



*Department of Mathematics and
General Sciences*

General Science (SCI101)
Second Major Exam

First Semester, Term 121
Date: Wednesday 12/12/2012

Name:

ID#:

Section # (or time):

Important instructions:

1. Write your name now before starting with the questions.
2. Check that you have 3 pages in total.
3. **Examination time: 60 Minutes.**
4. Put any books/notebooks/sheets away.
5. You may use a calculator but you may **not** borrow a calculator from anyone.
6. You may **not** use your mobile phone **at all**. Also, you may **not** use it as a calculator.
7. Any cheating signs may cause you to be expelled from the exam.

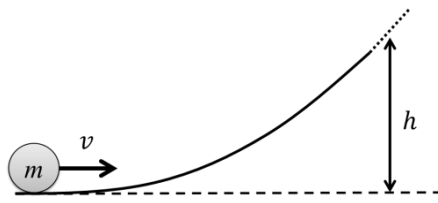
Good Luck!

Mark

Circle ○ the letter of the correct answer using a pen.

Use $g = 10 \text{ m/s}^2$, and $G = 6.67 \times 10^{-11} \text{ N.m}^2/\text{kg}^2$.

- Q1. A 70 kg man runs at the same speed of a 280 kg horse. Which of the following is correct?
- a) They have the same kinetic energy
 - b) The kinetic energy of the horse is 4 times larger than the kinetic energy of the man
 - c) The kinetic energy of the horse is 2 times larger than the kinetic energy of the man
 - d) The momentum of the horse is 2 times larger than the momentum of the man
- Q2. A stone is thrown horizontally at 27 m/s from the top of a 45 m high building. What is the horizontal component of its velocity after 2 seconds?
- a) 47 m/s
 - b) 27 m/s
 - c) 51 m/s
 - d) 7 m/s
- Q3. Falling on sand is safer than falling on solid concrete because:
- a) the time of impact is reduced which increases the force of impact
 - b) both the time of impact and the force of impact are reduced
 - c) the time of impact is increased which reduces the force of impact
 - d) both the time of impact and the force of impact are increased
- Q4. Stone A was thrown horizontally from a high cliff. At the same moment, stone B was released from rest from the same place. Ignoring air resistance, which of the following is correct
- a) Both stones A and B will reach the ground at the same time.
 - b) Stones A and B will hit the ground with the same velocity.
 - c) Stone A will reach the ground in less time than stone B.
 - d) Stone B will reach the ground in less time than stone A.
- Q5. A projectile can become an Earth satellite if:
- a) It was thrown straight upward with a very high speed.
 - b) It was thrown straight upward with a reasonable speed.
 - c) It has enough horizontal speed such that the curvature of its path matches that of the Earth.
 - d) It has a zero horizontal speed.
- Q6. Consider a ball thrown straight up. Neglecting air resistance, which of the following is true?
- a) The mechanical energy of the ball remains unchanged
 - b) The ball has zero kinetic energy at the highest position it reaches
 - c) The ball has the maximum potential energy at the highest position it reaches
 - d) All of the above
- Q7. A rabbit has a kinetic energy of 300 J. If it doubles its speed its kinetic energy becomes:
- a) 1200 J
 - b) 600 J
 - c) 400 J
 - d) 2400 J

- Q8. What is the average force required by a goalkeeper to stop a 500 g soccer ball moving at 30 m/s in 0.1 seconds?
a) 15 N b) 150 N c) 150000 N d) 15000 N
- Q9. On an icy road a 1200 kg car moving at 12 m/s crashes into an 800 kg car parked at the roadside. If the two cars stick and move together after collision, their speed will be
a) 8.0 m/s b) zero c) 6.2 m/s d) 7.2 m/s
- Q10. While standing on slippery ice (no friction), you throw a 10 kg bowling ball horizontally away from you at 5 m/s to the left. If your mass is 80 kg, the velocity at which you recoil is:
a) 1.6 m/s to the right
b) 1.6 m/s to the left
c) 0.625 m/s to the right
d) 0.625 m/s to the left
- Q11. You lift a 25 kg crate to a height of 1.5 m at a constant speed in 2 seconds. The work done by the gravity force is:
a) Zero b) -375 J c) 375 J d) - 37.5 J
- Q12. In the previous question, your power in lifting the box is:
a) 187.5 W b) 375 W c) 37.5 W d) 18.75 W
- Q13. The total work required to increase the speed of a 1500 kg car from 2 m/s to 4 m/s is:
a) 3000 J b) 15000 J c) 18000 J d) 9000 J
- Q14. A ball of mass $m = 3.0$ kg rolling horizontally at a speed of $v = 4$ m/s encounters a hill, as shown in the figure. Ignoring friction, what is the maximum height h the ball will reach before rolling back?
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- a) 1.6 m
b) 4.0 m
c) 2.4 m
d) 0.8 m
- Q15. The work done in carrying a 5 kg bag horizontally at a constant speed for 10 m is:
a) Zero b) 50 J c) -50 J d) 500 J
- Q16. Given that the radius of Mars is 3396 km and its mass is 6.42×10^{23} kg, the weight of a 100 kg man on Mars is:
a) 3713 N b) 371.3 N c) 556.7 N d) 5567 N
- Q17. The gravitational attractive force between two objects is 900 N. If the distance between the two objects is tripled, what will be the new value of the force?
a) 300 N b) 900 N c) 100 N d) 2700 N