



*Department of Mathematics
and General Sciences*

**General Science (SCI101)
First Major Exam**

First Semester, Term 131
Date: Wednesday 23/10/2013

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

Important instructions:

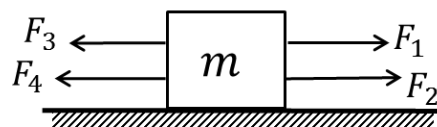
1. Examination time: 60 minutes.
2. Write your name now before starting with the questions.
3. Switch off your mobile phone and put any books and notes away.
4. You should have 6 pages in total, including this page and a scratch paper.
5. You may use a calculator but you may *not* borrow one.

Good Luck!

Mark

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

- Q1. Which of the following is a unit of acceleration?
a) m/s b) kg.m/s^2 c) m/s^2 d) kg/s^2
- Q2. For an object moving with a constant acceleration ($a > 0$):
a) Its velocity is also constant.
b) The net force acting on it is zero.
c) It covers equal distances in equal time intervals.
d) Its velocity is changing by a constant amount each second.
- Q3. The lion has an average speed of 80 km/h . What is the distance it covers in 15 minutes?
a) 20 km b) 1200 km c) 5.3 km d) 320 km
- Q4. According to Newton's first law:
a) Objects at rest tend to remain at rest
b) For every action there is an equal opposing reaction
c) Objects in motion tend to remain in motion
d) Both (a) and (c)
- Q5. Which of the following is a vector quantity?
a) Distance
b) Acceleration
c) Time
d) None of the above
- Q6. Consider a car moving at 120 km/h north and a van moving at 80 km/h south. What is the velocity of the car relative to the van?
a) 200 km/h north b) 200 km/h south c) 40 km/h north d) 40 km/h south
- Q7. Four forces affect an object of mass m in the directions shown. If $F_1 = 10 \text{ N}$, $F_2 = 12 \text{ N}$, $F_3 = 7 \text{ N}$, and the object is in mechanical equilibrium, what value of the force F_4 ?
a) 22 N b) 15 N c) 29 N d) 19 N



- Q9. As a parachutist reaches the terminal velocity:
- a) Air resistance force is zero
 - b) His acceleration is equal to g
 - c) The force of gravity acting on him is zero
 - d) Air resistance force is equal to his weight
- Q10. When a cannonball is fired from a cannon, the acceleration of the cannonball is greater than the acceleration of the recoiling cannon because:
- a) The mass of the cannonball is less than the mass of cannon
 - b) The force acting on the cannonball is more than the force acting on the cannon
 - c) The force acting on the cannon is more than the force acting on the cannonball
 - d) Both (a) and (b)

End of part 1

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

Q1. (3 points) During takeoff, a 20000 kg airplane starts from rest using its two engines. Each of its engines provides a force of 50000 N. If the average friction force acting on the airplane on the runway is 20000 N. Calculate:

a) The net force acting on the airplane

b) The acceleration of the airplane

c) Its speed after travelling 200 m on the runway

Q2. (3 points) A catcher stops a 0.1 kg ball traveling at 40 m/s in 0.2 seconds. Calculate:

a) The acceleration of the ball.

b) The force that affects his glove.

- Q3. (4 points) To find the maximum speed at which you can throw objects, you throw a small stone vertically upward and measure its total time of flight (until it comes back to your hand). If your measured time is 4 seconds, ignoring air resistance, calculate:
- (a) The speed at which the stone was thrown

(b) The maximum height reached by the stone

(c) The velocity of the stone 2 seconds after it was thrown

End of part 2

Scratch paper

Name:
