

► 2024 LCHL Paper 1 – Question 2

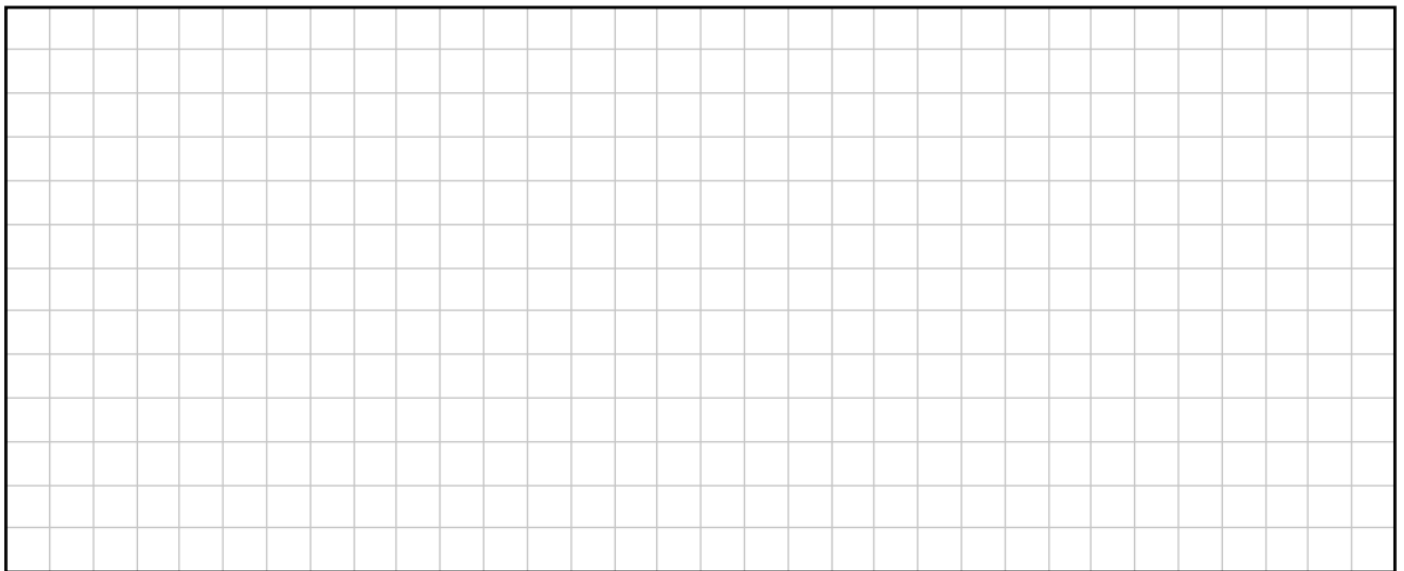
- (a) The table below shows the prizes, in euro, that a player can win in a game, as well as the probability of winning each prize. The player wins at most one prize each time that she plays. Some of the prizes are given in terms of  $x \in \mathbb{R}$ .

|                    |      |     |          |     |
|--------------------|------|-----|----------|-----|
| <b>Prize (€)</b>   | None | 2   | $x - 10$ | $x$ |
| <b>Probability</b> | 30%  | 40% | 28%      | 2%  |

It costs €10 to play the game once.

The game is **fair** – that is, the expected value of the winnings, taking the cost into account, is €0.

Work out the value of  $x$ .



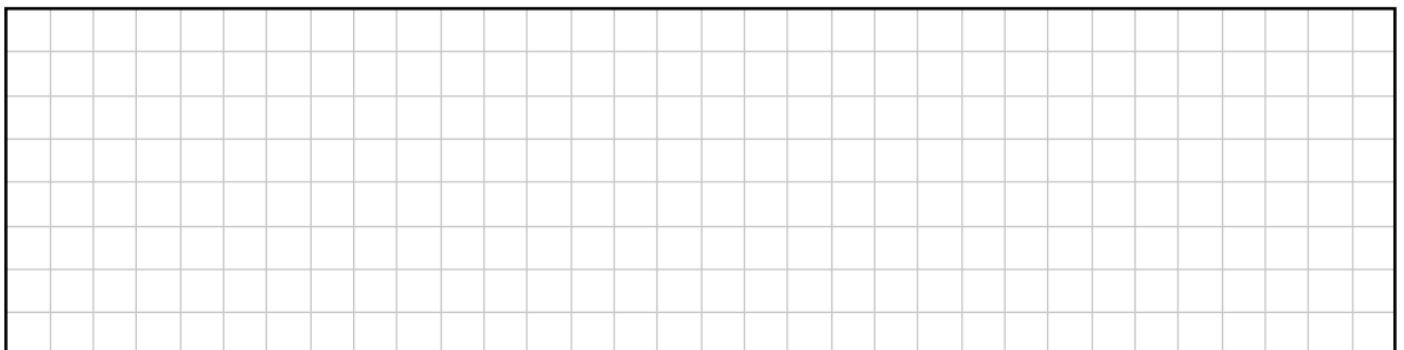
- (b)  $A$  and  $B$  are **mutually exclusive** events.

$$P(A) = 0.1 \text{ and } P(B) = 0.4.$$

Write down the value of each of the following:

$$P(A \cap B) = \boxed{\phantom{0.0}}$$

$$P(A \cup B) = \boxed{\phantom{0.5}}$$



(c)  $C$  and  $D$  are two other events, with universal set  $U$ .

$$P(C) = 0.5 \text{ and } P(D) = 0.7.$$

Find the **maximum** value of  $P[(C \cup D)']$ .

Note:  $(C \cup D)'$  is the complement of the set  $C \cup D$  in the set  $U$ .

(d)  $E$  is the event that it will be raining tomorrow morning.

$F$  is the event that I will wear a coat going outside tomorrow morning.

Explain why it would **not** be reasonable to assume that  $E$  and  $F$  are independent events.