

One Axis Vector & One Angled Vector

Represent each situation accurately before calculating. Draw the vectors, resolve the angled vector into horizontal and vertical components, and use the diagram to determine the resultant or change.

Part A — Geometry

Draw each pair of vectors head-to-tail. Label all magnitudes, directions, and angles. Do not calculate unless instructed.

1. Travel 182 km east and then 40.0 km, 20° south of east. Determine the resultant displacement.
2. Travel 9.0 m south and then 6.0 m, 30° north of west. Determine the resultant displacement.

Part B — Calculating Resultant Displacement

For each problem, draw the vectors head-to-tail, resolve the angled vector, combine horizontal and vertical components, then determine the magnitude and direction of the resultant.

3. Travel 6.0 m east and then 8.0 m, 30° north of east. Determine the resultant displacement.
4. Travel 9.0 km north and then 3.4 km, 25° east of south. Determine the resultant displacement.
5. Travel 1500 km, 40° east of north and then 2700 km south. Determine the resultant displacement.

Part C — Displacement Between Two Positions

Draw the initial and final position vectors from the same origin. Resolve the angled position into components, then draw the displacement from the initial position to the final position.

6. An object's initial position is 10 m north of the origin. Its final position is 8.0 m, 30° north of west. Determine the resultant displacement.
7. A dog is first seen 25 m north of you. Later, the dog is 12 m, 25° north of west of you. Determine the resultant displacement.
8. An object's initial position is 11 m, 32° south of east. Its final position is 10 m south of the origin. Determine the resultant displacement.

Part D — Working Backward

In these problems, the desired resultant is known. Draw the complete vector relationship first, then determine the direction of the angled vector.

9. A search-and-rescue team travels **6.0 km east along a road** before turning off the road toward a search location. The search location is **10.0 km, 35° north of east** from where the team started.
 - a. Draw the team's first displacement and locate the search location relative to the starting point.
 - b. Determine the magnitude and direction of the team's remaining travel.

10. A boat first travels **12 km north**. Its resultant displacement is **18 km, 40° east of north**.
 - a. Draw the known displacement and the resultant.
 - b. Determine the magnitude and direction of the current.

11. An aircraft first travels **180 km west**. Its final displacement from its starting point is **320 km, 28° north of west**.
 - a. Draw the known displacement and the resultant.
 - b. Determine the magnitude and direction of the wind.