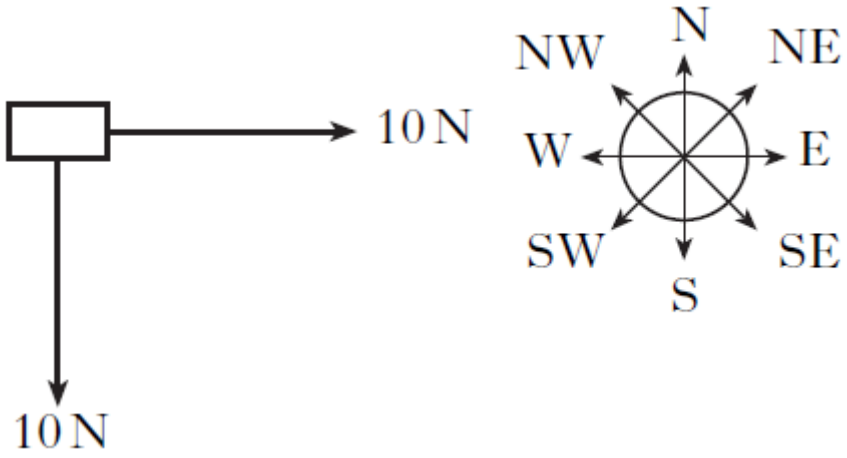
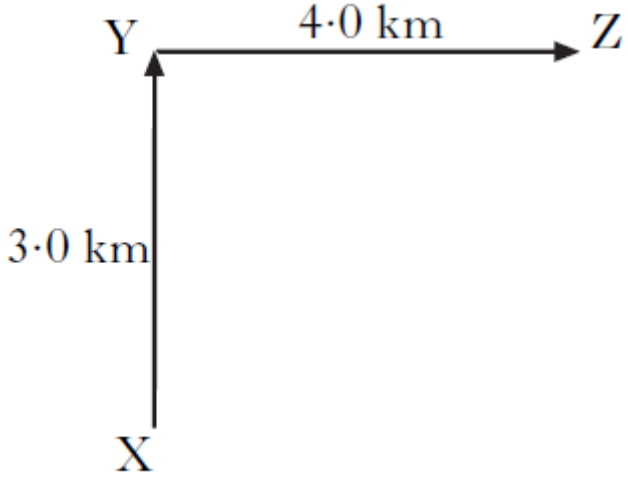
Vectors and Scalars Questions – NAT 5

1) Two forces act on an object, with the angle between the forces being 90°.



Calculate the resultant force acting on the object. (M + D's!!!!!!)

2) A student walks from **X to Y** and then from **Y to Z** in 2 hours.



Calculate or find the following from the students walk:

a) Total distance travelled in km

b) Average speed in kmh^{-1}

c) Displacement (M + D's!!!!!!) in km

d) Average velocity (M + D's!!!!!!) in kmh^{-1}

3) A cross country runner travels 2.1km due South followed by 1.5km due West in a total time of 20 minutes.

Calculate or find the following from the cross country run:

a) Total distance travelled in m

b) Average speed in ms^{-1}

c) Displacement in m

d) Average velocity in ms^{-1}

4) Put the following quantities into the table below:

Velocity, distance, time, weight, speed, mass, displacement, force, power and acceleration.

Scalars	**Vectors**

5) During training an athlete sprints 30m due East followed by 50m due West.

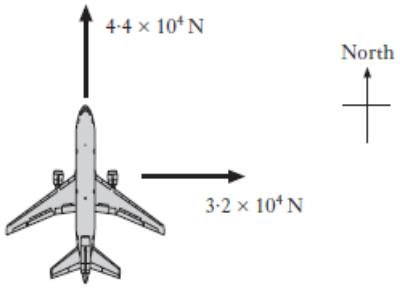
Calculate or find the following from the sprints:

a) Distance travelled

b) Displacement

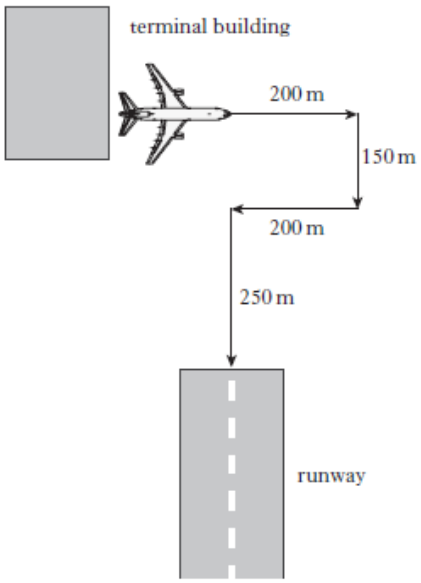
6) An aircraft is flying horizontally at a constant speed.

During the flight the aircraft's engines produce a force of 4.4×10^4N due North. The aircraft encounters a crosswind blowing from West to East, which exerts a force of 3.2×10^4N.



Calculate the resultant force on the aircraft.

7) At an airport an aircraft moves from the terminal building to the end of the runway.

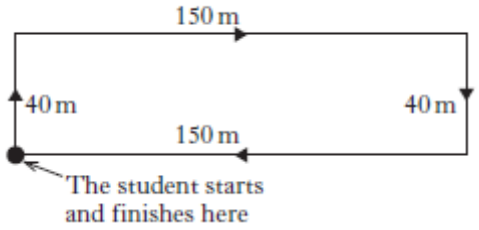


Calculate or find:

a) Total distance travelled by the aircraft

b) Displacement of the aircraft.

8) A student follows the route shown in the diagram and arrives back at the starting point.

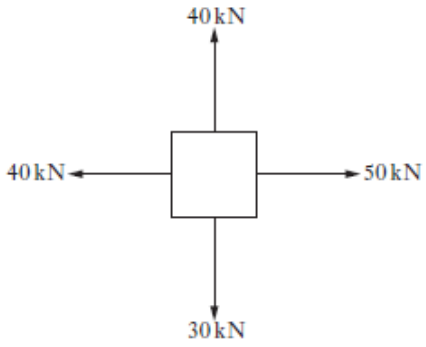


Calculate or find:

a) The total distance travelled

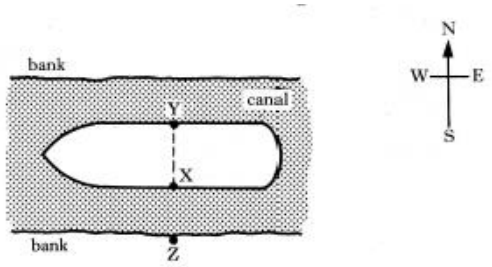
b) Displacement.

9) Four tug boats apply forces to an oil rig in the directions shown below.



Calculate the magnitude and direction of the resultant force acting on the oil rig.

10) A barge is travelling, with a velocity of 2.0ms^{-1}due West, along a canal. A girl runs, with a speed of 4.8ms^{-1}, from X to Y across the deck of the barge as shown below.



By drawing a scale drawing or otherwise, find the **resultant velocity** of the girl **relative to** someone at **point Z** on the bank of the canal.