This review, produced by the CLAS Teaching Center, contains a collection of questions which are representative of the type you may encounter on the exam. Other resources made available by the Teaching Center include:

- Walk-In tutoring at Broward Hall
- Private-Appointment, one-on-one tutoring at Broward Hall
- Walk-In tutoring in LIT 215
- Supplemental Instruction
- Video resources for Math and Science classes at UF
- Written exam reviews and copies of previous exams

The teaching center is located in the basement of Broward Hall:

You can learn more about the services offered by the teaching center by visiting https://teachingcenter.ufl.edu/
1. Oasis B is 25 km due east of oasis A. Starting from oasis A, a camel walks 24 km in a direction 15° south of east and then walks 8.0 km due north. How far is the camel then from oasis B?

A. 1.2 km  B. 2.6 km  C. 3.0 km  D. 3.9 km

2. In the product \( \vec{F} = q\vec{v} \times \vec{B} \), take \( q = 2, \vec{v} = 2.0\hat{i} + 4.0\hat{j} + 6.0\hat{k} \), and \( \vec{F} = 4.0\hat{i} - 20\hat{j} + 12\hat{k} \). What then is \( \vec{B} \) in unit-vector notation if \( B_x = B_y \)?

A. 2.5\( \hat{i} + 2.5\hat{j} - 3.5\hat{k} \)
B. 5.0\( \hat{i} + 5.0\hat{j} - 2.0\hat{k} \)
C. -3.0\( \hat{i} - 3.0\hat{j} - 4.0\hat{k} \)
D. 7.0\( \hat{i} + 7.0\hat{j} + 2.0\hat{k} \)

3. What is the angle between \( 3\vec{C} \) and \( (2\vec{A} \times \vec{B}) \) if

\( \vec{A} = 1\hat{i} + 2\hat{j} + 3\hat{k} \),

\( \vec{B} = -3\hat{i} + 4\hat{j} + 2\hat{k} \), and

\( \vec{C} = 9\hat{i} - 10\hat{j} \)?

A. 40.28°  B. 80.37°  C. 97.65°  D. 74.87°

4. A motorist drives along a straight road at a constant speed of 40 m/s. At \( t = 0 \) she passes a parked motorcycle police officer, and the officer takes off after her with acceleration \( a(t) = bt \), where \( b \) is a constant and \( t \) is the time. If the officer maintains this rate of acceleration, what is the speed of the police officer when he reaches the motorist?

A. 120 m/s  B. 180 m/s  C. 30 m/s  D. 90 m/s
5. A 4 kg block is at rest on a frictionless horizontal track. A constant horizontal force acts on the block at time $t = 0$ seconds. A graph of the position of the block at half-second intervals is shown in the figure below. What is the block’s speed after traveling the full 0.8 meters?

A. 0.80 m/s  
B. 1.20 m/s  
C. 0.40 m/s  
D. 0.76 m/s

6. A ball is shot from ground level toward a wall from different distances. The figure below shows the $y$ component $v_y$ of the ball’s velocity just as it would reach the wall, as a function of the initial distance $x$ of the ball from the wall. The scaling is set by $v_{ys} = 5 m/s$ and $x_s = 20 m$. What is the launch angle?

A. 31.7°  
B. 14.3°  
C. 89.5°  
D. 7.3°

7. A crate of mass $m$ is stationary on a ramp at an angle of $\theta = 20^\circ$. What is the minimum coefficient of static friction $\mu_s$ between the crate and surface for this to be possible?

A. 1  
B. 0.8  
C. 0.4  
D. 0.6
8. In the figure below, a 1.34 kg ball rotates with a vertical rod. The ball is connected to two massless strings each of length 1.7 m. The strings are also connected to the vertical, rotating rod. The strings are tied to the rod with separation $d = 1.7$ m and are taut. The tension in the upper string is 35 N. What is the speed of the ball?

![Diagram of a ball rotating with a vertical rod and two strings]

a. 7.5 m/s  b. 10.2 m/s  c. 14 m/s  d. 6.5 m/s

9. A box of Cheerios has a mass of 1 kg, and a box of Wheaties has a mass of 3 kg. In the figure below a 12 N force is applied to a box of Cheerios sitting to the left of a box of Wheaties. The magnitude of the frictional force on the Cheerios box is 2 N and the magnitude of the frictional force on the Wheaties box is 4 N. What is the magnitude of the force on the Wheaties box from the Cheerios box?

![Diagram showing forces on a box of Cheerios and Wheaties]

A. 7 N  B. 8.5 N  C. 10 N  D. 13 N

10. An 85 kg man lowers himself to the ground from a height of 10.0 m by holding onto a rope that runs over a frictionless pulley to a 65 kg sandbag. With what speed does the man hit the ground if he started from rest?

A. 1.9 m/s  B. 10.2 m/s  C. 3.8 m/s  D. 5.1 m/s