

Exercise 1. Let $A = (1, 2)$, $B = (3, 1)$. Draw the points $A + B$, $A + 2B$, $A + 3B$, $A - B$, $A - 2B$, and $A - 3B$ on a sheet of graph paper (or a reasonably drawn set of axes).

Exercise 2. Which of the following pairs of vectors are perpendicular?

- $(1, -1, 1), (2, 1, 5)$
- $(1, -1, 1), (2, 3, 1)$
- $(-5, 2, 7), (3, -1, 2)$
- $(\pi, 2, 1), (2, -\pi, 0)$

Exercise 3. Suppose $A = (a_1, a_2, a_3)$ is perpendicular to every vector X . Show that A is the zero vector.

Exercise 4. Determine the interior angles of the triangle whose vertices are $(2, -1, 1)$, $(1, -3, -5)$, and $(3, -4, -4)$.

Exercise 5. Let A_1, \dots, A_r be vectors which are mutually perpendicular (i.e. $A_i \cdot A_j = 0$ whenever $i \neq j$). Suppose c_1, \dots, c_r are numbers such that

$$c_1 A_1 + \dots + c_r A_r = 0.$$

Show that we must have $c_i = 0$ for each $i = 1, \dots, r$.

Exercise 6. Let $P = (1, 3, -1)$ and $Q = (-4, 5, 2)$. Determine the coordinates of the following points

- The midpoint of the line segment between P and Q
- The point on this line segment that is two thirds of the way from P to Q .

Exercise 7. Find the equation of the plane passing through the points $(2, 1, 1)$, $(3, -1, 1)$, and $(4, 1, -1)$.