

Subject: Mathematic

Level: S.2

Topic: Application of estimation and approximation

Learning objectives:

Content:

1. Students should be able to apply theorems of estimation (absolute error, percentage error, lower limit and precision) to evaluate daily life problems of estimation and precision..

Language:

2. Students should be able to write a paragraph with language support to evaluate daily life problems of estimation and precision.

S2 Mathematics
Application of estimation and approximation
Worksheet for Student A

Name : _____ No.: _____ Class: _____ Date: _____



Instruction:

1. Read the problem described below.
2. Answer the questions that follow by yourself in 10 minutes.
3. Then, form a group of four with nearby students.
4. Discuss in your group your ideas and evaluate the accuracy of the advertisement in the next 15 minutes.

Hint: to evaluate something means to comment / judge on something (say that something is good or bad, etc.) by considering all known information.

Daily life open-ended problem:

In an advertisement, the dimensions of a room were described as approximately 20m x 5m. John wanted to rent the room. He measured its dimensions with an accurate instrument. He found that the area was 70 m² only. What can you say about the advertisement?

1.	According to the advertisement, what is the approximate area of the room?
	The approximate area is _____
2.	Assume that John's measured area is the actual area of the room, find and comment on the absolute error of the area of the room provided by the advertisement. (Hint: absolute error = approximate value – actual value)
	The absolute error is _____, which is too _____.
3.	Does the advertisement show precision of measurement (e.g. correct to the nearest integer, 1 significant figure, etc.)? Is the precision important for calculating the maximum absolute error?
	The advertisement _____
	The precision _____

4. Complete the following table.

Precision of measurement	Approximate length $L = 20$ Possible length $L_{\min} \leq L < L_{\max}$	Approximate width $W = 5$ Possible width $W_{\min} \leq W < W_{\max}$	Lower limit of area of room $A_{\min} = L_{\min} W_{\min}$	Maximum absolute error of area of room $100 - A_{\min}$
To nearest integer				
To 1 sig. fig.				

5. If the precision of measurement is taken as “correct to nearest integer”, state the lower limit of the area of the room and compare it with the actual area of the room. Comment on the assumption of this precision.

If the precision of measurement is taken as “correct to nearest integer”,

the lower limit of the area of the room is _____, which is _____ than

the actual area of _____ m².

Therefore, the assumption of this precision is _____.

6. Calculate the percentage error of the area of the room if the precision of measurement is taken as “correct to 1 significant figure”. Is it too large? Comment on the assumption of this precision. Is there any other possible assumption of precision with reference to the dimensions given in the advertisement?

(Hint: percentage error = $\frac{\text{maximum absolute error}}{\text{measured value}} \times 100\%$,

measured value = 100 m²)

If the precision of measurement is taken as _____,

the percentage error is _____, which is _____.

Therefore, _____.

There

7. Evaluate the advertisement. Explain your answer in a paragraph by using words such as first, second, third, fourth to join the answers in Questions 2, 3, 5 and 6.	
The advertisement is * () and** () because	
of the following reasons.	
First, the absolute error of the area of room is , which is too .	
Second, the advertisement does not show	
which is very for calculating .	
Third, if the precision	
Fourth,	
*	choose from the following description: well written, poorly written,
**	choose from the following description: misleading, accurate

Answers of the Worksheet

1. According to the advertisement, what is the approximate area of the room?

The approximate area is **100 m²**.

2. Assume John's measured area to be the actual area of the room, find and comment on the absolute error of area of the room provided by the advertisement. (Hint: absolute error = approximate value – actual value)

The absolute error is **30 m²**, which is too **large**.

3. Does the advertisement show the precision of measurement (e.g. correct to the nearest integer, 1 significant figure, etc.)? Is the precision important for calculating the maximum absolute error?

The advertisement **does not show precision of measurement**.

The precision **is important for calculating the maximum absolute error**.

4. Complete the following table.

Precision of measurement	Approximate length $L = 20$ Possible length $L_{\min} \leq L < L_{\max}$	Approximate width $W = 5$ Possible width $W_{\min} \leq W < W_{\max}$	Lower limit of area of the room $A_{\min} = L_{\min} W_{\min}$	Maximum absolute error of area of the room $100 - A_{\min}$
To nearest integer	$19.5 \leq L < 20.5$	$4.5 \leq W < 5.5$	$19.5 \times 4.5 = 87.75$	12.25
To 1 sig. fig.	$15 \leq L < 25$	$4.5 \leq W < 5.5$	$15 \times 4.5 = 67.5$	32.5

5. If the precision of measurement is taken as “correct to nearest integer”, state the lower limit of area of the room and compare it with the actual area of the room. Comment on the assumption of this precision.

If the precision of measurement is taken as “correct to nearest integer”,

the lower limit of the area of the room is **87.75 m²**, which is **greater** than the actual area of **70 m²**.

Therefore, the assumption of this precision is **wrong**.

6. Calculate the percentage error of area of the room if the precision of measurement is taken as “correct to 1 significant figure”. Is it too large? Comment on the assumption of this precision. Finally, is there any other possible assumption of precision with reference to the dimensions given in the advertisement?

$$\text{(Hint: percentage error = } \frac{\text{maximum absolute error}}{\text{measured value}} \times 100\%$$

measured value = 100 m²)

If the precision of measurement is taken as “**correct to 1 significant figure**”, the percentage error is **32.5%**, which is **too large**.

Therefore, **the assumption of this precision is also wrong**.

There is no other possible assumption of precision with reference to the dimensions given in the advertisement.

7. Evaluate the advertisement. Explain your answer in a paragraph by using sequence connectives like firstly, secondly, thirdly, fourthly to join the answers in questions 2, 3, 5 and 6.

The advertisement is * **poorly written** and** **misleading** because of the following reasons.

First, the absolute error of area of room is 30 m², which is **too large**.

Second, the advertisement does not show **precision of measurement**, which is very **important** for calculating **the maximum absolute error**.

Third, if the **precision of measurement is taken as “correct to nearest integer”**, the lower limit of the area of the room is **87.75m²**,

which is greater than the actual area of 70 m².

Therefore, the assumption of this precision is wrong.

Fourth, if the **precision of measurement is taken as “correct to 1 significant figure”**, the percentage error is **32.5%**, which is **too large**.

Therefore, the assumption of this precision is also wrong.

There is no other possible assumption of precision with reference to the dimensions given in the advertisement.

* choose from the following description: well written, poorly written,

** choose from the following description: misleading, accurate

Note: the answers are printed in bold faces.