Sample for Physics Placement Test

Choose the correct answer:

1. A 64 kg woman stands on frictionless level ice with a 0.10 kg stone at her feet. She kicks the stone with her foot so that she acquires a velocity of 0.0017m/s in the forward direction. The velocity acquired by the stone is:

A. 1.1 m/s forward
B. 1.1 m/s backward
C. 0.0017 m/s forward
D. 0.0017 m/s backward
E. none of these

2. A 0.50 kg object moves on a horizontal circular track with a radius of 2.5m. An external force of 3.0N, always tangent to the track, causes the object to speed up as it goes around. If it starts from rest its speed at the end of one revolution is:

A. 9.8 m/s
B. 14 m/s
C. 15 m/s
D. 19 m/s
E. 21 ms

3. A 700 N man jumps out of a window into a fire net 10m below. The net stretches 2m before bringing the man to rest and tossing him back into the air. The maximum potential energy of the net, compared to its unstretched potential energy, is:

A. 300 J
B. 710 J
C. 850 J

D. 7000 J

E. 8400 J

4. A 3g bullet is fired horizontally into a 10–kg block of wood suspended by a rope from the ceiling. The clock swings in an arc, rising 3mm above its lowest position. The velocity of the bullet was:

A. unknown since the heat generated in the collision was not given

B. 8.0×10^2 m/s

C. 24.0 m/s

D. 8.0 m/s

E. 2.4×10^4 m/s

5. A particle moves in simple harmonic motion according to $x = 2\cos(50t)$, where x is in meters and t is in seconds. Its maximum velocity in m/s is:

A. 100 sin (50t)

B. 100 cos (50t)

C. 100

D. 200

E. none of these

6. If the potential difference across a resistor is doubled:

A. only the current is doubled

B. only the current is halved

C. only the resistance is doubled

D. only the resistance is halved

E. both the current and resistance are doubled

7. A student kept her 60 watt, 120 volt study lamp turned on from 2:00 PM until 2:00 AM. How many coulombs of charge went through it?

A. 150

B. 3,600

C. 7,200

D. 18,000

E. 21,600

8. Four 20–resistors are connected in parallel and the combination is connected to a 20 V emf device. The current in the device is:

A. 0.25 A

B. 1.0 A

C. 4.0 A

D. 5.0 A

E. 100 A

9. A long narrow solenoid has length ℓ and a total of N turns, each of which has cross–sectional area A. Its inductance is:

A. $\mu_0 N^2 A\ell$

B. $\mu_0 N^2 A/\ell$

C. $\mu_0 NA/\ell$

D. $\mu_0 N^2 \ell/A$

E. none of these

10. An LC series circuit with an inductance L and a capacitance C has an oscillation frequency f. Two inductors, each with inductance L, and two capacitors, each with capacitance C, are all wired in series and the circuit is completed. The oscillation frequency is:

A. f/4

B. f/2

C. f

D. 2f

E. 4f

11. In a Young's double-slit experiment, light of wavelength 500 nm illuminates two slits that are separated by 1mm. The separation between adjacent bright fringes on a screen 5m from the slits is:

A. 0.10 cm
B. 0.25 cm
C. 0.50 cm
D. 1.0 cm
E. none of the above

12. Interference of light is evidence that:

A. the speed of light is very large
B. light is a transverse wave
C. light is electromagnetic in character
D. light is a wave phenomenon
E. light does not obey conservation of energy

13. In the equation $\sin \theta = \lambda/a$ for single-slit diffraction, θ is:

A. the angle to the first minimum
B. the angle to the second maximum
C. the phase angle between the extreme rays
D. $N\pi$ where N is an integer
E. $(N + 1/2) \pi$ where N is an integer

14. A nucleus with a mass number of 64 has a mean radius of about:

A. 4.8 fm
B. 19 fm
C. 77 fm
D. 260 fm
E. 2.6×10^5 fm

15. Starting with a sample of pure ^{66}Cu, 7/8 of it decays into Zn in 15 minutes. The corresponding half-life is:

   A. 15 minutes
   B. 5 minutes
   C. 7 minutes
   D. 3.75 minutes
   E. 10 minutes

16. The ^{66}Cu (Z = 29) produced in a nuclear bombardment is unstable, changes to ^{66}Zn (Z = 30) by the emission of:

   A. a proton
   B. a gamma ray photon
   C. a positron
   D. an electron
   E. an alpha particle

Good Luck

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
B	B	E	B	C	A	E	C	B	C	B	D	A	A	B	D