



**eClassroom**

GCSE Mathematics

# **AND & OR Rules**

**Worked Solutions**

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Pearson Edexcel GCSE & iGCSE Mathematics



## Section A — Foundation — Worked Solutions

### [Fluency] Question 1

Mutually exclusive:  $P(A)+P(B)$

$\therefore 0.7$

### [Fluency] Question 2

Independent:  $P(A) \times P(B) = 0.5 \times 0.2$

$\therefore 0.1$

### [Fluency] Question 3

$$P(\text{red or king}) = \frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52}$$

$\therefore$

### [Fluency] Question 4

$$P(A) \times P(B) = 0.6 \times 0.35 = 0.21 = P(A \cap B) \checkmark$$

$\therefore$  **Independent**  $\checkmark$

### [Fluency] Question 5

$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

$\therefore$

### [Reasoning] Question 6

$$(a) P(A \cap B) = 0.7 \times 0.4 = 0.28$$

$$(b) P(A \cup B) = 0.7 + 0.4 - 0.28 = 0.82$$

$\therefore$  **(a) 0.28 (b) 0.82**

### [Reasoning] Question 7

$$(a) P(A \cap B) = 0.5 + 0.4 - 0.8 = 0.1$$

$$(b) P(A) \times P(B) = 0.5 \times 0.4 = 0.2 \neq 0.1 \rightarrow \text{not independent}$$

$\therefore$  **(a) 0.1 (b) Not independent**



**[Reasoning] Question 8**

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$P(\text{even})=1/2$ . Independent rolls.

$$P(\text{both even}) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$\therefore$

**[Problem Solving] Question 9**

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$0.4 \times 0.3$

$\therefore$  **0.12**

**[Problem Solving] Question 10**

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(a)  $P(A \cup B) = 0.45 + 0.30 - 0.15 = 0.60$

(b)  $P(A \text{ only}) = 0.45 - 0.15 = 0.30$

(c)  $P(B \text{ only}) = 0.30 - 0.15 = 0.15$

$\therefore$  **(a) 0.60 (b) 0.30 (c) 0.15**



## Section B — Higher — Worked Solutions

### [Fluency] Question 1

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$$P(A \cup B) = 0.55 + 0.40 - 0.20$$

$$\therefore \mathbf{0.75}$$

### [Fluency] Question 2

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$$P(A \cap B) = 0.4 + 0.5 - 0.7$$

$$\therefore \mathbf{0.2}$$

### [Fluency] Question 3

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$$P(A \cup B) = \frac{3}{8} + \frac{1}{4} - \frac{1}{8} = \frac{3+2-1}{8}$$

$$\therefore$$

### [Reasoning] Question 4

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$$(a) P(A \cap B) = 0.6 + 0.5 - 0.8 = 0.3$$

$$(b) P(A) \times P(B) = 0.6 \times 0.5 = 0.30 = P(A \cap B) \rightarrow \text{independent } \checkmark$$

$$\therefore \mathbf{(a) 0.3 \quad (b) Independent } \checkmark$$

### [Reasoning] Question 5

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$$\text{General: } P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\text{Mutually exclusive: } P(A \cap B) = 0$$

$$\text{Therefore: } P(A \cup B) = P(A) + P(B) - 0 = P(A) + P(B) \checkmark$$

$$\therefore \mathbf{Shown } \checkmark$$

### [Reasoning] Question 6

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$$(a) P(A \cap B) = 0.3 + 0.4 - 0.58 = 0.12$$

$$(b) P(A) \times P(B) = 0.3 \times 0.4 = 0.12 = P(A \cap B) \rightarrow \text{independent}$$

$$\therefore \mathbf{(a) 0.12 \quad (b) A \text{ and } B \text{ are independent}}$$



**[Problem Solving] Question 7**

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$$P(A \cup B) = p + q - pq$$

$$1 - (1 - p)(1 - q) = 1 - 1 + p + q - pq = p + q - pq \checkmark$$

$$p=0.3, q=0.4: P(A \cup B) = 0.3 + 0.4 - 0.12 = 0.58$$

$$\therefore \mathbf{P(A \cup B) = 0.58}$$

**[Problem Solving] Question 8**

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$$0.3 \times 0.4 \times 0.5$$

$$\therefore \mathbf{0.06}$$

**[Problem Solving] Question 9**

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$$(a) P(B|A) = \frac{P(A \cap B)}{P(A)} = \frac{0.12}{0.4} = 0.3$$

$$(b) P(A) \times P(B) = 0.4 \times 0.3 = 0.12 = P(A \cap B) \rightarrow \text{independent} \checkmark$$

$$\therefore \mathbf{(a) 0.3 \quad (b) Independent \checkmark}$$

**[Problem Solving] Question 10**

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$$P(A \cup B) = 2P(A) - P(A \cap B)$$

$$\frac{4}{5} = 2P(A) - \frac{1}{10}$$

$$2P(A) = \frac{4}{5} + \frac{1}{10} = \frac{9}{10}$$

$$\therefore$$

