الإدارة المركزية للتعليم العام

تنمية مادة العلوم

Physics

الصف الثاني الثانوي

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الواجب المنزلي + التقييم

الاسم: .....

الفصل: .....

المدرسة: .....

الأسبوع 8



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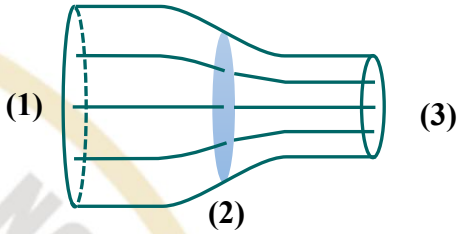
د/ هالـة عبـد السلام

رئيس الإدارة المركزية للتعليم العام

Chapter 4| Hydrodynamics

First: Multiple Choice

1) **The figure shows a flow tube through which the liquid flows in a laminar (streamline) flow. Then:**



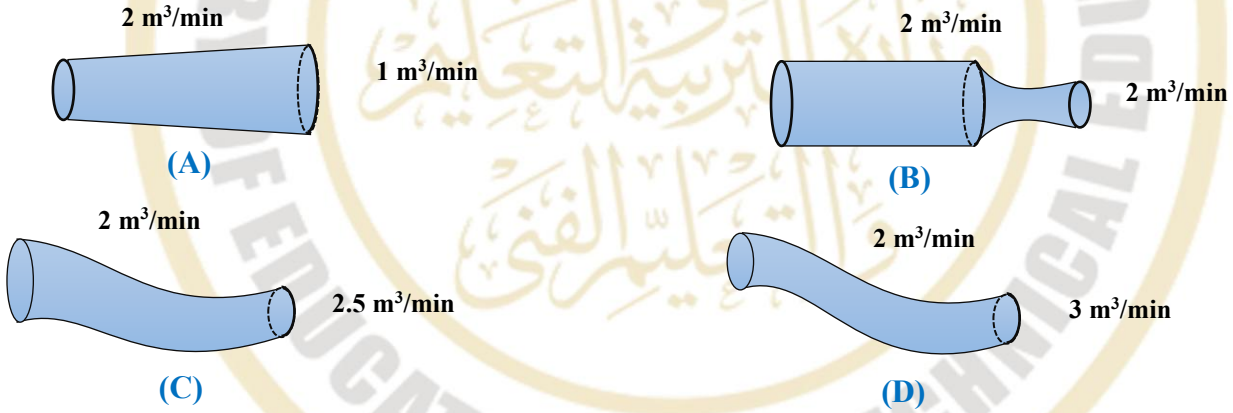
(A) The mass flow rate at (1) has the greatest value

(B) The mass flow rate at (2) has the greatest value

(C) The mass flow rate at (3) has the greatest value

(D) The mass flow rates are equal at all points

2) **From the figures given, determine which one represents laminar flow?**



3) In steady flow of liquids, the ratio between the number of streamlines passing through the wide section of the tube to the number of streamlines passing through the narrow section of the same tube equals ……

(A) Greater than one

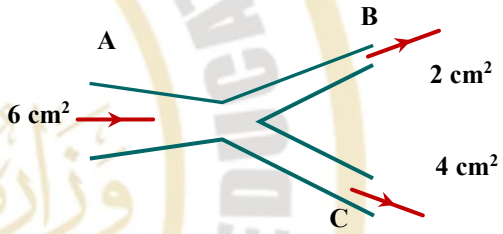
(B) Equal to one

(C) Less than one

(D) Equal zero

4) In the adjacent figure represents a tube with water flowing in steady flow:

If the velocity of water at A and C is 8 m/s and 4 m/s respectively, then its velocity at B is:



(A) 6 m/s

(B) 8 m/s

(C) 12 m/s

(D) 16 m/s

5) A liquid flows through a tube of uniform diameter (X) with velocity (v). If a cork stopper is placed at the end of the tube, and the diameter of the hole in the cork is equal to X/4, then the velocity of the liquid emerging through the hole in the cork equals ……

(A) 16 v

(B) 4 v

(C) 1/4 v

(D) 1/16 v

6) **The figure shows equal quantities of different liquids poured into identical funnels. Given that viscosity: M > Z > X > Y**

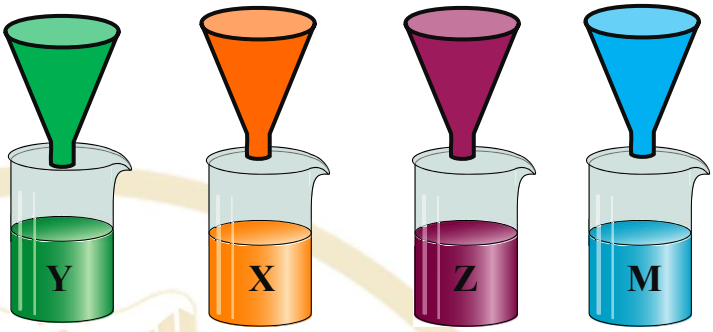
Which liquid collects in the container first?

(A) Liquid M

(B) Liquid Y

(C) Liquid X

(D) Liquid Z



7) **Can water be used for lubricating metallic machines?**

(A) Yes, because it is a low-cost liquid and it cools the machine parts.

(B) No, because its viscosity is low and it causes corrosion of metals.

(C) Yes, because it adheres to the machine parts, fully covering and protecting them from corrosion.

(D) No, because liquid water cannot be used for cooling metals.

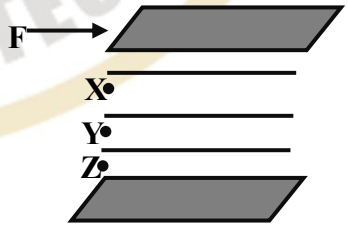
8) **A liquid is confined between two parallel plates. A tangential force is applied to the upper plate to move it, so the velocity of the points shown in the figure will be as follows:**

(A) $V_Z < V_Y < V_X$

(B) $V_Z = V_Y = V_X$

(C) $V_Z < V_Y = V_X$

(D) $V_Z > V_Y > V_X$



9) **Four identical metallic balls are fallen down from the same height, each ball toward a separate jar where each jar contains a different liquid from the other jars then the taken time by each ball to reach the bottom of the jar is recorded in each case as the following:**

The jar	The time taken by the ball to reach the bottom
1	0.2 s
2	0.3 s
3	0.6 s
4	1 s

Which jar contains the liquid with higher viscosity?

(A) Jar 1

(B) Jar 2

(C) Jar 3

(D) Jar 4

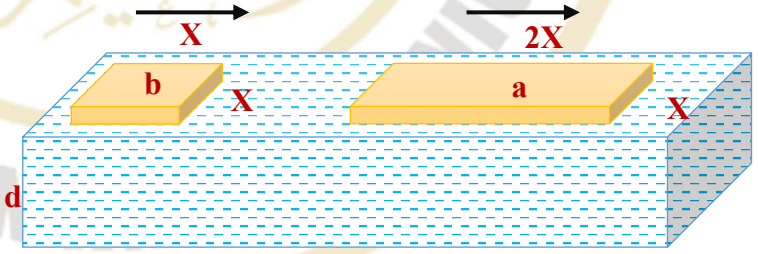
10) **Two plates, a and b move on the surface of a liquid with the same velocity. The ratio between the forces F_a/F_b is equal to the ratio:**

(A) 2/1

(B) 1/1

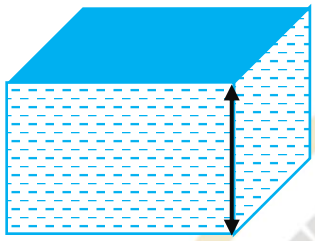
(C) 4/1

(D) 1/2



11) **The figure represents a sample of a liquid confined between two plates: the lower plate (stationary) and the upper plate (moving). Which of the following graphs represents the relationship between the velocity of flow of each liquid layer (v) and the depth of that layer (d)?**

The upper plate (moving)



Second: Essay

12) **Three taps are used to fill a tank. the first fills the tank in 1 hour, the second fills the tank in 1/2 hour and the third fills the tank in 1/4 hour.**
Calculate the time required to fill the tank if all three taps are opened at the same moment.

13) **A main artery of an adult person has a cross-sectional area of 3 cm^2 and a blood flow velocity of 30 cm/s. The blood is distributed into a number of capillaries, each having a cross-sectional area of 3×10^{-5} m^2 and a velocity of 0.05 cm/s. Calculate the number of capillaries.**

Chapter 4| Hydrodynamics

Group (A)

First: Multiple Choice

1) A tube of diameter 10 cm ends with a diameter 2.5 cm. If the velocity of water in the wide section of the tube is 1 m/s.
Given that the density of water is 1000 kg/m^3

	The velocity of water at the end.	The mass of water flowing per minute through any cross-section of the tube.
(A)	4 m/s	118 kg
(B)	8 m/s	235 kg
(C)	16 m/s	472 kg
(D)	25 m/s	785 kg

2) In a steady flow, if the radius of a tube is doubled, the mass flow rate .....
(A) Doubles
(B) decreases to a quarter
(C) remains constant
(D) decreases to half

3) If the cross-sectional area of a tube in which a liquid flows steady increases to double, the volume flow rate ……

(A) Doubles

(B) decreases to half

(C) remains constant

(D) decreases to a quarter

4) When measuring the speed of a liquid in a pipe, the value of the speed at a certain point at that moment was 8 m/s, and at another moment at the same point the speed became 9 m/s, then the type of flow is .....

(A) Turbulent flow

(B) Steady flow

(C) Steady then turbulent flow

(D) Turbulent then steady flow

Second: Essay Questions

5) In human body, why is the speed of flow of blood in the major artery greater than its speed in blood capillaries although the area of capillary is less than the area of artery?

Group (B)

First: Multiple Choice

1) **The ratio between the sedimentation rate of red blood cells in anemia patients and in rheumatic fever patients is .....**

   (A) Less than one

   (B) Equal one

   (C) Greater than one

   (D) less or greater than one

2) **Water flows steadily through a pipe of radius 4 cm with a speed of 2 m/s. The volume of the liquid that flows in one minute is …… m^3**

   (A) 0.151

   (B) 0.302

   (C) 0.452

   (D) 0.603

3) **If you know that the volume flow rate of a liquid is $2x10^2$ m^3/s and the mass flow rate is $2 x 10^5$ kg/s, then its density is ..... kg/m^3**

   (A) 500

   (B) 750

   (C) 1000

   (D) 1500

4) You have four wooden plates of different areas where $A_1 > A_2 > A_3 > A_4$.

They are placed on the surface of the same liquid, and each is to be moved with the same speed.

If the depth of the liquid is the same, which of the following represents the correct order of the force required to move them?

(A) $F_1 > F_2 > F_4 > F_3$

(B) $F_1 > F_4 > F_2 > F_3$

(C) $F_1 > F_3 > F_2 > F_4$

(D) $F_1 > F_2 > F_3 > F_4$

Second: Essay

5) A surface layer of a liquid of area 2 m^2 moves with a velocity of 2 m/s due to the action of a tangential force of 4 N, while the stationary layer of the liquid lies at a depth of 2 cm below the surface.

Calculate:

(a) The coefficient of viscosity of the liquid.

(b) The force required for the moving layer to reach double the speed.

Group (C)

1) **A certain mass flow rate of two different liquids passes through two flow tubes. The ratio of their densities is 1 : 4 , and the volume of the first liquid is twice that of the second. If the mass flow rate is constant, then the ratio t_1/t_2 ……**

(A) 1/2

(B) 2/1

(C) 1/4

(D) 4/1

2) **When performing an erythrocyte sedimentation rate (ESR) test for three individuals — the first suffering from rheumatic fever, the second from anemia, and the third being healthy — the final rate of red blood cell sedimentation will be highest in:**

(A) All three persons are the same

(B) The second person

(C) The first person

(D) The third person

3) **A car starts from rest and its speed increases until it exceeds 120 km/h. Which of the following graphs correctly represents the relationship between speed and air resistance?**

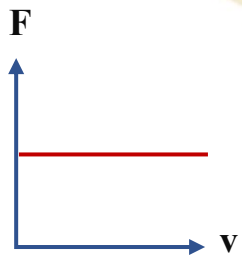


(A) (2)

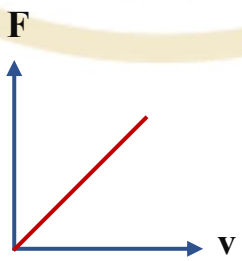
(B) (3)

(C) (4)

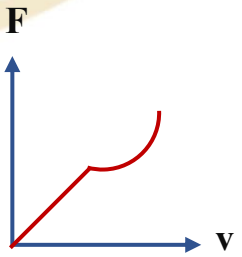
(D) (1)



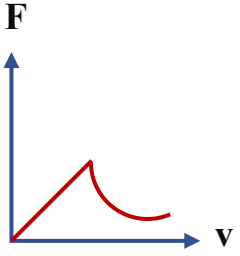
(1)



(2)



(3)



(4)

4) **A liquid flows through a tube with a speed v.**

If its speed increases to 2v, the ratio r_2/r_1 is ……

(A) 1/2

(B) $\sqrt{2}$ / 1

(C) 2 / 1

(D) 1 / $\sqrt{2}$

Second: Essay

5) **A circular plate of diameter 140 cm slides with a speed of 0.1 m/s on a layer of viscous liquid of thickness 2.5 mm and coefficient of viscosity 2.5 kg/(m·s).**

Calculate the tangential force acting on the plate.

(Given that π = 22/7)

- The end -