Question	1	2	3	4	5	6	7	8	9	Total	
Marks											
Max Marks	1	1	4	4	4	4	5	7	6	36	%

TRY IN EXAM CONDITIONS FIRST (40 MINUTES), THEN USE THE MARK SCHEME TO SCORE AND *HELP* CORRECT YOUR WORK.

DON'T FORGET TO MAKE USE OF SUBJECT SUPPORT TO HELP YOU COMPLETELY UNDERSTAND ALL QUESTIONS. THE EFFORT YOU PUT IN WILL PAY OFF!

1.

The lines $y = \dfrac{a}{3}x - 4$ and $y = 3 - \dfrac{b}{4}x$ are perpendicular.

Find the value of ab.

Circle your answer.

[1 mark]

$\dfrac{3}{4}$ $\qquad$ -12 $\qquad$ $-\dfrac{4}{3}$ $\qquad$ 12

2.

Simplify $\dfrac{\left(a^4 b\right)^{\frac{5}{2}}}{\left(a^3 b^{\frac{1}{2}}\right)^{-3}}$

Circle your answer.

[1 mark]

$a^{19}b$ $\qquad$ ab^4 $\qquad$ ab $\qquad$ $a^{19}b^4$

3.

The position vector of point A is $7\mathbf{i} + 9\mathbf{j}$

The position vector of the midpoint of the line joining point A to point B is $3\mathbf{i} + 6\mathbf{j}$

(a) Find the position vector of the point B.

[2 marks]

(b) Find $\left|\overrightarrow{AB}\right|$

[2 marks]

4. Work out the values of a when

$$2^{a^2} = 8^a \times 16$$

Do **not** use trial and improvement.
You **must** show your working.

(4)

5   The points A and B have coordinates $(1, -2)$ and $(5, 6)$ respectively.

Given that the point with coordinates $(p, p + 8)$ lies on the perpendicular bisector of AB, find the value of p.

[4 marks]

6.

Given that the point A has position vector $3\mathbf{i} - 7\mathbf{j}$ and the point B has position vector $8\mathbf{i} + 3\mathbf{j}$,

(a) find the vector $\overrightarrow{AB}$

(2)

(b) Find $|\overrightarrow{AB}|$. Give your answer as a simplified surd.

(2)

7.

In this question you must show detailed reasoning.

(i)   Express $3^{\frac{7}{2}}$ in the form $a\sqrt{b}$, where a is an integer and b is a prime number.   **[2]**
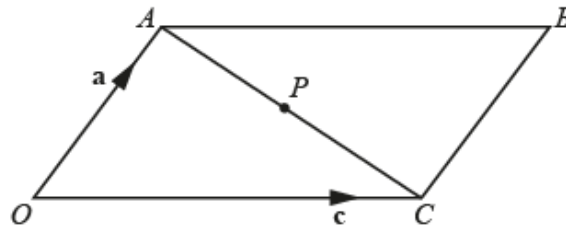
(ii)   Express $\dfrac{\sqrt{2}}{1-\sqrt{2}}$ in the form $c + d\sqrt{e}$, where c and d are integers and e is a prime number.   **[3]**

8.

$OABC$ is a parallelogram with $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$. P is the midpoint of AC.

(i)   Find the following in terms of $\mathbf{a}$ and $\mathbf{c}$, simplifying your answers.

(a) $\overrightarrow{AC}$ **[1]**

(b) $\overrightarrow{OP}$ **[2]**

(ii)   Hence prove that the diagonals of a parallelogram bisect one another.   **[4]**

Q9.

The points A, B and C have position vectors $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} 6 \\ 3 \end{pmatrix}$ respectively. M is the midpoint of BC.

(i) Find the position vector of the point D such that $\overrightarrow{BC} = \overrightarrow{AD}$.   **[3]**

(ii) Find the magnitude of $\overrightarrow{AM}$.   **[3]**