Vectors

GCSE Mathematics • **Higher Tier** • Grades 8–9 • Non-calculator

Name: _____ Class: _____ Total: _____ / 62

Show all your working. Marks are given for correct method as well as the final answer.

1. Work out $\begin{pmatrix}3\\2\end{pmatrix} + \begin{pmatrix}1\\4\end{pmatrix}$. **[2 marks]**

Answer: _____

2. Work out $\begin{pmatrix}5\\1\end{pmatrix} - \begin{pmatrix}2\\3\end{pmatrix}$. **[2 marks]**

Answer: _____

3. Work out $3\begin{pmatrix}2\\-1\end{pmatrix}$. **[2 marks]**

Answer: _____

4. Work out $2\begin{pmatrix}1\\3\end{pmatrix} + \begin{pmatrix}4\\-2\end{pmatrix}$. **[3 marks]**

Answer: _____

5. Work out the magnitude of $\begin{pmatrix}3\\4\end{pmatrix}$. **[3 marks]**

Answer: _____

6. Work out the magnitude of $\begin{pmatrix}-5\\12\end{pmatrix}$. **[3 marks]**

Answer: _____

7. $\overrightarrow{AB} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$. Write down $\overrightarrow{BA}$. **[2 marks]**

Answer: _____

8. $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$. Work out $\mathbf{a} + 2\mathbf{b}$. **[3 marks]**

Answer: _____

9. Using the same $\mathbf{a}$ and $\mathbf{b}$, work out $3\mathbf{a} - \mathbf{b}$. **[3 marks]**

Answer: _____

10. Show that $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\begin{pmatrix} 6 \\ 9 \end{pmatrix}$ are parallel. **[3 marks]**

Answer: _____

11. Explain whether $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ 9 \end{pmatrix}$ are parallel. **[3 marks]**

Answer: _____

12. $\begin{pmatrix}3\\k\end{pmatrix}$ is parallel to $\begin{pmatrix}9\\15\end{pmatrix}$. Work out k. **[3 marks]**

Answer: _____

13. $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$. Write $\overrightarrow{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. **[3 marks]**

Answer: _____

14. Using the same diagram, write $\overrightarrow{BA}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. **[2 marks]**

Answer: _____

15. M is the midpoint of AB, where $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$. Write $\overrightarrow{AM}$. **[3 marks]**

Answer: _____

16. With the same M, write $\overrightarrow{OM}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. **[4 marks]**

Answer: _____

17. P divides AB in the ratio $1 : 2$. Write $\overrightarrow{AP}$ in terms of **a** and **b**. **[4 marks]**

Answer: _____

18. A point moves by $\begin{pmatrix}3\\1\end{pmatrix}$ then by $\begin{pmatrix}-1\\4\end{pmatrix}$. Write down the single vector for the whole journey. **[2 marks]**

Answer: _____

19. $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$, and C is such that $\overrightarrow{OC} = 3\mathbf{a}$.

(a) Write $\overrightarrow{BC}$ in terms of **a** and **b**. **[3 marks]**

(b) Write $\overrightarrow{AB}$, and hence say whether BC is parallel to AB. **[3 marks]**

Answer: _____

20. $\mathbf{p} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$.

(a) Work out $2\mathbf{p} + 3\mathbf{q}$. **[3 marks]**

(b) Work out the magnitude of $\mathbf{p}$, in surd form. **[3 marks]**

Answer: _____

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