

Unit 5 - Week 2 :

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Assignment 2

The due date for submitting this assignment has passed. **Due on 2019-08-21, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Saturated water vapour at 200 kPa is in a constant pressure piston/cylinder assembly. At this state the piston is 0.1 m from the cylinder bottom. How much is this distance if the temperature is changed to 200°C. **1 point**

- (a) 0.0144 m
(b) 0.0820 m
(c) 0.6955 m
(d) 0.1220 m

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

2) Saturated water vapour at 200 kPa is in a constant pressure piston/cylinder assembly. At this state the piston is 0.1 m from the cylinder bottom. What is the temperature if the water is cooled to occupy half the original volume? **1 point**

- (a) 120.23°C
(b) 372°C
(c) 496°C
(d) 543°C

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

3) Saturated water vapour at 200 kPa is in a constant pressure piston/cylinder assembly. At this state the piston is 0.1 m from the cylinder bottom. What is the temperature if the water is heated to occupy twice the original volume? **1 point**

- (a) 120.23°C
(b) 372°C
(c) 496°C
(d) 543°C

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

4) Saturated (liquid +vapour) water at 150°C is contained in a rigid steel tank. It is used in an experiment, where it should pass through the critical point when the system is heated. What should the initial mass fraction of liquid be? **1 point**

- (a) 0.0053
(b) 0.9947
(c) 0.9470
(d) 0.0530

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

5) A sealed rigid tank contains 1 kg of water (liquid + vapour) at 50°C with a volume of 0.002 m³. The tank is now slowly heated. What happens to the liquid level inside the tank? **1 point**

- (a) The liquid level will not change during the process.
(b) The liquid level will eventually drop to the bottom of the tank.
(c) The liquid level will eventually rise to the top of the tank.
(d) None of the above

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

6) What if the initial mass of water in Question 5 is 0.5 kg instead of 1 kg? **1 point**

- (a) The liquid level will eventually drop to the bottom of the tank.
(b) The liquid level will eventually rise to the top of the tank.
(c) The liquid level will not change during the process.
(d) None of the above

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

7) **Common Data for Questions 7 to 9**
A sealed rigid vessel of volume 2 m³ contains water as a saturated liquid-vapour mixture at 50°C. If it is heated to 100°C, the liquid phase disappears. **1 point**

What is the specific volume of the saturated liquid-vapour mixture?

- (a) 1.67290 m³/kg
(b) 12.0318 m³/kg
(c) 0.001012 m³/kg
(d) 0.001044 m³/kg

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

8) Determine the initial quality of the saturated liquid-vapour mixture. **1 point**

- (a) 0.861
(b) 0.139
(c) 1
(d) 0

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

9) Find the initial mass of liquid water. **1 point**

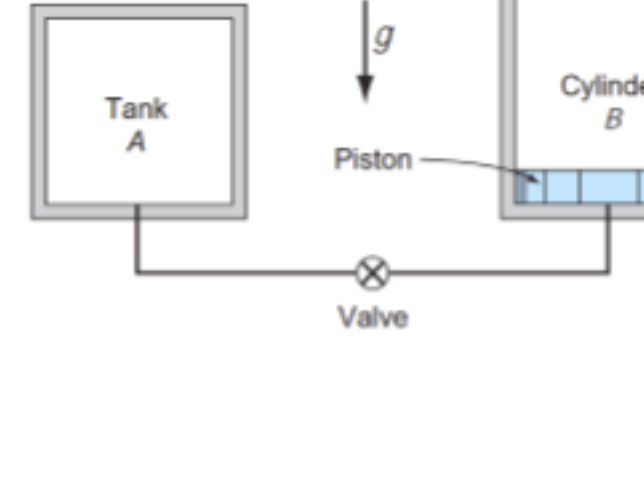
- (a) 0.124 kg
(b) 0.166 kg
(c) 1.195 kg
(d) 1.029 kg

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

10) A 50-kg piston in a cylinder with diameter of 100 mm is loaded with a linear spring and the outside atmospheric pressure of 100 kPa as shown in the figure below. The spring exerts no force on the piston when it is at the bottom of the cylinder, and for the state shown, the pressure is 400 kPa with volume 0.4 L. The valve is opened to let some air in, causing the piston to rise 2 cm. Find the new pressure. Assume $g=10 \text{ m/s}^2$. **1 point**



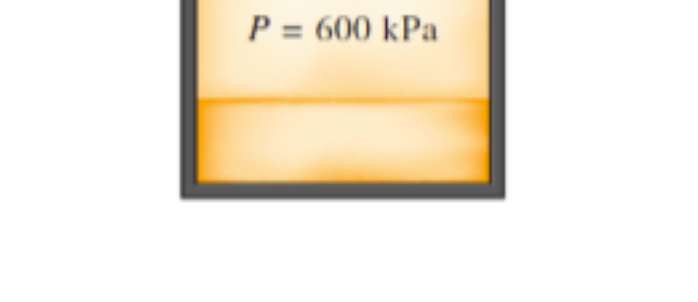
- (a) 492.8 kPa
(b) 532 kPa
(c) 557 kPa
(d) 517.8 kPa

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

11) A 1-m³ rigid tank has air at 1500 kPa and ambient 300 K connected by a valve to a piston/cylinder as shown in the figure below. The piston of area 0.1 m² requires 250 kPa below it to float. The valve is opened and the piston moves slowly 2 m up and the valve is closed. During the process air temperature remains at 300 K. What is the final pressure in the tank? **1 point**



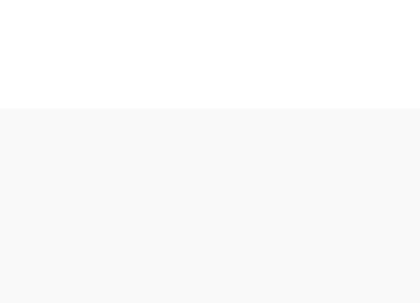
- (a) 1500 kPa
(b) 1450 kPa
(c) 1400 kPa
(d) 250 kPa

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

12) **Common data for Questions 12 to 14**
A piston/cylinder device contains 0.005 m³ of liquid water and 0.9 m³ of water vapour in equilibrium at 600 kPa. Heat is transferred at constant pressure until the temperature reaches 200°C. **1 point**



What is the initial quality of the saturated liquid-vapour mixture?

- (a) 0.386
(b) 0.614
(c) 0.312
(d) 0.688

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

13) Determine the total mass of water inside the piston/cylinder device. **1 point**

- (a) 2.85 kg
(b) 4.54 kg
(c) 5.62 kg
(d) 7.39 kg

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

14) Calculate the final volume. **1 point**

- (a) 1.004 m³
(b) 1.599 m³
(c) 2.602 m³
(d) 1.98 m³

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

15) A rigid tank whose volume is unknown is divided into two parts by a partition. One side of the tank contains an ideal gas at 927°C. The other side is evacuated and has a volume twice the size of the part containing the gas. The partition is now removed and the gas expands to fill the entire tank. Heat is now applied to the gas until the pressure equals the initial pressure. Determine the final temperature of the gas. **1 point**



- (a) 3327.3°C
(b) 2781°C
(c) 2127.15°C
(d) 1854°C

- ☐ a
☐ b
☐ c
☐ d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a