Instructor(s): C. Parks

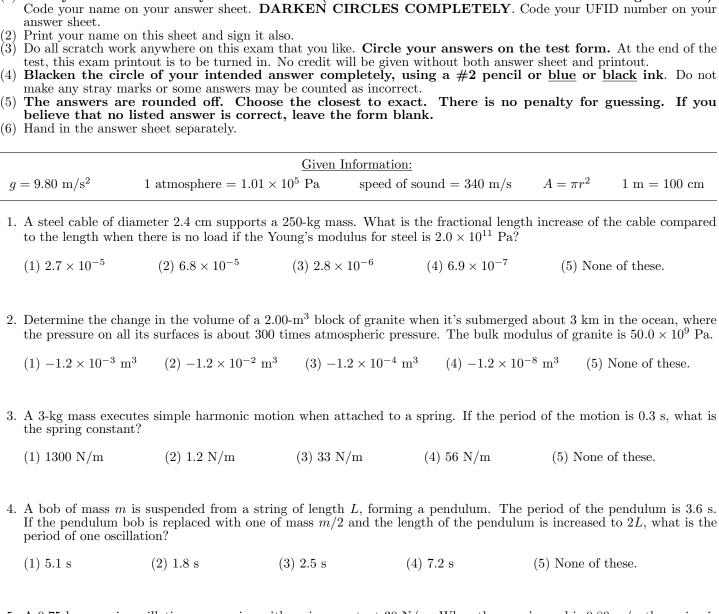
DHYSICS DEDARTMENT

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PHY2053, Summer 2012	EXAM 3	August 3, 2012
Name (print, last first):	Signature:	
$On m_{\tilde{t}}$	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). answer sheet.
- test, this exam printout is to be turned in. No credit will be given without both answer sheet and printout.



- 5. A 0.75-kg mass is oscillating on a spring with spring constant 30 N/m. When the mass' speed is 0.80 m/s, the spring is stretched 15 cm. What is the amplitude of the mass' oscillations? Assume that mechanical energy is conserved.
- (4) 28 cm(1) 20 cm(2) 30 cm(3) 15 cm(5) None of these.
- 6. A mass' motion in time can be described by the equation $x = A\cos\omega t$ where A = 0.50 m. The period of the mass is 1.5 s. What is its velocity at 5 seconds?
 - (2) 0 m/s(4) 8.8 m/s(1) -1.8 m/s(3) 2.1 m/s(5) None of these.

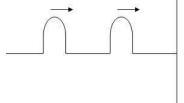
7. Frustrated by his failure to capture Princess and overcome Peach's vegetable defense, Bowser roars in anger. A Koopa Troopa standing 3 m from Bowser is hit with a sound wave with intensity 10 W/m². A second Koopa is standing 4 m from Bowser. What intensity does the second Koopa hear?



- $(1) 5.6 \text{ W/m}^2$
- $(2) 18 \text{ W/m}^2$
- $(3) 10 \text{ W/m}^2$
- $(4) 5.0 \text{ W/m}^2$
- (5) None of these.
- 8. A 100-gram wire has a 50 kg mass hanging from it. If the wire is 8 m long, how long does it take for a transverse wave to travel the length of the wire?
 - (1) 0.040 s
- (2) 0.13 s
- (3) .024 s
- (4) 0.080 s
- (5) None of these.

- 9. In a transverse wave, the individual particles of the medium
 - (1) move perpendicularly to the direction of the wave's travel
 - (2) move parallel to the direction of the wave's travel
 - (3) move in circles
 - (4) move in ellipses
 - (5) None of these.
- 10. What is the wavelength of a 440-Hz sound wave traveling through air?
 - (1) None of these.
- (2) 1.3 m
- (3) 4.9 m
- (4) 0.12 m
- (5) 0.21 m
- 11. A 25-Hz wave with amplitude A is traveling in the +x-direction at 50 m/s. What is the equation for the traveling wave?
 - (1) $y = A\sin((157 \text{ rad/s})t (3.14 \text{ rad/m})x)$
 - (2) $y = A\sin((157 \text{ rad/s})t + (3.14 \text{ rad/m})x)$

 - (3) $y = A \sin((25 \text{ rad/s})t (2 \text{ rad/m})x)$ (4) $y = A \sin((25 \text{ rad/s})t + (2 \text{ rad/m})x)$
 - (5) None of these.
- 12. Two successive pulses are traveling down a rope as shown. The rope is attached to a wall forming a fixed point for the rope. The first pulse reflects back and interferes with the second pulse. What is the amplitude of the rope when the two pulses overlap? Assume the pulses have the same amplitude A.



- (1) zero
- (2) 2A
- (3) A/2
- $(4) \sqrt{2}A$
- (5) None of these.
- 13. The distance between two nodes in a standing wave is 30 cm. If the frequency of the wave is 60 Hz what is the equation of the standing wave. The amplitude of the wave is 2A.
 - $\begin{array}{l} (1) \ y = 2A\sin((377 \ \mathrm{rad/s})t\cos((10.5 \ \mathrm{rad/m})x) \\ (2) \ y = 2A\sin((377 \ \mathrm{rad/s})t\cos((5.24 \ \mathrm{rad/m})x) \\ (3) \ y = 2A\sin((60 \ \mathrm{rad/s})t\cos((0.30 \ \mathrm{rad/m})x) \\ (4) \ y = 2A\sin((60 \ \mathrm{rad/s})t\cos((10.5 \ \mathrm{rad/m})x) \end{array}$

 - (5) None of these.

14.	$A \ wave \ can \ spread \ around \ an \ obstacle \ when \ the \ obstacle's \ wavelength \ is \ similar \ to \ the \ size \ of \ the \ obstacle. \ This \ is \ called$							
	(1) diffraction	(2) reflection	(3) refraction	(4) interference	(5) None of these.			
15.	A 160-gram rope 4 m long is fixed at both ends. The tension in the rope is 400 N. What is the frequency of the secon harmonic wave in the rope?							
	(1) 25 Hz	(2) 50 Hz	(3) 75 Hz	(4) 43 Hz	(5) None of these.			
16.	. How much larger is the intensity of a 90 dB sound than the intensity of a 74 dB sound?							
	(1) 40 times	(2) 16 times	(3) 8 times	(4) 20 times	(5) None of these.			
17.	7. The shortest pipes used in pipe organs are about 7.7 cm long. What is the fundamental frequency of a pipe this that is open at both ends?							
	$(1)~2200~\mathrm{Hz}$	(2) 4400 Hz	(3) 1100 Hz	(4) 3300 Hz	(5) None of these.			
18.	. The Bernoulli whistle we made in class (cut from a drinking straw) can be considered to a tube with one end open (and one end closed). At its full length, its fundamental frequency is f . If we cut the straw so that it is now $2/3$ as long a before, what is the new fundamental frequency?							
	(1) $3f/2$	$(2) \ 2f/3$	(3) $f/3$	(4) f	(5) None of these.			
19.	. Two identical tuning forks oscillate at 440 Hz. Dropping one of the tuning forks breaks a piece off the tip of the vibratin end. Now when the tuning forks sound, a beat frequency of 6 Hz is heard. What is the frequency of the damaged tunin fork? (Hint: The piece is broken from the vibrating end, reducing its mass. Will it vibrate faster or slower?)							
	(1) 446 Hz	(2) 434 Hz	(3) 440 Hz	(4) 220 Hz	(5) None of these.			
20.	. While driving down Museum Road, you see Mr. Parks crossing the road. Seeing your opportunity, you accelerate you car (1200 kg) from 9.0 m/s (about 20 miles/hour) to 15 m/s. Unfortunately, you do not see another car (mass of 1500 kg pull out in front of you and they collide. Emergency vehicles come racing to the scene at 70 mph (31 m/s). From you volunteer work at Shand's, you know that the siren on the ambulance has a frequency of 1000 Hz. What frequency degree you hear? You are at rest after the collision.							
	(1) 1100 Hz	(2) 920 Hz	(3) 910 Hz	(4) 1000 Hz	(5) None of these.			