PROBLEM 3: SHOWERHEAD

Section A – Multiple Choice Questions (*Circle the correct answer)*

1. Which of the following factors can affect the maximum flow rate of a fluid through a given hose or pipe?

    a. The color of the fluid
    b. The viscosity of the fluid
    c. The smell of the fluid
    d. The shape of the container

2. Which of the following is an example of a Bernoulli effect in action?

    a. A river flowing around a bend
    b. Water droplets forming on the outside of a cold drink
    c. A showerhead spraying water
    d. Air flowing over an airplane wing

3. Which of the following factors can affect the angle at which a handheld showerhead deviates when the water is turned on?

    a. The color of the showerhead
    b. The length of the hose
    c. The water pressure
    d. The weight of the showerhead

4. Which of the following is an example of a laminar flow of a fluid?

    a. A waterfall cascading down a cliff
    b. Smoke rising from a chimney
    c. Water flowing smoothly through a pipe
    d. A whirlpool forming in a bathtub

5. Which of the following factors can affect the rate of heat transfer in a fluid?

    a. The temperature of the fluid
    b. The color of the container
    c. The sound of the fluid
    d. The size of the container

6. Which of the following factors can affect the ability of a fluid to lubricate moving parts in a machine?

    a. The weight of the machine
    b. The color of the fluid
    c. The viscosity of the fluid
    d. The size of the machine

7. Which of the following is an example of a turbulent flow of a fluid?

    a. A river flowing smoothly over a flat surface
    b. A stream of air blowing from a fan
    c. A balloon floating through the air
    d. A lava lamp bubbling

8. Which of the following factors can affect the behavior of a fluid in a container or hose?

    a. The weight of the container
    b. The temperature of the container
    c. The viscosity of the fluid
    d. The smell of the container

9. Which of the following factors can affect the way a fluid flows in a container or hose?

    a. The color of the container
    b. The weight of the container
    c. The shape of the container
    d. The sound of the container

10. Which of the following is an example of a hydraulic system?

    a. A bicycle pump
    b. A water wheel
    c. A car engine
    d. A construction crane

Section B – Structured Questions (*Write answer in space provided)*

1. What is the name of the area of physics that deals with fluid dynamics?

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2. What factors determine the angle at which a handheld shower head on a long hose deviates from its resting position?

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3. How can the principles of fluid dynamics be used to improve firefighting equipment?

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4. What is the purpose of irrigation systems, and how can the principles of fluid dynamics be used to optimize their design?

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5. How can the principles of fluid dynamics be used to improve fuel injection systems in internal combustion engines?

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6. What is the name of the process used to cut materials using a high-pressure jet of water, and how can the principles of fluid dynamics be used to optimize its design?

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7. What is the relationship between the diameter of a hose and the flow rate of fluid through it?

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8. What is the Bernoulli principle, and how is it applied in fluid mechanics?

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9. What is laminar flow, and how is it different from turbulent flow?

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10. How can the Reynolds number be used to predict whether fluid flow will be laminar or turbulent?

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11. What is the purpose of a flow meter, and how does it work?

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12. What is the difference between a fixed and variable area flow meter?

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13. What is the purpose of a pump, and how does it work?

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14. What is the difference between a positive displacement pump and a centrifugal pump?

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15. If the water pressure in a shower is increased, what effect will this have on the angle at which the handheld shower head deviates?

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16. How does the shape of a fluid container affect the way the fluid flows inside it?

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17. What factors determine the maximum flow rate of a fluid through a given hose or pipe?

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18. How does the surface tension of a fluid affect its behavior in a container or hose?

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19. What is the relationship between the density and viscosity of a fluid, and how does this affect its behavior in a container or hose?

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20. How can the principles of fluid dynamics be used to optimize the design of wind turbines?

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21. What factors affect the rate of heat transfer in a fluid, and how can these be controlled?

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22. How does the viscosity of a fluid affect its ability to lubricate moving parts in a machine?

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23. What is the relationship between pressure and velocity in a fluid, and how can this be used to optimize the design of hydraulic systems?

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24. What is the difference between laminar and turbulent flow, and how can each type of flow be used to optimize the design of fluid systems?

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25. What is the name of the process used to cut materials using a high-pressure jet of water, and how can the principles of fluid dynamics be used to optimize its design?

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