

Cat Eyes is an arcade game where players try to guess correctly which direction an animated cat will look. The cat can look in four possible directions:

After a player has guessed, the cat looks in one of these directions.

(a) A player makes the following assumptions when guessing:

- Let X represent the number of correct guesses when playing a game. When using the assumptions stated above, X can be modelled using a binomial distribution.

(ii) Determine the probability of zero correct guesses in a game.

(iii) A player *wins a prize* if they make more than k correct guesses in a game.

Determine the value of k .

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- (b) After playing many games, the player suspects that the probability of *winning a prize* is less than anticipated (i.e. less than the probability of *winning a prize* when calculated using the binomial distribution).

To test their suspicions, they play 1000 games in which they *win a prize* 80 times.

- (i) Determine the sample proportion of games in which they *won a prize*.

(1 mark)

- (ii) Construct a 95% confidence interval for the population proportion of games which *win a prize*.

(2 marks)

- (iii) (1) Does the confidence interval calculated in part (b)(ii) support the player's suspicions with 95% confidence?

Tick the appropriate box to indicate your answer.

1

Yes

1

No

(1 mark)

- (2) Tick the appropriate box to justify your answer.

The upper bound of the confidence interval is less than 0.08.

The upper bound of the confidence interval is less than 0.1035.

The upper bound of the confidence interval is less than 0.25.

□

The upper bound of the confidence interval is less than 0.95.

(1 mark)