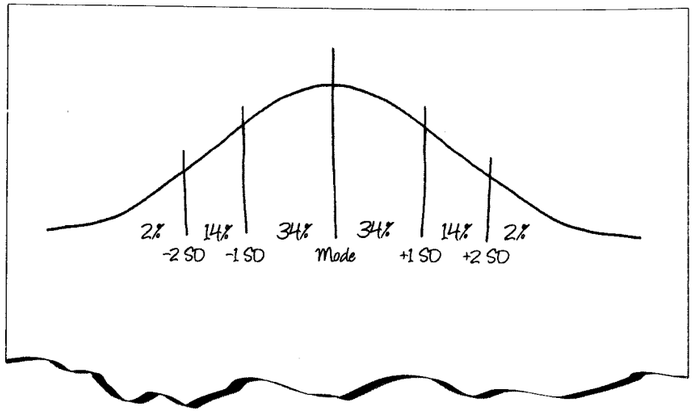
Your Friend the Bell Curve

The first thing to know about a bell curve is that the number in the middle is the mean, the median, and the mode.

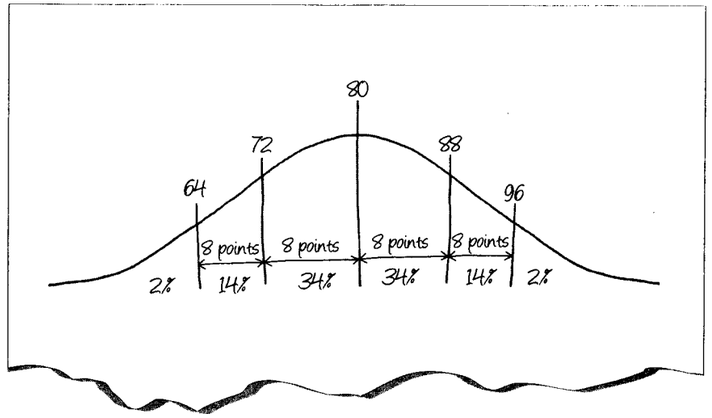
> The minute you see the phrase "standard deviation" or "normal distribution," draw your curve and fill in your percentages.



Imagine that 100 students take a test and the results follow a normal distribution. The minute you see the phrase, "normal distribution," draw your curve. Let's say that the average score on this test is an 80. That means that the median and the mode must also be 80. Put 80 in the middle of your curve. You know, however, that a few of those students were extremely well prepared and got a really high score, let's say that 2% of them got a 96 or higher. Put a 96 above the right 2% line on your curve.

Standard deviation measures how much a score differs from the norm (the average) in even increments. The curve tells us that a score earned by only 2% of the students is two standard deviations from the norm. If the norm is 80 and 96 is two standard deviations away; then one standard deviation on this test is 8 points. Two standard deviations above the norm is 96 while two standard deviations below the norm is 64. One standard deviation above the norm is 88, and one standard deviation below the norm is 72. Fill these in on your bell curve.

Now you know quite a bit about the distribution of scores on this test. Sixty-eight percent of the students received a score between 72 and 88. Ninety-eight percent scored above a 64. That's all there is to know about standard deviations. The percentages don't change, so memorize those. When you see the phrase, just make your curve and fill in what you know. Here's what the curve would look like for this test:



> When it comes to standard deviation, the percentages don't change, so memorize those: 2, 14, and 34.

Here's an example of how ETS might test standard deviation:

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Quantity A	Quantity B
The standard deviation of a set of data consisting of 10 integers ranging from –20 to –5	The standard deviation of a set of data consisting of 10 integers ranging from 5 to 20

- ○ Quantity A is greater.
- ○ Quantity B is greater.
- ○ The two quantities are equal.
- ○ The relationship cannot be determined from the information given.

Here's How to Crack It

ETS is hoping you'll make a couple of wrong turns on this problem. The first trap they set is that one set of numbers contains negative integers while the other doesn't—but this doesn't mean that one set will have a negative standard deviation. Standard deviation is defined as the distance a point is from the mean, so it can never be negative. The second trap is that ETS hopes you'll waste a lot of time trying to calculate standard deviation based on the information given. But you know better than to try to do that. Remember that ETS won't ask you to calculate standard deviation; it's a complex calculation. Plus, as you know, you need to know the mean in order to figure the standard deviation and there's no way we can find it based on the information here. Thus, we have no way of comparing these two quantities, and our answer is (D).

Now let's try a question that will make use of the bell curve.

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The fourth grade at School x is made up of 300 students who have a total weight of 21,600 pounds. If the weight of these fourth graders has a normal distribution and the standard deviation equals 12 pounds, approximately what percentage of the fourth graders weighs more than 84 pounds?

- ○ 12%
- ○ 16%
- ○ 36%
- ○ 48%
- ○ 60%

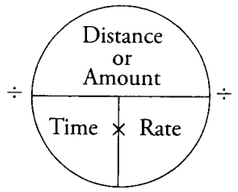
Here's How to Crack It

This one's a little tougher than the earlier standard deviation questions. The first step is to determine the average weight of the students, which is $\frac{21,600}{300} = 72$ pounds. If the standard deviation is 12 pounds, then 84 pounds places us exactly one standard deviation above the mean, or at the 84th percentile (remember the bell curve?). Because 16 percent of all students weigh more than 84 pounds, the answer is (B).

RATE

Rate problems are similar to average problems. A rate problem might ask for an average speed, distance, or the length of a trip, or how long a trip (or a job) takes. To solve rate problems, use the Rate Pie.

A rate problem is really just an average problem.



The Rate Pie works exactly the same way as the Average Pie. If you divide the *distance* or *amount* by the *rate,* you get the *time.* If you divide the *distance* or *amount* by the *time,* you get the *rate.* If you multiply the *rate* by the *time,* you get the *distance* or *amount.*

Let's take a look.

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It takes Carla three hours to drive to her brother's house at an average speed of 50 miles per hour. If she takes the same route home, but her average speed is 60 miles per hour, how long does it take her to get home?

- ○ 2 hours
- ○ 2 hours and 14 minutes
- ○ 2 hours and 30 minutes
- ○ 2 hours and 45 minutes
- ○ 3 hours

Here's How to Crack It

The trip to her brother's house takes three hours, and the rate is 50 miles per hour. Plug those numbers into a Rate Pie and multiply to find the distance.