Questions: Vector addition and scalar multiplication

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Summary

A selection of questions for the study guide on vector addition and scalar multiplication.

*Before attempting these questions, it is highly recommended that you read* [*Guide: Vector addition and scalar multiplication*](../studyguides/addandsm.qmd)*.*

## Q1

Answer the following questions.

1.1. If $a=4i+5j+7k$ and $b=8i+2j+4k$, find $a+b$.

1.2. If $a=3j+4k$ and $b=2i+5k$, find $a+b$.

1.3. If $a=−2i+6k$ and $b=−4i+11j−8k$, find $a−b$.

1.4. If $a=4i+12j−7k$, $b=3i−3j−2k$ and $c=11i−4j+9k$, find $a−\left(b+c\right)$.

## Q2

Solve the following, expressing your answers in terms of the unknown scalars $x,y,z$.

2.1. If $a=\left(\begin{matrix}x\\2y\\0\end{matrix}\right)$ and $b=\left(\begin{matrix}3x\\5y\\0\end{matrix}\right)$, find $a+b$.

2.2. If $a=\left(\begin{matrix}5\\3y\\5z\end{matrix}\right)$ and $b=\left(\begin{matrix}−2\\2x\\6z\end{matrix}\right)$, find $a−b$.

2.3. If $a=\left(\begin{matrix}2x\\3y\\4z\end{matrix}\right)$, $b=\left(\begin{matrix}−2x\\y\\0\end{matrix}\right)$ and $c=\left(\begin{matrix}0\\4y\\4z\end{matrix}\right)$, find $a+b−c$.

2.4. If $a=\left(\begin{matrix}2x\\3y\\5z\end{matrix}\right)$, what is $a+0$?

## Q3

Answer the following questions.

3.1. If $u=5j+6k$, find $3u$.

3.2. If $v=\left(\begin{matrix}0\\−3\\7\end{matrix}\right)$, find $−6v$.

3.3. If $u=\left(\begin{matrix}0\\5\\6\end{matrix}\right)$ and $v=\left(\begin{matrix}0\\−3\\7\end{matrix}\right)$, find $4v−3u$.

3.4. If $u=\left(\begin{matrix}0\\5\\6\end{matrix}\right)$, $v=\left(\begin{matrix}0\\−3\\7\end{matrix}\right)$ and $w=\left(\begin{matrix}2\\3\\−4\end{matrix}\right)$, find $−2w−\left(4u−2v\right)$.

## Q4

Answer the following questions.

4.1. If $A=\left(3,4,5\right)$. $B=\left(−2,5,7\right)$, find $\vec{AB}$.

4.2. If $A=\left(2,5,7\right)$, $B=\left(6,11,7\right)$ and $C=\left(0,1,2\right)$, find $\vec{AB}−\vec{AC}$.

4.3. If $\vec{AB}=\left(\begin{matrix}6\\7\\−2\end{matrix}\right)$ and $B=\left(1,5,9\right)$, find the coordinates of $A$.

4.4. If $a=2i+3j$ and $b=3i−5j$, find $13i−9j$ in terms of $a$ and $b$.

4.5. If $a=\left(\begin{matrix}3\\5\\z\end{matrix}\right)$, $b=\left(\begin{matrix}−1\\−3\\4\end{matrix}\right)$ and $2a+3b=\left(\begin{matrix}x\\y\\0\end{matrix}\right)$, solve for the unknown scalars $x,y,z$.

4.6. Given that $a$ and $b$ are parallel, if $a=\left(x−7\right)i+\left(5x+1\right)k$ and $b=−2i+8k$, find $x$.

[After attempting the questions above, please click this link to find the answers.](../answers/as-addandsm.qmd)

## Version history and licensing

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* v1.1: edited 05/24 by tdhc.

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