Digital Third Coast

A Complete Guide to Marketing Math

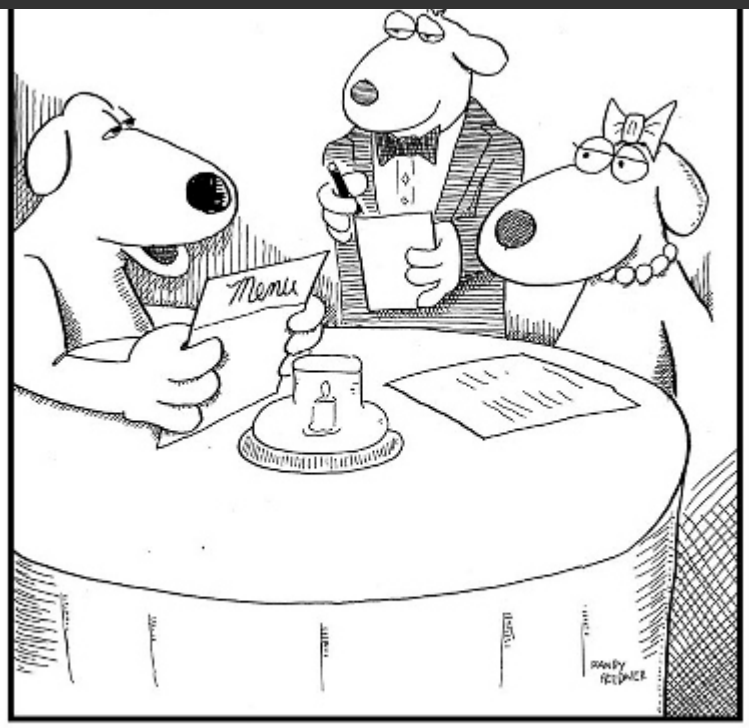
By Mike Theodore

Let's be honest — you didn't get into marketing because you loved high school algebra class. But it turns out your teacher was right. You do need math later in life. But stop fretting, Digital Third Coast has you covered. Feel free to crib our notes below. Just make sure Mrs. Wallace isn't looking.

This math for marketers guide gives quick and useful definitions for basic marketing principles, Google Analytics, pay-per-click strategies, testing and probability topics and social media. Be sure to bookmark this page — there's a lot here.

Something still not adding up? Pass us a note.

Dive in to Marketing Math Equations



"I'll have the math homework."

What is Marketing Math?

Marketing math refers to mathematical concepts, calculations and analysis in the field of marketing. It is used to gather, analyze, and help businesses make data-driven decisions around the globe. Things like pricing strategies, ROI analysis, forecasting, customer segmentation, and market research all utilize marketing math and formulas to decipher data and create actionable insights.

Uses at a Glance

There are many uses of using math in marketing, some listed above. The root use of math in marketing comes down to measuring profitability and marketing effectiveness. Most uses hover around competitive analysis, strategies, and forecasting.

Marketing Math Basics

Average Sales from New Customers

Total Sales ($) from New Customers / # New Customers

Great, you've landed new customers. But what is their average value? If the goal of your campaign is to get new customers then this metric is for you. Knowing where your money is coming in from can help you tailor your efforts in order to maximize it.

Break-Even Analysis

analysis, you'll know the relationship between cost, revenue and profit at different levels of production. Knowing this amount is an integral part of making a profit in your business. You want to make sure you're not selling your products for too little or you'll end up losing money on each sale. Knowing the least amount you have to charge to break even can give you leverage on promotions.

Churn Rate

Customers Lost / Total Customers

Customers come and go. But are you losing customers too quickly? The churn rate tells you how quickly your customers are leaving. Knowing how many people are leaving is just as important as how many new customers are making purchases every month. If your churn rate is high, then your business needs to take a look at why they're leaving or else you may not be profitable for long.

Conversion Value

Value / Conversions

Average value or dollar amount made from each conversion. This is an important metric especially if you have many different conversions. If not every conversion is equal, then balancing the conversion values to make sure you know where your revenue is coming in from is a key to success.

Cost per Acquisition

Cost / Conversions

Look at all these new customers! Congrats, your marketing is working. Or is it? Do you know the cost of each acquisition cost? Know the amount of effort (money) you're spending on every new customer. This metric is a good indicator of how your campaigns are doing. The more conversions, the lower your cost will be. Knowing this average can give you an idea how profitable the campaign is.

Successful customer retention starts with the first contact an organization has with a customer and continues throughout the entire lifetime of the relationship. It is usually cheaper to keep existing customers than it is to go out and get new ones, so keeping this metric very high can be easier on your bottom line.

Impression Share

% Impressions Compared To Max Available Placements

That new copy and sharp design is a can't miss. But are your customers seeing it? Know the impression share, which shows the number of impressions compared to the total amount of ads shown for that keyword.

Lead Close Rate

New Customers / Leads

Stockpiling leads isn't the best strategy. You need qualified leads who convert to actually earn revenue. With this calculation, you'll know the rate at which leads convert to customers.

Customer Lifetime Value

Gross Contribution * (Retention Rate / (1 + Discount Rate – Retention Rate))

Prediction of the net profit attributed to the entire relationship with a customer. This is an easy way you can plan how much money you'll have coming in from different clients. Having a prediction of how much money you can expect from them can help you plan future expenses and whether or not you need to expand in certain areas.

Margin

Unit Cost / Revenue per Unit

The cost of your product doesn't tell you how much profit you've made. You'll need to know the cost of production versus the revenue from every

Market Penetration

Customers Who Purchased a Product / Total # Prospects

How far is your marketing message reaching? This formula tells you how many customers you are reaching. In other words, you'll learn how many customers have purchased your products compared to everyone buying products in your market.

Market Share

Sales in Units / Total Market Sales in Units

You have competitors. It's more than nice to know how much of the shared market you control. This is helpful to show how successful your sales efforts are compared to your competitors. If this calculation is 1, well, congrats. You're a monopoly.

Marketing Expense to Revenue

Total $ Marketing Cost / $ Revenue Generated

Whether it's quarter to quarter or at year's end, you'll need to justify your marketing budget to revenue. Here, you're calculating salaries, consultant costs, ad spend, designer support and so forth against revenue generated. This provides a larger picture than ROI.

Net Promoter Score (NPS)

% of Promoters – % of Detractors

Happy customers mean happy businesses. The Net Promoter Score, typically scored via survey, is a customer satisfaction metric. Obviously, you want this to be higher than lower, as having high customer satisfaction is bound to lead to more sales and more word of mouth advertising.

Percent Change

Decrease:
Original Number – New Number / Original Number * 100

Ahh, the bane of every marketer. So logical and seemingly so simple. But why do we always turn to that free online calculator? Make a resolution to finally learn the formula!

Price Premium Percentage

Average Retail Price of Product / Average Retail Price of All Comparable Products

Do you know how your product price compares to comparable products? If not, you should.

Profit

Revenue – Cost / Revenue * 100

Without profit, you have a (costly) hobby. Profit is simply the amount of money your sales bring compared to the amount of costs and expenses.

Return on Ad Spend (ROAS)

Revenue from Ads / Cost of Ads

When it's time to justify your ad spend, you'll need to calculate the return.

Return on Customer

Current Cash Flow from Customer + Change in CLTV / CLTV at Beginning of Period

This metric matters because it can show you how customer relationships are evolving, are they ordering more or less than usual, etc.

Return on investment (ROI)

Return on Investment boils down your net profit and your total investment. It's a quick snapshot of the profitability of your efforts.

Sales from New Customers

Total Sales $ – Sales $ from Existing Customers

Are your new marketing efforts paying dividends? Find out with this calculation that shows the number of sales from new customers. It never hurts to know where your revenue is coming from.

Sales from New Products

Total Sales $ – Sales $ from Existing Products

The product team is pretty proud of the latest launch. But what's the impact? Be sure to calculate the sales directly tied to the new products

Sales Price Increase

Units Sold * (Avg. Price Now – Avg. Price Previous)

Did you recently change your pricing? Calculate the amount you're bringing in at the new price point.

Share of Voice

People Talking About Your Brand / People Talking in Your Industry

The internet is cacophonous. Be sure your brand is cutting through the white noise. Think of this metric as a buzz market share.

Wallet Share Percentage

Sales to Customer in a Category / Total Spending by Customer in that Category

Your customers aren't devout. Often they're customers of your competitors, too. This calculation tells you how much a customer is spending on your

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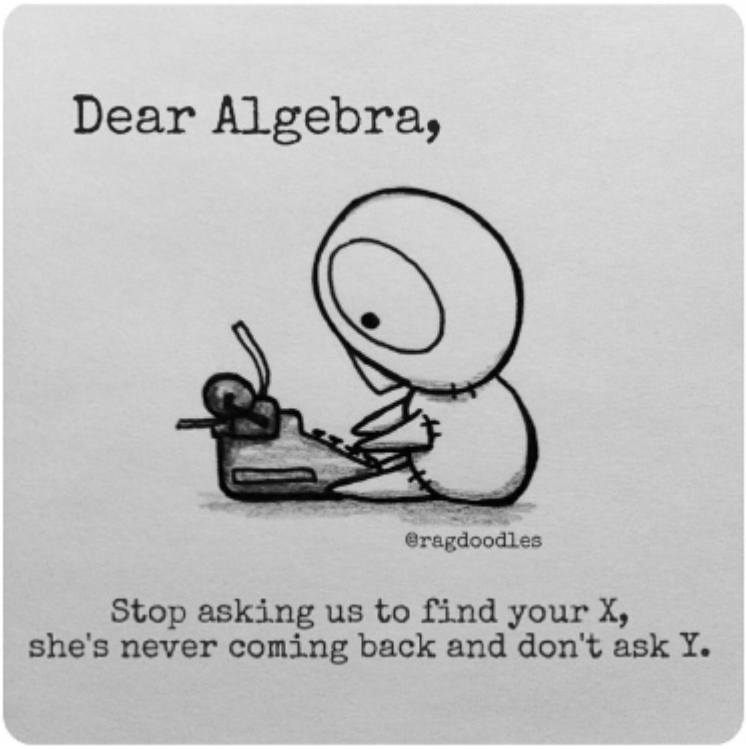

Pay-Per-Click

You should be paying per click, not paying for your math mistakes. Get up to speed today with these essential PPC terms and equations.

- Ad Rank
- Average Cost per View
- Average CPM
- Bid Adjustments
- Cost Per Click (CPC)
- Click Through Rate
- Clicks Before Keyword Is Unprofitable w/0 Conversions
- Conversions Per Impressions
- Conversion Rate
- Daily Budget
- Probability of Being a Profitable KW
- Quality Score
- Revenue per Click (RPC)

CPC Bid * Quality Score

This is the combination of Quality Score, your bid and ad extensions. It determines where you show up in the search results. It is an important metric if you're putting ads on YouTube or getting people to interact with your videos, so you can know how much you're spending on average per view.

Average Cost per Impression (CPM)

Average Cost / 1000 Impressions

How much are you spending to reach 1,000 impressions? In digital marketing, CPM is commonly used in display advertising. The most common use being when impressions and awareness is the end goal, rather than CPC, which is typically preferred in direct response marketing.

Average Cost per View

Average Cost / View

Related to impressions, this ratio details the average cost per view. It is an important metric if you're putting ads on YouTube or getting people to interact with your videos so that you can know how much you're spending on average per view.

Bid Adjustments

Max Bid +/- x%

In a competitive space? Of course you are. This equation changes the bid based on different qualifiers and multiplies the maximum bid by a certain percentage to get the new maximum bid. Bid adjustments allow you to manage your bids more precisely based on your data. If you have strong evidence that mobile users in Arkansas on Thursdays at 6:30 am are your best customers, you can ensure your bid is more competitive by increasing your mobile bid, your time of day bid, your day of week bid and your location bid. These bid increases stack, and you're just as easily able to adjust the other direction and bid fractionally less.

Clicks = log(P) / log(1 – cRate)

Take the guessing out of your strategy. This reveals how many clicks without a conversion and shows you if a keyword will never be profitable. This is a great tool to see if you should keep faith with a keyword or move on and pause it. You want to be careful not to give up on a keyword too early, but you don't want to keep it in your profile if it's just a money sink either.

Click Through Rate

Clicks / Impressions

You think your ad looks and sounds good. But are people actually clicking? This measures the percentage of people that see an ad and actually click it. This is an important metric that can show how successful your ad is compared to other ads. It also shows how relevant a user thinks your ad is.

Conversions per Impression

Conversions / Impressions

Know the effectiveness of your ad or landing page. This ratio compares conversions based on the number of impressions. Expert Brad Geddis has a wonderful, in-depth post on this metric. Give it a read but be sure to come back!

Conversion Rate

Conversions / Clicks

Clicks don't guarantee success. Conversions are the lifeblood of leads and sales. Be sure to measure the ratio of conversions based on the number of clicks. This is a key metric that shows how your clicks are converting. It could be sales or leads or a video completion, but it proves that users are engaging with your site in a way that you have defined at the beginning of your marketing campaign.

Cost Per Click (CPC)

number of clicks received. Since you do not pay the same amount for each click for each keyword, this can give you a pretty good idea of how much you're paying on average for each click.

Daily Budget

Monthly Budget / (# days in the month)

A simple but useful number, this breaks down your daily budget based on your monthly budget. This helps you stay on track with pacing in an account. If you get ahead or behind, you can calculate this and adjust what you're spending to hit your goals.

Probability of Being a Profitable KeyWord

P = (1 – cRate) ^ clicks

Don't prop up a losing bet. This formula helps determine if your keyword is profitable. This is a great tool to see if you should keep faith with a keyword or move on and pause it. You want to be careful not to give up on a keyword too early, but you don't want to keep it in your profile if it's just a money sink either.

Quality Score

1 + Landing Page Experience weight + Ad Relevance weight + CTR weight

The Quality Score is Google's algorithm that impacts how much an advertiser pays for a click. If your Quality Score is higher, you receive a discount on your CPC and can even show at a higher ad position with a lower bid. If your quality score is poor, your CPC and ad costs will be higher.

Revenue per Click (RPC)

Revenue / Clicks

make money, and we advertise to create revenue. For lead-based businesses, where lead quality comes into play and the actual business outcome is often further removed from the click, RPC can help you make better decisions on what is actually moving the dial for your business.

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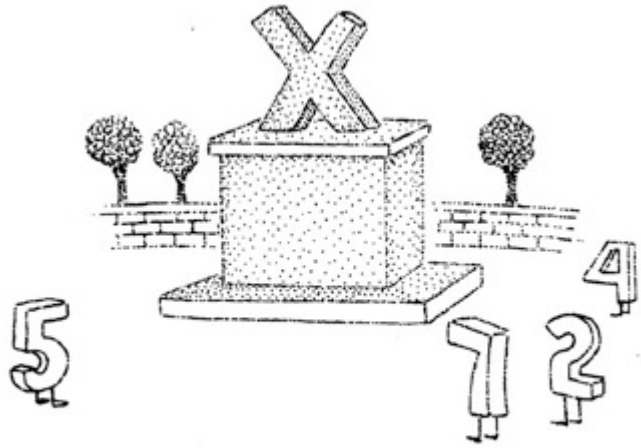

Tomb of the Unknown Quantity.

Google Analytics

Let's take your marketing skills to the next level with this helpful explanation of marketing terms and formulas for Google Analytics.

- % New Sessions
- Average Time On Page
- Average Page Load Time
- Average Search Depth
- Average Search Duration
- Average Session Duration
- Average Search Result Views
- Bounce Rate
- Buy to Detail Rate
- Cart Abandon Rate
- Cart to Detail Rate
- Exit Rate
- Items per Purchase
- Goal value per Session

- Revenue
- Revenue per Item
- Revenue per Transaction
- Revenue per User
- Search Exit Rate
- Search Goal Conversion Rate All
- Sessions per User
- Transactions per Session
- Transaction Revenue per Session

% New Sessions

New Sessions / # Total Sessions

It's a good metric to see how new customer growth is going. You want to have new customers, especially if you are running ads. You don't want just the same customers coming back.

Average Session Duration

Are your users getting to your site but then jumping ship? This number from Google Analytics shows the amount of time a user spends on your site during a session.

Average Time On Page

Total Time Spent by All Visitors / Total # Visits

Do you know if your landing page is effective? This important average is calculated by taking the total time by all visitors divided by the total number of visits. For example, if you have 180 minutes of time spent on your site in a day, and you had 40 visits, then the average time on site would be 4 and a half minutes. But remember, a meaningful action (a conversion or moving further down the funnel) is more important than time on a page. If the average time is low, don't automatically condemn the page. The time on page starts counting after you leave the entry/landing page.

Average Search Result Views

affect your brand and sales. This metric is essential when looking at site engagement.

Average Search Depth

Search Depth / Total Unique Searches

This is another important metric when you are looking at site engagement. This metric shows the average number of pages viewed after performing a search.

Average Search Duration

This metric details the amount of time a user spends on your site during a session. Its a good measure of engagement on a site. The more time they spend on site the better chances of a conversion.

Average Page Load Time

Page Load Time / Page Load Sample * .001

Don't let web frustrations interfere with your bottom line. This metric is important because you want your site to load quickly. If you have slow load times, then your visitors may move on to another site.

Bounce Rate

Visitors Leaving After 1 Page / Total Visitors

The bounce rate can show how certain pages work. It calculates the percentage of visitors that leave (bounce) after only seeing one page on your site. The lower the better. If the bounce rate is high, its content might not match up with the search terms people used to land there.

Buy To Detail Rate

Products Purchased / Total Product Detail Views for That Product

looking on a product page before making a purchase.

Cart Abandon Rate

1 – (# People Who Begin Checkout / # People Who Added to Cart)

This details the average number of people who begin the checkout process then quit at some point. If this percentage gets too high, you might want to take a look at your cart and checkout process. People might get bogged down and decide it's not worth the effort.

Cart To Detail Rate

Products Added To Cart / Total Product Detail Views

This is another important e-commerce metric that gives you insight into what the potential customer is doing. It shows the number of products added per number of product-detail views.

Exit Rate

Amount Users Leaving Site From This Page / Total # Users Visiting This Page

The Exit Rate shows how many users leave your site from a given page. This is an indicator that something might be wrong with a page because it is creating conversions.

Items Per Purchase

Items / # Purchases

Knowing the average number of items purchased each time a sale is made can help you tailor certain promotions in order to optimize the number of items made per purchase.

Goal Value Per Session

Goal Value / # Sessions

values. It can be a misleading stat, but you can see approximately what every session is worth on your site.

Pageviews Per Session

Amount of Page Views / 1 Session

This is the ratio of total pageviews divided by the total number of sessions. It is a good metric to see how engaged a person is with your site. Generally, the higher this is the better.

Percent Sessions With Search

Sessions with Search / # Sessions

This formula is the number of sessions with a search divided by the total number of sessions. For example, if you had 50 sessions with a search and 200 searches, your percentage will be 25%. Knowing the health of your site search is always important.

Revenue

Amount Sold * Price

Making money is an important thing to keep track of. Revenue is the first piece of the puzzle. But remember revenue doesn't account for expenses.

Revenue Per Item

Revenue / # Items

The formula for this is Revenue divided by the total number of items bought. So if you made $75 dollars on an order, and sold 3 items, the average per item would be $25 dollars.

Revenue Per Transaction

Revenue / # Transactions

Revenue Per User

Revenue / # Users

This can show you if you have a lot of users that spend a small amount or a few users that spend a lot.

Search Exit Rate

of Users Leaving Site After a Search / Total # Users Making a Search

The formula for this is the total number of users that leave the site after performing a search divided by the total number of users that make a search on your site. So if you had 10 people leave after making a search and 200 people performing a search you would have a 5% search exit rate.

Search Goal Conversion Rate All

Goal Completions / Total Unique Searches

In order to calculate this, you take the number of goal completions after a search divided by the total number of unique searches.

Sessions Per User

Sessions / # Users

To find sessions per user, you take the total number of sessions divided by the total number of users. For example, if you have 15,000 sessions on your site and 240 users, your sessions per user is 62.5. The higher this is, the more users are returning to your site. The more they stick around the better chances that they convert and buy something from you.

Transactions Per Session

Transactions / # Sessions

Transaction Revenue Per Session

Revenue from Transactions / # Sessions

To find revenue per session, you take the total revenue from transactions and divide it by the total number of sessions.

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Social Media

Got friends? Great. Know math? You'd better.

Customer Engagement

Suggestions / # Complaints

All over social media customers and brands are engaging more and more. Know the ratio of suggestions to complaints. This is an interesting ratio of positive comments to negative comments about your product or service. Customer engagement is good on both sides, as long as you take negative comments into consideration and learn from them.

Engagement Rate

Engaged Users / Reached Users * 100

The more engaged users are, the more likely they can and will spread your posts and amplify your voice and reach.

Negative Feedback Rate

Hidden/Unlike/Reporting as Spam / Reached Users

determine which content and social posts are driving the results you want to see and which posts are negatively affecting your social media reach.

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Testing and Probability

Your marketing strategy should be heavy on testing and adjustments. It should also be data driven. If you're a data scientist, feel free to move on. But if not, take a look at the topics below and learn the basics.

Algorithm Process

Usually used in a script or code, you can write a set of rules that will be executed in order to simplify and automate a task. An algorithm can take a lot of work off your hands. If you are doing the same things over and over, a script can be used so that you can focus on more important efforts.

Correlation (R Value)

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\,n\Sigma x^2 - (\Sigma x)^2\,]\,[\,n\Sigma y^2 - (\Sigma y)^2\,]}}$$

Correlation: Use this technique to help you fit your data to a line or curve, which can help you forecast. If you can get a good idea on what will happen in the future, you can plan and expand growth even more. It is important to use the right type of line in order to get best results.

This is a series of formulas that can reproduce and predict an event. Machine learning makes these formulas even more powerful by learning from past events. The idea of this technique is to be able to predict what will happen in the future so you can plan.

Standard Deviation

Square Root(Average of Squared Differences from the Mean)

This is used in the standard error. It is used a lot for testing purposes to help calculate whether a result is significant.

Standard Error

Standard Dev. / Sqr(Number of Observations)

It is frequently used for testing purposes to help calculate whether a result is significant.

T-Tests

t = (mean1 – mean2) / Sqr(stddev1^2/#values1 + stddev2^2/#values2)

This is a tool you can use to see if two results are the same or different.

Weighted Average/Normalized Values

example: QS * Impressions

Statistics can easily lie. For example, if you're reaching 90% of market A and 10% of market B, you might think that you're reaching 50% of the total marketing ((90%+10%)/2). But if there is a disparity of population of the two markets, say 50k in Market A and 10k in Market B, then you're actually reaching 76.6% of total people – a much better outlook! Weighted averages give a cleaner view of each data segment.

Final Word

help you track business objectives. The above equations are always here for reference if needed!

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2540 W North Ave Chicago, IL 60647

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