

# Index

- Abel, 91  
 absolute geometry, 140  
 absolute space, 139–140, 161–163, 165  
 Academos, 48  
 Academy of Sciences (St. Petersburg), 92, 180  
 Academy (Plato), 48, 61  
 Adelard, 66–67  
 advanced geometry, 146  
 Ahmes, 27  
 al-Abbas, 62  
 Alexander I (czar of Russia), 111, 116–117, 143  
 Alexander the Great, 43, 47  
 Alexandria, Egypt, 47–48  
 al-Fazari, Muhammed, 62  
 algebra, 63–64, 80–82  
*Alice's Adventures in Wonderland* (Carroll), 200  
 al-Khwarizmi, 63, 67  
 al-Kindi, Abu Yusuf, 63  
*Almagest* (Ptolemy), 22, 62  
 al-Mahans, 64  
 al-Ma'mon, Abdallah, 62, 63  
 al-Nairizi, 64  
 American Fur Company, 159  
*American Mathematical Monthly*, 202  
 Anaxagoras, 41  
 Anaximander, 33  
 anti-Euclidean geometry, 126  
 Arabic numerals, 62, 67–68  
 Archimedes, 49, 59, 100  
 Archytas of Tarentum, 42  
 Aristotle, 23–24, 43, 50  
*Arithmetica Infinitorum* (Wallis), 74  
 astral geometry, 127–129  
 astronomy  
   Ceres discovery, 83–94  
   Lobachevsky on, 150–151  
   Ptolemaic system, 68–69  
   terrestrial magnetism, 172–173  
 atheism, 116–117  
 at-Tusi, Nassiruddin, 65–66, 75  
 Avicenna, 64  
 Babylonians, 27–28  
 Bacon, Roger, 67  
 Baltzer, Richard, 197  
 Bartels, Johann Christian Martin, 16–17, 111–113, 116  
 bell curve, 11  
 Beltrami, Eugenio, 197–199  
 ben Gerson, Levi, 68  
 Benze, Dorothea. *See* Gauss, Dorothea (mother)  
 Berlin, Germany, 134–135  
 Berlin Academy of Sciences, 4, 5  
 Beruilius, 64  
 Bessel, Friedrich, 120, 128, 133  
 big bang theory, 210  
 Billingsley, Sir Henry, 68  
 binomial theorem, 19  
 birth date calculation, by Gauss, 13  
 Bode, J. E., 84  
 Bolyai, Farkas, 113–114  
   death of, 187  
   Gauss and, 45–46, 77–82, 92, 97–98, 102–103, 120–121, 154–155, 161–163

- Bolyai, Farkas (*continued*)  
 “Göttingen theory of parallels,”  
 79–80  
 Lobachevsky and, 180–183  
 on son’s pursuit of fifth postulate  
 study, 137–140  
*Tentamen*, 154–155, 165
- Bolyai, János, 2, 9, 137–140  
 appendix to *Tentamen* (F. Bolyai) by,  
 154–155, 165  
 death of, 184  
 education of, 113–114, 121  
 on fifth postulate, 139–140  
 Gauss and, 154–155, 161–163,  
 181–183  
 health of, 164–165, 187  
 legacy of, 187–188  
 Lobachevsky and, 151, 180–183  
*The Science of Absolute Space*, 161–163,  
 165  
 Szász and, 138–139  
 works of, advanced by others,  
 197–200
- Bolyai, Rozália Kibédi von Orbán,  
 164–165
- Boncompagni, Prince Baldassare,  
 187
- Bonner, F. K., 111, 141–142
- Braque, Georges, 200
- Brewster, Sir David, 171
- Bruno, Giordano, 106
- Brunswick, Duke of, 17–19, 82, 92, 96,  
 98–100, 119–120
- Brunswick, Germany, 12
- Burckhardt, Johann Karl, 86–88
- Büttner, Mr. (Gauss’ teacher), 15–17
- calculus, 181
- calendars, 27, 75
- Cambridge, Duke of, 168
- Campanus of Novara, 68
- Carnot, Lazare, 3
- Carroll, Lewis, 200–201
- Cataldi, Pietro Antonio, 68
- Cauchy, Augustin, 3
- celestial mechanics, 87, 207–210
- Ceres  
 Burckhardt on, 86–88  
 Gauss on, 83, 84, 88–94
- Piazzi on, 83–86, 88  
 Zach on, 85–86, 89, 94
- Chaldeans, 48
- Charles I (king of England), 72
- Charles II (king of England), 74
- Charles X (king of France), 173
- Cicero, 48
- circles  
 F. Bolyai on, 78  
 third postulate on, 52, 54
- Clairaut, 87
- Clifford, William Kingdon, 197
- Collegium Carolinum (Brunswick,  
 Germany), 19–20
- communication technology, Gauss and,  
 167–172
- complex numbers, 11
- Conatum Praecipuorum Theoriam  
 Parallelarum Demonstrandi Recensio*  
 (Klügel), 107–108
- “Concise Outline of the Foundations of  
 Geometry with Vigorous Proofs of  
 the Theorem of Parallels, A”  
 (Lobachevsky), 149
- Confederation of the Rhine, 99
- Copernican system, 69
- Copernicus, Nicolaus, 69, 87
- Copley medal (Royal Society of  
 London), 176
- Critique of Practical Reason* (Kant), 110
- Critique of Pure Reason* (Kant), 110, 202
- Cromwell, Oliver, 73–74
- Cromwell, Richard, 74
- cryptography, 71–76
- cubism, 200
- curvature  
 bell curve, 11  
 curved space-time concept, 208  
*Disquisitiones Generales circa Superficies  
 Curves* (Gauss), 100, 146  
 Gaussian curvature, 145–146  
 hyperbolic curve, 53–54, 61, 195–196  
 theory of curved surfaces, 144–146
- Cylon, 37–38
- d’Alembert, Jean le Rond, 52
- Dase, Zacharias, 18
- Declaration of Independence, 54
- Dedekind, Richard, 198

- Delphi, 32–33  
 Democritus, 41  
 De Morgan, Augustus, 106  
 Descartes, René, 69–70, 70  
 differential calculus, 144  
 differential geometry, 144  
 Dinostratos, 42  
 “Direction for Obtaining Knowledge of All Dark Things” (Ahmes), 27  
*Disquisitiones Arithmeticae* (Gauss), 11, 81–82  
*Disquisitiones Generales circa Superficies Curves* (Gauss), 100, 146  
 Dodgson, Reverend C. L., 200–201  
 Duchamp, Marcel, 200  
 Düring, Eugen, 203
- Earth, terrestrial magnetism, 172–173  
 Eckwehr, Johann Walter von, 140  
 École Normale Supérieure, 6  
 École Polytechnique, 6  
 Eddington, Sir Arthur, 69, 207  
 Egypt, 26–27, 64  
     Alexandria, 47–48  
     Thales in, 30  
 Einstein, Albert, 196, 204, 208–210  
 electrodynamics, 208  
 electromagnetic telegraphy, 167–172  
*Elementa* (Taurinus), 129  
*Elements* (Euclid)  
     contributions to/editions of, 40, 42, 50–51, 60, 76  
     Euclid on fifth postulate in, 2, 6–7, 8, 49–55, 57  
     influence of, 22–24  
     organization of, 51–52  
     “Elements of Geometry” (Lobachevsky), 151–154  
*Elements of Mathematics* (Baltzer), 197  
 eleventh axiom, 52  
 elliptical geometry, 194–196  
 elliptical integrals, 91  
 Encke, Johann Franz, 119  
 England  
     Charles I, 72  
     Charles II, 74  
     Civil War, 71–74  
     Euclid taught in, 77  
     George I, 155  
     George II, 20  
     George V, 160  
     Victoria, 174  
     William IV, 174  
 Eötvös, Baron József, 187  
 equal sign, 57  
 equidistance concept, 58, 68  
 equivalence of similar triangles, 31  
 Eratosthenes, 49  
 Ernest Augustus (king of Hanover), 174  
 Euclid, 2, 6–7, 8, 22–24, 49–55. *See also Elements* (Euclid); fifth postulate  
*Euclid and His Modern Rivals* (Dodgson), 200  
 Euclidean geometry, non-Euclidean geometry compared to, 200–203. *See also Elements* (Euclid); fifth postulate  
*Euclides ab Omni Naevo Vindicatus* (Euclid Freed from All Flaws) (Saccheri), 105  
 Eudemus of Rhodes, 40, 42  
 Eudoxus of Cnidos, 42, 50  
 Euler, 87  
 Euler, Leonhard, 134–135, 144  
 Europe. *See individual names of countries*  
 Ewald, George Henry, 160, 174–175  
 Ewald, Wilhelmine “Minna” Gauss (Gauss’s daughter), 160–161, 174–175  
 exceptional theorem (*theorem egregium*), 145–146
- Faraday, Michael, 169  
 Ferdinand, Karl Wilhelm. *See Brunswick, Duke of*  
 Fermat, Pierre de, 70  
     Fermat number, 21  
     last theorem of, 1–2, 39  
 fifth postulate  
     defined, 7–8, 52–53  
     Euclid on, 2, 6–7, 8, 49–55, 57  
     Lagrange on, 6–9  
     non-Euclidean geometry compared to Euclidean geometry, 200–203  
     rejection of, 105–110, 124–125  
     study of, in Middle Ages, 57–70

- fifth postulate (*continued*)  
*See also* Bolyai, Farkas; Bolyai, János;  
 Gauss, Carl Friedrich;  
 Lobachevsky, Nikolai; non-  
 Euclidean geometry  
*Foundations of Geometry* (Hilbert), 204  
 fourth postulate, 52  
 France, 3, 6  
   Charles X, 173  
   Institute of France, 83, 115  
   Louis XIV, 72–73  
   Louis XVI, 4  
   Napoleon and, 3, 5–6, 20, 98–102,  
     102, 116–117, 175 (*See also*  
     Napoleon I [Napoleon  
     Bonaparte])  
   tenth century, 64  
 Franklin, Benjamin, 20  
 Frederick the Great, 5, 134  
 Frederick VI (king of Denmark), 131  
 French Academy of Sciences, 5, 82  
 French Revolution, 3  
 Fuks (professor), 140, 144  
 Fuss, Nikolaus von, 92
- Galileo Galilei, 70, 87  
 Gaspar, Don, 106  
 Gauss, Carl Friedrich, 2, 9, 209–210  
   on astronomy, 82, 83, 87, 88–94  
   brain of, 189–190  
   on curvature, 144–146  
   *Disquisitiones Arithmeticae*, 11, 81–82  
   *Disquisitiones Generales circa Superficies*  
     *Curves*, 100, 146  
   family of, 12–17, 97–98, 114–116, 121,  
     123–124, 134–135, 157–161, 184  
     (*See also individual names of family*  
     *members*)  
   F. Bolyai and, 45–46, 77–82, 92,  
     97–98, 102–103, 120–121, 154–155,  
     161–163  
   fifth postulate rejected by, 105, 108–  
     110, 124–125  
   on geodesy, 129–134, 146  
   *Intensitas vis Magneticae Terrestis ad*  
     *Mensuram Absolutam Revocata*, 172  
   inventions of, 130, 167–170  
   J. Bolyai and, 154–155, 161–163, 181–  
     183  
   legacy of, 10–12, 22, 188–191  
   Lobachevsky and, 178–183, 196–197  
   on method of least squares, 90–94,  
     132  
   during Napoleonic Wars, 98–102, 175  
   on non-Euclidean geometry, 10, 12,  
     19–20, 155–156  
   patronage, 17–19, 82, 92, 96, 98–100,  
     119–120  
   on publishing, 91, 95–97, 118–120,  
     163  
   Riemann and, 193–196  
   Schweikart and, 127–129  
   septadecagon figure by, 20–21, 46,  
     80, 119–120  
   on terrestrial magnetism, 172–173  
   *Theoria Motus Corporum*, 92–93  
   at University of Göttingen, 101–102,  
     116, 117, 123–124 (*See also*  
     University of Göttingen)  
   Wachter and, 125–126  
 Gauss, Dorothea (mother), 12,  
   123–124, 175, 176  
 Gauss, Eugene (son), 115, 130, 157–160  
 Gauss, Gebhard Dietrich (father), 12  
 Gauss, George (brother), 18  
 Gauss, Johanna Elisabeth Rosina  
   Osthoff (first wife), 97–98, 114–115  
 Gauss, Joseph (son), 92, 159, 160  
 Gauss, Louis (son), 114  
 Gauss, Minna Waldeck (second wife),  
   115–116, 121, 123–124, 134–135,  
   158, 160–161  
 Gauss, Theresa (daughter), 115, 189  
 Gauss, Wilhelmine “Minna”  
   (daughter), 160–161, 174–175  
 Gauss, William (son), 159  
 Gaussian curvature, 145–146  
 gauss (measurement), 172  
 Gauss-Weber current-reversing great  
   galvanic circuit, 167–170  
 Geminus of Rhodes, 58–59  
 general theory of relativity, 196,  
   208–210  
 geodesy, 129–134, 146  
*Geometriya* (Lobachevsky), 142–143  
 geometry  
   absolute geometry, 140  
   advanced geometry, 146

- astral geometry, 127–129  
 development of, in Italy, 33–41  
 differential geometry, 144  
 Egyptians and, 27  
 elliptical geometry, 194–196  
 Euclidean compared to non-Euclidean, 200–203  
 Greeks on, 41–43  
 imaginary geometry, 150, 153, 177–180  
 loss of, in Dark Ages, 61–62  
 method of least squares, 90–94, 132  
 projective geometry, 144  
 Pythagoras on, 37  
 solid geometry, 51  
 universal geometry, 105–108  
*See also non-Euclidean geometry; individual names of geometric figures*  
 Geometry (Descartes), 69–70  
 George I (king of England), 155  
 George II (king of England), 20  
 George V (king of England), 160  
 Gerling, Christian Ludwig, 96, 109, 124, 127, 162  
 Germain, Sophie, 3, 99–101  
 Germany, 183  
   astronomy and, 85  
   Berlin, 134–135  
   Brunswick, 12  
   Collegium Carolinum, 19–20  
   German emigration to U.S., 159–160  
   Hanover, 160, 174  
   railroads of, 170–171  
   Royal Society of Sciences (Göttingen), 179  
   St. John's Church (Göttingen), 167, 173  
   St. Katherine's (Brunswick), 14–17  
   St. Michael's (Lüneberg), 131  
   *See also Gauss, Carl Friedrich; University of Göttingen*  
 Giza, Egypt, 30–31  
 Golitsin, Prince A. N., 141  
 Göttingen Seven, 173–175  
 "Göttingen theory of parallels" (Farkas Bolyai), 79–80  
 gravity, 208–209  
 Greece, 31, 41–43, 47–48, 53, 59–60  
 Gregorian calendar, 27, 75  
 Gregory, David, 74  
 Hall of Wisdom, 64  
 Hamilton, Alexander, 7  
 Hanover, 160, 174  
 heliotrope, 130  
 Helmholtz, Hermann von, 197, 204  
 Hermadamas, 33  
 Herodotus, 30  
 Hero of Alexandria, 60  
 Herschel, William, 83  
 Hilbert, David, 204  
 Hindu numerals, 62, 67–68  
 Hipparchus, 49  
 Hippias of Elis, 42  
 Hippocrates of Chios, 42  
 Hippocrates of Cos, 42  
*Hisab al-jabr wal-mugabala* (Khwarizmi), 63–64  
 Hoüel, Guillaume-Jules, 188, 197  
 House of Wisdom, 63  
 Hubble, Edwin, 209–210  
 Hulagu, 65  
 Humboldt, Alexander von, 91–92, 175  
 Hungarian Academy of Sciences, 165, 187–188  
 Hungary  
   Hungarian Academy of Sciences, 165, 187–188  
   recognition of J. Bolyai by, 162, 187–188  
   *See also Bolyai, Farkas; Bolyai, János*  
 Huygens, Christian, 70  
 Hypatia, 60  
 hyperbolic curve, 53–54, 61, 195–196  
 ibn abd al-Baqi, Muhammed, 65  
 ibn Ishaq, Hunain, 63  
 ibn Musa brothers, 62–63  
 ibn Qurra, Thabit, 63  
 ibn Sina, 64  
 ibn Yazid, Khalid, 61–62  
 ibn Yusuf, al-Hajjaj, 62–63, 64  
 imaginary geometry, 150, 153, 177–180. *See also Lobachevsky, Nikolai*  
 imaginary numbers, 11  
 infinite series, 19

- Inselberg-Brocken-Hohenhagen triangle, 133, 150–151
- Institute of France, 83, 115
- instrument (musical) design, 35
- integer problem, Gauss on, 15–16
- Intensitas vis Magneticae Terrestris ad Mensuram Absolutam Revocata (Intensity of the Earth's Magnetic Force Reduced to Absolute Measurement)* (Gauss), 172
- Isidoros of Miletus, 51
- Islam, 61–66
- Italy, 33–41
- Jacobi, Carl Gustav Jacob, 96
- Jefferson, Thomas, 101
- Jensen, Christian Albrecht, 11
- Julian calendar, 27, 75
- Justinian, 61
- Kant, Immanuel, 110, 141–144, 143, 202
- Kästner, Abraham, 107–108
- Kazan Messenger*, 151–154
- Kepler, Johannes, 69, 70, 87
- Khayyam, Omar, 65
- Klein, Felix, 198
- Klügel, Georg Simon, 76, 107–108
- Kondyrev, P. S., 116
- Lagrange, Joseph-Louis, 3–10, 82, 87, 134
- Gauss and, 11
- Mécanique analytique*, 7
- Lambert, Johann, 76
- Lambert, John Henry, 108
- land surveying, 27
- Laplace, Pierre-Simon, 3, 87, 90, 101, 102
- Lavoisier, Antoine, 5
- Le Blanc. *See* Germain, Sophie
- Legendre, Adrien-Marie, 3, 76–77, 82, 91
- on differential geometry, 144
- Gauss and, 95–96
- Germain and, 100
- on method of least squares, 93
- Leibniz, Gottfried Wilhelm, 70, 71, 89, 181–182
- Leodamaso of Thasos, 42
- Leonardo of Pisa, 67
- Leon (Byzantine emperor), 42, 62
- Life of Pythagoras* (Porphyry), 38–39
- lines
- hyperbolic curve and, 61
- J. Bolyai on straight lines, 140
- postulates one and two on, 52
- See also* geometry; non-Euclidean geometry; parallel lines
- Littrov, I. A., 111
- Lobachevsky, Alexi (son), 186
- Lobachevsky, Nikolai, 2, 9, 17, 112–113, 116–117, 148–149, 166
- “A Concise Outline of the Foundations of Geometry with Vigorous Proofs of the Theorem of Parallels,” 149
- as atheist, 116–117
- “birth” of non-Euclidean geometry and, 149–151
- Bolyai family and, 180–183
- “Elements of Geometry,” 151–154
- family life of, 166, 184–186
- Gauss and, 178–183
- Geometriya*, 142–143
- on imaginary geometry, 177–180
- legacy of, 197–200
- New Elements of Geometry*, 177
- Pangeometry*, 185
- at University of Kazan, 111–113, 116–117, 141–144, 148–149, 151–154, 177, 180, 185
- Lobachevsky, Varvara Alexeyavna Moiseyeva (wife), 166, 185
- Lorentz, Hendrik, 208
- “lost rectangle,” 150
- Louisiana Purchase, 98, 101
- Louis XIV (king of France), 72–73
- Louis XVI (king of France), 4
- Lyle, John, 202
- Magnitsky, M. L., 141–142
- Mamercus, 41–42
- maps, 130–134. *See also* geodesy
- Maric, Mileva, 204
- Marie Antoinette, 5
- Martini, Sylvester, 106

- mathematics  
   algebra, 63–64  
   ancient Greek development of, 41–43  
     (See also Pythagoras)  
   calculus dispute, 181–182  
   Egyptians and Babylonians on, 28–29  
   mathematical harmony, 40  
   Napoleon Bonaparte on, 6  
   Romans and, 59–60  
   systematic proof, 54  
   trigonometry, 64  
   See also geometry; non-Euclidean geometry  
 Maxwell, James Clerk, 172, 208  
*Mécanique analytique* (Lagrange), 7  
 Menaechmos, 42  
 Mentovich, Franz, 180  
 method of least squares, 90–94, 132  
 metric system, 6  
 Metternich, Count, 125  
 Milo, 38  
 Ministry of Religious Affairs and  
   National Education (Russia), 141–142  
 Mnesarchus, 32–33  
 modern art, 200  
 Moiseyeva, Varvara Alexeyavna, 166, 185  
*Monatliche Correspondenz* (German magazine), 85, 88  
 Mongols, 65–66  
 Moscow University, 179  
 Münster, Count, 155  
 music theory, 35  
 Musin-Pushkin, Count M. N., 144  
  
 Napoleon I (Napoleon Bonaparte), 3, 5–6, 20, 175  
   battlefield communication used by, 168  
   Napoleonic Code, 102  
   Napoleonic Wars, 98–102, 116–117  
 Neoclides, 42  
*New Elements of Geometry* (Lobachevsky), 177  
 Newton, Isaac, 19, 70, 87  
   calculus discovery, 181–182  
   Gauss on, 109  
   *Principia*, 51, 81, 89  
  
 Nicholas I (czar of Russia), 143  
 non-Euclidean geometry, 2, 9–10  
   criticism of, 200–203  
   elliptical geometry, 194–196  
   Gauss on, 102–103, 118–120, 128  
   impact of, 190–191, 203–205, 207–210  
   J. Bolyai on, 139–140  
   Lobachevsky on, 149–151  
   similar triangles and, 76  
   See also Bolyai, Farkas; Bolyai, János; Gauss, Carl Friedrich; Lobachevsky, Nikolai  
 “normal” distribution, 11  
*n*-space, 195–196  
  
 Oenopides of Chios, 42  
 Olbers, Heinrich, 89, 95–96, 102, 109, 114, 126, 172, 176  
 “On the Hypotheses Which Lie at the Basis of Geometry” (Riemann), 194  
*On the Space Theory of Matter* (Clifford), 197  
 oracle of Delphi, 32–33  
 Orbán, Rozália Kibédi von, 164–165  
 Osthoff, Johanna Elisabeth Rosina. See Gauss, Johanna Elisabeth Rosina Osthoff (first wife)  
 Ostrogradskii, Mikhail Vasilievich, 151–154  
 Oxford University, 67, 71–76  
  
*Pangeometry* (Lobachevsky), 185  
 parallel lines, 2  
   elliptical geometry and, 194–196  
   equal sign and, 57  
   equidistance concept, 58, 68  
   Lobachevsky on, 150–151  
   parallel, defined, 52–53  
   See also fifth postulate; lines  
*Pathwaie to Knowledge* (Recorder), 68  
 patronage, Gauss and, 17–19  
 Pericles, 41  
 Pherecydes of Syria, 33  
 Philip of Macedon, 43  
 Phoenecians, 48  
 physics, 207–210  
 Piazzi, Giuseppe, 83–86, 88

- Picasso, Pablo, 200  
 Plato, 23–24, 30, 41, 42  
   Academy of, 48, 61  
   on geometry, 55  
   on music theory, 35  
 Playfair, John, 76  
 Plutarch, 30  
 Poincaré, Henri, 199–200, 205  
 Poisson, Siméon-Denis, 3  
 Polycrates, 33  
 Poncelet, Jean-Victor, 144  
 Porphyry, 34, 38–39  
 Posidonius, 58  
 postulates, 43, 51–52  
*Principia* (Newton), 51, 81, 89  
 printing press, 22  
 probability, 11  
 problem of libration, 4  
 Proclus, 42, 60–61, 68  
 projective geometry, 144  
 Prussia, 98  
 pseudosphere, 198  
 Ptolemaic system, 68–69  
 Ptolemy, Claudius, 22, 58, 62, 68–69  
 Ptolemy (king of Egypt), 47–49  
 Pythagoras, 2, 24, 26–27, 29, 33–34, 84  
   biographical information, 32–33  
   legacy of, 40–41  
   legends about, 25–26, 34–35  
   Pythagoreans and, 34, 35–39, 48  
   Pythagorean theorem, 28, 39–40, 201  
   travel to Egypt by, 31–32  
 Pythagorean triangles, 40  
  
 railroads, 170–171, 184  
 Recorde, Robert, 57, 68  
*reductio ad absurdum*, 42, 105  
 Reid, Thomas, 108  
 Reign of Terror, 4–5  
 relativity, defined, 208  
 Renner, K. F., 111  
*Review of the Most Celebrated Attempts at  
   Demonstrating the Theory of Parallels*  
   (Klügel), 107–108  
 Riemann, Bernhard, 184, 193–196, 209  
 right angles, fourth postulate on, 52  
 right triangles, 40  
 Ritter, Friedrich Behrend, 97  
 Ritter, George Karl, 97  
  
 Royal Society of London, 92, 176  
 Royal Society of Sciences (Göttingen,  
   Germany), 179  
 Russia  
   Alexander I, 111, 116–117, 143  
   cholera epidemic, 147–149, 154  
   Ministry of Religious Affairs and  
   National Education, 141–142  
   Napoleonic Wars, 98–102, 116–117  
   (See also Napoleon I [Napoleon  
   Bonaparte])  
   Nicholas I, 143  
   University of Kazan and, 141–144  
   (See also University of Kazan)  
   See also Lobachevsky, Nikolai  
  
 Saccheri, Giovanni Girolamo, 105–108,  
   127  
 Savile, Sir Henry, 69, 73  
 Schumacher, Heinrich Christian, 119,  
   131, 161, 178  
 Schwab, J. C., 125  
 Schweikart, Ferdinand Karl, 127–129  
 science  
   of absolute space, 139–140, 161–163,  
   165  
   Aristotle on, 23  
   astronomy, 68–69, 82, 83–94, 150–  
   151, 172–173  
   Egyptians and Babylonians on, 28  
   *Elements* as scientific book, 50  
   geodesy, 129–134, 146  
   physics, 207–210  
   *Science of Absolute Space, The* (J. Bolyai),  
   161–163, 165  
 Scott, Winfield, 159  
 second postulate, 52  
 septadecagon, 19–21, 46, 80,  
   119–120  
 Seyffer (professor), 77  
 similar triangles, 31, 75–76  
 Socrates, 41  
 solar eclipse (May 1919), 207  
 solid geometry, 51  
*Son of Fatherland* (St. Petersburg  
   journal), 153  
 Spain, 64  
 special relativity, 208  
 speed of light, 208

- spheres  
 pseudosphere, 198  
 surface of infinite sphere, 126
- St. John's Church (Göttingen, Germany), 167, 173
- St. Katherine's (Brunswick, Germany), 14–17
- St. Michael's (Lüneberg, Germany), 131
- St. Petersburg Academy of Sciences, 151–154
- Staufenau, Constantine, 189
- straight lines. *See* lines; parallel lines
- Sylvester II (pope), 64
- Szász, Carl, 138–139
- Taurinus, Franz Adolf, 128–129
- telegraphy, 167–172
- Tentamen* (F. Bolyai), 154–155, 165
- terrestrial magnetism, 172–173
- Thales, 2, 24, 29–31, 33
- Theaetetus of Athens, 42, 50
- Theodorus of Cyrene, 23, 42
- Theon of Alexandria, 60
- theorema egregium* (exceptional theorem), 145–146
- Theoria Motus Corporum* (Theory of Motion of the Heavenly Bodies) (Gauss), 92–93
- theory of curved surfaces, 144–146
- Theory of Parallels* (Lambert), 108
- Theudios of Magnesia, 42
- third postulate, 52, 54
- Tilly, Joseph, 197
- time measurement, 28
- Titus, J. D., 84
- triangles  
 Inselberg-Brocken-Hohenhagen triangle, 133, 150–151  
 Pythagorean, 40  
 similar, 31, 75–76
- trigonometry, 64
- Turner, Peter, 73
- twelfth axiom, 52
- United States, German immigration to, 158–160
- universal geometry, 105–108
- University of Göttingen, 19, 45–46, 77–82, 92, 135  
 Göttingen Seven, 173–175  
 Kästner and, 107–108  
 Napoleon and, 101–102  
 observatory, 116, 117, 123–124  
 Olbers, 90  
 Saccheri and, 108  
*See also* Gauss, Carl Friedrich
- University of Kazan, 116–117, 177, 180, 185  
 cholera epidemic and, 148–149  
 inception of, 111–113  
 Kantianism and, 141–144  
*Kazan Messenger*, 151–154  
*See also* Lobachevsky, Nikolai
- Uranus, 83
- Vállas, Antal, 165
- Vere, Lady Mary, 71
- Viccomes, Ignatius, 106
- Victoria (queen of England), 174
- von Zach, Baron Franz Xaver. *See* Zach, Baron Franz Xaver von
- Wachter, Friedrich Ludwig, 125–126
- Wafa, Abu-al, 64
- Waldeck, Minna. *See* Gauss, Minna Waldeck (second wife)
- Wallis, John, 70, 71–76, 105
- Weber, William, 167–171, 173–175, 183
- Westphalia, 99
- Wheeler, John Archibald, 209
- Wiles, Andrew, 1–2
- Wilkes, Charles, 173
- William IV (king of England), 174
- Windebank, Sir Francis, 72
- $y=1/x$  (hyperbolic curve), 53–54
- Zach, Baron Franz Xaver von, 85–86, 89, 94, 130
- Zeno, 41
- Zimmerman, Eberhard August Wilhelm von, 17–18, 119–120













