

Name: _____

Score: _____

35 Written questions

Definition

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What type of flow visualization method is used in BOS?

Definition

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Give the most general formula for the 2nd law of thermodynamics.

Definition

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Define enthalpy as an equation using the usual notation: _____

Definition

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Carl de Laval was the first to make industrial use of converging-diverging _____.

Definition

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Does the 1st law of thermodynamics determine the unique direction of all real processes?

Definition

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Total density is invariant in an _____ flow.

Definition

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Hypersonic flows are for flights Mach numbers in excess of about _____.

Definition

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What can be said about the intermolecular forces between molecules of a perfect gas? They are _____.

Definition

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The second law of thermodynamics allows us to determine the _____ that physical processes take.

Definition

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Name the two-dimensional parameters that govern Gas Dynamics: ratio of specific heats and _____.

Definition

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One of the most important physical laws that govern high-speed flight is the energy equation, which is just this law of physics:

Definition

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Write the most common form of the perfect gas law, that is, the one with density: _____

Definition

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Does the energy equation play a central role in our study of Gas Dynamics?

Definition

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For a calorically perfect gas the speed of sound is given by the equation:

Definition

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A calorically perfect gas is one for which: c_p and ____ are constant with temperature (give symbol).

Definition

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_____ flows are characterized by presence of both sub- and super-sonic flows.

Definition

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The critical pressure ratio required to achieve sonic condition is: $p/p_0 = \underline{\hspace{1cm}}$

Definition

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Is the propagation of sound waves in a perfect gas an isentropic process?

Definition

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An _____ and reversible process is called isentropic.

Definition

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The minimum type of flow characteristic required to go from p to p_0 is _____ flow.

Definition

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The well-known pressure ratio 0.528 is the minimum p/p_0 value required to achieve $M = \underline{\hspace{1cm}}$.

Definition

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The AIAA research paper on BOS photographs of the supersonic flow field generated by Northrop _____ aircraft was presented in the year 2016.

Definition

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The BOS photos of the flow field of a Northrop T-38 aircraft flying at approximately $M \approx$ ____ were taken by NASA Ames and

Definition

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In real-life processes, can the entropy of the system and the surroundings decrease?

Definition

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Chuck Yeager's historic first ____ flight took place in the year 1947 at Edwards Air Force Base.

Definition

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Give the mass conservation equation for a steady, compressible, 1-D flow in terms of flow properties:

Definition

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Write the relationship between pressure and density for isothermal flows:

Definition

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Is the speed of sound in a gas higher than that in a liquid?

Definition

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In an ____ flow, the total temperature remains constant.

Definition

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We can calculate the specific gas constant from the _____ gas constant using the molecular weight of the gas.

Definition

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Name one of the three most commonly used thermodynamic properties of a gas in gas dynamics:

Definition

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The BOS photos of formation fight of two T-38 aircraft show complex _____ interactions as we go from the near field to the far field.

Definition

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Write the proportionality that relates pressure and density for an isentropic flow: _____.

Definition

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Name the minimum type of flow characteristic required to go from T to T0: _____ flow.

Definition

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In a _____ flow, there are limited regions of influence.
