

Z Secret Training Institute

Physics weekly exam from Grade 12 unit unit 2 linked with grade 10 unit 1: Motion in 2D
and Grade 11 unit 2 linked with Grade 9 unit: Vectors [Time Allowed 2:00]

* Indicates required question



Email *



Full name *



Phone Number: *



1. Which of the following is not true about a uniform circular motion?

1 point

Mark only one oval.

☐

A. The direction of the velocity continuously changes



B. The magnitude of the velocity continuously changes

☐

C. The direction of the acceleration continuously changes

☐

D. The magnitude of the acceleration remains constant and the speed is constant.

2. Suppose $\vec{A} = 3\vec{i} - 2\vec{j}$, $\vec{B} = -\vec{i} - 4\vec{j}$ and $\vec{C}$ are vectors in xy plane with the property $\vec{A} + \vec{B} - \vec{C} = 0$. Which of the following is a unit vector along $\vec{C}$?

3 points

Mark only one oval.

- ☐ A. $2\vec{i} - 6\vec{j}$
- ☐ B. $(1/\sqrt{10})\vec{i} - (6/\sqrt{10})\vec{j}$
- ☒ C. $(1/\sqrt{10})\vec{i} - (3/\sqrt{10})\vec{j}$
- ☐ D. $-2\vec{i} - 6\vec{j}$

3. A football is kicked into the air at some angle ignoring air friction, the horizontal component of the velocity

1 point

Mark only one oval.

- ☐ A. Is zero at the maximum point
- ☒ B. Remains constant
- ☐ C. Increases with time
- ☐ D. Decrease with time

4. Which of the following pairs of vectors are collinear?

3 points

Mark only one oval.

- ☐ A. $2\vec{i} + 3\vec{j}$ and $-4\vec{i} + 6\vec{j}$
- ☒ B. $2\vec{i} + 3\vec{j}$ and $-4\vec{i} - 6\vec{j}$
- ☐ C. $2\vec{i} - 3\vec{j}$ and $-4\vec{i} - 6\vec{j}$
- ☐ D. $\vec{i} + \vec{j}$ and $-\vec{i} + \vec{j}$

5. A marble is to be thrown horizontally from a height of 19.6 cm above the ground so that it hits another marble on the ground 2m away. The final velocity should be

3 points

Mark only one oval.

- ☐ A. 10 m/s
- ☒ B. 10.2m/s
- ☐ C. 2 m/s
- ☐ D. 5 m/s

6. Suppose $A \vec{=} 3\hat{i} - 2\hat{j}$ and $B \vec{=} -\hat{i} - a\hat{j}$ are two vectors in xy plane. What is the value of a such that $A \vec{+} B \vec{=} 2\hat{i}$

3 points

Mark only one oval.

- ☐ A. 3
- ☐ B. 2
- ☒ C. -2
- ☐ D. -3

7. Two objects are thrown from the top of a tall building. One is thrown up, and the other is thrown down, both with the same initial speed. What are their speeds when they hit the street? Neglect air resistance.

2 points

Mark only one oval.

- ☐ A. The one thrown up is traveling faster.
- ☐ B. The one thrown down is traveling faster.
- ☒ C. They are traveling at the same speed.
- ☐ D. It is impossible to tell because the height of the building is not given.

8. A vector that represents the position of an object in relation to another object is called 3 points

Mark only one oval.

- ☐ A. Unit vector
- ☐ B. Coplanar vector
- ☒ C. Position vector
- ☐ D. Collinear vector

9. When a ball is thrown straight up with no air resistance, the acceleration at its highest point 1 point

Mark only one oval.

- ☐ A. Is upward
- ☒ B. Is downward
- ☐ C. is zero
- ☐ D. Reverses from upward to downward

10. How would the period of an object in a circular orbit change if the radius of the orbit doubled? 3 points

Mark only one oval.

- ☐ A. The period would increase by a factor of 2.
- ☐ B. The period would decrease by a factor of 4.
- ☒ C. The period would increase by a factor of $2\sqrt{2}$.
- ☐ D. The period would decrease by a factor of $2\sqrt{2}$.

11. Three point masses each of mass m are placed at the corners of an equilateral triangle of side ' L '. Then the moment of inertia of this system about an axis passing along one side of the triangle is (ignore the masses on the side)

3 points

Mark only one oval.

- ☐ A. mL^2
- ☐ B. $3 mL^2$
- ☒ C. $\frac{3}{4} mL^2$
- ☐ D. $\frac{3}{2} mL^2$

12. Suppose $\vec{A} = 3\vec{i} - 2\vec{j} + \vec{k}$, $\vec{B} = -\vec{i} - 4\vec{j} + 3\vec{k}$ and $\vec{C}$ is a vector lying along x-axis with the property that $\vec{A} \cdot (\vec{B} + \vec{C}) = 0$. Then, vector $\vec{C}$ is given by

3 points

Mark only one oval.

- ☐ A. $(3/\sqrt{10}) \vec{i}$
- ☐ B. $(8/3) \vec{i}$
- ☐ C. $(6/\sqrt{10}) \vec{i}$
- ☒ D. $(-8/3) \vec{i}$

13. Which of the following are not correct about Kepler's law?

2 points

Mark only one oval.

- ☐ A. The path of the planets around the sun is elliptical, with the sun being located at one of the two foci.
- ☐ B. The line joining the planet and the sun sweeps equal areas in equal intervals of time.
- ☐ C. The cube of the average distance of a planet from the sun is directly proportional to the square of the planet's orbital time period.
- ☒ D. The path of the planets around the sun is elliptical, with the sun being located at the center

14. Which pair of forces CANNOT give a resultant of 5N?

3 points

Mark only one oval.

- ☐ A. 1N and 4N
- ☐ B. 1N and 6N
- ☐ C. 3N and 4N
- ☒ D. 1N and 7N

15. A stone is thrown in vertically upward direction with a velocity of 5 ms^{-1} . 2 points

If the acceleration of the stone during its motion is 10 ms^{-2} in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?

Mark only one oval.

- ☒ A. Height=1.25m and time 0.5s
- ☐ B. Height=2.5m and time 0.5s
- ☐ C. Height=2.5m and time 0.05s
- ☐ D. Height=1.25m and time 0.05s

16. Two non-zero vectors $\vec{A}$ and $\vec{B}$ are related by $\vec{A} = C\vec{B}$, where C is a scalar. If the two vectors have opposite directions, then one of the following is true about C? 3 points

Mark only one oval.

- ☐ A. C is positive
- ☒ B. C is negative
- ☐ C. C = 1
- ☐ D. C = 0

17. Orbital velocity of a satellite does not depend on

2 points

Mark only one oval.

- ☐ A. Mass of earth
- ☒ B. Mass of satellite
- ☐ C. Radius of earth
- ☐ D. Acceleration due to gravity

18. What is the angle between $A = (ai + a\sqrt{3}j)$ and $B = (a\sqrt{3}i + aj)$?

3 points

Mark only one oval.

- ☐ A. 90 degree
- ☐ B. 60 degree
- ☐ C. 37 degree
- ☒ D. 30 degree

19. A planet moving around sun sweeps Area A1 in 2 days, A2 in 3 days and A3 in 6 days. then the relation between A1, A2 and A3 is

2 points

Mark only one oval.

- ☒ A. $3A_1 = 2A_2 = A_3$
- ☐ B. $2A_1 = 3A_2 = 6A_3$
- ☐ C. $3A_1 = 2A_2 = 6A_3$
- ☐ D. $6A_1 = 3A_2 = 2A_3$

20. A ball is thrown straight up, reaches a maximum height, and then falls to its initial height. Which of the following statements about the direction of the velocity and acceleration of the ball as it is going up is correct? 1 point

Mark only one oval.

- ☐ A. Both its velocity and its acceleration point upward
- ☒ B. Its velocity points upward and its acceleration points downward
- ☐ C. Its velocity points downward and its acceleration points upward
- ☐ D. Both its velocity and its acceleration points downward

21. Which of the following is NOT true of vector product? 3 points

Mark only one oval.

- ☐ A. $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$
- ☒ B. $\vec{A} \times (\vec{B} + \vec{C}) = \vec{B} \times \vec{A} + \vec{A} \times \vec{C}$
- ☐ C. $\vec{A} \perp \vec{B} \Rightarrow |\vec{A} \times \vec{B}| = AB$
- ☐ D. $\vec{A} \parallel \vec{B} \Rightarrow |\vec{A} \times \vec{B}| = 0$

22. A ball is dropped from the top of a building 100m high. At the same instant another ball is projected upward with a velocity of 40 m/s from the bottom. Then the time after which the two ball meet is: 2 points

Mark only one oval.

- ☐ A. 5s
- ☒ B. 2.5s
- ☐ C. 4s
- ☐ D. 2s

23. A wheel turning with angular speed of 30 rev/sec is brought to rest with a constant acceleration. it turns 60 Revolution before it stops. the time that elapses before it stop is 3 points

Mark only one oval.

☐ A. 2s

☒ B. 4s

☐ C. 5s

☐ D. 6s

24. The unit vector in the direction of $A^{\rightarrow} = 3i + 4j$ is 3 points

Mark only one oval.

☐ A. $3/2 i + 4/3 j$

☐ B. $i + j$

☒ C. $3/5 i + 4/5 j$

☐ D. $2i - j$

25. if the ball is kicked horizontally from certain height it takes 10 sec to reach the ground, what time it takes if the ball is dropped? neglect the air resistance 2 points

Mark only one oval.

☐ A. 5 sec

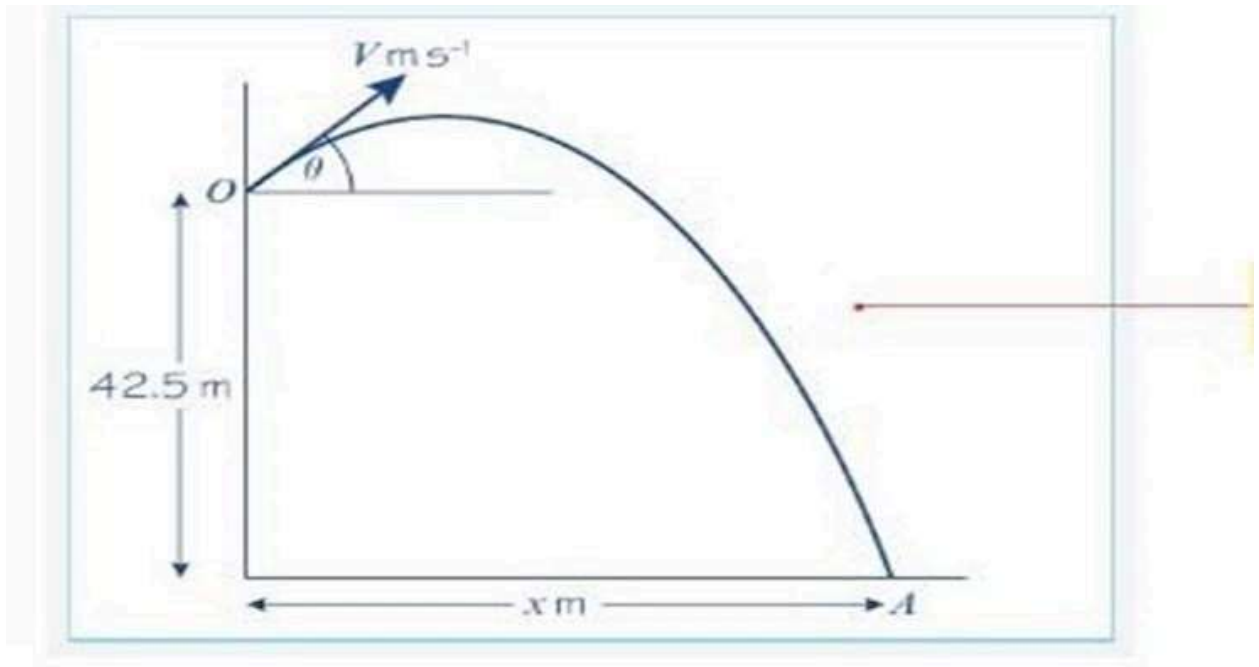
☐ B. 7.5 sec

☐ C. 8.5 sec

☒ D. 10 sec

26. A particle is projected from a point O with speed $V \text{ m/s}$ and at an angle of elevation of θ , where $\tan \theta = 4/3$. The point O is 42.5m above a horizontal plane. The particle strike the plane at Point A, 5Second after it's projected. The value of initial speed is ?($g=10\text{m/s}^2$)

2 points



Mark only one oval.

- ☒ A. 20.6m/s
☐ B. 16.6m/s
☐ C. 75m/s
☐ D. -20.6m/s

27. A ball is dropped from height h and another from $2h$. The ratio of time taken by the two balls to reach the ground is:

2 points

Mark only one oval.

- ☒ A. 1: square root of 2
☐ B. square root of 2 : 1
☐ C. 2 : 1
☐ D. 1 : 2

28. Two projectiles are launched from the ground with the same initial speed but at different angles: one at 45° and the other at 75° . Which projectile will hit the ground first? 3 points

Mark only one oval.

- ☒ A. 45 degrees
☐ B. 75 degrees
☐ C. Both hit at the same time
☐ D. Cannot be determined

29. Two non-zero vectors D and E have equal magnitudes. For the magnitude of $D + E$ to be 3 times larger than the magnitude of $D - E$, what must be the angle between D and E? 3 points

Mark only one oval.

- ☐ A. 30 degree
☒ B. 37 degree
☐ C. 53 degree
☐ D. 60 degree

30. A 0.5 kg ball is thrown vertically upward with an initial speed of 20 m/s. Neglecting air resistance, what is the ball's speed when it is at half its maximum height? 3 points

Mark only one oval.

- ☐ A) 10 m/s
☒ B) 14 m/s
☐ C) 15 m/s
☐ D) 20 m/s

31. What is the acceleration due to gravity at an altitude twice the radius of the earth? (g_E is the gravitational acceleration on the surface of the earth) 3 points

Mark only one oval.

- ☒ A. $g_E/9$
- ☐ B. $g_E/3$
- ☐ C. $g_E/4$
- ☐ D. $3g_E$

32. Which of the following expression is NOT correct ? 3 points

Mark only one oval.

- ☐ A. $k \times i = j$
- ☒ B. $i \times i = 1$
- ☐ C. $i \times j = -j \times i$
- ☐ D. $i \times k = -j$

33. If Saturn is on average 9 times farther from the sun than the earth is, how long is its days in terms of earth days 3 points

Mark only one oval.

- ☐ A. 27 years
- ☒ B. 9855 days
- ☐ C. 27 days
- ☐ D. $9/10^{14}$ days

34. The relation between escape velocity (V_e) and orbital velocity (V_o) on the earth surface is 2 points

Mark only one oval.

- ☒ A. $V_e = (\text{square root of } 2) * V_o$
☐ B. $V_e = 2V_o$
☐ C. $V_o = (\text{square root of } 2) * V_e$
☐ D. $V_o = 2V_e$

35. The vector $2i + j + k$ is perpendicular to $i - 4j + \lambda k$. If λ is equal to 3 points

Mark only one oval.

- ☐ A. 0
☐ B. -1
☒ C. 2
☐ D. 3

36. The scape speed at the surface of a certain planet is twice that of earth. 2 points
if the planet has radius twice that of earth, what is its mass in unit of earth mass?

Mark only one oval.

- ☐ A. 2
☐ B. 4
☒ C. 8
☐ D. 0.5

37. The point on the Orbit that is farther away from the sun is

2 points

Mark only one oval.

- ☐ A. Focus
- ☐ B. Perihelion
- ☒ C. Aphelion
- ☐ D. centre of curvature

38. Given two vectors $V_1=10$ units along the positive y-axis and $V_2=6$ units at an angle of 37 degree above the positive x-axis. What is the scalar product of the vectors in square of units?

3 points

Mark only one oval.

- ☐ A. 45
- ☒ B. 36
- ☐ C. 48
- ☐ D. 60

39. An airplane flying in the sky with a uniform speed of 200 m/s moves in a vertical circle of radius 400 m. The mass of the pilot is 70 kg. The force exerted by the pilot on the seat at the lowest point on the circle will be

3 points

Mark only one oval.

- ☐ A. 4500N
- ☐ B) 6300N
- ☒ C) 7700N
- ☐ D) 770N



40. If for two non-zero vectors a, b : $|a+b|=|a|=|b|$ then angle between them is 3 points

Mark only one oval.

- ☐ A) 0 degree
- ☐ 60 degree
- ☐ C) 90 degree
- ☒ D) 120 degree

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