PRINCE SULTAN UNIVERSITY
جامعة الأمير سلطان

Department of Mathematics and General Sciences

General Science (SCI101)
First Major Exam

Second Semester, Term 132
Date: Sunday 9/3/2014

Name:	
ID number:	
Section number or time:	
Instructor's name:	

Important instructions:

1. Examination time: 60 minutes.
2. Write your name before starting with the questions.
3. **Switch off your mobile phone** and put any books and notes away.
4. You should have 6 pages in total, including this page and a scratch paper.
5. You may use a calculator but you may *not* borrow one.

Good Luck!

Mark

Part 1: 10 multiple choice questions, 1 point each. Circle the letter of the most correct answer using a pen. Use $g = 10$ m/s^2.

Q1. What is the average speed of a runner that covers 11.7 km in 30 minutes?

a) 6.5 m/s b) 0.39 m/s c) 23.4 m/s d) 390 m/s

Q2. Consider a stone placed on the ground. Which of the following sentences is true

a) The Earth pulls the stone down but the stone does not pull the Earth up
b) The Earth pulls the stone down and the stone pulls the Earth up with an equal force
c) The Earth pulls the stone down and the stone pulls the Earth up but with a much smaller force
d) The Earth does not pull the stone down because it is at rest

Q3. A rocket moving in free space suddenly runs out of fuel. The rocket

a) is going to stop immediately
b) is going to slow down to stop after some time
c) is going to continue moving in a straight line at constant speed
d) It depends on its mass

Q4. Consider an object moving at a constant speed. Which of the following is correct?

a) its acceleration must be zero
b) it must be moving in a straight line
c) its velocity must also be constant
d) None of the above

Q5. Which of the following units is equivalent to the unit of force (Newton)?

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

Q6. Which of the following is a vector quantity?

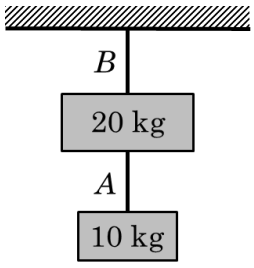
a) time b) speed c) velocity d) mass

Q7. If we use plus and minus signs to indicate the directions of velocity and acceleration in one dimension, in which of the following situations does the object slow down?

a) negative velocity and negative acceleration
b) positive velocity and positive acceleration
c) negative velocity and positive acceleration
d) None of the above

Q8. Two masses are hanged from the ceiling using two ropes as shown in the figure. What is the tension in rope *A*?

a) 150 N
b) 100 N
c) 200 N
d) 300 N



Q9. As a football player kicks a ball he acts with a certain force on the ball. The reaction force is:

a) The acceleration of the ball
b) The weight of the ball
c) The friction that acts on his shoe
d) The force from the ball on his shoe

Q10. When a falling rain drop reaches terminal velocity,

a) its acceleration becomes zero
b) the air drag force acting on it becomes zero
c) its weight becomes zero
d) its speed becomes zero

End of part 1

Part 2: Solve each of the following three problems. ***Show all the steps of your work*** in the provided space and include the appropriate units with your answer. Use $g = 10$ m/s^2.

Q1. (3 points) You constantly push a 200 kg box across a horizontal floor at a constant velocity of 2 m/s to the East. If your pushing force is 100 N, calculate:

a) The net force acting on the box and its acceleration

b) The friction force acting on the box

c) The distance the box covers in 2 minutes

Q2. (3 points) A 1200 kg car starts from rest and reaches a speed of 126 km/h in 10 seconds.

a) What is the acceleration of the car?

b) If the engine of the car provides a constant force of 4400 N, what friction force acts on the car?

c) Starting from rest and at the same acceleration as calculated in (a), how far does the car travel in 20 seconds?

Q3. (4 points) A ball is thrown vertically upward. It reaches a maximum height of 30 m and then it falls back to its starting point. Assuming air resistance is negligible:

a) With what speed was the ball thrown

b) How long it took the ball to reach its maximum height

c) Calculate the velocity of the ball 4 seconds after it was thrown

d) Calculate the height of the ball 2 seconds after it was thrown

End of part 2

Scratch paper. ***DO NOT remove***