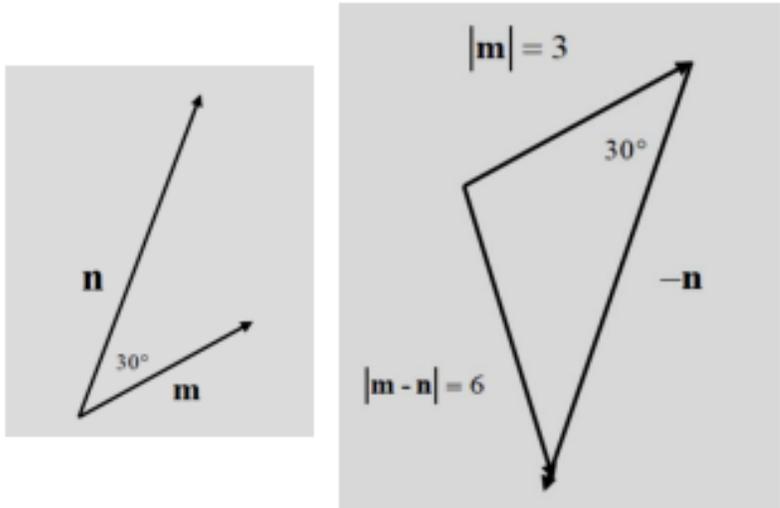


Vectors- Mark Scheme

May 2019 Mathematics Advanced Paper 1: Pure Mathematics 1

1.

Question	Scheme	Marks	AOs
16(i)	Explains that a and b lie in the same direction or	B1	2.4
		(1)	
(ii)		M1	1.1b
	Attempts $\frac{\sin 30^\circ}{6} = \frac{\sin \theta}{3}$	M1	3.1a
	$\theta = \text{awrt } 14.5^\circ$	A1	1.1b
	Angle between vector m and vector m - n is awrt 135.5°	A1	3.2a
		(4)	
			(5 marks)

- (i)
B1: Accept any valid response E.g The lines are collinear. Condone "They are parallel"
 Mark positively. ISW after a correct answer
 Do not accept "the length of line a +b is the same as the length of line a + the length of line b"
 Do not accept $|a|$ and $|b|$ are parallel.
- (ii)
M1: A triangle showing 3, 6 and 30° in the correct positions.
 Look for 6' opposite 30° with another side of 3.
 Condone the triangle not being obtuse angled and not being to scale.
 Do not condone negative lengths in the triangle. This would automatically be M0
M1: Correct sine rule statement with the sides and angles in the correct positions.
 If a triangle is drawn then the angles and sides must be in the correct positions.
 This is not dependent so allow recovery from negative lengths in the triangle.
 If the candidate has not drawn a diagram then correct sine rule would be M1 M1
 Do not accept calculations where the sides have a negative length. Eg $\frac{\sin 30^\circ}{6} = \frac{\sin \theta}{-3}$ is M0
A1: $\theta = \text{awrt } 14.5^\circ$
A1: CSO awrt 135.5°

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2.

Question	Scheme	Marks	AOs
3(a)	Attempts $\overline{AB} = \overline{OB} - \overline{OA}$ or similar	M1	1.1b
	$\overline{AB} = -9\mathbf{i} + 3\mathbf{j}$	A1	1.1b
		(2)	
(b)	Finds length using 'Pythagoras' $ AB = \sqrt{(-9)^2 + (3)^2}$	M1	1.1b
	$ AB = 3\sqrt{10}$	A1ft	1.1b
		(2)	
(4 marks)			

- (a)
M1: Attempts subtraction either way around.
 This may be implied by one correct component $\overline{AB} = \pm 9\mathbf{i} \pm 3\mathbf{j}$
 There must be some attempt to write in vector form.
A1: cao (allow column vector notation but not the coordinate)
 Correct notation should be used. Accept $-9\mathbf{i} + 3\mathbf{j}$ or $\begin{pmatrix} -9 \\ 3 \end{pmatrix}$ but not $\begin{pmatrix} -9\mathbf{i} \\ 3\mathbf{j} \end{pmatrix}$

(b)

M1: Correct use of Pythagoras theorem or modulus formula using their answer to (a)

Note that $|AB| = \sqrt{(9)^2 + (3)^2}$ is also correct.

Condone missing brackets in the expression $|AB| = \sqrt{-9^2 + (3)^2}$

Also allow a restart usually accompanied by a diagram.

A1ft: $|AB| = 3\sqrt{10}$ ft from their answer to (a) as long as it has both an **i** and **j** component.

It must be simplified, if appropriate. Note that $\pm 3\sqrt{10}$ would be M1 A0

Note that, in cases where there is no working, the correct answer implies M1A1 in each part of this question