

Do this practice quiz and turn it in with your homework for extra credit.

Name: _____

Directions below are for the actual quiz...this p-quiz is condensed to save copying...

Be honest. Follow the Quiz/Test Policy. Please identify your answers by circling them where feasible, etc. No reference material allowed on this quiz unless otherwise stated. Show ALL WORK or no credit. It is O.K. to use Calculators (but no TI-89's or other symbolic calculators are allowed unless otherwise stated).

Note: The actual quiz problem difficulty level will be at most as difficult as the problems on this practice quiz. 😊

Note: Exact answers are required where possible unless otherwise stated.

1. For $P(-2, -1)$, $Q(5, -1)$, and $R(2, 4)$, let $\mathbf{u} = \overrightarrow{PQ}$ and $\mathbf{v} = \overrightarrow{PR}$, and find
 - (a) the component forms of \mathbf{u} and \mathbf{v}
 - (b) the magnitude of \mathbf{v}
 - (c) $\mathbf{u} \cdot \mathbf{v}$
 - (d) $2\mathbf{u} + \mathbf{v}$
 - (e) the vector component of \mathbf{u} in the direction of \mathbf{v}
 - (f) the vector component of \mathbf{u} orthogonal to \mathbf{v}

2. Find the standard form of the equation of the sphere with endpoints of a diameter: $(0, 0, 4)$, $(4, 6, 0)$

3. Find the center and radius of the sphere and sketch its graph. $x^2 + y^2 + z^2 - 10x + 6y - 4z + 34 = 0$

4. For $P(2, -1, 3)$, $Q(0, 5, 1)$, and $R(5, 5, 0)$, let $\mathbf{u} = \overrightarrow{PQ}$ and $\mathbf{v} = \overrightarrow{PR}$, and find
 - (a) the component forms of \mathbf{u} and \mathbf{v}
 - (b) $\mathbf{u} \cdot \mathbf{v}$
 - (c) $\mathbf{u} \times \mathbf{v}$
 - (d) an equation of the plane containing P , Q , and R
 - (e) a set of parametric equations of the line through P and Q .

5. Determine whether the vectors are orthogonal, parallel, or neither. $\langle -4, 3, -6 \rangle$, $\langle 16, -12, 24 \rangle$

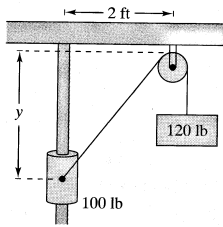
6. Find the angle θ between the vectors \mathbf{u} and \mathbf{v} .
 $\mathbf{u} = 5[\cos(3p/4)\mathbf{i} + \sin(3p/4)\mathbf{j}]$, $\mathbf{v} = 2[\cos(2p/3)\mathbf{i} + \sin(2p/3)\mathbf{j}]$

7. Find the component form of \mathbf{u} when \mathbf{u} is perpendicular to the plane $x - 3y + 4z = 0$, and $\|\mathbf{u}\| = 3$.

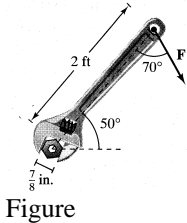
8. Find the component form of \mathbf{u} when \mathbf{u} is a unit vector perpendicular to the lines
 $x = 4 - t$, $y = 3 + 2t$, $z = 1 + 5t$
 $x = -3 + 7s$, $y = -2 + s$, $z = 1 + 2s$.

9. Let $\mathbf{u} = \langle 3, -2, 1 \rangle$, $\mathbf{v} = \langle 2, -4, -3 \rangle$, and $\mathbf{w} = \langle -1, 2, 2 \rangle$.
 - (a) find $\|\mathbf{u}\|$
 - (b) find the angle between \mathbf{u} and \mathbf{v}
 - (c) determine a unit vector perpendicular to the plane containing \mathbf{v} and \mathbf{w}
 - (d) determine the projection of \mathbf{w} onto \mathbf{u}
 - (e) find the work done in moving an object along the vector \mathbf{u} , if applied force is \mathbf{w} .

10. A 100 pound collar slides on a frictionless vertical rod (see figure). Find the distance y for which the system is in equilibrium if the counterweight weighs 120 pounds.



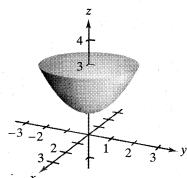
11. The specifications for a tractor state that the torque on a bolt with head size $\frac{7}{8}$ inch cannot exceed 200 foot-pounds. Determine the maximum force $\|\mathbf{F}\|$ that can be applied to the wrench in the figure.



12. Find a set of parametric and symmetric equations for the line that passes through the point $(1, 2, 3)$ and is parallel to the line given by $x = y = z$.
13. Find a set of parametric and symmetric equations for the line that passes through the point $(0, 1, 4)$ and is perpendicular to $\mathbf{u} = \langle 2, -5, 1 \rangle$ and $\mathbf{v} = \langle -3, 1, 4 \rangle$.
14. Find an equation of the plane that passes through the points $(-3, -4, 2)$, $(-3, 4, 1)$ and $(1, 1, -2)$.

15. Find the distance between the lines $x - 4 = \frac{y - 3}{-1} = \frac{z - 7}{3}$ and $\frac{x + 3}{5} = \frac{y - 7}{2} = \frac{z + 5}{-6}$.

16. The top of a rubber bushing designed to absorb vibrations in an automobile is the surface of revolution generated by revolving the curve $z = \frac{1}{2}y^2 + 1$, $(0 \leq y \leq 2)$ in the yz -plane about the z -axis (see figure). Find an equation for the surface of revolution.



Figure

17. Convert $(-2\sqrt{2}, 2\sqrt{2}, 2)$ to the following coordinates.
 (a) cylindrical
 (b) spherical
18. Find equations in the following coordinates $x^2 + y^2 + z^2 = 16$
 (a) cylindrical
 (b) spherical

- 1a) $7\mathbf{i}, 4\mathbf{i} + 5\mathbf{j}$
 1b) $\sqrt{41}$
 1c) 28
 1d) $18\mathbf{i} + 5\mathbf{j}$
 1e) $112\mathbf{i}/41 + 140\mathbf{j}/41$
 1f) $175\mathbf{i}/41 + 140\mathbf{j}/41$
 1g) $(0, -7, 0)$
 2) $(2, 3, 2), \sqrt{17}$
 3) $(5, -3, 2), 2$
 4a) $\langle -2, 6, -2 \rangle, \langle 3, 6, -3 \rangle$
 4b) 36
 4c) $-6(\mathbf{i} + 2\mathbf{j} + 5\mathbf{k})$
 4d) $x + 2y + 5z = 15$
 4e) $1 - 2t$