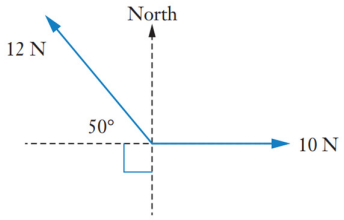
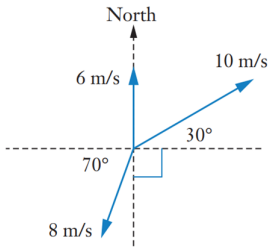
Sadler Chapter 4A and 4B Review (Week 2 Lesson 1)

Exercise 4A Question 19

Find the resultant in the form a**i** + b**j**

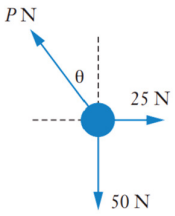


Exercise 4A Question 21



4B Example 4

The forces acting on a body are as shown in the diagram. If the body is in equilibrium, find P and Q



4B Example 3

A body is moving with velocity $(7\mathbf{i} + 24\mathbf{j})$ m/s. How far will it travel in twenty seconds?

4B Further Ex 2

If $\mathbf{a} = 2\mathbf{i} + 3\mathbf{j}$, $\mathbf{b} = 3\mathbf{i} - 4\mathbf{j}$ and $\mathbf{c} = x\mathbf{i} + \mathbf{j}$ find.

a a vector in the same direction as **a** but twice the magnitude of **a**,

b a unit vector in the same direction as **a**,

c a vector in the same direction as **a** but the same magnitude as **b**,

d the possible values of x if $|\mathbf{c}| = |\mathbf{a}|$.

4B Example 6a

Using **a** = 2**i** + 3**j** and **b**= 4**i** – **j** as base vectors, express 5**i** + 3**j** in the form $\lambda a + \mu b$.

4B Example 5

Airports A and B are such that $\overrightarrow{AB} = (600\mathbf{i} + 200\mathbf{j})$ km. An aircraft is to be flown directly from A to B. The aircraft can maintain a steady speed of 390 km/h in still air. There is a wind blowing with velocity $(30\mathbf{i} - 20\mathbf{j})$ km/h.

Find, in the form $a\mathbf{i} + b\mathbf{j}$, the velocity vector the pilot should set so that this velocity, together with the wind, causes the plane to travel directly from A to B.

Exercise 4B Question 15

A helicopter can fly at 75 m/s in still air. The pilot wishes to fly from airport A to a second airport B, 300 km due North of A. If $\mathbf{i}$ is a unit vector due East and $\mathbf{j}$ a unit vector due North, find (in the form $a\mathbf{i} + b\mathbf{j}$) the velocity vector that the pilot should set and the time the journey will take if

a there is no wind blowing,

b there is a wind of $(21\mathbf{i} + 10\mathbf{j})$ m/s blowing.