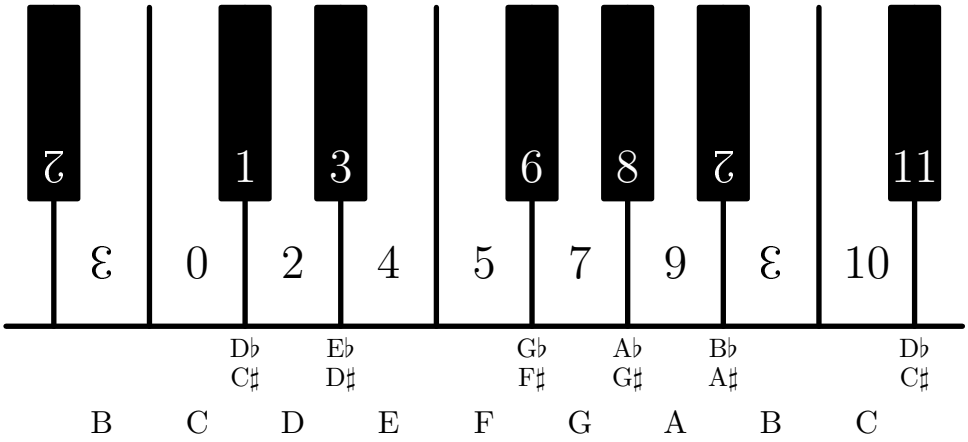
Music à la Dozen*

Tom Pendlebury

Part 1

The Keyboard



There are twelve equal semitones in an octave. This has been fundamentally true since the days of J. S. Bach, when a form of tuning musical instruments known as "Equal Temperament" was devised, but as can be seen above musicians still refer to notes by the archaic idea of one scale of *seven* notes to the *octave*, with sharps (meaning "another up" or +1) and flats ("another down" or −1) to refer to the others.

But of course those who are not musicians want to know what the words "semitone" and "octave" mean.

The two white keys 0 and 10 (C and C') above are an "octave" apart. (Counting up the white keys you have to count the *top C as well as* the

[0]Originally published in 1 The Dozenal Journal (DSA and DSGB, 1191).

bottom one to make it 8. This leads to bad arithmetic, for if you count up two octaves to the next C you will find that twice 8 is fifteen, not sixteen!! and 3 octaves make twenty two!!!)

If you play these two C notes together you will find that they sound almost like one single note. This is because the upper one does two vibrations for each vibration of the lower one. *An octave is a* double *of frequency.* If a note is two octaves higher its frequency is $(2 \times 2 =)$ 4 times, and if three octaves $(2 \times 2 \times 2 =)$ 8 times. n octaves up and the frequency is 2^n times the lower note.

A "semitone" of course is half a "tone", but the best definition of a tone is to say that it is two semitones! For a semitone is the step from one note on the keyboard to the next one up, e.g. from note 0 to note 1 is a semitone, from 3 to 4, 4 to 5 and so on. As there are twelve of them to the octave *a semitone is a* zenidouble *of frequency.* (Zeni- prefix meaning "one do*zenth* of" similar to "deci-" for tenth.)

In the traditional system the step from C to C-sharp is called a "chromatic semitone" because both notes contain the letter C, but that from C to D-flat (which is identical in sound to C-sharp) is called a "diatonic semitone" because it goes up to the next letter of the alphabet!! C-sharp and D-flat are called "enharmonics"—a word that means you change the names and manner of writing of the notes without changing their *sound.* In fact Note 8 is the only one in the scale that does not have *three* names, for there are also double sharps (+2) and double flats (−2). Then there are key signatures that contain so many sharps or flats according to which note you call "doh", and so it goes on and on.

More beginners have been put off learning music by this complicated mad rigmarole than by anything else.

Now look at the keyboard pattern at the beginning of this article and notice that C is the white key just left of a group of two black ones. Look at a piano and you find there are a lot of these Cs about. Take hold of the jambs at the ends of the keyboard so that your arms are equally extended and the C you find most directly in front of your nose is called "Middle C". (It is the C nearest the lock if the piano has one.)

Middle C is the note that musicians count up and down from. They speak of "the G below Middle C", or the A-flat below the double octave below Middle C", or "the F-sharp in the third octave up from Middle C", etc.

In dozenal let us called Middle C "Note 60" (sixzen). Then the C an octave above Middle C is Note 70 (sevenzen), and the one an octave below

is Note 50 (fivezen), etc. Every time you go up an octave you add one to the dozens figure, and every time you go down an octave take one off the dozens figure. We can now indicate any note directly by a simple number instead of the long-winded phrases used hitherto. The G below Middle C becomes Note 57 (fivezen seven), A-flat below the double octave below Middle C becomes Note 38 (threezen eight), and the F-sharp in the third octave up from Middle C becomes Note 96.

Now to play your first tune. Find Middle C (note 60) in the way described above, then counting upwards to the right and downwards to the left, play the following notes (count both black and white keys as in the keyboard table):

60 60 62 5Ɛ 60 62 ,64 64 65 64 62 60 ,
62 60 5Ɛ 60 ,67 67 67 67 65 64 ,
65 65 65 65 64 62 ,64 65 64 62 60 64 65 67 ,
69 65 64 62 60

If you play it in the right rhythm, roughly indicated by the spacing of the numbers, you will play our national anthem.[1] With a little practice you will get to know the pattern of the keyboard in respect to the units figures of the numbers.

Now play the tune again but this time add 1 to each note number so that you play the next note up. It still sounds like "God Save the Queen", doesn't it? but a bit higher up. You have now done a most wonderful thing: you have "transposed" it from "the open key of C major" which has no sharps or flats into the "remote key of D-flat" which contains *five* flats in its "key signature", and at the same time even cleverer into the "enharmonic equivalent" the "key of C-sharp major" which contains *seven* in its "signature"!!! A remarkable feat that you would never perform until you had had one or two terms of lessons in traditional teaching.

Scales

Now find your Note 60 again and play up the white keys in order:

60 62 64 65 67 69 6Ɛ 70 it sounds like

[1] That is, the British national anthem, "God Save the Queen"; the tune is the same as our American "My Country, 'Tis of Thee." —Ed.

Doh ray me fah soh lah te doh doesn't it?

This is known traditionally as the "scale of C major". Since the Note 0 sounds like the doh, let us call it *the scale of 0-doh* (pronounce: Oh-doh).

Play the scale again, this time adding 2 to each number. Again it sounds like doh, ray, me, etc (the same tune) but it is now Note 2 (62, 72, etc) that sounds like doh. This is *the scale of "D major" or 2-doh.*

And so we go on for all the other scales; A-flat major is the scale or key of 8-doh, the scale of F-sharp major or G-flat maor is the scale of 6-doh. After all, all that is meant by "the scale of G-flat major" is that your doh is G-flat, i.e. Note 6.

The explanation of how these major scales came about, with their steps of sometimes 2 zeniDoubles and sometimes 1, will be given later. All you have to remember to play a major scale is, that it consists of three even numbers 0 2 4 then four odd ones 5 7 9 Ɛ and finally back to even at zen (10). Just add to these your key number:

	doh	ray	me	fah	soh	lah	te	doh
Basic	0	2	4	5	8	9	Ɛ	10
For key 3-doh, +3	3	5	7	8	ƻ	10	12	13

With a little practice you get to that in 0-doh (the white keys) it is the Note 5 that sounds like fah, the Note Ɛ that sounds like te, and so on; so when playing in 3-doh, if the tune you are playing sounds in your mind as though it goes to *fah*, you play $(5 + 3 =)$ Note 8, for *te* $(\text{Ɛ} + 3 =)$ Note 12 and you get the right notes. Most mistakes by beginners when learning to play in keys other than C major are due to miscounting semitones caused by the queer way of counting by sharps and flats.

Now play another scale:

0	2	3	5	7	8	Ɛ	10,	which sounds like
lah	te	doh	ray	me	fah	soh	lah	

This sounds more solemn or serious than the bright major scale and is called the "minor scale". It sounds most like a finish when we stop at note *lah*, so we call the the *scale of 0-lah* (C minor). For any other minor key add the note number of the keynote (lah): E minor is 4-lah, G minor is 7-lah, and by adding 4 or 7 respectively to the scale numbers you can play these scales without learning anything about sharps and flats:

Scale	Add	Notes							
4-lah	4	4	5	7	9	Ɛ	10	3	4
7-lah	7	7	9	ƻ	10	2	3	6	7

Difference Numbers or "Invervals"

When we added 4 to a scale or tune to shift it 4 zeniDoubles up, we were doing what in traditional language is "transposing up by a major third". Just as they counted octaves up the white keys and made life harder by counting both the top and bottom notes, so also with other "intervals" (as they call differences), C D E was one two three—"a third"; also E F G was one two three "an interval of a third". We see immediately in dozenal that 7 (note G) minus 4 (note E) is 3 zeniDoubles, whereas 4 (note E) minus 0 (note C) is 4 zeniDoubles. FInding that they had two different sorts of thirds they called one the "major third" (4 zeniDoubles) and the other the "minor third" (3 zeniDoubles). They have all sorts of fancy names: "perfect fifth", "diminished fifth", "augmented fifth" (7, 6, or 8 zeniDoubles respectively), and "enharmonic equivalents": "augmented second" and "minor third" both being 3 zeniDoubles, while a "diminished third" is the same as a "major second" (2 $_1$Db).

Music teachers actually circumnavigate their own jargon by explaining that a minor third is one with *3* semitones, a major third one with *4*. Could anything be a better recommendation for the adoption of a system of numbering notes by semitones (zeniDoubles)?

All you have to learn about this in dozenal is that you *subtract one Note-number from the other to find the "interval" in zeniDoubles.*

Just out of curiosity there is a table showing the traditional names for these simplicities on page 6.

Harmony

Now have a go at playing two notes at a time: Find the note indicated in the top line, hold your finger over it while you find the one in the bottom line, then play both together. Do the same with the next pair, and the next...

64	64	64	67	65	64	,64	62	60	5Ɛ	69	67	66	61	67	67
60	57	60	57	5Ɛ	60	,56	56	56	57	5Ɛ	5Ɛ	60	60	5Ɛ	57

This is known as two-part harmony.

The note differences are *very important.* Melody is going up or down by the right amount from note to note. Harmony is being the right amount up or down from other notes played at the same time. So two notes together with

Table of Spans or "Intervals"		
$_1$Db	Dozenal Name	Traditional Name
0	Noughtspan, or Unison	Unison, Diminished Second
1	Onespan	Semitone, Minor second, Augmented unison.
2	Twospan	Tone, Major second, Diminished third.
3	Threespan	Minor third, Augmented second.
4	Fourspan	Major third, Diminished fourth.
5	Fivespan	Perfect fourth, Augmented third.
6	Sixspan	Augmented fourth, Diminished fifth.
7	Sevenspan	Perfect fifth, Diminished sixth.
8	Eightspan	Minor sixth, Augmented fifth.
9	Ninespan	Major sixth, Diminished seventh.
↊	Tenspan	Minor seventh, Augmented sixth.
↋	Elvspan	Major seventh, diminished octave.
10	Zenspan	Octave, Augmented seventh, Diminished nineth.

Table 1: Rational and Old-style Intervals Compared.

their difference we call a *span*, and speak of *onespans*, *twospans*, *threespans*, etc.

Chords and Appegios

For three and four part harmony, full orchestra, etc., you play or sing three or more notes at the same time. These are called chords.

Play: 67) 64) 60) This is the chord of "C major"

Now play: 67) 63) 60) This is the chord of "C minor"

Table of Chords

Traditional Names	$_1$Db	Dozenal Name
Major chord, Major triad	+ 4, 7	A four-seven chord
Minor chord, Minor triad	+ 3, 7	A three-seven chord
Dominant seventh chord	+ 4, 7, ↊	A four-seven-ten chord
Diminished seventh chord	+ 3, 6, 9	A three-six-nine chord
Augmented triad	+4, 8	A four-eight chord
Dominent major nineth chord	+4, 7, ↊, 12 or 4, 7, 12[a]	A 4-7-↊-2 chord
Dominant minor nineth chord	+ 4, 7, ↊, 11	A 4-7-↊-1 chord
Dominant eleventh chord	+ 7, ↊, 15	A 7-↊-5 chord
Dominant minor thirteenth chord	+ 4, ↊, 18	A 4-↊-8 chord
Dominant major thirteenth chord	+ 4, ↊, 19	A 4-↊-9 chord
Chord of the added sixth (major)	+ 4, 7, 9	A 4-7-9 chord
Chord if the added sixth (minor)	+ 3, 7, 9	A 3-7-9 chord
Neapolitan sixth	+ 3, 8	A three-eight chord
Italian sixth	+ 4, ↊	A four-ten chord
French sixth	+ 4, 6, ↊	A four-six-ten chord
German sixth	+ 4, 7, ↊	A four-seven-ten chord

[a] NB In the more complex chords some of the lower notes get omitted as in the last example. ZeniDouble notation makes the structure quite clear without ambiguity.

Table 2: Table of Chords

Now add 7 to all of these numbers, and play the answers, and you have played the chords of "G major" and "G minor" respectively.

To play a major chord, select any note, count 4 zeniDoubles up, then another 3, making 7, and play the three notes arrived at. We can thus call a "major chord" a *four-seven chord*. $0 + 4$ and 7 is the chord of "C major", $7 + 4$ and 7 i.e. Notes 7, ℰ and 12 is the chord of "G major", etc.

The minor chord is a *three-seven chord*, +3 and 7.

To understand how to use them is, of course, another story, but all you have to do to hear what they sound like with no follow-up is to play the notes as shown by the numbers.

Pitch and Compass

Most instruments and voices have a bottom note and a top note below and above which they cannot go. The range of notes they can play or sing is called their *compass*. A full compass piano usually runs from Note 29 to Note ↊0 and piano-makers could express that as *a compass 29–↊0*. It is obvious from this ($↊0 - 29 = 73$) that it comprises seven and a quarter octaves.

The compass of a song can be quoted on the front cover by a simple pair of dozenal numbers, e.g. 62–7↊. The soprano singer about to purchase it and knowing that her vital statistics cantabile are 60-79 would ask if the shop held another copy in a lower key—that is as long as the accompaniment is written in a form not easily transposed. With a change of notation dozenal can probably solve this also.

The strings of a violin are tuned to the Notes 57, 62, 69, 74 (all at intervals of 7 zeniDoubles, aren't they?), and those of the 'cello to 40, 47, 52, 59; add zen (10) to those of the 'cello and you have the strings of the viola.

When two instruments or singers are performing *out of tune* there is a difference of frequency much less than one zeniDouble between them. To get the best quality performance it is essential that instruments are made to give exactly the same number of vibrations for the same note. There is an internationally agreed standard that Note 69 (A above Middle C) vibrates at ↂ440 cycles per second. An instrument, tuned to this, gives for Note 78, *100;2536 vibrations per quedriHour (hour divided by the fourth power of the dozen), and Note 68, *100;2536 vibrations per queniDay (day divided by the fifth power of zen).

So the *dozenal standard for Musical Pitch* is:

Note 78 (A-flat about an octave and a half above Middle C) = **100 $c/_4 Hr$*, which is the same as:

Note 68 (A-flat above Middle C) = **100 cycles/$_5$Day.*

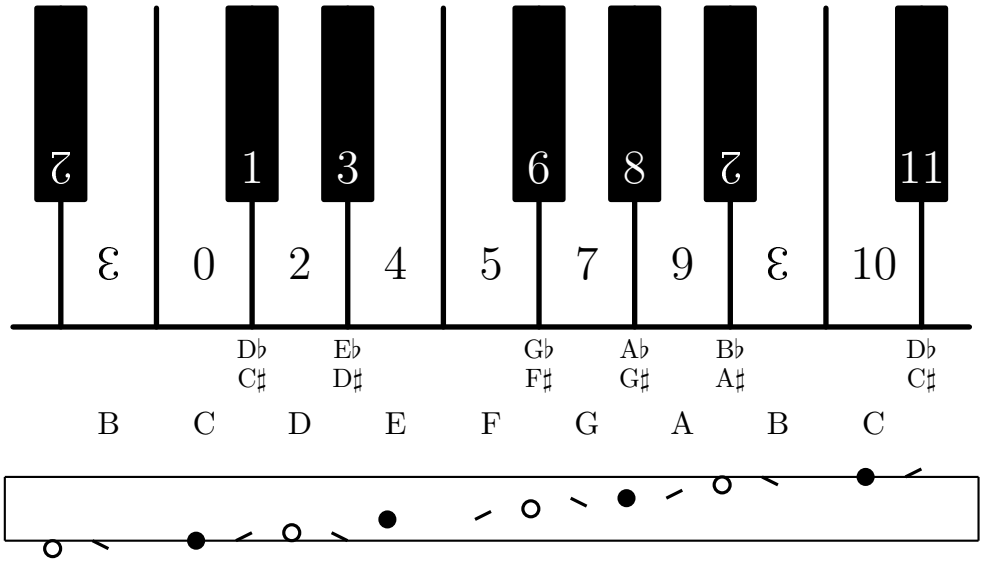
Instruments tuned to this and playing with others tuned to the international pitch are so close that only professional tuners could tell the difference, and only then when high notes were played slowly. The best orchestras and singers are more out-of-tune than this most of the time.

Rhythm is another aspect of music that spurns tens counting and falls right into the dozenist's lap, so let's talk about that in another article, shall we? Meanwhile, here is "Beautiful dreamer" in dozenal:

70 6Ɛ 70,67.. ,64..;62 61 62,69.....;67 6Ɛ 69,69 67 65,65 64 62;64.....;
70 6Ɛ 70,67.. ,64..;62 61 62,69.....;67 6Ɛ 60,69 67 64,65 64 62;60.....;
67 65 62,5Ɛ.. ,69..;69 67 64,60.....;70 6Ɛ 70,69.. ,72. 70;6Ɛ 70 69,67.....;
70 6Ɛ 70,67.. ,64..;62 61 62,69.....;67 6Ɛ 69,69 67 65,65 64 63;64.....;
69 6Ɛ 70,70 67 64,65 64 62;60.....

Sweet dreams!

Part 2



Thanks for all the letters! So you like Mus-al-Doz, and want more of it! Thanks also for the many suggestions for methods of staff notation without sharps and flats. The trouble that we all ran into is, that if you use one line or space per note, the music wanders up and down excessively, even more so than the old staff notation. Another thing is that notes to be played simultaneously, chords, etc get too spread out and not so easy to read. Why clutter up the page with lots and lots of lines? We want to see the picture, not the frame!

The system shown above is one that I evolved [over] many years of trial and error experiments, writing pages and pages of complex stuff like the first movement of Beethoven's *Sonata Pathétique*, overtures from G&S operas, etc. Frequently I had to scrap the lot and think of another idea, as the first bright ideas proved not so good in practice.

Some of the many advantages are:

1. Of course, no sharps, flats, keysignatures, etc.

2. No need for specially ruled manuscript paper. This system can be done on any ordinary ruled feint. The omission of all those horizontal lines of the traditional method, leaves an open score, where notes, dots, and other marks can be clearly seen.

3. Zenspans or "octaves" look like the same thing only higher up. Compare the last four notes in the example above with the first four. In the old

system the octave above a note on a *line* was in a *space*, and vice versa.

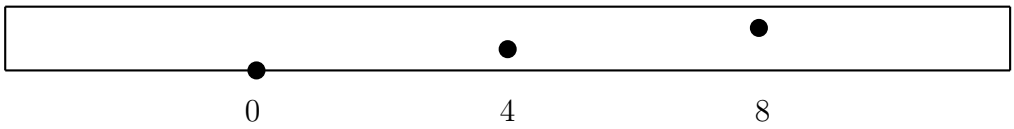
4. Odd notes are stroke-heads, and even notes are round-heads, and there are two kinds of each, which gives scales and chords, etc *characteristic aspects*. Things that sound similar look similar, things that do not look different. The keynote can often be seen in the pattern of the notes.

5. Having only one line per *zenade* ("octave" considered as a series of twelve consecutive numbers, compare decade) avoids the escdalating difficulties of rampant leger lines. Zenades can be stacked in twos and threes to suit the nature of the music, though for most instruments a one-zenade staff will suffice. Notes written outside the staff up to half a zenade are easily recognized, making the total compass two zenades.

6. The complications of base- and treble- and sometimes various C-clefs are done away with. By prefixing different zenade numbers any instrument or voice can be accomodated. The note on the line is always Note 0 (Transposing Instruments later).

The System

Everything is counted from the *Cardinal Notes*:

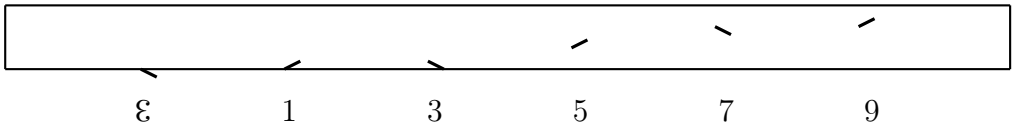


Cardinal Positions:

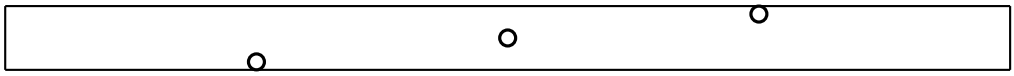
on line a third the way up two thirds up

Odd notes start in cardinal positions and slope up or down (left to right), according to whether they are above or below the cardinal note.

Downslopers and *upslopers*:



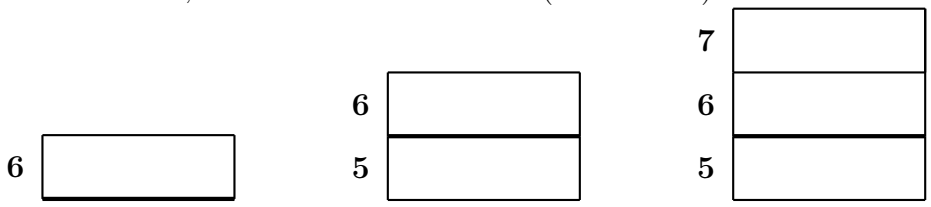
Non-Cardinal Evens 2, 6, Ƶ:



2	6	↊
Above and touching	Smack in the middle	Hanging and touching

(Musicians please note that note-heads are concerned only with pitch and *not* with duration.)

One, two, three or more zenades ("octaves") of staves can be used according to the nature of the music. The zenade number (dozens figure) is written in front of the staves, and the line for Note 60 ("Middle C") is thickened.

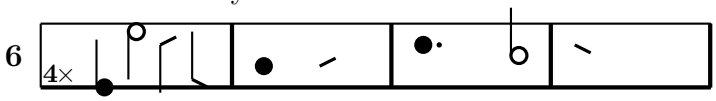


Rhythm

The basic unit of rhythm is the *beat*. Traditional notation did not recognize this at first, but started with notes of different duration, which were then strung together to form all sorts of different "times." $^{3}/_{2}$, $^{3}/_{4}$, $^{3}/_{8}$, $^{9}/_{16}$ all being basically three in a bar. A note that stood for one beat in one piece could stand for two beats or a half, a third or a quarter beat in other pieces.

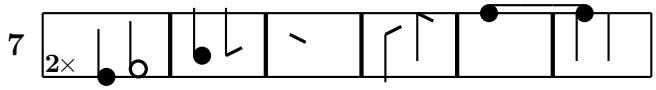
Beats are grouped in twos, threes, or fours (sometimes fives or sevens) to form *bars*. The end of a bar is shown by the *barline*.

Staff Notation:

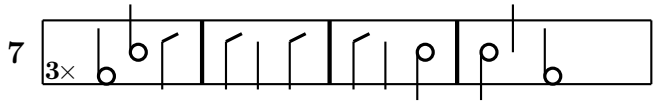


Number Notation: |60:↊|9:3 | 4:-|5:- | 8:-|-:6 | 7:-|-:- |

All those are examples of four beats in a bar, indicated by the *Time Signature* 4×. The following are in 2× and 3×.



|70:2 | 4:5 | 7:- | 9:Ɛ | 0:- | -: |

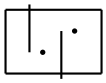
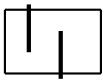
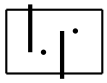


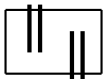
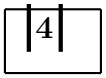
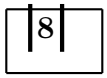
| 2:6:9 | 9: :9 | 9: :6 | 6: :2 |

Most of it is self-explanatory, but just a few comments:

1. A dot after a note adds half as much again to its duration (as in the old notation). See the 3-beat note near the end of the first line.

2. A stem without a note-head means a beat without a sound; i.e. a silence or rest. For longer silences we have:

1 1/2-beat  2-beat  3-beat 

4-beat  4-bar  8-bar 

3. The straight line joining thelast two notes of the 2× example is called a *tie*. It means that the sound continues unbroken through to the end of the last note.

4. A double barline marks the end of a section or piece.

5. A plain stem means the note lasts for 1 beat. It normally stands (with very few exceptions) on the left, the start end of slopers.

6. The *number notation* is evolved from the examples in the last article, with rhythm markings borrowed from the Tonic-sol-fa system. A short dash "-" means the last note to be continued unbroken. Silence are indicated by leaving the space between punctuations blank.

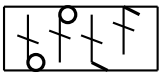
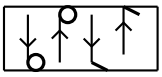
Pulses

Beats are subdivided again and again by twos and threes (the factors of the half-dozen) into shorter notes called *pulses*. Since $2 \times 2 = 4$, $2 \times 3 = 6$, $3 \times 3 = 9$, etc. beats get divided by the following numbers:

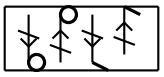
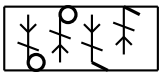
Beat:	1
Primos:	2 3
Secundos:	4 6 9
Tertios:	8 10 16 23
Quartos:	14 20 30 46 69

No, I'm not trying to make life awkward! That is just how music does go. Musicians may have bad arithmetic in theory, but in practice they are extremely clever at dividing beats up in exact fractions including from time to time fifths and sevenths. But the old notation was designed only to divide by twos, with makeshift methods for thirds and others.

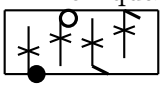
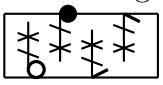
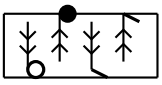
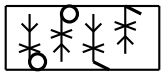
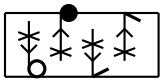
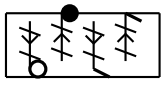
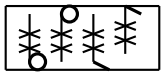
A *straight tick* across a stem means division by two. A *curved tick* by three.

Half-beats:  Thirds: 

A third of a half is a sixth, and a half of a third is a sixth, but the former go DA-di-di DA-di-di, while the latter go DA-di DA-di DA-di. The old system used the same symbol for both, which was also used for the "sixteenth-note" (American) or "semi-quaver" (English). With the tick method we get:

Thirds of halves:  Halves of thirds: 

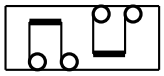
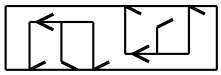
The series of ticks shoes the *pedigree* of the note. The *stem* has a *free-end* and a *note-end*. The tick nearest the note-end shows the grouping of the note with its immediate neighbours, whether one of two or one of three. The tick nearest the free-end shows how the conductor's beat is to be first divided: Do we have to squeeze the group into a half or a third of a beat?

For quarter-beats we put the two straight ticks in the form of a cross:  , and so on. Eighths:  . Ninths:  and the zeniBeats: quarters of thirds:  ; thirds of quarters:  ; and halves of thirds of halves:  ; and, of course, the onzen-fourths ("sixteenths"):  .[2]

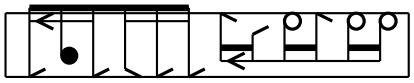
To put the Pedigree on each individual stem clutters up the paper till we can't see wood for trees. So notes that belong to the same beat can be grouped together by a *groupline* joining their free-ends, and subgroups can have a second line. Normally the pedigree is then put on the groupline between the first and second notes. For division by two it is sufficient to thicken the line[3]:

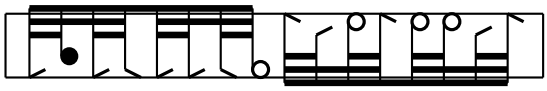
[2]Originally this last clause read simply "Onezen-fourths"; it has been slightly expanded to allow for proper typesetting. —Ed.

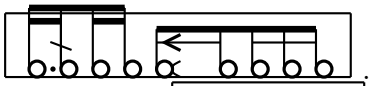
[3]These examples have been changed slightly to suit the new format. —Ed.

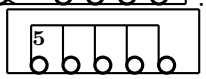
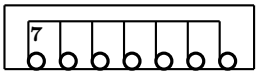
Halves  Thirds 

Quarters 

Sixths 

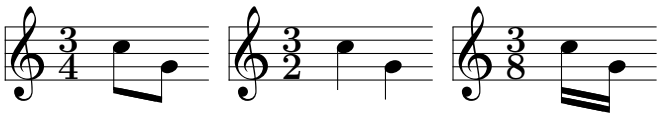
Eighths 

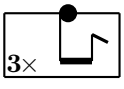
Dots and ticks can be used within a group;  after a third makes two thirds.  .

Fifths:  Sevenths:  (Always *inside* the corner.)

Musicians please note that these symbols and fractions refer to the division of the *beat*, whether quick or slow, and not to the American "Whole-Note" (= English "Semibreve"), nor to the English "Crochet" (American "Quarter-Note").

The traditional



in Music à la Dozen all become  .

The rapidity or tempo can be shown by a number after the 2×, 3×, etc. giving the duration of the beat in TGM Tims, i.e. 6 = 1 second. 3×6 menas 3 eats of 1 second each = 1 bar = 16 Tm, 8 bars of which lasts 1000 Tm or ⁄125 seconds.[4] So twelve sections of 8 bars each takes 0;1 Hr or 5 minutes. 3×2 is three times as quick and will take only a third of the time. They are

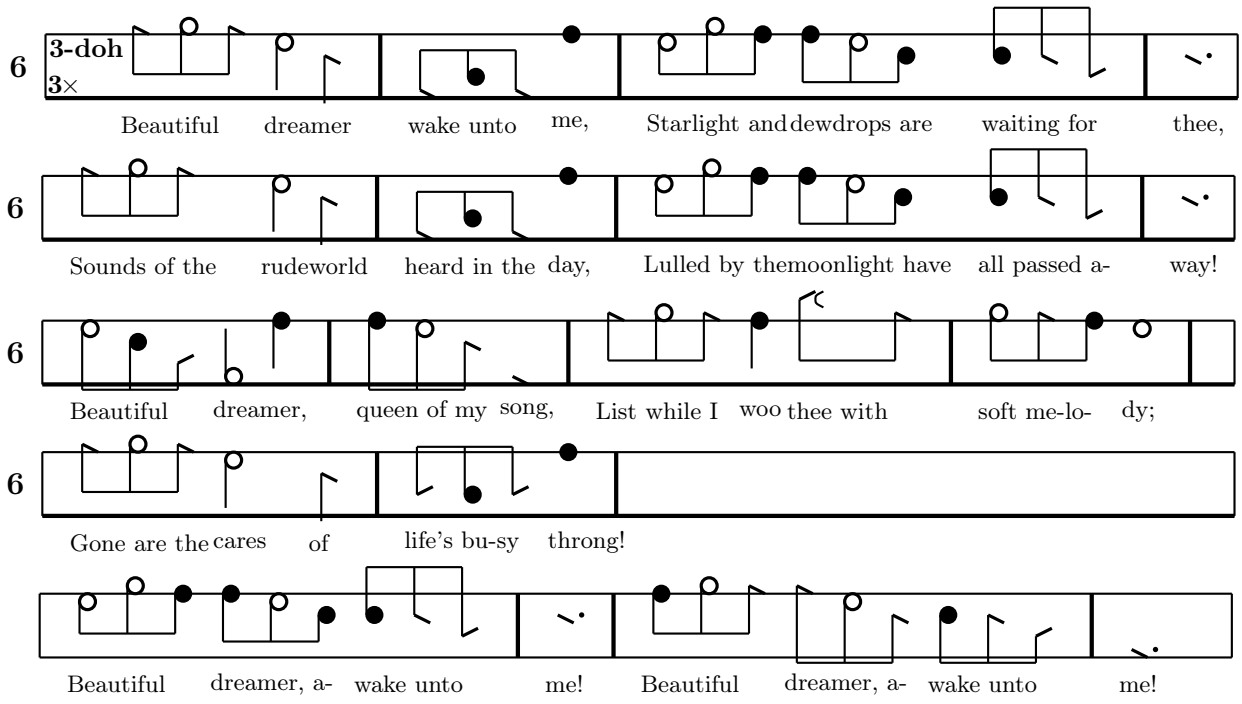
[4]This paragraph has been written to assume that numbers are dozenal, with decimals numbers specially marked. —Ed.

only a guide, not to be taken too precisely. Words like “Lento”, “allegro” etc. can still be used.

Enough talk! Let’s have some tunes.

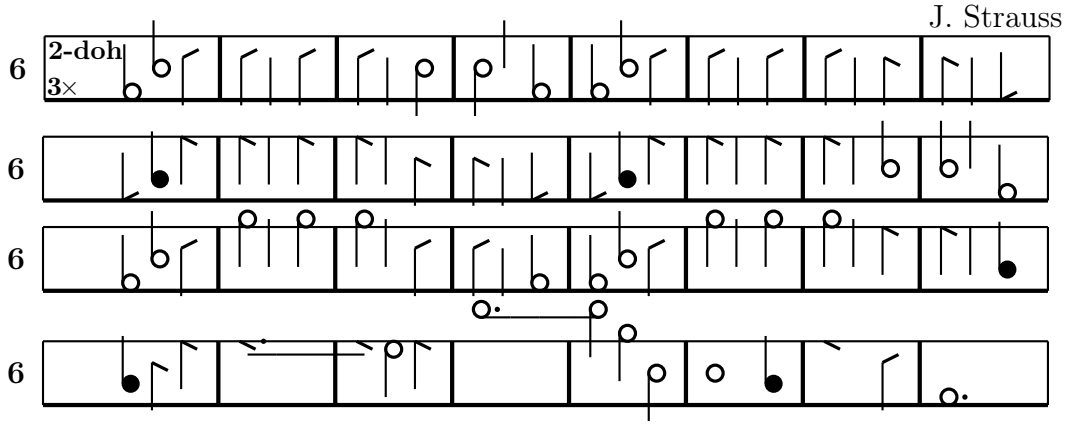
Beautiful Dreamer

Stephen Foster



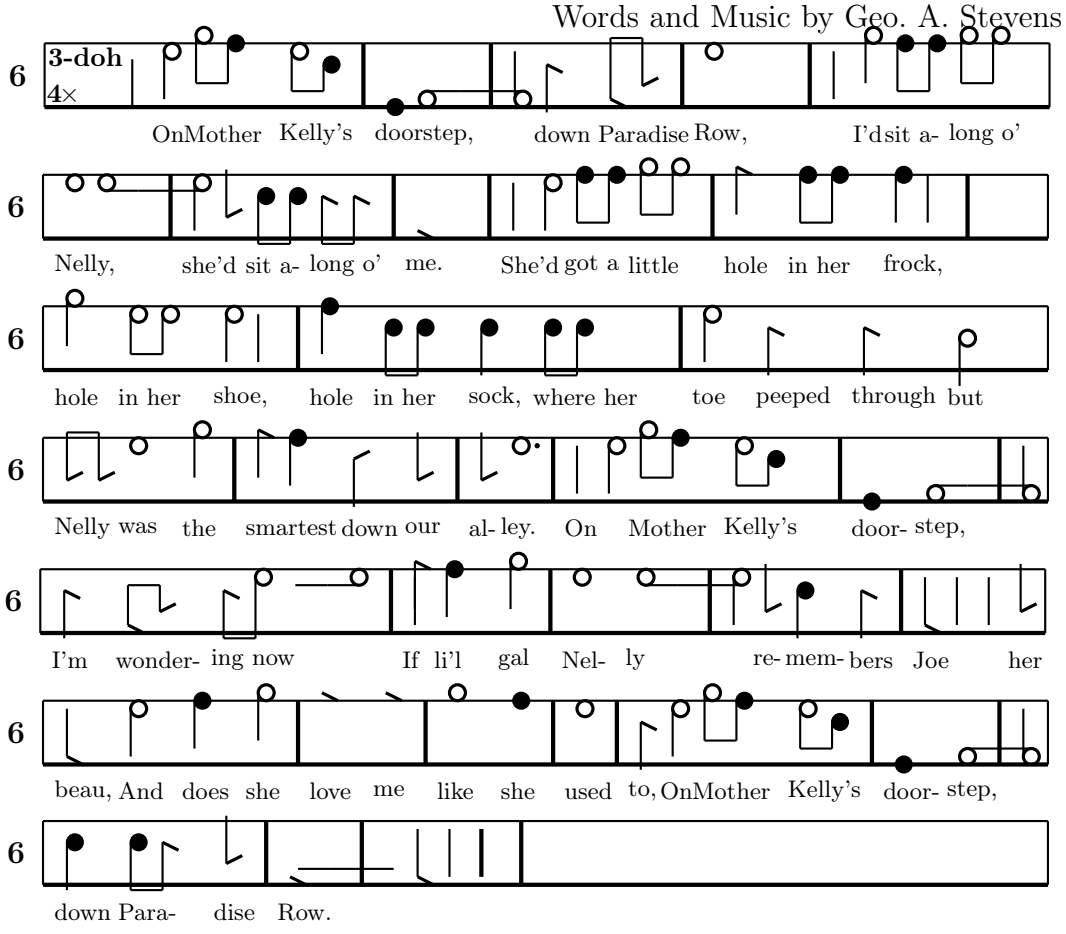
Blue Danube Waltz

J. Strauss



On Mother Kelly's Doorstep

Words and Music by Geo. A. Stevens



In the Shade of the Old Apple Tree

Words: H. W. Williams Music: Egbert van Alstyne