



# Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

| Chemistry<br>QCC   | Chemistry: Matter and Change<br>Student Edition Pages  |
|--|--|
| <b>1. Topic: Inquiry, Process and Problem Solving</b>  |  |
| <b>Standard:</b> Uses science process skills in laboratory or field investigations, including observation, classification, communication, metric measurement, prediction, inference, collecting and analyzing data.                        | 3, 15, 18–19, 25, 28, 46–47, 55, 68, 78–79, 87, 96, 102, 108–109, 117, 125, 142–143, 151, 164, 170–171, 179, 184, 202–203, 211, 230, 232–233, 241, 261, 268–269, 277, 295, 300–301, 309, 329, 342–343, 353, 362, 374–375, 385, 401, 410–411, 419, 439, 444–445, 453, 473, 480–481, 489, 505, 520–521, 529, 539, 550–551, 559, 573, 586–587, 595, 604, 626–627, 635, 638, 654–655, 663, 681, 688–689, 697, 715, 728–729, 737, 751, 766–767, 775, 786, 796–797, 805, 819, 832–833, 841, 848, 862–863 |
| <b>1.1</b> Designs and conducts a scientific experiment that identifies the problem, distinguishes manipulated, responding and controlled variables, collects, analyzes and communicates data, and makes valid inferences and conclusions. | 18–19, 688–689, 832–833  |
| <b>1.2</b> Evaluates procedures, data and conclusions to determine the scientific validity of research.  | 3, 4–6, 11–13, 18–19, 25, 28, 46–47, 55, 68, 78–79, 87, 92–97, 102, 108–109, 112, 117–118, 125, 142–143, 151, 164, 170–171, 176, 179, 184, 202–203, 211, 230, 232–233, 241, 261, 268–269, 277, 295, 300–301, 309, 329, 342–343, 353, 362, 374–375, 385, 401, 410–411, 421, 423–424, 426, 439, 444–445, 473, 480–481, 505, 520–521, 539, 550–551, 559, 573, 586–587, 604, 626–627, 635, 654–655, 663, 688–689, 698, 715, 728–729, 766–767, 796–797, 806–807, 815, 819, 832–833, 848, 860, 862–863   |
| <b>2. Topic: Inquiry, Process and Problem Solving</b>  |  |
| <b>Standard:</b> Uses traditional reference materials to explore background and historical information regarding a scientific concept.   | 4–6, 11–14, 20, 22, 47, 52, 63, 70–71, 75, 80, 84, 88–98, 110, 111–114, 117, 122–124, 126–127, 129–130, 146, 148, 151–153, 171, 174, 176, 208, 232–234, 238, 274, 306, 344, 350, 382, 384, 416, 450, 482, 486, 526, 556, 587–588, 592, 627, 632, 660, 689–690, 694, 730, 734, 768, 802, 834, 838, 867  |
| <b>2.1</b> Uses current technologies such as CD-ROM, Internet and on-line data search to explore current research related to a science concept.  | 2, 5, 20, 22, 24, 28, 46–47, 52, 54, 58, 80, 84, 86, 89, 110, 114, 116, 118, 148, 150, 152, 171, 176, 178, 185, 208, 210, 213, 232–234, 240, 242, 274, 276, 280, 306, 308, 310, 344, 350, 352, 357, 382, 384, 390, 416, 418, 420, 446, 450, 452, 454, 482, 486, 488, 490, 524, 526, 528, 530, 541, 556, 558, 560, 587, 588, 592, 594, 597, 627, 632, 634, 639, 660, 666, 689–690, 694, 696, 699, 730, 734, 736, 768, 774, 778, 802, 804, 809, 834, 838, 840, 842, 864, 867                         |
| <b>3. Topic: Inquiry, Process and Problem Solving</b>  |  |
| <b>Standard:</b> Learns and uses on a regular basis standard safety practices for laboratory or field investigations.  | 3, 15–19, 25, 28, 46–47, 55, 68, 78–79, 108–109, 125, 142–143, 151, 170–171, 179, 184, 202–203, 211, 230, 232–233, 241, 261, 268–269, 277, 295, 300–301, 329, 342–343, 353, 362, 374–375, 385, 401, 410–411, 419, 439, 444–445, 453, 473, 480–481, 489, 505, 520–521, 529, 539, 550–551, 559, 573, 586–587, 595, 604, 626–627, 635, 638, 654–655, 663, 681, 688–689, 697, 715, 728–729, 737, 751, 766–767, 775, 786, 796–797, 805, 832–833, 841, 848, 862–863                                      |
| <b>3.1</b> Learns and uses safety procedures specific to an investigation or research activity.  |  |



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|--|---|
| <b>4. Topic: Inquiry, Process and Problem Solving</b>  |   |
| <b>Standard:</b> Gives examples of industrial processes that have been derived from scientific research and describe the impact on society.  | 7, 9, 14, 48, 80, 110, 114, 144, 181–196, 199–201, 205, 230, 344, 412, 559, 583, 647, 656, 677–682, 684–687, 690, 725–726, 730, 741–747, 751, 759, 768, 808, 815, 824–831, 838, 846–849, 851–854, 856–857, 859–860, 867 |
| <b>5. Topic: Atomic Structure and Patterns of Reactivity</b>   |   |
| <b>Standard:</b> Describes the fundamental parts of the atom.  | 93, 95–97, 104, 111–112, 114–115, 122–124, 127–141, 148, 208, 314, 526, 808–809, 810–811, 835, 868  |
| <b>5.1</b> Uses the periodic table to identify atomic number and mass.   | 98–104, 111–115, 154, 698, 808, 810–814, 816, 837–839   |
| <b>5.2</b> Relates relative position of elements on the periodic chart to period and group reactivity trends.  | 77, 155, 158, 160–164, 170–171, 173–175, 177, 179–209, 214, 227, 238, 416, 639–643, 658–661, 688–689, 693, 734, 868   |
| <b>5.3</b> Describes the relationships of ionization energy and electron affinity to atomic radius and describes the relationship of valence electrons to reactivity trends in the periodic table. | 159–169, 173–177, 179–186, 189, 192, 194, 196–198, 201, 205–206, 208–209, 212–215, 220, 228–231, 235, 237–238   |
| <b>6. Topic: Electron Configuration</b>  |   |
| <b>Standard:</b> Describes electron orbital configuration of common elements.  | 128, 132–141, 145–149, 159–162, 173–174, 176–177, 180–181, 183, 185, 186–187, 189, 192, 194, 196–197, 201, 205, 207, 213–214, 232–233, 235, 382, 526, 698, 734, 868   |
| <b>6.1</b> Illustrates the patterns of filling s, p, d, and f orbitals and its relation to quantum number.   | 132–141, 145–149, 159–162, 173–174, 177   |
| <b>6.2</b> Uses emission spectroscopy to illustrate change in energy levels between orbitals.  | 125–130, 142–143, 145–149   |
| <b>6.3</b> Draws electron dot structures to represent electron arrangements of atoms and molecules.  | 140–141, 145, 147–149, 160–161, 212, 237, 243–245, 247, 252–258, 261–262, 271, 273–275, 868   |
| <b>7. Topic: Nuclear Chemistry</b>   |   |
| <b>Standard:</b> Describes how energy is produced in nuclear fission reactions.  | 821–823, 835–836  |
| <b>7.1</b> Describes alpha, beta and gamma particles and how they are involved in nuclear reactions.   | 105–107, 111–112, 114–115, 807–809, 811–814, 815–816, 835–839   |
| <b>7.2</b> Evaluates the societal, economic, political and environmental impact of nuclear energy.   | 824–826, 838  |



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| Chemistry QCC  | Chemistry: Matter and Change Student Edition Pages  |
|--|---|
| <b>8. Topic: Bonding and Formation of Chemical Compounds</b>   |   |
| <b>Standard:</b> Writes formulas for and names a variety of compounds.   | 221–227, 232–233, 235–238, 248–258, 271–272, 274–275, 279, 282, 285–286, 291, 294–296, 299, 306, 338, 340–341, 349, 351, 357, 372, 450, 486, 526, 596, 600–601, 606–607, 628, 630–632, 655, 698–724, 727, 731–735, 738–753, 761–767, 770–773, 802, 868  |
| <b>8.1</b> Describes ionic and covalent bonds and describes conditions under which each would occur.   | 211–220, 235–236, 239, 241–247, 271–272, 275, 382, 416, 544, 592, 698, 700, 708, 710–711, 714, 716–723, 753–756, 764  |
| <b>8.2</b> Uses electron configuration to predict the shape and therefore properties of molecules.   | 245–247, 259–262, 270–272, 274, 698–699, 705, 708, 710, 716   |
| <b>8.3</b> Determines polarity of bonds and molecules to describe characteristics of compounds.  | 263–269, 271–272, 274, 395, 436, 455–456, 461, 482, 485–486, 632, 708–709, 716, 731, 742–746, 748–750, 765–767, 781, 784, 786–788, 800–801  |
| <b>8.4</b> Describes weak bond interactions such as Van der Waals, hydrogen, dipole-dipole, or ion-dipole bonds.   | 393–395, 398–399, 403, 413–414, 417, 436, 455–456, 461, 482, 709, 716, 727, 732, 742–746, 748–750, 766–767, 778–779, 785, 788–791, 800–801  |
| <b>9. Topic: Writing and Balancing Chemical Equations</b>  |   |
| <b>Standard:</b> Classifies four types of chemical reactions.  | 284–287, 289–291, 303–307, 868  |
| <b>9.1</b> Uses the law of conservation of matter and provides standard rules for writing and balancing equations.   | 63–65, 75–77, 82–85, 279–301, 303–307, 350, 355–357, 359–369, 371–372, 374–383, 440, 556, 579–581, 583, 586–587, 592, 594, 596, 601, 604–605, 617, 622, 625, 628, 630–632, 635, 638, 643–646, 648–649, 651–655, 657, 659–661, 670–672, 715, 734, 751, 760, 787, 796–797, 802  |
| <b>9.2</b> Predicts products of replacement reactions based on relative reactivity of reactants in terms of ionization energy, electronegativity and location in the periodic table. | 288–289, 291, 300–301, 303–307, 586–587, 639–640, 643   |
| <b>9.3</b> Classifies products of a reaction as heterogeneous or homogeneous and demonstrates how they may be separated.   | 68–69, 74, 78–79, 82–85, 295, 300–301, 585  |
| <b>9.4</b> Defines the term mole and uses this concept to determine relative amounts of reactants and products in a given equation.  | 310–337, 339–340, 342–343, 345–351, 354–363, 365–369, 371–383, 416, 486, 592, 660, 801, 803, 868–869  |
| <b>9.5</b> Determines empirical formula of a compound from experimental data.  | 331–337, 339–343, 345, 347, 349–351   |
| <b>9.6</b> Provides evidence from an experiment that a chemical reaction has occurred.   | 3, 15, 55, 57, 62–64, 74, 78–79, 114, 148, 184, 202–203, 232–233, 277–278, 292–295, 297–301, 303–304, 307, 339–340, 342–343, 353, 358, 360–362, 367, 371–372, 374–375, 489, 520–521, 529, 539, 550–551, 573, 581–582, 584, 586–587, 626–627, 635, 638, 654–655, 663, 681, 688–689, 715, 737, 751, 775, 786, 795, 796–798, 841 |
| <b>9.7</b> Determines experimentally the percentage by weight or volume of a compound.   | 370–373, 377, 381–383   |



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| Chemistry QCC  | Chemistry: Matter and Change Student Edition Pages                        |
|--|---|
| <b>10. Topic: Equilibrium</b>  |   |
| <b>Standard:</b> Writes a general expression for an equilibrium constant.  | 563–568, 574, 575–577, 581, 589–593, 604–609, 623                         |
| <b>10.1</b> Uses Le Châtelier's principle to predict relative position of an equilibrium during a reaction with a variation in temperature and pressure.     | 569–574, 588–593  |
| <b>10.2</b> Evaluates the importance of chemical equilibrium to production efficiency in industry.   | 575, 588  |
| <b>10.3</b> Calculates ionization constants of common salts in water.  | 577–587, 586, 592–593   |
| <b>11. Topic: Acids, Bases and Salts</b>   |   |
| <b>Standard:</b> Writes formulas for and names a variety of acids, bases and salts.  | 596, 600–601, 606–607, 628, 629–632, 750, 776, 780, 784–788, 791, 800–802 |
| <b>11.1</b> Operationally defines acids, bases and salts in an experimental setting using selected indicators.   | 595–596, 601, 604, 606–609, 617, 622, 629–633                             |
| <b>11.2</b> Compares the descriptions of acids/bases including Arrhenius, Brønsted–Lowry and Lewis.  | 597–604, 606–607, 629–630, 633  |
| <b>11.3</b> Uses experimentally determined pH to calculate hydrogen ion concentrations in solutions.   | 609–616, 623–625, 629, 631–633  |
| <b>11.4</b> Explains the roles of indicators in determining relative pH of a substance.  | 619–620, 626–627, 630–631   |
| <b>11.5</b> Conducts neutralization reactions in a laboratory by titration method.   | 618–621, 625–627, 632   |
| <b>12. Topic: Kinetics, Thermodynamics, Collision Theory, and Rates of Chemical Reaction</b>   |   |
| <b>Standard:</b> Graphically illustrates activation energy, activated complex, reactant, product, and reaction rates by means of a potential energy diagram. | 500, 502, 505, 507, 509, 512, 532–534, 538, 540, 549, 555, 665–666        |
| <b>12.1</b> Describes the rate and spontaneity of a reaction in terms of free energy, entropy and enthalpy.  | 513–519, 523–527, 535, 553–554, 559–560, 772, 868                         |
| <b>12.2</b> Uses potential energy diagram to predict the rate and extent of a reaction.  | 540, 549  |
| <b>12.3</b> Explains the effect of concentration, temperature, pressure, surface area and catalysts on the rate of a reaction.                               | 373, 529, 533, 536–541, 550, 552–557, 560, 656, 778–780, 796–798, 801–802 |



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| Chemistry QCC  | Chemistry: Matter and Change Student Edition Pages  |
|--|---|
| <b>13. Topic: Oxidation, Reduction</b>   |   |
| <b>Standard:</b> Defines oxidation and reduction and describes common reactions of each.   | 635–661, 663–695, 802   |
| <b>13.1</b> Describes compounds as oxidizing or reducing agents.   | 638–640, 643, 645–646, 648–661, 663, 688–689, 692–695                                     |
| <b>14. Topic: Phase Changes</b>  |   |
| <b>Standard:</b> Uses vapor pressure to describe boiling points and intermolecular interactions and uses crystal structure to describe melting points. | 61, 82, 404, 406, 408–409, 413, 415–417, 732, 868   |
| <b>14.1</b> In a laboratory, determines variables which affect evaporation, vaporization, condensation and sublimation.                                | 405, 407, 410–411, 413, 415, 766–767  |
| <b>14.2</b> Operationally defines calorie and temperature.   | 30, 491, 495, 525   |
| <b>14.3</b> In a laboratory setting, determines and graphs the total heat involved in changing a solid to a gas (e.g., ice to steam).                  | 503   |
| <b>15. Topic: Solids, Liquids and Gases</b>  |   |
| <b>Standard:</b> Compares solids, liquids, and gases in terms of collision theory and physical properties.   | 58–61, 82–83, 85, 386–403, 413, 415, 417, 423   |
| <b>15.1</b> Describes crystalline structures that define types of solids.  | 58, 400–403, 413–414, 416   |
| <b>15.2</b> Uses vapor pressure, density, and intermolecular interactions to describe liquids.   | 58–60, 61, 396–399, 403, 408–411, 413–415, 417  |
| <b>15.3</b> Uses Boyle’s, Charles’, and Ideal Gas Laws to calculate and explain the relationship of temperature, and pressure on the volume of a gas.  | 421–430, 433, 434–439, 444–445, 447–449, 451, 728–729                                     |
| <b>15.4</b> Uses concept of molar volume in calculations of gaseous products of a chemical reaction.   | 431–433, 440–443, 449, 451, 486, 592, 694, 802, 867, 868                                  |
| <b>15.5</b> Distinguishes between ideal gases and those that are not.  | 420, 435–436, 439, 445, 447, 448, 451   |
| <b>15.6</b> Applies concepts related to the behavior of gases to everyday life (e.g., seasonal tire pressure variation).                               | 60, 420, 423, 424, 427, 428, 433, 434–436, 441, 445, 446, 450–451, 522, 842–843, 850, 861 |



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|--|--|
| <b>16. Topic: Solutions</b>  |  |
| <b>Standard:</b> Given a mixture of liquids and/or solids, classifies the mixture as: homogeneous, heterogeneous, miscible, immiscible, or a colloid.  | 66–67, 69, 78–79, 82–83, 85, 114, 148, 299, 306, 453–454, 461, 476–479, 484, 487 |
| <b>16.1</b> Determines if a reaction is endothermic or exothermic when two substances are mixed.   | 292, 302, 453, 457, 489, 499–501, 513, 517, 523–524, 556                         |
| <b>16.2</b> Identifies factors that affect solubility of a substance and theories that explain the formation of solutions.   | 455–461, 484–487, 581–587, 589   |
| <b>16.3</b> Calculates appropriate amounts of substances and prepares solutions that have differing molarity, molality and normality.  | 462–470, 484–487, 556, 604, 621, 626–627   |
| <b>16.4</b> Determines the effects of solute on boiling point elevation and freezing point depression and uses data to calculate molecular weight of a solute.   | 471–475, 484–487   |
| <b>16.5</b> Describes the formation and properties (Tyndall effect) of colloids and their uses in the everyday world.  | 476–479  |
| <b>17. Topic: Organic Chemistry</b>  |  |
| <b>Standard:</b> Uses the structure of methane as a model structure to draw configurations of, and name, representative classes of organic compounds. Discusses the solubility properties of such compounds. | 698–724, 727, 731–735, 738–753, 761–767, 770–773, 776–778, 780–791, 800–803      |
| <b>17.1</b> Describes the applications of organic compounds to modern industry, such as the pharmaceuticals and plastics industries.   | 740–741, 752, 754, 757, 759, 761–765, 768–770, 772                               |



# Georgia Quality Core Curriculum Standards

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| 1.1 The Stories of Two Chemicals                     | 2–6                   | 1, 1.2, 2, 2.1, 3.1, 9.6                               |
| 1.2 Chemistry and Matter                             | 7–9                   | 4  |
| 1.3 Scientific Methods                               | 10–13                 | 1.2, 2   |
| 1.4 Scientific Research                              | 14–23                 | 1, 1.1, 1.2, 2, 2.1, 3.1, 4, 9.6                       |
| <b>Chapter 2 Data Analysis</b>                       |                       |  |
| 2.1 Units of Measurement                             | 24–30                 | 1, 1.2, 2.1, 3.1, 14.2                                 |
| 2.2 Scientific Notation and Dimensional Analysis     | 31–35                 |  |
| 2.3 How reliable are measurements?                   | 36–42                 | 1.2  |
| 2.4 Representing Data                                | 43–53                 | 1, 1.2, 2, 2.1, 3.1, 4                                 |
| <b>Chapter 3 Matter—Properties and Changes</b>       |                       |  |
| 3.1 Properties of Matter                             | 54–60                 | 1, 1.2, 2, 2.1, 3.1, 9.6, 15, 15.1, 15.2, 15.6         |
| 3.2 Changes in Matter                                | 61–65                 | 2, 9.1, 9.6, 14, 15, 15.2                              |
| 3.3 Mixtures of Matter                               | 66–69                 | 1, 1.2, 3.1, 9.3, 16                                   |
| 3.4 Elements and Compounds                           | 70–85                 | 1, 1.2, 2, 2.1, 3.1, 4, 5.2, 9.1, 9.3, 9.6, 14, 15, 16 |
| <b>Chapter 4 The Structure of the Atom</b>           |                       |  |
| 4.1 Early Theories of Matter                         | 86–91                 | 1, 1.2, 2, 2.1   |
| 4.2 Subatomic Particles and the Nuclear Atom         | 92–97                 | 1, 1.2, 2, 5   |
| 4.3 How Atoms Differ                                 | 98–104                | 1, 1.2, 2, 5, 5.1                                      |
| 4.4 Unstable Nuclei and Radioactive Decay            | 105–115               | 1, 1.2, 2, 2.1, 3.1, 4, 5, 5.1, 7.1, 9.6, 16           |
| <b>Chapter 5 Electrons in Atoms</b>                  |                       |  |
| 5.1 Light and Quantized Energy                       | 116–126               | 1, 1.2, 2, 2.1, 3.1, 5, 6.2                            |
| 5.2 Quantum Theory and the Atom                      | 127–134               | 2, 5, 6, 6.1, 6.2                                      |
| 5.3 Electron Configurations                          | 135–149               | 1, 1.2, 2, 2.1, 3.1, 4, 5, 6, 6.1, 6.2, 6.3, 9.6, 16   |
| <b>Chapter 6 The Periodic Table and Periodic Law</b> |                       |  |
| 6.1 Development of the Modern Periodic Table         | 150–158               | 1, 1.2, 2, 2.1, 3.1, 5.1, 5.2                          |
| 6.2 Classification of the Elements                   | 159–162               | 5.2, 5.3, 6, 6.1, 6.3                                  |
| 6.3 Periodic Trends                                  | 163–177               | 1, 1.2, 2, 2.1, 3.1, 5.2, 5.3, 6, 6.1                  |
| <b>Chapter 7 The Elements</b>                        |                       |  |
| 7.1 Properties of s-Block Elements                   | 178–185               | 1, 1.2, 2.1, 3.1, 4, 5.2, 5.3, 6, 9.6                  |
| 7.2 Properties of p-Block Elements                   | 186–196               | 4, 5.2, 5.3, 6   |
| 7.3 Properties of d-Block and f-Block Elements       | 197–209               | 1, 1.2, 2, 2.1, 3.1, 4, 5, 5.2, 5.3, 6, 9.6            |



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| 8.2 The Formation and Nature of Ionic Bonds        | 215–220               | 5.3, 8.1   |
| 8.3 Names and Formulas for Ionic Compounds         | 221–227               | 5.2, 8   |
| 8.4 Metallic Bonds and Properties of Metals        | 228–239               | 1, 1.2, 2, 2.1, 3.1, 4, 5.2, 5.3, 6, 6.3, 8, 8.1, 9.6    |
| <b>Chapter 9 Covalent Bonding</b>                  |                       |  |
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| 9.5 Electronegativity and Polarity                 | 263–275               | 1, 1.2, 2, 2.1, 3.1, 6.3, 8, 8.1, 8.2, 8.3               |
| <b>Chapter 10 Chemical Reactions</b>               |                       |  |
| 10.1 Reactions and Equations                       | 276–283               | 1, 1.2, 2.1, 3.1, 8, 9.1, 9.6                            |
| 10.2 Classifying Chemical Reactions                | 284–291               | 8, 9, 9.1, 9.2   |
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| <b>Chapter 11 The Mole</b>                         |                       |  |
| 11.1 Measuring Matter                              | 308–312               | 1, 1.2, 2.1, 9.4   |
| 11.2 Mass and the Mole                             | 313–319               | 5, 9.4   |
| 11.3 Moles of Compounds                            | 320–327               | 9.4  |
| 11.4 Empirical and Molecular Formulas              | 328–337               | 1, 1.2, 3.1, 9.4, 9.5                                    |
| 11.5 The Formula for a Hydrate                     | 338–351               | 1, 1.2, 2, 2.1, 3.1, 4, 8, 9.1, 9.4, 9.5, 9.6            |
| <b>Chapter 12 Stoichiometry</b>                    |                       |  |
| 12.1 What is stoichiometry?                        | 352–357               | 1, 1.2, 2.1, 3.1, 8, 9.1, 9.4, 9.6                       |
| 12.2 Stoichiometric Calculations                   | 358–363               | 1, 1.2, 3.1, 9.1, 9.4, 9.6                               |
| 12.3 Limiting Reactants                            | 364–369               | 9.1, 9.4, 9.6  |
| 12.4 Percent Yield                                 | 370–383               | 1, 1.2, 2, 2.1, 3.1, 6, 8, 8.1, 9.1, 9.4, 9.6, 9.7, 12.3 |
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