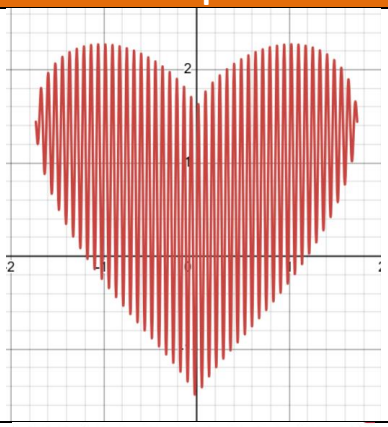
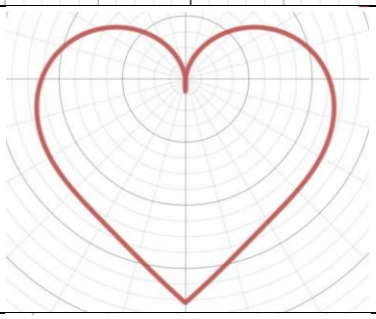
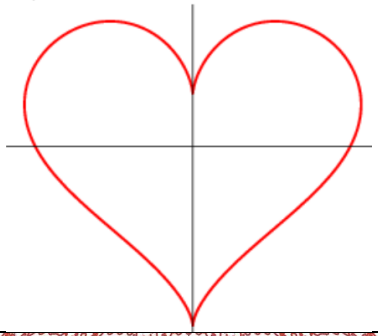
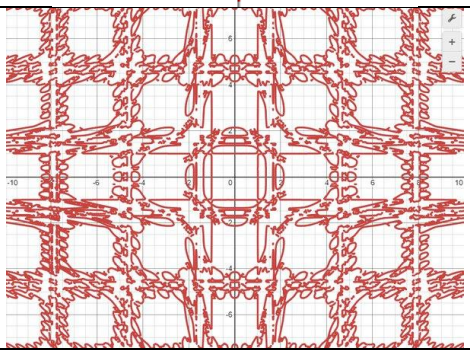
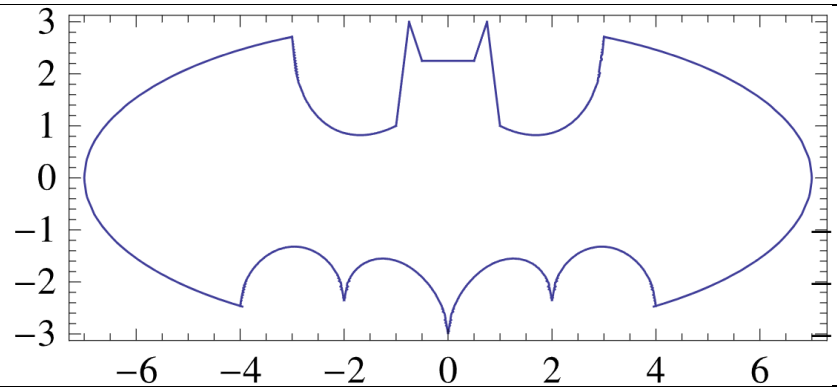
Harold's Math is Fun
Cheat Sheet
1 September 2025

Cool Graph Equations

Description	Equation	Graph
Heart – Rectangular	$f(x) = x^{2/3} + 0.9\ sin(kx)\ \sqrt{3 - x^2}$ $k = 81.5$	
Heart – Polar	$r = 3.6 - \frac{\cos(2\theta) + 3\sin(\theta)}{0.8 + \lvert\cos(\theta)\rvert} + 1.5\cos(2\theta)$	
Heart – Parametric	$x(t) = 16(sin\ t)^3$ $y(t) = 13\ cos(t) - 5\ cos(2t) - 2\ cos(3t) - cos(4t)$ $0 \le t \le 2\pi$	
Persian Rug	$\sin(\cos(\tan(xy))) = \sin(\cos(\tan(x))) + \sin(\cos(\tan(y)))$	

Batman Equation



Upper Part:

$$f(x) = (h-l)H(x+1) + (r-h)H(x-1) + (l-w)H(x+3) + (w-r)H(x-3) + w$$

Lower Part :

$$g(x) = \frac{1}{2}\left[\left|\frac{x}{2}\right| + \sqrt{1-\left(\left||x|-2\right|-1\right)^2} - \frac{1}{122}\left(3\sqrt{33}-7\right)x^2 + w - 3\right] \cdot [sgn(x+4) - sgn(x-4)] - w$$

Where $H(x)$ is the Heaviside step function

$$H(x) = \begin{cases} 0 & x < 0 \\ \frac{1}{2} & x = 0 \\ 1 & x > 0 \end{cases}$$

and

$$w = 3\sqrt{1-\left(\frac{x}{7}\right)^2}$$

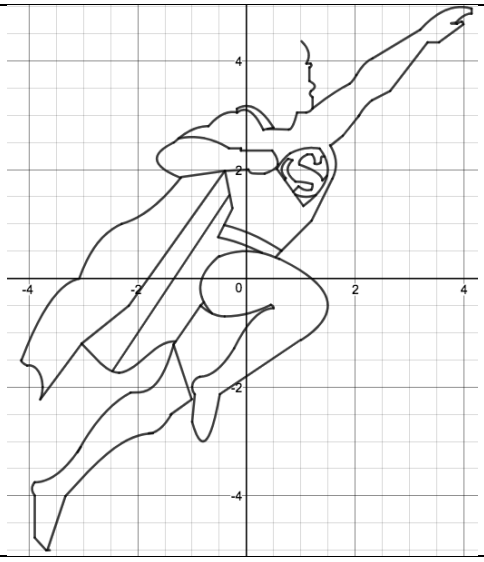
$$l = \frac{1}{2}(x+3) - \frac{3}{7}\sqrt{10}\sqrt{4-(x+1)^2} + \frac{6}{7}\sqrt{10}$$

$$r = \frac{1}{2}(3-x) - \frac{3}{7}\sqrt{10}\sqrt{4-(x+1)^2} + \frac{6}{7}\sqrt{10}$$

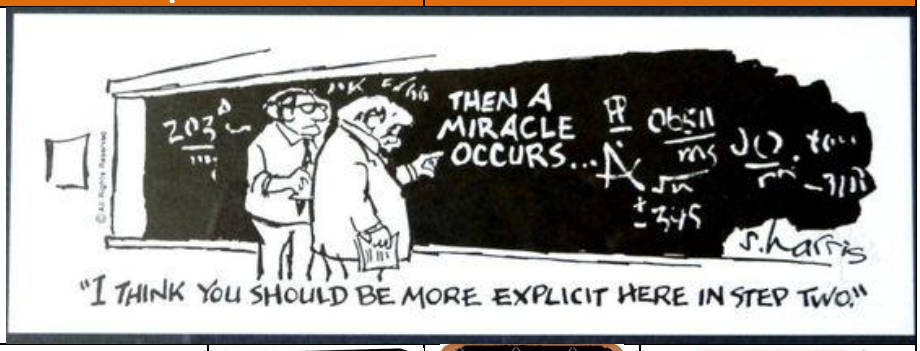
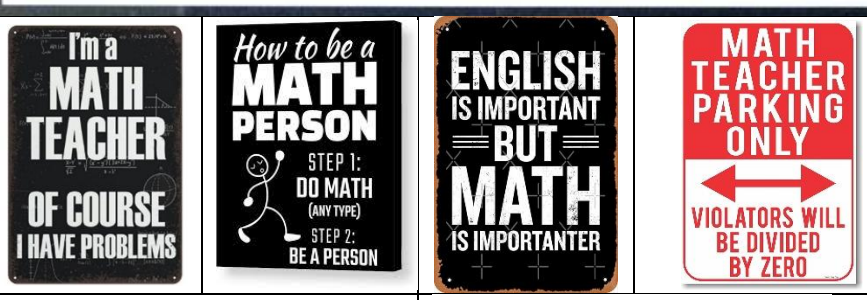
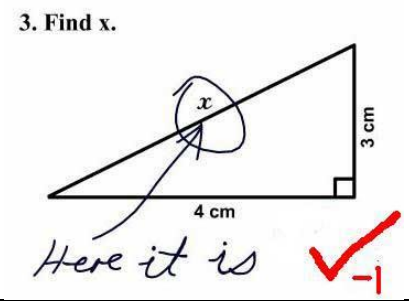
$$h = \frac{1}{2}[f\left(\left|x+\frac{1}{2}\right| + \left|x-\frac{1}{2}\right| + 6\right) - 11\left(x+\frac{3}{4}\right) + \left|x-\frac{3}{4}\right|]$$

Superman

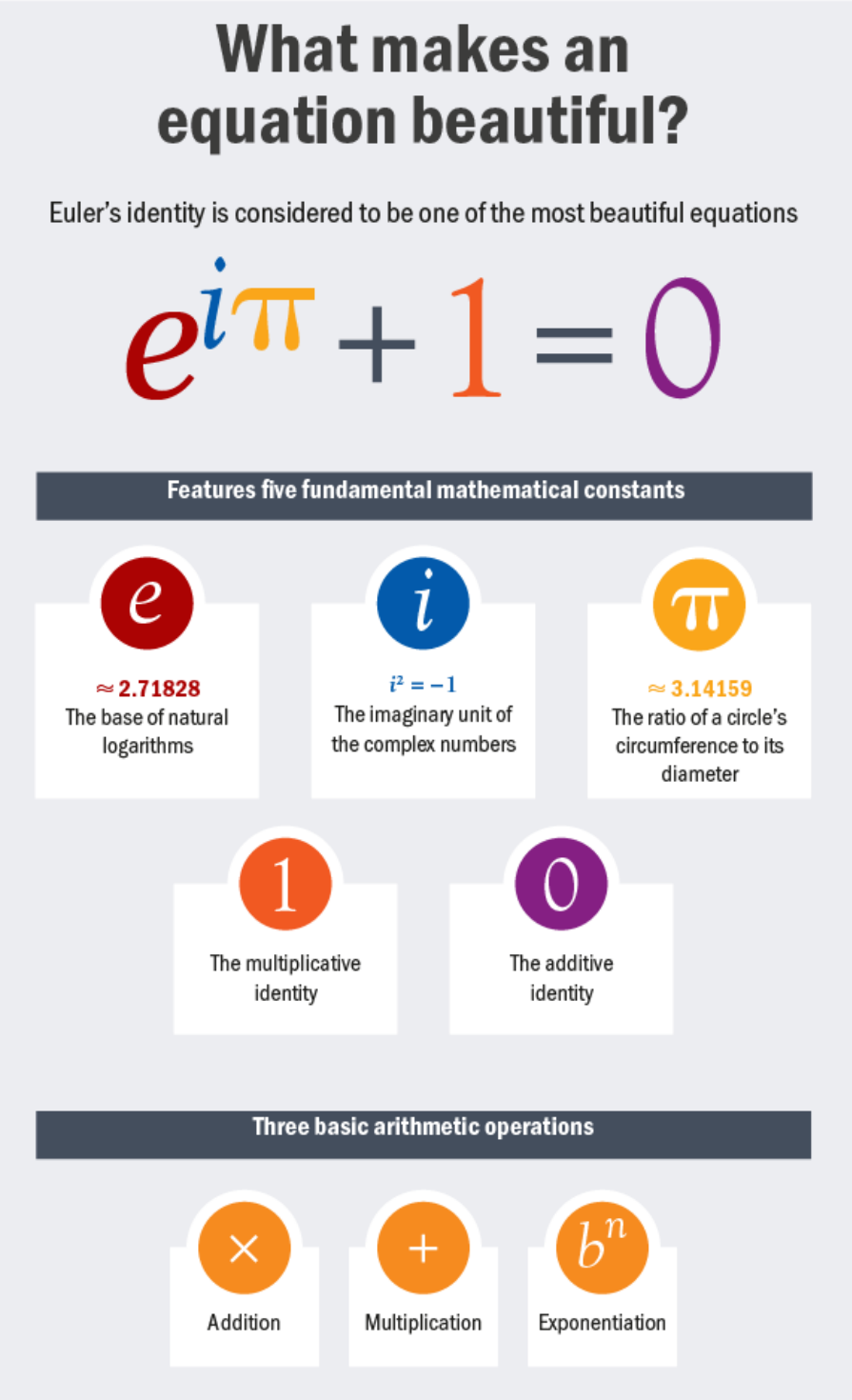
Desmos



Fun Math Quotes

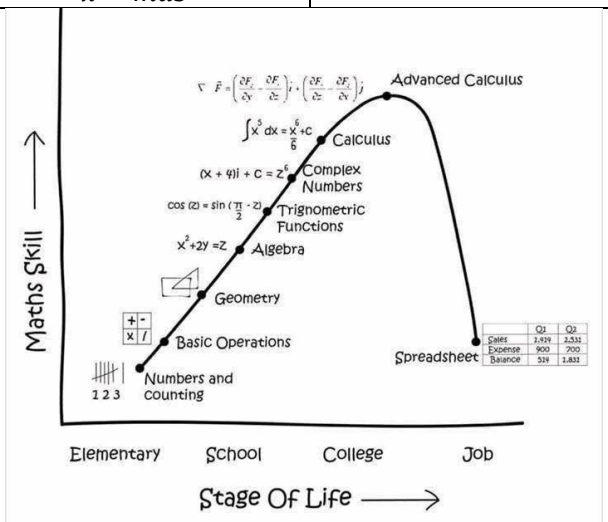
Description	Equation	Note
Then a Miracle Occurs		
Math Teacher Signs		
Find x	$a^2 + b^2 = c^2$	
3 Types of People	*"There are three types of people: those who can count and those who cannot."* - Gene Wolfe	
Lottery Tax	"*Lottery: A tax on people who are bad at math.*"	
Carnivorous Integers	Q: Why was 6 afraid of 7? A: Because 7 ate 9, since you are supposed to eat 3 squared meals a day.	
Old MacDonald	"Old Macdonald had a form, $e_i \wedge e_i = 0$."	
Pierre de Fermat	Pierre de Fermat walks into a bar. *"I have devised a most humorous punchline to this joke, but this margin is too narrow to contain it."*	
Hiitchhiker	A kindergarten teacher asked students to introduce their parents. • "My mom is a doctor. She saves lives!" "Wonderful!" • "My dad drives for Uber. He takes people where they need to go!" "That's nice." • "My dad kills hitchhikers and sells their valuables on eBay!" "Goodness gracious!" ○ "Actually, I'm a mathematician, but how can you explain that to kids?"	
Breaking Bad Parody	*"I took care of it. I divided by zero."*	Studio C two math teachers' parody of the TV series "Breaking Bad", where they were dealing in Math, not Meth.

Beautiful Math

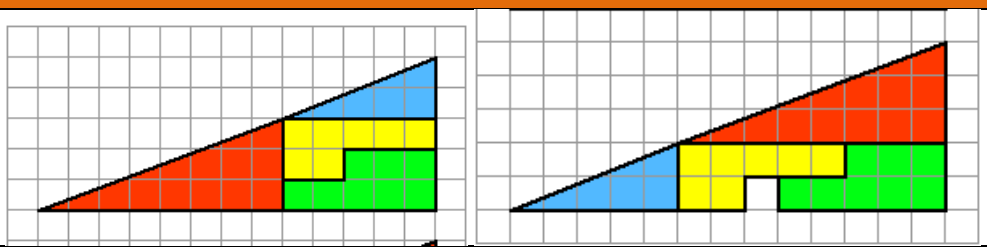
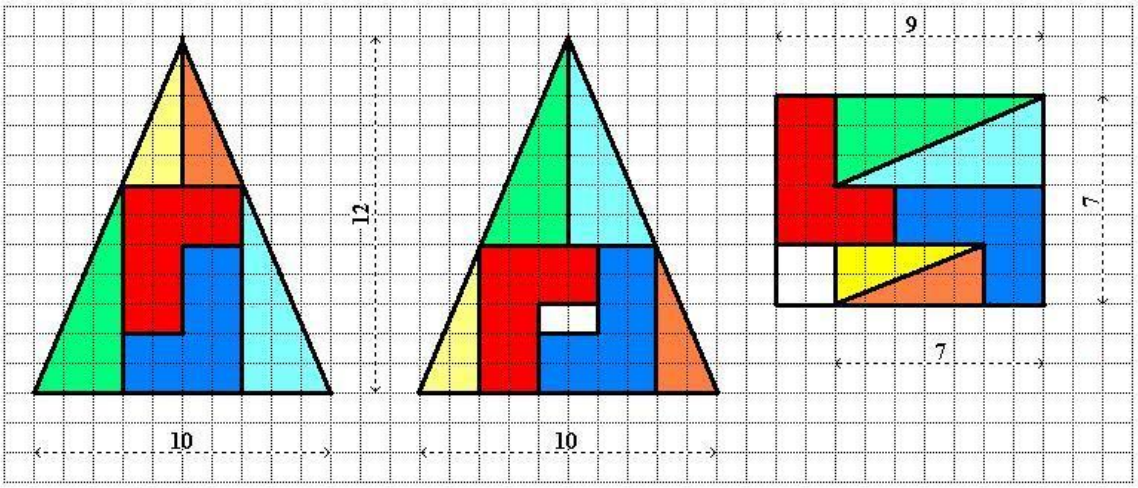
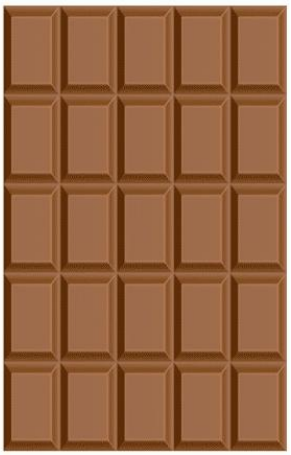
Description	Equation	Note
Euler's Identity		
Gamma Function: Factorial of a Fraction	$\left(\frac{1}{2}\right)! = \frac{\sqrt{\pi}}{2}$	

Deceptive Algebra Proofs

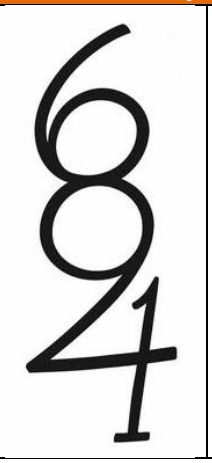
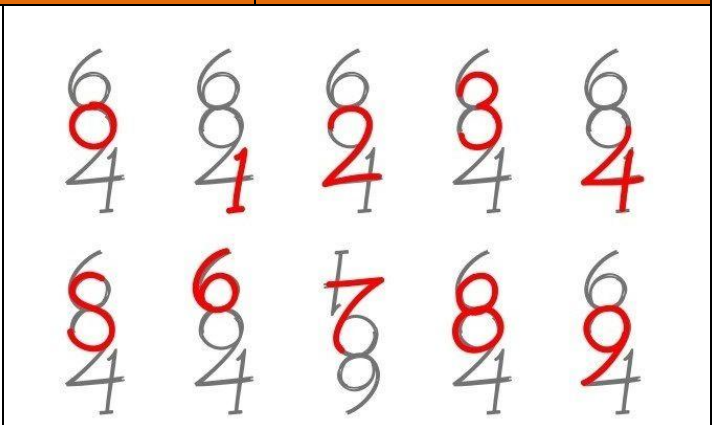
Description	Equation	Note
$\mathbf{2 = 1}$	$a = b$ $a^2 = a \cdot b$ $a^2 - b^2 = a \cdot b - b^2$ $(a + b)(a - b) = b(a - b)$ $a + b = b$ $b + b = b$ $2b = b$ $\mathbf{2 = 1}$	Can you find the illegal operation?
$\mathbf{2 + 2 = 5}$	$0 = 0$ $20x - 20x = 25x - 25x$ $4x \cdot 5 - 4x \cdot 5 = 5x \cdot 5 - 5x \cdot 5$ $4x(5 - 5) = 5x(5 - 5)$ $4x = 5x$ $4 = 5$ $\mathbf{2 + 2 = 5}$	That darn zero again
$\mathbf{2 = 0}$	$2 = 1 + 1$ $2 = 1 + \sqrt{1}$ $2 = 1 + \sqrt{(-1)(-1)}$ $2 = 1 + \sqrt{(-1)} \bullet \sqrt{(-1)}$ $2 = 1 + i \bullet i$ $2 = 1 + i^2$ $2 = 1 - 1$ $\mathbf{2 = 0}$	Complex numbers
$\mathbf{1 = -1}$	$1 = 1$ $1 = \sqrt{1}$ $1 = \sqrt{(-1)^2}$ $1 = \sqrt{-1}\sqrt{-1}$ $1 = i^2$ $\mathbf{1 = -1}$	Imaginary numbers
$\mathbf{\$1 = 1¢}$	\$1 = 100 cents \$1 = (10 cents)^2 \$1 = (\$0.1)^2 \$1 = \$0.01 $\mathbf{\$1 = 1¢}$	Proof that \$1 = 1 cent
$\boldsymbol{\pi = 3}$	$x = (\pi + 3)/2$ $2x = \pi + 3$ $2x(\pi - 3) = (\pi + 3)(\pi - 3)$ $2\pi x - 6x = \pi^2 - 9$ $9 - 6x = \pi^2 - 2\pi x$ $9 - 6x + x^2 = \pi^2 - 2\pi x + x^2$ $(3 - x)^2 = (\pi - x)^2$ $3 - x = \pi - x$ $\pi = 3$	"And he made a molten sea, ten cubits from the one brim to the other: *it was* round all about, and his height *was* five cubits: and a line of thirty cubits did compass it round about.". - 1 Kings 7:23

Girls are Evil	**Given:** Girls = Time x Money Time = Money Money = $\sqrt{\text{Evil}}$ **Proof:** Girls = $(\text{Money})^2$ Girls = $\left(\sqrt{\text{Evil}}\right)^2$ Girls = Evil	Proof that girls are evil
Dilbert's Salary Theorem	**Given:** Knowledge is Power Time is Money Power = Work/Time **Proof:** Knowledge = Power Knowledge = Work/Time Knowledge = Work/Money Money = Work/Knowledge $\text{Money} = \lim_{\text{Knowledge}\to 0} \frac{\text{Work}}{\text{Knowledge}} \to \infty$ **Conclusion:** All else being equal, the less you know, the more money you make.	Proof relating to Knowledge, Power, and Money If Work is held constant as a positive number, Money approaches infinity (∞) as Knowledge approaches zero (0).
Halloween = Christmas	$OCT\ 31 = DEC\ 25$ Halloween = Christmas	Think of octal and decimal.
Merry Christmas	$y = \frac{\ln\left(\frac{x}{m} - sa\right)}{r^2}$ $r^2 y = \ln\left(\frac{x}{m} - sa\right)$ $e^{r^2 y} = \frac{x}{m} - sa$ $me^{r^2 y} = x - sam$ $me^{rry} = x - mas$	
Spreadsheets		

Deceptive Geometry Proofs

Description	Picture
Lost Squares	
	 $S_1 = \frac{10 \times 12}{2} = 60$ $S_2 = 60 - 2 = 58$ $S_3 = 9 \times 7 - 4 = 59$
Free Chocolate	

Math Puzzles

Description	Equation	Note
How many numbers can you see?		
Where did the other dollar go?	Three guys in a hotel call room service and order two large pizzas. The delivery boy brings them up with a bill for exactly $30.00. Each guy gives him a $10.00 bill, and he leaves. When he hands the $30.00 to the cashier, he is told that a mistake has been made. The bill was only $25.00, not $30.00. The cashier gives the delivery boy five $1.00 bills and tells him to take them back to the 3 guys who ordered the pizza. On the way back to their room, the delivery boy has a thought... these guys did not give him a tip. He figures that since there is no way to split $5.00 evenly three ways anyhow, he will keep two dollars for himself and give them back three dollars. He knocks on the door, and one fellow answers. He explains about a mix-up in the bill, and hands the guy the three dollars, then departs with his two-dollar tip in his pocket. Now the fun begins! $30 - $25 = $5 $5 - $3 = $2 Answer this: Each of the three guys originally gave $10.00 each. They each got back $1.00 in change. That means they paid $9.00 each, which times three is $27.00. The delivery boy kept $2.00 for a tip. $27.00 plus $2.00 equals $29.00. Where is the other dollar?	

Marital Relationship Math

Description	Equation	Note
Romance	Smart man + smart woman = romance Smart man + dumb woman = affair Dumb man + smart woman = marriage Dumb man + dumb woman = pregnancy	
Office	Smart boss + smart employee = profit Smart boss + dumb employee = production Dumb boss + smart employee = promotion Dumb boss + dumb employee = overtime	
Shopping	A man will pay $2 for a $1 item he needs. A woman will pay $1 for a $2 item that she doesn't need.	
Future	A woman worries about the future until she gets a husband. A man never worries about the future until he gets a wife.	
Success	A successful man is one who makes more money than his wife can spend. A successful woman is one who can find such a man.	
Happiness	To be happy with a man, you must understand him a lot and love him a little. To be happy with a woman, you must love her a lot and not try to understand her at all.	
Longevity	Married men live longer than single men do, but married men are a lot more willing to die.	
Propensity to Change	A woman marries a man expecting he will change, but he doesn't. A man marries a woman expecting that she won't change, and she does.	
Discussions	A woman has the last word in any argument. Anything a man says after that is the beginning of a new argument.	
You're Next	Old aunts used to come up to me at weddings, poking me in the ribs and cackling, telling me, "You're next." They stopped after I started doing the same thing to them at funerals.	
Conclusion	Show this list to a smart woman who needs a laugh, and to the smart guys you know can handle it.	

Sources

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