

- 13 Each weekday Keira drives to work with her son Kaito. She always sets off at 8.00 a.m. She models her journey time,  $x$  minutes, by the distribution  $X \sim N(15, 4)$ .

Over a long period of time she notes that her journey takes less than 14 minutes on 7% of the journeys, and takes more than 18 minutes on 31% of the journeys.

- (i) Investigate whether Keira's model is a good fit for the data. [3]

Kaito believes that Keira's value for the variance is correct, but realises that the mean is not correct.

- (ii) Find, correct to two significant figures, the value of the mean that Keira should use in a refined model which does fit the data. [2]

Keira buys a new car. After driving to work in it each day for several weeks, she randomly selects the journey times for  $n$  of these days. Her mean journey time for these  $n$  days is 16 minutes. Using the refined model she conducts a hypothesis test to see if her mean journey time has changed, and finds that the result is significant at the 5% level.

- (iii) Determine the smallest possible value of  $n$ . [5]