PHYS115

Qassim University جامعة القصيم

Student's name................................ ….

ID..........................…………………

Time (90 minutes)

Choose the best answer:

1. The y-component of vector ($\vec{a}$) can be found using the relation (where θ is the angle between the vector and the positive *x*-axes):

a) $a_y = a.\sin\theta$ b) $a_y = a.\cos\theta$ c) $a_y = a.\tan\theta$

2. The SI unit of frictional force is:

a) Dimensionless b) kg.m/s^2 c) J d) Kelvin

3. The vector product of two vectors $\vec{C}$ and $\vec{D}$ is written as:

a) $\vec{C}\times\vec{D} = C.D.\sin\theta$ b) $\vec{C}\times\vec{D} = C.D.\cos\theta$ c) $\vec{C}.\vec{D} = C.D.\sin\theta$ d) $\vec{C}.\vec{D} = C.D.\cos\theta$

4. The resultant between two vectors can be found by placing the vectors:

a) tip to tip b) tip to tail c) tail to tail d) tip to midpoint

5. In uniform circular motion, the velocity vector is always __________ to the path.

a) Horizontal b) Vertical c) Tangent d) Parallel

6. The vector $\frac{1}{2}\vec{A}$ is:

a) Greater than $\vec{A}$ in magnitude and in opposite direction

b) Less than $\vec{A}$ in magnitude and in opposite direction

c) Greater than $\vec{A}$ in magnitude and in the same direction

d) Less than $\vec{A}$ in magnitude and in the same direction

7. The angle between $\vec{A}$ = (45 m)$\hat{\imath}$ + (52 m)$\hat{\jmath}$ and the positive *x* axis is:

a) 29° b) 56.3° c) 151° d) 49°

8. Let $\vec{A}$ = (2 m)$\hat{\imath}$ + (4 m)$\hat{\jmath}$ – (2 m)$\hat{k}$ and $\vec{B}$ = (5 m)$\hat{\imath}$ + (8 m)$\hat{\jmath}$ + (4 m)$\hat{k}$.Then $\vec{A} + 2\vec{B}$ equals:

a) (9 m)$\hat{\imath}$ + (12 m)$\hat{\jmath}$ – (6 m)$\hat{k}$ b) (12 m)$\hat{\imath}$ − (14 m)$\hat{\jmath}$ – (20 m)$\hat{k}$

c) 15 d) 11

9. If the position of a puck as it moves in an *xy* plane is $\vec{r}$ = (4 t^2)$\hat{\imath}$ − (2t+6)$\hat{\jmath}$. Are the *x* and *y* acceleration components constant?

a) Yes b) No

10. If the x-component of a vector ($\vec{a}$), in the xy plane, is half as large as the magnitude of the vector, find the tangent of the angle between the vector and the *x*- axes.

a) b) c) d)

11. A car rounds a 46 m radius curve at a speed of 14 m/s. The magnitude of its acceleration is:

a) 8.5 m/s^2 b) 0.34 m/s^2 c) 4.3 m/s^2 d) 22.3 m/s^2

12. Let $\vec{A}$ = (4 m)$\hat{\imath}$ + (5m)$\hat{\jmath}$ – (5 m)$\hat{k}$ and $\vec{B}$ = (2m)$\hat{\imath}$ + (7m)$\hat{\jmath}$ – (8 m)$\hat{k}$. The vector sum $\vec{S} = \vec{A} \times \vec{B}$ is:

a) (6 m)$\hat{\imath}$ + (8 m)$\hat{\jmath}$ – (2 m)$\hat{k}$ b) (8 m)$\hat{\imath}$ + (12 m)$\hat{\jmath}$ – (3 m)$\hat{k}$

c) (2 m)$\hat{\imath}$ − (4 m)$\hat{\jmath}$ + (4 m)$\hat{k}$ d) (8 m)$\hat{\imath}$ + (10 m)$\hat{\jmath}$ + (3 m)$\hat{k}$

13. Which of the following is NOT a vector quantity?

a) Force b) Velocity c) Speed d) Acceleration

14. At a certain instant, a fly ball has velocity $\vec{v}$ = (32)$\hat{\imath}$ + (24)$\hat{\jmath}$ (the x-axes is horizontal, the y-axes is upward, and $\vec{v}$ is in meters per seconds). Has the ball passed its highest point?

a) Yes b) No

15. 40^0 is equal to approximately:

a) 3.7 rad b) 0.7 rad c) 1.7 rad d) 2.7 rad

16. A basketball shot to the net follows a path which is:

a) Parabolic b) Straight line c) Hyperbolic d) Circular

17. A force is given as $\vec{F} = 3N\hat{\imath} + 8N\hat{\jmath} - 6N\hat{k}$. The magnitude of the force $\vec{F}$ is:

a) 5 b) 9.6 c) 10.4 d) 8.2

18.

a) Mass b) Displacement c) Speed d) Temperature

19. An object in uniform circular motion is accelerating because the velocity changes in:

a) Magnitude b) Direction c) Both magnitude and direction

20. The net force on a body is equal to the product of the body’s mass and its acceleration, describes:

a) Newton's first law b) Newton's second law c) Newton's third law

21. Two vectors $\vec{A}$ and $\vec{B}$ have magnitudes of 12 and 8 units, respectively. What is the angle between the directions of $\vec{A}$ and $\vec{B}$ and if $\vec{A}.\vec{B}$ equals 83 units.

a) 0° b) 30° c) 180° d) 45°

22. If you are standing on a surface, the push back on you from the surface (due to deformation) is the:

a) Normal force b) Gravitational force c) Tension force c) Spring force

23. The period of revolution in uniform circular motion is given by:

a) $\frac{2\pi r}{v}$ b) $\frac{2\pi v}{r}$ c) $\frac{2\pi r}{T}$ d) $\frac{2\pi T}{v}$

24. A motionless 600 N steel ball is suspended by a light rope from the ceiling. The tension in the rope is:

a) 600 N b) 800 N c) 0 N d) 200 N

25. Acceleration and force are always in the direction:

a) True b) False

26. A car travels west at constant velocity. The net force on the car is:

a) East b) West c) Up d) Zero

27. A constant force of 6 N is exerted for 2.0 s on a 12 kg object initially at rest. The change in speed of this object will be:

a) 0.5 m/s b) 1 m/s c) 4 m/s d) 8 m/s

28. A 8 kg object is moving south. A net force of 10 N north on it result in the object having an acceleration of:

a) 1.25 m/s^2, north b) 1.25 m/s^2, south c) 80 m/s^2, north d) 18 m/s^2, north

29. A 60 kg man stands in an elevator that has a downward acceleration of 1.2 m/s^2. The force exerted by him on the floor is about:

a) 1.2 N b) 60 N c) 516 N d) 880 N

30. A 20 kg crate is pushed across a frictionless horizontal floor with a force of 22 N, directed 30° below the horizontal. The acceleration of the crate is:

a) 27 m/s^2 b) 0.95 m/s^2 c) 2.5 m/s^2 d) 70 m/s^2