1. Resolve \( \vec{F} \) into vectors \( \vec{P} \) and \( \vec{N} \), where \( \vec{P} \) is the projection of \( \vec{F} \) onto \( \vec{d} \) and \( \vec{N} \) is perpendicular to \( \vec{P} \).

   (a) \( \vec{F} = 6\vec{i}+8\vec{j}, \quad \vec{d} = 4\vec{i}+\vec{j}, \quad \vec{P} = \quad \quad \), \( \vec{N} = \quad \quad \)

   work done by a force, \( \vec{F} \) in the direction of \( \vec{d} \) is \( \quad \quad \).

   (b) \( \vec{F} = 4\vec{i}+\vec{j}, \quad \vec{d} = 6\vec{i}+8\vec{j}, \quad \vec{P} = \quad \quad \), \( \vec{N} = \quad \quad \)

   work done by a force, \( \vec{F} \) in the direction of \( \vec{d} \) is \( \quad \quad \).

   (c) \( \vec{F} = -200\vec{j}, \quad \vec{d} = \langle -10\sqrt{3}, -10 \rangle, \quad \vec{P} = \quad \quad \), \( \vec{N} = \quad \quad \)

   work done by a force, \( \vec{F} \) in the direction of \( \vec{d} \) is \( \quad \quad \).

   (d) \( \vec{F} = -40\vec{j}, \quad \vec{d} = 12\vec{i}+12\vec{j}, \quad \vec{P} = \quad \quad \), \( \vec{N} = \quad \quad \)

   work done by a force, \( \vec{F} \) in the direction of \( \vec{d} \) is \( \quad \quad \).

2. Answer the following

   (a) Force applied is \( ||\vec{F}|| = 16N \) and direction \( \vec{F} = 60^{\circ} \), for a distance \( ||\vec{d}|| = 20m \),

   work = \( \quad \quad \).

   (b) Force applied is \( ||\vec{F}|| = 40\sqrt{2}N \) and direction \( \vec{v} = 45^{\circ} \) for a distance of 4 meters,

   work=\( \quad \quad \).

   (c) A car sits on a icy hillside of 20\(^{\circ}\) and the coefficient of friction with the ice is \( \mu = 0.20 \). If the car produces a force of 1200N, will the car slide? \( \quad \quad \)

   \( ||\vec{P}|| = \quad \quad \),

   \( ||\vec{N}|| = \quad \quad \)
3. \( \vec{v} = \langle -4, 3 \rangle \), \( \vec{w} = \langle 6, 8 \rangle \), \( \vec{u} = 2\vec{i} - 3\vec{j} \), \( \vec{a} = 5\vec{i} + 12\vec{j} \). Determine the angle between the vectors

\[
\vec{w} \text{ and } \vec{v} = \quad \quad \vec{v} \text{ and } \vec{a} = \quad \quad \\
\vec{u} \text{ and } \vec{a} = \quad \quad \vec{u} \text{ and } \vec{w} = \quad \quad
\]

4. A ball rolls along a marked table and its position at any time \( t \) can be determined by the parametric equations: \( x(t) = t^3 - t^2 \) and \( y(t) = t^3 - 3t \). Determine \( \frac{dy}{dx} \) when \( t = 3 \).

5. The paths \( \vec{r}_1(t) = \langle t, t^2 \rangle \) and \( \vec{r}_2(t) = \langle \sin t, \sin 2t \rangle \) intersect when \( t = 0 \). Determine the angle of intersection by determining the angle between their tangent vectors.

6. Determine the angle of intersection of the paths \( \vec{r}(t) = \langle t^3 + t + 2, \sin (\sqrt{3}t) \rangle \) and \( \vec{s}(t) = \langle 2e^{\sqrt{3}t}, 2t \rangle \) as they cross at the time \( t = 0 \) through the point \((2, 0)\).

7. The angular speed of the vinyl records with radius 10 inches is 33 rpm (revolutions per minute). Find the speed in inches/sec of a breadcrumb on the edge.

8. A saw blade with diameter 10 inches rotates at 2000 rpm (revolutions per minute). What is the acceleration in ft/sec\(^2\) on a carbide bit at the end of the blade?