

Percentage Increase, Decrease, and Error

Unit: Comparing Quantities - Student Practice Worksheet

Overview: Zara's plant grew from 40 cm to 50 cm. She said it grew by 25%. Kabir said it grew by 20%, since 10 out of 50 is 20%. Both had divided 10 by a number. They just divided by different numbers. Only one of them had picked the right one.

Practice Questions (30 Total)

Section A - Easy

Q1. Teal 40 plus maroon 10 reaches 50. Percentage increase?



40, plus 10, to 50

- ☐ A. 25%
- ☐ B. 20%
- ☐ C. 10%
- ☐ D. 50%

Q2. What value do you divide by to find percentage increase?

- ☐ A. The new value
- ☐ B. The original value
- ☐ C. The average of both values
- ☐ D. Always 100

Q3. A value falls from 50 to 40. What is the percentage decrease?

- ☐ A. 25%
- ☐ B. 10%
- ☐ C. 20%
- ☐ D. 50%

Q4. True 50, ruler 49.5. Percentage error?



- ☐ A. 1%
- ☐ B. 0.5%
- ☐ C. 2%
- ☐ D. 5%

Q5. What is the formula for percentage error?

- ☐ A. $|\text{measured} - \text{true}| / \text{measured} \times 100$
- ☐ B. $\text{measured} / \text{true} \times 100$
- ☐ C. $\text{true} / \text{measured} \times 100$
- ☐ D. $|\text{measured} - \text{true}| / \text{true} \times 100$

Q6. A recipe needs 200g flour but 210g was measured. What is the percentage error?

- ☐ A. 10%
- ☐ B. 4.76%
- ☐ C. 5%
- ☐ D. 2%

Q7. One teal bar becomes two equal bars. Percentage increase?



one bar becomes two

- ☐ A. 200%
- ☐ B. 50%
- ☐ C. 20%
- ☐ D. 100%

Q8. Is percentage error ever reported as negative?

- ☐ A. Yes, if the measured value is too low
- ☐ B. No, it uses an absolute value, always positive
- ☐ C. Only for decimals
- ☐ D. Only when measuring length

Q9. A value rises then falls by the same NUMBER of units. Are the percentage rise and fall equal?

- ☐ A. No, the reference values differ
- ☐ B. Yes, always
- ☐ C. Only if the value doubles
- ☐ D. Only for whole numbers

Q10. True 100 cm, measured 95 cm. Percentage error, using the true as base.

- ☐ A. 95%
- ☐ B. 5%
- ☐ C. 0.5%
- ☐ D. 10%

Section B - Medium

Q11. Bar of 100, teal remaining 80. Percentage fall from 100?



- ☐ A. 20%
- ☐ B. 25%
- ☐ C. 15%
- ☐ D. 30%

Q12. Which statement about a 50% increase followed by a 50% decrease is true, starting from 100?

- ☐ A. It returns to exactly 100
- ☐ B. It ends at 75, lower than the start
- ☐ C. It ends at 125
- ☐ D. It ends at 50

Q13. A quantity increases by 25% from an original value of 200. What is the new value?

- ☐ A. 225
- ☐ B. 250
- ☐ C. 210

☐ D. 275

Q14. From 120 down to 90 on the line. Percentage decrease?



- ☐ A. 25%
- ☐ B. 33.3%
- ☐ C. 30%
- ☐ D. 75%

Q15. If the percentage error in a measurement is 0%, what does that tell you?

- ☐ A. The measurement exactly matches the true value
- ☐ B. The measurement is impossible to determine
- ☐ C. The true value is zero
- ☐ D. The measured value is zero

Q16. A quantity decreases by 15% from an original value of 400. What is the new value?

- ☐ A. 385
- ☐ B. 360
- ☐ C. 340
- ☐ D. 415

Q17. 2000 grows to 2300. Percentage increase?

2000 → 2300

- ☐ A. 13%
- ☐ B. 30%
- ☐ C. 11.5%
- ☐ D. 15%

Q18. A recipe scaled from 4 servings to 6 servings. What is the percentage increase in servings?

- ☐ A. 33.3%
- ☐ B. 50%
- ☐ C. 66.7%
- ☐ D. 25%

Q19. A table's true length is 150 cm, and it's measured as 147 cm. What is the percentage error?

- ☐ A. 3%
- ☐ B. 1.5%
- ☐ C. 4.9%
- ☐ D. 2%

Q20. True 40 hours, timesheet 42. Percentage error, and why divide by 40.

- ☐ A. 4.76%
- ☐ B. 2%
- ☐ C. 5%
- ☐ D. 20%

Section C - Challenge

Q21. 500 up 20% to 600, then down 20%. Final value?



- ☐ A. 480, lower than the start
- ☐ B. 500, unchanged
- ☐ C. 520, higher than the start
- ☐ D. 450

Q22. A shopkeeper marks a price up by 30% then offers a 30% discount off the marked price. Is the final price the same as the original?

- ☐ A. Yes, exactly the same
- ☐ B. No, the final price is lower than the original
- ☐ C. No, the final price is higher than the original
- ☐ D. Cannot be determined without knowing the original price

Q23. By what percent must a value that fell by 20% now rise to return to its original value?

- ☐ A. 20%
- ☐ B. 22%
- ☐ C. 25%
- ☐ D. 16.7%

Q24. True 80, measures 84 and 76 equally far. Larger percentage error?



- ☐ A. Both have exactly equal percentage error
- ☐ B. Student A, with 5%
- ☐ C. Student B, with 5%
- ☐ D. Cannot be determined

Q25. A quantity increases by $x\%$ and then decreases by $x\%$, starting from value V (x is not 0). Is the final result always exactly V ?

- ☐ A. Yes, always exactly V
- ☐ B. No, it is always slightly less than V
- ☐ C. No, it is always slightly more than V
- ☐ D. It depends only on whether x is even or odd

Q26. A measured value has a 4% error above a true value of 250. What is the measured value?

- ☐ A. 254
- ☐ B. 246
- ☐ C. 240
- ☐ D. 260

Q27. 1000 falls 10% then rises 10%. Value after Tuesday?

1000 $\rightarrow$ 900

then +10%

- ☐ A. 1000, unchanged
- ☐ B. 1010, slightly higher
- ☐ C. 990, slightly lower
- ☐ D. 900

Q28. Which of these produces the SAME numeric percentage answer as the others: (a) a value rising 25% from 40 to 50, (b) a percentage error where true=40, measured=50, (c) a value falling 25% from 50 to 40, (d) a percentage error where true=50, measured=40?

- ☐ A. (a) and (b) only
- ☐ B. (c) and (d) only
- ☐ C. All four give the same answer
- ☐ D. None match

Q29. A true value is unknown, but a measurement of 51 has a percentage error of 2%. What could the true value be?

- ☐ A. 52
- ☐ B. 49
- ☐ C. 51
- ☐ D. 50

Q30. True 20 km/l, gauge 18. Percentage error, over or under?

- ☐ A. 10% error, an over-report
- ☐ B. 10% error, an under-report
- ☐ C. 11.1% error, an under-report
- ☐ D. 2% error, an under-report

Answer Key

Q1: (A) (a) 25%. $(50-40)/40 \times 100 = 25$.

Q2: (B) (b) The original value. Percentage change is always measured relative to where the quantity started.

Q3: (C) (c) 20%. $(50-40)/50 \times 100 = 20$.

Q4: (A) (a) 1%. $|49.5-50|/50 \times 100 = 0.5/50 \times 100 = 1$.

Q5: (D) (d) $|\text{measured} - \text{true}| / \text{true} \times 100$. Always divide by the true/actual value.

Q6: (C) (c) 5%. $|210-200|/200 \times 100 = 10/200 \times 100 = 5$.

Q7: (D) (d) 100%. Doubling means the new value equals 2x the original, so the increase is $(2x-x)/x \times 100 = 100\%$.

Q8: (B) (b) No, it's always a positive size using an absolute value. The bars around the difference guarantee a non-negative result.

Q9: (A) (a) No, because they use different original values. The rise is measured against the smaller starting value, the fall against the larger one.

Q10: (B) (b) 5%. $|95-100|/100 \times 100 = 5/100 \times 100 = 5$.

Q11: (A) (a) 20%. $(100-80)/100 \times 100 = 20$, a different number from the 25% rise that got it there in the first place.

Q12: (B) (b) It ends at 75, lower than the start. 100 rises to 150, then 50% of 150 (which is 75) is subtracted, giving $150-75=75$, not back to 100.

Q13: (B) (b) 250. 25% of 200 is 50, and $200+50=250$.

Q14: (A) (a) 25%. $(120-90)/120 \times 100 = 30/120 \times 100 = 25$.

Q15: (A) (a) The measurement exactly matches the true value. A 0% error means the numerator $|\text{measured}-\text{true}|$ is exactly zero.

Q16: (C) (c) 340. 15% of 400 is 60, and $400-60=340$.

Q17: (D) (d) 15%. $(2300-2000)/2000 \times 100 = 300/2000 \times 100 = 15$.

Q18: (B) (b) 50%. $(6-4)/4 \times 100 = 2/4 \times 100 = 50$.

Q19: (D) (d) 2%. $|147-150|/150 \times 100 = 3/150 \times 100 = 2$.

Q20: (C) (c) 5%. $|42-40|/40 \times 100 = 2/40 \times 100 = 5$.

Q21: (A) (a) 480, lower than the start. 500 rises to 600, then falls by 20% of 600 (120), giving $600-120=480$, not back to 500.

Q22: (B) (b) No, the final price is lower than the original. A rise of 30% followed by a 30% fall from the NEW (higher) value always lands below the original, the same asymmetry as any equal-percent up-then-down pair.

Q23: (C) (c) 25%. If original is 100, a 20% fall gives 80; to get back to 100 from 80 needs a rise of $20/80 \times 100 = 25\%$, a bigger percent than the original fall.

Q24: (A) (a) Both have exactly equal percentage error. $|84-80|/80 \times 100=5\%$ and $|76-80|/80 \times 100=5\%$ — the absolute value makes over- and under-measuring by the same

amount give the same error.

Q25: (B) (b) No, it is always slightly less than V . Rising by $x\%$ then falling by the same $x\%$ of the now-larger value always removes a bit more than was added, landing below the start for any nonzero x .

Q26: (D) (d) 260. 4% of 250 is 10, and since it's above the true value, measured = $250+10=260$.

Q27: (C) (c) 990, slightly lower. 1000 falls to 900, then rises 10% of 900 (90), giving $900+90=990$, not back to 1000.

Q28: (A) (a) (a) and (b) only. Both divide the 10-unit difference by 40, giving 25% — (c) and (d) instead divide by 50, giving 20%, a genuinely different pair of results.

Q29: (D) (d) 50. $|51-50|/50 \times 100 = 1/50 \times 100 = 2\%$, matching the given error exactly.

Q30: (B) (b) 10% error, an under-report. $|18-20|/20 \times 100 = 2/20 \times 100 = 10\%$, and since 18 is less than the true 20, it under-reports the efficiency.

You've got this! Keep learning and shining! - Ruchi Math Coaching