

ADDIS ABABA EDUCATION BUREAU
ARADA SUB-CITY EDUCATION OFFICE FIRST SEMESTER
PHYSICS EXAMINATION FOR GRADE 12
JANUARY 2018 E.C

GENERAL DIRECTIONS

IN THIS EXAMINATION, THERE ARE A TOTAL OF 60 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND BLANK ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND EXAMINATION PAPER CAREFULLY.

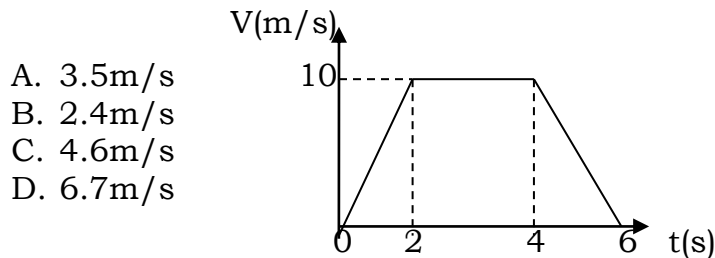
USE ONLY PENCIL TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY INCLUDING ANSWERS YOU HAVE CHANGED FROM YOUR ANSWER SHEET.

YOU ARE ALL ALLOWED TO WORK ON THE EXAM FOR 2:30 HOURS. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTION.

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DON'T TURN THIS PAGE OVER UNTIL YOU ARE TOLD TO DO SO.

- Which of the following is **not true** about uniform motion?
 - It covers equal interval of distance at equal interval of time in a fixed direction.
 - Its speed remains constant throughout its motion along straight line.
 - Its acceleration stays uniform throughout its motion on its way at a given time.
 - Its graph is a straight line with constant positive slope.
- Two students walk from school to home student A takes a short cut in straight line, but student B follows the road which curves around a hill. Which one is **true**?
 - Student A has greater distance but the same displacement
 - Student B has greater distance but the same displacement
 - Student A has greater displacement but the same distance.
 - Both distance and displacement are the same for both students.
- The speed – time ($V - t$) graph of an object of an object moving along a straight line is shown in the figure below, what is the average speed of the whole journey?



- A man runs one-fourth of his destination at 80 m/s and walks the rest of the way at 10 m/s. What is his average speed for the entire tripe?
 - 12.8m/s
 - 36m/s
 - 24.8m/s
 - 4.9m/s
- Which statement is **wrong** about average velocity and instantaneous velocity?
 - Average velocity depends on total displacement, instantaneous velocity does not.
 - Average velocity and instantaneous are equal when an object moves in straight line with constant velocity.
 - The speed shown on a speedometer at a moment represents instantaneous velocity.
 - The average velocity expresses motion of an object at specific moment in time.
- If the force of attraction b/n the two point masses at a distance r is 250N. What will be the new force if the distance b/n them decreases by quarter for the same masses? ($G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$)
 - 1600N
 - 8000N
 - 4000N
 - 1200N

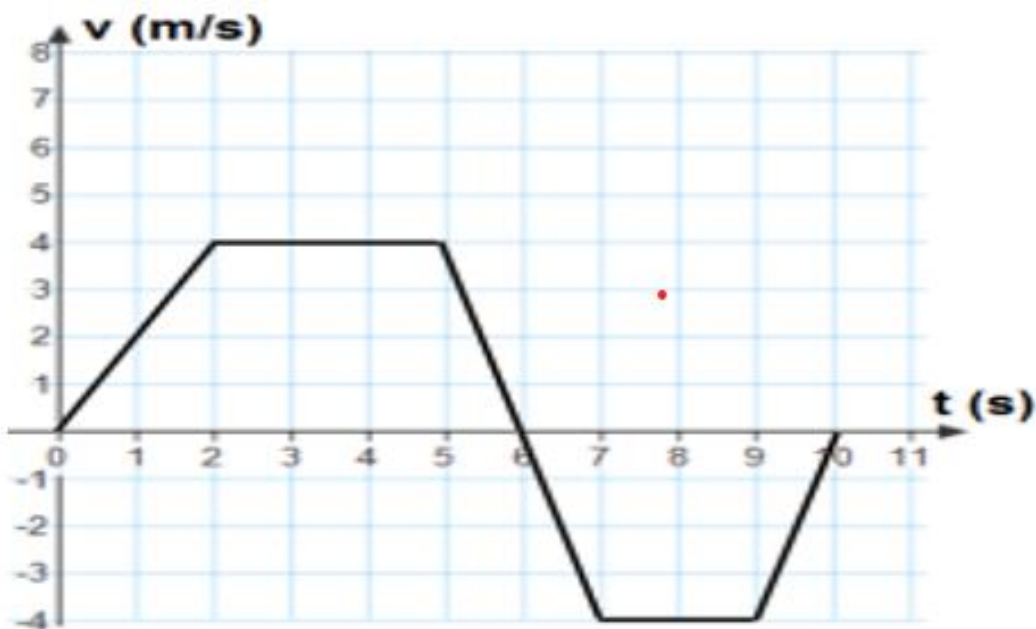
7. All are dimensionless except

- A. Specific gravity B. Yong modulus C. Strain D. Index of refraction

8. Which of the following is necessarily **true**?

- A. If the velocity of an object is zero, then acceleration is also zero.
B. If acceleration of an object is zero then its velocity is also zero.
C. Deceleration mean that acceleration is necessarily negative
D. The instantaneous acceleration has the same value as the average acceleration if the motion is uniformly accelerated motion.

9. The graph below describes the relationship between velocity and time for a moving object. From this graph which one of the following is WRONG?

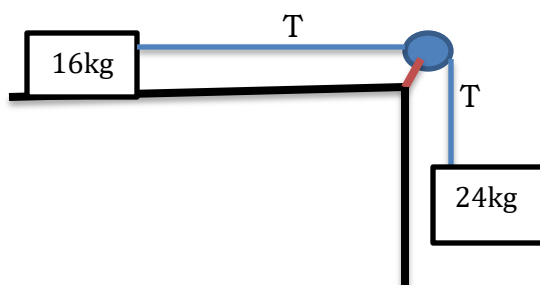


- A. The acceleration at time $t = 1$ sec is 2m/s^2
B. The total displacement for the entire trip is 6m
C. The acceleration at time $t = 6$ sec is 5m/s^2
D. The total distance traveled for the entire trip is 30m

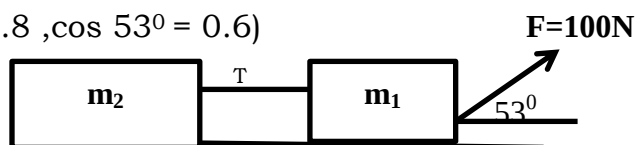
10. A certain force gives mass m_1 and acceleration of 6m/s^2 and mass m_2 acceleration of 18m/s^2 . What acceleration would it give when the two masses added together?

- A. 4.5m/s^2 B. 24m/s^2 C. 12m/s^2 D. 3.6m/s^2

11. Which of the following sets of quantities remains constant in **uniform circular motion**?
- A. Velocity, speed, radius C. speed, acceleration, radius
 B. Velocity, acceleration, kinetic energy. D. speed, radius, kinetic energy
12. An earth satellite has an orbit radius which is 4 times that of a communication satellite C. What is the periods of revolution of the earth's satellite in terms of communication satellite C? (use period of the earth= 1year)
- A/ $T_{es} = 8T_c$ B/ $T_{es} = 4T_c$ C/ $T_c = 5T_{es}$ D/ $T_c = 2T_{es}$
13. The acceleration that a force produces on 80kg mass is larger by 6m/s^2 the acceleration it produces on 100kg. What will be the acceleration on 80kg mass?
- A. 24m/s^2 B. 18m/s^2 C. 30m/s^2 D. 40m/s^2
14. A 20kg block is placed on a smooth horizontal surface. A horizontal rope over alight frictionless pulley and is attached to 24kg body as shown below ($g=10\text{m/s}^2$). What will be the tension on the rope? A. 96N B. 72N C. 6N D 44N

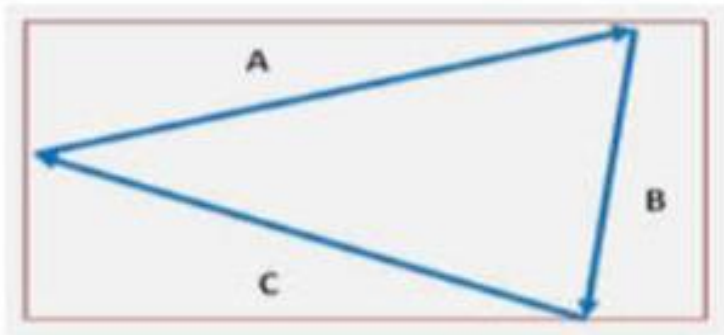


15. When a driver applies a sudden break to save a child at a center of the road, you are moving forward from your sit and you may collide with others, that's why you are advised to fit your belt on your sit. Which Newton's laws express this phenomenon best?
- A. Newton's first law C. Newton's third law
 B. Newton's second law D. Newton's gravitational law
16. How much work is required to accelerate a 900Kg car from 10m/s to 20m/s ? (Ignore friction) A. $7.46 \times 10^5\text{J}$ B. $2.46 \times 10^5\text{J}$ C. $1.35 \times 10^5\text{J}$ D. $4.36 \times 10^5\text{J}$
17. Two masses $m_1 = 8\text{kg}$ and $m_2 = 4\text{kg}$ that are connected by a light string are pulled horizontally by 100N force that makes an angle of 53° to the horizontal as shown in the figure below. If the surfaces are frictionless, then what is the acceleration of the system? ($\sin 53^\circ = 0.8$, $\cos 53^\circ = 0.6$)

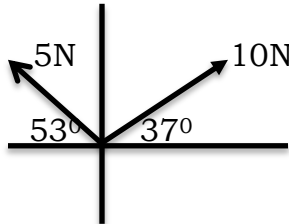


- A. 2m/s^2 C. 5m/s^2
 B. 4m/s^2 D. 1m/s^2

18. A horizontal force of 80N is applied on a 10kg block which is moving on a horizontal rough surface. If the coefficient of friction between the block and the surface is $\mu = 0.5$, what is the acceleration of the block?
- A. 8m/s^2 B. 2m/s^2 C. 18m/s^2 D. 3 m/s^2
19. Which one of the following is **false**?
- A. The slope of acceleration versus time graph is velocity
 B. The area under velocity versus graph is displacement
 C. The area under of acceleration versus time graph is velocity
 D. The slope of velocity versus time graph is of acceleration
20. In which one of the following case does work is done in physics?
- A. Holding a 200N load without moving.
 B. Pushing a concrete wall horizontally by applying horizontal force.
 C. Pushing a block horizontally by applying horizontal force.
 D. Carrying a load by shoulder and moving along straight line a distance of 2km.
21. Which one of the following correctly expressed about friction strength?
- A. Sliding friction > rolling friction > static friction.
 B. Sliding friction > Static friction > rolling friction
 C. Sliding friction < *rolling* friction > static friction.
 D. Rolling friction < Sliding friction < static friction.
22. An object of mass is dropped from a certain height to the ground; at what height above the ground do we assume that the object has the same potential and kinetic energies if its velocity is 20m/s ?
- A. 5m B. 20m C. 60m D. 40m
23. Which one of the following is NOT true about the three vectors?
- A. $-A=B+C$ B. $B=-C-A$ C. $A+B-C=0$ D. $A+B+C=0$

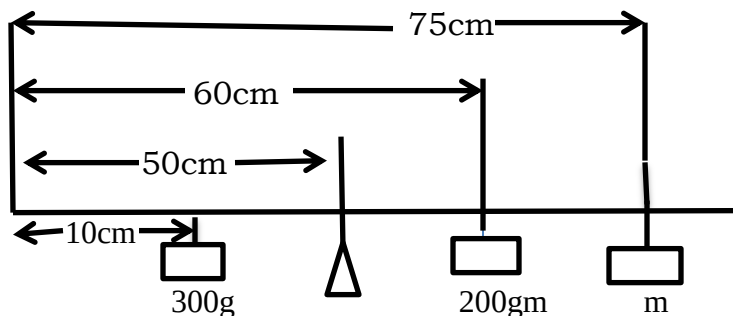


24. What will be the magnitude of the resultant and direction of the given vectors below? ($\sin 37^\circ = \cos 53^\circ = 0.6$, $\cos 37^\circ = \sin 53^\circ = 0.8$)



- A. $2\sqrt{5}N$ & $\tan^{-1} 2$, N of E C. $5N$ & $\tan^{-1} 2$, N of E
 B. $5\sqrt{5}N$ & $\tan^{-1} 2$, N of E D. $15N$ and $\tan^{-1} \frac{1}{2}$ E of N

25. A car initially at rest is uniformly accelerated along a straight road. The car passes two marks separated by 48m at 4s and 8s respectively. What is the acceleration of the car?
 A. $1m/s^2$ B. $3m/s^2$ C. $2m/s^2$ D. $4m/s^2$
26. An automobile driver spotted a truck 250m ahead of him moving on straight level Road, if a truck is moving uniformly at a velocity of 10m/s. How long will it take the automobile driver to overtake the truck if he drives his automobile at a velocity of 20m/s.
 A. 10s B. 50s C. 5s D. 25s
27. Which of the following is **False**?
 A. Materials with higher young modulus also possess greater bulk modulus.
 B. Materials with higher strain are highly elastic.
 C. Shearing stress happens when the deforming forces are tangential
 D. Materials with smaller strain are highly elastic.
28. A 400kg load is hung on a wire having a length of 6.0m and cross-sectional area of $0.40 \times 10^{-5} m^2$ and the young modulus $8.00 \times 10^{10} N/m^2$. What is its increase in length?
 A. 0.075m B. 7.25m C. 0.09m D. 0.05m
29. A uniform meter stick supported at 50cm mark has 300gm and a 200gm masses hanging from it at the 10cm and 60cm marks respectively. What must be hung at 75cm mark to keep the meter stick balanced?



- A. 400gm B. 250gm C. 500gm D. 300gm

30. Two charges of $+9\mu\text{C}$ and $+25\mu\text{C}$ are 40cm apart. At what distance from either charge is the field zero?

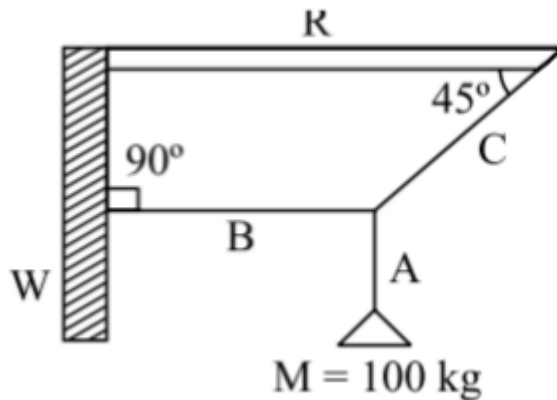


- A. 15cm from q_1 & 25cm from q_2
- B. 10cm from q_1 & 15cm from q_2
- C. 35cm from q_1 & 15cm from q_2
- D. 20cm from q_1 & 45cm from q_2

31. The electric force between two positive charges at a distance of 0.2m is 10^{-9}N . At what distance between these charges would this force have a magnitude of 10^{-5}N ?

- A. $4 \times 10^{-3}\text{m}$
- B. $3 \times 10^{-3}\text{m}$
- C. $2 \times 10^{-3}\text{m}$
- D. $5 \times 10^{-3}\text{m}$

32. A mass M of 100 kg is suspended with the use of strings A, B, and C as shown in the figure, where W is the vertical wall and R is a rigid horizontal rod. The tension in the string B is ($\sin 45^\circ = \cos 45^\circ = 0.7$, $\sin 90^\circ = 1$, $\cos 90^\circ = 0$, $g = 10\text{m/s}^2$)



- A. 1000 N
- B. 200 N
- C. 500
- D. zero

33. Suppose a given resistor is connected to a constant voltage supply. When will the current in the resistor decrease?

- A. When the length of the resistor is reduced.
- B. When the resistance of the resistor is decreased.
- C. When cross-sectional area of the resistor is increased.
- D. When the length of the resistor is increased.

34. Consider four heavily charged plastic rods. Rods 1 and 2 attract each other whereas rods 3 and 4 repel each other. Which one of the following statements is correct?

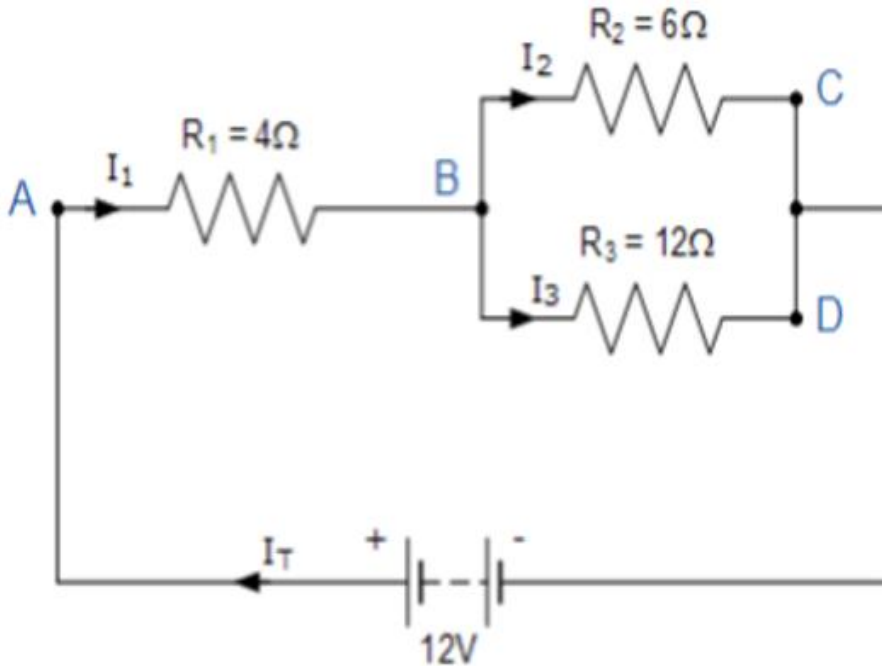
- A. If rod 1 repels rod 3, rod 2 also repels rod 4.
- B. If rod 1 attracts rod 4, rod 2 also attracts rod 3.
- C. If rod 1 attracts rod 3, rod 2 also attracts rod 4.
- D. If rod 1 repels rod 4, rod 2 attracts rod 3.

35. A body falls from a height of 100m. At the same instance a second body is thrown vertically downward from a height of 400m with a velocity v_0 . The two bodies strike the earth at the same instant. Find the initial velocity of the second body.

- A. $10\sqrt{5}\text{ m/s}$
- B. $30\sqrt{5}\text{ m/s}$
- C. $20\sqrt{5}\text{ m/s}$
- D. $40\sqrt{5}\text{ m/s}$

36. From the given circuit below, the current drop in 6Ω and 12Ω resistors respectively is

- A. 3A & 2A B. 4A & 3A C. 1A & 0.5A D. 1.2A & 3A



37. A wheel starts rotating at 1.2HZ to 1.8HZ in 2 seconds. What will be the angular displacement it covers within 2 seconds.

- A. $3\pi\text{rad}$ B. $6\pi\text{rad}$ C. $4\pi\text{rad}$ D. $0.3\pi\text{rad}$

38. An egg is placed at the bottom of a vessel filled with water common salt is slowly Added and dissolved in the water until the egg rises and floats at the surface. From this information, what can you concludes.

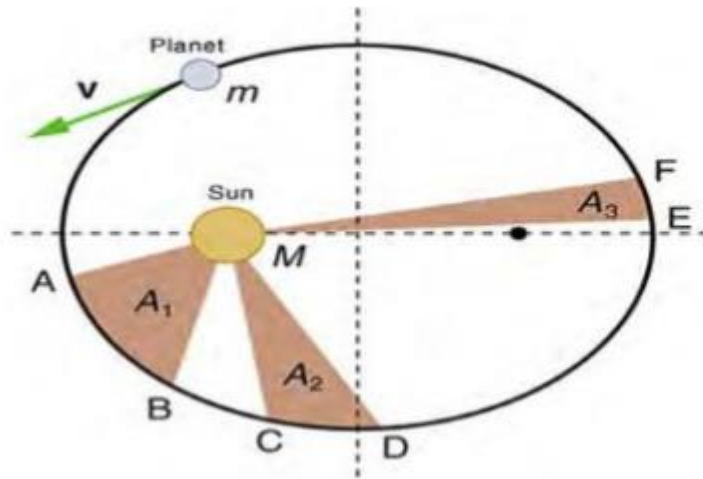
- A. The density of salt exceeds the density of the egg.
 B. There is a tendency for calcium in the eggshell to be repelled by sodium chloride.
 C. Salt sinks to the bottom
 D. There is no physical explanation

39. A substances whose density is equal to $0.4 \times 10^3 \text{kg/m}^3$ floats in fresh water ($\rho_w = 1000 \text{kg/m}^3$) what fraction of its volume is submerged?

- A. $1/2$ B. $1/5$ C. $2/5$ D. $1/4$

40. In the figure, the time it takes for the planet to go from A to B, C to D, and E to F is the same. Compare the areas A_1 , A_2 , and A_3 in terms of size.

- A. $A_1 \neq A_2 \neq A_3$ C. $A_1 = A_2 > A_3$
 B. $A_1 = A_2 = A_3$ D. $A_1 > A_2 = A_3$



41. Physics be applied to everyday life except?

- A. The development of telephone, telegraph and telex have enabled us to transmit important messages instantly.
 B. The development of radio, television, satellites have increased the means of communication.
 C. Rapid means of transport have increased the pace of transportation through air, water, and land.
 D. Enhancing artistic expressions and career opportunities by ignoring real world implications.

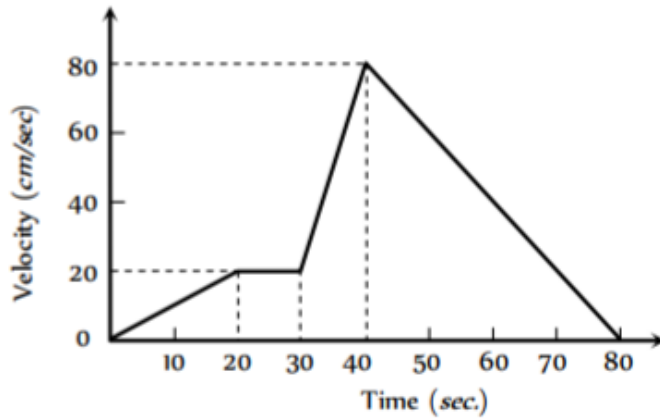
42. Which one is wrong action when a leak is suspected in high-pressure equipment?

- A. Shut down and depressurize the system safely.
 B. Use hands to feel for escaping fluid from the system
 C. Keep a safe distance from the suspected leak.
 D. Report the issue according to safety procedures

43. Which of the following best describes the importance of career awareness in physics education?
- It is optional and has a little impact on future employment.
 - It is irrelevant; students should only focus their theoretical knowledge.
 - It helps students understand the diverse career opportunity, provide hand-on experience and networking system.
 - It primarily focuses students' interest in academia and it serves no purpose in advancing physics knowledge.
44. If you feel a pressure three times that of the atmospheric pressure when you are deep under water, How high is the water level from your position?(atm= 10^5 pa, density $\rho_w = 10^3 \text{kg/m}^3$, $g = 10 \text{m/s}^2$ and assume atmospheric pressure is exerted on it.)
- 20m
 - 10m
 - 40m
 - 30m
45. Playing a dart game best explain_
- Concurrent vectors
 - parallel vectors
 - Collinear vectors
 - Coplanar vector
46. The vertical component of force acting at an angle of 37° to the horizontal is 12N. What will be the magnitude of the force and its horizontal component respectively?
- 50N, 30N
 - 20N, 16N
 - 20N, 25N
 - 5N, 25N
47. For what value of C lying on the x-axis does if $\vec{A} \cdot (\vec{B} - \vec{C}) = 0$ if $A = 5i - 3j + 4k$ and $B = 2i + 4j - 5k$?
- 5i
 - 3.2i
 - 1.9i
 - 4.4i
48. What will be the value of m such that vector $\vec{A} = 6i - 4j + 3k$ and vector $\vec{B} = 2i + mj - 2k$ if the two Vectors are perpendicular?
- 2.5
 - 3
 - 1.5
 - 4
49. The resultant of two vectors A and B is $\sqrt{160}$ when the angle between them is 120° . if the angle between them is 60° , their resultant would be $\sqrt{90}$. What is the value of B if the value of A is 5m? ($\sin 60^\circ = 0.87$, $\cos 60^\circ = 0.5$)
- 10m
 - 2m
 - 8m
 - 20m
50. Which of the following is **NOT** correct about momentum?
- The total linear momentum of an isolated system remains constant.
 - Impulse is the change in momentum.
 - Impulse and momentum have the same unit.
 - Linear momentum is mass multiplied by impulse
51. In **aero –space engineering**, the stability of satellite in orbit is ensured by
- Air friction
 - Newton's law of motion and gravitational force
 - Electromagnetic shielding
 - Laser production

52. What is the main focus of **physics** compared to **chemistry**?
- physics studies reaction b/n substances but chemistry studies about motion.
 - Physics studies fundamental laws of matter and energy, while chemistry studies composition and reaction of matter.
 - Physics studies at macro levels about atoms while chemistry studies at micro levels.
 - Physics concerns transformation of physical matter but chemistry concerns the movement of physical objects.
53. The principle behind **optical fibers** in medical imaging (endoscopy) is
- Total internal reflection
 - Diffraction
 - Polarization
 - Scattering
54. Which of the following best describes **cruise missiles**?
- They are propelled by rocket
 - It follows a high space-based trajectory before descending target.
 - It travels at a very high speed without guidance.
 - It flies at low altitudes with continuous engine power and precise guidance.
55. A body is thrown vertically upward and at the instant when it reaches its maximum height;
- Its velocity is zero and its acceleration is constant
 - Its velocity is zero and its acceleration is also zero.
 - Its velocity is zero but its acceleration is maximum.
 - Its velocity is zero but its acceleration is minimum
56. A particles move in a circular path of radius 0.1m with a constant angular speed of 10π rad/s. What is the acceleration of the particles?
- $10\pi^2$ m/s²
 - $20\pi^2$ m/s²
 - $30\pi^2$ m/s²
 - $40\pi^2$ m/s²
57. Three balls A, B and C are thrown at an angle 37° , 45° and 53° respectively from the ground with the same initial velocity u . Which of the following comparisons correct about the horizontal distance they travel?
- Distance of A = Distance of B=Distance of C
 - Distance of A = Distance of C>Distance of B
 - Distance of A = Distance of C<Distance of B
 - Distance of B >Distance of C>Distance of A
58. Which one of the following is **false** about fluid flow?
- Laminar fluid flow occurs with low velocity and small diameter pipe.
 - Turbulent fluid flow occurs with high velocity and larger diameter pipe.
 - The path of different particles during laminar fluid flow crosses each other.
 - The velocity of the particles is tangent to streamline for laminar fluid flow.

59. The V-t graph of a moving object as shown the figure below. The maximum acceleration is
 A. 1 cm / sec^2 B. 2 cm / sec^2 C. 3 cm / sec^2 D. 6 cm / sec^2



60. A solid sphere of radius R and moment of inertia about its diameter ($I = \frac{2}{5}mr^2$) starts from the rest and rolls down an inclined plane of 7m high. What is the speed of the sphere at the bottom of the inclined plane ?(Ignore friction)

- A. 10 m/s B. 100 m/s C. 30 m/s D. 5 m/s

