Recruiting, Retaining and Rewarding Top Tier Teachers

Top Teacher Test Prep

Math Principles

Probability and Statistics

- How do you **FIND A PERCENT**?

- Percent = $\frac{\text{Part}}{\text{Total}} \times (100)$

- No matter what aspect you need to find, given any two variables in the formula you solve for the third.

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- How do you find **PERCENT CHANGE (INCREASE OR DECREASE)** ?

- Percent Change = $\frac{|\text{start} - \text{end}|}{\text{start}} \times (100)$

- Use sign appropriate to increase or decrease

- For example

Probability and Statistics

- How do you **FIND THE ORIGINAL AMOUNT GIVEN A PERCENT CHANGE**?

- Set up an equation and use appropriate decimals for percent change so a 30 percent decrease you would work with .7 and a 30 percent increase you would work with 1.3

- For example during a 30% off sale sweater is sold for $20, what is the initial price?
  - .7x = 20 so x = $28.57

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- How do you **DO PROBLEMS WITH MULTIPLE PERCENT CHANGES**?

- Pick a number to start with like 100 the go through one step at a time.

- For example if A phone bill goes up 25% one month and then decreases 35% the next month what is the percent change
- 1.25 (100) = 125 then 125 (.65) = 81.25
  so 100 - 81.25 = 18.75% decrease

- HINT: the answer that is just the combination of the percent changes is a trap and should be crossed out
- For example if you increase by 10% then decrease by 25% that is not the same as just decreasing by 15%

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- How do you **SET UP A RATIO**?

- To find a ratio, put the number associated with the word of on top and the quantity associated with the word to on the bottom and reduce.

- For example the ratio of 18 rainy days to 12 sunny days in April would be $\frac{18}{12} = \frac{3}{2}$

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- How do you **WORK WITH PART TO PART AND PART TO WHOLE RATIOS**?

- Given a ratio to work with always write down the parts and total first then address the question. The actual total will be a multiple of the ratio total. Then if asked how many of a part exist multiply the part to total ratio times the given total.

- For example if you have 2 white eggs for every 3 brown eggs laid by a hen then you have 5 total. So the actual total should be a multiple of 5. If you are asked about a hen laying 23 eggs you can find the number of white by 23 (2/5) = 46/5 = 9 white eggs

Probability and Statistics

- How do you **SOLVE PROPORTIONS**?
- Set them up and cross multiply
- For example if $\frac{x}{3} = \frac{5}{7}$

$7x = 15$ so $x = 2.5$

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- How do you **SOLVE RATE PROBLEMS**?
- $\text{rate} = \frac{\text{amount}}{\text{time}}$
- For example if you have a printer that produces 12 pages per minute how long will it take to print 100 pages. So the rate is 12/60 or 1 page per 5 seconds.

  $\frac{12}{60} = \frac{100}{x}$ so $12x = 6000$ and $x = 500$ sec
- HINT: Look at the units to guide you

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- How do you **FIND THE AVERAGE RATE**?

- Average rate = $\frac{\text{total amount}}{\text{total time}}$

- For example if you travel 40 mph for 5 hrs and 50 mph for 2 hrs what is the average rate?
  $40 = d_1 / 5$ so $d_1 = 200$
  $50 = d_2 / 2$ so $d_2 = 100$
  average rate = 300 / 7 = 42.86 mph

- HINT – it is not just the average of the two individual rates

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- How do you **FIND THE MEDIAN**?

- Write the numbers in order and find the middle one for a set with an odd number of elements and find the average of the two middle numbers for a set with an even number of elements.

- For example the median of 2,5,7,3,4,8,1,9 is
- 1,2,3,4,5,7,8,9 = 4.5

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- How do you **FIND THE MODE**?
- The mode is the most common number in the set.
- For example in the set of
  1,2,2,2,3,3,3,4,4,4,4,5,5,6
  the mode is 4

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- How do you **FIND THE MEAN (AVERAGE)**?

- Average = $\frac{\text{sum of terms}}{\text{\# of terms}}$

- The average of 15, 25, 30, 45, 10 is
  $\frac{15 + 25 + 30 + 45 + 10}{5} = 25$

- HINT: The same formula can be used to solve for the sum or the number of terms

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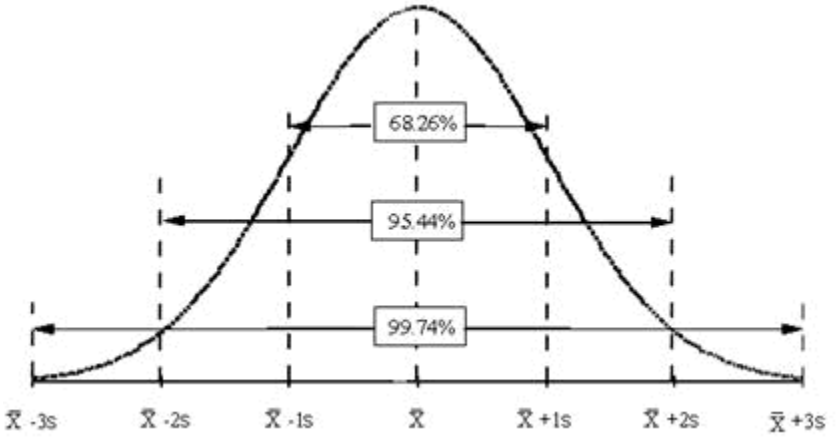
- How do you **DEAL WITH STANDARD DEVIATION?**

- Standard deviation is defined as the spread of the data around the mean. A bigger standard deviation indicates that values in a set of number are more spread out, a smaller standard deviation indicates that values are clustered around the mean.



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- How do you **AVERAGE EVENLY SPACED NUMBERS**?

- Just find the average of the largest and smallest numbers.

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- How do you **FIND THE MISSING NUMBER**?
- In this type of problem they will give you the average and then ask you for the missing term so you just need to use the sum.
- For example a student takes 3 tests and receives a 70, 75 and 80. What score does he need to get a 80 average for the quarter?
- $80 = \frac{70 + 75 + 80 + x}{4}$ so $320 = 225 + x$, $x = 95$

Probability and Statistics

- How do you **COUNT THE POSSIBILITIES**?

- The fundamental counting principle: if there are m ways one event can happen and n ways a second event can happen, then there are (m)(n) ways for the two events to happen.

- For example if you have 5 entres and 4 deserts there are (5)(4) = 20 meals total

Probability and Statistics

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- How do you **DETERMINE POSSIBILITIES WHEN ORDER MATTERS**?
- Remember that the number of possibilities decreases for each position. And multiply them together
- For example if you have 10 students running for president, vice president and secretary how many combinations are possible?
- (10) (9) (8) = 720

Probability and Statistics

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- How do you **MAKE SURE YOU COUNTED THE POSSIBILITIES CORRECTLY**?

- When in doubt, write them out. There is never a situation where the amount of possibilities is too high to make this effective.

Probability and Statistics

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- How do you do **PROBABILITY PROBLEMS**?
- Probability is like a ratio or proportion problem.
- Probability = $\frac{\text{desired outcomes}}{\text{possible outcomes}}$
- For example if you have 20 shirts in a closet and 4 are blue the probability of choosing a blue shirt at random is 4/20 = 1/5