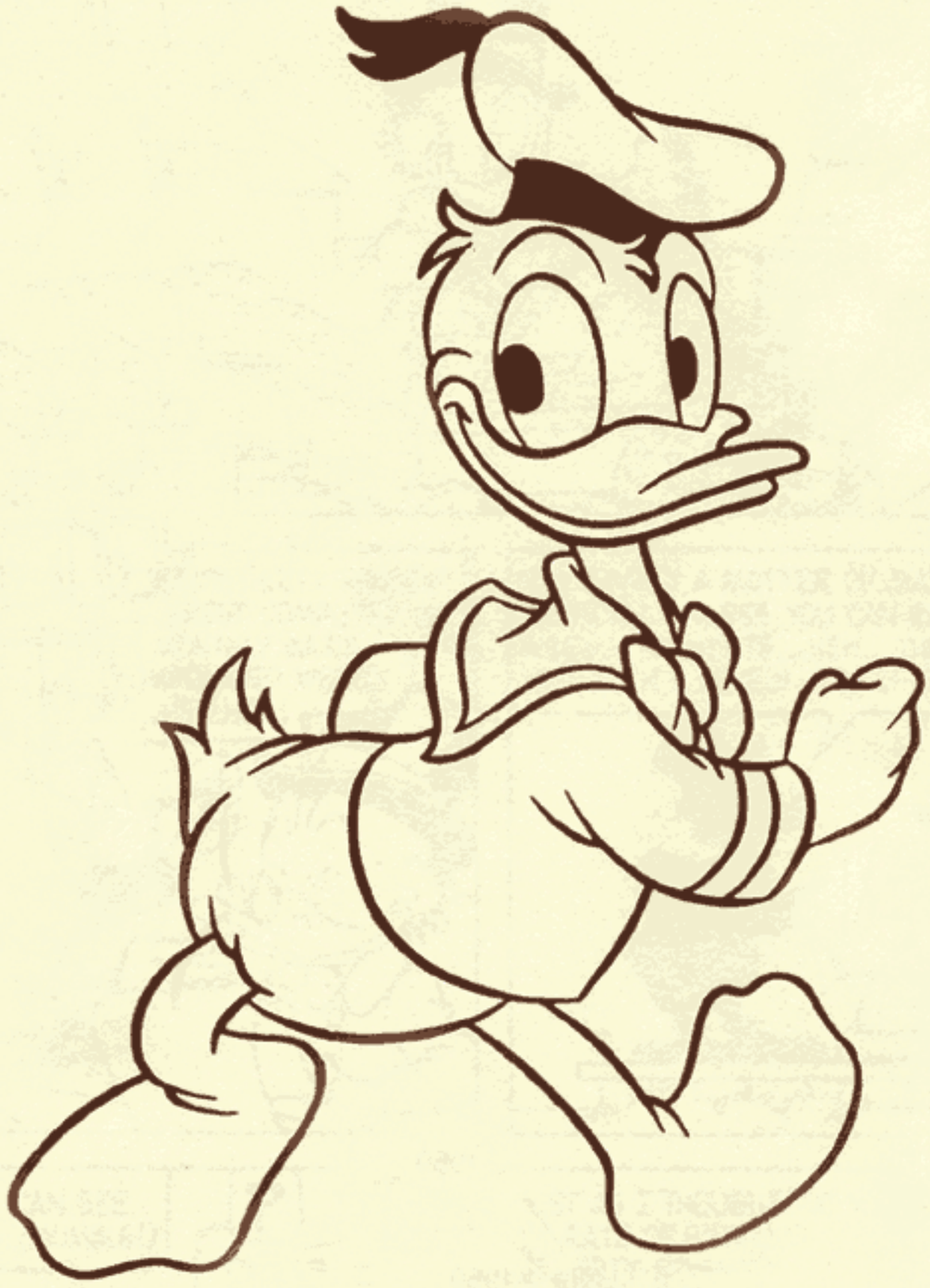
Walt Disney's

Donald in MATHMAGIC LAND



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DONALD in MATHMAGIC LAND

UM-M...AFTER DEDUCTING YOUR FIFTEEN-CENT PAYMENT FOR THIS WEEK, DONALD...YOUR BALANCE STILL OWING IS ONLY UP TO FOURTEEN DOLLARS AND SEVENTY-THREE CENTS!

UP!? IF I KEEP PAYING ON MY LOAN IT'S SUPPOSED TO GET LESS, UNCLE SCROOGE! NOT MORE!

SCROOGE Mc DUCK COLLECTIONS

I BORROWED ONLY A MEASLY EIGHTY-NINE CENTS FROM YOU, IN THE FIRST PLACE!

BUT AT THIRTY PERCENT INTEREST COMPUTED ON A MONTHLY BASIS COMPOUNDED WEEKLY ...HEH, HEH!

IT'S SIMPLY A MATTER OF MATHEMATICS, NEPHEW! UNLESS YOU CAN RAISE YOUR WEEKLY PAYMENTS...HEH...THE BALANCE HAS SUCH A LOVELY WAY OF GROWING!

BUT IT CAN'T!

CAN IT?

FIGURES DON'T LIE! YOU CAN SEE FOR YOURSELF...UM-M-M...(MUMBLE!) (MUMBLE!)

? ?

YES! JUST AS I THOUGHT! AT YOUR PRESENT RATE OF PAYMENTS, YOU'LL OWE ME THIRTY-SEVEN DOLLARS AND NINETY-TWO CENTS BY YOUR BIRTHDAY!

IT'S HIGHWAY ROBBERY!

D.IN MATHMAGIC.L.O.S.#1051-598

YOU AGREED TO THE TERMS, NEPHEW! NOW YOU'RE STUCK WITH THEM!

YOU HAVE TO WATCH YOUR FIGURES,

UNCA DONALD,

WHENEVER YOU DO BUSINESS...

WITH UNCA SCROOGE!

REMEMBER...WE SAID YOU SHOULD

BRUSH UP ON YOUR MATHEMATICS!

MATHEMATICS!? THERE'S TOO MUCH MATHEMATICS HERE ALREADY! ON *MY* BUDGET I NEED TO BE A MAGICIAN!

BUT I'M GOING TO GET OUT OF UNCLE SCROOGE'S CLUTCHES, SOMEHOW! JUST LEAVE ME ALONE, BOYS...TO DO SOME FIGURING!

THAT'S THE SPIRIT, UNCA DONALD!

LET'S SEE NOW... IF I CAN GET HALF A DOLLAR FOR MY JACKKNIFE...AND MAYBE TWO BITS FOR MY RABBIT'S FOOT...AND...

?

GEE! IT'S GOING TO TAKE A LOT OF FIGURING,

UNCA DONALD!

HERE'S OUR BOOK ON MATHEMATICS! IT MIGHT HELP YOU SOME!

COMPLETE MATHEMATICS

HUMPH! WELL... MAYBE JUST TO CHECK UP ON THIS COMPOUND INTEREST ANGLE...AND A FEW OF UNCLE SCROOGE'S FIGURES!

GOOD LUCK!

COMPLETE MATHEMATICS

Z-Z-Z-

...EIGHTY-FIVE PLUS...NINE TIMES SIX...CARRY THE FIVE ...SEVEN NINETY-FOUR ...NO ...THAT'S WRONG, TOO! DECIMAL POINT COMES ABOUT HERE..., I THINK!

O-O-O-OH...NUMBERS...FIGURES...NOTHING BUT TROUBLE! I WISH MATHEMATICS HAD NEVER BEEN INVENTED!

COMPLETE MATHEMATICS

FR-R-R-OOM!

I heard your words, Small One!

EH? WHAT? WHO?

I am the **Spirit of Mathematics!** The torchbearer of progress since civilization began!

WELL, SHAKE MY TAIL AND CALL ME SHIVERS!

Mathematics . . . the key to achievement! To all sciences . . . to the arts . . . to music . . .

OH, CHUCK IT, CHARLIE! YOU'RE JUST TALKING ABOUT A LOT OF NUMBERS... REMEMBER?

You doubt the truth, Donald? Then you had better come with me! There is so much you should know!

COME WITH YOU...WHERE?

You shall see! It will be a great adventure! There you are! All ready for the trip!

WELL, OKAY! ADVENTURE IS MY DISH, CHUM!

BUT WAIT! IF YOU WANT ME TO COME WITH YOU, QUIT FADING AWAY! WHERE YOU GOING?

. . . Slipping back into the fourth dimension of time! Do not fear . . . I'll be with you! I can take you anywhere . . .

Just follow my voice! Follow . . . follow . . . to **Mathmagic Land** . . .

I'M FOLLOWING... I'M FOLLOWING... MY TAIL, AT LEAST!

OOF!

OMIGOSH! WHAT KIND OF A...

SQUARE ROOTS, DONALD! OF COURSE, YOU KNOW FIVE IS THE SQUARE ROOT OF TWENTY-FIVE!

AND SIX IS THE SQUARE ROOT OF THIRTY-SIX!

OKAY, OKAY! YOU DON'T HAVE TO TELL ME THAT STUFF! I'M NO DUMMY!

AND TWO IS THE SQUARE ROOT OF FOUR...AND FOUR IS THE SQUARE ROOT OF...YE CATS! THE WHOLE ROUTINE IS STRICTLY FOR SQUARES!

PERHAPS YOU'RE MORE INTERESTED IN PI THEN?

PIE? NOW YOU'RE TALKING! TROT IT OUT! ANY FLAVOR WILL DO!

TUT, TUT! IN MATHEMATICS...

PI IS THE GREEK LETTER USED TO DESIGNATE THE RELATION OF THE CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER!

PI IS THREE...POINT...ONE FOUR ONE FIVE NINE TWO SIX FIVE...OR TO PUT IT MORE BRIEFLY, JUST THREE...POINT...

YOU CAN'T PUT IT BRIEFLY ENOUGH FOR ME, BUB!

WHAT DO I CARE ABOUT THE CIRCUMFERENCE OR DIAMETER OF A CIRCLE?

BONK!

SEE! THAT ONE WASN'T EVEN BIG ENOUGH! IT'S JUST LIKE I SAID... THE WHOLE MATHEMATICS BUSINESS IS JUST A LOT OF TROUBLE AND NUISANCE!

DONALD! Oh, no! You are still so wrong!

UH-OH! I KNEW IT! HIS NIBS, THE SPIRIT, IS IN AGAIN!

If we judge it by the value received, mathematics is the queen of all sciences . . . yet the greatest **servant of man!**

TALK! TALK!

Perhaps the best way to convince you is to take you back to the world **before** mathematics!

WELL, AT LEAST, NOW MAYBE YOU'RE TALKING SOME ADVENTURE STUFF!

Ho! Trouble, you mean! Here... look back to the days before man could count . . . and see the problem a quantity of anything presented...

I GIVE-UM YOU MY BEARSKIN, MUHGOO! YOU SUPPOSED TO GATHER ME *MANY* STICKS OF WOOD FOR MY FIRE!

THIS IS MANY ENOUGH!

YOUR IDEA OF MANY NOT *MY* IDEA OF MANY!

OH, IZZATSO? I GIVE-UM YOU MY IDEA OF MANY... IN LUMPS!

CHUMS! WAIT! IF YOU WANT MY IDEA... WHY DON'T YOU...

YOU KEEP OUT, NOSY!

ALREADY WE GOT TOO MANY IDEAS OF HOW MUCH "MANY" IS!

See, Donald? There just had to be some definite way of measuring quantities. So, inevitably, counting and numbers evolved.

O-OH ...I WISH THEY'D GOT WITH IT BEFORE I GOT HERE!

With developing civilization, came the need for some shorthand way of expressing numbers in **visual terms**, however.

PUT DOWN THIS MUCH!

AND THIS MUCH!

?

Our modern **place-value system**, in which each digit's place in a number determines its value is easy . . .

THOUSANDS HUNDREDS TENS SINGLES

9, 5 3 7

But writing numbers was not always so simple. Go ahead, give this early Egyptian a number to record.

HEY, BUSTER! LET'S SEE YOU PUT DOWN ... UM-M... SIX THOUSAND, SEVEN HUNDRED FORTY-ONE!

SIX THOUSAND, SEVEN HUNDRED...JUST BE PATIENT, FEATHERED ONE ...IT WILL TAKE AWHILE, YOU UNDERSTAND!

YES, YES... NOW FOUR TENS TO MAKE THE FORTY...AND THEN MERELY A SINGLE ONE!

OH, BROTHER! IT'S A GOOD THING I DIDN'T ASK HIM TO WRITE SIX MILLION!

He couldn't have done it in a day! Even centuries later, Romans were struggling with this same problem.

HERE WE GO, DONALD! ALL ROADS LEAD TO ROME...NOWADAYS!

ROME?

Look! This Roman is writing your number. For a higher one, he would need a much bigger wall!

MMMMMMDCC

WOW! I'M BEGINNING TO APPRECIATE OUR LITTLE OLD 1...2...3...4...5...6 ...7...8...9's!

Later, the Romans added great range to their system by simply deciding that a line over a letter multiplied it by a thousand, thus:

X-10	D-500
$\bar{X}$-10,000	$\bar{D}$-500,000
L-50	M-1,000
$\bar{L}$-50,000	$\bar{M}$-1,000,000
C-100	
$\bar{C}$-100,000	

We still use Roman numerals to number book chapters or a succession of kings . . . but think what a Roman schoolboy faced in arithmetic!

MCMXLVII
DCCXXXIX

JUST MULTIPLY THEM, DONALD!

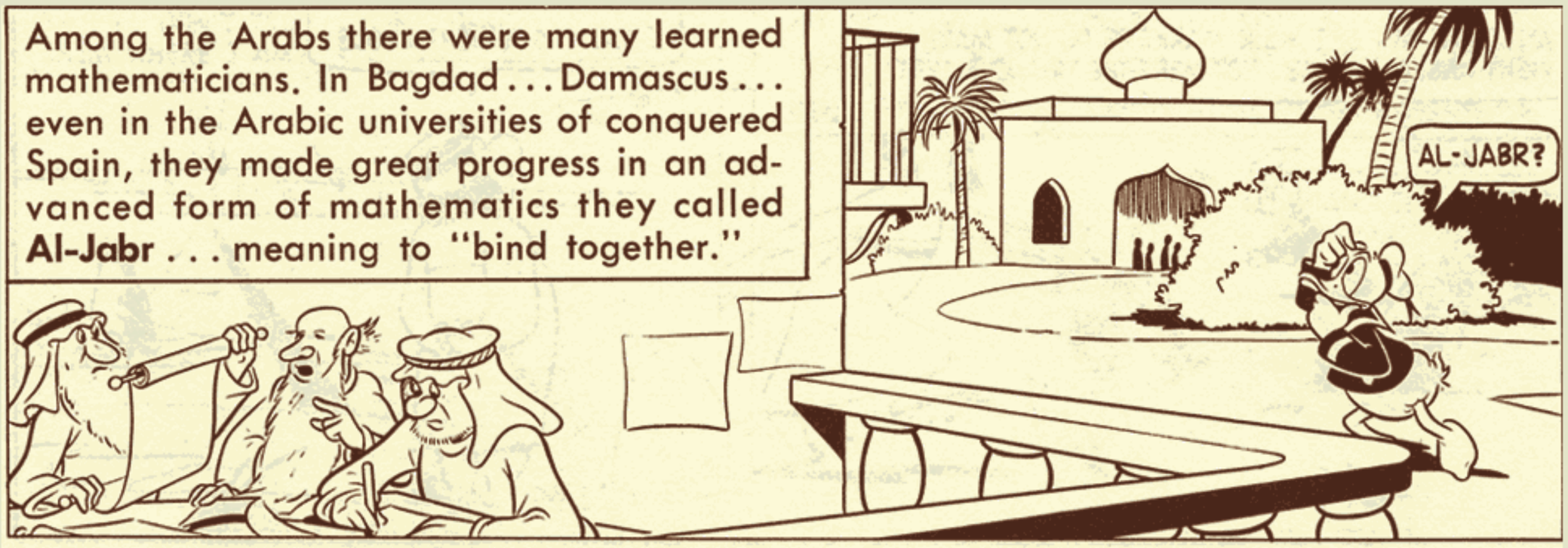
Today you can do the same problem easily with our place-value system.

YOU SAID IT, SPIRIT! IT'S EASY AS PIE...EVEN FOR ME!

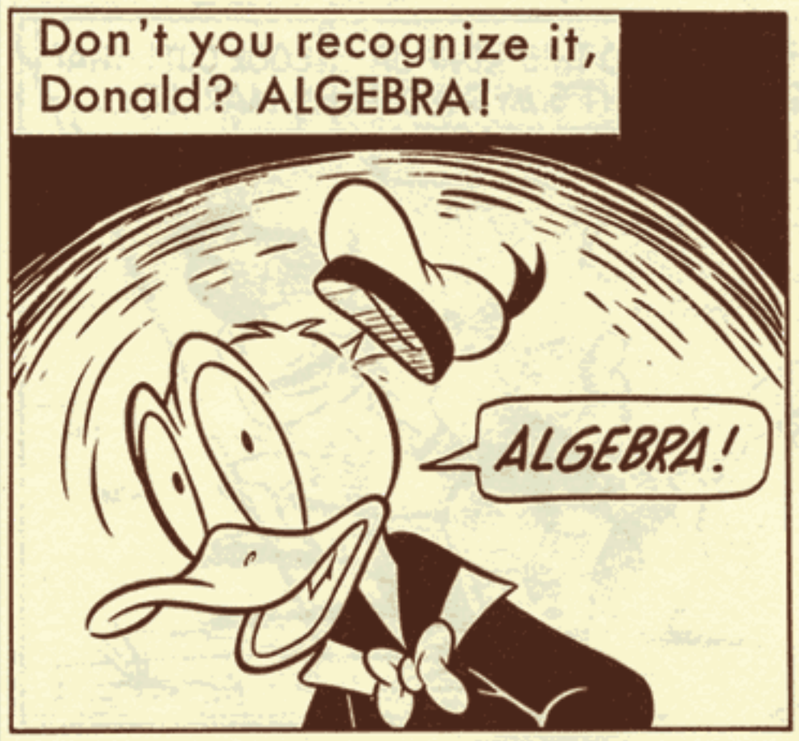
1947
X739
17523
13841
13629
823

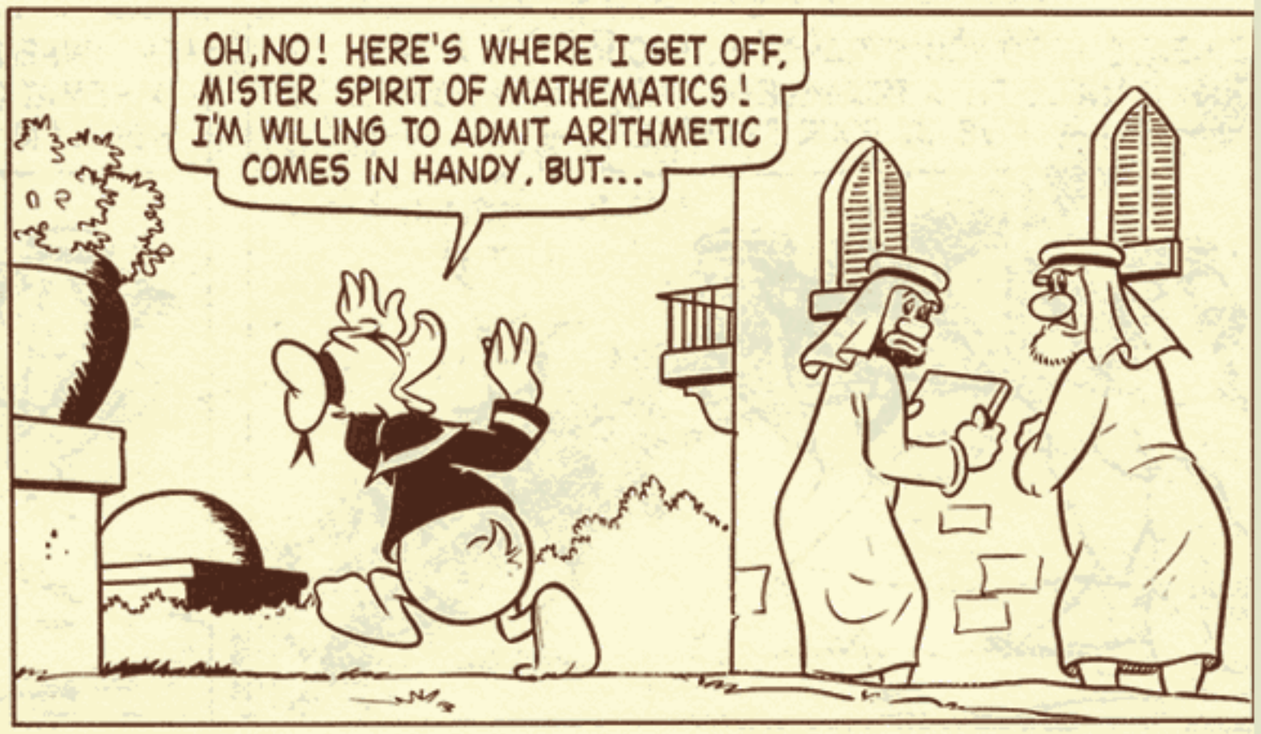
Our versatile digits were invented by an unknown Hindu...but we call them Arabic numbers, because Arabs introduced them to the European world in about the 9th century.

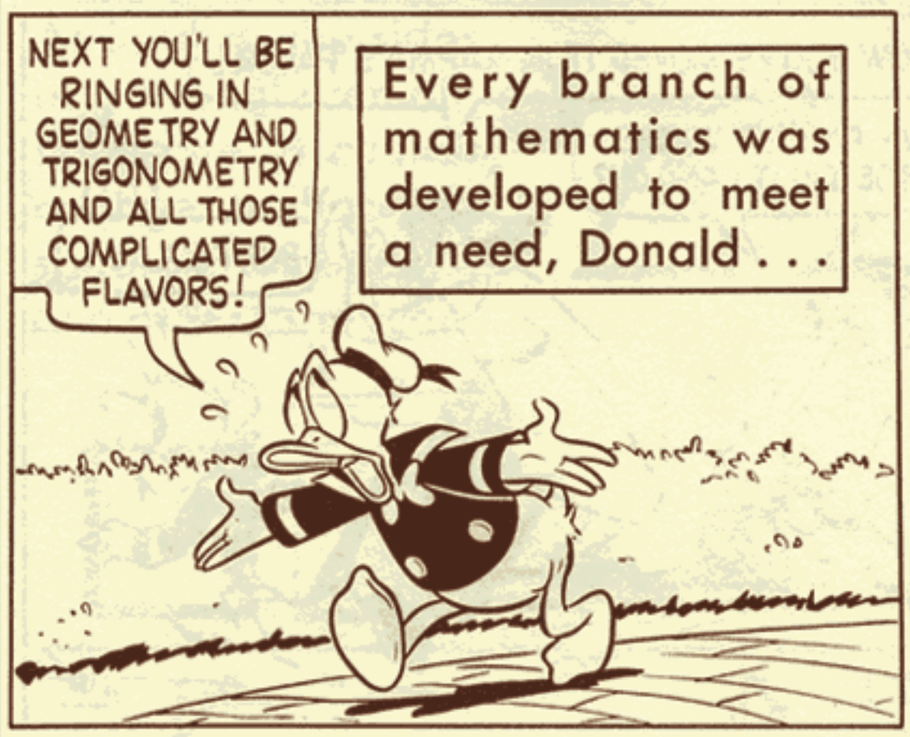
Among the Arabs there were many learned mathematicians. In Bagdad . . . Damascus . . . even in the Arabic universities of conquered Spain, they made great progress in an advanced form of mathematics they called **Al-Jabr** . . . meaning to "bind together."



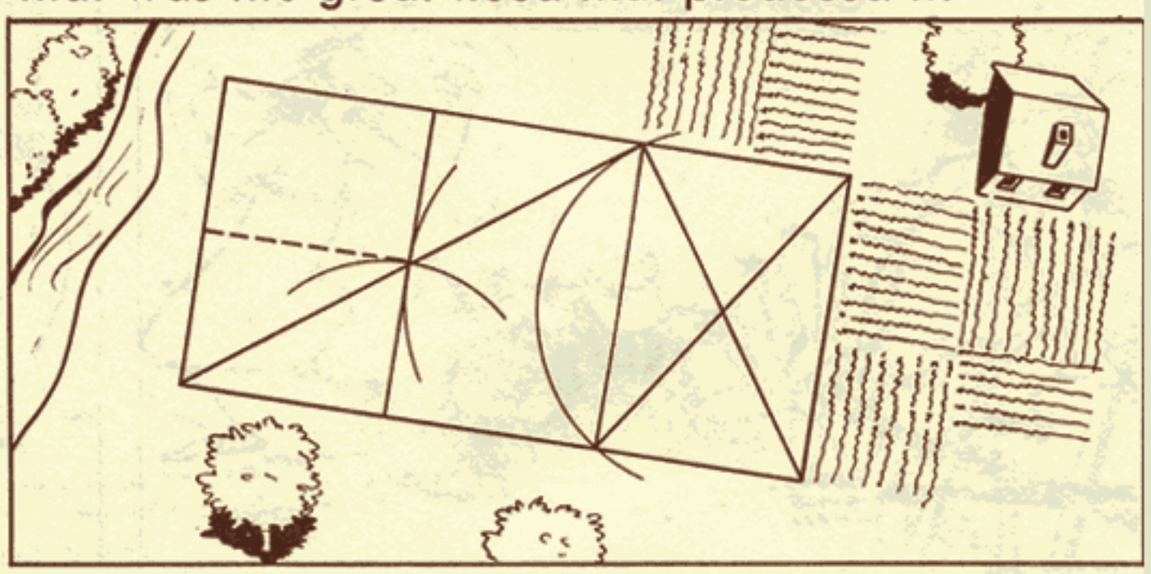
Don't you recognize it, Donald? ALGEBRA!







Geometry, for instance, is from a Greek word meaning "measurement of the earth" . . . because that was the great need that produced it.



Even long before the Greeks made geometry an exact science, the Egyptians developed knowledge of it to help reestablish property lines wiped out by frequent floodings of the river Nile.

They learned a lot about triangles, rectangles, and other shapes dealt with in geometry.

ANYBODY CAN SEE YOUR MARKERS DO NOT MAKE A RIGHT ANGLE! IT DOES NOT MEET THE TRIANGLE TEST!

I SAY IT'S A RIGHT ANGLE!

I LEAVE IT TO YOU, STRANGER! SHOULD NOT A TRUE RIGHT ANGLE FIT A TRIANGLE WHOSE SIDES MEASURE FIVE BY FOUR BY THREE?

UH...ER, WELL...

HEH...WHEN IT COMES TO THIS KIND OF MATHEMATICS, CHUMS... IT'S MY DAY OFF! HEH...I'M JUST A TOURIST, YOU SEE!

LOOK OUT! THAT MARKER...

OW!

OOPS! SORRY!

OH-H, YOU CLUMSY OAF!

NOW YOU'VE MOVED IT IN RAHMA'S FAVOR!

MY FAVOR? WHOSE TOE DID IT LAND ON?

BUT, FELLAS...

SCOUNDREL!

INTERLOPER!

I DIDN'T DO IT ON PURPOSE! I DON'T KNOW A RIGHT TRIANGLE...

FROM A KIPPERED HERRING!

Donald! Donald! Wait!

SH-H-H! DON'T TELL THEM WHERE I AM!

Oh, there you are!

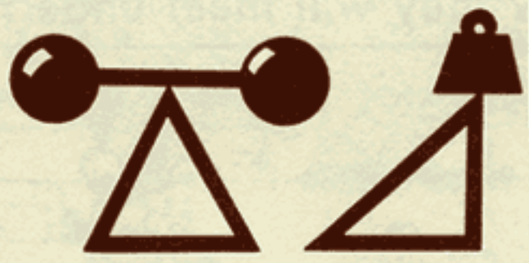
At least, you picked a fine spot to appreciate how well the Egyptians **applied** their knowledge of the triangle in their great pyramids.

TRIANGLES! PHOOEY! THEY COME TO A POINT IN THE MOST UNCOMFORTABLE PLACES!

I'D JUST AS SOON NEVER SEE ONE AGAIN!

Tut, tut, Donald . . . you can't escape them! The triangle's versatile, dependable qualities are used throughout the world. Structurally, it is the perfect shape.

As long as the sides of a triangle remain the same, it cannot change its shape as squares, rectangles, and other forms can.



That's why triangles are a basic part of all heavy-construction. From now on, just notice how often you see them, Donald.

SAY, THAT'S RIGHT! AND ESPECIALLY THERE ARE LOADS OF THEM IN THOSE GEO-SOMETHING DOMES!

Geodesic domes?

Yes, you're so right, Donald. The framework of these structures consists exclusively of triangles, each exerting such equal weight and stress that no uprights are needed for support.

Proponents of geodesic dome construction say there is theoretically no size limit. A dome a mile across would be possible.

BUT HOW DO THEY KNOW IF THEY'VE NEVER TRIED IT?

SILLY! THEY JUST FIGURE IT OUT MATHEMATICALLY!

HUMPH! EVEN FROM SQUIRRELS I GET IT TODAY!

But it's true, Donald! All construction is figured out mathematically.

That's how architects, engineers, and builders are sure of results before construction starts.

That's how tunnel building crews know they will meet underneath a river.

Yes, you will have to look hard to find a job where mathematics is not important.

It enables astronomers to measure our universe.

HMMM... I'D SAY THAT THIRD STAR FROM THE LEFT IS EXACTLY SIXTEEN MILLION TRILLION MILES AWAY!

WHY, OUR FIGURES AGREE PRECISELY, DONALD!

GEE, THAT'S SWELL, EXCEPT FOR ONE THING, GENTS! I HAVEN'T THE FOGGIEST IDEA HOW I DID IT!

WHY, IT'S REALLY QUITE SIMPLE, MY BOY! HERE IS THE ANGLE OF OUR SIGHTING SIX MONTHS AGO... WHEN WE WERE AT THIS POINT IN THE EARTH'S ORBIT!

AND HERE IS THE ANGLE OF OUR SIGHTING TONIGHT!

186,000,000 MILES

SO WITH THOSE KNOWN ANGLES, AND WITH THE DIAMETER OF THE EARTH'S ORBIT AS THE BASE LINE, WE CONSTRUCTED THIS IMAGINARY TRIANGLE TO THAT STAR AND EASILY DETERMINED THE HEIGHT OF THE TRIANGLE!

186,000,000 MILES.

MAN! THESE TRIANGLES SURE KEEP BUSY!

Indeed, they do! You know trigonometry is a branch of mathematics dealing **just** with triangles and other shapes involving them . . .

OBSERVATORY

Although originally developed just to aid astronomers, trigonometry is a basic tool in countless fields of modern science and industry today.

The designing and construction of supersonic planes . . .

FWOO!

YI-I-I!

In optics, sonics, acoustics . . . and lighting!

In hundreds of military ways!

KABOOM!

OW! SPIRIT OF MATHEMATICS ...THAT'S ENOUGH!

OKAY...SO NOW I'M CONVINCED ABOUT TRIGONOMETRY! IT SURE IS A VERY MATHEMATICAL WORLD, ALL RIGHT!

Indeed it is, Donald! There are mathematics in every atom of our existence.

ALL RIGHT, MISTER SPIRIT OF MATHEMATICS ... YOU THINK YOU'VE GOT ALL THE ANSWERS, BUT I'M TRIPPING YOU UP ON ONE THING! IT'S WHAT YOU SAID ABOUT MATHEMATICS AND *MUSIC!*

JUST TURN ON YOUR EARS FOR A MUSICAL SAMPLE AND TELL ME WHERE THE MATHEMATICS IS IN THIS!

MI MI MI

FOR I'M A JOLLY GOOD FELLOW...

FOR I'M A JOLLY GOOD FELLOW...

Well, I won't quibble, Donald . . . if you want to call that music . . .

But, for the mathematics of it, we must go back to ancient Greece . . . to the time of Pythagoras.

HUMPH! I STILL SAY MUSIC ISN'T NUMBERS!

To Pythagoras it was . . . for he is recognized as the father of mathematics **and music!**

FATHER OF IT?

WE'LL SHOW YOU, DONALD!

SNAP!

FIRST HE TOOK A STRING!

That's it...and now, with the string pulled tight...

PLUNK IT, DONALD!

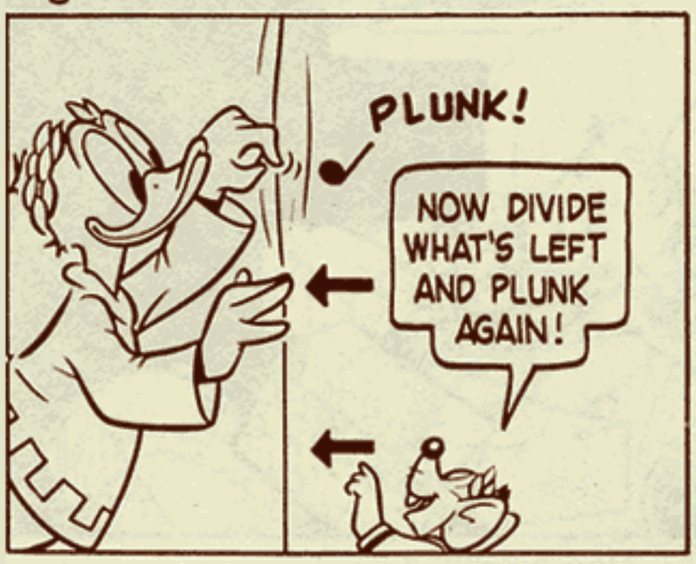
PLUNK!

GOOD BOY! NOW HOLD THE STRING EXACTLY IN THE MIDDLE AND PLUNK IT AGAIN!

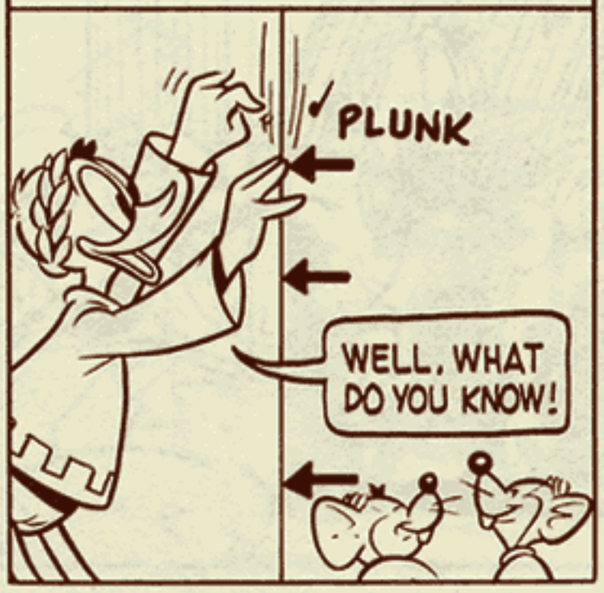
PLUNK!

Ah! Hear that? It's the same musical tone . . . one octave higher!

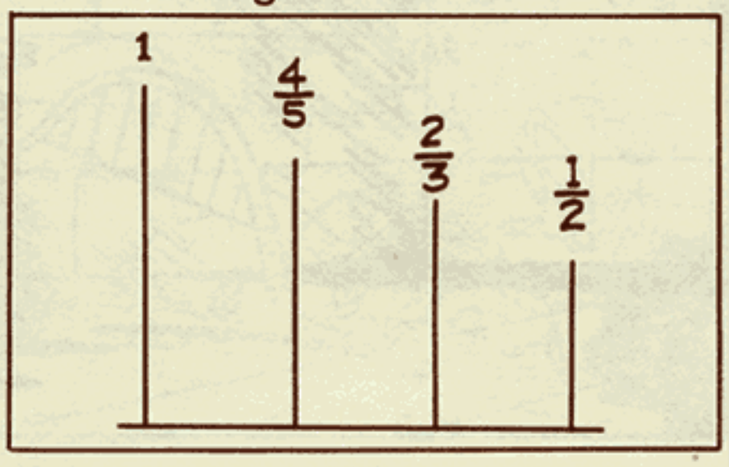
Now divide the next section in half. That's it...now plunk again.



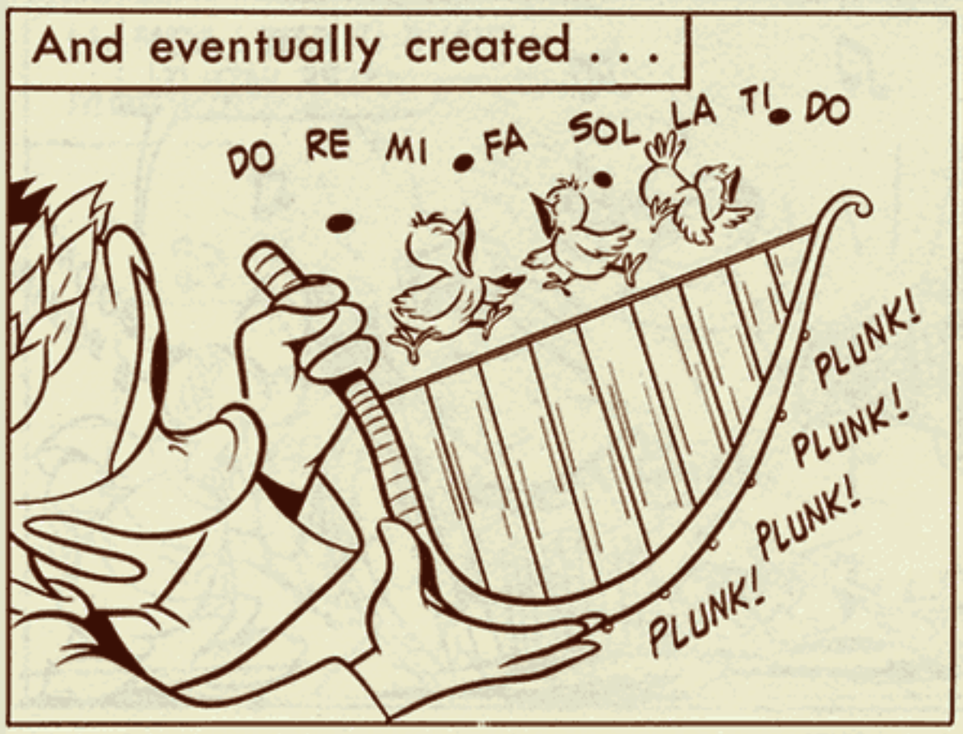
Each time, your note is one octave higher.



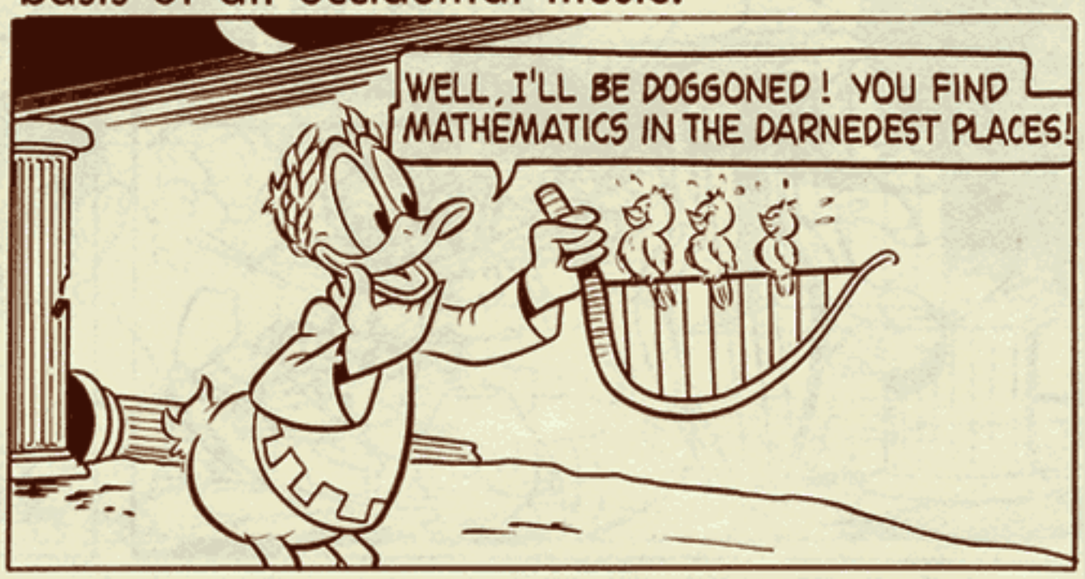
After discovering that the octave had a ratio of two to one, Pythagoras used simple fractions to measure the lengths of additional strings.



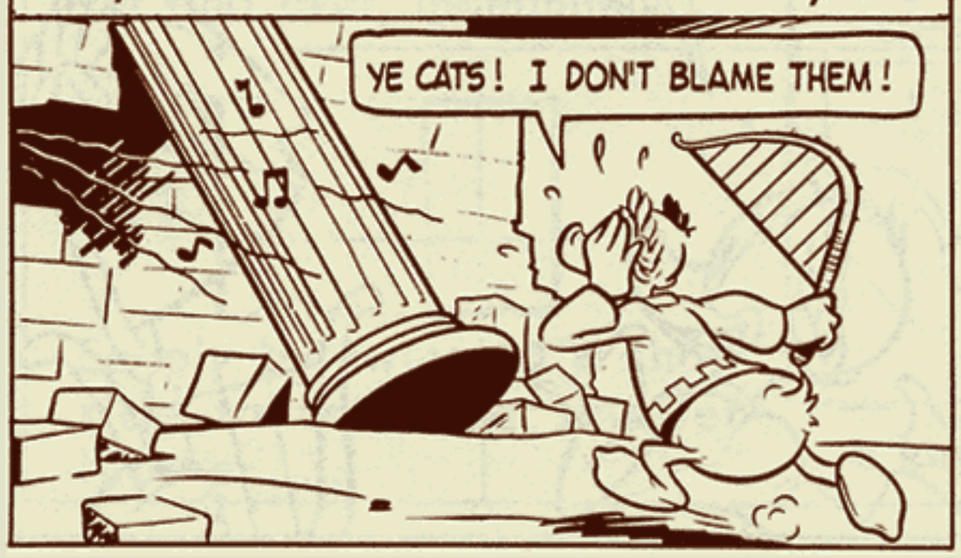
And eventually created . . .



So you see, Donald? The fractions of Pythagoras created our whole musical scale, which is the basis of all occidental music.



...a meeting of Pythagoras and his followers! Their ideas were so advanced, they found it best to meet secretly.



Their gatherings usually dealt with serious and weighty subjects . . . but it sounds as if Pythagoras' musical scale is tonight's topic.

LET YOURSELF GO, CHUMS! HERE... I'LL GIVE YOU SOMETHING WITH A BEAT!

!

?

?

BOOM TE TE BOOM! TEE TEE BOOMP TE BOP!

DEET DEET DAH DO DAH DO DATIC...HIT IT, BOYS ...IT'S MATHEMATIC!

THAT'S IT, CATS! NOW YOU'RE WITH IT!

BOOMP! TE BOOMP!

YAHOO! FOR PYTHAGOREANS YOU'RE ALL REET JUST SO'S YOU GIVE YOUR STUFF A BEAT!

HUEY! DEWEY! LOUIE! YOU BOYS...HERE, TOO?

SURE THING,

UNCA DONALD!

WHY NOT?

IT'S JUST LOGICAL! IT WAS OUR...

MATHEMATICS BOOK THAT YOU...

BORROWED!

ER...OH, SURE! LOGICAL!

HERE, IN MATHMAGIC LAND, I WON'T BE SURPRISED AT ANYTHING ANY MORE! HEH, HEH!

YOU SPEAK WITH WISDOM, YOUNG FRIEND! I HEREBY PROCLAIM YOU A FELLOW PYTHAGOREAN!

ER...THANKS, PYTHAG, OLD BOY!

Congratulations, Donald! You have won your pentagram . . . the secret symbol of Pythagoras and his followers.

IT'S JUST A FIVE-POINTED STAR!

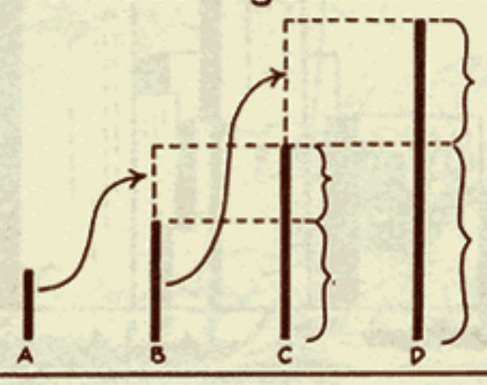
Ho! It's much more than that, Donald. Within the pentagram, Pythagoras discovered **mathemagical** proportions, which influenced art and architecture from then on.

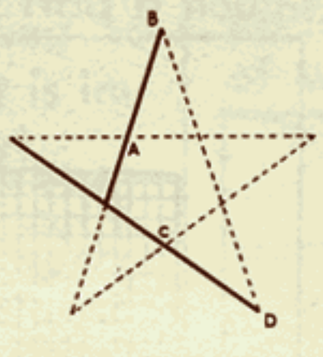
MATH-

EH-

MAGICAL?

The two shorter lines making up the length of the third line, and the second and third lines making up the length of the fourth . . . gave them the proportions of their famous "golden section."





Hidden within the pentagram is also the secret for creating . . .

. . . from its golden triangle . . .

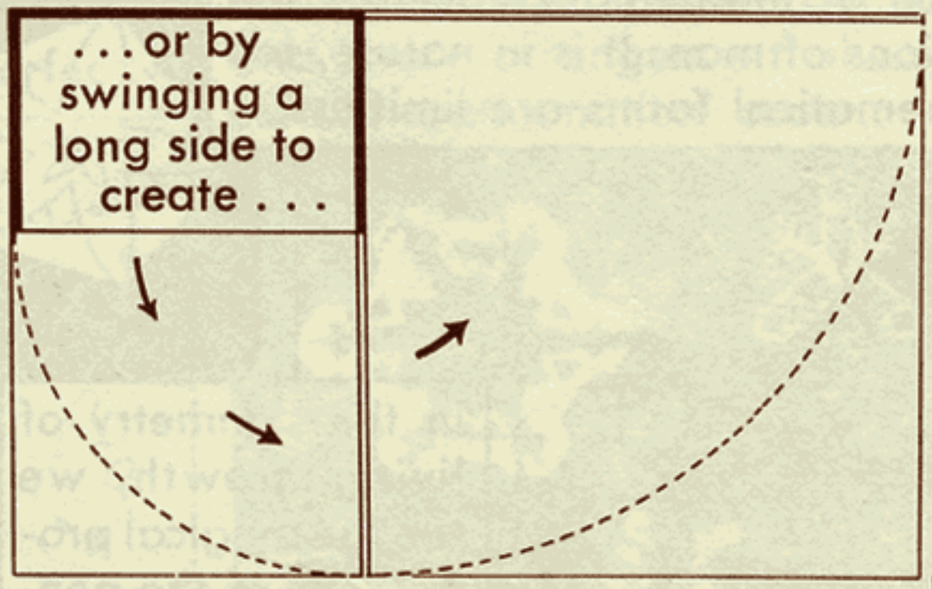
...the...

GOLDEN RECTANGLE

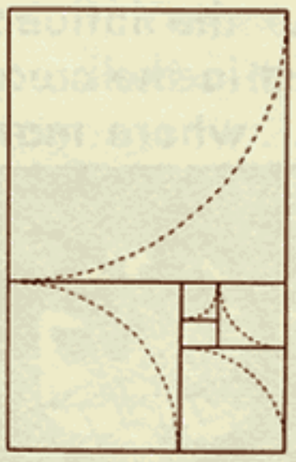
Which the Greeks admired for its beautiful proportions and its magic qualities.

This particular rectangle is a most remarkable shape. It can mathematically reproduce itself over and over, indefinitely.

Simply by swinging a short side to create a smaller brother . . .



. . . a **larger** one . . . and still larger ones!



Large or small, they always retain the same proportion.

To the Greeks, the golden rectangle represented a mathematical law of beauty. We find it in all their classical architecture.

WELL, I'LL BE DOGGONED!

YOU'RE RIGHT, SPIRIT! I CAN SEE OODLES OF GOLDEN RECTANGLES IN THESE OLD GREEK BUILDINGS!

And you can see them in Greek sculpture.

For hundreds of years, the golden rectangle dominated the idea of beauty in the western world. In architecture . . .

Notre Dame de Paris

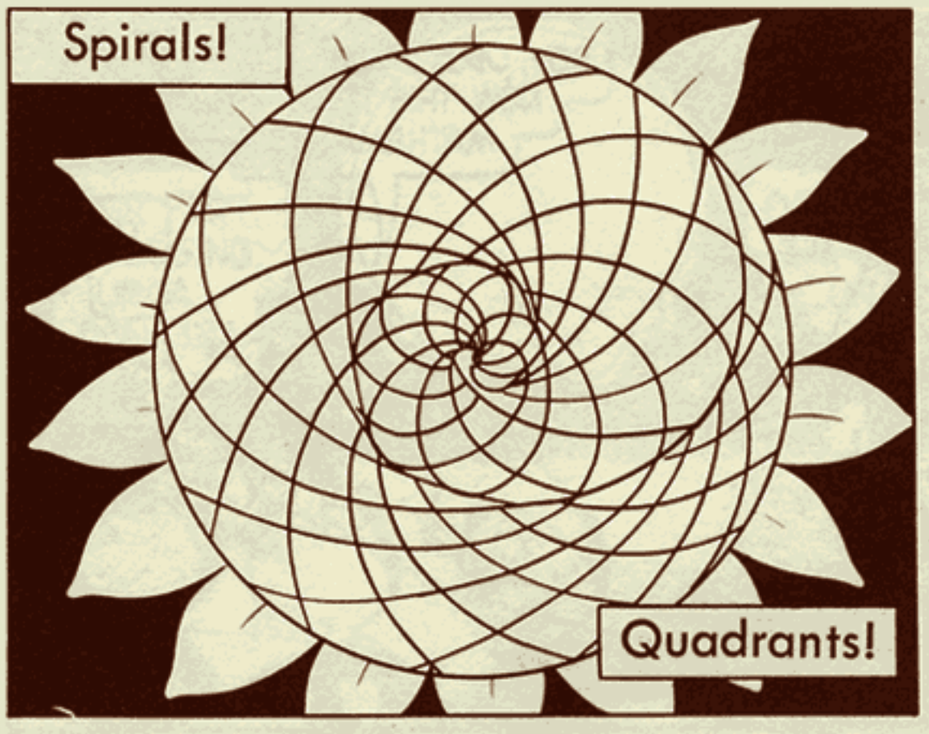
In the works of great painters . . .

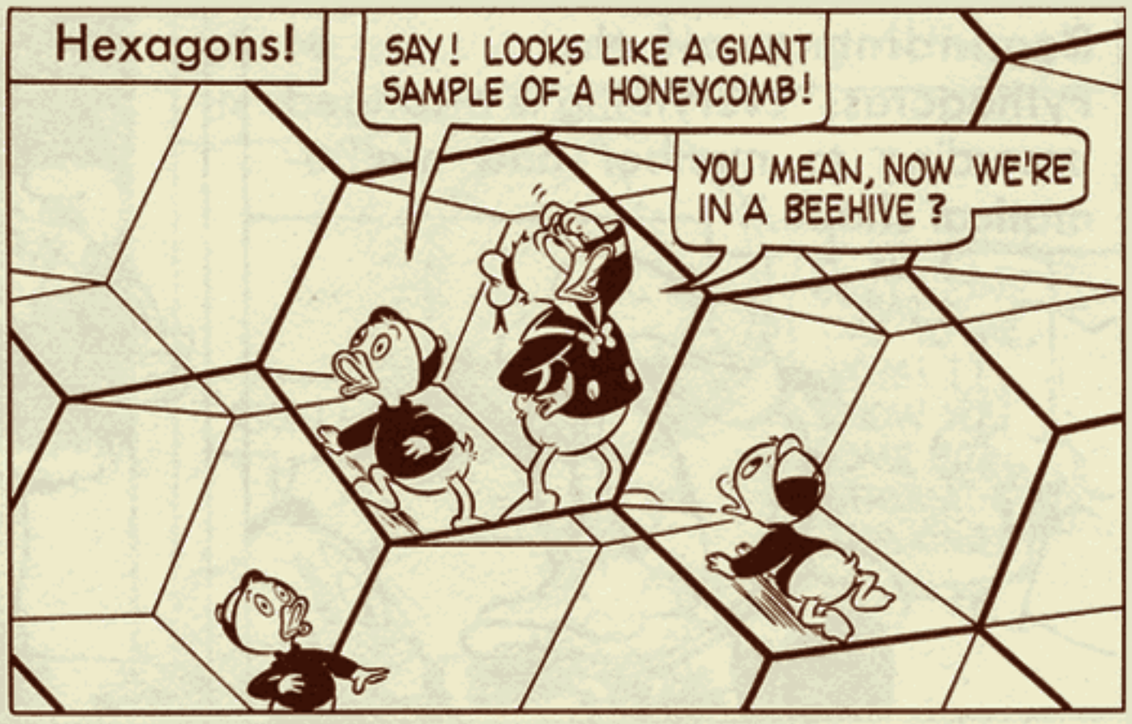
And, even today, the golden rectangle is very much a part of our modern world.

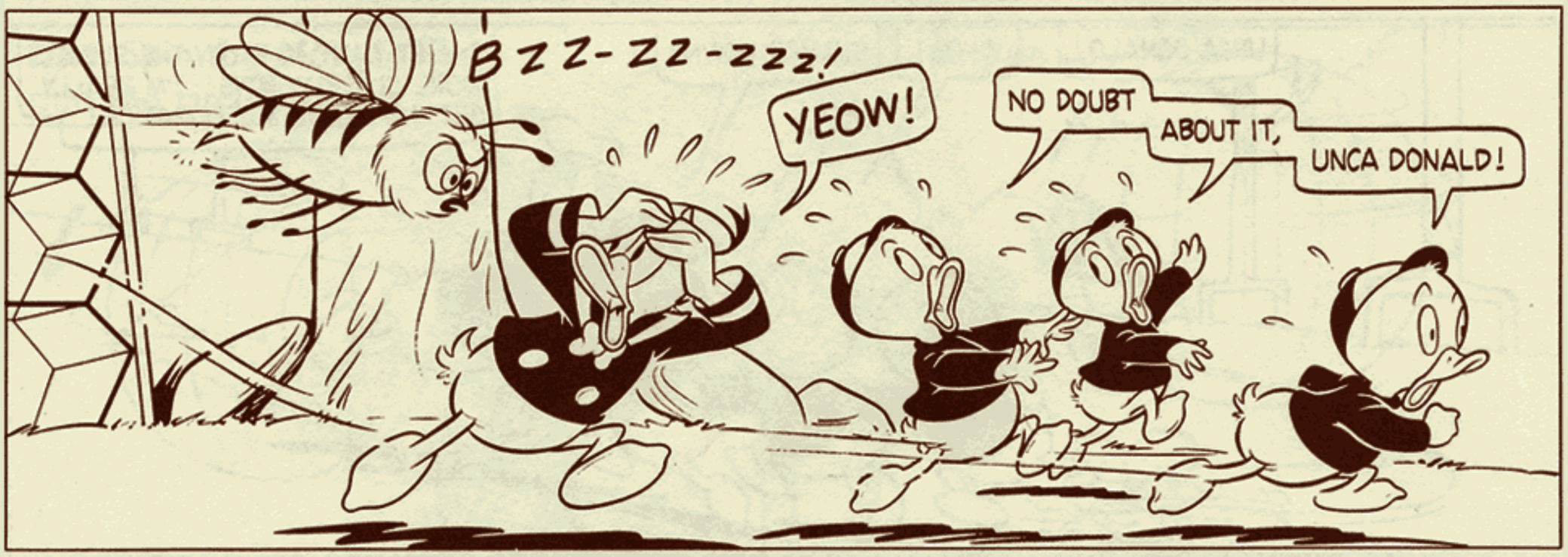
But the influence of mathematics persists not just in the creations of man. It is in nature, too . . . where mathematical forms are limitless.

?

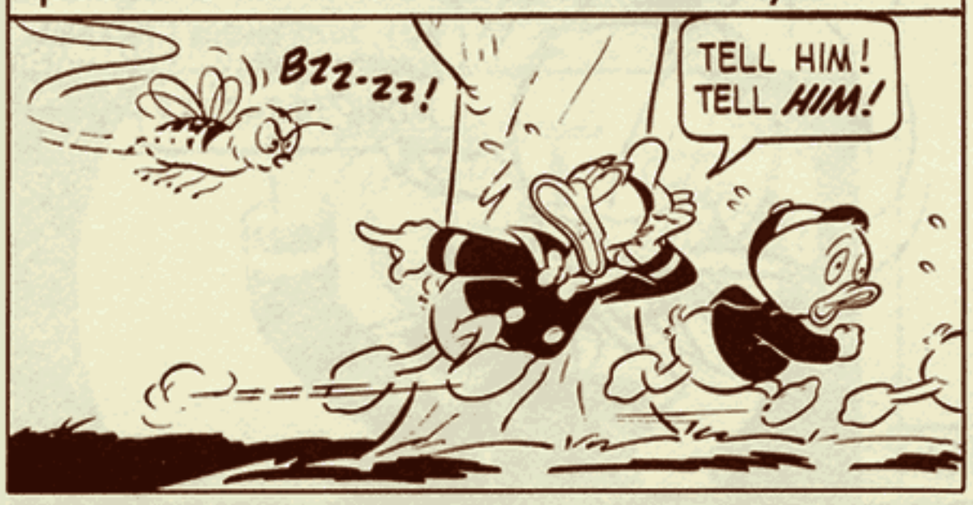
In the symmetry of living growth, we see the magical proportions of the pentagram.



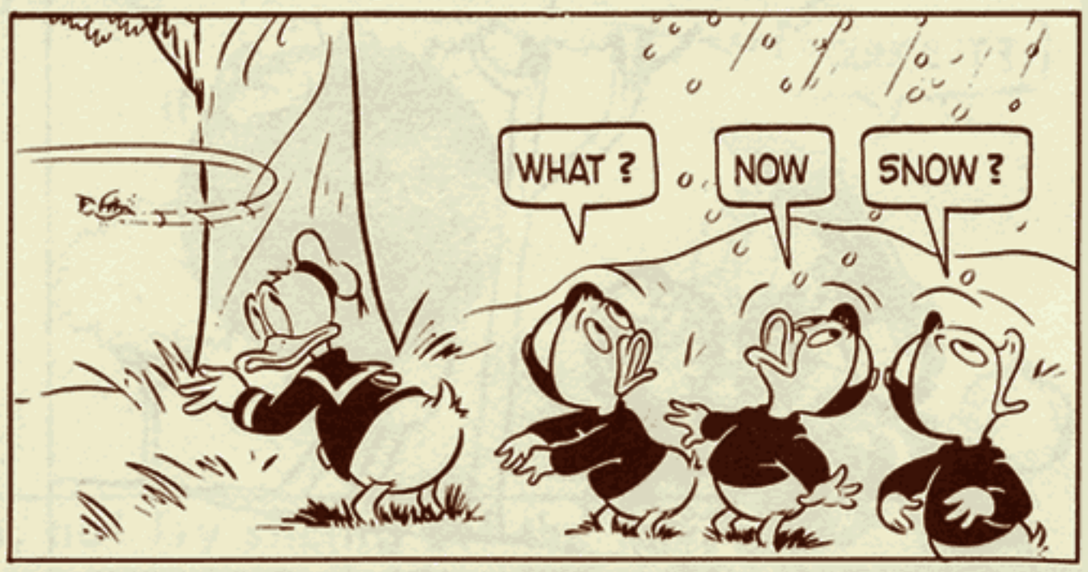




This fellow still requires some mathematical figuring, boys. According to present laws of aerodynamics, it is impossible for the bumblebee to fly!



But for startling examples of mathemagical **perfection** we have only to turn to a fluffy fall of winter snow.



Microscopic enlargements of snowflakes reveal exquisite displays of perfectly matched angles . . .

Infinite variety . . . never a duplication! Yet, each and every arrangement always adheres to a certain mathematical order . . .

Reminding us of the words of Pythagoras: "Everything is arranged according to **number and mathematical shape.**"

LA DA DE DAH ♫

5'4"
36"
23"
36"

MISS COOKIE WEEK

BOY, OBOY! YOU SAID IT, SPIRIT! NOW THIS IS MY KIND OF MATHEMATICS!

!

UNCA DONALD!

WHOA!

SIMMER DOWN!

I JUST WANT TO STUDY THE SUBJECT MORE CLOSELY, BOYS! I'M REALLY GETTING HEP TO MATHEMATICS!

YOU KNOW, I'VE LEARNED A LOT HERE IN MATHMAGIC LAND... EVEN BEFORE YOU CAME ALONG! I'M THE ONE WHO REALLY GOT THE WHOLE TOUR!

The whole tour, Donald? Ho, Ho ... we've hardly scratched the surface.

BUT, SUFFERING CYCLONES, MISTER SPIRIT...HOW MUCH MORE IS THERE?

WE'VE DONE THE NUMBERS BIT...ALGEBRA...GEOMETRY ...TRIGONOMETRY...THE TRIANGLE ...THE GOLDEN RECTANGLE?

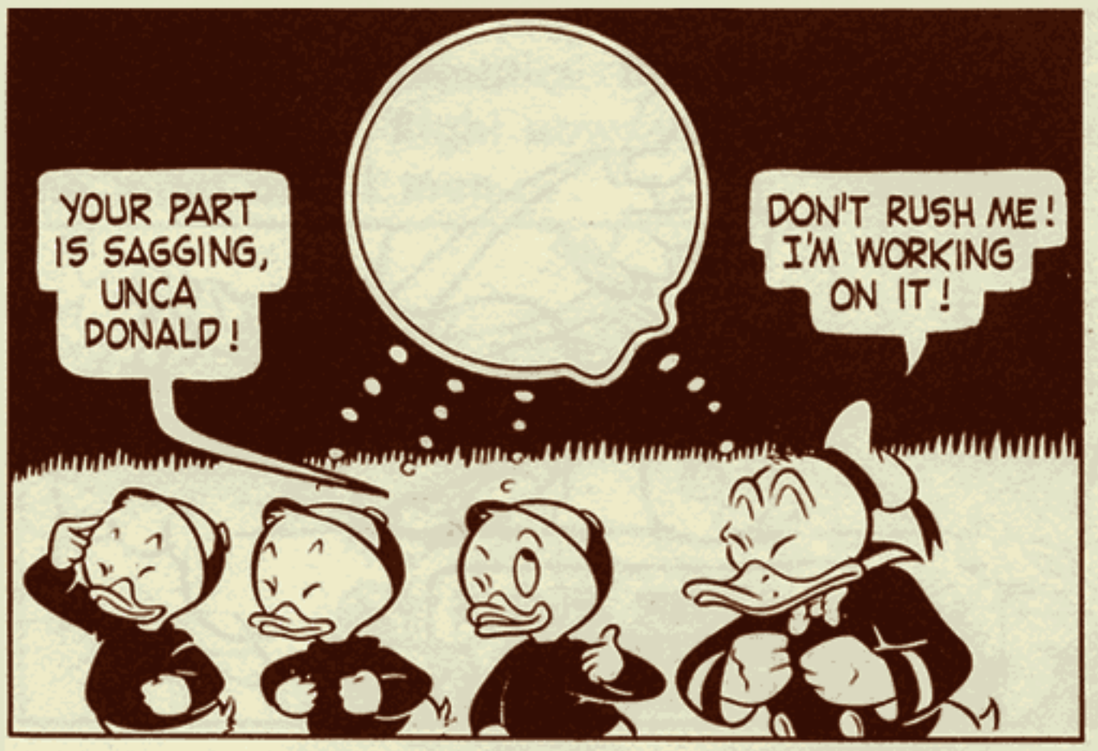
What about that important relative of the triangle, who doesn't look at all like him?

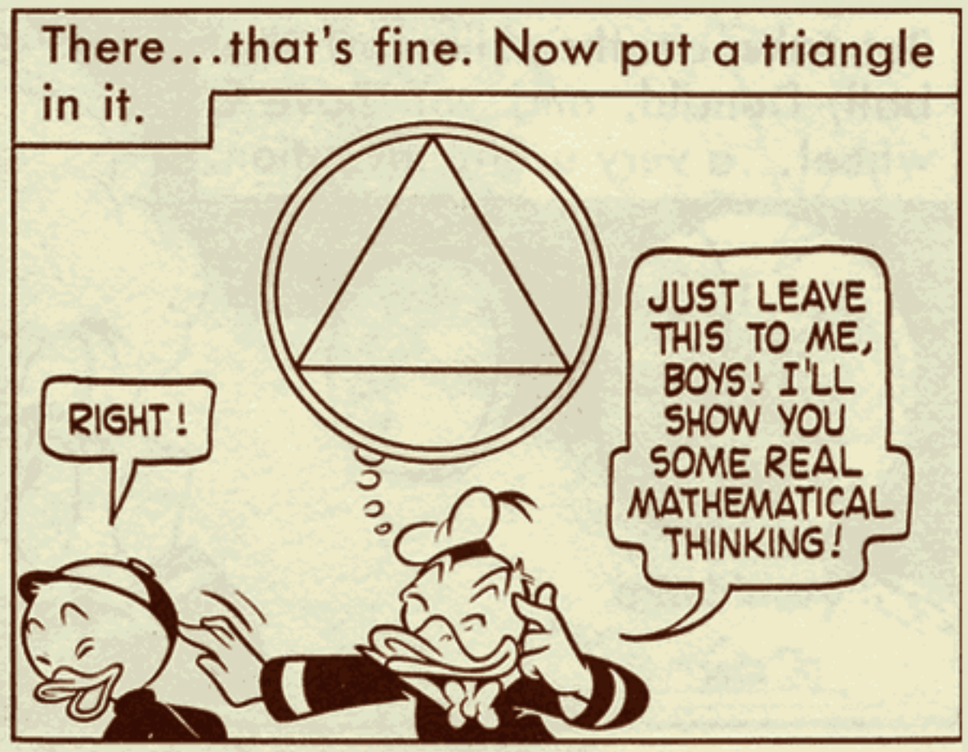
RELATIVE?

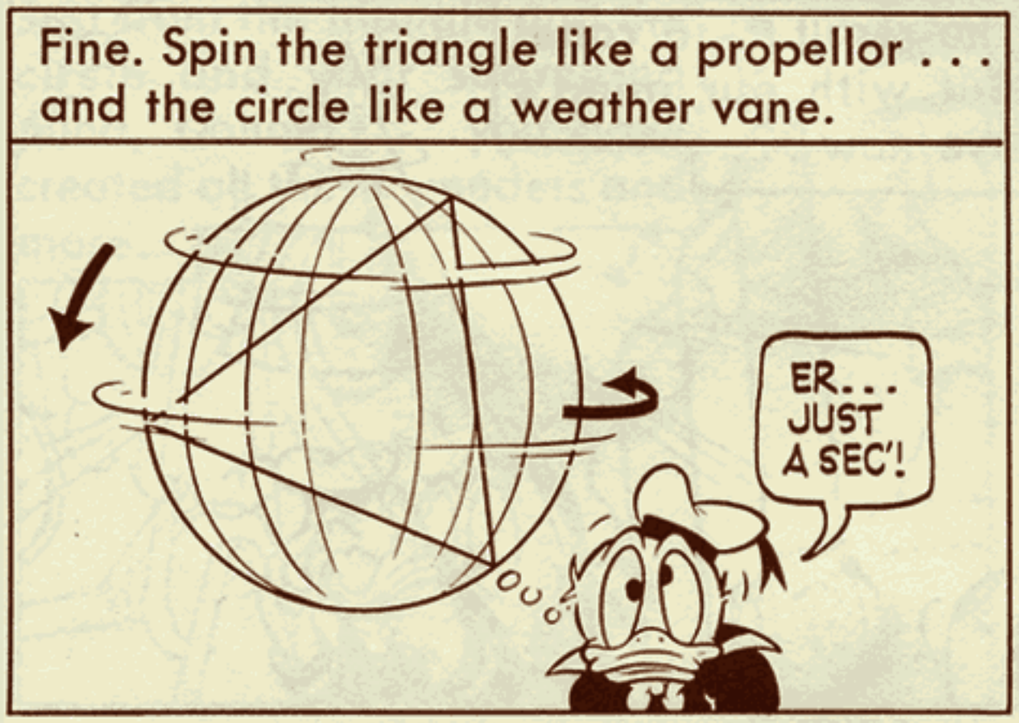
The circle. Nowhere in nature do we find a **perfect** circle, so it is a product of man. Try to visualize one, if you can . . .

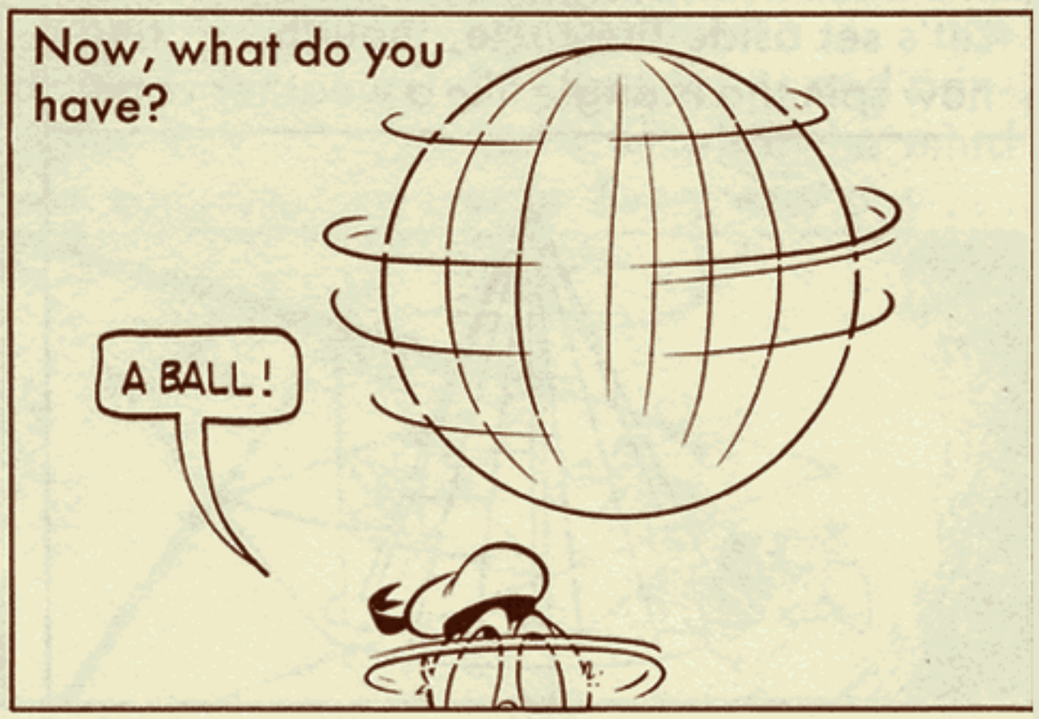
A PERFECT CIRCLE?

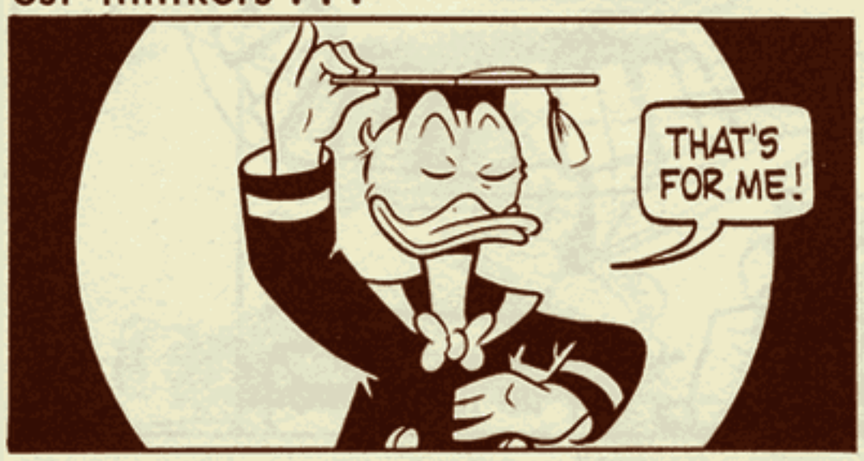
OKAY! THAT'S EASY!

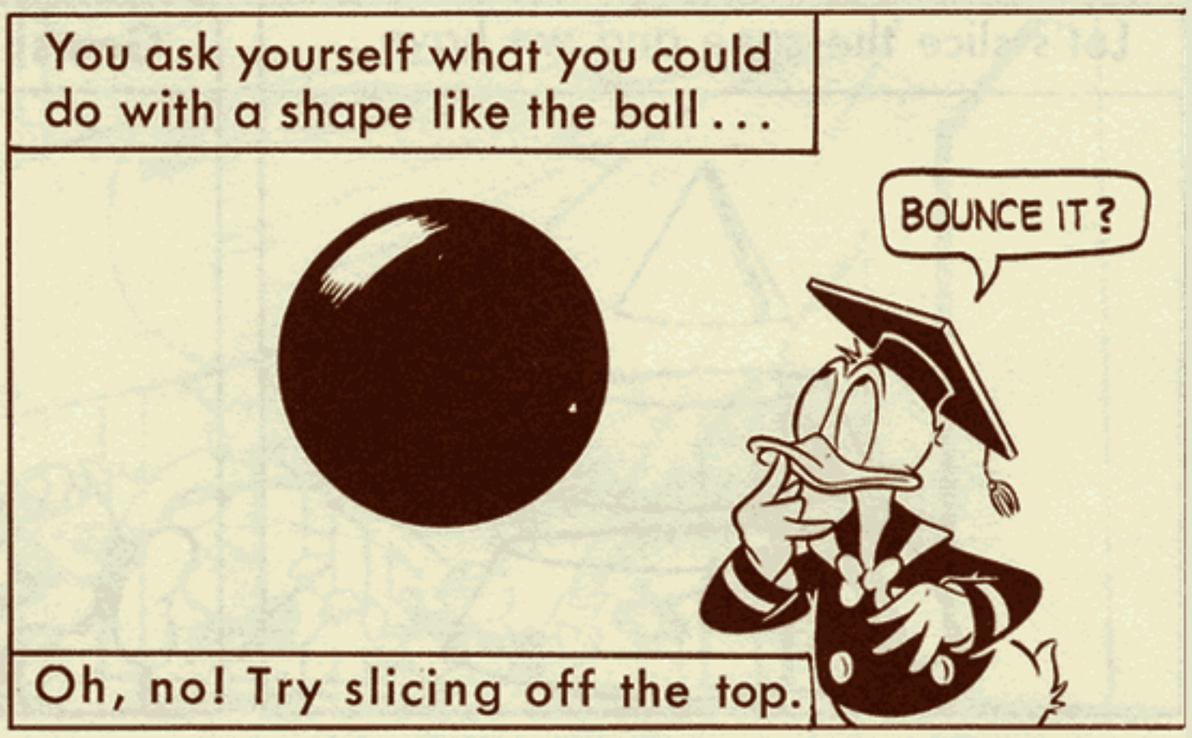

YOUR PART IS SAGGING, UNCA DONALD!
DON'T RUSH ME! I'M WORKING ON IT!

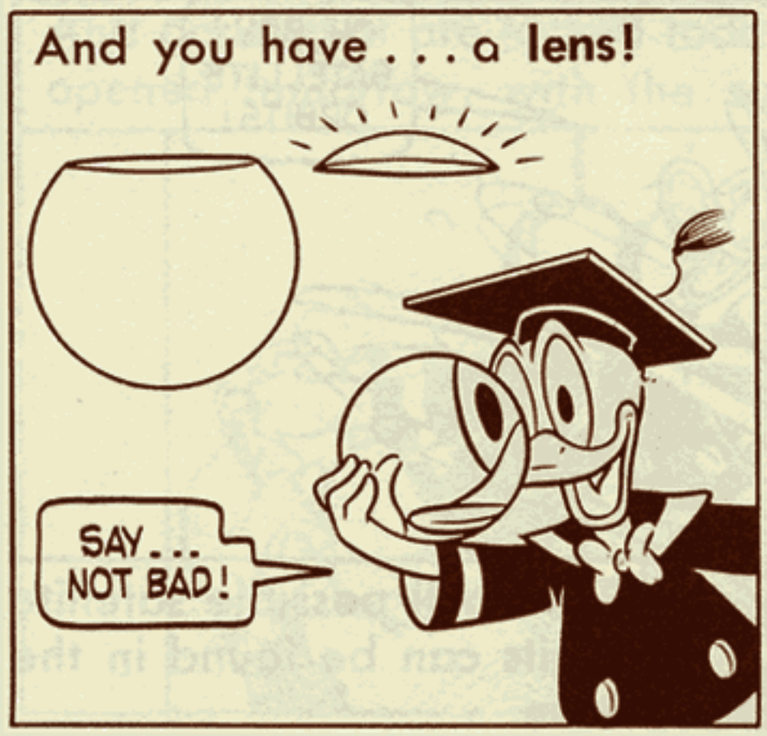

There...that's fine. Now put a triangle in it.
RIGHT!
JUST LEAVE THIS TO ME, BOYS! I'LL SHOW YOU SOME REAL MATHEMATICAL THINKING!

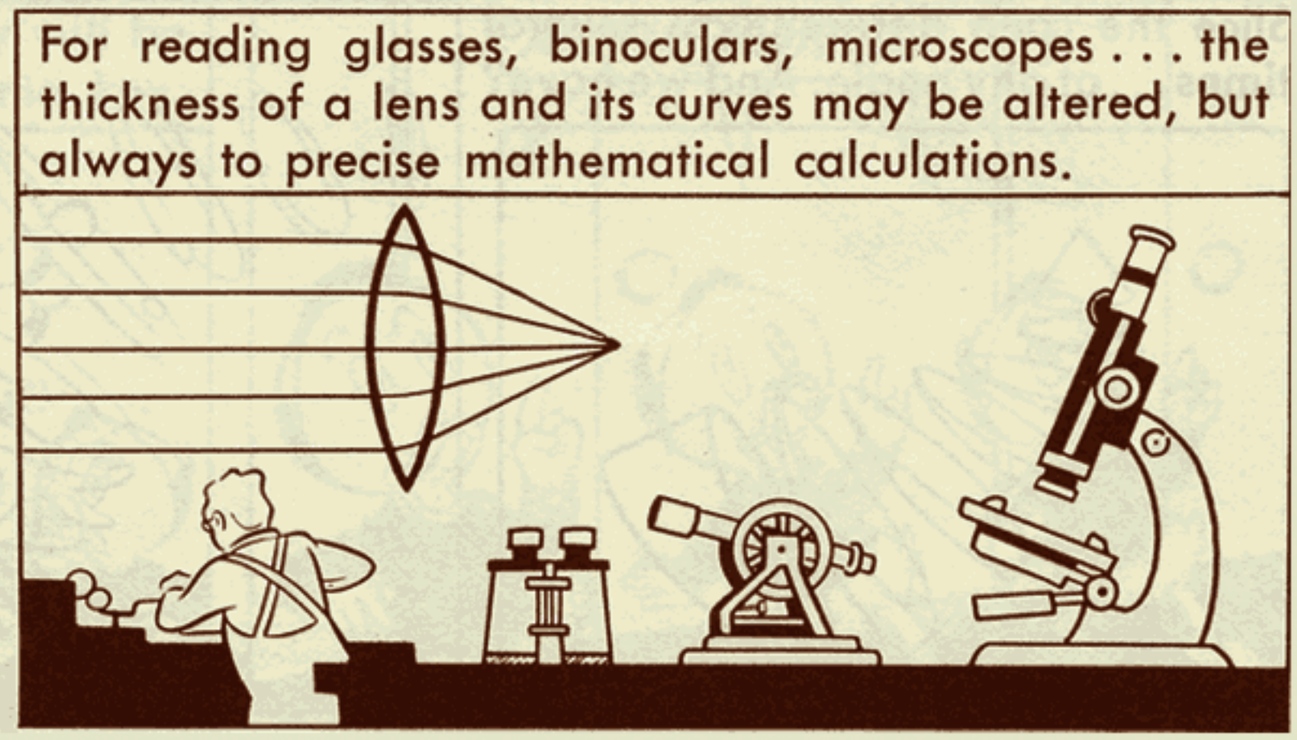

Fine. Spin the triangle like a propellor . . . and the circle like a weather vane.
ER... JUST A SEC'!


Now, what do you have?
A BALL!


Correct. The shape of all things is first discovered in the mind. Now, just imagine yourself retracing the thoughts of some of history's greatest thinkers . . .
THAT'S FOR ME!


You ask yourself what you could do with a shape like the ball . . .
BOUNCE IT?
Oh, no! Try slicing off the top.


And you have . . . a lens!
SAY... NOT BAD!

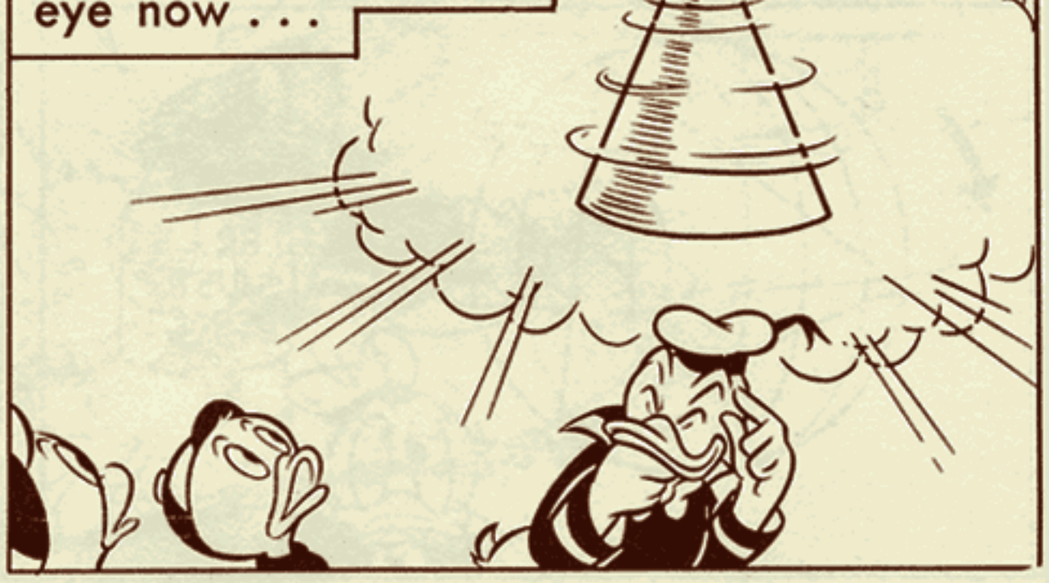

For reading glasses, binoculars, microscopes . . . the thickness of a lens and its curves may be altered, but always to precise mathematical calculations.

But take another slice off that ball, Donald, and you have a wheel...a very useful invention.

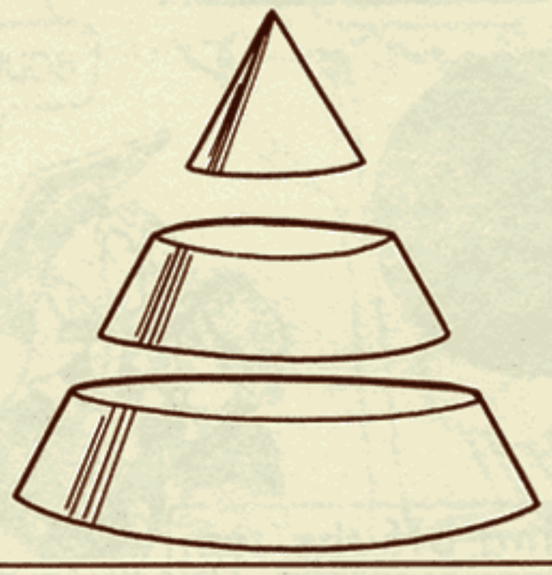
UM-M...YEP! A LOT OF POSSIBILITIES IN A GIMMICK LIKE THAT!

Let's set aside the circle, though . . . and now spin the **triangle** like a weather vane.

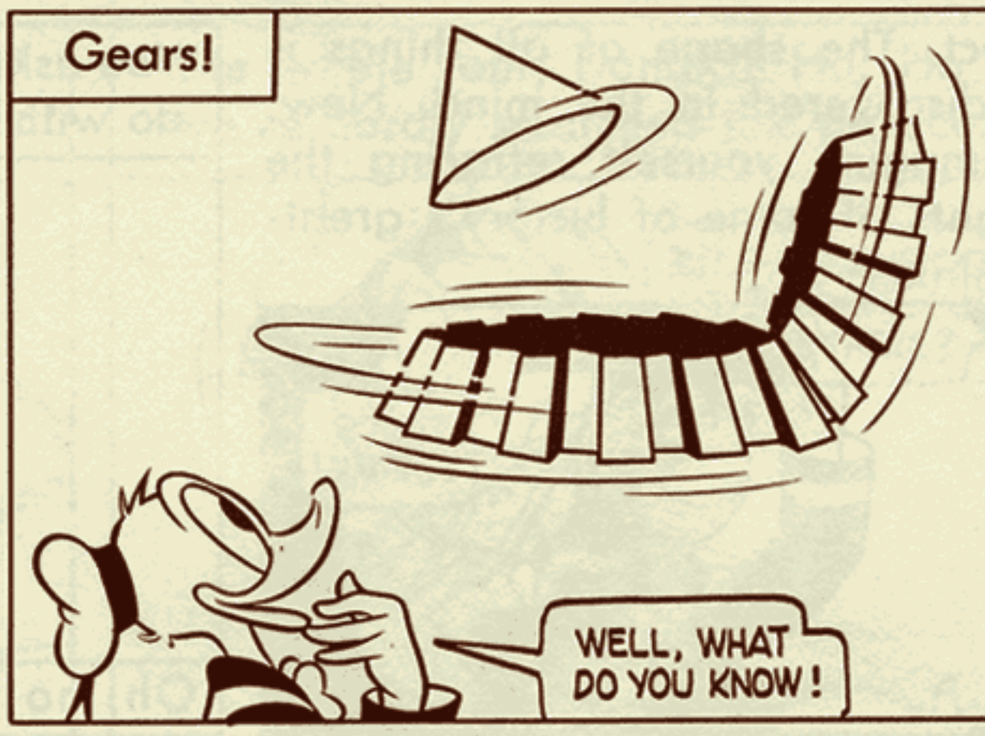
The result . . . a **cone!** But with our mind's eye now . . .



Let's slice the cone and we have . . .

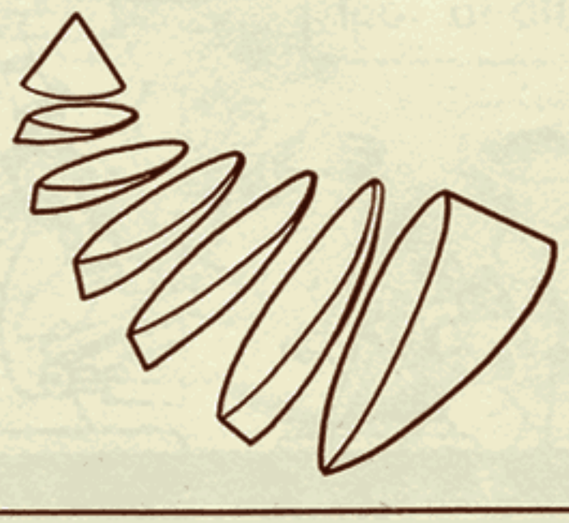


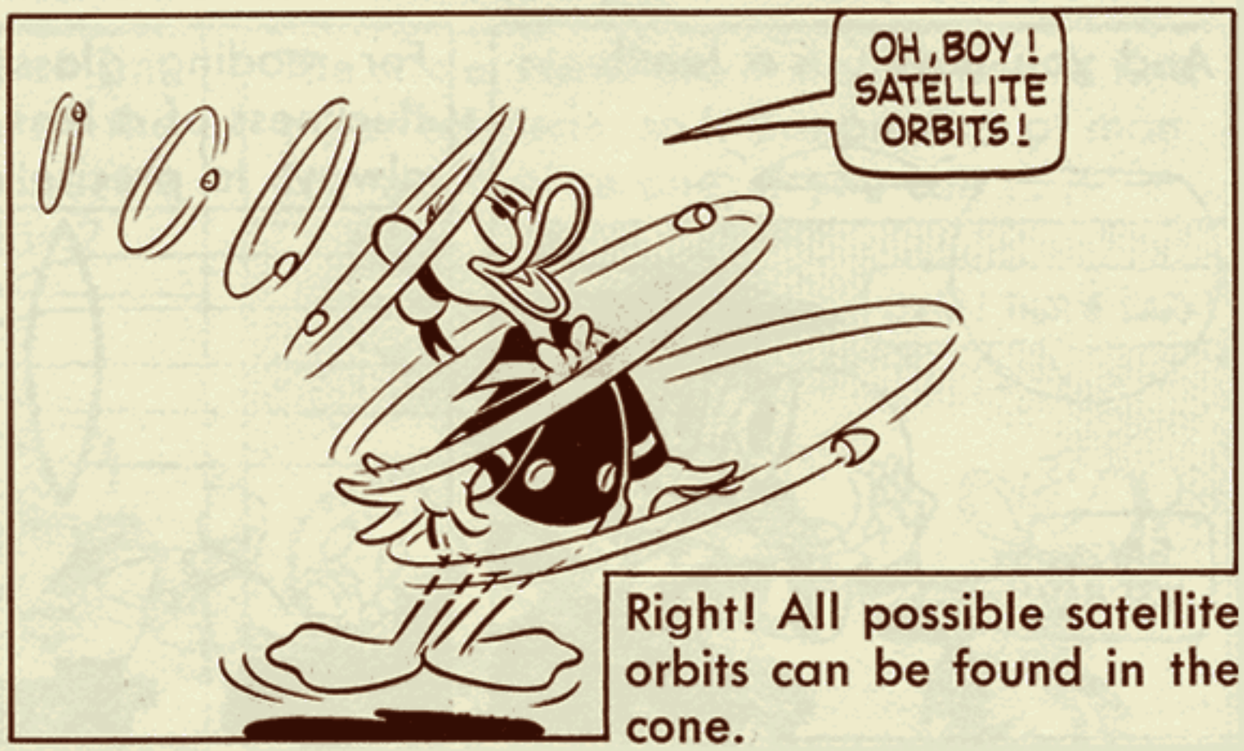
Gears!



WELL, WHAT DO YOU KNOW!

Slice the cone differently . . . several times . . . at any angle. And we have?





OH, BOY! SATELLITE ORBITS!

Right! All possible satellite orbits can be found in the cone.

And no matter how you slice it . . . it's always mathematics. But keep slicing, Donald. Right now, yours is the mind of all men . . .

Searching through the ages . . . and finding . . .

the reflector

the spiral

the telescope

the spring

the cylinder

the piston

machinery

Just from the triangle and the circle and your searching mind, Donald . . . you have created all these wonders and more.

But they were only the beginning . . . the proof that from certain basic forms and principles there are no limits to what the mind can conceive and create. Every new day . . .

. . . doors are swinging wide on new scientific achievements!

(GASP!)

And doors that are locked today will be opened tomorrow, with the same key.

MATHEMATICS!

OH, BROTHER! WHAT A WORKOUT! (PUFF, PUFF!)

Ho, ho! You've covered thousands of years in just a few minutes, Donald.

But mathematics isn't all work. It's play, too. It's the basis for most games...games where you keep score or play on a geometrically shaped area.

Like baseball . . .

Football . . .

Basketball . . .

Checkers . . . Chess . . .

Tennis . . . Hockey . . .

HOPSCOTCH!

And billiards. Here is a game where actual arithmetic can be used on every play.

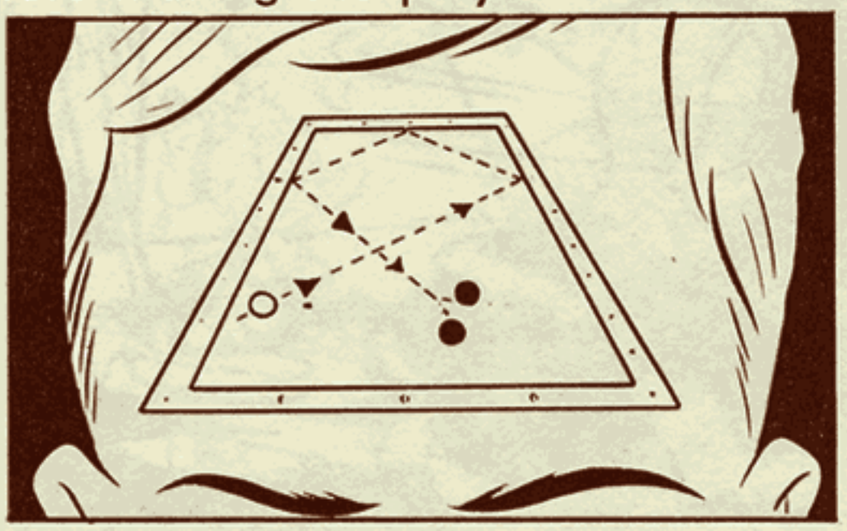
HMM...THESE TABLES ALWAYS REMIND ME OF HOW I WISH OUR FRONT LAWN WOULD LOOK!

In billiards the playing area equals two squares. The cue ball must hit both of the other balls, contacting at least three cushions **before** it hits the final ball.

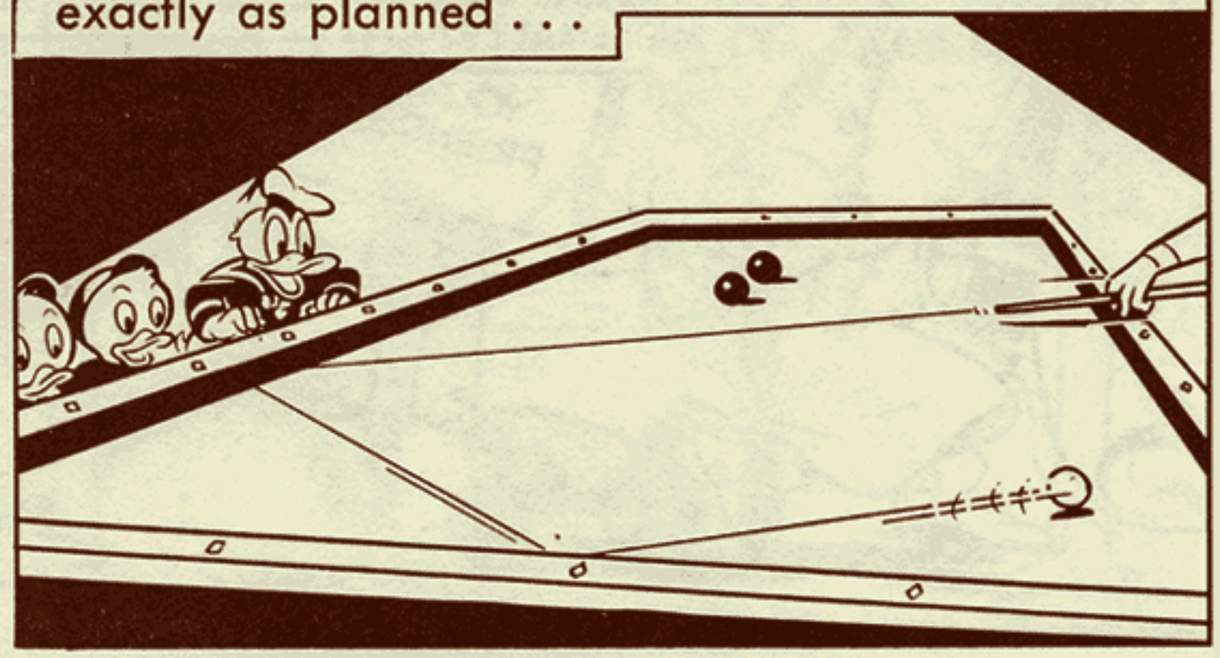
Only an expert can make several shots in succession, but these diamond markings on the rail are his mathematical guide.

YE CATS! HOW DO THEY HELP HIM?

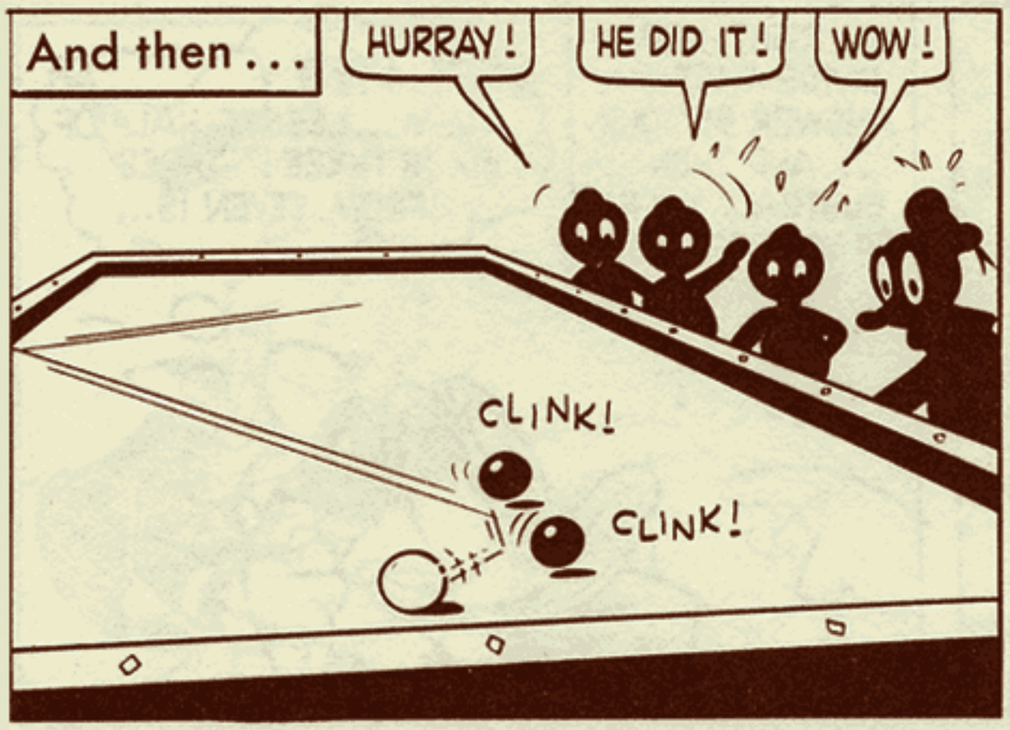
They contain a formula for making perfect shots, enabling the expert to figure out each shot in his mind before making the play . . .



Now, there it goes . . . and it is hitting the cushion exactly as planned . . .



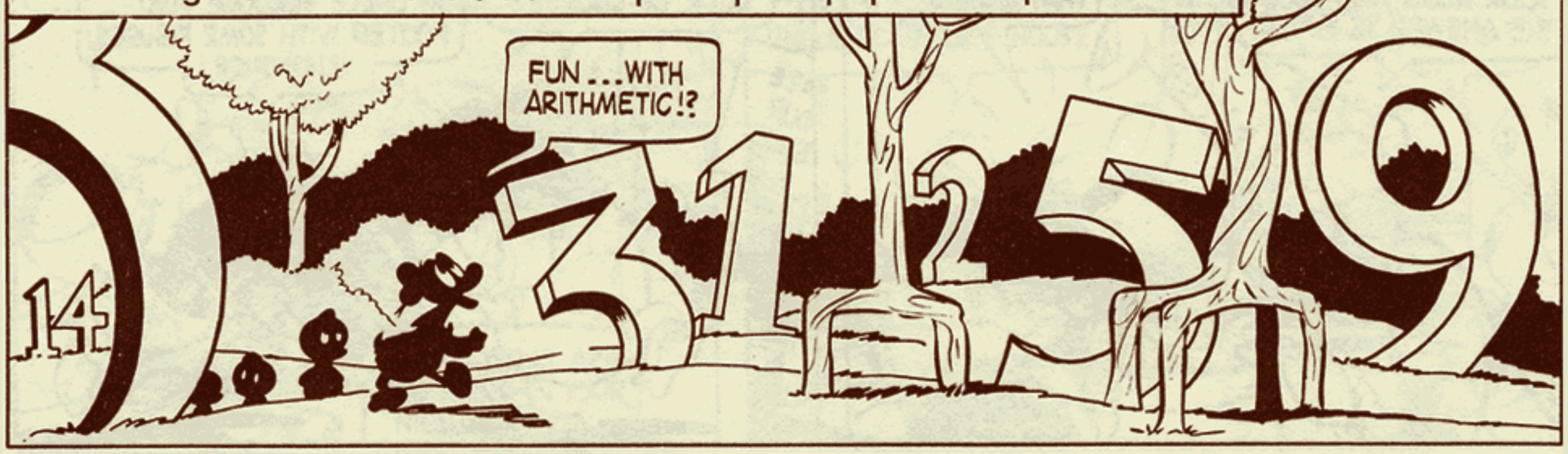
And then . . .



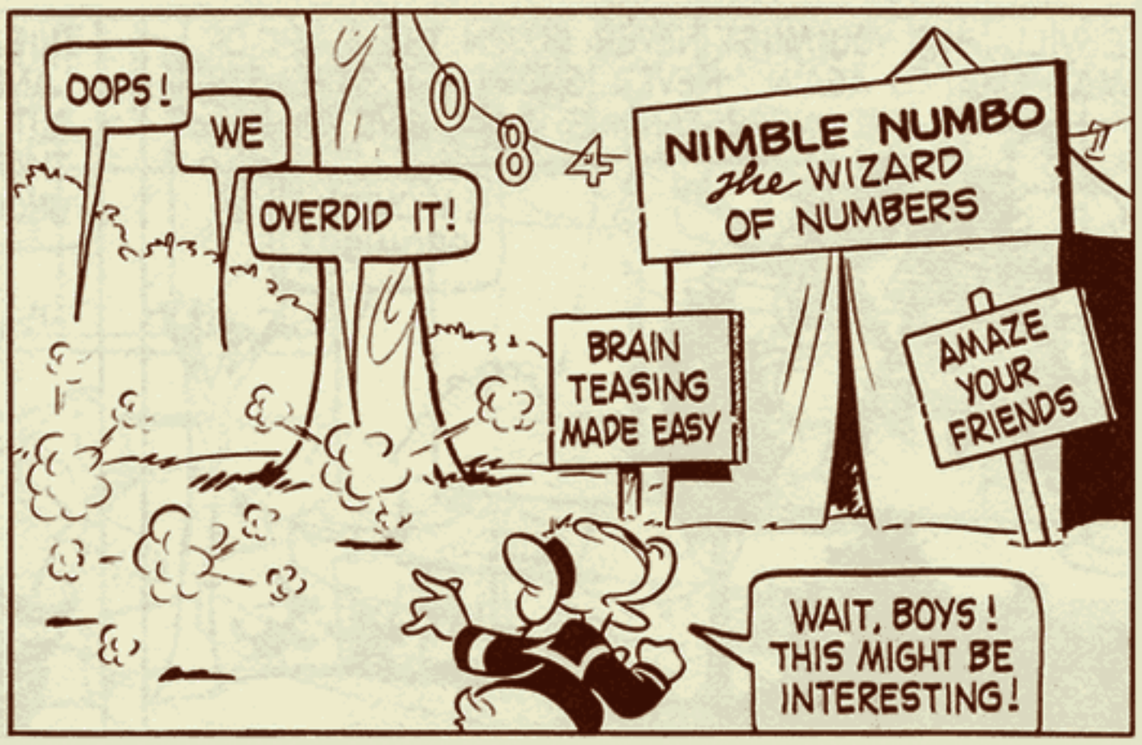
GEE WHIZ, SPIRIT... THE ONLY TROUBLE IS... SEEMS LIKE MATHEMATICAL GAMES MOSTLY CALL FOR FANCY SET-UPS LIKE BILLIARD TABLES, AND CHESSBOARDS, AND FOOTBALL FIELDS...

Not at all, Donald!

Lots of the fun in mathematics calls for no more equipment than some knowledge of arithmetic . . . and perhaps a paper and pencil.



Of course! Fun with numbers is a fascinating pastime . . . especially if you know a few of their amazing tricks.



INTERESTING, INDEED, DONALD! OF ALL MAN'S INVENTIONS NONE CAN PRODUCE MORE INTRIGUING RESULTS THAN SIMPLE MATHEMATICS!

YOUR FRIENDS

HUEY! DEWEY! LOUIE! WHERE...?

THINK OF A NUMBER FROM ONE TO TEN...THEN ADD EIGHT AND DOUBLE THE RESULT!

UH...ER... OKAY!

6
+8
14
+14
28

ALL RIGHT, NOW DIVIDE THAT ANSWER BY FOUR ...AND THEN SUBTRACT HALF OF YOUR ORIGINAL NUMBER!

7
4|28
UM-M... LESSEE, HALF OF SIX IS THREE! THREE FROM SEVEN IS...

HOHO! DON'T TELL ME! I CAN LOOK RIGHT INTO YOUR MIND AND TELL YOU THE ANSWER IS ***FOUR!***

WELL, I'LL BE A RUFFLED DUCK... THAT'S RIGHT!

OH, I DIDN'T READ YOUR MIND, DONALD! IT'S A TRICK, OF COURSE!

AZE OUR ENDS

SHOW IT TO ME, WIZARD! PLEASE! SO I COULD CATCH MY UNCLE SCROOGE FLAT-FOOTED WITH SOME FIGURES, JUST ONCE!

I WILL, BUT YOU MUST NEVER SCORN THE MAGIC OF MATHEMATICS AGAIN! NEVER IGNORE THE STRENGTH AND UNDERSTANDING IT CAN GIVE YOU!

I WON'T! I PROMISE!

THIS WHOLE TRIP THROUGH MATHMAGIC LAND HAS BEEN A TERRIFIC ADVENTURE, BUT IF I COULD JUST LEARN SOMETHING THAT WOULD GET ME OUT OF MY UNCLE SCROOGE'S CLUTCHES... OH, BOY!

SO BE IT! HO, HO!

I'LL SHOW YOU SOME TRICKS YOUR UNCLE SCROOGE NEVER HEARD OF! HE'S BEEN TOO BUSY TO HAVE FUN WITH HIS FIGURES!

SAY! THESE ARE ALL GOOD ONES, WIZARD!

HA,HA...WAIT TILL YOU SEE THIS ONE ...(MUMBLE!)(MUMBLE!)...YOU SEE, HERE'S THE IDEA...(MUMBLE,MUMBLE!)...

YAHOO! THIS'LL DO IT, WIZARD! WITH THIS ONE I'LL FLABBERGAST HIM!

WOWEE! FROM NOW ON, NUMBERS ARE MY DISH! BRING ON UNCLE SCROOGE!

!

?

UNCA DONALD!

WAKE UP!

YOU'VE BEEN DREAMING...

BOYS! WHAT ARE YOU DOING IN YOUR NIGHTSHIRTS?

COMPLETE MATHEM

WE WANT TO STRIKE WHILE THE IRON IS HOT! COME ON ... LET'S GET OVER TO UNCLE SCROOGE'S HOUSE!

BUT,

UNCA

DONALD?

WHAT'S GOT INTO HIM?

SEARCH ME!

SOMETHING'S SURE GOT HIS STEAM UP!

UNCLE SCROOGE! WAKE UP! I WANT TO SETTLE MY DEAL WITH YOU!

KNOCK!

KNOCK!

?

WHAT!? YOU WANT TO PAY OFF YOUR LOAN AT THIS RIDICULOUS HOUR? AHRUMPH... WELL, I'M ALWAYS READY TO ACCEPT MONEY! WHERE IS IT? WHERE?

ER... HAVE YOU EVER HEARD THE STORY OF THE ANCIENT KING AND THE GRAINS OF WHEAT ON HIS CHESSBOARD?

OF COURSE NOT! I DON'T HAVE TIME FOR SILLY STORIES!

FINE! UH... I MEAN, HERE'S MY OFFER! THE BALANCE I STILL OWE YOU IS ABOUT FIFTEEN DOLLARS, BY NOW, I EXPECT... SO I'LL GIVE YOU MY WHOLE HOUSE TO PAY IT OFF!

ACCOUNTS D TO E

OH, NO, UNCA DONALD!

OUR HOUSE IS WORTH MORE THAN...

TUT, TUT, BOYS... HE'LL HAVE TO PAY ME A LITTLE SOMETHING EXTRA TO MAKE UP THE DIFFERENCE, NATURALLY!

BAH! I WON'T PAY *MUCH!*

AT LEAST A FEW PENNIES, UNCLE SCROOGE! HERE! HERE'S YOUR CHESSBOARD! I'LL SETTLE IF YOU'LL JUST PUT A PENNY ON THE FIRST SQUARE AND TWO PENNIES ON THE SECOND SQUARE... AND FOUR PENNIES ON THE THIRD...

JUST DOUBLE THE NUMBER OF PENNIES EACH TIME UNTIL YOU'VE GIVEN ME SOME FOR EVERY ONE OF THESE SIXTY-FOUR SQUARES!

PENNIES... OH, NO! HE'S FLIPPED HIS LID!

HMM... THAT HOUSE OF HIS IS WORTH A FEW THOUSAND, AT LEAST! HEH... I COULD RENT IT BACK TO THEM FOR A NICE PROFIT, TOO!

ALL RIGHT...IT'S A DEAL, DONALD! HERE...WE'VE GOT IT ALL DOWN IN BLACK AND WHITE...AND NOW WE'LL SIGN...HEH,HEH!...BOTH COPIES!

OH-H...YOU'RE MAKING A BIG MISTAKE, UNCA DONALD!

THERE! ALL SIGNED!

FINE! AND NOW THERE'S NO USE PILING ALL THE PENNIES ON THIS CHESSBOARD! I'LL JUST RUN UP THE TOTAL ON MY COMPUTER!

FOUR THOUSAND NINETY-SIX PENNIES ON THE THIRTEENTH SQUARE!

GOSH! IT DOUBLES PRETTY FAST AT THAT!

HAH! FOUR THOUSAND PENNIES IS ONLY FORTY DOLLARS!

JUST KEEP GOING, UNCLE SCROOGE!

AGREEMENT

E. Scrooge
Donald D.

AT LEAST, YOU HAVE TO GIVE ME AS MUCH AS OUR DEAL CALLS FOR!

TISH,TUSH! IF YOU'RE SO IMPATIENT, DONALD, MY ELECTRONIC BRAIN WILL GIVE US THE TOTAL IN A JIFFY!

CLICK! CLICK! CLICK!

HERE IT COMES! ALL I OWE YOU FOR YOUR HOUSE IS...

(GULP!)

WHAT!? OH, NO!

TOTAL

167,440,732,095,516,911

YEP! THAT'S THE FIGURE WE AGREED ON, UNCLE SCROOGE!

OH MY GOSH!... HOW MANY THOUSAND TRILLION DOLLARS! NO! THIS CAN'T BE RIGHT!

ELECTRONIC BRAINS DON'T MAKE MISTAKES!

WOW!

THERE ISN'T THIS MUCH MONEY IN ALL MY MONEY VAULTS! NOT EVEN THIS MUCH IN THE WHOLE WORLD!

(SIGH!)...AND TO THINK YOU OWE IT ALL TO ME!

NO, NO! GIVE ME YOUR COPY OF OUR AGREEMENT, DONALD! PLEASE! LET ME OUT OF IT! I'LL BUY IT FROM YOU! MAKE ME A CUT RATE!

YOU MEAN, A NICE ROUND FIGURE...IN EVEN TRILLIONS?

TELL YOU WHAT I'LL DO, UNK! YOU JUST CALL THINGS SQUARE ON MY LOAN...AND I'LL TEAR UP THIS WHOLE DEAL!

OH, YES! YOU DON'T OWE ME A THING, NEPHEW! YOU'RE SO SWEET! SO KIND!

ACCOUNTS

AND ALL OF A SUDDEN SO SMART!

UNCA DONALD, IT ISN'T ANYWHERE IN OUR MATHEMATICS BOOK!

WHERE DID YOU EVER LEARN THAT TERRIFIC DOUBLING ROUTINE?

COMPLETE MATHEMAT

HOW CAN YOU BOYS ASK SUCH A SILLY QUESTION? WHY, I LEARNED IT BACK IN MATHMAGIC LAND, OF COURSE!

A MAGIC LAND?

THERE IS NO SUCH THING! IT'S IMPOSSIBLE!

HEH...OH, COME NOW, UNCLE SCROOGE! LOOK! I'M ALL SQUARE WITH YOU!

THAT SURE OUGHT TO PROVE...HEH...IN MATHEMATICS *ANYTHING* IS POSSIBLE!