# Foundation Check In - 4.01 Approximation and estimation

**Do questions 1 – 8 without a calculator.**

Round the following to an appropriate degree of accuracy.

1. Annual tax calculation of £2153.6752.
2. Average speed of a car journey of 38.241 km/h.
3. If  rounded to 3 significant figures, what is the error interval for *x*?
4. If the speed of a bus, *b*, is given as43.7 km/h truncated to1 decimal place, what is the error interval for *b*?
5. The surface area of an object is given by the formula .

Estimate the value of *A* correct to 1 significant figure if cm and cm.

1. Write an appropriate estimation to show that .
2. Explain why  is slightly greater than 7.
3. A TV report claimed that an accident on a motorway had caused a 3 km queue of 750 cars. Given that the average length of a car is 4.17 m, explain whether the report overestimated or underestimated the number of cars in the queue.
4. The number of people who attended a concert was reported as 25 000, correct to 2 significant figures. If tickets cost £50 per person, what would be the **minimum** possible income from ticket sales?
5. A petrol pump display truncates the number of litres to 2 decimal places. If one litre of petrol costs £1.019 and the pump display indicates that 32.00 litres of petrol has been dispensed, what would be the **maximum** cost of the petrol? Give your answer to an appropriate degree of accuracy.

**Extension (Do not use a calculator)**

There are 7430 cinemas in the UK, and every day an average of 280 people visit each cinema. A recent newspaper article claimed that over 4% of the UK population visited a cinema every day. Given that the UK population is around 64.1 million, is this article fair?

Show your working to explain your decision.

Answers

1. £2154 to the nearest pound (£2153.68 to the nearest penny)
2. 38 km/h (accept 40 km/h)
3. 
4. 
5. 315 cm2
6. 
7.  and 
8. cars, but the average car length is greater than 4 m so the number of cars has been overestimated. In addition, there will be gaps between the cars so there will be fewer cars in the queue.
9. 
10. £32.62

**Extension**

Cinema visits per day 

4% of the UK population 

The article is not fair. The percentage of the population visiting cinemas every day has been overestimated.

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| **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |  | **Assessment Objective** | **Qu.** | **Topic** | **R** | **A** | **G** |
| AO1 | 1 | Round to an appropriate degree of accuracy |  |  |  |  | AO1 | 1 | Round to an appropriate degree of accuracy |  |  |  |
| AO1 | 2 | Round to an appropriate degree of accuracy |  |  |  |  | AO1 | 2 | Round to an appropriate degree of accuracy |  |  |  |
| AO1 | 3 | Use inequality notation to write the error interval of a rounded value |  |  |  |  | AO1 | 3 | Use inequality notation to write the error interval of a rounded value |  |  |  |
| AO1 | 4 | Use inequality notation to write the error interval of a truncated value |  |  |  |  | AO1 | 4 | Use inequality notation to write the error interval of a truncated value |  |  |  |
| AO1 | 5 | Substitute appropriate approximate values into a formula |  |  |  |  | AO1 | 5 | Substitute appropriate approximate values into a formula |  |  |  |
| AO2 | 6 | Use appropriate approximations to check an answer |  |  |  |  | AO2 | 6 | Use appropriate approximations to check an answer |  |  |  |
| AO2 | 7 | Use appropriate approximations to make an estimation of a complex calculation |  |  |  |  | AO2 | 7 | Use appropriate approximations to make an estimation of a complex calculation |  |  |  |
| AO2 | 8 | Use appropriate approximations to estimate an answer to a problem |  |  |  |  | AO2 | 8 | Use appropriate approximations to estimate an answer to a problem |  |  |  |
| AO3 | 9 | Use limits of accuracy to solve a problem in context |  |  |  |  | AO3 | 9 | Use limits of accuracy to solve a problem in context |  |  |  |
| AO3 | 10 | Use limits of accuracy to solve a problem in context, rounding the answer to an appropriate degree of accuracy |  |  |  |  | AO3 | 10 | Use limits of accuracy to solve a problem in context, rounding the answer to an appropriate degree of accuracy |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| AO1 | 3 | Use inequality notation to write the error interval of a rounded value |  |  |  |  | AO1 | 3 | Use inequality notation to write the error interval of a rounded value |  |  |  |
| AO1 | 4 | Use inequality notation to write the error interval of a truncated value |  |  |  |  | AO1 | 4 | Use inequality notation to write the error interval of a truncated value |  |  |  |
| AO1 | 5 | Substitute appropriate approximate values into a formula |  |  |  |  | AO1 | 5 | Substitute appropriate approximate values into a formula |  |  |  |
| AO2 | 6 | Use appropriate approximations to check an answer |  |  |  |  | AO2 | 6 | Use appropriate approximations to check an answer |  |  |  |
| AO2 | 7 | Use appropriate approximations to make an estimation of a complex calculation |  |  |  |  | AO2 | 7 | Use appropriate approximations to make an estimation of a complex calculation |  |  |  |
| AO2 | 8 | Use appropriate approximations to estimate an answer to a problem |  |  |  |  | AO2 | 8 | Use appropriate approximations to estimate an answer to a problem |  |  |  |
| AO3 | 9 | Use limits of accuracy to solve a problem in context |  |  |  |  | AO3 | 9 | Use limits of accuracy to solve a problem in context |  |  |  |
| AO3 | 10 | Use limits of accuracy to solve a problem in context, rounding the answer to an appropriate degree of accuracy |  |  |  |  | AO3 | 10 | Use limits of accuracy to solve a problem in context, rounding the answer to an appropriate degree of accuracy |  |  |  |