



MATHEMATICS SPECIALIST : UNITS 1 & 2, 2023

Test 2 – Vectors; Circle Properties (10%)

1.3.1 – 1.3.9, 1.3.14, 1.1.17; 1.1.6 – 1.1.15

PM

Time Allowed 15 minutes	First Name	Surname	Marks
			20 marks

Circle your Teacher's Name: Ms Chua Mr Koulianos Mr Liu Ms Robinson

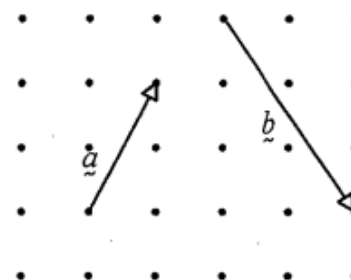
Assessment Conditions: (N.B. Sufficient working out must be shown to gain full marks)

- ❖ Calculators: Not Allowed
- ❖ Formula Sheet: Provided
- ❖ Notes: Not Allowed

PART A – CALCULATOR FREE

1. (1, 2, 2, = 5 marks)

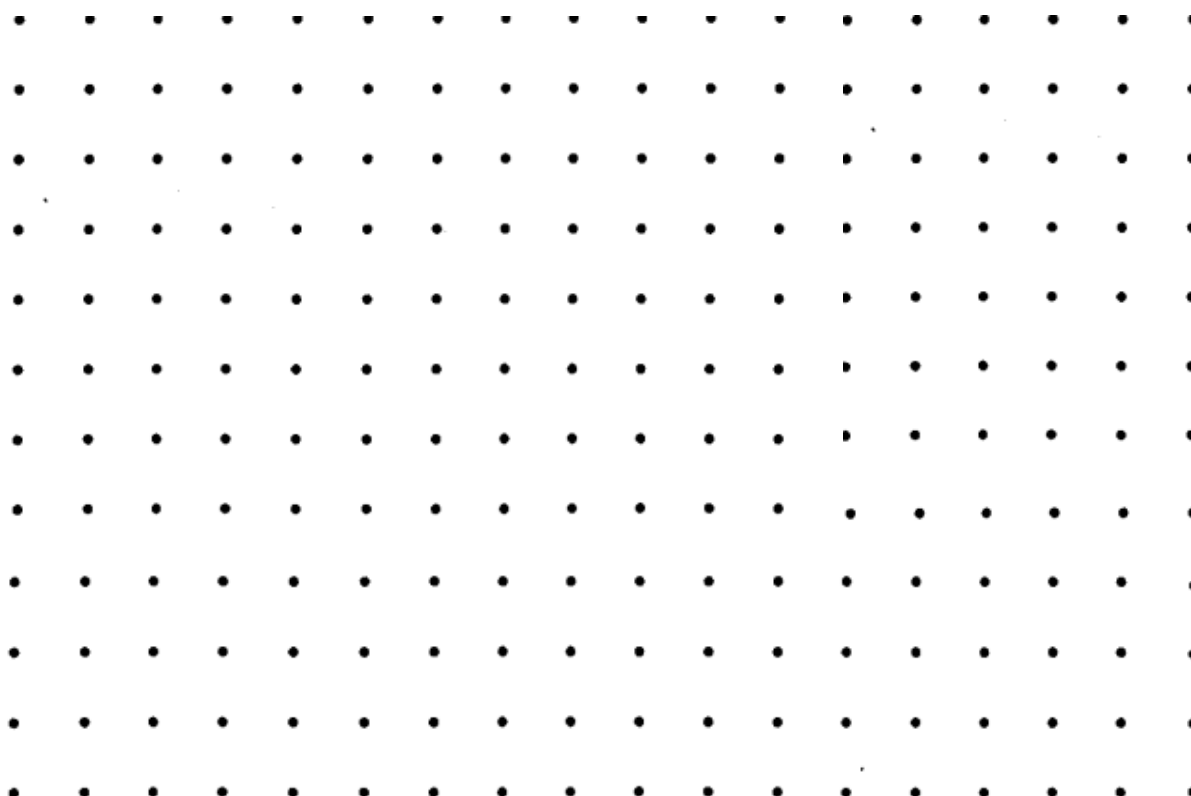
With $\underline{a}$ and $\underline{b}$ as defined in the diagram on the right,
draw each of the following on the grid below
clearly labelling each vector.



(a) $\underline{p} = \underline{a} - \underline{b}$

(b) $\underline{q} = 2\underline{a} + \frac{1}{2}\underline{b}$

(c) the vector $\underline{r}$ such that $\underline{p} + \underline{q} + \underline{r} = \underline{0}$



2. (2, 2, 4 = 8 marks)

Given $\mathbf{p} = 2\mathbf{i} + 3\mathbf{j}$, $\mathbf{q} = -12\mathbf{i} - 5\mathbf{j}$ and $\mathbf{r} = x\mathbf{i} + 3\mathbf{j}$ determine each of the following:

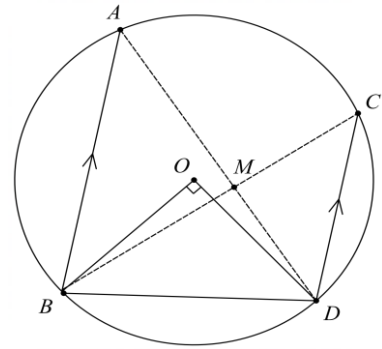
(a) $-\mathbf{p} + 2\mathbf{q}$

(b) A vector in the opposite direction as $\mathbf{q}$, but with three times the magnitude of vector $\mathbf{p}$

(c) The value of x such that $|3\mathbf{p} - \mathbf{r}| = 10$

3. (2, 3, 2 = 7 marks)

In the circle on the right, A , B , C and D lie on the circumference of a circle with centre O .



(a) Prove that $\angle BAD = \angle BCD = 45^\circ$.

(b) Prove that $AD \perp BC$

(c) Prove that M lies on the circle BOD .