

MarkingScheme

SetsH

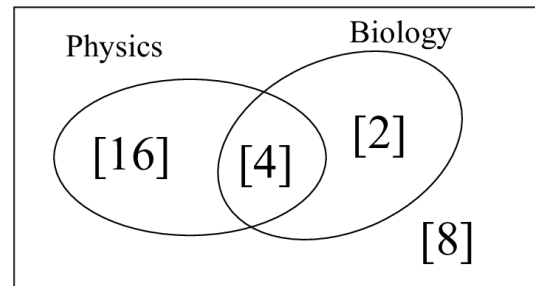
Question 1 (2016)

<p>(b)</p>	$P(A \cap B) = P(A) \times P(B)$ $0.1 = (x + 0.1) \times 0.4$ $0.4x = 0.06$ $x = 0.15$ <p>or</p> $P(A B) = P(A)$ $\frac{0.1}{0.4} = x + 0.1$ $x = 0.15$	<p>Scale 10C (0, 3, 7, 10)</p> <p><i>Low Partial Credit</i></p> <ul style="list-style-type: none"> • formula written or implied • writes $P(A) = x + 0.1$ <p><i>High Partial Credit</i></p> <ul style="list-style-type: none"> • formula fully substituted
-------------------	--	--

Question 2 (2013)

(b) In a class of 30 students, 20 study Physics, 6 study Biology and 4 study both Physics and Biology.

(i) Represent the information on the Venn Diagram.



A student is selected at random from this class.

The events E and F are:

- E: The student studies Physics
- F: The student studies Biology.

(ii) By calculating probabilities, investigate if the events E and F are independent.

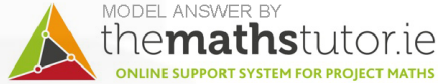
$P(E \cap F) = \frac{4}{30}$ $P(E) \times P(F) = \frac{20}{30} \times \frac{6}{30} = \frac{4}{30}$ $P(E \cap F) = P(E) \times P(F) \Rightarrow \text{E and F are independent events}$

Question 1**(25 marks)**

The events A and B are such that $P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$.

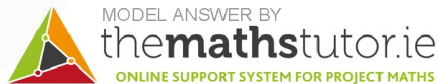
(a) Find $P(A \cup B)$.

$$\begin{aligned}P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= 0.7 + 0.5 - 0.3 \\ &= 0.9\end{aligned}$$



(b) Find $P(A|B)$.

$$\begin{aligned}P(A|B) &= \frac{P(A \cap B)}{P(B)} \\ &= \frac{0.3}{0.5} \\ &= 0.6\end{aligned}$$



(c) State whether A and B are independent events and justify your answer

If A and B are independent events then $P(A \cap B) = P(A)P(B)$.
Here, $P(A \cap B) = 0.3$ but $P(A)P(B) = (0.7)(0.5) = 0.35$.
So A and B are NOT independent events.

