Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 February 4, 2015

Name (print, last first): _____ Signature: _____

On my honor, I have neither given nor received unauthorized aid on this examination.

YOUR TEST NUMBER IS THE 5-DIGIT NUMBER AT THE TOP OF EACH PAGE.

(1) **Code your test number on your answer sheet (use lines 76–80 on the answer sheet for the 5-digit number)**. Code your name on your answer sheet. **DARKEN CIRCLES COMPLETELY**. Code your UFID number on your answer sheet.
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(6) Hand in the answer sheet separately.

$g = 9.80\ \text{m/s}^2$

Each question is worth 5 points.

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1. Jane starts at the town center and drives 4 km due northeast, and then drives 5 km due south. How far is she from her starting point?

   (1) 3.6 km (2) 2.8 km (3) 1.6 km (4) 5.4 km (5) 0 km

2. Joe drops a pebble from a bridge. If the pebble hits the water in 3 seconds after it is dropped, how far did the pebble travel?

   (1) 44.1 m (2) 22.1 m (3) 14.7 m (4) 88.3 m (5) 34.5 m

3. Jack stands on scales in an elevator. When the elevator is at rest the scales read 99 N. When the elevator moves down the scales read 50 N. What is the acceleration of the elevator?

   (1) 5.0 m/s^2 (2) 9.8 m/s^2 (3) 2.5 m/s^2 (4) 7.0 m/s^2 (5) 6.3 m/s^2

4. A horizontal force P pushes a 10 kg mass across a floor. What value of P is needed to move the block with an acceleration of 2 m/s^2 if the coefficient of kinetic friction is 0.4?

   (1) 59 N (2) 98 N (3) 37 N (4) 15 N (5) 72 N

5. A car is initially moving backwards at a speed of 5 m/s and then suddenly accelerates in the forward direction with an acceleration $a = 5\text{m/s}^2$. What is the speed of the car after 4 seconds of acceleration?

   (1) 15 m/s (2) 25 m/s (3) 18 m/s (4) 7.5 m/s (5) 36 m/s

6. A truck traveling at an unknown speed suddenly brakes with a deceleration of 5 m/s^2. If the truck leaves a skid mark of 30 m, what was the truck's initial velocity?

   (1) 17.3 m/s (2) 30 m/s (3) 3.45 m/s (4) 0 m/s (5) 22 m/s

Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 September 24, 2014

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$g = 9.80\ \text{m/s}^2$ $G = 6.67 \times 10^{-11}\text{N}\cdot\text{m}^2/\text{kg}^2$

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1. (4 points) Jane starts at the center of town and walks 12 km due west, and then walks 5 km due south. How far is she from her starting point at the end of the walk?
   (1) 13 km (2) 17 km (3) 7.0 km (4) 25 km (5) 5.0 km

2. (6 points) A 100 kg car is traveling at 12 m/s. If the driver applies the brakes, the car stops in a distance of 30 m. What is the force of friction exerted by the tires when the car is braking?
   (1) 240 N (2) 2.2 N (3) 12 N (4) 44 N (5) 120 N

3. (5 points) A small stone is dropped from a bridge. The stone hits the water below the bridge 3 seconds after it is dropped. How high is the bridge above the water?
   (1) 44.1 m (2) 17 m (3) 12 m (4) 29.4 m (5) 3.0 m

4. (4 points) Planet X has the same size as the Earth. If the acceleration due to gravity on planet X is 4.9 m/s^2, what is the ratio of the mass of planet X to that of the Earth?
   (1) 0.5 (2) 2.0 (3) 0.25 (4) 4.0 (5) 1.0

5. (6 points) Car A is traveling with a constant speed of 5 m/s. A drives past car B which is at rest. At the moment A passes B, B accelerates with a constant acceleration of 5 m/s^2. How long does it take B to catch up with A?
   (1) 2.0 s (2) 5.0 s (3) 0.5 s (4) 1.0 s (5) 7.5 s

6. (5 points) A 35 kg mass is dragged across an icy pond with an acceleration of 2 m/s^2. If the friction exerted by the ice is negligible, what is the magnitude of the force used to drag the mass?
   (1) 70 N (2) 140 N (3) 17.5 N (4) 200 N (5) 35 N

Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 September 1[illegible]13

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$g = 9.80$ m/s^2

---

1. (4 points) Nancy sets out on a drive. She drives 8 km east and then 15 km north. At the end of her drive, how far is she from her starting point?

   (1) 17 km (2) 23 km (3) 16 km (4) 7 km (5) 30 km

2. (3 points) A stone is dropped from a bridge. [illegible]its the water 2 seconds after it is dropped. What is the height of the bridge above the water?

   (1) 19.6 m (2) 39.2 m (3) 27.6 m (4) 9.8 m (5) 4.9 m

3. (4 points) A block of mass 10 kg sits on an inclined plane. The coefficient of static friction between the block and the surface is 0.60. A what angle (in degrees) must the block be raised before it begins to slide?

   (1) 31° (2) 75° (3) 42° (4) 25° (5) 62°

4. (4 points) An automobile is initially backing up at a speed of 5 m/s. At time $t = 0$ the automobile begins accelerating in the forward direction at 4 m/s^2. What is its net displacement after 4 s of acceleration?

   (1) 12 m (2) 0 m (3) 6 m (4) 3 m (5) 9 m

5. (5 points) An astronaut wants to measure the acceleration of gravity on planet X. On Earth his powerful dart gun will shoot a dart a maximum horizontal distance of 30 m before the dart returns to the same height from which it was shot. She performs the same experiment on planet X, and finds that the dart gun shoots the dart a maximum distance of 90 m. What is the value of the acceleration due to gravity on Planet X?

   (1) 3.3 m/s^2 (2) 7.6 m/s^2 (3) 9.8 m/s^2 (4) 4.9 m/s^2 (5) 27.4 m/s^2

First Answwer is Correct Answer

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Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 September 19, 2011

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$g = 9.80\ \text{m/s}^2$

---

1. (4 points) A ball is thrown up vertically at 20 m/s. How high will the ball go?

   (1) 20.4 m (2) 2.04 m (3) 5.10 m (4) 40.8 m (5) 7.10 m

2. (4 points) Jane sets out on a walk. She walks 8 km east and then 15 km north. How far is she from her starting point?

   (1) 17 km (2) 23 km (3) 16 km (4) 7 km (5) 30 km

3. (4 points) A stone is dropped from a bridge. It hits the water 2 seconds after it is dropped. What is the height of the bridge above the water?

   (1) 19.6 m (2) 39.2 m (3) 27.6 m (4) 4.9 m (5) 9.8 m

4. (4 points) A block of mass 10 kg sits on an inclined plane. The coefficient of static friction between the block and the surface is 0.60. At what angle (in degrees) must the block be raised before it begins to slide?

   (1) 31° (2) 75° (3) 42° (4) 25° (5) 62°

5. (5 points) An automobile is initially backing up at a speed of 5 m/s. At time $t = 0$ the automobile begins accelerating in the forward direction at 4 m/s^2. What is its net displacement after 4 s of acceleration?

   (1) 12 m (2) 0 m (3) 6 m (4) 3 m (5) 9 m

6. (5 points) A police cruiser is traveling at 20 m/s. A car traveling in the same direction at 30 m/s passes the cruiser. At this moment the car begins to accelerate in the forward direction at a rate of 2 m/s^2, and the cruiser begins to accelerate in the forward direction at 4 m/s^2. How far does the cruiser travel until it catches up to the car?

   (1) 400 m (2) 500 m (3) 200 m (4) 100 m (5) 200 m

7. (4 points) An astronaut wants to measure the acceleration of gravity on planet X. On Earth his powerful dart gun will shoot a dart a maximum horizontal distance of 30 m before the dart returns to the same height from which it was shot. He performs the same experiment on planet X, and finds that the dart gun shoots the dart a maximum distance of 60 m. What is the value of the acceleration due to gravity on Planet X?

   (1) 4.9 m/s^2 (2) 7.6 m/s^2 (3) 9.8 m/s^2 (4) 14.8 m/s^2 (5) 2.5 m/s^2

Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 September 19, 2012

Name (print, last first): _____ Signature: _____

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$g = 9.80$ m/s^2

---

1. (3 points) A cyclist travels 8 km east and then 15 km north. How far is she from her starting point?

   (1) 17 km (2) 23 km (3) 15 km (4) 5 km (5) 0 km

2. (4 points) A pebble is dropped from the top of a water well. If the pebble takes 2 seconds to hit the water, how deep is the well?

   (1) 19.6 m (2) 9.8 m (3) 39.2 m (4) 0 m (5) 4.9 m

3. (5 points) Car A is traveling with a constant speed of 10 m/s. A drives by car B which is at rest. As soon as A passes B, B accelerates with a constant acceleration of 10 m/s^2. How long does it take B to catch up with A?

   (1) 2.0 s (2) 5.0 s (3) 10.0 s (4) 1.0 s (5) 7.5 s

4. (6 points) An arrow is shot horizontally from the top of a 10 m tower. If the horizontal speed of the arrow is 12 m/s, how far from the foot of the tower does the arrow hit the ground?

   (1) 17.1 m (2) 12.3 m (3) 10.0 m (4) 8.5 m (5) 2.5 m

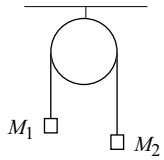
5. (4 points) An astronaut equipped with full gear can jump a horizontal distance of 1 m on the surface of the earth. On the surface of the moon the acceleration due to gravity is 1/6 th of the value on earth. How far can the astronaut jump on the surface of the moon with the same equipment and same energy?

   (1) 6.0 m (2) 3.0 m (3) 1.0 m (4) 0.0 m (5) 12.0 m

6. (4 points) A 100 kg car is traveling at 12 m/s. If the driver hits the brakes and the car skids to a stop in 10 m, what is the force of friction exerted by the tires as the car is braking?

   (1) 720 N (2) 360 N (3) 120 N (4) 1440 N (5) 550 N

7. (4 points) In the Atwood's machine shown in the sketch, M_2 is 100 grams and M_1 is 50 grams. What is the magnitude of the acceleration of the masses when allowed to fall?



   (1) 3.27 m/s^2 (2) 6.54 m/s^2 (3) 13.1 m/s^2 (4) 0 m/s^2 (5) 1.63 m/s^2

77777

77777 Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Exam 1 September 22, 2010

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$g = 9{:}80\ \text{m/s}^2$

The first answer given on this template are the correct answers.

1. A ball is thrown up vertically at 20 m/s. How high will the ball go?
(1) 20.4 m (2) 40.8 m (3) 5.1 m (4) 2 m (5) 7.1 m

2. Jane sets out on a walk. She walks 5 km east and then 12 km north. How far is she from her starting point?
(1) 13 km (2) 17 km (3) 7 km (4) 12 km (5) 5 km

3. A stone is dropped from a bridge. It hits the water 3 seconds after it is dropped. What is the height of the bridge above the water?
(1) 44.1 m (2) 22 m (3) 10.5 m (4) 66 m (5) 5.5 m

4. A block of mass 10 kg sits on an inclined plane. The coefficient of static friction between the block and the surface is 0.75. At what angle (in degrees) must the block be raised before it begins to slide?
(1) 37^o (2) 53^o (3) 89^o (4) 5^o (5) 45^o

5. An automobile is initially backing up at a speed of 5 m/s. At time $t = 0$ the automobile begins accelerating in the forward direction at 4 m/s^2. What is its net displacement after 4*s* of acceleration? (In other words, if $XI = 0$, what is the value of XF at $t = 4$s?)
(1) 12 m (2) 9 m (3) 6 m (4) 3 m (5) 0 m

6. A police cruiser is traveling at 20 m/s. A car traveling in the same direction at 30 m/s passes the cruiser. At this moment the car begins to accelerate in the forward direction at a rate of 2 m/s2, and the cruiser begins to accelerate in the forward direction at 4 m/s2. How far does the cruiser travel until it catches up to the car?
(1) 400 m (2) 300 m (3) 200 m (4) 100 m (5) 500 m

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7. An astronaut wants to measure the acceleration of gravity on planet X. On Earth her powerful dart gun will shoot a dart a maximum horizontal distance of 30 m before the dart returns to the same height from which it was shot. She performs the same experiment on planet X, and finds that the dart gun shoots the dart a maximum distance of 45 m.
   What is the value of the acceleration due to gravity on Planet X?

   (1) 6.5 m/s^2 (2) 3.8 m/s^2 (3) 9.8 m/s^2 (4) 12.4 m/s^2 (5) 15.9 m/s^2

8. A 0.02 kg bullet initially traveling at 500 m/s imbeds itself in a 2 kg block. What is the kinetic energy of the block immediately after the collision?

   (1) 2500 J (2) 2000 J (3) 4500 J (4) 3500 J (5) 6500 J

Instructor(s): *N. Sullivan*

PHYSICS DEPARTMENT

PHY 2004 Midterm Exam 1 February 1, 2012

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$g = 9.80$ m/s^2

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1. (3 points) A ball is thrown up vertically at 25 m/s. How high will the ball go?

   (1) 31.9 m (2) 3.20 m (3) 0.51 m (4) 40.8 m (5) 7.10 m

2. (3 points) Jane sets out on a walk. She walks 8 km east and then 3 km north. How far is she from her starting point?

   (1) 8.5 km (2) 23 km (3) 17.1 km (4) 3 km (5) 30 km

3. (3 points) A stone is dropped from a bridge. It hits the water 1.5 seconds after it is dropped. What is the height of the bridge above the water?

   (1) 11.0 m (2) 39.2 m (3) 19.6 m (4) 5.5 m (5) 1.10 m

4. (3 points) A block of mass 10 kg sits on an inclined plane. The coefficient of static friction between the block and the surface is 0.51. At what angle (in degrees) must the block be raised before it begins to slide?

   (1) 27° (2) 75° (3) 47° (4) 15° (5) 67°

5. (4 points) An automobile is initially backing up at a speed of 5 m/s. At time $t = 0$ the automobile begins accelerating in the forward direction at 4 m/s^2. What is its net displacement after 4 s of acceleration?

   (1) 12 m (2) 0 m (3) 6 m (4) 3 m (5) 9 m

6. (5 points) A police cruiser is traveling at 20 m/s. A car traveling in the same direction at 30 m/s passes the cruiser. At this moment the car begins to accelerate in the forward direction at a rate of 2 m/s^2, and the cruiser begins to accelerate in the forward direction at 4 m/s^2. How far does the cruiser travel until it catches up to the car?

   (1) 400m (2) 27.9 m (3) 100 m (4) 15.7 m (5) 175 m

7. (4 points) An astronaut wants to measure the acceleration of gravity on planet X. On Earth his powerful dart gun will shoot a dart a maximum horizontal distance of 30 m before the dart returns to the same height from which it was shot. She performs the same experiment on planet X, and finds that the dart gun shoots the dart a maximum distance of 45 m. What is the value of the acceleration due to gravity on Planet X?

   (1) 6.5 m/s^2 (2) 7.6 m/s^2 (3) 9.8 m/s^2 (4) 14.8 m/s^2 (5) 2.5 m/s^2

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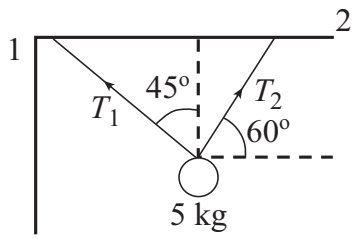
8. (5 points) A 5 kg mass is held in equilibrium by 2 ropes aas shown. What is the value of T_2, the tension in rope 2?



(1) 36 N
(2) 13 N
(3) 47 N
(4) 61 N
(5) 72 N