



*Phys 101(Mid-2)*

*Name: ..... ID: ..... Section: ...*

الدرجة المستحقة	درجة السؤال	رقم السؤال
	5	الأول
	5	الثاني
	5	الثالث
	5	الرابع
	20	المجموع

ملاحظات هامة:

1-يمنع استخدام الجوال او المترجم منعاً باتاً.

2-اجابتين للسؤال الواحد تلغي درجة السؤال .

**\*Useful Constants:  $g= 9.8 \text{ m/s}^2$  and  $k_e=9 \times 10^9 \text{ N.m}^2/\text{C}^2$ .**

*Good luck... ☺*

**Q1: Choose the correct answer of the following question and write its letter in the following table: (one point for each)**

1	2	3	4	5
A	A	C	A	E

1- When a glass rod is rubbed with silk, which of the following statements best describes what happens?

- a) **Electrons are removed from the rod**
- b) The silk remains neutral
- c) Protons are removed from the silk
- d) Positive ions are removed from the silk
- e) The silk is charged positively

2-Work is done when

- a) **The displacement is not zero.**
- b) The displacement is zero.
- c) The force is zero.
- d) The force and displacement are perpendicular.

3- The kinetic energy of a 3 kg block moving with constant velocity 1.2 m/s:

- a) 3.6J
- b) 1.8J
- c) **2.16J**
- d) 4.32J
- e) 1.98J

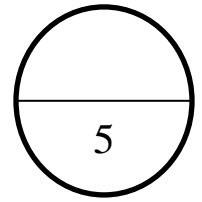
4- Two charges located as shown in figure. At which point the resultant force is equal to zero

- a) **X**
- b) Y
- c) Z
- d) T



5-The work done by a vertical force 20 N acting on moving 10 Kg object which displaced 10m:

- a) 200J
- b) -200J
- c) 2J
- d) - 2 J
- e) **0**



**Q2:**

**Write (T) if the statement is true and (F) if the statement is false: (one point for each)**

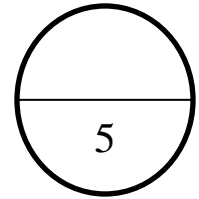
1-A moving car on a horizontal road has a positive gravitational potential energy ( **F** )

2- In the presence of frictional force, mechanical energy is conserved(**F**)

3- If the surface has no friction, then  $\Delta K$  equals your push times the distance of your push. (**T** )

4- The electric force is vector quantity ( **T** )

5- There are only two types of charges (**T** )



**Q3:**

Consider a freely falling ball that has a speed of 6 m/s at a certain height. Use conservation of mechanical energy to calculate the speed of the ball after falling additional 14.4 m?

$$\Delta E = 0$$

$$\Delta K + \Delta U = 0$$

$$\frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 + mgy_f - mgy_i = 0$$

$$\frac{1}{2}v_f^2 - \frac{1}{2}6^2 + 0 - (9.8)(14.4) = 0$$

$$v^2 - 36 - 282.24 = 0$$

$$v = \sqrt{318.24} = 17.84 \text{ m/s}$$

**Q4:**

Calculate the resultant electric force exerted on 3nC?

$$1) r_{13} = \sqrt{6^2 + 6^2} = 8.5m$$

$$r_{23} = \sqrt{6^2 + 6^2} = 8.5m$$

$$2) F_{13} = k_e \frac{|q_1||q_3|}{r_{13}^2} = 9 \times 10^9 \frac{2 \times 10^{-9} \times 3 \times 10^{-9}}{8.4^2}$$

$$= 7.5 \times 10^{-10} N$$

$$F_{23} = k_e \frac{|q_1||q_3|}{r_{23}^2} = 9 \times 10^9 \frac{6 \times 10^{-9} \times 3 \times 10^{-9}}{8.4^2}$$

$$= 2.24 \times 10^{-9} N$$

$$3) \theta_{13} = -45^\circ$$

$$\theta_{23} = 45^\circ$$

$$4) F_{13x} = F_{13} \cos(-45^\circ) = 5.33 \times 10^{-10} N$$

$$F_{13y} = F_{13} \sin(-45^\circ) = -5.33 \times 10^{-10} N$$

$$F_{23x} = F_{23} \cos(45^\circ) = 1.6 \times 10^{-9} N$$

$$F_{23y} = F_{13} \sin(45^\circ) = 1.6 \times 10^{-9} N$$

5)

$$F_x = F_{13x} + F_{23x} = 2.12 \times 10^{-9} N$$

$$F_y = F_{13y} + F_{23y} = 1.07 \times 10^{-9} N$$

6)

$$\vec{F} = F_x \hat{i} + F_y \hat{j} = 2.12 \times 10^{-9} \hat{i} + 1.07 \times 10^{-9} \hat{j} N$$

