OCR 04 Approximation and Estimation (Foundation)

1. Round 6 967 527 to the nearest thousand.

2. Round 4.3826 to 2 decimal places.

3. Round 7392 to 2 significant figures.

4. Round 25.9815 to 3 significant figures.

5. The length of a garden (*l*) is 32 m correct to the nearest metre.
   Write down the error interval.

6. Estimate the answer to $79.4 \div 4.19$.

7. A value, *v*, is given as 25.74 truncated to 2 decimal places.
   Write down the error interval for *v*.

8. The crowd at a rugby match was estimated to be 14 750 to the nearest 50 people.
   What are the smallest and largest numbers of people that could have attended the match?

9. Estimate the answer to $\dfrac{18.37 \times 4.89}{0.475 \times 1.12}$.

10. A garden that is open to the public had 1789 visitors one Saturday. Each person paid £5.75 to visit the garden. Estimate the total amount of money that was taken that day.

11. A river is 2850 km to the nearest 10 km and 2800 km to the nearest 100 km.
    Write down the error interval for the length (*l*) of the river.

12. Selma says that $\sqrt{68}$ is approximately 8.2.
    Use estimation to show that Selma is correct.

13. Mr Khan had solar panels fitted to his house. The solar panels cost £5845 to install. He saves £316 pounds on his fuel bill each year after he has the solar panels fitted. Show by estimation that it will take him 20 years to recover the cost through savings on his fuel bills.

14. Clyde measures the four walls in a field. The lengths of the sides are 78 m, 56 m, 99 m and 92 m, all correct to the nearest metre. Clyde says the perimeter of the field is 325 m, correct to the nearest metre. Explain why he may be wrong.

15. Marcus thinks that the total of 59.6, 57.9, 78.6 and 65.7 is 283.8.
    Use estimation to show that Marcus is incorrect.

16. The average daily water consumption of a person in Britain is 163 litres. Estimate the number of litres of water that a person uses in one year, and explain whether your answer is an overestimate, underestimate or about right.

17. An average adult inhales 0.5 litres of air per breath at a rate of 18 breaths per minute. Use estimation to show that an average adult inhales approximately 5 million litres of air per year.

18. A bicycle wheel has a diameter of 68.5 cm. Estimate how many times the wheel will turn when the bicycle travels a distance of 5 km. Give your answer to the nearest whole number.

19. A camera is on sale in France for 58.68 euros. The same camera is on sale in Sweden for 1119.32 Swedish kroner. Show that the camera costs approximately twice as much in Sweden. £1 ≈ 1.18 euros and £1 ≈ 11.25 Swedish kroner.

20. The distance from London to San Francisco is 8590.4 km. One particular aircraft completes this journey at an average speed of 804 km/h. If a different aircraft completes this journey at an average speed of 715 km/h, estimate how much longer this aircraft will take.

Answers

1. 6 968 000

2. 4.38

3. 7400

4. 26.0

5. $31.5 \leq l < 32.5$

6. $79.4 \div 4.19 \approx 80 \div 4 = 20$

7. $25.74 \leq v < 25.75$

8. Smallest number 14 725; largest number 14 774

9. $\dfrac{18.37 \times 4.89}{0.475 \times 1.12} \approx \dfrac{20 \times 5}{0.5 \times 1} = \dfrac{100}{0.5} = 200$

10. $2000 \times £6 = £12 000$

11. $2845 \leq l < 2850$

12. $\sqrt{64} < \sqrt{68} < \sqrt{81}$ so $\sqrt{68}$ is between 8 and 9, so 8.2 is a sensible estimate.

13. $6000 \div 300 = 20$ years

14. Actual measurements would be in the ranges:
    $77.5 \leq$ length of side one < 78.5
    $55.5 \leq$ length of side two < 56.5
    $98.5 \leq$ length of side three < 99.5
    $91.5 \leq$ length of side four < 92.5
So the perimeter would be $323 \leq$ perimeter < 327 metres.

15. Using estimation (rounding up), the total cannot be bigger than $60 + 60 + 80 + 70 = 270$.

16. $200 \times 400 = 80000$ litres. Overestimation, since both figures were rounded up in the approximation.

17. $0.5 \times 18 \times 60 \times 24 \times 365 \approx 0.5 \times 20 \times 60 \times 20 \times 400 = 4 800 000 \approx 5$ million litres

18. Circumference of wheel $= \pi \times 68.5 \approx 3 \times 70 = 210$ cm ≈ 2 m.
    5km $= 5000$ m so the wheel turns approximately $5000 \div 2 = 2500$ times.

19. 58.68 euros $\approx$ 60 euros. $\dfrac{60}{1.18} \approx \dfrac{60}{1.2} = \dfrac{600}{12} = £50$.

1119.32 Swedish kroner $\approx$ 1100 Swedish kroner. $\dfrac{1100}{11.25} \approx \dfrac{1100}{11} = £100$.

$100 \div 50 = 2$, so the camera costs approximately twice as much in Sweden.

20. Time $= \dfrac{\text{distance}}{\text{speed}}$

804 km/h: time $= \dfrac{8590.4}{804} \approx \dfrac{9000}{800} = \dfrac{90}{8} \approx 11$

715 km/h: time $= \dfrac{8590.4}{715} \approx \dfrac{9000}{700} = \dfrac{90}{7} \approx 13$

So the journey will take approximately 2 hours longer.

We'd like to know your view on the resources we produce. By clicking on 'Like' or 'Dislike' you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

Whether you already offer OCR qualifications, are new to OCR, or are considering switching from your current provider/awarding organisation, you can request more information by completing the Expression of Interest form which can be found here: www.ocr.org.uk/expression-of-interest

Looking for a resource? There is now a quick and easy search tool to help find free resources for your qualification: www.ocr.org.uk/i-want-to/find-resources/

GCSE (9–1)
MATHEMATICS
Section Check In

Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Round to the nearest thousand			
AO1	2	Round to 2 decimal places			
AO1	3	Round a large number to 2 significant figures			
AO1	4	Round to 3 significant figures when the third digit is 9			
AO1	5	Write an error interval for continuous data			
AO1	6	Estimate an answer			
AO1	7	Write an error interval for a truncated answer			
AO1	8	Write an error interval for discrete data			
AO1	9	Estimate the answer to a calculation involving division by a decimal			
AO1	10	Estimate the answer to a product			
AO2	11	Interpret approximate values			
AO2	12	Estimate a square root			
AO2	13	Use estimation			
AO2	14	Interpret estimation			
AO2	15	Use estimation to check whether an answer is feasible			
AO3	16	Estimate and evaluate			
AO3	17	Estimate a value in context			
AO3	18	Use a formula and estimate in context			
AO3	19	Solve a real-life problem by estimation			
AO3	20	Estimate times given distance and speed			