

Subject: Mathematics

Class: 8-10

Topic: Using Tolerance in Context

Levels: Basic, Intermediate, Advanced

Level: Basic

1. A packet of Haldiram's Bhujia is labeled $250\text{g} \pm 5\text{g}$. What is the minimum acceptable weight? _____
2. A gold ring is measured at 4.5g with a tolerance of $\pm 0.1\text{g}$. Can it weigh 4.45g ? (Yes/No) [?]
3. An engineer measures a rod as $10\text{cm} \pm 2\text{mm}$. Write the maximum length in mm: _____
4. If a bottle holds $500\text{ml} \pm 10\text{ml}$, what is the range of volume? _____ to _____ ml.
5. A price tag says $\text{₹}500 \pm \text{₹}5$. Which is acceptable: $\text{₹}494$ or $\text{₹}496$? _____
6. Draw a $\pm$ (circle) if a 98cm pipe fits in a $100\text{cm} \pm 5\text{cm}$ slot: _____
7. A cricket bat's width tolerance is $108\text{mm} \pm 1\text{mm}$. Is 109.5mm allowed? _____
8. The temperature of an oven is set to $180^\circ\text{C} \pm 5^\circ\text{C}$. Is 174°C within tolerance? _____
9. A 10kg bag of rice has a tolerance of 2% . Calculate 2% of 10kg in grams: _____
10. If the target length is 15cm and the actual is 15.2cm , find the absolute error: _____

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Level: Intermediate

1. A CNC machine cuts a part to $50\text{mm} \pm 0.05\text{mm}$. Write the upper and lower limits: _____
2. A ₹2000 note has a length of $166\text{mm} \pm 1\text{mm}$. Write the tolerance as a percentage: _____%
3. An Indian Railways track gap is $12\text{mm} \pm 2\text{mm}$. Calculate the total variation (Range): _____
4. A medicine bottle contains $100\text{ml} \pm 2\%$. If the lab finds 97ml, is it rejected? [? / ?]
5. Calculate the error percentage if a 50.0m wire is measured as 50.5m: _____
6. A concrete block must weigh $25\text{kg} \pm 0.5\text{kg}$. What is the value of ? if ? = (Max - Min)? _____
7. A square tile has side $30\text{cm} \pm 0.1\text{cm}$. What is the maximum possible area? _____ cm^2
8. Amit needs a 12.5cm bolt. The shop has bolts with $12.5\text{cm} \pm 0.4\text{mm}$. Is 12.53cm okay? _____
9. A petrol pump has a tolerance of $\pm 0.5\%$ per 5 liters. Calculate the allowed error in ml: _____
10. Write the value of ? up to 2 decimal places as a target for a circle's ratio: _____

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1. A piston diameter is $80.00\text{mm} \pm 0.02\text{mm}$. If it measures 79.975mm , by how much does it miss the limit?

2. A solar panel produces $330\text{W} \pm 3\%$. Calculate the range of power in Watts: _____
3. A bridge cable must withstand $5000\text{kN} \pm 100\text{kN}$. Represent this as $5000(1 \pm x)\%$, find x : _____
4. The resistance of a wire is $10 \pm 5\%$. If two such wires are in series, find the total tolerance: _____
5. A rocket part is $15\text{cm} \pm 0.001\text{cm}$. Why is high precision (low tolerance) expensive?

6. Find the volume tolerance of a cube with side $s = 10\text{cm} \pm 0.1\text{cm}$ (Use $s^3 \pm \Delta s$): _____
7. A gold smith uses a scale with $\pm 0.001\text{g}$ error. Is it better than a scale with $\pm 0.01\text{g}$? [?] _____
8. If a mass is $M \pm \Delta M$, write the formula for relative error: _____
9. A manufacturing process has a 1% defect rate. In 1000 items, what is the expected range of 'good' items?

10. Explain in one sentence why a 0% tolerance is impossible in real-world engineering: _____