Unit 1: Physical quantities and units

Subunit 1.4: Scalars and vectors:

Topical Question No: 1

3 The speed of an aircraft in still air is 200 $km\,h^{-1}$. The wind blows from the west at a speed of 85.0 $km\,h^{-1}$.

In which direction must the pilot steer the aircraft in order to fly due north?

A 23.0° east of north

B 23.0° west of north

C 25.2° east of north

D 25.2° west of north

Topical Question No: 2

4 Which statement about scalar and vector quantities is correct?

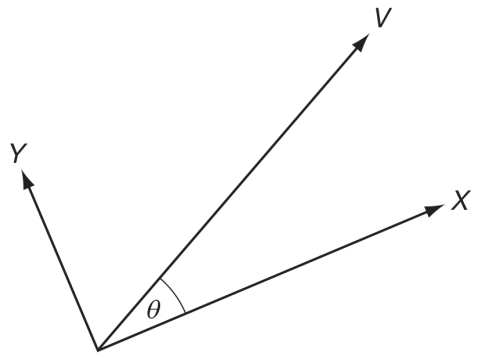
A A scalar quantity has direction but not magnitude.

B A scalar quantity has magnitude but not direction.

C A vector quantity has direction but not magnitude.

D A vector quantity has magnitude but not direction.

5 A vector quantity *V* is resolved into two perpendicular components *X* and *Y*. The angle between *V* and component *X* is θ.



The angle between component *X* and the vector *V* is increased from 0° to 90°.

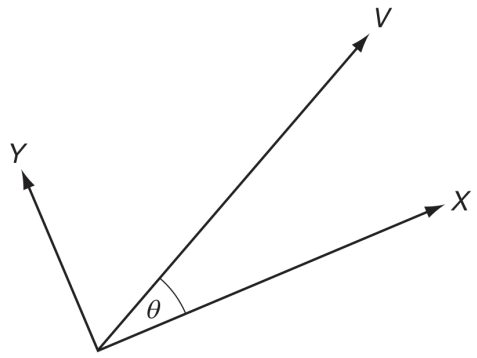
How do the magnitudes of *X* and *Y* change as the angle θ is increased in this way?

	X	*Y*
A	increase	increase
B	increase	decrease
C	decrease	increase
D	decrease	decrease

Space for working

Topical Question No: 4

2 A vector quantity *V* is resolved into two perpendicular components *X* and *Y*. The angle between *V* and component *X* is θ.



The angle between component *X* and the vector *V* is increased from 0° to 90°.

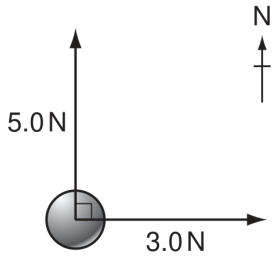
How do the magnitudes of *X* and *Y* change as the angle θ is increased in this way?

	X	*Y*
A	increase	increase
B	increase	decrease
C	decrease	increase
D	decrease	decrease

Space for working

Topical Question No: 5

3 A force of 5.0 N pushes a ball due north and another force of 3.0 N pushes it due east.



What is the magnitude of the net force acting on the ball?

A 2.8 N **B** 4.0 N **C** 5.8 N **D** 8.0 N

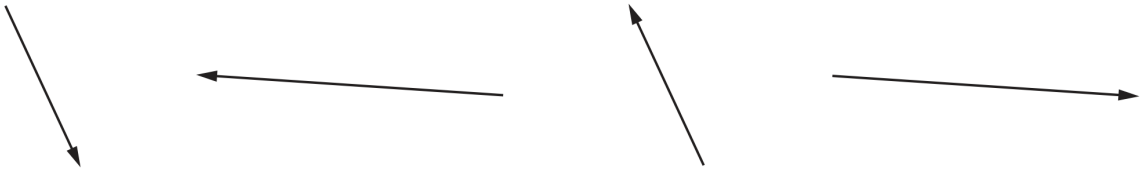
Space for working

Topical Question No: 6

3 Vectors P and Q are drawn to scale.

Which diagram represents the vector (P – Q)?

A **B** **C** **D**

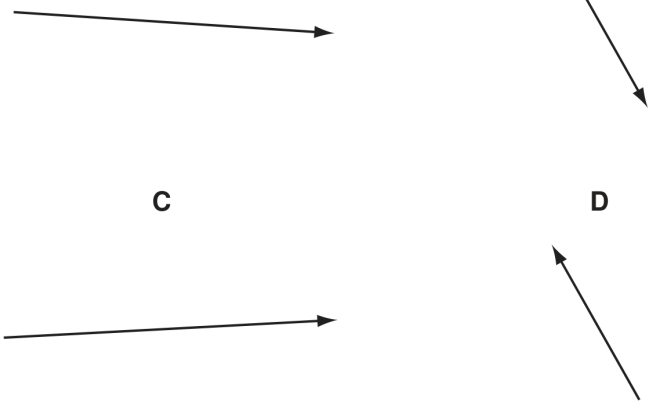


Topical Question No: 7

2 Vectors P and Q are drawn to scale.

Which diagram represents the vector (P + Q)?

A **B**



C **D**

Space for working

Topical Question No: 8

4 Physical quantities can be classed as vectors or as scalars.

Which pair of quantities are both vectors?

A kinetic energy and elastic force

B momentum and time

C velocity and electric field strength

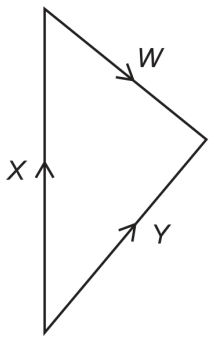
D weight and temperature

Topical Question No: 9

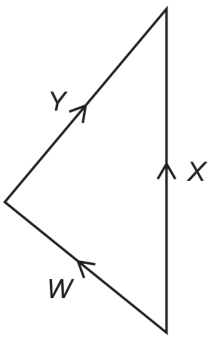
3 An aeroplane can fly at a velocity *X* when moving through still air. When flying in wind the aeroplane's velocity relative to the ground is *Y*.

Which vector diagram shows the magnitude and direction of the wind velocity *W*?

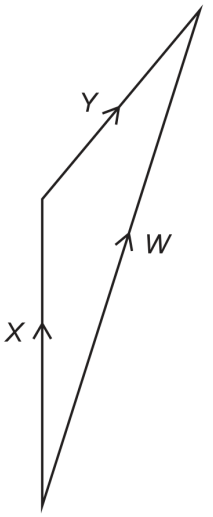
A



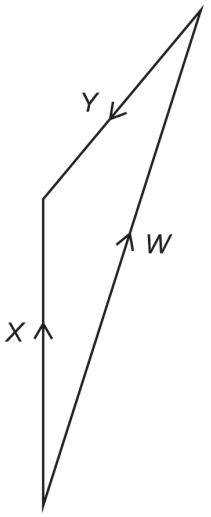
B



C



D



Topical Question No: 10

4 What is the difference between a scalar quantity and a vector quantity?

A A scalar quantity has direction but a vector quantity does not.

B A scalar quantity has magnitude but a vector quantity does not.

C A vector quantity has direction but a scalar quantity does not.

D A vector quantity has magnitude but a scalar quantity does not.

Answer Key

1. N/A
2. B
3. N/A
4. N/A
5. N/A
6. N/A
7. N/A
8. N/A
9. N/A
10. C