second number refers to the two Testaments, as it says in the Book of Kings: 'And he made in Dabir two cherubim of ten cubits in height' <I Kings 6:23>. Finally, the sweet reward of all our hope rests in the holy Trinity, not because it is subject to number, but because the power of its majesty displays the usefulness of number. Indeed, unity is understood to be in the essence of the divine, but Trinity is in the persons. For it says in the Epistle of John: 'There are three things that bear witness: the Spirit, and the water, and the blood' <I John 5:8>. Concerning the four evangelists we also read in Ezechiel: 'Within it were figures resembling four living creatures' <Ezechiel 1:5>. The fifth number refers to the five books of Moses, as it says in Paul: 'In the church I had rather speak five words with my understanding' <I Corinthians 14:19>. 'On the sixth day God made man, in His own image and likeness' <Genesis 1:26>.[202] Indeed we call the Spirit itself Holy and believe that it is sevenfold; number is necessary to enable us to understand the highest and most omnipotent matters.} Now we will take up music that is sweetness in its name and in its particular excellence.

{V. Music}[203]

1. A certain Gaudentius writing on music said that Pythagoras discovered the elements of this subject from the sound of hammers[204] and by the striking of taut strings. That very learned man, [our friend] Mutianus, translated this work into Latin.[205] The quality of the work undertaken indicates his talent. Clement of Alexandria, a priest, in his book *Against the Pagans*, said that music took its beginning from the Muses and explains carefully why the Muses were invented.[206] For [And] the Muses themselves are named *apo tu*

202 For the discussion of the first six numbers, see Eucherius, *Formulae spiritalis intellegentiae* 10 (CSEL 31.59–60 Wotke) [*CPL* 488].

203 I have made use of the translation of Helen Dill Goode and Gertrude C. Drake in this section.

204 Gaudentius, *Harmonica Introductio* 11: Τὴν ἀρχὴν τῆς τούτων εὑρέσεως Πυθαγόραν ἱστοροῦσι λαβεῖν ἀπὸ τύχης παρίοντα χαλκεῖον τούς ἐπὶ τὸν ἄκμονα κτύπους τῶν ῥαιστήρων αἰσθόμενον διαφώνους τε καὶ συμφώνους [340.4–7 Jan] ('They tell that Pythagoras gained the beginning of the discovery of these matters when he was passing by chance a forge and recognized from the blows of the hammers on the anvil the discords and harmonies').

205 This work is not extant.

206 Clement of Alexandria, *Protrepticus* 31 (47 Marcovich). Cassiodorus does not cite Clement exactly. What Clement offers is a euhemeristic explanation of the origin of the Muses and he never explicitly connects them with music as such.

maso, i.e., from seeking,[207] since through them, as the ancients believed, the power of song and the harmony of voice was sought. We also find Censorinus, who, in a work presented to Quintus Cerellius (*On his Birthday*) discussed the discipline of music; nor should his section on another part of learning <viz., astrology?> be neglected either.[208] It is useful to read, to enable the depth of the mind to store this information by frequent consideration.

2. The discipline of music, then, extends through all acts of our life in the following way. First, if we obey the commands of the Creator, and we keep with pure minds the rules set out by him, whatever we say, or however we are moved by the inward pulses of our veins, is shown to be linked by musical rhythms to the virtues of harmony. Music indeed is the discipline of proper harmony; if we live properly we are always associated with such a discipline. But when we are wicked, we do not have music. Furthermore, the heaven, the earth, and everything that takes place in them according to divine economy, do not lack the discipline of music. For [And] Pythagoras bears witness that this world was founded through music[209] and can be given order by it.

3. Religion itself is strongly associated with music, for example [there is] the decachord of the Ten Commandments, the twang of the harp, the drums, the melody of the organ, and the sound of cymbals. The Psalter itself also is certainly named like [for its likeness] to the musical instrument, because it contains the sweet and pleasing harmony of heavenly excellence.

4. Now let us consider [discuss] the divisions of music, as they have been handed down from our ancestors. Music is a discipline that deals with numbers, which relate to qualities that are found in sounds, as double, triple, quadruple and the like indicate the relationship of one thing to another.[210]

5. Music has three parts: harmonics – rhythmics – metrics.[211]

207 See Maltby, 399, who suggests that *maso* perhaps is to be understood as μαστεύω, 'seek'.

208 Censorinus, *De die natali ad Q. Caerellium*, ed. N. Sallmann, Leipzig: Teubner, 1983.

209 Censorinus, *De die natali* 13.1 (22.10–23.1 Sallmann): ... *Pythagoras prodidit hunc totum mundum musica factum ratione...* ('Pythagoras stated that the whole universe was constructed on a musical principle').

210 Cf. *Exp.Ps.* 97.219–21: *Musica est disciplina quae rerum sibi congruentium, id est sonorum differentias et conuenientias perscrutatur* ('Music is the discipline that examines the differences and harmonies of things in accord with each other, that is, their sounds' [trans. Walsh, 2.436]).

211 *Exp.Ps.* 80.97–102: *Est enim disciplinae ipsius magna uis delectabilisque cognitio, quam doctores saecularium litterarum... fecerunt doctrinabili lectione cognosci, quae in rerum natura prius tenebantur abscondita. Prima ergo huius disciplinae partitio est harmonica,*

Harmonics is the musical discipline that distinguishes high and low pitch in sounds.[212]

Rhythmics is the discipline that considers the coming together of words [in the joining of words] whether sounds fit together well or badly.

Metrics is that discipline that discovers by laudable calculation the measurement [measurements] of the different meters, such as the heroic, the iambic, and the elegiac, etc.

6. There are three kinds of musical instruments: percussion – strings – wind.[213] Percussion instruments include bronze and silver hand-bells, and other types that give forth sweet tinkling sound when struck by a rigid piece of metal. Stringed instruments are those that have skilfully tied strings that {will} sweetly delight the ears when <just> struck with a(n) {applied} plectrum. Among these are different kinds of harps. Wind instruments are those that are set in motion to create the sound when filled with breath. Among these are trumpets, reeds, organ, bagpipes, etc.

7. It now remains for us to speak about consonances. A consonance is the modulation of a low pitch to a high pitch or of a high pitch to a low pitch, creating euphony in a voice or in a wind instrument or in percussion [or in percussion or in a wind instrument]. There are six consonances:[214] (1) the diatessaron; (2) the diapente; (3) the diapason; (4) the diapason and diatessaron; (5) the diapason and diapente; (6) the double diapason.

1. A diatessaron is a consonance that consists of a 4:3 ratio and is made up of four notes from which it receives its name.

2. The diapente is a consonance that consists of a 3:2 ratio and is made up of five notes [whence also it takes its name].

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rhythmica, metrica ('The discipline of music incorporates great power and knowledge that brings delight; teachers of secular literature… have made it possible through theoretical texts to ascertain what was earlier regarded as hidden from view in the nature of the world. The first division of this discipline, then, is into harmonics, rhythmics, and metrics' [trans. Walsh, 2.295]).

212 Cf. Alypius (3rd or 4th century AD), *Isagoge* (367.6–9 Jan): αὕτη δὲ ἁρμονικὴ καλεῖται [δια]κριτικήν τινα δύναμιν ἔχουσα καὶ καταληπτικὴν τῶν ἐμμελῶν καὶ διαστηματικῶν φθόγγων καὶ τῶν ἐν αὐτοῖς γινομένων διαφορῶν ('This [art] is called harmonics that has a certain critical power capable of apprehending harmonious sounds and those that move in intervals as well as the differences that arise between them').

213 *Exp.Ps.* 80.102–04: *Secunda partitio instrumentorum eius est in percussionalia, in tensibilia, in flatilia* ('The second division , that of musical instruments, is into percussion, strings, and wind [trans. Walsh, 2.295, slightly altered]).

214. *Exp.Ps.* 80.104: *Tertia diuiditur in symphonias sex* ('The third division is into six harmonies' [trans. Walsh, 2.295]).

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3. The diapason is a consonance that is also called the octave; it is made up of a 2:1 ratio, i.e., double, and it is produced by an interval of eight notes from which it receives its name either octave or diapason because among the ancients the harp consisted of eight strings; therefore it is called the diapason, consisting as it were of all intervals.

4. The diapason and diatessaron is a consonance that consists of a ratio 24:8; it is made up of eleven notes.

5. The diapason and diapente is a harmony that consists of a ratio 3:1; it is made up of an interval of twelve notes.

6. The disdiapason, i.e., the double diapason, is a consonance that is in a ratio of 4:1; it is made up of an interval of fifteen notes.[215]

8. The mode, which consists of the pitch or dominant tone quality of the sound, is a distinguishing characteristic and quantity of the whole aggregate of sounds. There are fifteen modes:[216] hypodorian, hypoiastian,[217] hypophrygian, hypoaeolian, hypolydian, dorian, iastian, phrygian, aeolian, lydian, hyperdorian, hyperiastian, hyperphrygian, hyperaeolian, hyperlydian.

1. The hypodorian mode is the lowest of all in pitch; therefore it is also called the bottom mode.

2. The hypoiastian is a half tone higher than the hypodorian.

3. The hypophrygian is a half tone higher than the hypoiastian, and a full tone higher than the hypodorian.

4. The hypoaeolian is a half tone higher than the hypophrygian, a full tone higher than the hypoiastian, and a tone and a half higher than the hypodorian.

5. The hypolydian is a half tone higher than the hypoaeolian, a tone higher than the hypophrygian, and a tone and a half higher than the hypoiastian, and two tones higher than the hypodorian.

6. The dorian is a half tone higher than the hypolydian, a tone higher than the hypoaeolian, a tone and a half higher than the hypophrygian, two tones higher than the hypoiastian, two and a half tones higher than the hypodorian, i.e., the consonance of the diatessaron.

7. The iastian is a half tone higher than the dorian, a tone higher than the hypolydian, a tone and a half higher than the hypoaeolian, two tones higher than the hypophrygian, two and a half {tones} higher than the hypoiastian, i.e., the consonance of the diatessaron, and three tones higher than the hypodorian.

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215 On this section, cf. Gaudentius, *Harmonia introductio* 9 (338–39 Jan).

216 *Exp.Ps.* 80.105: *Quarta diuiditur in tonos quindecim* ('[T]he fourth [division is] into fifteen tones' [trans. Walsh, 2.295]).

217 Hypoiastian, iastian, and hyperiastian are other names for the ionic modes.

8. The phrygian is a half tone higher than the iastian, a tone higher than the dorian, one and a half tones higher than the hypolydian, two tones higher than the hypoaeolian, two and a half tones higher than the hypophrygian, i.e., the consonance of the diatessaron, three tones higher than the hypoiastian, three and a half tones higher than the hypodorian, i.e., the consonance of the diapente.

9. The aeolian is a half tone higher than the phrygian, one tone higher than the iastian, one and a half tones higher than the dorian, {two tones} higher than the hypolydian, two and a half {tones} higher than {the hypoaeolian,}, i.e., the consonance of the diatessaron, three tones higher than the hypophrygian, three and a half {tones} higher than the hypoiastian, i.e., the consonance of the diapente, four tones higher than the hypodorian.

10. The lydian is a half tone higher than the aeolian, one tone higher than the phrygian, one and a half tones higher than the iastian, two tones higher than the dorian, two and a half tones higher than the hypolydian, i.e., the consonance of the diatessaron, three tones higher than the hypoaeolian, three and a half tones higher than the hypophrygian, i.e., the consonance of the diapente, four tones higher than the hypoiastian, four and a half <tones> higher than the hypodorian.

11 The hyperdorian is a half tone higher than the lydian, one tone higher than the aeolian, one and a half tones higher than the phrygian, two tones higher than the iastian, two and a half {tones} higher than the dorian, i.e., the consonance of the diatessaron, three tones higher than the hypolydian, three and a half tones higher than the hypoaeolian, i.e., the consonance of the diapente, four tones higher than the hypophrygian, four and a half tones higher than the hypoiastian, five {tones} higher than the hypodorian.

12. The hyperiastian is a half tone higher than the hyperdorian, one tone higher than the lydian, one and a half tones higher than the aeolian, two tones higher than the phrygian, two and a half tones higher than the iastian, i.e., the consonance of the diatessaron, three tones higher than the dorian, three and a half tones higher than the hypolydian, i.e., the consonance of the diapente, four tones higher than the hypoaeolian, four and a half tones higher than the hypophrygian, five tones higher than the hyperiastian, five and half tones higher than the hypodorian.

13. The hyperphrygian is a half tone higher than the hyperiastian, one tone higher than the hyperdorian, one and a half tones higher than the lydian, two tones higher than the aeolian, two and a half tones higher than the phrygian, i.e., the consonance of the diatessaron, three tones higher than the iastian, three and a half tones higher than the dorian, i.e., the consonance of the diapente, four tones higher than the hypolydian, four and a half tones higher than the hypoaeolian, five tones higher than the hypophrygian, {five and} a half tones higher {than the hypoiastian,} six tones higher than the

hypodorian, i.e., the consonance of the diapason.

14. The hyperaeolian is a half tone higher than the hyperphrygian, one tone higher than the hyperiastian, one and a half tones higher than the hyperdorian, two tones higher than the lydian, two and a half tones higher than the aeolian, i.e., the consonance of the diatessaron, <three tones higher than the phrygian, three and a half tones higher than the iastian, i.e., the consonance of the diapente,> four tones higher than the dorian, four and a half tones higher than the hypolydian, five tones higher than the hypoaeolian five and a half tones higher than the hypophrygian, six tones higher than the hypoiastian, i.e., the consonance of the diapason, six and a half tones higher than the hypodorian.

15. The hyperlydian is the last and highest of all. It is a half tone higher than the hyperaeolian, one tone higher than the hyperphrygian, two tones higher than the hyperdorian, two and a half tones higher than the lydian, i.e., the consonance of the diatessaron, three tones higher than the aeolian, three and a half tones higher than the phrygian, i.e., the consonance of the diapente, four tones higher than the iastian, four and a half tones higher than the dorian, five tones higher than the hypolydian, five and a half <tones> higher than the hypoaeolian, six tones higher than the hyperphrygian, i.e., the consonance of the diapason, six and a half tones higher than the hypoiastian, seven tones higher than the hypodorian.[218]

It is clear from this that the hyperlydian is the highest of all modes and is seven tones higher than the hypodorian, the lowest of all. As Varro reminds us, their excellence is useful to calm the aroused spirits; they also attract beasts as well as serpents, birds and dolphins to hear their harmony.[219]

9. Leaving aside as fictions the lyre of Orpheus and the song of the Sirens, what shall we say of David? By the knowledge of the most salutary harmonies he drew unclean spirits from Saul and in a novel way through his hearing restored sanity to the king, an achievement the doctors were unable to accomplish by the power of herbs <I Samuel 16:13–23>. They say that Aesclepiades, whom the ancients considered a very skilled doctor, restored a certain madman to his former sanity [to his own nature] through harmony. Many miracles among sick men are {said to be} accomplished by this discipline. As we mentioned above, the heaven itself is said to revolve in sweet harmony.[220] To include everything concisely: whatever in heavenly

218 Cf. Alypius, *Isagoge* (368–83 Jan) for this entire section. The order of the modes, however, is that of Aristides Quintilianus (Courcelle, *Late Latin Writers*, 350, note 66).

219 See Holzer, 11–13.

220 Cf. Censorinus, *De die natali* 12.4 (22.3–9 Sallmann); 13.1 (23.1–6 Sallmann); *Variae* 2.40.6–7 (88.46–89.65 Fridh).

and earthly matters occurs in accordance with the management of its Creator, is considered to fall under this discipline.

10. This is, then, a pleasing and useful knowledge, which both raises our understanding to the heights and pleases our ear {with sweet harmony}. Alypius,[221] Euclid,[222] and Ptolemy[223] among the Greeks as well as others have produced laudable instruction on this subject. Among the Latin writers Albinus wrote a book on this subject with summary brevity.[224] I recall that we had this book in our library at Rome and read it eagerly. If by chance this work has been destroyed by the barbarian invasion, you have <here> Gaudentius, <the Latin Gaudentius of Mutianus,> and if you {should} read him with careful attention he {will} open(s) the doors to this discipline for you. Apuleius of Madaura is said to have written in Latin on the elements of this subject.[225] Father Augustine also wrote six books *On Music* in which he showed that the human voice has naturally rhythmical sounds and harmony {capable of} modulation [modulated] in long and short syllables.[226] Censorinus also has a careful discussion on pitches that are {very} important to our voice; [saying] he said these pitches belong to the discipline of music. I have left you his work transcribed among other works.[227]

11. Now let us come to geometry, the theoretical description of figures, and also the visible demonstration by which philosophers teach; they, to praise this method of teaching, testify that their Jove used geometry in his own works. I do not know whether this should be considered as praise or blame, since they say in their lies that Jove draws in the heavens what they draw on coloured sand. But if for our salvation we associate this idea with the Creator and omnipotent Lord, it is possible for this thought [from this thought] to agree with the truth, for the holy Trinity, if we may express it

221 Alypius, *Isagoge*, ed. C. Jan, *Musici Scriptores Graeci*, Leipzig: Teubner, 1895, 357–406.

222 Euclid, *Sectio Canonis*, ed. C. Jan, *Musici Scriptores Graeci*, Leipzig: Teubner, 1895, 113–66. Cassiodorus did not use this work, and it may not have been in his library (Courcelle, *Late Latin Writers*, 349).

223 Ingemar Düring, ed., *Die Harmonielehre des Klaudios Ptolemaios*, Goteborg: Elanders boktr. aktiebolag, 1930 [Goteborgs hogskolas årsskrift 36 (1930): 1]. Cassiodorus probably did not use this work and may not have possessed it in his collection (Courcelle, *Late Latin Writers*, 349). Claudius Ptolemaeus (fl. AD 146–70) also wrote a major work on astronomy, the *Almagest* (see below).

224 Albinus: see Kaster 182 (pp. 382–83).

225 This work of Apuleius is lost.

226 Augustine, *De musica, PL* 32.1081–1194. Cassiodorus never used this treatise, and he may not have had this work in his library (Courcelle, *Late Latin Writers*, 349).

227 Censorinus' *De accentibus* is not extant.

thus, uses geometry [is geometry], since it [divinity] has endowed the creatures [that which] it has brought [brings] into being with various species and shapes, and with awesome power it assigns the movements of the stars and makes to move in their assigned orbits the stars that move and established those that are fixed in place. Whatever is well ordered and complete may be attributed to the qualities of this discipline.

VI. Geometry[228]

1. Geometry in Latin means the measurement of the earth; some say it is so named because Egypt was first divided among its own lords by various forms of this discipline. In earlier times the teachers of this discipline were called measurers.[229] But Varro, the most learned of the Latin writers, offers the following reason for the name. First the measurement of the earth gave useful peace to wandering peoples {who disagreed} by setting down boundary stones. Then the circle of the whole year was apportioned out by the measurement of the months. As a result, the months themselves were so named because they measure the years. But after these things were discovered, scholars were moved to study intangible phenomena, and began to ask how far the moon was from the earth and the sun from the moon and how far it was to the top of the heavens. He reports that the most learned geometricians arrived at the measurements of these distances. Then he also relates that the measurement of the whole earth was arrived at by a praiseworthy reasoning; thus it came about that the discipline received the name geometry [of geometry] that it bears over the course of the ages.[230] In the book that he wrote to Quintus Cerellius, Censorinus describes with careful

228 For Pythagorean geometry, see Thomas 1.172–225. Cassiodorus probably used Boethius' translation of Euclid, which is not extant, as well as his *Ars geometriae*, of which only a few fragments remain. See *PL* 63.1358C–1364D, and Bubnov, 180–96.

229. *Var.* 3.52.3–5 (136.16–29 Fridh): *Geometriam quippe... Chaldaei primum inuenisse memorantur... Hanc post Aegyptii... ad dimensionem terrae et recuperandas formas finium transtulerunt... Quapropter agrimensorem peritissimum, cui ab arte nomen est, uestra nihilominus adhibeat magnitudo...* ('As to geometry... it is recorded that the Chaldaeans first discovered it... Later, the Egyptians... transferred geometry to the measurement of land and to restoring the shapes of boundaries...Therefore, your mightiness is likewise to recruit a highly skilled land-surveyor – his name is derived from his art' [trans. Barnish, 72]).

230 Varro, *De geometria*, one of his books on the nine disciplines (see above, n. 79), is not extant. The beginning of this section to this point is excerpted in [Boethius], *Ex demonstratione artis geometricae excerpta* (= *Schriften der römischen Feldmesser*, 1, ed. F. Blume–K. Lachmann–A Rudorff, Berlin: Georg Reimer, 1848), 393.4–17.