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## **1.3 Vectors & Scalars**

Medium



# **PHYSICS**

## **IB HL**

# 1.3 Vectors & Scalars

## Question Paper

|            |                                |
|------------|--------------------------------|
| Course     | DP IB Physics                  |
| Section    | 1. Measurement & Uncertainties |
| Topic      | 1.3 Vectors & Scalars          |
| Difficulty | Medium                         |

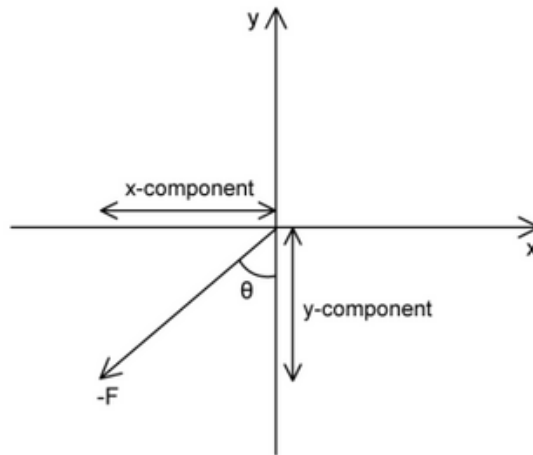
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Time allowed: 20  
Score: /10  
Percentage: /100



### Question 1

Which of the following represents the correct values of the x-component and y-component of the vector  $-F$ ?



|    | x-component      | y-component      |
|----|------------------|------------------|
| A. | $-F \sin \theta$ | $-F \cos \theta$ |
| B. | $-F \cos \theta$ | $-F \tan \theta$ |
| C. | $F \sin \theta$  | $-F \cos \theta$ |
| D. | $-F \cos \theta$ | $-F \sin \theta$ |

[1 mark]



## Question 2

Velocity is a vector quantity, so can be represented by a vector arrow. Which quantity is represented by the length of its vector arrow?

- A. Speed
- B. Magnitude
- C. Acceleration
- D. Distance

[1 mark]

## Question 3

Which of the following represents correct vector and scalar quantities?

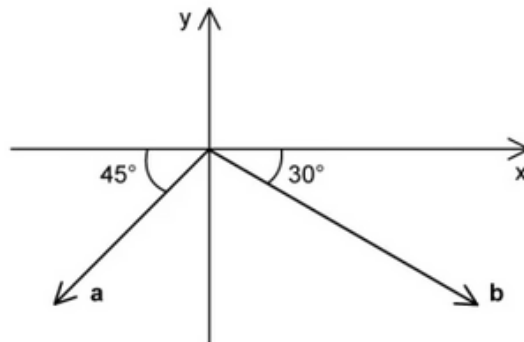
|    | vectors         | scalars   |
|----|-----------------|-----------|
| A. | Electric charge | Weight    |
| B. | Impulse         | Current   |
| C. | Temperature     | Pressure  |
| D. | Time            | Work done |

[1 mark]



#### Question 4

The magnitude of **a** is 15 N and that of **b** is 30 N.



Which of the following represents the correct resultant horizontal and vertical components of the vectors in the diagram?

|    | Horizontal Component             | Vertical Component        |
|----|----------------------------------|---------------------------|
| A. | $15\sqrt{3} - 7.5\sqrt{2}$ N     | $15 - 7.5\sqrt{2}$ N      |
| B. | $15\sqrt{3} - 7.5\sqrt{2}^\circ$ | $-15 - 7.5\sqrt{2}^\circ$ |
| C. | $15\sqrt{3} - 7.5\sqrt{2}$ N     | $-15 - 7.5\sqrt{2}$ N     |
| D. | $-15 - 7.5\sqrt{2}$ N            | $15 - 7.5\sqrt{2}$ N      |

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You may use the fact that:

$$\cos(30) = \frac{\sqrt{3}}{2} \text{ and } \cos(45) = \frac{\sqrt{2}}{2}$$

$$\sin(30) = \frac{1}{2} \text{ and } \sin(45) = \frac{\sqrt{2}}{2}$$

[1 mark]

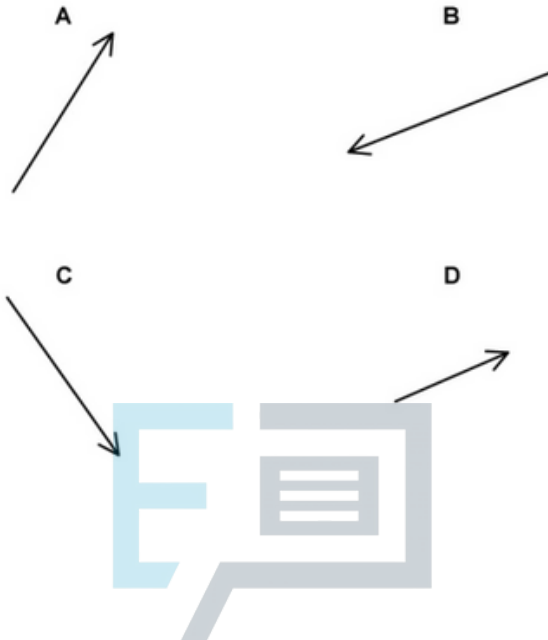


### Question 5

The diagram shows vector  $\mathbf{p}$ .



In which of the following diagrams is vector  $\mathbf{p}$  multiplied by a scalar represented?



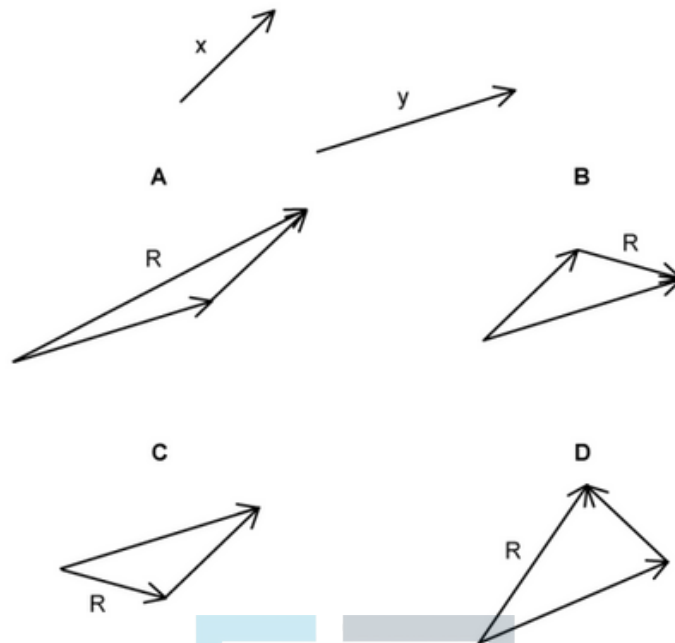
- A. 1 and 4
- B. 2 only
- C. 2 and 4
- D. 1 only

[1 mark]



### Question 6

In which of the following diagrams is the addition of vectors  $x$  and  $y$  represented?

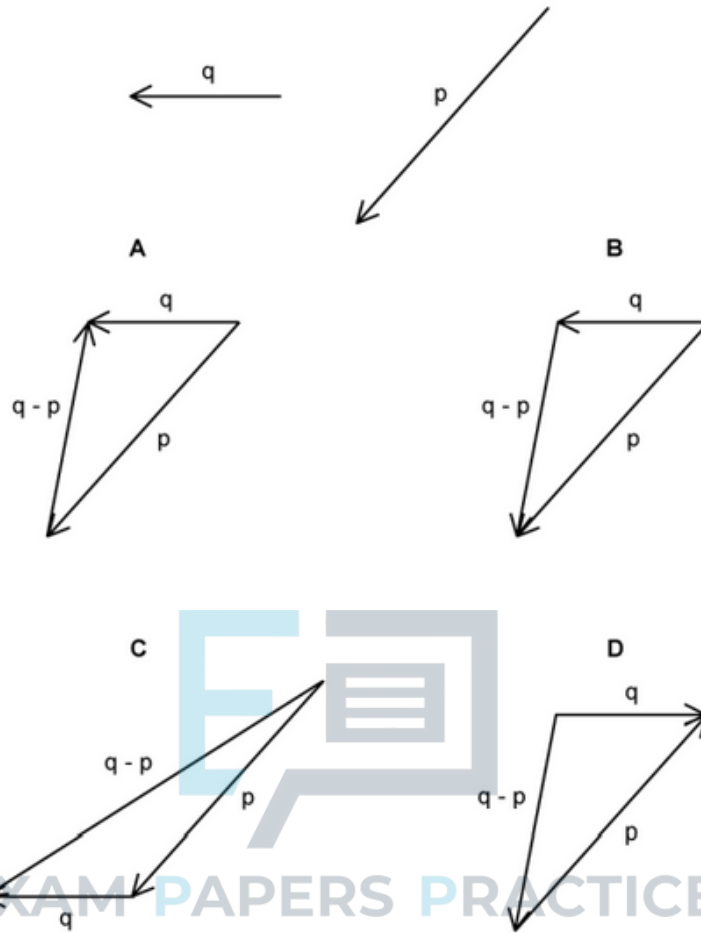


[1 mark]



### Question 7

In which of the following diagrams is  $\mathbf{q} - \mathbf{p}$  represented correctly?



[1 mark]

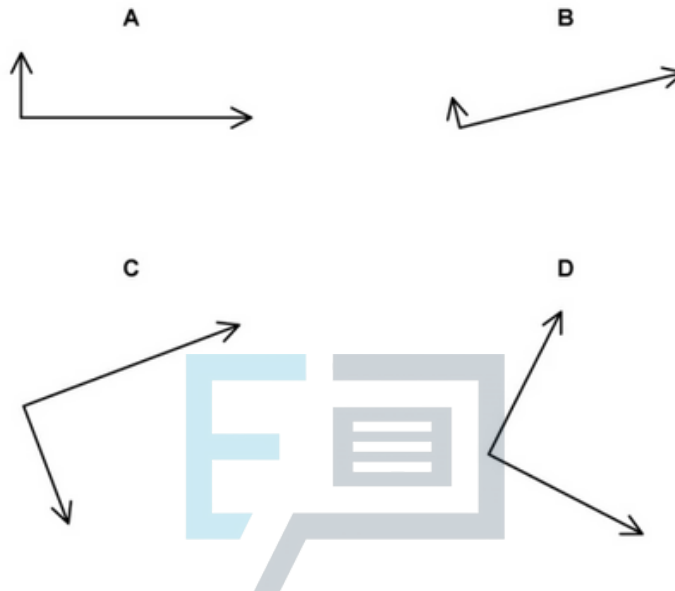


### Question 8

The arrow represents the vector  $\mathbf{R}$ .



Which diagram does **not** represent  $\mathbf{R}$  as two perpendicular components?

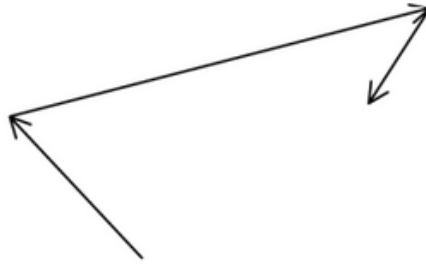


[1 mark]

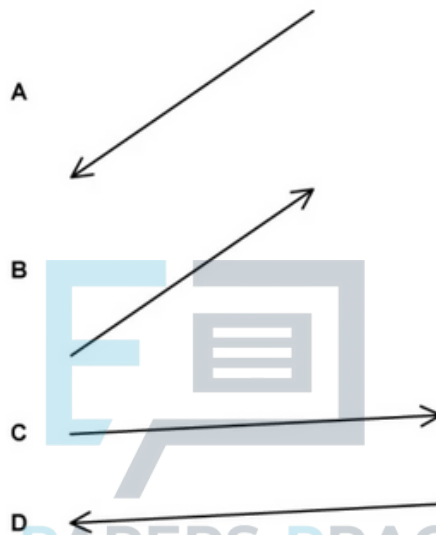


### Question 9

Three forces act on a body as shown.



Which fourth force is required so that the resultant force is zero?

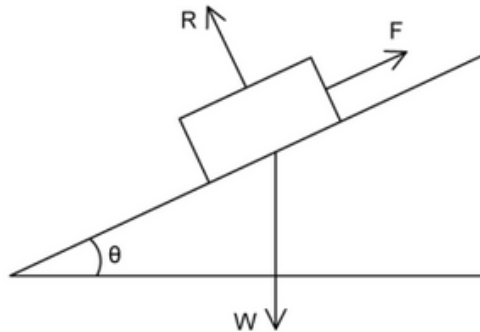


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[1 mark]

### Question 10

A rectangular object sits at rest on a plane inclined at angle  $\theta$  to the horizontal.



$R$  is the normal force,  $W$  is the weight and  $F$  is friction.

Which row correctly labels  $R$  and  $F$  in terms of mass  $m$  and acceleration due to gravity  $g$ .

|    | $R$              | $F$              |
|----|------------------|------------------|
| A. | $mg$             | $mg$             |
| B. | $mg \cos \theta$ | 0                |
| C. | $mg \sin \theta$ | $mg \cos \theta$ |
| D. | $mg \cos \theta$ | $mg \sin \theta$ |

[1 mark]