This Questionnaire has to be returned with the rest of the materials for the test .Failing to comply results in forfeiting the test with score of 0.

PHY1322 Winter 2015
Midterm I Feb 27
Prof. Andrzej Czajkowski

Ver A

CLOSED BOOK TEST. APPROXIMATE DURATION :100min
ANSWER ALL OF THE QUESTIONS BELOW for 48 % of the test mark

E1 The equation describing horizontal motion of the mass m attached to a spring is given by: $x = 2\pi\cos(\sqrt{\frac{3}{2}}t + \pi)$ where x is in meters and t in seconds. Find the magnitude of horizontal acceleration of this body at time $t_1 = \sqrt{\frac{2}{3}}\pi$ seconds

a) 0 b) -3π m/s^2 c) 2π m/s^2 d) 3π m/s^2 e) none of the above

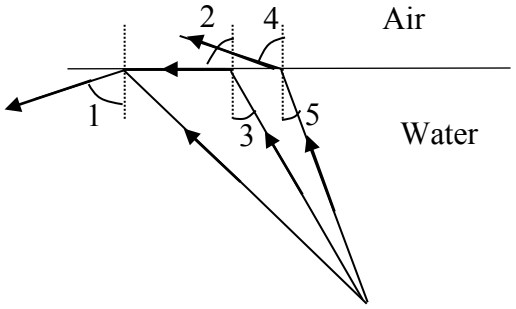
E2 A uniform rod (length L = 1.0 m, mass = 2.0 kg) is suspended from a pivot a distance d = 0.10 m above its center of mass. The angular frequency in rad/s for small oscillations is approximately

a) 1.3 b) 2.2 c) 3.2 d) 4.0 e) none of the above

E3 A piano string is under a tension of 1350 N. If the velocity with which a wave travels on the string is 1040m/s, the density of string in kg/m is given by

a) 0.2000 b) 0.0052 c) 0.0012 d)0 e) none of the above.

E4 Light from the underwater source is incident on water-air interface. The critical angle is labeled as



a) 1 b) 2 c) 3 d) 4 e) 5

M5. Two converging lenses of focal lengths 20 cm and 30 cm are separated by 40cm. An object is located 15 cm in front of the first (20cm) lens (to its left) . Where is the final image with respect to the second (30cm) lens?

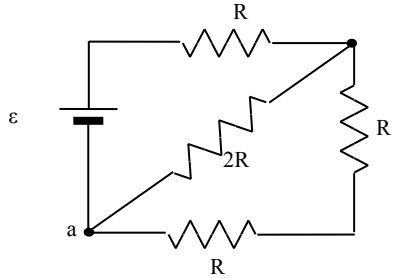
a) at -60cm b) at 60 cm c) -43cm
d 43cm e) none of these answers is correct

D6 The explosion of a vertically launched firecracker in the air at a height of 40 m produces a 100-dB sound level at the ground below. What is the intensity level (in dB) of the resulting sound heard by a reveler 50 m horizontally away from the point where the fire-cracker was launched.

a) 96dB b) 98dB c)0.0039^{W}/m^2 d) 0.0025^{W}/m^2 e) none of the above

D7 At what rate is thermal energy being generated in the 2*R*-resistor when ε = 12 V and *R* = 3.0 Ω?

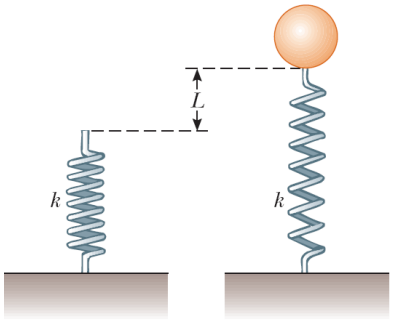
a. 24 b)12 W c) 6W d)3W e) none of the above



PART II Each problem is worth 13%

IN THE EXAM BOOKLET PROVIDE THE DETAILED SOLUTION TO 4 out of 5 PROBLEMS BELOW. AT THE COVER OF YOUR EXAM BOOKLET INDICATE CLEARLY WHICH PROBLEMS ARE TO BE MARKED

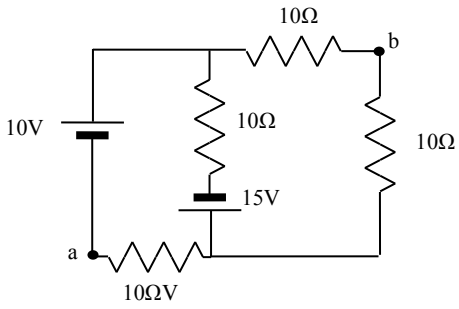
1 A mass-less spring of constant k = 90.0 N/m is attached vertically to a table. A 2.00-g balloon is filled with helium (density = 0.180 kg/m^3) to a volume of 5.00 m^3 and is then connected to the spring, causing it to stretch as shown.



a) Determine the spring extension L when the balloon is in equilibrium. (6)

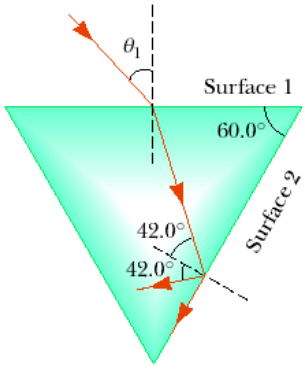
b) The string (with a balloon) is then compressed by 2cm. Find the period of string oscillations about the equilibrium. (Neglect the air resistance) (7)

2 Determine the potential difference Va – Vb shown in the circuit diagram.

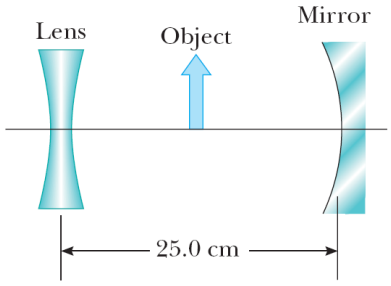


3 A block with a speaker bolted to it is connected to a spring having spring constant k= 20.0 N/m . The total mass of the block and speaker is 5.00 kg, and the amplitude of this unit's motion is 0.500 m.
(a) If the speaker emits sound waves of frequency 440 Hz, determine the highest and lowest frequencies heard by the person to the right of the speaker?
(b) find the length of tube opened on one end such that its third harmonic would match the highest frequency heard by the observer
(c) If the observer is 12 Meters away from the equilibrium point to the right of the speaker and if the power emitted by the speaker is 8 W what are the maximum and minimum sound levels (in dB) observed by a stationary observer?
Assume that the speed of sound is 343 m/s.

4 The light beam in Figure strikes surface 2 of the prism at the critical angle.
Determine the angle of incidence θ_1.



5 The object in Figure P26.48 is midway between the lens and the mirror. The mirror's radius of curvature is 20.0 cm, and the lens has a focal length of –16.7 cm. Considering only the light that leaves the object and travels first toward the mirror, locate the final image formed by this system. Is this image real or virtual? Is it upright or inverted? What is the overall magnification?



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PHY1322 Winter 2015
Midterm I Feb 27
Prof. Andrzej Czajkowski

Ver B
CLOSED BOOK TEST. APPROXIMATE DURATION :100min

PART I IN SCANTRON SHEET ANSWER ALL OF THE QUESTIONS for 48 % of the test mark

E1 The equation describing horizontal motion of the mass m attached to a spring is given by: $x = 2\pi\cos(\sqrt{\frac{3}{2}}t + \pi)$ where x is in meters and t in seconds. Find the magnitude of horizontal acceleration of this body at time $t_1 = \sqrt{\frac{2}{3}}\pi$ seconds

a) 0 b) -3π m/s^2 c) 2π m/s^2 d) 3π m/s^2 e) none of the above

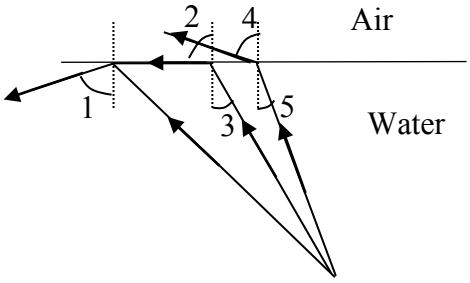
E2 A uniform rod (length L = 1.0 m, mass = 2.0 kg) is suspended from a pivot a distance d = 0.20 m above its center of mass. The angular frequency in rad/s for small oscillations is approximately

a) 1.3 b) 2.2 c) 3.2 d) 4.0 e) none of the above

E3 A piano string is under a tension of 1350 N. If the velocity with which a wave travels on the string is 510 m/s, the density of string in kg/m is given by

a) 0.2000 b) 0.0052 c) 0.0012 d)0 e) none of the above.

E4 Light from the underwater source is incident on water-air interface. The critical angle is labeled as



a) 4 b) 3 c) 2
d) 1 e) 5

M5. Two converging lenses of focal lengths 20cm and 30 cm are separated by 40cm. An object is located 10 cm in front of the first (20cm) lens (to its left) . Where is the final image with respect to the second (30cm) lens?

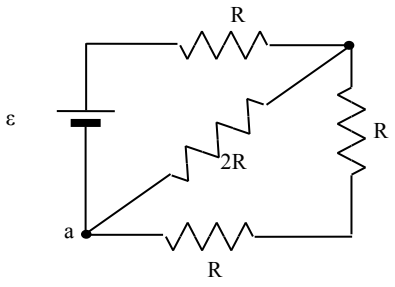
a) at -60cm b) at 60cm c) -43cm
d) 43cm e) none of these answers is correct

D6 The explosion of a vertically launched firecracker in the air at a height of 40 m produces a 100-dB sound level at the ground below. What is the intensity level (in dB) of the resulting sound heard by a reveler 30 m horizontally away from the point where the fire-cracker was launched.

a) 96dB b) 98dB c)0.0039^W/m^2 d) 0.0025^W/m^2 e) none of the above

D7 At what rate is thermal energy being generated in the 2*R*-resistor when ε = 24 V and *R* = 6.0 Ω?

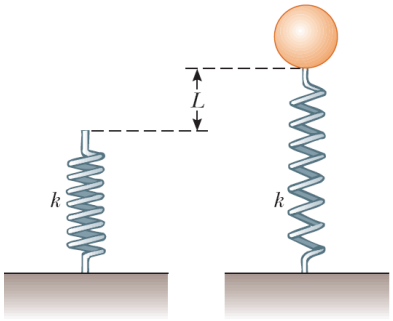
a. 24 b)12 W c) 6W
d)3W e) none of the above



PART II Each problem is worth 13%

IN THE EXAM BOOKLET PROVIDE THE DETAILED SOLUTION TO 4 out of 5 PROBLEMS BELOW. AT THE COVER OF YOUR EXAM BOOKLET INDICATE CLEARLY WHICH PROBLEMS ARE TO BE MARKED

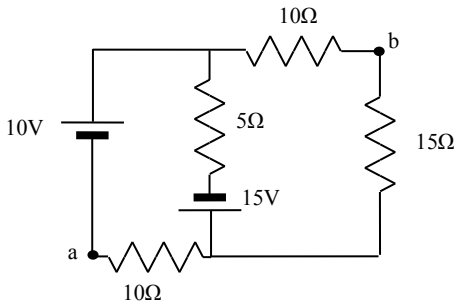
1 A mass-less spring of constant k = 80.0 N/m is attached vertically to a table. A 2.00-g balloon is filled with helium (density = 0.180 kg/m^3) to a volume of 6.00 m^3 and is then connected to the spring, causing it to stretch as shown.



a) Determine the spring extension L when the balloon is in equilibrium. (6)

b) The string (with a balloon) is then compressed by 2cm. Find the period of string oscillations about the equilibrium. (Neglect the air resistance) (7)

2 Determine the potential difference Va – Vb shown in the circuit diagram.



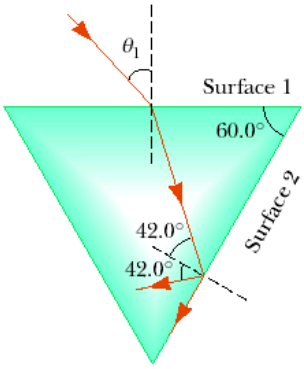
3 A block with a speaker bolted to it is connected to a spring having spring constant k= 20.0 N/m . The total mass of the block and speaker is 5.00 kg, and the amplitude of this unit's motion is 0.500 m.

(a) If the speaker emits sound waves of frequency 440 Hz, determine the highest and lowest frequencies heard by the person to the right of the speaker?

(b) find the length of tube opened on one end such that its third harmonic would match the highest frequency heard by the observer

(c) If the observer is 12 Meters away from the equilibrium point to the right of the speaker and if the power emitted by the speaker is 8 W what are the maximum and minimum sound levels (in dB) observed by a stationary observer?

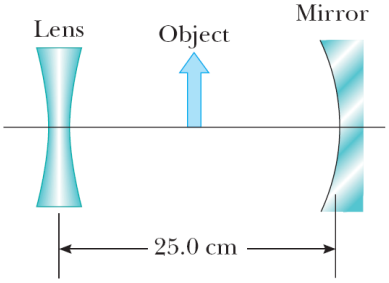
Assume that the speed of sound is 343 m/s.



4 The light beam in Figure strikes surface 2 of the prism at the critical angle.

Determine the angle of incidence θ_1.

5 The object in Figure P26.48 is midway between the lens and the mirror. The mirror's radius of curvature is 20.0 cm, and the lens has a focal length of –16.7 cm. Considering only the light that leaves the object and travels first toward the mirror, locate the final image formed by this system. Is this image real or virtual? Is it upright or inverted? What is the overall magnification?



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PHY1322 Winter 2015
Midterm I Feb 27
Prof. Andrzej Czajkowski

uOttawa
L'Université canadienne
Canada's university

Ver C
CLOSED BOOK TEST. APPROXIMATE DURATION :100min

PART I IN SCANTRON SHEET ANSWER ALL OF THE QUESTIONS for 48 % of the test mark

E1 The equation describing horizontal motion of the mass m attached to a spring is given by: $x = 2\pi\cos(\sqrt{\frac{3}{2}}t + \pi)$ where x is in meters and t in seconds. Find the magnitude of horizontal acceleration of this body at time $t_1 = \sqrt{\frac{2}{3}}\pi$ seconds

a) 0 b) -3π m/s^2 c) 2π m/s^2 d) 3π m/s^2 e) none of the above

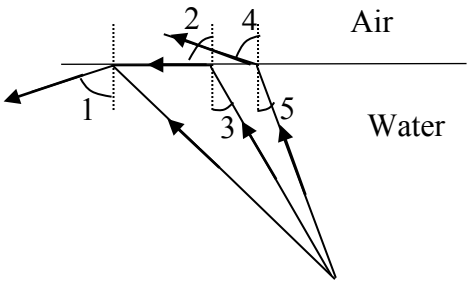
E2 A uniform rod (length L = 1.0 m, mass = 2.0 kg) is suspended from a pivot a distance d = 0.20 m above its center of mass. The angular frequency in rad/s for small oscillations is approximately

a) 1.3 b) 2.2 c) 3.2 d) 4.0 e) none of the above

E3 A piano string is under a tension of 675 N. If the velocity with which a wave travels on the string is 510 m/s, the density of string in kg/m is given by

a) 0.0026 b) 0.0052 c) 0.0072 d) 0 e) none of the above.

E4 Light from the underwater source is incident on water-air interface. The critical angle is labeled as



a) 3 b) 4 c) 5
d) 2 e) 1

M5. Two converging lenses of focal lengths 40cm and 20 cm are separated by 20cm. An object is located 20 cm in front of the first (40cm) lens (to its left) . Where is the final image with respect to the second (20cm) lens?

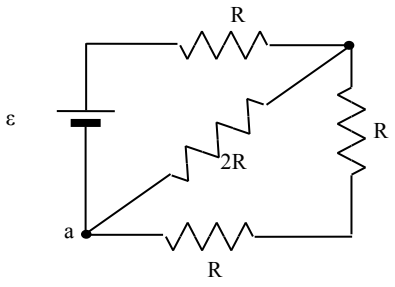
a) at 60cm b) at 43cm c) 30cm
d) 20cm e) none of these answers is correct

D6 The explosion of a vertically launched firecracker in the air at a height of 30 m produces a 90-dB sound level at the ground below. What is the intensity level (in dB) of the resulting sound heard by a reveler 40 m horizontally away from the point where the fire-cracker was launched.

a) 98dB b) 96dB c) 86dB d) 81dB e) none of the above

D7 At what rate is thermal energy being generated in the 2*R*-resistor when ε = 48 V and *R* = 12.0 Ω?

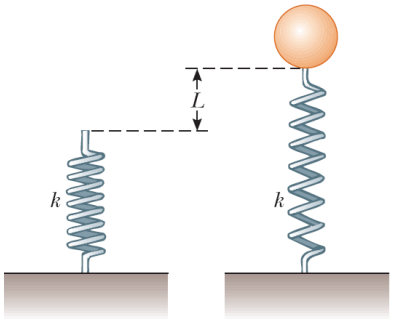
a) 24 b)12 W c) 6W
d)3W e) none of the above



PART II Each problem is worth 13%

IN THE EXAM BOOKLET PROVIDE THE DETAILED SOLUTION TO 4 out of 5 PROBLEMS BELOW. AT THE COVER OF YOUR EXAM BOOKLET INDICATE CLEARLY WHICH PROBLEMS ARE TO BE MARKED

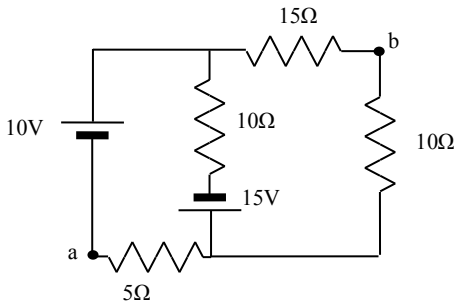
1 A mass-less spring of constant k = 70.0 N/m is attached vertically to a table. A 2.00-g balloon is filled with helium (density = 0.180 kg/m^3) to a volume of 4.00 m^3 and is then connected to the spring, causing it to stretch as shown.



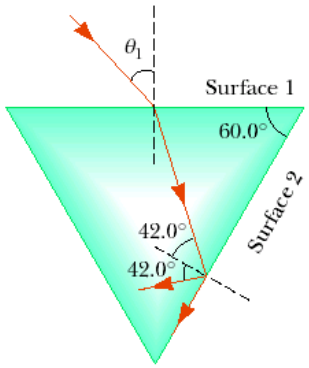
a) Determine the spring extension L when the balloon is in equilibrium. (6)

b) The string (with a balloon) is then compressed by 2cm. Find the period of string oscillations about the equilibrium. (Neglect the air resistance) (7)

2 Determine the potential difference $V_a - V_b$ shown in the circuit diagram.



3 A block with a speaker bolted to it is connected to aspring having spring constant k= 20.0 N/m .
The total mass of the block and speaker is 5.00 kg, and the amplitude of this unit's motion is 0.500 m.
(a) If the speaker emits sound waves of frequency 440 Hz, determine the highest and lowest frequencies heard by the person to the right of the speaker?
(b) find the length of tube opened on one end such that its third harmonic would match the highest frequency heard by the observer
(c) If the observer is 12 Meters away from the equilibrium point to the right of the speaker and if the power emitted by the speaker is 8 W what are the maximum and minimum sound levels (in dB) observed by a stationary observer?
Assume that the speed of sound is 343 m/s.



4 The light beam in Figure strikes surface 2 of the prism at the critical angle. Determine the angle of incidence θ_1.

5 The object in Figure P26.48 is midway between the lens and the mirror. The mirror's radius of curvature is 20.0 cm, and the lens has a focal length of –16.7 cm. Considering only the light that leaves the object and travels first toward the mirror, locate the final image formed by this system. Is this image real or virtual? Is it upright or inverted? What is the overall magnification?