SCHOOL: Your school name

SENIOR THREE MATHEMATICS · UNIT 10 HOMEWORK

Collinear points and orthogonal vectors in 2D · FREE SAMPLE

Academic year: 20..... – 20..... **Date:** ...../...../20.....

Name: ..... Class: .....

Duration: Take-home **Total marks:** 18

INSTRUCTIONS

1. Answer ALL questions.
2. Show all your working.
3. This free sample is a short extract. A full homework sheet has 25 marks.

PART 1: OBJECTIVE QUESTIONS

Write the letter of the correct answer (1 mark each).

1. Find k if $\begin{pmatrix} k \\ 2 \end{pmatrix} \perp \begin{pmatrix} 3 \\ 6 \end{pmatrix}$. (1 mark)

A. -1
B. 4
C. 1
D. -4

2. Which vector is orthogonal to $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$? (1 mark)

A. $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$
B. $\begin{pmatrix} 10 \\ 4 \end{pmatrix}$
C. $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$
D. $\begin{pmatrix} -2 \\ 5 \end{pmatrix}$

3. Find $\begin{pmatrix} 2 \\ 3 \end{pmatrix} \cdot \begin{pmatrix} 4 \\ -1 \end{pmatrix}$. (1 mark)

A. $\begin{pmatrix} 8 \\ -3 \end{pmatrix}$
B. 5
C. 14
D. 11

4. Are $A(0,0)$, $B(1,2)$, $C(3,6)$ collinear? (1 mark)

A. Only A and B
B. Cannot tell
C. No
D. Yes

5. Matching. Match each item in column A with the correct answer in column B. Write the letter in the answer column. (4 marks)

Column A	Answer	Column B
1. A(0, 0), B(3, 1), C(4, 4), D(1, 3). What kind of quadrilateral is ABCD?		**a.** k=1
2. Find y so that A(1, 2), B(3, 4), C(5, y) are collinear.		**b.** (8; –6)
3. Find a vector of length 10 perpendicular to (3; 4).		**c.** 6
4. Find k so that A(1, k), B(3, 5) and C(5, 9) are collinear.		**d.** a rhombus (equal sides, perpendicular diagonals)

6. Fill in the blanks. Use the words in the box to complete the sentences. One word in the box is not needed. (3 marks)

acute · **90°** · **A** · **60°**

(i) If u·v>0, the angle between them is ..... .

(ii) Triangle A(0, 0), B(4, 0), C(0, 3) has a right angle at ..... .

(iii) AB=(2; –1) and BC=(1; 2). The angle at B is ..... .

PART 2: SHORT ANSWERS

Show your working.

7. Find k such that $A(1,k)$, $B(3,5)$, $C(7,13)$ are collinear. (2 marks)

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8. Show that $P(-1,-3)$, $Q(1,1)$ and $R(3,5)$ are collinear. (3 marks)

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9. Find a unit vector orthogonal to $\begin{pmatrix}3\\4\end{pmatrix}$. (2 marks)

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PART 3: STRUCTURED PROBLEM

Show all your working.

10. Collinear points and orthogonal vectors in 2D **(7 marks)**

(a) Find k so that $\begin{pmatrix}3\\k\end{pmatrix} \perp \begin{pmatrix}4\\-6\end{pmatrix}$. (3 marks)

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(b) Find k so that $A(1,1)$, $B(3,k)$ and $C(5,9)$ are collinear. (4 marks)

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END