TOPIC: 293006
KNOWLEDGE: K1.03 [2.4/2.5]
QID: B925 (P1921)

Refer to the drawing of a centrifugal pump operating curve and system curve (see figure below).

Which one of the following determines the general shape of the curve from point C to point D?

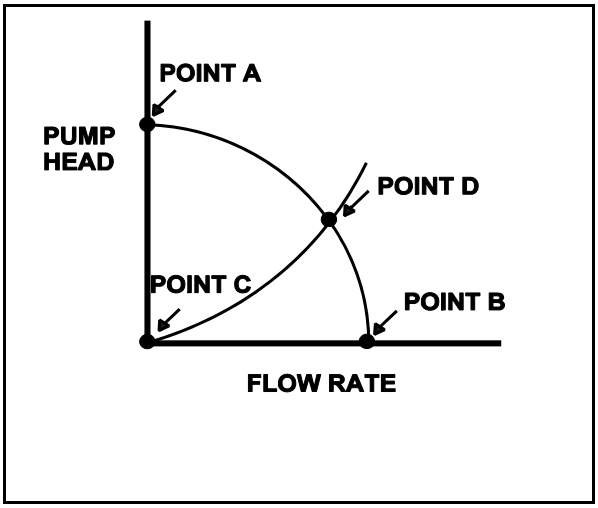
A. The pump flow losses due to the decrease in available net positive suction head as the system flow rate increases.

B. The pump flow losses due to back leakage through the clearances between the pump impeller and casing as the D/P across the pump increases.

C. The frictional and throttling losses in the piping system as the system flow rate increases.

D. The frictional losses between the pump impeller and its casing as the differential pressure (D/P) across the pump increases.

ANSWER: C.



TOPIC: 293006
KNOWLEDGE: K1.03 [2.4/2.5]
QID: B979

Head loss is the...

A. reduction in discharge pressure experienced by a real pump due to slippage.

B. reduction in discharge pressure experienced by a real pump due to mechanical friction.

C. conversion of system fluid pressure and velocity to heat energy as a result of friction.

D. decrease in static pressure in a piping system resulting from decreases in elevation.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B79 (P80)

If a valve closure suddenly stops fluid flow, the resulting piping system pressure change is referred to as...

A. cavitation.

B. shutoff head.

C. water hammer.

D. valve chatter.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B148 (P2279)

Which one of the following operating practices minimizes the possibility of water hammer?

A. Change valve position as rapidly as possible.

B. Start a centrifugal pump with the discharge valve throttled.

C. Start a positive displacement pump with the discharge valve closed.

D. Vent a system only after initiating system flow.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B279 (P679)

A sudden stop of fluid flow in a piping system, due to rapid closure of an isolation valve, will most likely result in...

A. check valve slamming.

B. pump runout.

C. piping hanger damage.

D. pressurized thermal shock.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B380 (P381)

The major concern with starting a main feedwater pump with downstream fluid in a saturated condition is...

A. cavitation.

B. water hammer.

C. thermal shock.

D. positive reactivity addition.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B1180 (P2480)

Which one of the following will increase the possibility of water hammer?

A. Opening and closing system valves very slowly

B. Venting liquid systems only after initiating system flow

C. Starting centrifugal pumps with the discharge valve closed

D. Starting positive displacement pumps with the discharge valve open

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B2081 (P2079)

Which one of the following will minimize the possibility of water hammer?

A. Draining the discharge line of a centrifugal pump after shutdown

B. Draining condensate out of steam lines before and after initiating flow

C. Starting a centrifugal pump with its discharge valve fully open

D. Starting a positive displacement pump with its discharge valve partially closed

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B2679 (P2279)

Which one of the following operating practices minimizes the possibility of water hammer?

A. Change valve positions as rapidly as possible.

B. Start centrifugal pumps with the discharge valve throttled.

C. Start positive displacement pumps with the discharge valve closed.

D. Vent systems only after initiating system flow.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B2779 (P1879)

Which one of the following describes why large steam lines are gradually warmed instead of suddenly admitting full steam flow?

A. To minimize the possibility of stress corrosion cracking of the steam lines.

B. To minimize the total thermal expansion of the steam lines.

C. To minimize the potential for water hammer in the steam lines.

D. To minimize the heat loss from the steam lines.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.05 [3.2/3.3]
QID: B4041 (P4042)

Refer to the drawing of two lengths of 6-inch diameter pipe, each containing an identical automatic isolation valve. The actual pipe lengths are proportional to their symbols in the drawing

Water at 65°F is flowing at 1,000 gpm through each pipe. If the isolation valves instantly close, valve A and its associated piping will experience a pressure increase that is _____ the pressure increase experienced by valve B and its associated piping. The pressure spike will dissipate quicker in the _____ length of pipe.

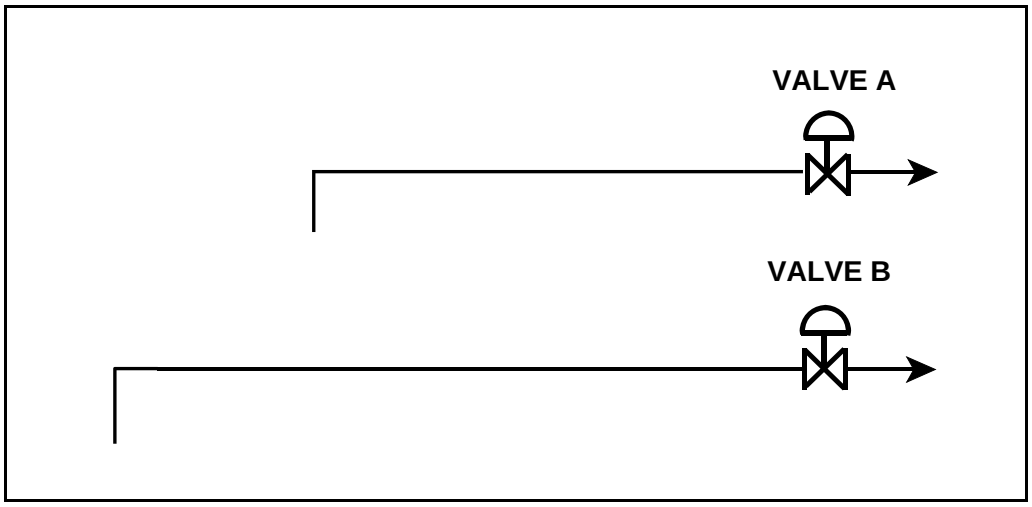
A. equal to; shorter

B. equal to; longer

C. less than; shorter

D. less than; longer

ANSWER: A.



TOPIC: 293006
KNOWLEDGE: K1.06 [2.5/2.6]
QID: B1480

Which one of the following components of a centrifugal pump has the specific primary function of converting the kinetic energy of a fluid into pressure?

A. Volute

B. Impeller

C. Pump shaft

D. Discharge nozzle

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.07 [2.5/2.6]
QID: B479

If the discharge valve of an operating ideal positive displacement pump is repositioned from fully open to 75% open, pump head will _____ and pump flow rate will _____.

A. increase; remain the same

B. increase; decrease

C. remain the same; remain the same

D. remain the same; decrease

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.07 [2.5/2.6]
QID: B1280

Which one of the following describes pump head?

A. The energy added by a pump to increase fluid pressure or velocity

B. The energy added by a pump in excess of shutoff head

C. The fluid energy required to ensure a pump does not cavitate

D. The fluid energy contained at the inlet of a pump

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.07 [2.5/2.6]
QID: B1680 (P3525)

An ideal positive displacement pump is pumping to a system operating at 100 psig. Assume pump speed is constant, zero pump slip, and pump backpressure remains within normal pump operating limits.

If system pressure increases to 200 psig, the pump head will _____; and pump flow rate will _____.

A. increase; remain the same

B. increase; decrease

C. remain the same; remain the same

D. remain the same; decrease

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.08 [2.5/2.6]
QID: B198

Which one of the following statements describes application of centrifugal pump laws?

A. Pump head is directly proportional to speed.

B. Power varies as the square of the speed.

C. Pump head varies as the square of the speed.

D. Capacity varies as the cube of the speed.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.08 [2.5/2.6]
QID: B322 (P325)

Increasing the flow rate from a centrifugal pump by throttling open the discharge valve will cause pump head to...

A. increase and stabilize at a higher value.

B. decrease and stabilize at a lower value.

C. remain constant because pump head is a design parameter.

D increase, then decrease following the pump's efficiency curve.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.08 [2.5/2.6]
QID: B2579

Decreasing the flow rate from a centrifugal pump by throttling the pump discharge valve will cause pump head to...

A. increase and stabilize at a higher value.

B. decrease and stabilize at a lower value.

C. remain constant because pump head is a design parameter.

D. decrease, then increase following the pump's efficiency curve.

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.08 [2.5/2.6]
QID: B3579 (P2923)

Refer to the drawing of four centrifugal pump operating curves (see figure below).

A two-speed centrifugal pump is operating at fast speed in a cooling water system and discharging through a heat exchanger. The pump is then switched to slow speed.

Which set of curves illustrates the initial and final pump operating conditions?

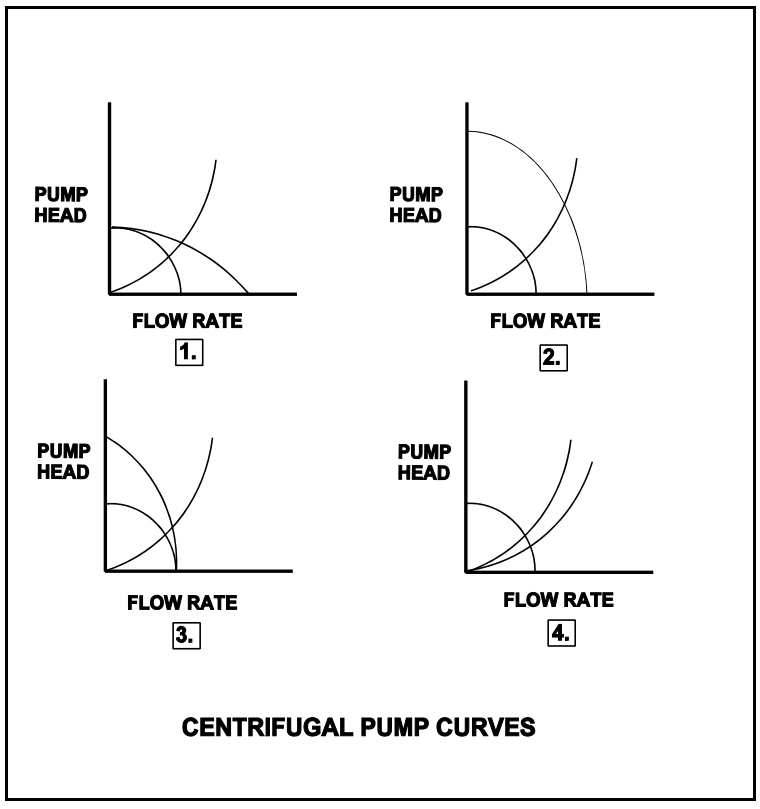
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: B.



TOPIC: 293006
KNOWLEDGE: K1.09 [2.8/2.9]
QID: B80 (P382)

Which one of the following is most likely to cause cavitation of an operating centrifugal pump?

A. Lowering the suction temperature.

B. Throttling the pump suction valve.

C. Throttling the pump discharge valve.

D. Decreasing the pump speed.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.09 [2.8/2.9]
QID: B280 (P2680)

Cavitation is the formation of vapor bubbles in the _____ pressure area of a pump followed by the _____ of these bubbles within the pump casing.

A. low; expansion

B. low; collapse

C. high; expansion

D. high; collapse

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.09 [2.8/2.9]
QID: B1880

Complete the following statement.

Pump cavitation occurs when vapor bubbles are formed at the eye of a pump impeller...

A. because the localized flow velocity exceeds sonic velocity for the existing fluid temperature.

B. because the localized pressure exceeds the vapor pressure for the existing fluid temperature.

C. and enter a high pressure region of the pump where they collapse causing damaging pressure pulsations.

D. and are discharged from the pump where they expand into larger bubbles causing damaging pressure pulsations.

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.10 [2.7/2.8]
QID: B82

Net positive suction head is the...

A. difference between pump suction pressure and the saturation pressure of the fluid being pumped.

B. difference between the total suction head and the pressure at the eye of the pump.

C. amount of suction pressure required to prevent cavitation.

D. difference between the pump suction pressure and the pump discharge pressure.

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.10 [2.7/2.8]
QID: B281

The available net positive suction head of a centrifugal pump...

A. decreases with increased subcooling to the pump.

B. decreases with an increase in pump flow rate.

C. increases as the suction temperature increases.

D. decreases as pump discharge pressure increases.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.10 [2.7/2.8]
QID: B1381

Which one of the following sets of parameters directly affects available net positive suction head for the recirculation pumps?

A. Feed water temperature, reactor power, and reactor water level

B. Feed water temperature, reactor pressure, and reactor water level

C. Reactor water level, feed water flow rate, and reactor power

D. Reactor pressure, reactor power, and feed water flow rate

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.11 [2.4/2.5]
QID: B381

A single stage centrifugal pump is operating in an open system. Which one of the following is the force caused by subjecting the pump impeller to the unequal pressures that exist at the suction and the discharge of the pump?

A. Axial thrust

B. Radial thrust

C. Kingsbury thrust

D. Journal thrust

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.11 [2.4/2.5]
QID: B680

An ac motor-driven centrifugal pump is operating at rated flow and pressure in a cooling water system. A break occurs in the pump discharge piping resulting in a loss of pump backpressure.

As a result of the break, the pump will operate at a _____ flow rate and the pump motor will draw _____ electrical power.

A. higher; more

B. higher; less

C. lower; more

D. lower; less

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.12 [2.9/2.9]
QID: B143 (P279)

A centrifugal water pump is being returned to service after maintenance. However, the operator fails to vent the pump.

Compared to normal operations, after the pump is started, the operator will see _____ flow rate and _____ discharge head.

A. higher; lower

B. higher; higher

C. lower; lower

D. lower; higher

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B283

A single-speed centrifugal pump, A, is operating in a closed system. An identical centrifugal pump, B, is started in parallel with pump A. The major effect of operating pump B in parallel with pump A is...

A. increased system pressure.

B. increased system flow rate.

C. decreased system pressure.

D. decreased system flow rate.

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B880

Refer to the drawing of a cooling water system (see figure below).

Pumps A and B are identical single-speed centrifugal pumps, but only pump A is operating. Assume real (non-ideal) system and pump operating characteristics.

If pump B is started, system flow rate will _____ and the total pump head will _____.

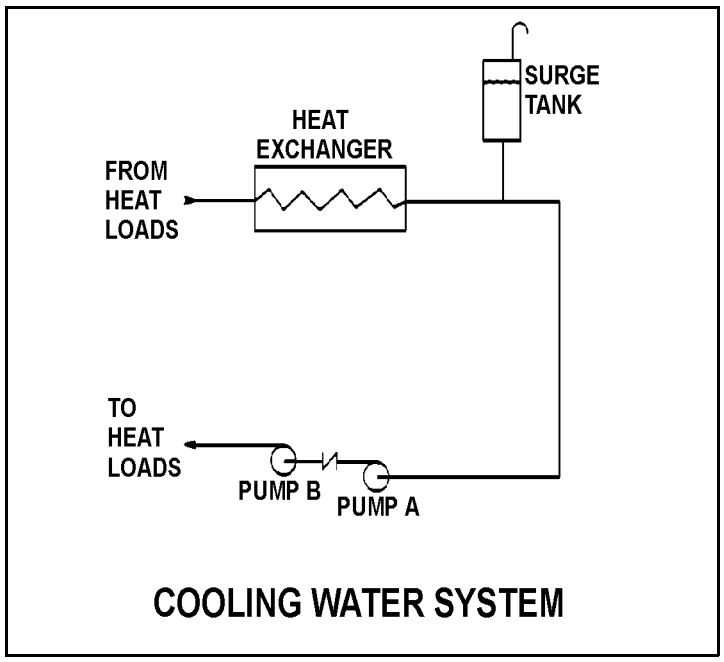
A. increase; increase

B. increase; remain the same

C. remain the same; increase

D. remain the same; remain the same

ANSWER: A.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B1578 (P926)

Refer to the drawing of four sets of centrifugal pump operating curves (see figure below). Each set of curves shows the results of a change in pump/system operating conditions.

Two identical constant-speed centrifugal pumps are operating in series in an open system when one pump trips.

Which set of operating curves depicts the "before" and "after" conditions described above?

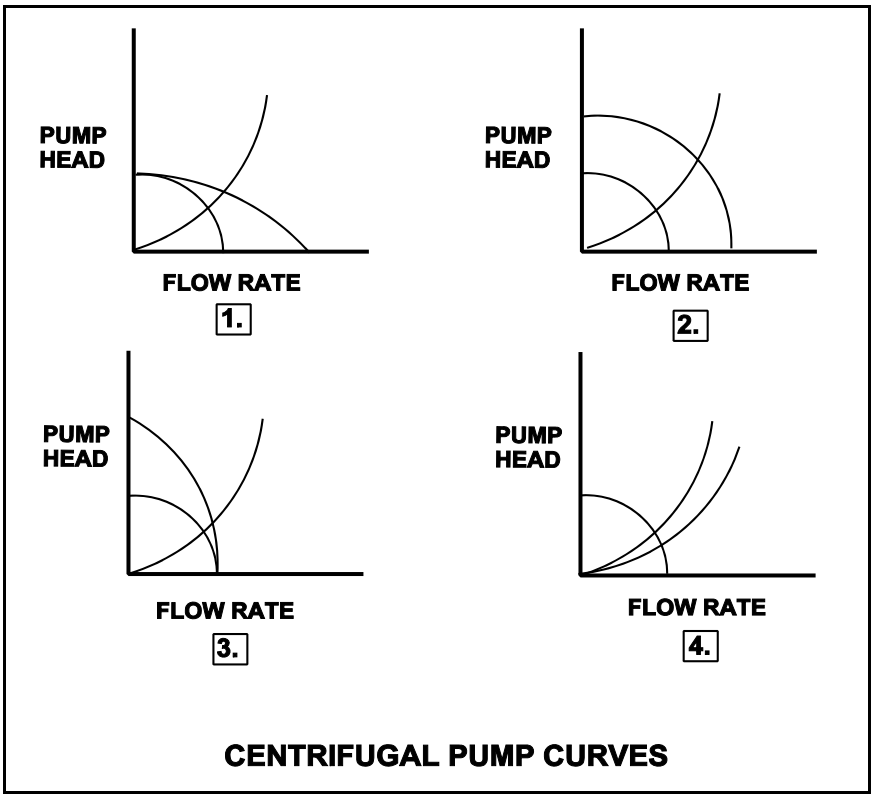
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: C.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B1678

Refer to the drawing of a cooling water system and the associated centrifugal pump operating curve showing two-pump operation (see figure below).

Pumps A and B are identical single-speed centrifugal pumps and both pumps are operating.

If pump B trips, system flow rate will _____ and common pump discharge pressure will _____.

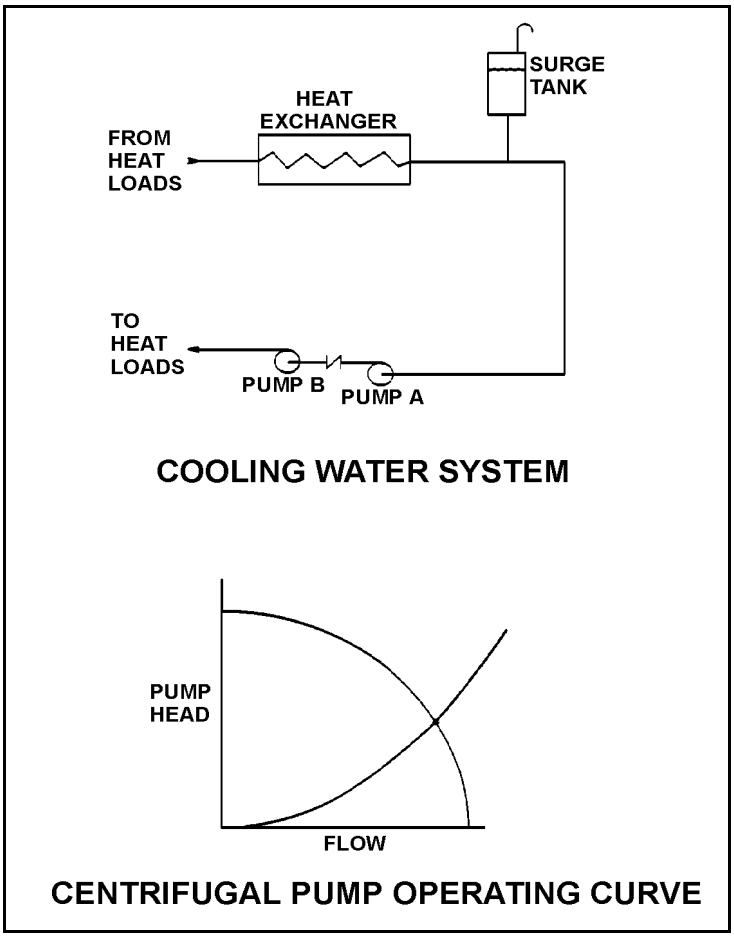
A. remain the same; decrease

B. decrease; remain the same

C. remain the same; remain the same

D. decrease; decrease

ANSWER: D.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B1725 (P1784)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the lowest makeup flow rate to the system if system pressure is at 1,700 psig?

A. Two CPs in series

B. Two CPs in parallel

C. One PDP and one CP in series (CP supplying PDP)

D. One PDP and one CP in parallel

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B1780 (P1724)

Refer to the drawing of four centrifugal pump operating curves (see figure below).

A centrifugal pump is initially operating in a closed water system and discharging through a heat exchanger. A second heat exchanger, in parallel with the first, is then placed in service.

Which set of curves illustrates the initial and final operating conditions?

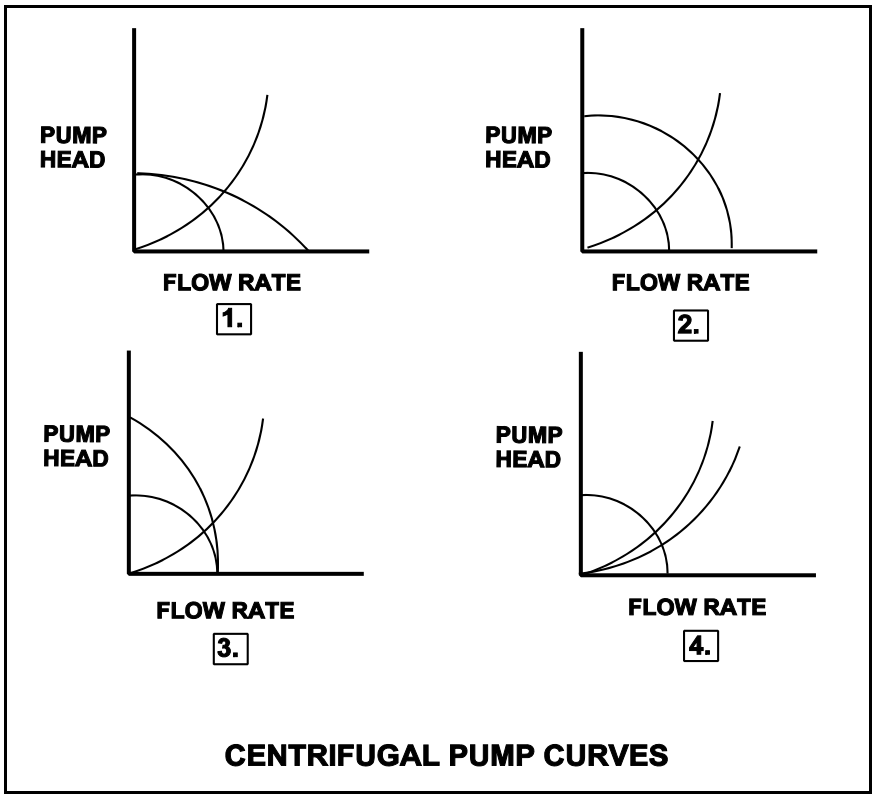
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: D.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B1878 (P1324)

Refer to the drawing of four centrifugal pump operating curves (see figure below).

A centrifugal pump is operating in a cooling water system. Another identical centrifugal pump is started in series with the first. Which set of curves illustrates the resulting change in system parameters?

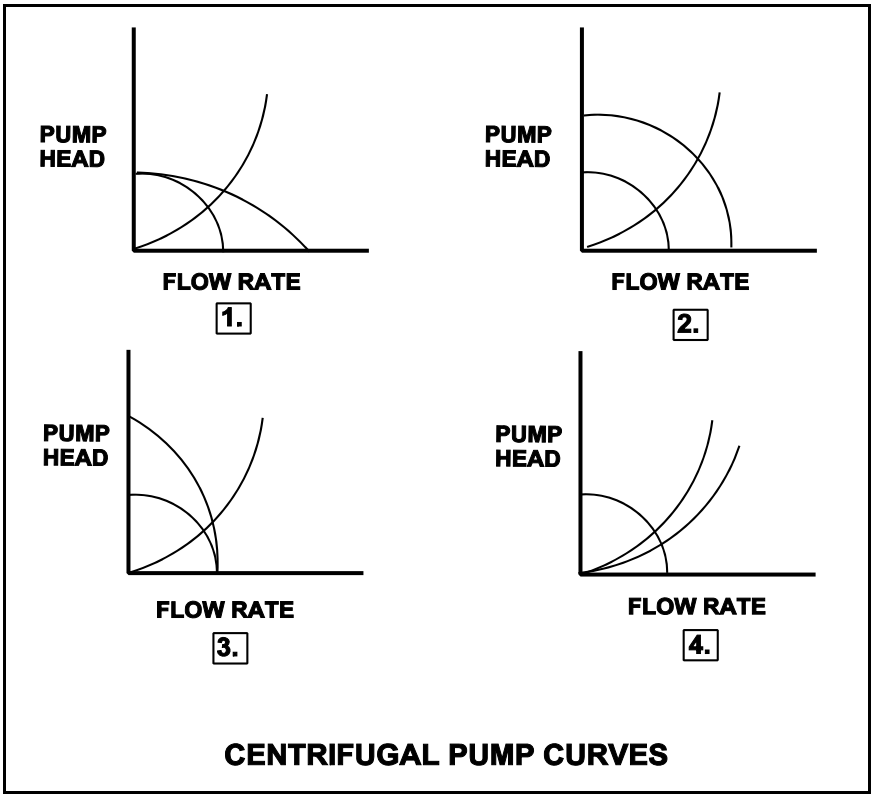
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: C.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B2279 (P1524)

Refer to the drawing of four sets of centrifugal pump operating curves (see figure below). Each set of curves shows the results of a change in pump/system operating conditions.

Two identical constant-speed centrifugal pumps are operating in parallel in an open system when one pump trips.

Which set of operating curves depicts the "before" and "after" conditions described above?

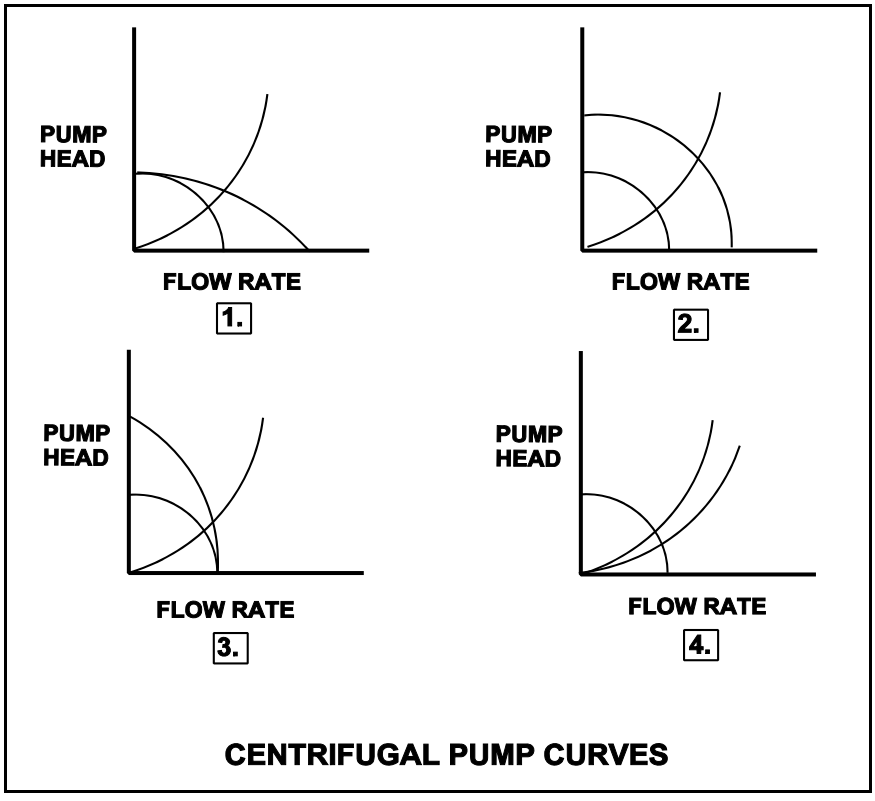
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: A.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B2324 (P2383)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1,500 psig
Maximum design pressure: 2,000 psig

Positive Displacement Pumps

Maximum design pressure: 2,000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the system if system pressure is at 500 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B2723 (P2783)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1200 psig.

Given the following information:

Centrifugal Pumps

Shutoff head:	1,500 psig
Maximum design pressure:	2,000 psig
Flow rate with no backpressure:	180 gpm

Positive Displacement Pumps

Maximum design pressure:	2,000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the cooling water system if system pressure is at 1,700 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B2879 (P2823)

Refer to the drawing of four centrifugal pump operating curves (see figure below).

A two-speed centrifugal pump is operating in low speed in a cooling water system and discharging through a heat exchanger. The pump is then switched to high speed.

Which set of curves illustrates the initial and final operating conditions?

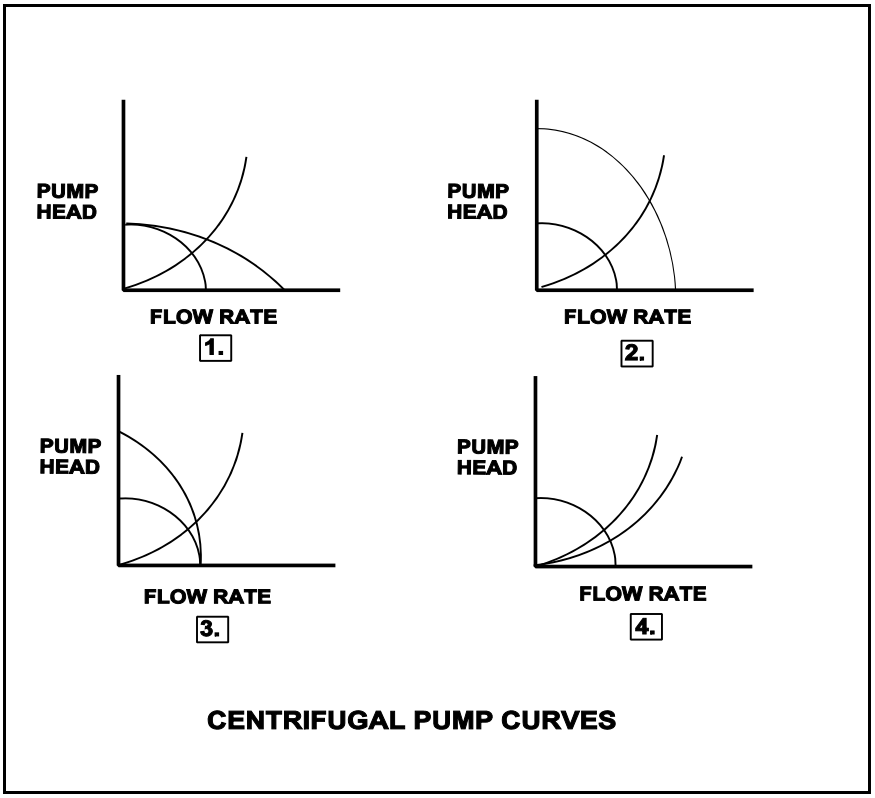
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: B.



TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B3681 (P3683)

Two identical single-speed centrifugal pumps (CPs) and two identical single-speed positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Discharge pressure at shutoff head:	1,500 psig
Maximum design pressure:	2,000 psig
Flow rate with no backpressure:	180 gpm

Positive Displacement Pumps

Maximum design pressure:	2,000 psig

Which one of the following makeup water pump configurations will supply the highest initial flow rate to a cooling water system that is drained and depressurized?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.13 [2.6/2.7]
QID: B4342 (P4343)

Two identical single-speed centrifugal pumps (CPs) and two identical single-speed positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

Discharge pressure at shutoff head:	1,500 psig
Maximum design pressure:	2,000 psig
Flow rate with no backpressure:	180 gpm

Positive Displacement Pumps

Maximum design pressure:	2,000 psig

Which one of the following pump configurations will supply the lowest initial flow rate of makeup water to a cooling water system that is drained and depressurized?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One CP and one PDP in series (CP supplying PDP)

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.19 [2.7/2.9]
QID: B1181 (P1222)

A nuclear power plant is operating at full power when a 200 gpm reactor coolant leak occurs, which results in a reactor scram and initiation of emergency coolant injection. Reactor vessel pressure stabilizes at 900 psia and all centrifugal injection pumps are operating with all pump miniflow paths isolated. The shutoff heads for the pumps are as follows:

High pressure coolant injection (HPCI) pumps: 1,200 psia
Low pressure coolant injection (LPCI) pumps: 200 psia

Which pumps are currently threatened for operability and why?

A. LPCI pumps due to pump overheating

B. LPCI pumps due to motor overheating

C. HPCI pumps due to pump overheating

D. HPCI pumps due to motor overheating

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.19 [2.7/2.9]
QID: B3281

A nuclear power plant is operating at full power when a 200 gpm reactor coolant leak occurs, which results in a reactor scram and initiation of emergency coolant injection. Reactor vessel pressure stabilizes at 900 psia and all injection pumps are operating with all pump miniflow paths isolated. The shutoff heads for the pumps are as follows:

High pressure coolant injection (HPCI) pumps: 800 psia
Low pressure coolant injection (LPCI) pumps: 200 psia

Which pumps are currently threatened for operability and why?

A. Only the LPCI pumps due to pump overheating

B. All LPCI and HPCI pumps due to pump overheating

C. Only the HPCI pumps due to motor overheating

D. All LPCI and HPCI pumps due to motor overheating

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.21 [2.4/2.6]
QID: B1980

A reactor heatup is in progress. Which one of the following reactor temperatures will result in a main steam line pressure of approximately 530 psig?

A. 462°F

B. 468°F

C. 476°F

D. 484°F

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B383 (P380)

An 85 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 33.3 gpm

B. 42.5 gpm

C. 51.7 gpm

D. 60.1 gpm

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B681 (P680)

A 55 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 27.5 gpm

B. 31.8 gpm

C. 38.9 gpm

D. 43.4 gpm

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B1783 (P1779)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 45 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 30 psig?

A. 25 gpm

B. 50 gpm

C. 67 gpm

D. 82 gpm

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B1979 (P1580)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 15 gpm

B. 30 gpm

C. 42 gpm

D. 53 gpm

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2080 (P2080)

An 80 gpm leak to atmosphere has developed from in a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 69 gpm

B. 60 gpm

C. 51 gpm

D. 40 gpm

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2281 (P2282)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 4-inch diameter pipe and an 8-inch diameter pipe.

Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 4-inch and 8-inch diameter pipes?

	4-inch Pipe (lbm/sec)	8-inch Pipe (lbm/sec)
A.	20	80
B.	25	75
C.	30	70
D.	33	67

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2381 (P2379)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?

A. 27 gpm

B. 35 gpm

C. 40 gpm

D. 49 gpm

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2479 (P2481)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 3-inch diameter pipe and a 6-inch diameter pipe. Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 3-inch and 6-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

	3-inch Pipe (lbm/sec)	6-inch Pipe (lbm/sec)
A.	10	90
B.	20	80
C.	25	75
D.	33	67

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2581 (P2582)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 6-inch diameter pipe and an 8-inch diameter pipe.

Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 6-inch and 8-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

	6-inch Pipe (lbm/sec)	8-inch Pipe (lbm/sec)
A.	24	76
B.	32	68
C.	36	64
D.	40	60

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2781 (P2779)

An 80 gpm leak to atmosphere has developed in a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 20 gpm

B. 40 gpm

C. 49 gpm

D. 57 gpm

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B2981 (P1679)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 60 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 20 psig?

A. 33.3 gpm

B. 53.0 gpm

C. 57.7 gpm

D. 70.7 gpm

ANSWER: C.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B3181 (P3080)

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 80 psig?

A. 26.5 gpm

B. 38.9 gpm

C. 56.4 gpm

D. 67.1 gpm

ANSWER: D.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B3581

A reactor shutdown has been performed because of leakage from the main condenser cooling water system into the main condenser through a tube leak.

Given the following initial conditions:

Main condenser pressure is 1.0 psia.
Main condenser cooling water system pressure is 10 psig.
Main condenser cooling water inlet temperature is 60°F.
Cooling water leak rate into the main condenser is 100 gpm.

If the main condenser is brought to atmospheric pressure, with no changes to the main condenser cooling water system parameters, what will be the approximate rate of cooling water leakage into the main condenser?

A. 17 gpm

B. 28 gpm

C. 42 gpm

D. 65 gpm

ANSWER: D.

TOPIC: 293006 (Also 291002K1.01)
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B4242 (P4243)

Refer to the drawing of a venturi in a main steamline (see figure below). The venturi inlet and outlet pipe diameters are equal.

A main steamline break downstream of the venturi causes the main steam mass flow rate through the venturi to increase. Soon, the steam reaches sonic velocity in the throat of the venturi.

How will the main steam mass flow rate through the venturi be affected as the steam pressure downstream of the venturi continues to decrease?

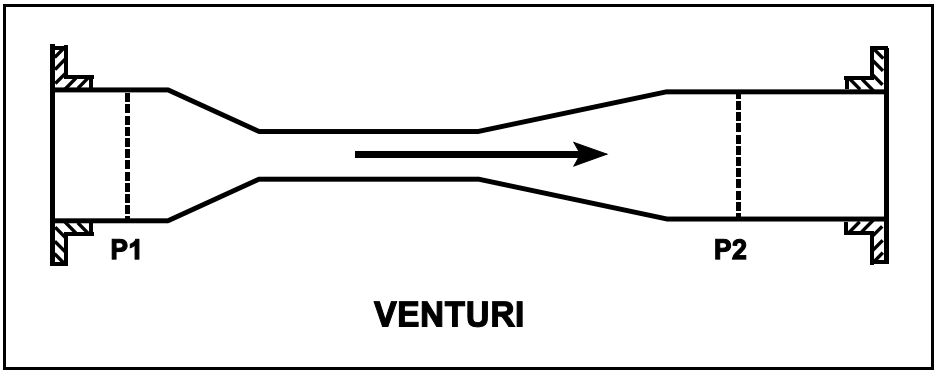
A. It will continue to increase at a rate that is dependent on the steam velocity in the throat of the venturi.

B. It will continue to increase at a rate that is dependent on the differential pressure (P1 - P2) across the venturi.

C. It will <u>not</u> continue to increase because the steam velocity <u>cannot</u> increase above sonic velocity in the throat of the venturi.

D. It will <u>not</u> continue to increase because the differential pressure (P1 - P2) across the venturi <u>cannot</u> increase further once the steam reaches sonic velocity in the throat of the venturi.

ANSWER: C.



TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B4542 (P4543)

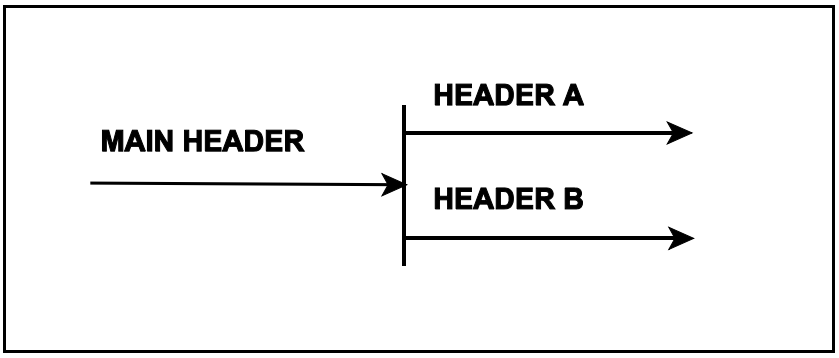
Refer to the drawing of a main water header that splits into two parallel headers (see figure below).

Header A has a 2-inch diameter and header B has a 3-inch diameter. The velocity of the water in both headers is the same.

If the main water header has a flow rate of 500 gpm, what is the approximate flow rate in each of the parallel headers?

	HEADER A (gpm)	HEADER B (gpm)
A.	125	375
B.	154	346
C.	200	300
D.	222	278

ANSWER: B.



TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B4642 (P4643)

A length of pipe in a cooling water system uses a reducer fitting to decrease the pipe diameter from 6 inches to 4 inches. The flow rate in the 6-inch diameter section of pipe is 200 gpm. What is the flow rate in the 4-inch diameter section of pipe?

A. 133 gpm

B. 200 gpm

C. 300 gpm

D. 450 gpm

ANSWER: B.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B5342 (P5342)

A heat exchanger has the following initial cooling water inlet temperature and differential pressure (ΔP) parameters:

Inlet Temperature = 70°F
Heat Exchanger ΔP = 10 psi

Six hours later, the current heat exchanger cooling water parameters are:

Inlet Temperature = 85°F
Heat Exchanger ΔP = 10 psi

In comparison to the initial cooling water mass flow rate, the current mass flow rate is...

A. lower because the density of the cooling water has decreased.

B. higher because the velocity of the cooling water has increased.

C. the same because the changes in cooling water velocity and density offset.

D. the same because the heat exchanger cooling water ΔP is the same.

ANSWER: A.

TOPIC: 293006
KNOWLEDGE: K1.29 [2.6/2.7]
QID: B5542 (P5543)

A vented water storage tank contains 60 feet of water at 70°F. A cracked weld at the bottom rim of the tank results in a leak rate of 12 gpm. If makeup water flow rate is 5 gpm, at what water level will the tank stabilize? (Ignore any frictional head losses as the water exits the tank.)

A. 38.7 feet

B. 25.0 feet

C. 10.4 feet

D. 0.0 feet

ANSWER: C.