Some things to keep in mind:

- Make sure to show all your steps. What we write on the board together, I expect to see on your paper.
- Do not write 0 when you mean 0.
- If it will help, draw a picture.
- Don’t use any decimals in your answer, unless there are decimals in the question.

Section 12.1: Three-Dimensional Coordinate Systems

1. how do the coordinate planes relate to our classroom?
2. what is the first octant?
3. the right-hand rule tell us the orientation of the $x$, $y$, and $z$ axes
4. be able to identify simple surfaces given their equation
5. distance formula in 3D
6. the equation of a sphere looks like the equation for a circle

Section 12.2: Vectors

1. what are the two properties every vector has?
2. $\langle$ pointy $\rangle$ brackets are for vectors, ($round$) brackets are for points
3. geometric interpretations of:
   a. vector addition and subtraction
   b. scalar multiplication
   c. negative vectors
   d. triangle/parallelogram law
4. using components to add, subtract, and scalar multiply vectors
5. magnitude/length/norm all mean the same thing
6. when are two vectors equal? parallel?
7. do the properties of vectors on page 819 look similar to the properties of numbers?
8. what is a unit vector?
9. converting a vector to a unit vector in the same direction
10. the standard basis vectors $\mathbf{i}$, $\mathbf{j}$ and $\mathbf{k}$ in 3D, how are they defined?
11. the standard basis vectors $\mathbf{i}$ and $\mathbf{j}$ in 2D, how are they defined?

Section 12.3: The Dot Product

1. the dot product multiplies two vectors to get a number
2. properties of the dot product, which ones do not look like a property of numbers?
3. we can express the dot product in terms of cosine
4. be able to find the angle between two vectors
5. when are two vectors orthogonal/perpendicular?
6. scalar and vector projections (think shadows)
7. the dot product’s application in physics: work
8. we skipped direction angles and direction cosines

Section 12.4: The Cross Product

1. the cross product multiplies two vectors to get a vector perpendicular to both of them
2. does order matter when taking the cross product?
3. use the right hand rule and determinants
4. both vectors need to have 3 components, so this only works in $V_3$ (three dimensions)
5. we can express the length of the cross product in terms of the sine
6. how can we use the cross product to decide when two vectors are parallel?
7. the length of the cross product is area of the corresponding parallelogram, how about a triangle?
8. properties of the cross product, what doesn’t look like a property of numbers?
9. the scalar triple product is the volume of a parallelepiped (box) formed by the three vectors
10. the cross product’s application in physics: torque

Section 12.5: Equations of Lines and Planes

1. a line is determined by a point and a direction (vector)
2. there are vector, parametric, and symmetric equations of a line
3. if two lines in 3D do not intersect and are not parallel, what do we call them?
4. a plane is determined by a point and a normal vector (to the plane)
5. we have vector and scalar equations for a plane
6. when are two planes are parallel/perpendicular?
7. finding the distance from a point to a plane, careful with the formula
8. finding the angle, distance between two planes
9. two planes intersect in a line

Section 12.6: **Cylinders and Quadric Surfaces**

1. you must expand your definition of a “cylinder”
2. there are six different types of quadric surfaces
3. don’t memorize the formulas, be able to identify them through traces/slices