height times the density of the liquid.
 A. Head D. Pressure, Atmospheric
 B. Head, static E. Pressure, Static
 C. Hydrokinetics F. None of the Above
9. The head required to overcome the friction at the interior surface of a conductor and between fluid particles in motion. It varies with flow, size, type, and conditions of conductors and fittings, and the fluid characteristics.
 A. Head D. Pressure, Atmospheric
 B. Head, static E. Pressure, Static
 C. Head, Friction F. None of the Above
10. The height of a column or body of fluid above a given point.
 A. Pressure D. Pressure, Atmospheric
 B. Head, static E. Pressure, Static
 C. Hydrokinetics F. None of the Above
11. Engineering science pertaining to the energy of liquid flow and pressure.
 A. Pressure D. Pressure, Atmospheric
 B. Head, static E. Hydraulics
 C. Hydrokinetics F. None of the Above
12. Pressure exerted by the atmosphere at any specific location. (Sea level pressure is approximately 14.7 pounds per square inch absolute, 1 bar = 14.5psi.)
 A. Pressure D. Pressure, Atmospheric
 B. Head, static E. Pressure, Static
 C. Hydrokinetics F. None of the Above

Hydraulic Principles Section

13. Definition: **Hydraulics** is a branch of engineering concerned mainly with?
 A. Pressure D. Hydrostatics
 B. Head, static E. Hydraulics
 C. Hydrokinetics F. None of the Above
14. Hydraulics can be divided into two areas, _____ and hydrokinetics.
 A. Pressure D. Hydrostatics
 B. Head, static E. Hydraulics
 C. Hydrokinetics F. None of the Above

Hydraulics: The Engineering science pertaining to liquid pressure and flow.

15. Which of the following terms - is based on the Greek word for water, and originally covered the study of the physical behavior of water at rest and in motion?
 A. Pressure D. Hydrostatics
 B. Hydrodynamics E. Hydraulics
 C. Hydrokinetics F. None of the Above

16. Which of the following terms - includes the manner in which liquids act in tanks and pipes, deals with their properties, and explores ways to take advantage of these properties.

- A. Pressure
- B. Hydrodynamics
- C. Hydrokinetics
- D. Hydrostatics
- E. Hydraulics
- F. None of the Above

17. Which of the following terms - the consideration of liquids at rest, involves problems of buoyancy and flotation, pressure on dams and submerged devices, and hydraulic presses?

- A. Pressure
- B. Hydrodynamics
- C. Hydrokinetics
- D. Hydrostatics
- E. Hydraulics
- F. None of the Above

18. Which of the following terms – is 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. Pressure
- B. Hydrodynamics
- C. Hydrokinetics
- D. Hydrostatics
- E. Hydraulics
- F. None of the Above

Hydrostatics

19. Hydrostatics is about the _____ exerted by a fluid at rest.

- A. Pressures
- B. Hydrodynamics
- C. Hydrokinetics
- D. Hydrostatics
- E. Hydraulics
- F. None of the Above

20. Which of the following terms - is an excellent example of deductive mathematical physics, one that can be understood easily and completely from a very few fundamentals, and in which the predictions agree closely with experiment.

- A. Pressure
- B. Hydrodynamics
- C. Hydrokinetics
- D. Hydrostatics
- E. Hydraulics
- F. None of the Above

Atmospheric Pressure... Now we will step it up with harder questions.

21. The atmosphere is the entire mass of air that surrounds the earth. While it extends upward for about 500 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?

- A. The atmosphere
- B. The mercury column
- C. The troposphere
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

22. Which of the following terms - serves as an indicator of atmospheric pressure?

- A. The originating level
- B. Back pressure
- C. Absolute pressure
- D. The total pressure
- E. The height of the mercury column
- F. None of the Above

23. Which of the following terms - and at a temperature of 0° Celsius (C), the height of the mercury column is approximately 30 inches, or 76 centimeters?

- A. The atmosphere
- B. The mercury column
- C. At sea level
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

Barometric Loop

24. The barometric loop consists of a continuous section of supply piping that abruptly rises to _____ and then returns back down to the originating level.

- A. The originating level
- B. Backsiphonage
- C. Absolute pressure
- D. A height of approximately 35 feet
- E. A rotating fluid
- F. None of the Above

25. It is a loop in the piping system that effectively protects _____. It may not be used to protect against back-pressure.

- A. The atmosphere
- B. The mercury column
- C. Back-pressure
- D. Against backsiphonage
- E. Absolute backsiphonage
- F. None of the Above

26. Which of the following terms - is based upon the principle that a water column, at sea level pressure, will not rise above 33.9 feet. In general, barometric loops are locally fabricated, and are 35 feet high.

- A. The originating level
- B. Backsiphonage
- C. Absolute pressure
- D. The total acceleration
- E. The protection against backsiphonage
- F. None of the Above

27. Which of the following terms - may be referred to using an absolute scale, pounds per square inch absolute (psia), or gauge scale, (psiag)?

- A. The atmosphere
- B. The mercury column
- C. Pressure
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

28. Absolute pressure and gauge pressure are related. Absolute pressure is equal to gauge pressure plus the _____. At sea level, the atmospheric pressure is 14.7 psai.

- A. The originating level
- B. Backsiphonage
- C. Absolute pressure
- D. The total acceleration
- E. Atmospheric pressure
- F. None of the Above

29. Absolute pressure is?

- A. The atmosphere
- B. The mercury column
- C. The total pressure
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

30. Which of the following terms - is simply the pressure read on the gauge.

- A. The atmosphere
- B. The mercury column
- C. The total pressure
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

31. If there is no pressure on the gauge other than atmospheric, the gauge will read zero. Then the absolute pressure would be equal to 14.7 psi, which is?

- A. The atmosphere
- B. The mercury column
- C. The atmospheric pressure
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

Hydrostatic Paradox

32. If a volume of fluid is _____, the acceleration can be added to the acceleration of gravity. A free surface now becomes perpendicular to the total acceleration, and the pressure is proportional to the distance from this surface.

- A. The originating level
- B. Accelerated uniformly
- C. Absolute pressure
- D. The total acceleration
- E. A rotating fluid
- F. None of the Above

33. The same can be done for a rotating fluid, where the _____ is the important quantity. The earth's atmosphere is an example.

- A. The atmosphere
- B. The mercury column
- C. Centrifugal acceleration
- D. Gauge pressure
- E. Absolute pressure
- F. None of the Above

34. When air moves relative to the rotating system, _____ must also be taken into account. However, these are dynamic effects and are not strictly a part of hydrostatics.

- A. The originating level
- B. Backsiphonage
- C. Absolute pressure
- D. The total acceleration
- E. The Coriolis force
- F. None of the Above

Pascal's Law

35. The foundation of _____ was established when Pascal discovered that pressure in a fluid acts equally in all directions.

- A. $P = F/A$
- B. Fluids at rest
- C. Inertia and friction
- D. Two different heights
- E. Modern hydraulics
- F. None of the Above

36. This pressure acts at right angles to the containing surfaces. If some type of pressure gauge, with an exposed face, is placed beneath the surface of _____ and pointed in different directions, the pressure will read the same. Thus, we can say that pressure in a liquid is independent of direction.

- A. Velocity head
- B. A liquid at a specific depth
- C. A liquid
- D. Dynamic factors of fluid power
- E. Is directly proportional to the depth
- F. None of the Above

37. Which of the following terms -, at any level, depends on the depth of the fluid from the surface?

- A. $P = F/A$
- B. Fluids at rest
- C. Inertia and friction
- D. Two different heights
- E. Pressure due to the weight of a liquid
- F. None of the Above

38. Which of the following terms - is directly proportional to the depth?

- A. Velocity head
- B. Gravity
- C. A liquid
- D. Dynamic factors of fluid power
- E. The pressure in a liquid
- F. None of the Above

39. Using this information and equation, _____, we can calculate the pressure on the bottom of the container.

- A. $P = F/A$
- B. Fluids at rest
- C. Inertia and friction
- D. Two different heights
- E. The indicated pressure is doubled
- F. None of the Above

Gravity

40. Gravity is one of the four forces of nature. The strength of the _____ between two objects depends on their masses. The more massive the objects are, the stronger the gravitational attraction.

- A. Velocity head
- B. Gravity
- C. Gravitational force
- D. Dynamic factors of fluid power
- E. Odor
- F. None of the Above

41. When you pour water out of a container, the earth's gravity pulls the water towards the ground. The same thing happens when you put two buckets of water, with a tube between them, at two different heights. You must work to start the flow of water from one bucket to the other, but then _____ takes over and the process will continue on its own.

- A. Gravity
- B. Fluids at rest
- C. Inertia and friction
- D. Two different heights
- E. The indicated pressure is doubled
- F. None of the Above

42. Gravity, applied forces, and atmospheric pressure are _____ that apply equally to fluids at rest or in motion, while inertia and friction are dynamic factors.

- A. Velocity head
- B. Gravity
- C. Static factors
- D. Dynamic factors
- E. Are directly proportional
- F. None of the Above

Static Pressure

43. Static pressure exists in addition to _____ that may also be present at the same time. Pascal's law states that a pressure set up in a fluid acts equally in all directions and at right angles to the containing surfaces.

- A. $P = F/A$
- B. Any dynamic factors
- C. Inertia and friction
- D. Two different heights
- E. The indicated pressure is doubled
- F. None of the Above

44. Obviously, when velocity becomes a factor it must have _____, 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. Velocity head
- B. Gravity
- C. A liquid
- D. Dynamic factors of fluid power
- E. A direction
- F. None of the Above

45. The dynamic factors of inertia and friction are related to?

- A. Velocity head
- B. Gravity
- C. A liquid
- D. Dynamic factors of fluid power
- E. The static factors
- F. None of the Above

46. Velocity head and _____ are obtained at the expense of static head. However, a portion of the velocity head can always be reconverted to static head.

- A. Friction head
- B. Fluids at rest
- C. Inertia
- D. Two different heights
- E. The indicated pressure
- F. None of the Above

47. Force, which can be produced by pressure or head when dealing with fluids, is necessary to start a body moving if it is at rest, and is present in some form when the motion of the body is arrested; therefore, whenever a fluid is given velocity, some part of its _____ is used to impart this velocity, which then exists as velocity head.

- A. Velocity head
- B. Gravity
- C. Original static head
- D. Dynamic factor
- E. Direction
- F. None of the Above

Pump Introduction

48. Which of the following terms - are used to move or raise fluids. They are not only very useful, but are excellent examples of hydrostatics?

- A. The lift pumps
- B. The force pumps
- C. The Bellows
- D. The force and lift pumps
- E. Pumps
- F. None of the Above

49. Pumps are of two general types, hydrostatic or positive displacement pumps, and pumps depending on dynamic forces, such as?

- A. Centrifugal pumps
- B. The force pumps
- C. The Bellows
- D. The force and lift pumps
- E. The Roots blowers
- F. None of the Above

Pump Safety Regulations

50. Before installing and operating or performing maintenance on the pump and associated components described in this manual, it is important to ensure that it covers _____ from high speed rotating machinery.

- A. The minor and major hazards
- B. The severe dangers
- C. The hazards arising
- D. Interest of personal safety
- E. Due consideration
- F. None of the Above

51. It is also important that _____ consideration be given to those hazards which arise from the presence of electrical power, hot oil, high pressure and temperature liquids, toxic liquids and gases, and flammable liquids and gases.

- A. Minor
- B. Severe
- C. Due
- D. Interest of personal safety and
- E. Little
- F. None of the Above

52. Proper installation and care of protective guards, shut-down devices and over pressure protection equipment must also be considered.

- A. Minor
- B. Severe
- C. The hazards arising
- D. Interest of personal safety
- E. An essential part of any safety program
- F. None of the Above

53. In the following safety procedures you will encounter the words DANGER, WARNING, CAUTION, and NOTICE. These are intended to _____ in the interest of personal safety and satisfactory pump operation and maintenance.

- A. Scare
- B. Create fear
- C. Inform of the hazards arising
- D. Emphasize certain areas
- E. Warn
- F. None of the Above

The definitions of these words are as follows:

54. "DANGER" Danger is used to indicate the presence of a hazard which will cause _____, death, or substantial property damage if the warning is ignored.

- A. Severe personal injury
- B. Create fear
- C. Inform of the hazards arising
- D. Emphasize certain areas
- E. Minor personal injury
- F. None of the Above

55. "WARNING" Warning is used to indicate the presence of a hazard which can cause _____, death, or substantial property damage if the warning is ignored.

- A. Severe personal injury
- B. Create fear
- C. Inform of the hazards arising
- D. Emphasize certain areas
- E. Minor personal injury
- F. None of the Above

56. "CAUTION" Caution is used to indicate the presence of a hazard which will or can cause _____, death, or substantial property damage if the warning is ignored.

- A. Severe personal injury
- B. Create fear
- C. Inform of the hazards arising
- D. Emphasize certain areas
- E. Minor personal injury
- F. None of the Above

Complicated Pumps

57. Which of the following terms - have valves allowing them to work repetitively. These are usually check valves that open to allow passage in one direction?

- A. On the discharge side of pumps
- B. Suction side of the pumps
- C. The discharge valve on pumps
- D. Vanes of the impeller on the liquid
- E. Positive displacement pumps
- F. None of the Above

58. Which of the following terms - has two check valves in the cylinder, one for supply and the other for delivery?

- A. Diaphragm pumps
- B. The Roots blower
- C. The Bicycle pump
- D. The force pump
- E. Fire fighting force pumps
- F. None of the Above

59. Which of the following terms - has a supply valve and a valve in the piston that allows the liquid to pass around it when the volume of the cylinder is reduced?

- A. The lift pump
- B. The force pump
- C. The Bellows
- D. The force and lift pumps
- E. The Roots blower
- F. None of the Above

60. Which of the following terms - are force pumps in which the oscillating diaphragm takes the place of the piston?

- A. Diaphragm pumps
- B. The Roots blower
- C. The Bicycle pumps
- D. The free pumps
- E. Fire fighting force pumps
- F. None of the Above

61. Which of the following terms - has two valves in the cylinder, while the lift pump has one valve in the cylinder and one in the piston.

- A. The lift pump
- B. The force pump
- C. The Bellows
- D. The force and lift pump
- E. The Roots blower
- F. None of the Above

62. The maximum lift, or "suction," is determined by the atmospheric pressure, _____ must be within this height of the free surface.
- A. On the discharge side D. Vanes of the impeller on the liquid
 B. Suction side of the pump E. And either cylinder
 C. The discharge valve F. None of the Above
63. Which of the following terms - can give an arbitrarily large pressure to the discharged fluid, as in the case of a diesel engine injector?
- A. The lift pump D. The force and lift pump
 B. The force pump E. The Roots blower
 C. The Bellows F. None of the Above
64. Which of the following terms - usually have two cylinders feeding one receiver alternately?
- A. Diaphragm pumps D. Diaphragm pumps
 B. The Roots blower E. Fire fighting force pumps
 C. The Bicycle pump F. None of the Above
65. Which of the following terms - has no valves, their place taken by the sliding contact between the rotors and the housing?
- A. The lift pump D. The force and lift pumps
 B. The force pump E. The Roots blower
 C. The Bellows F. None of the Above
66. Which of the following terms - can either exhaust a receiver or provide air under moderate pressure, in large volumes?
- A. Diaphragm pumps D. Diaphragm pumps
 B. The Roots blower E. Fire fighting force pumps
 C. The Bicycle pump F. None of the Above
67. Which of the following terms - is a very old device, requiring no accurate machining. The single valve is in one or both sides of the expandable chamber?
- A. The lift pump D. The force and lift pumps
 B. The force pump E. The Roots blower
 C. The Bellows F. None of the Above
68. Which of the following terms - uses the valve on the valve stem of the tire or inner tube to hold pressure in the tire?
- A. Diaphragm pumps D. The free surface
 B. The Roots blower E. Fire fighting force pumps
 C. The Bicycle pump F. None of the Above
69. Which of the following terms - and vane pumps are not shown, but they act the same way by varying the volume of a chamber, and directing the flow with check valves?
- A. The lift pump D. The force and lift pumps
 B. The force pump E. Diaphragm
 C. The Bellows F. None of the Above

Fluid Properties

The properties of the fluids being pumped can significantly affect the choice of pump. Key considerations include:

70. Acidity/alkalinity (pH) and chemical composition. _____ can degrade pumps, and should be considered when selecting pump materials.

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Corrosive and basic fluids
- E. Corrosive and acidic fluids
- F. None of the Above

71. Operating temperature. Pump materials and expansion, mechanical seal components, and packing materials need to be considered with?

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Pumped fluids that are hotter than 200°F
- E. Corrosive and acidic fluids
- F. None of the Above

72. Solids concentrations/particle sizes. When pumping abrasive liquids such as industrial slurries, selecting a pump that will not clog or fail prematurely depends on particle size, hardness, and the?

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Pump materials
- E. Volumetric percentage of solids
- F. None of the Above

73. Specific gravity. The fluid specific gravity is the ratio of the _____ to that of water under specified conditions.

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Pump materials
- E. Corrosive and acidic fluids
- F. None of the Above

74. Which of the following terms - affects the energy required to lift and move the fluid, and must be considered when determining pump power requirements?

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Pump materials
- E. Specific gravity
- F. None of the Above

75. Proper consideration of the fluid's vapor pressure will help to minimize the?

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Material size
- E. Risk of cavitation
- F. None of the Above

76. Since kinematic viscosity normally varies directly with temperature, the pumping system designer must know the _____ at the lowest anticipated pumping temperature.

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. Pump materials
- E. Viscosity of the fluid
- F. None of the Above

77. Which of the following terms - result in reduced centrifugal pump performance and increased power requirements?

- A. Fluid's vapor pressure
- B. Fluid density
- C. Kinematic viscosity
- D. High viscosity fluids
- E. Corrosive and acidic fluids
- F. None of the Above

Types of Pumps

78. The family of pumps comprises a large number of types based on application and capabilities. The two major groups of pumps are _____ and positive displacement.

- A. Kinetic Energy
- B. Centrifugal
- C. Dynamic
- D. Vanes of the impeller
- E. Positive displacement
- F. None of the Above

Dynamic Pumps (Centrifugal Pump)

Centrifugal pumps are classified into three general categories:

79. Radial flow—a centrifugal pump in which the pressure is developed wholly by?

- A. Kinetic Energy
- B. Centrifugal force
- C. Dynamic
- D. Vanes of the impeller
- E. Positive displacement
- F. None of the Above

80. Mixed flow—a centrifugal pump in which the pressure is developed partly by centrifugal force and partly by the lift of the?

- A. On the discharge side
- B. Suction side of the pump
- C. The discharge valve
- D. Vanes of the impeller on the liquid
- E. Positive displacement
- F. None of the Above

81. Axial flow—a centrifugal pump in which the pressure is developed by the propelling or lifting action of the _____ on the liquid.

- A. Kinetic Energy
- B. Centrifugal force
- C. Dynamic
- D. Vanes of the impeller
- E. Positive displacement
- F. None of the Above

A centrifugal pump has two main components:

82. I. A rotating component comprised of _____. II. A stationary component comprised of a casing, casing cover, and bearings.

- A. An impeller and a shaft
- B. Suction side of the pump
- C. The discharge valve
- D. Vanes of the impeller on the liquid
- E. Positive displacement
- F. None of the Above

Pump Types come in Two Main Categories

83. Centrifugal Pumps and Positive Displacement Pumps as classified according to the method of how the energy is imparted to the fluid – _____ and again each of these categories having many pump types.

- A. Reciprocating and rotary
- B. Increases and decreases
- C. Increase the pressure
- D. Kinetic Energy or Positive Displacement
- E. Unlike a Centrifugal Pump
- F. None of the Above

Centrifugal Pump

84. Types the _____ type which imparts velocity energy to the pumped medium which is converted to pressure energy when discharging the pump casing and can be grouped according to several criteria, further to that a specific pump can belong to different groups.

- A. Kinetic Energy
- B. Centrifugal
- C. Dynamic
- D. Vanes of the impeller
- E. Positive displacement
- F. None of the Above

Positive Displacement Pump

85. Types impart energy by mechanical displacement, these are of a lower flow range and are pulsating. PD pumps divided into two classes – _____.
- A. Reciprocating and rotary
 - B. Increases and decreases
 - C. Increase the pressure
 - D. Kinetic Energy or Positive Displacement
 - E. Unlike a Centrifugal Pump
 - F. None of the Above

Plunger Pumps

86. The discharge stroke pushes the plunger forward closing _____ and pushing fluid out of the discharge valve.
- A. On the discharge side
 - B. Suction side of the pump
 - C. The discharge valve
 - D. Suction valve
 - E. Positive displacement suction valve
 - F. None of the Above

Diaphragm Pumps

87. Diaphragm pump types simply put use the plunger to pressurize either air or hydraulic fluid on one side which flexes the diaphragm which _____ the volumetric area in the pumping chamber; non-return check valves ensure no back flow of the fluid.
- A. Increases
 - B. Increases and decreases
 - C. Increases the pressure
 - D. Decreases the kinetic Energy
 - E. Unlike a Centrifugal pump and increases
 - F. None of the Above

Positive Displacement Pumps

88. A Positive Displacement Pump has an expanding cavity on the suction side of the pump and?
- A. Increases the pressure
 - B. Suction side of the pump
 - C. The discharge valve
 - D. A decreasing cavity on the discharge side
 - E. Positive displacement
 - F. None of the Above
89. Liquid is allowed to flow into the pump as the cavity on the suction side expands and the liquid is forced out of the discharge as?
- A. On the discharge side
 - B. Suction side of the pump
 - C. The discharge valve
 - D. Vanes of the impeller on the liquid
 - E. The cavity collapses
 - F. None of the Above
90. A Positive Displacement Pump, unlike a Centrifugal Pump, will produce the same flow at a given RPM no matter what?
- A. The discharge pressure is
 - B. Atmospheric pressure
 - C. The vertical distance
 - D. Gas volumetrically displacing a disportion of liquid
 - E. Build-up of pressure
 - F. None of the Above
91. A Positive Displacement Pump cannot be operated against a closed valve on the discharge side of the pump, i.e. it does not have a shut-off head like?
- A. A Centrifugal Pump does
 - B. Suction side of the pump
 - C. The discharge valve
 - D. Vanes of the impeller on the liquid
 - E. Positive displacement
 - F. None of the Above
92. If a Positive Displacement Pump is allowed to operate against a closed discharge valve it will continue to produce flow which will _____ until either the line bursts or the pump is severely damaged or both.
- A. Discharge
 - B. Increase the water level
 - C. Increase the boiling point
 - D. Increase the suction feet (or meters) of head
 - E. Increase the pressure in the discharge line
 - F. None of the Above

Plunger Pump

93. The plunger pump is a positive displacement pump that uses a plunger or piston to force _____ to the discharge side of the pump. It is used for heavy sludge.

- A. Liquid from the suction side
- B. Atmospheric pressure
- C. The vertical distance
- D. Gas volumetrically displacing a disproportion of liquid
- E. Build-up of pressure
- F. None of the Above

94. The movement of the plunger or piston inside the pump creates pressure inside the pump, so you have to be careful that this kind of pump is never operated?

- A. Discharge side of the pump
- B. Against any water level
- C. Against any boiling point
- D. Against any closed discharge valve
- E. With a particular combination of flow rate and head
- F. None of the Above

95. All discharge valves must be open before the pump is started, to prevent _____ that could damage the pump.

- A. Cavitation bubbles
- B. Atmospheric pressure
- C. The vertical distance
- D. Gas volumetrically displacing a disproportion of liquid
- E. Any fast build-up of pressure
- F. None of the Above

Diaphragm Pumps

96. In this type of pump, a diaphragm provides _____ used to force liquid from the suction to the discharge side of the pump.

- A. Discharge side of the pump
- B. The mechanical action
- C. The robot dance action
- D. Suction
- E. A particular combination of flow rate and head
- F. None of the Above

97. The advantage the diaphragm has over the plunger is that the diaphragm pump does not come in contact with?

- A. Cavitation bubble
- B. Atmospheric pressure
- C. The vertical distance
- D. The liquid
- E. Moving metal
- F. None of the Above

Pump Specifications

98. Pumps are commonly rated by horsepower, flow rate, _____ in meters (or feet) of head, inlet suction in suction feet of head.

- A. Discharge side of the pump
- B. Water level
- C. Outlet pressure
- D. Suction feet (or meters) of head
- E. A particular combination of flow rate and head
- F. None of the Above

99. The head can be simplified as the number of feet or meters the pump can raise or lower a column of water at?

- A. Cavitation pressure
- B. Atmospheric pressure
- C. The vertical distance
- D. Displacement of a disproportion of liquid
- E. Sea level
- F. None of the Above

100. From an initial design point of view, engineers often use a quantity termed the specific speed to identify the most suitable pump type for?

- A. The discharge side of the pump
- B. Water level
- C. Sea level
- D. Suction feet (or meters) of head
- E. A particular combination of flow rate and head
- F. None of the Above

Suction Lift Chart

101. The vertical distance that a pump may be placed above _____ (and be able to draw water) is determined by pump design and limits dictated by altitude.

- A. The water level
- B. Atmospheric pressure
- C. The vertical distance
- D. Gas volumetrically displacing a disproportion of liquid
- E. To prevent any fast build-up of pressure
- F. None of the Above

102. The closer the pump is to the _____, the easier and quicker it will be to prime.

- A. Discharge side of the pump
- B. Water level
- C. Boiling point
- D. Suction
- E. Flow rate and head
- F. None of the Above

103. Centrifugal pumps are particularly _____ especially when pumping heated solution near the vapor pressure, whereas positive displacement pumps are less affected by cavitation.

- A. Vulnerable to cavitation bubble
- B. Vulnerable to atmospheric pressure
- C. Vulnerable to the vertical distance
- D. Vulnerable to gas displacing a disproportion of liquid
- E. Vulnerable to any fast build-up of pressure
- F. None of the Above

104. Careful design is required to pump high temperature liquids with a centrifugal pump when the liquid is near?

- A. Discharge side of the pump
- B. Water level
- C. Its boiling point
- D. Suction feet (or meters) of head
- E. A particular combination of flow rate and head
- F. None of the Above

105. Which of the following terms - creates a shock wave that can literally carve material from internal pump components and creates noise often described as "pumping gravel".

- A. Cavitation bubble
- B. Atmospheric pressure
- C. Vertical distance
- D. Gas volumetrically displacing a disproportion of liquid
- E. Violent collapse of the cavitation bubble
- F. None of the Above

106. Additionally, the inevitable increase in _____ can cause other mechanical faults in the pump and associated equipment.

- A. Discharge side of the pump
- B. Water level
- C. Vibration
- D. Suction feet (or meters) of head
- E. A particular combination of flow rate and head
- F. None of the Above

107. For a typical "pumping" configuration, the work is imparted on the fluid, and is thus positive. For the fluid imparting the work on the pump, the work is negative power required to drive the pump is determined by dividing the output power by the pump efficiency. Furthermore, this definition encompasses pumps with no moving parts, such as?

- A. A siphon
- B. Atmospheric pressure
- C. The vertical distance
- D. Displacing a disproportion of liquid
- E. Any fast build-up of pressure
- F. None of the Above

108. When asked how a pump operates, most reply that it "sucks." While not a false statement, it's easy to see why so many pump operators still struggle with?

- A. Discharge side of the pump
- B. Pump problems
- C. Boiling point
- D. Suction
- E. A particular combination of flow rate and head
- F. None of the Above

109. Fluid flows from areas of high pressure to areas of low pressure. Pumps operate by creating low pressure at the inlet which allows the liquid to be pushed into the pump by?
- A. Discharge side of the pump
 - B. Water level
 - C. Atmospheric or head pressure
 - D. Suction feet (or meters) of head
 - E. A particular combination of flow rate and head
 - F. None of the Above

Pump Efficiency

110. Pump efficiency is defined as the ratio of the power imparted on the fluid by the pump in relation to the power supplied to drive the pump. Its value is not fixed for a given pump; efficiency is a function of the _____ and therefore also operating head.

- A. Dynamic
- B. Discharge
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Motor efficiency
- F. None of the Above

111. For centrifugal pumps, the efficiency tends to increase with flow rate up to a point midway through the operating range (_____) and then declines as flow rates rise further.

- A. Dynamic
- B. Pump efficiency
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Peak efficiency
- F. None of the Above

112. Pump performance data such as this is usually supplied by the manufacturer before pump selection. _____ tend to decline over time due to wear.

- A. Dynamic efficiency
- B. Motor efficiency
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Pump efficiencies
- F. None of the Above

113. When a system design includes a centrifugal pump, an important issue in its design is matching the head loss-flow characteristic with the pump so that it operates at or close to the point of?

- A. Dynamic efficiency
- B. Pump efficiency
- C. Pump performance data
- D. Its maximum efficiency
- E. Motor efficiency
- F. None of the Above

114. Which of the following terms - is an important aspect and pumps should be regularly tested. Thermodynamic pump testing is one method?

- A. Dynamic efficiency
- B. Motor efficiency
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Pump efficiency
- F. None of the Above

115. Static indicates the _____ does not take into account the friction caused by water moving through the hose or pipes.

- A. Dynamic efficiency
- B. Pump efficiency
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Motor efficiency
- F. None of the Above

116. Which of the following terms - indicates that losses due to friction are factored into the performance?

- A. Dynamic
- B. Motor efficiency
- C. Pump performance data
- D. Point of its maximum efficiency
- E. Pump efficiency
- F. None of the Above

117. Which of the following terms - The Static Suction Lift plus the friction in the suction line. Also referred to as a Total Suction Head.

- A. Total Dynamic Head
- B. Static Suction Lift
- C. Static Discharge Head
- D. Dynamic Suction Head
- E. Dynamic Discharge Head
- F. None of the Above

118. Which of the following terms - - The Static Discharge Head plus the friction in the discharge line. Also referred to as Total Discharge Head.

- A. Total Dynamic Head
- B. Static Suction Lift
- C. Static Discharge Head
- D. Dynamic Suction Head
- E. Dynamic Discharge Head
- F. None of the Above

119. _____ - The Dynamic Suction Head plus the Dynamic Discharge Head. Also referred to as Total Head.

- A. Total Dynamic Head
- B. Static Suction Lift
- C. Static Discharge Head
- D. Dynamic Suction Head
- E. Dynamic Discharge Head
- F. None of the Above

120. _____ - The vertical distance from the water line to the centerline of the impeller.

- A. Total Dynamic Head
- B. Static Suction Lift
- C. Static Discharge Head
- D. Dynamic Suction Head
- E. Dynamic Discharge Head
- F. None of the Above

121. _____ - The vertical distance from the discharge outlet to the point of discharge or liquid level when discharging into the bottom of a water tank.

- A. Total Dynamic Head
- B. Static Suction Lift
- C. Static Discharge Head
- D. Dynamic Suction Head
- E. Dynamic Discharge Head
- F. None of the Above

Specific Gravity

122. The term specific gravity compares the density of some substance to the density of water. Since _____ is the ratio of those densities.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses within the liquid
- E. Head loss
- F. None of the Above

End Use Requirements—System Flow Rate and Head

123. The design pump capacity, or desired pump discharge in gallons per minute is needed to accurately size the piping system, determine _____, construct a system curve, and select a pump and drive motor.

- A. The dynamic head
- B. Friction head losses
- C. Head loss
- D. The total system head
- E. Chézy formula
- F. None of the Above

124. Which of the following terms - may be met by providing a constant flow rate, or by using a throttling valve or variable speed drive to supply continuously variable flow rates.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses within the liquid
- E. Head loss
- F. None of the Above

125. The total system head has three components: static head, _____, and velocity head.

- A. The dynamic head
- B. Elevation (potential energy)
- C. Head loss
- D. The total system head
- E. Chézy formula
- F. None of the Above

126. Which of the following terms - is the pressure of the fluid in the system, and is the quantity measured by conventional pressure gauges?

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses within the liquid
- E. Head loss
- F. None of the Above

127. The dynamic head is the pressure required by the system to overcome head losses caused by flow rate resistance in pipes, valves, fittings, and?

- A. The dynamic head
- B. Mechanical equipment
- C. Head loss
- D. The total system head
- E. Chézy formula
- F. None of the Above

128. Dynamic head losses are approximately proportional to the square of the _____, or flow rate. If the flow rate doubles, dynamic losses increase fourfold.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Fluid flow velocity
- E. Head loss
- F. None of the Above

Understanding Pump Viscosity

129. When to use a centrifugal or a _____ is not always a clear choice. To make a good choice between these pump types it is important to understand that these two types of pumps behave very differently.

- A. The lift pump
- B. The force pump
- C. The Bellows
- D. Positive Displacement pump ("PD Pump")
- E. The Roots blower
- F. None of the Above

Darcy-Weisbach Formula

Flow of fluid through a pipe

130. The flow of liquid through a pipe is resisted by viscous shear stresses within the liquid and the turbulence that occurs along the internal walls of the pipe, created by?

- A. Specific gravity
- B. Variable flow rates
- C. The roughness of the pipe material
- D. Viscous shear stresses within the liquid
- E. Head loss
- F. None of the Above

131. This resistance is usually known as pipe friction and is measured in feet or meters head of the fluid, thus the term _____ is also used to express the resistance to flow.

- A. The dynamic head
- B. Variable flow rates
- C. Head loss
- D. The total system head
- E. Viscous shear
- F. None of the Above

132. Many factors affect the _____ in pipes, the viscosity of the fluid being handled, the size of the pipes, the roughness of the internal surface of the pipes, the changes in elevations within the system and the length of travel of the fluid.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses within the liquid
- E. Head loss
- F. None of the Above

133. The resistance through various valves and fittings will also contribute to?

- A. The dynamic head
- B. Static head
- C. Head loss
- D. The total system head
- E. The overall head loss
- F. None of the Above

134. In a well-designed system the resistance through valves and fittings will be of minor significance to the overall head loss, many designers choose to ignore the _____ for valves and fittings at least in the initial stages of a design.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses
- E. Head loss
- F. None of the Above

135. Much research has been carried out over many years and various formulas to calculate _____ have been developed based on experimental data.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses
- E. Head loss
- F. None of the Above

136. Using the concept of 'wetted perimeter' and the internal diameter of a pipe the Chézy formula could be adapted to estimate the head loss in a pipe, although the constant ' _____ ' had to be determined experimentally.

- A. Specific gravity
- B. Variable flow rates
- C. Static head
- D. Viscous shear stresses
- E. Head loss
- F. None of the Above

Understanding the Basic Water Pump

137. The water pump commonly found in our systems is centrifugal pumps. These pumps work by spinning water around in?

- A. Impeller blades
- B. Pumping head
- C. Column pipe
- D. A circle inside a cylindrical pump housing
- E. Center and edge of the pump
- F. None of the Above

138. The blades of this impeller project outward from an axle like the arms of a turnstile and, as the impeller spins, the water spins with it. As the water spins, the pressure near the outer edge of the pump housing becomes much higher than near?

- A. High-pressure water
- B. A pressure rise
- C. The center of the impeller
- D. The water spins with it
- E. Pressure or lift the pump is working against
- F. None of the Above

139. Objects do not naturally travel in a circle--they need _____ to cause them to accelerate inward as they spin.

- A. Impeller blades
- B. Pumping head
- C. A column pipe
- D. Variable displacement pumps
- E. Center and edge of the pump
- F. None of the Above

140. Without such an inward force, an object will travel in a straight line and will not complete the circle. In a centrifugal pump, _____ is provided by high-pressure water near the outer edge of the pump housing.

- A. High-pressure water
- B. A pressure rise
- C. That inward force
- D. The water spins with it
- E. Pressure or lift the pump is working against
- F. None of the Above

141. The water at the edge of the pump pushes inward on the water between the impeller blades and makes it possible for that water to travel in a circle. _____ at the edge of the turning impeller rises until it is able to keep water circling with the impeller blades.

- A. The water pressure
- B. Pumping head
- C. Force
- D. Variable displacement pumps
- E. Center and edge of the pump
- F. None of the Above

142. Here is where Bernoulli's equation figures in. As the water slows down and its kinetic energy decreases, that water's pressure potential energy increases (to conserve energy). Thus, the slowing is accompanied by a pressure rise. That is why the water pressure at the outer edge of the pump housing is higher than the water pressure near the?

- A. High-pressure water
- B. A pressure rise
- C. Column
- D. Center of the impeller
- E. Pressure or lift the pump is working against
- F. None of the Above

143. When water is actively flowing through the pump, arriving through _____ near the center of the impeller and leaving through a hole near the outer edge of the pump housing.

- A. Impeller blades
- B. A hole
- C. A column pipe
- D. Pressure or lift the pump is working against
- E. The center and edge of the pump
- F. None of the Above

Types of Water Pumps

144. A variable displacement pump will produce at different rates relative to the amount of pressure or?

- A. High-pressure water
- B. A pressure rise
- C. Lift the pump is working against
- D. The water spins with it
- E. Is working against
- F. None of the Above

145. Which of the following terms - are variable displacement pumps that are by far used the most?

- A. Diaphragm pumps
- B. The Roots blower
- C. Bicycle pumps
- D. Centrifugal pumps
- E. The turbine pump
- F. None of the Above

146. Which of the following terms - utilizes impellers enclosed in single or multiple bowls or stages to lift water by centrifugal force?

- A. Diaphragm pumps
- B. The Roots blower
- C. Bicycle pumps
- D. Centrifugal pumps
- E. The turbine pump
- F. None of the Above

147. Which of the following terms - are rotated by the pump motor, which provides the horsepower needed to overcome the pumping head?

- A. Impellers
- B. Pumping head
- C. Passing of the cam
- D. Variable displacement pumps
- E. Center and edges
- F. None of the Above

148. Which of the following terms - are commonly used in groundwater wells?

- A. Diaphragm pumps
- B. Line-shaft turbine
- C. Bicycle pumps
- D. Centrifugal pumps
- E. Vertical turbine pumps
- F. None of the Above

149. This type of pumping system is also called a _____. The rotating shaft in a line shaft turbine is actually housed within the column pipe that delivers the water to the surface.

- A. Diaphragm pumps
- B. Line-shaft turbine
- C. Bicycle pumps
- D. Centrifugal pumps
- E. Vertical turbine pumps
- F. None of the Above

150. The size of the column, impeller, and bowls are selected based on the desired pumping rate and?

- A. High-pressure water
- B. Pressure rise
- C. Lift requirements
- D. The water pressure
- E. Pressure or lift the pump is working against
- F. None of the Above

151. Column pipe sections can be threaded or coupled together while the drive shaft is coupled and suspended within the column by?

- A. Impeller blades
- B. Mechanical seals
- C. Spider bearings
- D. Packing
- E. Center and edge of the pump
- F. None of the Above

152. Which of the following terms - provide both a seal at the column pipe joints and keep the shaft aligned within the column?

- A. Impeller blades
- B. Mechanical seals
- C. Spider bearings
- D. Packing
- E. Center and edge of the pump
- F. None of the Above

153. Some _____ are lubricated by oil rather than water.

- A. Diaphragm pumps
- B. Line-shaft turbines
- C. Bicycle pumps
- D. Centrifugal pumps
- E. Vertical turbines
- F. None of the Above

Stuffing Box

154. The function of _____ is to control leakage and not to eliminate it completely.

- A. Impeller blades
- B. Mechanical seals
- C. Spider bearings
- D. Packing
- E. Center bearings
- F. None of the Above

155. Which of the following terms - must be lubricated, and a flow from 40 to 60 drops per minute out of the stuffing box must be maintained for proper lubrication?

- A. Impeller blades
- B. Mechanical seals
- C. Spider bearings
- D. Packing
- E. Center bearings
- F. None of the Above

Progressing Cavity Pump

156. In this type of pump, components referred to as a rotor and an elastic stator provide the mechanical action used to force liquid from the suction side to the?

- A. Discharge valve
- B. Two or more cylinders
- C. Passing of the cam
- D. Diaphragm valves
- E. Discharge side of the pump
- F. None of the Above

157. As the _____ turns within the stator, cavities are formed which progress from the suction to the discharge end of the pump, conveying the pumped material.

- A. Diaphragm valves
- B. Plunger
- C. Progressive cavity pump
- D. Liquid and slurry pumps
- E. Rotor
- F. None of the Above

158. Which of the following terms - between the rotor and the stator helices keeps the fluid moving steadily at a fixed flow rate proportional to the pump's rotational speed?

- A. Discharge valve
- B. Two or more cylinders
- C. Passing of the cam
- D. Continuous seal
- E. Progressing cavity pumps
- F. None of the Above

159. Which of the following terms - are used to pump material very high in solids content?

- A. Progressing cavity pumps
- B. Line-shaft turbine
- C. A peristaltic pump
- D. Centrifugal pumps
- E. Vertical turbine pumps
- F. None of the Above

160. Which of the following terms - must never be run dry, because the friction between the rotor and stator will quickly damage the pump?

- A. Progressive cavity pump
- B. Line-shaft turbine
- C. A peristaltic pump
- D. Centrifugal pumps
- E. Vertical turbine pumps
- F. None of the Above

Peristaltic Pumps

161. Which of the following terms - is a type of positive displacement pump used for pumping a variety of fluids?

- A. Progressing cavity pumps
- B. Line-shaft turbine
- C. A peristaltic pump
- D. Centrifugal pumps
- E. Vertical turbine pumps
- F. None of the Above

162. Which of the following terms - with a number of "rollers", "shoes" or "wipers" attached to the external circumference compresses the flexible tube?

- A. Diaphragm valve
- B. Plunger
- C. Progressive cavity
- D. Liquid and slurry pump
- E. Rotor
- F. None of the Above

163. Additionally, as the tube opens to its natural state after the passing of the cam ("restitution") fluid flow is induced to the pump. _____ and is used in many biological systems such as the gastrointestinal tract.

- A. Discharge valve peristalsis
- B. Peristalsis
- C. Passing of the cam
- D. This process is called peristalsis
- E. Progressing cavity peristalsis
- F. None of the Above

Priming a Pump

164. Which of the following terms - can lose prime and this will require the pump to be primed by adding liquid to the pump and inlet pipes to get the pump started?

- A. Diaphragm valves
- B. Plunger
- C. The progressive cavity pump
- D. Liquid and slurry pumps
- E. A plunger pump
- F. None of the Above

165. Loss of "prime" is usually due to ingestion of air into the pump. The clearances and displacement ratios in pumps used for liquids and other more viscous fluids cannot displace the air due to?

- A. Discharge valve
- B. Two or more cylinders
- C. Passing of the cam
- D. Diaphragm
- E. Its lower density
- F. None of the Above

Reciprocating Pumps

166. Which of the following terms - consists of a cylinder with a reciprocating plunger in it?

- A. Progressive cavity pump
- B. Line-shaft turbine
- C. A peristaltic pump
- D. Centrifugal pump
- E. A plunger pump
- F. None of the Above

167. In the _____ the plunger retracts and the suction valves open causing suction of fluid into the cylinder. In the forward stroke the plunger pushes the liquid out of the discharge valve.

- A. Discharge valve
- B. Suction stroke
- C. Passing of the cam
- D. Progressing cavity peristalsis
- E. Water hammer
- F. None of the Above

168. A lot of energy is wasted when the _____ is accelerated in the piping system.

- A. Discharge valve
- B. Suction stroke
- C. Passing of the cam
- D. Progressing cavity peristalsis
- E. Water hammer
- F. None of the Above

169. Vibration and " _____ " may be a serious problem. In general, the problems are compensated for by using two or more cylinders not working in phase with each other.

- A. Discharge valve
- B. Suction stroke
- C. Passing of the cam
- D. Progressing cavity peristalsis
- E. Water hammer
- F. None of the Above

170. In _____, the plunger pressurizes hydraulic oil which is used to flex a diaphragm in the pumping cylinder.

- A. Diaphragm valve
- B. Plunger pumps
- C. Diaphragm pumps
- D. Liquid and slurry pumps
- E. Gear Pump
- F. None of the Above

171. Which of the following terms - are used to pump hazardous and toxic fluids?

- A. Discharge valves
- B. Two or more cylinders
- C. Cams
- D. Diaphragm valves
- E. Progressing cavity pumps
- F. None of the Above

Gear Pump

172. This uses _____. Fluid is pumped around the outer periphery by being trapped in the tooth spaces. It does not travel back on the meshed part, since the teeth mesh closely in the center. Widely used on car engine oil pumps. It is also used in various hydraulic power packs.

- A. Gravity
- B. Fluids at rest
- C. Inertia and friction
- D. Two different heights
- E. The indicated pressure is doubled
- F. None of the Above

Vapor Pressure and Cavitation

173. Cavitation occurs when a liquid is subjected to rapid changes of pressure that cause the _____ where the pressure is relatively low.

- A. Vapor pressure
- B. Temperature
- C. Bubbles
- D. Inertial (or transient) cavitation
- E. Formation of cavities
- F. None of the Above

174. Cavitation is a significant cause of wear in some engineering contexts. When entering high pressure areas, cavitation bubbles that implode on a metal surface cause?

- A. Formation of cavities
- B. Cyclic stress
- C. Cavitation bubbles
- D. Inertial (or transient) cavitation
- E. Consequence of forces
- F. None of the Above

175. The most common examples of this kind of _____ are pump impellers and bends when a sudden change in the direction of liquid occurs.

- A. Vapor pressure
- B. Wear
- C. Cavitation bubbles
- D. Inertial (or transient) cavitation
- E. Consequence of forces
- F. None of the Above

176. Which of the following terms - is usually divided into two classes of behavior: inertial (or transient) cavitation and non-inertial cavitation?

- A. Formation of cavities
- B. Cyclic stress
- C. Cavitation
- D. Inertial (or transient) cavitation
- E. Consequence of forces
- F. None of the Above

Inertial Cavitation

177. Which of the following terms - is the process where a void or bubble in a liquid rapidly collapses, producing a shock wave?

- A. Vapor pressure
- B. Cyclic stress
- C. Cavitation bubbles
- D. Inertial cavitation
- E. Consequence of forces
- F. None of the Above

178. Which of the following terms - occurs in nature in the strikes of mantis shrimps and pistol shrimps, as well as in the vascular tissues of plants?

- A. Vapor pressure
- B. Cyclic stress
- C. Cavitation bubbles
- D. Inertial cavitation
- E. Consequence of forces
- F. None of the Above

Non-inertial Cavitation

179. To understand Cavitation, you must first understand?

- A. Vapor pressure
- B. Cyclic stress
- C. Cavitation bubbles
- D. Inertial cavitation
- E. Consequence of forces
- F. None of the Above

180. Which of the following terms - is the pressure required to boil a liquid at a given temperature?

- A. Vapor pressure
- B. Temperature
- C. Cavitation bubbles
- D. Inertial (or transient) cavitation
- E. Consequence of pressure
- F. None of the Above

181. Temperature affects _____ as well, raises the water's temperature to 212°F and the vapors are released because at that increased temperature the vapor pressure is greater than the atmospheric pressure.

- A. Vapor pressure
- B. Consequence of pressure
- C. Cavitation bubbles
- D. Inertial (or transient) cavitation
- E. Consequence of forces
- F. None of the Above

182. Which of the following terms - form at the inlet of the pump and are moved to the discharge of the pump where they collapse, often taking small pieces of the pump with them?

- A. Vapor pressure
- B. Vapor bubbles
- C. Cavitation bubbles
- D. Inertial (or transient) cavitation
- E. Consequence of forces
- F. None of the Above

Rope Pumps

183. Devised in China as chain pumps over 1000 years ago, these pumps can be made from _____ are sufficient to make a simple rope pump.

- A. Kinetic energy
- B. Velocity
- C. Hydropower
- D. Large amount of complex materials
- E. Rice
- F. None of the Above

Impulse Pumps

184. Impulse pumps use?

- A. Water hammer effect
- B. Liquid upwards
- C. A gravity pump
- D. Kinetic energy of flowing water
- E. Pressure created by gas
- F. None of the Above

Hydraulic Ram Pumps

185. A hydraulic ram is a water pump powered by hydropower. It functions as a hydraulic transformer that takes in water at one "hydraulic head" and flow-rate, and outputs water at a higher hydraulic-head and?

- A. Kinetic energy
- B. Lower flow-rate
- C. Hydropower
- D. Large amount of water falling
- E. Very reliable and low in maintenance
- F. None of the Above

186. The device uses the _____ to develop pressure that allows a portion of the input water that powers the pump to be lifted to a point higher than where the water originally started.

- A. Water hammer effect
- B. Liquid upwards
- C. A gravity pump
- D. Kinetic energy of flowing water
- E. Bernoulli's principle
- F. None of the Above

187. The hydraulic ram is sometimes used in remote areas, where there is both a source of low-head hydropower, and a need for pumping water to a destination higher in elevation than the source. In this situation, the ram is often useful, since it requires no outside source of power other than the?

- A. Kinetic energy
- B. Velocity
- C. Hydropower
- D. Large amount of water falling
- E. Kinetic energy of flowing water
- F. None of the Above

Velocity Pumps

188. Rotodynamic pumps are a type of velocity pump in which kinetic energy is added to the fluid by increasing the flow velocity. This increase in energy is converted to a gain in potential energy when the _____ or as the flow exits the pump into the discharge pipe.

- A. Kinetic energy
- B. Velocity
- C. Hydropower
- D. Large amount of water falling
- E. Velocity is reduced prior to
- F. None of the Above

189. This conversion of kinetic energy to pressure can be explained by the First law of thermodynamics or more specifically by?

- A. Water hammer effect
- B. Liquid upwards
- C. A gravity pump
- D. Kinetic energy of flowing water
- E. Bernoulli's principle
- F. None of the Above

190. Dynamic pumps can be further subdivided according to the means in which the _____ is achieved.

- A. Kinetic energy
- B. Velocity
- C. Hydropower
- D. Large amount of water falling
- E. Velocity gain
- F. None of the Above

Gravity Pumps

191. Gravity pumps include the syphon and Heron's fountain – and there also important qanat or foggara systems which simply use _____ to take water from far-underground aquifers in high areas to consumers at lower elevations. The hydraulic ram is also sometimes referred to as a gravity pump.

- A. Water hammer effect
- B. Liquid upwards
- C. A gravity pump
- D. Kinetic energy of flowing water
- E. Downhill flow
- F. None of the Above

Solar Power

192. Solar systems can be very reliable and low in maintenance, but are expensive and require?

- A. Kinetic energy
- B. Sun Velocity
- C. Solar power
- D. Large amount of sunshine
- E. Low maintenance
- F. None of the Above

Heissler Pump

193. This pump was designed by Paul Heissler of Frankford, Ontario. It is an inexpensive system and can be built from materials around the farm. It has a 12 volt submersible pump sitting in shallow water driven by a tractor battery. A 45 gallon drum acts as a reservoir with?

- A. Water hammer effect
- B. Liquid upwards
- C. A gravity pump
- D. Kinetic energy of flowing water
- E. A float to control water level
- F. None of the Above

Hydraulic Rams

194. Hydraulic ram pumps are a time-tested technology that uses the energy of a large amount of water falling a small height to lift a small amount of that water?

- A. To a much greater height
- B. Displaced axially at a variable rate
- C. Hydropower
- D. Large amount of water falling
- E. Displaced axially at a constant rate
- F. None of the Above

195. Which of the following terms - between the inlet pipe and the outlet pipe, these water pumps will lift 1-20 percent of the water that flows into it?

- A. To a much greater height
- B. Displaced axially at a constant rate
- C. Hydropower
- D. Depending on the difference in heights
- E. Displaced axially at a variable rate
- F. None of the Above

Wind Mills

196. Which of the following terms - and pump 5 gallons per minute. As wind is a variable energy source, use a storage reservoir to provide a supply for periods of low wind velocity. Locate the storage reservoir within 1,000 ft. of the water source.

- A. Pump discharge
- B. It can lift water up to 20 ft.
- C. Displaced axially at a constant rate
- D. Low maintenance
- E. Flow rates and differential pressures
- F. None of the Above

Pasture (Nose) Pumps

197. Using _____ to draw water to a bowl, the nose pump is a good alternative to in stream watering. Installation is quick and easy - easy enough to use as portable system for rotation pastures.

- A. Pump discharge
- B. A simple pumping mechanism
- C. The nose pump
- D. Displaced axially at a constant rate
- E. Flow rates and differential pressures
- F. None of the Above

Understanding Progressing Cavity Pump Theory

198. Progressing cavity pumps are a special type of rotary positive displacement pump where the produced fluid is?

- A. To a much greater height
- B. Displaced axially at a constant rate
- C. Hydropower
- D. Depending on the difference in heights
- E. Displaced axially at a variable rate
- F. None of the Above

199. Which of the following terms - are comprised of two helicoidal gears, where the rotor is positioned inside the stator?

- A. Progressing cavity pumps
- B. Line-shaft turbine
- C. Peristaltic pumps
- D. Centrifugal pumps
- E. Plunger pumps
- F. None of the Above

200. The combination of rotational movement and geometry of the rotor inside the stator results in the formation of cavities that move?

- A. To a much greater height
- B. Displaced axially at a constant rate
- C. Hydropower
- D. Depending on the difference in heights
- E. Axially from pump suction to pump discharge
- F. None of the Above

You are finished with your assignment. Please fax or email the answer key and registration form and call us to ensure we received it.