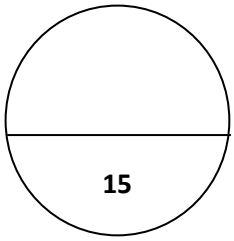
University # _____name_____

King Saud University
College of Science
Department of Physics and Astronomy



*1st term 1437-1438H**	*Physics 103*	*First mid term*
Thursday 24 /2/ 1438 H	*24th Nov. 2016*	*7:00 – 8:30 PM*

Submit all pages to the Examiner/ Invigilator

Name	
University number	
Section/ Dr Name	

Write your answers for each question in CAPITAL LETTERS in the table given

Q. 1	Q. 2	Q. 3	Q. 4	Q. 5
Q. 6	**Q. 7**	**Q. 8**	**Q. 9**	**Q. 10**
Q. 11	**Q. 12**	**Q. 13**	**Q. 14**	**Q. 15**

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Take g = 9.8 ms^{-2} where ever needed

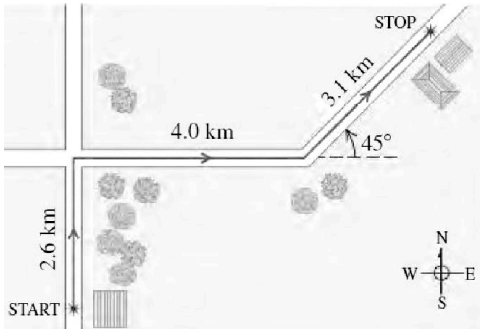
1 Assume the equation x = At^3 + Bt^2 + Ct describes the motion of an object, with x having the dimension of length and t having the dimension of time. A, B, and C are constants. The dimension of the constant A is:

a) LT **b)** LT^2 **c)** LT^{-3} **d)** LT^{-2} **e)** LT^{-1}

2 The distance between two cities is 100 mi. The number of kilometers between the two cities is:

a) equal to 100 **b)** larger than 100 **c)** smaller than 100 **d)** larger than 200 **e)** larger than 300

3 A person drives a truck along a route shown in the figure. the magnitude and direction of the resultant displacement are:

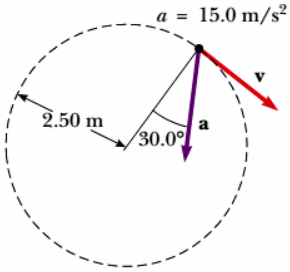


a) 7.8 km, 38° **b)** 9.5 km, 30° **c)** 12.2 km, 23° **d)** 9.5 km, 44° **e)** 7.8 km, 27°

4 Vector **A** has y-component A_y = + 9.6 m. **A** makes an angle of 32° counterclockwise from the + y-axis. The x-component A_x and the magnitude of **A** are:

a) - 8.1 m, 15.3 m **b)** 6 m, 12.2 m **c)** 6.9 m, 4.3 m **d)** - 6 m, 11.3 m **e)** - 6.9 m, 13 m

5 A particle is moving clockwise in a circle of radius 2.5 m with acceleration *a= 15* m/s^2 (see the figure). The speed of the particle and its tangential acceleration respectively are:



a) 4.7 m/s, 5 m/ s^2 **b)** 6.6 m/s, 10 m/ s^2 **c)** 4.7 m/s, 3.4 m/ s^2 **d)** 5.7 m/s, 8.7 m/ s^2 **e)** 5.7 m/s, 7.5 m/ s^2

6 A ball is thrown vertically upward and is caught 2 s later by someone at 4 m above the ground while it is going in the upward direction. The initial velocity of the object is :

a) 16 m/s **b)** 12 m/s **c)** 8 m/s **d)** 6 m/s **e)** 21 m/s

7 An airplane accelerates from rest down a runway at 3.2 m/s^2 for 33 seconds until it finally lifts off the ground. The distance traveled before taking off is:

a) 1310 m **b)** 1530 m **c)** 1740 m **d)** 1630 m **e)** 1850 m

8 A race car accelerates uniformly from 15 m/s to 45 m/s in 3 seconds. The acceleration of the car and the distance traveled are:

a) 10 m/s^2, 90 m **b)** 6 m/s^2, 150 m **c)** 8 m/s^2, 124 m **d)**10 m/s^2, 75 m **e)** 6 m/s^2, 130 m

9 At $t = 0$, a particle leaves the origin with a velocity of 12 m/s in the positive x direction and moves in the xy plane with a constant acceleration of $(-2\mathbf{i} + 4\mathbf{j})$ m/s^2. At the instant the y coordinate of the particle is 18 m, the x coordinate of the particle is:

a) 21 m **b)** 15 m **c)** 35 m **d)** 25 m **e)** 27 m

10 An archer shoots an arrow horizontally from a top of a tower of height 78.4 m. The arrow hits the ground at a horizontal distance of 200 m from the bottom of the tower. The speed of the arrow just before it hits the ground is:

a) 56.0 m/s **b)** 39.6 m/s **c)** 47.4 m/s **d)** 63.5 m/s **e)** 46.5 m/s

11 If vector **B** is added to vector **A**, under what conditions does the resultant vector **A** + **B** have magnitude $A + B$?

a) **A** and **B** are parallel and in the same direction **b)** **A** and **B** are parallel and in opposite directions **c)** **A** and **B** are perpendicular **d)** **A** and **B** are anti-parallel **e)** None of those

12 A ball is thrown upward. While the ball is in free fall, does its speed:

a) increase **b)** decrease **c)** increase and then decrease **d)** decrease and then increase **e)** remain constant

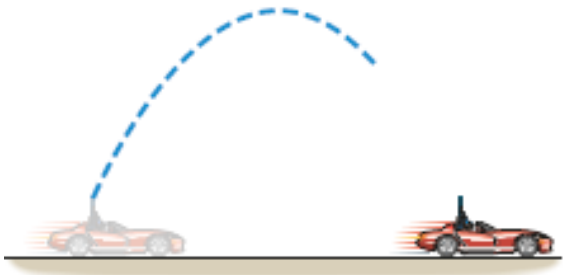
13 Under which of the following conditions is the magnitude of the average velocity of a particle moving in one dimension smaller than the average speed over some time interval?

a) A particle moves in the + x direction without reversing. **b)** A particle moves in the - x direction without reversing **c)** A particle moves in the + x direction and then reverses the direction of its motion **d)** there are no conditions for which this is true **e)** None of those

14 Consider a ball is thrown up in the air from the earth surface at an angle of 45° above the horizontal. While the ball in the air, its acceleration is:

a) 9.8 m/s^2 upward **b)** 9.8 m/s^2 downward **c)** 4.9 m/s^2 downward **d)** 4.9 m/s^2 upward **e)** zero

15 Suppose you are driving in an open top car. The car is moving to the right at a constant velocity (as shown in the figure), you point a gun straight upward and fire it. In the absence of air resistance, the bullet (طلقة) will land:



a) behind you (خلفك) **b)** ahead of you (امامك) **c)** none of those **d)** far away and it can't be seen **e)** in the gun barrel (فوهة)

The end

Rough work