



20 **11** **3**
MX **b** For what value(s) of a are the vectors $\begin{pmatrix} a \\ -1 \end{pmatrix}$ and $\begin{pmatrix} 2a-3 \\ 2 \end{pmatrix}$ perpendicular?
1

$$\begin{pmatrix} a \\ -1 \end{pmatrix} \cdot \begin{pmatrix} 2a-3 \\ 2 \end{pmatrix} = 0 \quad \checkmark$$

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$$a(2a - 3) - 1(2) = 0 \quad \checkmark$$

$$2a^2 - 3a - 2 = 0$$

$$(2a + 1)(a - 2) = 0$$

$$a = -\frac{1}{2}, 2 \quad \checkmark$$

State Mean:

2.6/3

HSC Marking Feedback

Students should:

- define, calculate and use the dot product of two vectors to examine the properties of perpendicular vectors. Alternatively, use the gradients of position vectors to determine properties of the two vectors.

In better responses, students were able to:

- state the property of perpendicular vectors
- apply the dot product formula from the Reference Sheet and solve the resultant quadratic equation
- state the relationship between the gradients of perpendicular position vectors and solve the resultant equation.

Areas for students to improve include:

- using their knowledge and understanding of vectors
- demonstrating the use and meaning of vector notation
- knowing how to apply the dot product or gradient formula to determine if vectors are perpendicular
- understanding methods of solving quadratic equations.

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