



Tolerance

*All the questions in Basic Skills and Context should be attempted without a calculator.

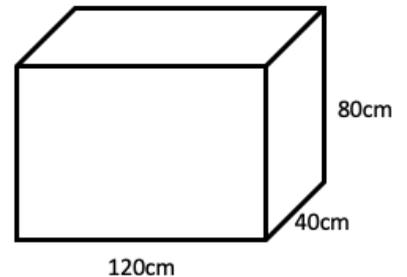
Basic Skills

- For each of the following write down the minimum and maximum sizes.
 - $15 \pm 3\text{cm}$
 - $22 \pm 5\text{kg}$
 - $100 \pm 23\text{cm}$
 - $150 \pm 50\text{mm}$
 - $120 \pm 2.5\text{cm}$
 - $1 \pm 0.2\text{mm}$
- Write the following in tolerance form.
 - Max = 22cm, Min = 16cm
 - Max = 120kg, Min = 150kg
 - Max = 15cm, Min = 17cm
 - Min = 44mg, Max = 44.5mg
 - Max = 1.2cm, Min = 0.9cm
 - Min = 0.02mg, Max = 0.1mg
- The following are the amount of liquid in bottles of soft drink that are allowed to be shipped out (ml).
498 500 501 500 499 498 502 499 501 498
Write down maximum and minimum allowed in tolerance form.
- A builder uses nails of the size $3 \pm 0.5\text{cm}$.
Which of the following would not be accepted by the builder.
 - 3.4cm
 - 3.6cm
 - 3.46cm
 - 28mm
 - 37mm
 - 2.49cm
- In April in Scotland the maximum rainfall was 16mm the minimum was 1mm. Write this in tolerance form.
- For each of the following write the maximum and minimum.
 - $400\text{mm} \pm 5\%$
 - $25\text{kg} \pm 2\%$
 - $1200\text{m} \pm 0.5\%$
 - $18\text{g} \pm 7\%$
 - $6\text{cm} \pm 10\%$
 - $300\text{miles} \pm 7.5\%$

Context Questions

- The prices in a local restaurant for a main course vary from £8.80 to £15.20. Write this in tolerance form.
- The temperature of bread in a bakery right after it comes out of the oven needs to be $88^{\circ}\text{C} \pm 14\%$. Calculate the minimum and maximum temperature allowed for the bread.
- In a football team each player in a match run $10\text{km} \pm 8\%$.
 - Write down the minimum and maximum distance covered by each player
 - Which of the following must be distances covered by players not in this team
 11.4km 10.5km 9.7km 8.4km 9350m
- Fred is training for a 10k. He is trying to be as consistent as possible and wants his times (in minutes) to be within a tolerance of $40\text{mins} \pm 7.5\%$.
 - Calculate his minimum and maximum times that Fred would like to run.
 - Which of the following would not be within Fred's tolerance.
 41mins 39mins40secs 35mins30secs 2040seconds
- One side of an enclosure is fenced off with 16 individual pieces of fence. The tolerance for the sizes of each piece of fence is $1.8\text{m} \pm 85\text{cm}$.
 - Calculate the minimum and maximum size for each piece of fence.
 - What the longest possible size of the full fence.
- In a pharmacy a reading between 72mg and 88mg was acceptable. Write this in tolerance notation in the form: (... mg \pm ... %)
- The Smith's have just bought a house for £78000. The price of the house is expected to drop by $\text{£}1200 \pm 5\%$ every year.
 - What is the most the house will still cost in 2 years.
 - What is the least the house will cost in 4 years.
- The following are race times for practice laps in a race.
 55.40secs 58.20secs 51.30secs 56.30secs
 The stopwatch used has an error of $\pm 0.8\text{seconds}$.
 Calculate the lowest possible mean score.

- The dimensions of a cuboid are shown. The measurements shown were measured with an accuracy of $\pm 10\%$. Calculate the minimum and maximum volume of the cuboid (**you may use a calculator**).



- The following are the sizes of nails produced by a supplied. They are made to be within a tolerance of $50 \pm 8\text{mm}$

52mm	51mm	62mm	59mm
47mm	51mm	40mm	55mm
49mm	45mm		

Calculate the success rate as a percentage.

Exam Questions

1. A company orders thickness of towels to be of $2.1\text{cm} \pm 0.15$
A sample of the thickness of towels is shown below.

2.22, 2.28, 1.94, 1.98, 2.11, 2.19, 1.86
2.10, 1.91, 1.97, 2.08, 2.01, 2.12, 2.27
1.92, 2.04, 2.31, 2.16, 2.01, 1.98, 2.15

For a batch to be accepted, at least 70% of the towels must be within the tolerance.

Will the batch be accepted? (Justify your answers)

2. **Non Calculator:** A sandwich shop orders backs of ham to be of weight $300\text{g} \pm 25$
A sample of the weights is shown below.

320, 330, 311, 288, 291
301, 293, 298, 271, 283
342, 324, 281, 290, 309
312, 333, 321, 298, 266

For his batch to be accepted, at least 85% of the ham must be within the tolerance.

Will the batch be accepted?

3. **Non Calculator:** A football pitch is surrounded by advertising hoardings. Each hoarding is made to be $3.5\text{m} \pm 0.7$. If there are 50 hoardings what is the maximum perimeter of the football pitch.
4. **Non Calculator:** A box to be put into a lorry weighs $8\text{kg} \pm 2.5$. If there are 62 boxes that need put into the lorry, what is the minimum weight of all the boxes.
5. A juice company is sampling a new machine to check it works correctly.

Bottles of juice must be within the capacity of $500\text{ml} \pm 2.5$

In order to pass inspection, the machine must have a success rate of greater than 90%.

Here is a sample below

500.05, 501.25, 498.55, 497.25, 499.10, 502.05, 499.25, 501.25, 498.50, 499.25
499.75, 501.30, 502.10, 500.41, 499.99, 503.10, 498.75, 499.12, 502.30, 501.23

Will the machine pass inspection?