16. The angle between a and b is given by the cosine of the dot product:
\[ a \cdot b = \cos(\theta) = \frac{a \cdot b}{|a||b|} \]
\[ = 2 \times 3 \times 5 = 30 \]
\[ = 30^\circ \]

2. (Cyclotron) A magnetic field B = 1 T acts on an object moving in a straight line. Find the radius of the circular path. Let the electron move in the plane perpendicular to the magnetic field. The radius of the circular path is given by:
\[ r = \frac{mv}{qB} \]
\[ = \frac{1 \times 1}{1 \times 1} = 1 \text{ m} \]

3. (Torsion spring) A torsion spring has a natural angular deflection of 180 degrees. The angle of deflection is given by:
\[ \theta = 2\theta_0 \]
\[ = 360^\circ \]

4. (Cable tension) A cable is hanging vertically. The tension force is given by:
\[ T = mg \]
\[ = 10 \times 9.8 = 98 \text{ N} \]
4. (3 points) Write the planes with equations:

\[ P_1: 2x + y - z = 0 \]
\[ P_2: x + 2y + 3z = 0 \]
\[ P_3: 4x - y + 2z = 0 \]

b) Find a vector perpendicular to the plane containing the triangle with vertices at:
\[ A(1, 2, 3), B(4, 5, 6), C(7, 8, 9) \]

\[ \mathbf{n} = \mathbf{AB} \times \mathbf{AC} = \begin{vmatrix} 
\mathbf{i} & \mathbf{j} & \mathbf{k} \\
1 & 2 & 3 \\
4 & 5 & 6 
\end{vmatrix} = \begin{vmatrix} 
2 & 3 \\
5 & 6 
\end{vmatrix} \mathbf{i} - \begin{vmatrix} 
1 & 3 \\
4 & 6 
\end{vmatrix} \mathbf{j} + \begin{vmatrix} 
1 & 2 \\
4 & 5 
\end{vmatrix} \mathbf{k} = (6 - 15) \mathbf{i} - (6 - 12) \mathbf{j} + (5 - 8) \mathbf{k} = -9 \mathbf{i} + 6 \mathbf{j} - 3 \mathbf{k} \]

5. (3 points) Find the area of the triangle with vertices at:

\[ A(1, 2, 3), B(4, 5, 6), C(7, 8, 9) \]

The area of a triangle with vertices \( A(x_1, y_1, z_1), B(x_2, y_2, z_2), C(x_3, y_3, z_3) \) can be found using the formula:

\[ \text{Area} = \frac{1}{2} | \mathbf{AB} \times \mathbf{AC} | 
\]

Where \( \mathbf{AB} = (x_2 - x_1, y_2 - y_1, z_2 - z_1) \) and \( \mathbf{AC} = (x_3 - x_1, y_3 - y_1, z_3 - z_1) \).

The direction vector of \( \mathbf{n} \) is \( \mathbf{n} = (-9, 6, -3) \). The area can be calculated as:

\[ \text{Area} = \frac{1}{2} | \begin{vmatrix} 
-9 & 6 & -3 \\
1 & 2 & 3 \\
4 & 5 & 6 
\end{vmatrix} | = \frac{1}{2} | (-9)(12 + 15) - 6(24 - 18) + 3(20 - 12) | = \frac{1}{2} | -162 | = 81 \]
The graph must be solved for the following equations by using the graph of random numbers.

4. \[ a = \frac{1}{b} \Rightarrow b = \frac{1}{a} \]

\[ x^2 + y^2 = r^2 \]

\[ x^2 - y^2 = c \]

\[ z^2 + w^2 = c^2 \]

\[ 4ab^2 + 6 = 4c - 2 \]

5. \[ x^2 + y^2 = r^2 \]

\[ x^2 + y^2 = c \]

\[ z^2 + w^2 = c^2 \]

\[ 4ab^2 + 6 = 4c - 2 \]
1. (a) prove that the equation of the plane which passes through the points with given

decomposes $x(2, 3, -1) + a(1, 4, 2)$

$x + a = 2 - b$

$2x = x + a = 1 + b$

$x = 1, x = 2, x = 3$

(b) prove that the equation of the plane which passes through the points with given
decomposes $x(2, 3, -1) + a(1, 4, 2)$

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2. (a) prove that the equation of the plane which passes through the points with given
decomposes $x(2, 3, -1) + a(1, 4, 2)$

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