AUS | الجامعة الأميركية في الشارقة American University of Sharjah

College of Arts and Sciences
Department of Physics
Physics Placement Test

90 Minutes Exam

Write down your name and ID number on the question paper in ***ink***.

Name_____

ID #: _____

Instructions:

1) This test has 25 multiple-choice questions on 6 pages, including this cover.
2) Use the space provided below the statement of each question for scratch work.
3) Fill the scantron sheet with 2 HB pencil only. DO NOT use INK or any other pencil.
4) You are allowed to use a scientific calculator.
5) Please turn off your cell phone and you cannot use it as a calculator.

1) Find an equation of the line containing the pair of points (8, −3) and (0, 6)

A) $y = -\frac{11}{6}x + 6$

B) $y = -\frac{9}{8}x + 6$

C) $y = \frac{9}{8}x + 6$

D) $y = \frac{11}{6}x + 6$

2) Vector $\vec{\mathbf{M}}$ = 4.00 m points eastward and vector $\vec{\mathbf{N}}$ = 3.00 m points southward. The resultant vector $\vec{\mathbf{M}} + \vec{\mathbf{N}}$ is given by

A) 5.00 m at an angle 26.6° south of east.
B) 5.00 m at an angle 18.4° south of east.
C) 5.00 m at an angle 71.6° south of east.
D) 5.00 m at an angle 36.9° south of east.

3) What is the conversion factor between km/h^2 and m/s^2?

A) 3.60 $(m/s^2)/(km/h^2)$
B) 1.30×10^4 $(m/s^2)/(km/h^2)$
C) 2.78×10^{-1} $(m/s^2)/(km/h^2)$
D) 7.72×10^{-5} $(m/s^2)/(km/h^2)$

4) Starting from rest, a 4.0−kg body reaches a speed of 8.0 m/s in 2.0 s. What is the net force acting on the body?

A) 2.0 N
B) 4.0 N
C) 16 N
D) 8.0 N

5) A 40.0−kg crate is being raised by means of a rope. Its upward acceleration is 2.00 m/s^2. What is the force exerted by the rope on the crate?

A) 80.0 N
B) 472 N
C) 392 N
D) 312 N

6) An object is thrown upwards with a speed of 14 m/s. How high above the projection point does it reach?

A) 20 m
B) 10 m
C) 5.0 m
D) 15 m

7) Vector $\vec{\mathbf{A}}$ has components A_x = 12 m and A_y = 5.0 m. What is the magnitude of vector $\vec{\mathbf{A}}$?

A) 13 m
B) 60 m
C) 7.0 m
D) 17 m

8) The velocity of a particle is given by $v = t^2 - 8t + 5$, where t is the time (in seconds) for which it has traveled. Find the time at which the velocity is at a minimum.

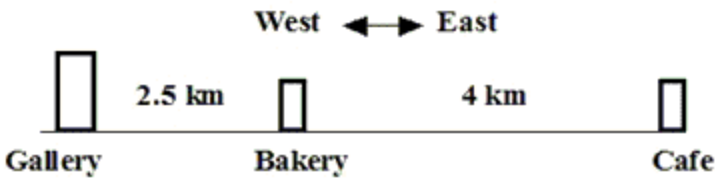
A) 2.5 s
B) 5 s
C) 4 s
D) 8 s

9) Two forces of 476 N and 271 N act at a point. The resultant (net) force is 558 N. Find the angle between the forces.

A) 68.3°
B) 92.5°
C) 163.5°
D) 87.5°

10) Refer to Fig. 1. If you start from the Bakery, travel to the Art Gallery, and then to the Cafe, in 1 hour, what is your average speed?

FIGURE 1

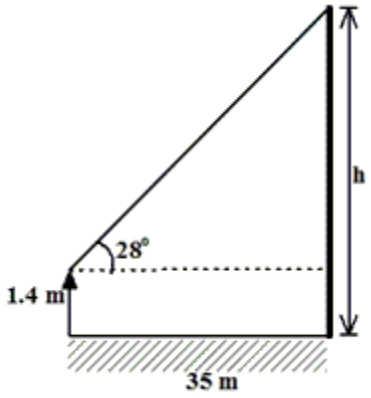


A) 10.5 km/h
B) 9.0 km/h
C) 6.5 km/h
D) 4.0 km/h

11) Refer to Fig. 1 of question 10. If you start from the Bakery, travel to the Cafe, and then to the Art Gallery, what is your displacement?

A) 2.5 km West
B) 6.5 km West
C) 4.0 km West
D) 9.0 km East

12) A person stands 35 m from a flag pole. With a protractor at eye level, he finds that the angle at the top of the flag pole makes with the horizontal is 28 degrees. Approximately how high is the flag pole? (The distance from his feet to his eyes is 1.4 m)



A) 66 m
B) 30 m
C) 20 m
D) 50 m

13) If a force accelerates 4.5 kg at 40 m/s^2, that same force would accelerate 18 kg by how much?

A) 0.18 km/s^2
B) 40. m/s^2
C) 0.16 km/s^2
D) 10 m/s^2

14) Given 1 angstrom unit = 10^{-10} m and 1 fermi = 10^{-15} m , what is the relationship between these units?

A) 1 angstrom = 10^{+25} fermi
B) 1 angstrom = 10^{+5} fermi
C) 1 angstrom = 10^{-5} fermi
D) 1 angstrom = 10^{-25} fermi

15) Vector $\vec{\mathbf{A}}$ has components A_x = 12.0 m and A_y = 5.00 m. What is the angle that vector $\vec{\mathbf{A}}$ makes with the x–axis?

A) 32.6°
B) 22.6°
C) 12.6°
D) 42.8°

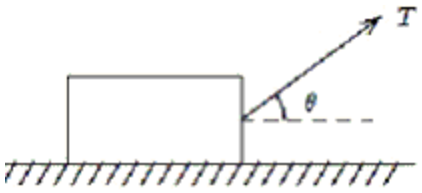
16) If we find v = A λ, where λ is a length and v is a speed, what are the mks (SI) units for the A?

A) s^{-1}
B) m/s^2
C) s
D) kg.m/s

17) The following conversion equivalents are given:
1 mile = 5280 ft 1 ft = 12 in 1 m = 39.37 in 1 hour = 60 min 1 min = 60 s
A particle has a speed of 8.4 miles per hour. The speed, in m/s, is closest to:

A) 3.4
B) 3.8
C) 4.5
D) 4.1

18) A block of mass m is pulled at <u>constant velocity</u> along a rough horizontal floor by an applied force T as shown. The magnitude of the frictional force is:



A) T sin θ
B) mg cos θ
C) mg
D) T cos θ

19) Refer to figure of question 18. The vertical component of the force exerted on the block by the floor is:

A) mg + T sin θ
B) mg − T cos θ
C) mg − T sin θ
D) mg

20) An airplane increases its speed from 100 m/s to 160 m/s, at the average rate of 15 m/s^2. How much time does it take for the complete increase in speed?

A) 17.3 s
B) 0.25 s
C) 0.0577 s
D) 4.0 s

21) Suppose $A = B^x C^y$, where the units in meters and seconds of A, B, C are respectively m.s, m^2/s, and $m.s^2$. Then the exponents x and y have the values:

A) 2/3 ; 1/3
B) 4/5 ; −1/5
C) 1/5; 3/5
D) 2; 3

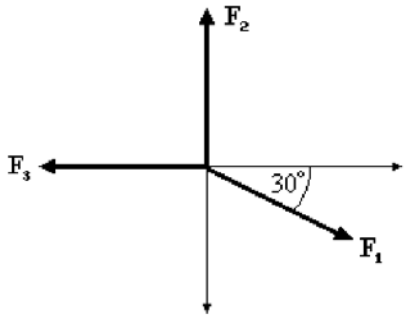
22) If you run a complete loop around an outdoor track (400 m) in 100 s, your average velocity is

A) 4.00 km/s.
B) 4.0 m/s.
C) 40,000 m/s.
D) zero.

23) A particle moves along the x axis from x_i to x_f. Of the following values of the initial and final coordinates, which results in the displacement with the largest magnitude?

A) $x_i = -4$ m, $x_f = 2$ m
B) $x_i = 1$ m, $x_f = 6$ m
C) $x_i = -4$ m, $x_f = 4$ m
D) $x_i = 4$ m, $x_f = -2$ m

FIGURE 2



24) Refer to **Figure 2** The magnitudes of the forces as shown in the figure are: F_1 = 80.0 N, F_2 = 60.0 N, and F_3 = 40.0 N. The resultant (net) vector force acting on the particle O is given by

A) 180 N at an angle 60.0° with respect to +x−axis.
B) 35.5 N at an angle 34.3° with respect to +x−axis.
C) 60.0 N at an angle 90.0° with respect to +x−axis.
D) 20.0 N at an angle 34.3° with respect to +x−axis.

25) The position of an object is given by $x = bt^2 - ct$, where $b = 2.0$ m/s^2 and $c = 6.7$ m/s. What is the instantaneous velocity of the object when $t = 2.2$ seconds?

A) 2.3 m/s
B) 2.1 m/s
C) 1.7 m/s
D) 2.7 m/s

Answer Key
Testname: PLACEMENT TEST

1) B
2) D
3) D
4) C
5) B
6) B
7) A
8) C
9) D
10) B
11) A
12) C
13) D
14) B
15) B
16) A
17) B
18) D
19) C
20) D
21) C
22) D
23) C
24) B
25) B