KUWAIT COLLEGE OF SCIENCE & TECHNOLOGY
كليـــة الكـــويت للعلـــــوم والتكنولـــوجيا
Private University جـامعـــــة خـاصـة

SAMPLE ENTRANCE EXAM – PHYSICS (B)

Student Name: _____ **School:** _____

Maximum Marks: 100 ***Duration: 90 Minutes***

Note*: *Attempt all the questions.

Question 1

(5 marks)

The mass and the volume of a body are 4.237 kg and 2.5 m^3, respectively. The density (in kg/m^3) of the body in ***correct significant figures*** (الارقام الهامة او المؤثرة المناسبة) is

(Hint; Density (كثافة)= Mass (كتلة)/Volume(حجم))

Answer:

Question 2

(5 marks)

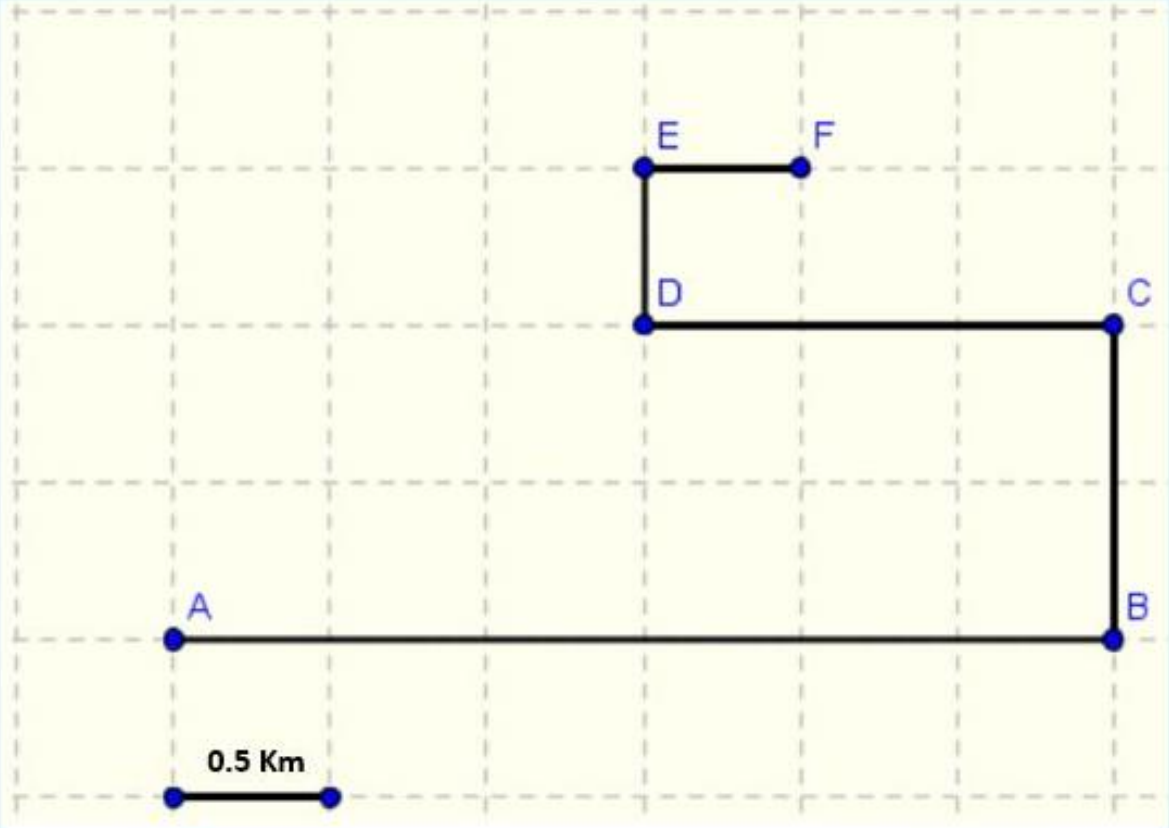
The number of significant figures (الارقام الهامة او المؤثرة) in 0.002900 is

Select one:

- a. 2
- b. 3
- c. 4
- d. 5

Question 3 (5+5=10 marks)

An object moves along the grid through the points A, B, C, D, E, and F as shown below.



(a) The total distance (المسافة) covered by the object from A to F is _____ km.

(b) The total displacement (الازاحة) covered by the object from A to D is _____ km.

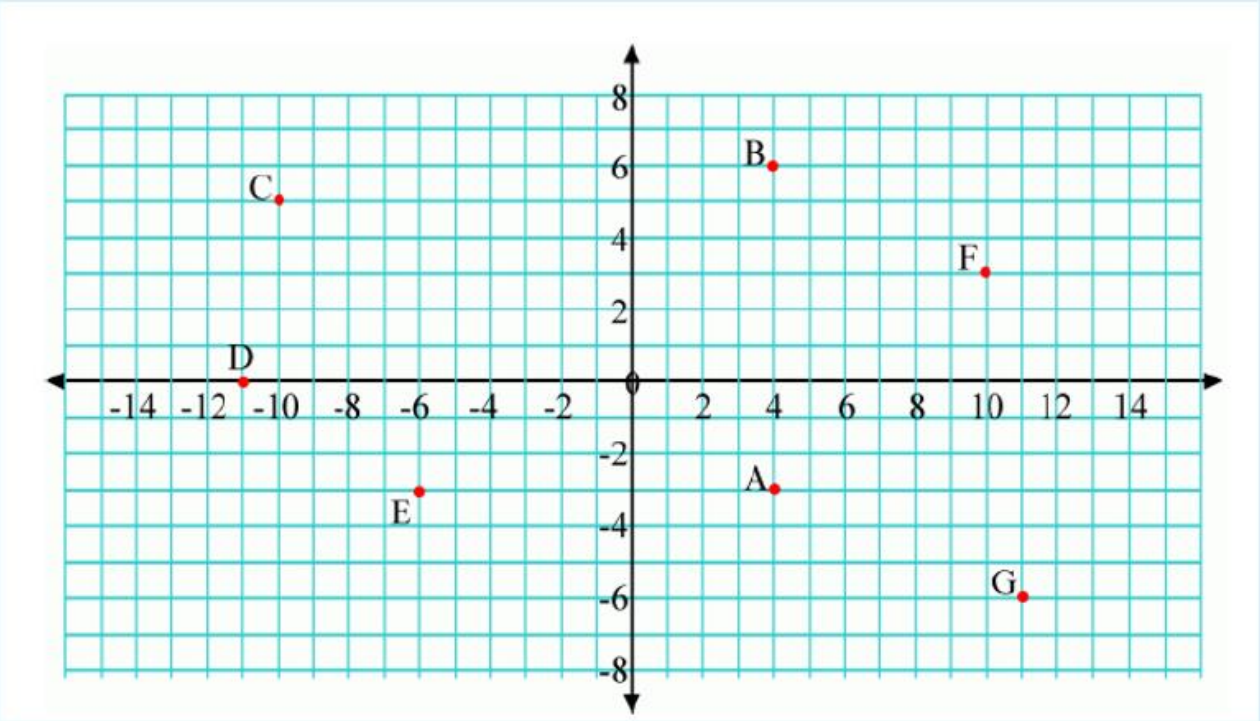
Question 4 (5 marks)

A car is at velocity of 20 km/h. How far does the car travel if the velocity (سرعة) changes to 40 km/h with an acceleration (العجلة) of 5 km/h^2 ? _____ km.

Question 5

(2+3=5 marks)

Figure below shows the vectors that point from A to the other point F.



(a) Express the vector AF in component notation (طريقة المركبات) $\square\,\hat{i} + \square\,\hat{j}$

(b) Find the magnitude of the vector (مقدار المتجه) AF $\square$.

Question 6

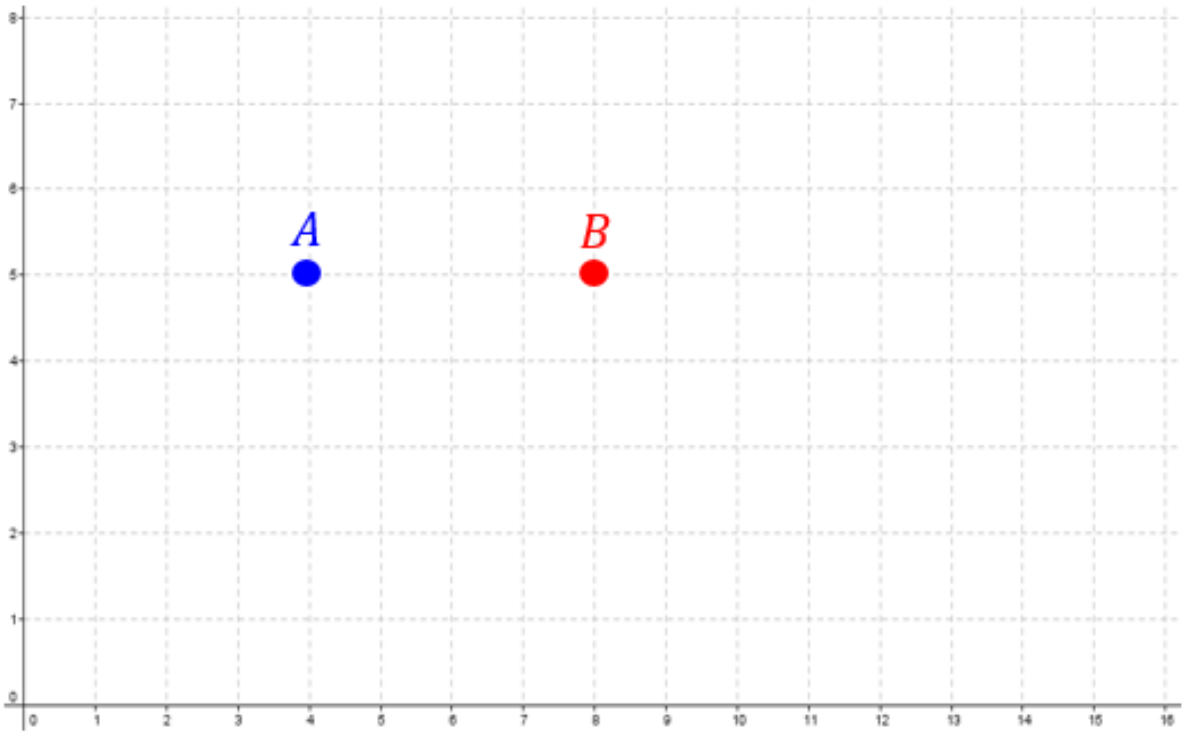
(5 marks)

A car is at velocity of 20 km/h. If the velocity changes to 40 km/h after the car travels 120 km, what is its acceleration (العجلة)? $\square$ km/h.

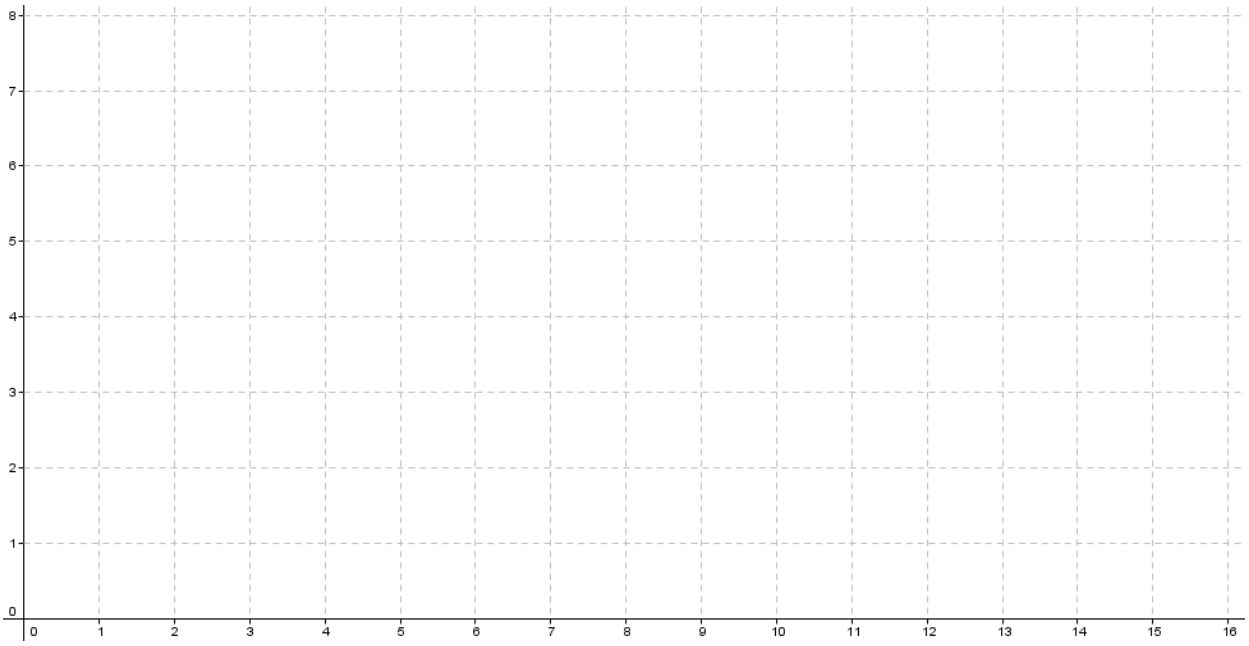
Question 7

(5 marks)

Person B is **<u>4 m to the right</u>** of person A relative to the origin O. Person B walks a displacement $\vec{D}_B = (2\hat{\imath} + 2\hat{\jmath})\ m$ and person A walks a displacement $\vec{D}_A = (3\,\hat{\imath} - 2\hat{\jmath})\ m$.



Sketch neatly the **<u>vector that points from A to B</u>**, $\vec{D}_{AB}$.



Question 8 (5 marks)

A car traveling at *15 m/s* starts to decelerate steadily. It comes to a complete stop in 10 seconds. What is it's acceleration (عجلة)? _____ m/s^2.

Question 9 (5 marks)

Suppose that an object is accelerating (عجلة) at a rate of 2 m/s^2. If the net force (محصلة القوي) is tripled (تلاتة اضعاف) and the mass is doubled (تزداد للضعف), then what is the new acceleration (in m/s^2) of the object?

Answer: _____

Question 10 (5+5=10 marks)

An object, of mass 20 kg, changes its speed from 80 m/s to 100 m/s after covering a distance of half a kilometer.

(a) What is the acceleration (عجلة) of the object? _____ m/s^2

(b) What is the magnitude of the net force (محصلة القوي) that acted on the object?
_____ N.

Question 11 (5+5=10 marks)

A vector $\vec{A}$ is given by:

$$\vec{A} = 4\hat{\imath} + 3\hat{\jmath}$$

(a) Find the **magnitude** of vector $\vec{A}$.
(b) Find the **unit vector** of $\vec{A}$.

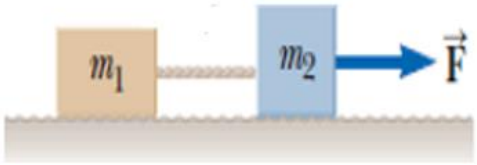
Solution:

(a):

(b):

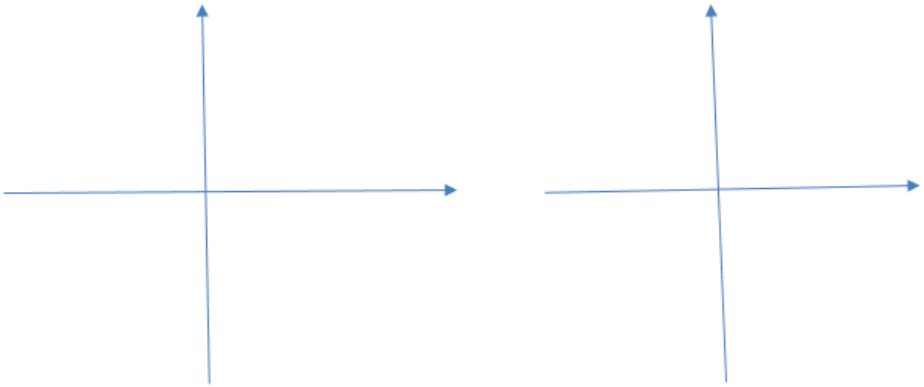
Question 12 (5+5=10 marks)

In the diagram below, a massless string connects two blocks m_1 and m_2 on a flat tabletop. A force of magnitude F pulls on block of mass m_2 as shown.



Draw ***separate*** well-labeled free-body diagrams showing all the forces acting on m_1 and m_2.

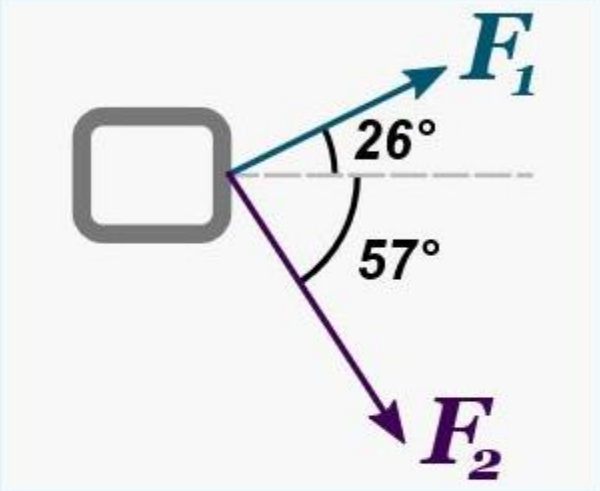
Solution



$F_{net}^{m_1} =$ $F_{net}^{m_2} =$

Question 13 (2.5x4=10 marks)

An empty box is pulled by two men with two forces, as shown below. $\vec{F}_1 = 10\ N$ and $\vec{F}_2 = 15\ N$.



(a) Find the x-components of the resultant force (اكس مركبة محصلة القوي فى اتجاه) _____ N

(b) Find the y-component of the resultant force (مركبة محصلة القوي فى اتجاه واي) _____ N

(c) Find the magnitude of the resultant force (مقدار محصلة القوي) _____ N

(d) If the box has a mass of 10 kg, what is the acceleration (عجلة) produced by the resultant force (محصلة القوي) _____ m/s^2

Question 14 (10 marks)

A constant force acting on a body of mass 10 kg changes its velocity from 10 m/s to 35 m/s in 10 seconds. Find the ***acceleration*** produced by the applied force and find the applied force.

Solution:

Formula Sheet

$$Velocity, v = \frac{displacement}{time} = \frac{x}{t}$$

$$Acceleration, a = \frac{velocity}{time} = \frac{v}{t}$$

$$v = u + at, \quad v^2 - u^2 = 2ax, \qquad x = ut + \frac{1}{2}at^2$$

$$\vec{A} = |A|\,\hat{A}, \quad \hat{A} = \frac{\vec{A}}{|A|}, \qquad \vec{A} = A_x\hat{\imath} + A_y\hat{\jmath}$$

$$\left|\vec{R}\right| = \sqrt{R_x^2 + R_y^2}, \qquad \tan\alpha = \frac{R_y}{R_x}, \qquad \hat{R} = \frac{\vec{R}}{|R|}.$$

$$\vec{p} = m\vec{v}, \qquad \vec{F} = m\vec{a}, \qquad F_f = \mu_s N$$