

(12 marks)

In 2016, the Vee Arr company began developing virtual reality goggles to use with computer games. However, some people experienced dizziness after using the goggles for an extended period of time.

In order to test how many people would be affected, Vee Arr decided to conduct a survey in which people used the goggles for 60 minutes and were asked if they experienced dizziness.

Veel Arr planned to sell its goggles if the proportion of people who experienced dizziness after using the goggles was less than 15%.

Of 100 people surveyed in 2016, a total of 26 people experienced dizziness.



Source: adapted from © Poike | iStock.com

- (a) Calculate a 95% confidence interval for the population proportion of people who experienced dizziness after using the goggles for 60 minutes.

(2 marks)

- (b) Vee Arr decided not to sell its goggles during 2016.

Explain why the confidence interval that you calculated in part (a) supports this decision.

(1 mark)

Question 12 continues on page 8.

- (c) In 2019, Vee Arr developed a new model of goggles. They conducted another survey and found that of 110 people in the sample, 10% experienced dizziness after using these goggles for 60 minutes.

The 95% confidence interval of the data was:

$$0.0439 \leq p \leq 0.156.$$

- (i) Determine the number of people from the sample of 110 who experienced dizziness when using the 2019 goggles.

(1 mark)

- (ii) Vee Arr claimed that fewer people are likely to experience dizziness when using the 2019 goggles than when using the 2016 goggles.

Based on the confidence interval that you calculated in part (a) and the confidence interval given in part (c), justify whether or not this claim can be supported.

(1 mark)

Veel Arr still planned to sell its goggles if the proportion of people who experienced dizziness after using the goggles was less than 15%.

- (iii) Does the confidence interval given in part (c) suggest that the 2019 goggles could be sold? Explain your answer.

(2 marks)

- (iv) Assume that the sample proportion that experienced dizziness remained fixed at 10%.

- (1) Explain why, if the width of the confidence interval given in part (c) was less than 0.1, Vee Arr could justify selling its goggles.

(2 marks)

- (2) Hence or otherwise, find the minimum number of people who would need to be surveyed (10% of whom experience dizziness) in order to construct a 95% confidence interval with a width that is less than 0.1.

(3 marks)