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Share/Bookmark Nutrition Unit (Preschool, K) February is Nutrition Month. Several activities for learning about foods and nutrition. Food & Nutrition @ Little Giraffes Teaching Ideas (Preschool, K) Photos and ideas for teaching a theme about food. Food and Nutrition Theme (Preschool-K) Printable activities, resources, crafts, and lessons for young children. Eat Right! (1-4) A nutritional art activity. Leafy Greens Lesson Plans (3-5) Students are led through activities across the core curriculum by a team of five dinosaur characters dressed in baseball uniforms who are the "Cruciferous Crusaders" All-Star Cancer Fighting Baseball Team. MyPyramid for Kids (All ages) Printable resources and classroom materials from the USDA. Nutrition Lesson Plans – Fun Hands-on Activities (3-5) Students learn about the four food groups by cutting pictures of food out of newspapers to make projects. Nutrition Education Resources Lesson Plan Collection: Ten lesson plan activities for K-2, 5 activities for grades 3-5, and 16 more lessons for preschool through secondary. Resources Ten Tips Nutrition Education Series Easy-to-follow tips in PDF format. These are a great resource for learning how to eat healthy and correctly teach students. Curriculum Resources Company Shop Support Platform Login Curriculum Resources Company SUBJECT: PHYSICAL AND HEALTH EDUCATION TERM: THIRD TERM WEEK: WEEK 1 CLASS: PRIMARY 5 DURATION: 40 MINUTES TOPIC: FOOD AND NUTRITION UNITS: Sources of food NutrientNutritional Deficiency Diseases PERFORMANCE OBJECTIVES At the end of this discussion in this unit, children should be able to: Mention sources of food nutrients.Know about Nutrition deficiencies TEACHING AND LEARNING MATERIALS Whiteboard/ChalkboardExplanatory posters/picturesFruitsPalm oilVegetable oilVegetablesGrains TEACHINNG AND LEARNING MATERIALS ExplanationDiscussionQuestions and answer REFERENCE MATERIALS NERDC Basic Education Curriculum (UBE)Lagos State Scheme of Work.Online Materials.Physical and Health Education for Primary Schools CONTENT SOURCES OF NUTRIENTS Nutrients are found in the variety of foods that we eat. We have six types of food from where we get all nutrients. TYPES OF FOOD Carbohydrates: Energy giving foods, made up of sugars or starches. Examples are yam, banana, cassava, maize, rice.Protein: make us grow, strong and repair the body. Examples are Beans, fish, egg.Fat: also gives us energy for work and play.it keeps us warm. Examples are Palm Oil, Soy oil, Margarine, vegetable oil.Vitamins: it protect us from diseases. Examples are fruits, corn.Minerals: help to form strong bones and teeth. Examples are Milk, meat vegetables, egg, iodine.Water: it carries other nutrients to all parts of the body and helps to remove wastes from the body. NUTRITIONAL DEFICIENCY DISEASES Nutritional diseases are illness that happen as a result of inadequate, poor diet. Inadequate and poor diet causes various diseases like: KWASHIORKOR: it is cause by eating mostly carbohydrate food. The person lack food that contains protein, vitamin C, iodine and folic acidRICKETS: it is the softening of bones in children due to deficiency in vitamin D, magnesium, calcium.PELLAGRA: it is vitamin deficiency disease caused by lack of niacin (Vitamin B3) in the diet. Not eating enough vegetables, sea foods, meat and egg can also cause PELLAGRA.SCURVY: happens when there is deficiency of Vitamin C (fruits and vegetables). BERIBERI: caused by thiamin (Vitamin B) and excessive intake of alcohol.ANEMIA: it occurs when the red blood cells are unable to carry enough to the body cell. It is caused by lack of vegetables, eggs, liver and meat.DIABETICS: it happens when the blood glucose level is higher than normal.it can be prevented by living a healthy life style. PRESENTATION The Teacher revises the previous lesson.The Teacher introduces the topic.The Teacher explains the lessons. EVALUATIVE ACTIVITIES What is Balanced diet?List the six kinds of food from which we can select the foods we eat daily.What is a nutritional disease?List three deficiency diseases. CONCLUSION: the teacher summarize the lesson. Related Articles Classcraft supports engaging, whole-class instruction for Grades K–8, using proven strategies. Classcraft provides standards-aligned, immersive learning experiences that support teachers in responding to students' needs in real time. The result: less teacher planning, more student engagement. Classcraft provides ready-made, standards-aligned lessons for ELA and math, making the delivery of whole-class instruction more efficient and effective. Classcraft includes instructional routines that are designed to make learning more interactive, increasing student engagement, ownership of learning, and peer-to-peer collaboration. Classcraft aggregates real-time insights on student performance during whole-class instruction, allowing teachers to quickly address the challenges of each learner. Classroom management can be a challenge. Classcraft makes it easier, with tools that keep students on task. Even classrooms that aren't 1:1 can benefit from the whole-class instructional support included in Classcraft. Learn more about the power of the Classcraft three-screen classroom experience below. Classroom Panel Student Panel Teacher Panel The Classroom Panel is the whole-classroom instruction view. From this view, educators can:Control what is being displayed in the front of the classroomShare student responses anonymously to encourage further discussionUse classroom management tools like a timer, stopwatch, volume meter, and grouping The Student Panel provides students a more immersive and interactive learning experience. On their own devices, students can:Engage with instructional tools, such as Learning Goals, Turn and Talk, and PollsCollaborate with classmates or respond independentlyHave their screens paused by educators when they are off task The Teacher Panel is the educator-only view that provides access to ready-made, standards-aligned lessons. From this view, educators can:Plan instruction with built-in teacher notesView real-time insights on each student's performance and readiness Adapt instruction to meet whole-classroom needs Now it's even easier to deliver engaging, whole-class instruction, using the most effective math and ELA content. Save every educator valuable planning time with whole-class, standards-aligned lessons, using the most essential Into Math contentMaximize the collaboration and student agency in Into Math lessons Aggregate real-time insights on studentperformance during whole-class instruction,allowing educators to quickly identify instructional challenges in the moment Save every educator valuable planning time with ready-made, whole-class lessons in reading, vocabulary, grammar, and writingMaximize the collaboration and student agency in HMH Into Reading lessons Aggregate real-time insights on studentperformance during whole-class instruction,allowing educators to quickly identify instructional challenges in the moment Elevate whole-class instruction with ready-made, standards-aligned lessons, using the most essential HMH Into Literature contentMaximize the collaboration and student agency in HMH Into Literature lessonsAggregate real-time insights on studentperformance during whole-class instruction,allowing educators to quickly identify instructional challenges in the moment Guided implementation Teachers starting at any time of the year can get up and running with resources in their Teacher Success Pathway that help them plan, teach, and assess learning, using their new HMH program. Teacher's Corner Teacher's Corner® on HMH Ed™ supports educators with year-round PD that puts classroom videos, teaching best practices, and live online events at their fingertips. Coaching and courses HMH Coachly™ and professional development courses provide personalized support aligned to district needs. Teachers of all experience levels can own their professional growth through continuous partnership with an HMH instructional coach, or get year-round unlimited access to a virtual coach, using Coachly on the HMH Ed platform. Leader support School and district leaders partner with experts who can help them drive transformation for all learners. Articles Webinar Research Report Type: Research Evidence Base Grade Level: Elementary, Middle Transform every classroom, engage every student Please note: If you have a question about billing, an order, an invoice, or just need technical support, please contact support. Get access to free resources including efficacy studies, educational videos, and testimonials to learn more about how Classcraft can help your students thrive. Home » Lesson Plans My Picks Please log in or sign up. Share this Page! email print share tweet Page 2 Page 3 Page 4 Page 5 Page 6 Page 7 Page 8 Page 9 Page 10 Page 11 Page 12 Page 13 Page 14 Page 15 Page 16 Page 17 Page 18 Page 19 Page 20 Page 21 Page 22 Page 23 Page 24 Page 25 Home » Lesson Plans My Picks Please log in or sign up. Share this Page! email print share tweet Page 2 Page 3 Page 4 Page 5 Page 6 Page 7 Page 8 Page 9 Page 10 Page 11 Page 12 Page 13 Page 14 Page 15 Page 16 Page 17 Page 18 Page 19 Page 20 Page 21 Page 22 Page 23 Page 24 Page 25 , the free encyclopedia that anyone can edit. 107,583 active editors 7,025,415 articles in English Sir William Gordon-Cumming (20 July 1848 – 20 May 1930) was a Scottish landowner, soldier and socialite. He was the central figure in the royal baccarat scandal of 1891. He joined the British Army in 1868 and saw service in South Africa, Egypt and the Sudan; he served with distinction and rose to the rank of lieutenant-colonel. An adventurer, he also hunted in the US and India. A friend of Edward, Prince of Wales, for over 20 years, in 1890 he attended a house party at Tranby Croft, where he took part in a game of baccarat at the behest of the prince. During the course of two nights' play he was accused of cheating, which he denied. After news of the affair leaked out, he sued five members of the party for slander; Edward was called as a witness. The case was a public spectacle in the UK and abroad, but the verdict went against Gordon-Cumming and he was ostracised from polite society. After the court case he married an American heiress, but their relationship was unhappy. (Full article...) Recently featured: Great Wilbraham (causewayed enclosure) Henry de Hinuber Hurricane Claudette (2003) Archive By email More featured articles About Postcard with a Fula woman ... that François-Edmond Fortier published more than 3,300 postcards of French West Africa (example pictured) between 1901 and 1920? ... that a language riot broke out between members of Our Lady of the Rosary in 1917? ... that Oleksandr Rodin's opera Kateryna was staged despite barricades, bombings, and an air-raid alarm? ... that Paul Among the People treats the Pauline epistles as sources comparable to Homer, Aristophanes and Virgil on Greco-Roman attitudes? ... that Gyula Kakas competed at two Olympics in gymnastics, set the Hungarian pole-vault record, and played for a national-champion football club? ... that a lyric in Beautiful Chaos was praised for "spreading queer joy"? ... that defending champions Bermuda did not compete in the women's football tournament at the 2015 Island Games? ... that Vatican Taekwondo has no registered athletes or coaches? ... that Iceland's entry for Eurovision in 2025 brought out a line of Ash Wednesday costumes? Archive Start a new article Nominate an article Muhammadu Buhari Former president of Nigeria Muhammadu Buhari (pictured) dies at the age of 82. Clashes between Druze militias and the Syrian Armed Forces result in hundreds of deaths. The International Criminal Court issues arrest warrants for Taliban leaders Hibatullah Akhundzada and Abdul Hakim Haqqani over their alleged persecution of women in Afghanistan. Flooding in Central Texas, United States, leaves at least 140 people dead. Ongoing: Gaza war Russian invasion of Ukraine timeline Sudanese civil war timeline Recent deaths: Andrea Gibson Raymond Guiot Felix Baumgartner Fauja Singh Bradley John Murdoch Frank Barrie Nominate an article July 20 Forensic experts at the site of the Suruç bombing 1807 – French brothers Claude and Nicéphore Niépce received a patent for their Pyréolophore, one of the world's first internal combustion engines. 1951 – Abdullah I of Jordan was assassinated while visiting the Al-Aqsa Mosque in Jerusalem. 1976 – The Viking 1 lander became the first spacecraft to successfully land on Mars and perform its mission. 1997 – USS Constitution, one of the United States Navy's original six frigates, sailed for the first time in 116 years after a full restoration. 2015 – A suicide attack (aftermath pictured) in Suruç, Turkey, for which Islamic State of Iraq and the Levant (ISIL) claimed responsibility, killed 34 people and injured 104 others. Alexander the Great (b. 356 BC)Amanda Clement (d. 1971)Bruce Lee (d. 1973)Gisele Bündchen (b. 1980) More anniversaries: July 19 July 20 July 21 Archive By email List of days of the year About C/2022 E3 (ZTF) is a non-periodic comet from the Oort cloud that was discovered by the Zwicky Transient Facility (ZTF) in 2022. With a comet nucleus of around 1 kilometre (0.62 mi) in diameter, C/2022 E3 rotates on its axis once every 8.5 to 8.7 hours. Its tails of dust and gas extended for millions of kilometers and, during January 2023, an anti-tail was also visible. The comet reached its most recent perihelion in January 2023, at a distance of 1.11 AU (166 million km; 103 million mi) from the sun, and the closest approach to Earth was a few weeks later, at a distance of 0.28 AU (42 million km; 26 million mi). The comet reached magnitude 5 and was visible with the naked eye under moonless dark skies. This photograph of C/2022 E3 was taken in January 2023 and released by the Italian National Institute for Astrophysics. Photograph credit: Alessandro Bianconi; National Institute for Astrophysics Recently featured: Passion fruit Basilica of St Paul, Rabat Clouded Apollo Archive More featured pictures Community portal – The central hub for editors, with resources, links, tasks, and announcements. Village pump – Forum for discussions about Wikipedia itself, including policies and technical issues. Site news – Sources of news about Wikipedia and the broader Wikimedia movement. Teahouse – Ask basic questions about using or editing Wikipedia. Help desk – Ask questions about using or editing Wikipedia. Reference desk – Ask research questions about encyclopedic topics. Content portals – A unique way to navigate the encyclopedia. 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Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles العربية Deutsch Español فارسی Français Italiano Nederlands 日本語 Polski Português Русский Svenska Українська Tiếng Việt 中文 250,000+ articles Bahasa Indonesia Bahasa Melayu Bân-lâm-gú Български Català Čeština Dansk Eesti Ελληνικά Esperanto Euskara עברית Հայերեն Magyar Norsk bokmål Română Simple English Slovenčina Srpski Srpskohrvatski Suomi Türkçe Oʻzbekcha 50,000+ articles Asturianu Azərbaycanca [illegible] Bosanski کوردی Frysk Gaeilge Galego Hrvatski ქართული Kurdî Latviešu Lietuvių [illegible] Македонски [illegible] Norsk nynorsk [illegible] Shqip Slovenščina [illegible] اردو Retrieved from " 2This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources: "1807" – news · newspapers · books · scholar · JSTOR (November 2015) (Learn how and when to remove this message) Calendar year Yea Millennium 2nd millennium Centuries 18th century 19th century 20th century Decades 1780s 1790s 1800s 1810s 1820s Years 1804 1805 1806 1807 1808 1809 1810 vte February 7: Napoleon leads French troops into Russia in winter, and fights the Battle of Eylau. June 14: Napoleon triumphs over Russia's General Benningsen, at the Battle of Friedland. 1807 (MDCCCVII) was a common year starting on Thursday of the Gregorian calendar and a common year starting on Tuesday of the Julian calendar, the 1807th year of the Common Era (CE) and Anno Domini (AD) designations, the 807th year of the 2nd millennium, the 7th year of the 19th century, and the 8th year of the 1800s decade. As of the start of 1807, the Gregorian calendar was 12 days ahead of the Julian calendar, which remained in localized use until 1923. Calendar year 1807 by topic Humanities Archaeology Architecture Art Literature Poetry Music By country Australia Brazil Canada Denmark France Germany New Zealand Norway Russia South Africa Sweden United Kingdom United States Other topics Rail transport Science Sports Lists of leaders Sovereign states Sovereign state leaders Territorial governors Religious leaders Law Birth and death categories Births Deaths Establishments and disestablishments categories Establishments Disestablishments Works category Works vte 1807 in various calendarsGregorian calendar1807MDCCCVIIAb urbe condita2560Armenian calendar1256ԹՎ ՌՄԾԶAssyrian calendar6557Balinese saka calendar1728–1729Bengali calendar1213–1214Berber calendar2757British Regnal year47 Geo. 3 – 48 Geo. 3Buddhist calendar2351Burmese calendar1169Byzantine calendar7315–7316Chinese calendar丙寅年 (Fire Tiger)4504 or 4297 — to —丁卯年 (Fire Rabbit)4505 or 4298Coptic calendar1523–1524Discordian calendar2973Ethiopian calendar1799–1800Hebrew calendar5567–5568Hindu calendars - Vikram Samvat1863–1864 - Shaka Samvat1728–1729 - Kali Yuga4907–4908Holocene calendar11807Igbo calendar807–808Iranian calendar1185–1186Islamic calendar1221–1222Japanese calendarBunka 4(文化４年)Javanese calendar1733–1734Julian calendarGregorian minus 12 daysKorean calendar4140Minguo calendar105 before ROC民前105年Nanakshahi calendar339Thai solar calendar2349–2350Tibetan calendar[illegible](male Fire-Tiger)1933 or 1552 or 780 — to —[illegible](female Fire-Hare)1934 or 1553 or 781 Wikimedia Commons has media related to 1807. January 7 – The United Kingdom of Great Britain and Ireland issues an Order in Council prohibiting British ships from trading with France or its allies.[1] January 20 – The Sierra Leone Company, faced with bankruptcy because of the imminent abolition of the slave trade in British colonies, petitions the British government for purchase and transfer of its property to the Crown; Parliament approves the transfer on July 29, and it takes effect on January 1, 1808.[2] February 3 – Napoleonic Wars and Anglo-Spanish War: Battle of Montevideo – The British Army captures Montevideo from the Spanish Empire, as part of the British invasions of the Río de la Plata. February 7 – Napoleon leads the forces of the French Empire in an invasion of the Russian Empire, and begins fighting at the Battle of Eylau against Russian and Prussian forces.[3] February 8 – Battle of Eylau: Napoleon fights a hard but inconclusive battle against the Russians under Bennigsen. February 10 – The Survey of the Coast (renamed the United States Coast Survey in 1836 and the United States Coast and Geodetic Survey in 1878) is established; work begins on August 3, 1816. February 17 – Henry Christopher is elected first President of the State of Haiti, ruling the northern part of the country. February 19 – Burr conspiracy: In Alabama, former Vice President of the United States Aaron Burr is tried for conspiracy, but acquitted. February 23 – The Slave Trade Act is passed in the House of Commons of the United Kingdom by an overwhelming majority.[4] March 2 – The United States Congress passes the Act Prohibiting Importation of Slaves "into any port or place within the jurisdiction of the United States ... from any foreign kingdom, place, or country" (to take effect January 1, 1808). March 25 The United Kingdom Slave Trade Act becomes law abolishing the slave trade in most of the British Empire[5] with effect from 1 May (slavery itself is abolished in British colonies in 1833). The Swansea and Mumbles Railway in South Wales, at this time known as the Oystermouth Railway, becomes the first passenger-carrying railway in the world. March 29 – H. W. Olbers discovers the asteroid Vesta. April 4–12 – Froberg mutiny: The British suppress a mutiny at Fort Ricasoli, Malta, by men of the irregularly-recruited Froberg Regiment. April 14 – African Institution holds its first meeting in London; it is intended to improve social conditions in Sierra Leone. May 22 – A grand jury indicts former Vice President of the United States Aaron Burr for treason.[6] May 24 – Siege of Danzig ends after 6 weeks with Prussian and Russian defenders capitulating to French forces. May 29 – Selim III, Ottoman Emperor since 1789, is deposed in favour of his nephew Mustafa IV. May 31 – Primitive Methodism originates in an All Day of Prayer at Mow Cop, in the north midlands of England.[7] June 9 – The Duke of Portland is chosen as Prime Minister after the United Kingdom general election. June 10 – The Battle of Heilsberg ends in a draw. June 14 – Battle of Friedland: Napoleon decisively defeats Bennigsen's Russian army. June 22 – Chesapeake–Leopard affair: British Royal Navy fourth rate HMS Leopard attacks and boards United States Navy frigate USS Chesapeake off Norfolk, Virginia, seeking deserters. This act of British aggression plays a role in the run-up to the War of 1812. July 5 – A disastrous British attack is mounted against Buenos Aires, during the second failed invasion of the Río de la Plata. July 7–9 – The Treaties of Tilsit are signed between France, Prussia and Russia. Napoleon and Russian Emperor Alexander I ally together against the British. The Prussians are forced to cede more than half their territory, which is formed into the Duchy of Warsaw in their former Polish lands, and the Kingdom of Westphalia in western Germany. The Free City of Danzig is also formed (established September 9 by Napoleon). July 13 – With the death of Henry Benedict Stuart, the last Stuart claimant to the throne of the United Kingdom, Jacobitism comes to an effective end. July 20 – Nicéphore Niépce is awarded a patent by Napoleon Bonaparte for the Pyréolophore, the world's first internal combustion engine, after it successfully powers a boat upstream on the river Saône in France. August 17 – The North River Steamboat, Robert Fulton's first American steamboat, leaves New York City for Albany on the Hudson River, inaugurating the first commercial steamboat service in the world. September 1 – Former U.S. Vice President Aaron Burr is acquitted of treason. He had been accused of plotting to annex parts of Louisiana and Mexico, to become part of an independent republic. September 2–7 – Battle of Copenhagen: The British Royal Navy bombards Copenhagen with fire bombs and phosphorus rockets, to prevent the Dano-Norwegian navy from surrendering to Napoleon; 30% of the city is destroyed, and 2,000 citizens are killed. September 7 – Robert Morrison, the first Protestant missionary to China, arrives in Guangzhou (Canton).[8] September 13 – Beethoven's Mass in C major, Op. 86, is premiered, commissioned by Nikolaus I, Prince Esterházy, and displeasing him.[9] September 27 – Napoleon purchases the Borghese art collection, including the Antinous Mondragone, and brings it to Paris.[10] October 9 – Prussian Reform Movement: Serfdom is abolished by the October edict. October 13 – The Geological Society of London is founded. October 30 – El Escorial Conspiracy: Ferdinand, Prince of Asturias is arrested for conspiring against his father Charles IV of Spain. November 24 – Battle of Abrantes, Portugal: The French under Jean-Andoche Junot take the town. November 29 – Portuguese Queen Maria I and the Court embark at Lisbon, bound for Brazil. Rio de Janeiro becomes the Portuguese capital. December 5–11 – Napoleonic Wars: Raid on Griessie – A British Royal Navy squadron attacks the Dutch port of Griessie on Java in the Dutch East Indies, eliminating the last Dutch naval force in the Pacific and concluding the Java campaign of 1806–1807.[11] December 17 – Napoleonic Wars: France issues the Milan Decree which confirms the Continental System (i.e. no European country is to trade with the United Kingdom). December 22 – The United States Congress passes the Embargo Act, a trade embargo on all foreign nations. Battle of Hingakaka between two factions of Māori people, the largest battle ever fought in New Zealand, and the last fought there without firearms.[12] In 1807 or 1808 is fought the Battle of Moremonui, first of the Musket Wars. Robert E. Lee January 13 – Napoleon Bonaparte Buford, American general, railroad executive (d. 1883) January 19 – Robert E. Lee, American Confederate general (d. 1870) January 28 – Robert McClure, Irish-born Arctic explorer (d. 1873) February 10 – Lajos Batthyány, 1st Prime Minister of Hungary (d. 1849) February 27 – Henry Wadsworth Longfellow, American poet (d. 1882)[13] March 1 – Wilford Woodruff, American religious leader (d. 1898) March 14 – Josephine of Leuchtenberg, Queen of Sweden and Norway (d. 1876) April 2 – William F. Packer, American politician (d. 1870) April 3 – Jane Digby, English adventurer (d. 1881) April 20 – John Milton, Governor of Florida (d. 1865) April 26 – Charles Auguste Frossard, French general (d. 1875) May 28 – Louis Agassiz, Swiss-born zoologist and geologist (d. 1873) June 6 – Adrien-François Servais, Belgian musician (d. 1866) June 16 – John Westcott, American surveyor and politician (d. 1888) Giuseppe Garibaldi July 4 – Giuseppe Garibaldi, Italian patriot (d. 1882) August 11 – David Rice Atchison, American politician (d. 1886) August 15 – Jules Grévy, 4th President of France (d. 1891) August 18 – Charles Francis Adams Sr., American historical editor, politician and diplomat (d. 1886) September 2 – Fredrika Runeberg, Finnish writer (d. 1879)[14] September 7 – Henry Sewell, 1st Premier of New Zealand (d. 1879) September 16 – John Lenthall, American naval architect and shipbuilder (d. 1882) October 8 – Harriet Taylor, English philosophical writer (d. 1858)[15] October 26 – Barbu Catargiu, 1st Prime Minister of Romania (d. 1862) October 29 – Andeo Kraljević, Herzegovinian Catholic bishop (d. 1879) October 30 – Christopher Wordsworth, Bishop of Lincoln (d. 1885) November 16 – Eduard von Fransecky, Prussian general (d. 1890) December 8 – Friedrich Traugott Kützing, German pharmacist, botanist and phycologist (d. 1893) December 17 – John Greenleaf Whittier, American Quaker poet and abolitionist (d. 1892) Pasquale Paoli February 1 – Sir Thomas Troubridge, 1st Baronet, British admiral (b. c. 1758) February 5 – Pasquale Paoli, Corsican patriot, military leader (b. 1725) February 27 – Louise du Pierry, French astronomer (b.1746) March 10 – Jean Thurel, French soldier (b. 1698) April 4 – Jérôme Lalande, French astronomer (b. 1732) April 10 – Duchess Anna Amalia of Brunswick-Wolfenbüttel, regent of Weimar and Eisenach (b. 1739) May 10 – Jean-Baptiste Donatien de Vimeur, comte de Rochambeau, French soldier (b. 1725) May 13 – Eliphalet Dyer, American statesman, judge (b. 1721) May 17 – John Gunby, Maryland soldier in the American Revolutionary War (b. 1745) May 18 – John Douglas, Scottish Anglican bishop, man of letters (b. 1721) June 9 – Andrew Sterett, American naval officer (b. 1778) Angelica Kauffman July 13 – Henry Benedict Stuart, Italian-born cardinal, Jacobite claimant to the British throne (b. 1725) July 19 – Uriah Tracy, American politician and congressman from Connecticut, 1793 until 1807 (b. 1755) September 14 – George Townshend, 1st Marquess Townshend, British field marshal (b. 1724) October 22 – Jean-François Houbigant, French perfumer (b. 1752) November 2 – Louis Auguste Le Tonnelier de Breteuil, Prime Minister of King Louis XVI of France (b. 1730) November 5 – Angelica Kauffman, Swiss painter (b. 1741) November 8 Darejan Dadiani, Georgian queen consort (b. 1738) Pierre-Alexandre-Laurent Forfait, French engineer, hydrographer, politician, and Minister of the Navy (1799–1801) (b. 1752) November 23 – Jean-François Rewbell, French politician (b. 1747) November 26 – Oliver Ellsworth, American founding father and 3rd Chief Justice of the United States Supreme Court (b. 1745) December 19 – Friedrich Melchior, Baron von Grimm, German writer (b. 1723) December 21 – John Newton, English cleric, hymnist (b. 1725) December 29 – Diogo de Carvalho e Sampayo, Portuguese diplomat, scientist (b. 1750) ^ William S. Dudley, ed. The Naval War of 1812: A Documentary History (Naval Historical Center, 1985) p34 ^ Stephen Tomkins, The Clapham Sect: How Wilberforce's Circle Transformed Britain (Lion Books, 2012) p200 ^ William Hodgson, The Life of Napoleon Bonaparte, Once Emperor of the French, who Died in Exile, at St. Helena, After a Captivity of Six Years' Duration (Orlando Hodgson, 1841) p384 ^ "William Wilberforce (1759–1833)". Retrieved January 18, 2021. ^ "Abolition of the Slave Trade 1807". BBC. Archived from the original on October 11, 2007. Retrieved September 11, 2007. ^ "The Aaron Burr Treason Trial" (PDF). ^ Farndale, W. E. (1950). The Secret of Mow Cop: a new appraisal of the origins of Primitive Methodism. London: Epworth Press. ^ "Sketch of the Canton Protestant Mission", by Rev. John Chalmers, in The Chinese Recorder and Missionary Journal, Volume 7 (American Presbyterian Mission Press, 1876) p174 ^ Marston, Nicholas (2006). Beethoven: Mass in C major, Op. 86 (PDF) (CD). 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"Mill [née Hardy; other married name Taylor], Harriet". Oxford Dictionary of National Biography (online ed.). Oxford University Press. doi:10.1093/ref:odnb/38051. (Subscription or UK public library membership required.) Retrieved from " 3Second-largest asteroid of the main asteroid belt This article is about the asteroid. For the Roman goddess, see Vesta (mythology). For other uses, see Vesta (disambiguation). 4 VestaTrue color image of Vesta taken by Dawn. The massive Rheasilvia Crater dominates Vesta's south pole.DiscoveryDiscovered byHeinrich Wilhelm OlbersDiscovery date29 March 1807DesignationsMPC designation(4) VestaPronunciation/ˈvɛstə/[1]Named afterVestaMinor planet categoryMain belt (Vesta family)AdjectivesVestanVestian[a]Symbol (historically astronomical, now astrological)Orbital characteristics[6]Epoch 13 September 2023(JD 2453300.5)Aphelion2.57 AU (384 million km)Perihelion2.15 AU (322 million km)Semi-major axis2.36 AU (353 million km)Eccentricity0.0894Orbital period (sidereal)3.63 yr (1325.86 d)Average orbital speed19.34 km/sMean anomaly169.4°Inclination7.1422° to ecliptic5.58° to invariable plane[7]Longitude of ascending node103.71°Time of perihelion26 December 2021[8]Argument of perihelion151.66°SatellitesNoneEarth MOID1.14 AU (171 million km)Proper orbital elements[9]Proper semi-major axis2.36151 AUProper eccentricity0.098758Proper inclination6.39234°Proper mean motion99.1888 deg / yrProper orbital period3.62944 yr(1325.654 d)Precession of perihelion36.8729 (2343 years) arcsec / yrPrecession of the ascending node−39.5979 (2182 years) arcsec / yrPhysical characteristicsDimensions572.6 km × 557.2 km × 446.4 km[10]Mean diameter525.4±0.2 km[10]Flattening0.2204Surface area(8.66±0.2)×105 km2[b][11]Volume7.4970×107 km3[10]Mass(2.590271±0.000058)×1020 kg[12]Mean density3.456±0.035 g/cm3[10]Equatorial surface gravity0.22 m/s2 (0.022 g0)Equatorial escape velocity0.36 km/sSynodic rotation period0.2226 d (5.342 h)[6][13]Equatorial rotation velocity93.1 m/s[c]Axial tilt29°North pole right ascension20h 32m[d]North pole declination48°[d]Geometric albedo0.423[15]Temperaturemin: 75 K (−198 °C)max: 250 K (−23 °C)[16]Spectral typeV[6][17]Apparent magnitude5.1[18] to 8.48Absolute magnitude (H)3.20[6][15]Angular diameter0.70″ to 0.22″ Vesta (minor-planet designation: 4 Vesta) is one of the largest objects in the asteroid belt, with a mean diameter of 525 kilometres (326 mi).[10] It was discovered by the German astronomer Heinrich Wilhelm Matthias Olbers on 29 March 1807[6] and is named after Vesta, the virgin goddess of home and hearth from Roman mythology.[19] Vesta is thought to be the second-largest asteroid, both by mass and by volume, after the dwarf planet Ceres.[20][21][22] Measurements give it a nominal volume only slightly larger than that of Pallas (about 5% greater), but it is 25% to 30% more massive. It constitutes an estimated 9% of the mass of the asteroid belt.[23] Vesta is the only known remaining rocky protoplanet of the kind that formed the terrestrial planets.[24] Numerous fragments of Vesta were ejected by collisions one and two billion years ago that left two enormous craters occupying much of Vesta's southern hemisphere.[25][26] Debris from these events has fallen to Earth as howardite–eucrite–diogenite (HED) meteorites, which have been a rich source of information about Vesta.[27][28][29] Vesta is the brightest asteroid visible from Earth. It is regularly as bright as magnitude 5.1,[18] at which times it is faintly visible to the naked eye. Its maximum distance from the Sun is slightly greater than the minimum distance of Ceres from the Sun,[e] although its orbit lies entirely within that of Ceres.[30] NASA's Dawn spacecraft entered orbit around Vesta on 16 July 2011 for a one-year exploration and left the orbit of Vesta on 5 September 2012[31] en route to its final destination, Ceres. Researchers continue to examine data collected by Dawn for additional insights into the formation and history of Vesta.[32][33] Vesta, Ceres, and the Moon with sizes shown to scale Heinrich Olbers discovered Pallas in 1802, the year after the discovery of Ceres. He proposed that the two objects were the remnants of a destroyed planet. He sent a letter with his proposal to the British astronomer William Herschel, suggesting that a search near the locations where the orbits of Ceres and Pallas intersected might reveal more fragments. These orbital intersections were located in the constellations of Cetus and Virgo.[34] Olbers commenced his search in 1802, and on 29 March 1807 he discovered Vesta in the constellation Virgo—a coincidence, because Ceres, Pallas, and Vesta are not fragments of a larger body. Because the asteroid Juno had been discovered in 1804, this made Vesta the fourth object to be identified in the region that is now known as the asteroid belt. The discovery was announced in a letter addressed to German astronomer Johann H. Schröter dated 31 March.[35] Because Olbers already had credit for discovering a planet (Pallas; at the time, the asteroids were considered to be planets), he gave the honor of naming his new discovery to German mathematician Carl Friedrich Gauss, whose orbital calculations had enabled astronomers to confirm the existence of Ceres, the first asteroid, and who had computed the orbit of the new planet in the remarkably short time of 10 hours.[36][37] Gauss decided on the Roman virgin goddess of home and hearth, Vesta.[38] Vesta was the fourth asteroid to be discovered, hence the number 4 in its formal designation. The name Vesta, or national variants thereof, is in international use with two exceptions: Greece and China. In Greek, the name adopted was the Hellenic equivalent of Vesta, Hestia (4 Εστία); in English, that name is used for 46 Hestia (Greeks use the name "Hestia" for both, with the minor-planet numbers used for disambiguation). In Chinese, Vesta is called the 'hearth-god(dess) star', 灶神星 Zàoshénxīng, naming the asteroid for Vesta's role, similar to the Chinese names of Uranus, Neptune, and Pluto.[f] Upon its discovery, Vesta was, like Ceres, Pallas, and Juno before it, classified as a planet and given a planetary symbol. The symbol represented the altar of Vesta with its sacred fire and was designed by Gauss.[39][40] In Gauss's conception, now obsolete, this was drawn . His form is in the pipeline for Unicode 17.0 as U+1F777 .[41][42][g] The asteroid symbols were gradually retired from astronomical use after 1852, but the symbols for the first four asteroids were resurrected for astrology in the 1970s. The abbreviated modern astrological variant of the Vesta symbol is (U+26B6 ⚶).[41][h] After the discovery of Vesta, no further objects were discovered for 38 years, and during this time the Solar System was thought to have eleven planets.[47] However, in 1845, new asteroids started being discovered at a rapid pace, and by 1851 there were fifteen, each with its own symbol, in addition to the eight major planets (Neptune had been discovered in 1846). It soon became clear that it would be impractical to continue inventing new planetary symbols indefinitely, and some of the existing ones proved difficult to draw quickly. That year, the problem was addressed by Benjamin Apthorp Gould, who suggested numbering asteroids in their order of discovery, and placing this number in a disk (circle) as the generic symbol of an asteroid. Thus, the fourth asteroid, Vesta, acquired the generic symbol ④. This was soon coupled with the name into an official number–name designation, ④ Vesta, as the number of minor planets increased. By 1858, the circle had been simplified to parentheses, (4) Vesta, which were easier to typeset. Other punctuation, such as 4) Vesta and 4, Vesta, was also briefly used, but had more or less completely died out by 1949.[48] SPHERE image is shown on the left, with a synthetic view derived from Dawn images shown on the right for comparison.[49] Photometric observations of Vesta were made at the Harvard College Observatory in 1880–1882 and at the Observatoire de Toulouse in 1909. These and other observations allowed the rotation rate of Vesta to be determined by the 1950s. However, the early estimates of the rotation rate came into question because the light curve included variations in both shape and albedo.[50] Early estimates of the diameter of Vesta ranged from 383 kilometres (238 mi) in 1825, to 444 km (276 mi). E.C. Pickering produced an estimated diameter of 513 ± 17 km (319 ± 11 mi) in 1879, which is close to the modern value for the mean diameter, but the subsequent estimates ranged from a low of 390 km (242 mi) up to a high of 602 km (374 mi) during the next century. The measured estimates were based on photometry. In 1989, speckle interferometry was used to measure a dimension that varied between 498 and 548 km (309 and 341 mi) during the rotational period.[51] In 1991, an occultation of the star SAO 93228 by Vesta was observed from multiple locations in the eastern United States and Canada. Based on observations from 14 different sites, the best fit to the data was an elliptical profile with dimensions of about 550 km × 462 km (342 mi × 287 mi).[52] Dawn confirmed this measurement.[i] These measurements will help determine the thermal history, size of the core, role of water in asteroid evolution and what meteorites found on Earth come from these bodies, with the ultimate goal of understanding the conditions and processes present at the solar system's earliest epoch and the role of water content and size in planetary evolution.[53] Vesta became the first asteroid to have its mass determined. Every 18 years, the asteroid 197 Arete approaches within 0.04 AU of Vesta. In 1966, based upon observations of Vesta's gravitational perturbations of Arete, Hans G. Hertz estimated the mass of Vesta at (1.20±0.08)×10−10 M☉ (solar masses).[54] More refined estimates followed, and in 2001 the perturbations of 17 Thetis were used to calculate the mass of Vesta to be (1.31±0.02)×10−10 M☉.[55] Dawn determined it to be 1.3029×10−10 M☉. Vesta orbits the Sun between Mars and Jupiter, within the asteroid belt, with a period of 3.6 Earth years,[6] specifically in the inner asteroid belt, interior to the Kirkwood gap at 2.50 AU. Its orbit is moderately inclined (i = 7.1°, compared to 7° for Mercury and 17° for Pluto) and moderately eccentric (e = 0.09, about the same as for Mars).[6] True orbital resonances between asteroids are considered unlikely. Because of their small masses relative to their large separations, such relationships should be very rare.[56] Nevertheless, Vesta is able to capture other asteroids into temporary 1:1 resonant orbital relationships (for periods up to 2 million years or more) and about forty such objects have been identified.[57] Decameter-sized objects detected in the vicinity of Vesta by Dawn may be such quasi-satellites rather than proper satellites.[57] Olbers Regio (dark area) defines the prime meridian in the IAU coordinate system. It is shown here in a Hubble shot of Vesta, because it is not visible in the more detailed Dawn images.Claudia crater (indicated by the arrow at the bottom of the closeup image at right) defines the prime meridian in the Dawn/NASA coordinate system. Vesta's rotation is relatively fast for an asteroid (5.342 h) and prograde, with the north pole pointing in the direction of right ascension 20 h 32 min, declination +48° (in the constellation Cygnus) with an uncertainty of about 10°. This gives an axial tilt of 29°.[58] Two longitudinal coordinate systems are used for Vesta, with prime meridians separated by 150°. The IAU established a coordinate system in 1997 based on Hubble photos, with the prime meridian running through the center of Olbers Regio, a dark feature 200 km across. When Dawn arrived at Vesta, mission scientists found that the location of the pole assumed by the IAU was off by 10°, so that the IAU coordinate system drifted across the surface of Vesta at 0.06° per year, and also that Olbers Regio was not discernible from up close, and so was not adequate to define the prime meridian with the precision they needed. They corrected the pole, but also established a new prime meridian 4° from the center of Claudia, a sharply defined crater 700 metres across, which they say results in a more logical set of mapping quadrangles.[59] All NASA publications, including images and maps of Vesta, use the Claudian meridian, which is unacceptable to the IAU. The IAU Working Group on Cartographic Coordinates and Rotational Elements recommended a coordinate system, correcting the pole but rotating the Claudian longitude by 150° to coincide with Olbers Regio.[60] It was accepted by the IAU, although it disrupts the maps prepared by the Dawn team, which had been positioned so they would not bisect any major surface features.[59][61] Relative sizes of the four largest asteroids. Vesta is second from left. This graph was using the legacy Graph extension, which is no longer supported. It needs to be converted to the new Chart extension.The mass of 4 Vesta (blue) compared to other large asteroids: 1 Ceres, 2 Pallas, 10 Hygiea, 704 Interamnia, 15 Eunomia and the remainder of the Main Belt. The unit of mass is×1018 kg. Other objects in the Solar system with well-defined masses within a factor of 2 of Vesta's mass are Varda, Gǃkúnǁʼhòmdímà, and Salacia (245, 136, and 492×1018 kg, respectively). No moons are in this range: the closest, Tethys (Saturn III) and Enceladus (Saturn II), are over twice and less than half of Vesta's mass. Vesta is the second most massive body in the asteroid belt, although it is only 28% as massive as Ceres, the most massive body.[62][23] Vesta is, however, the most massive body that formed in the asteroid belt, as Ceres is believed to have formed between Jupiter and Saturn. Vesta's density is lower than those of the four terrestrial planets but is higher than those of most asteroids, as well as all of the moons in the Solar System except Io. Vesta's surface area is about the same as the land area of Pakistan, Venezuela, Tanzania, or Nigeria; slightly under 900,000 km2 (350,000 sq mi; 90 million ha; 220 million acres). It has an only partially differentiated interior.[63] Vesta is only slightly larger (525.4±0.2 km[10]) than 2 Pallas (512±3 km) in mean diameter,[64] but is about 25% more massive. Vesta's shape is close to a gravitationally relaxed oblate spheroid,[58] but the large concavity and protrusion at the southern pole (see 'Surface features' below) combined with a mass less than 5×1020 kg precluded Vesta from automatically being considered a dwarf planet under International Astronomical Union (IAU) Resolution XXVI 5.[65] A 2012 analysis of Vesta's shape[66] and gravity field using data gathered by the Dawn spacecraft has shown that Vesta is currently not in hydrostatic equilibrium.[10][67] Temperatures on the surface have been estimated to lie between about −20 °C (253 K) with the Sun overhead, dropping to about −190 °C (83.1 K) at the winter pole. Typical daytime and nighttime temperatures are −60 °C (213 K) and −130 °C (143 K), respectively. This estimate is for 6 May 1996, very close to perihelion, although details vary somewhat with the seasons.[16] Further information: List of geological features on Vesta Before the arrival of the Dawn spacecraft, some Vestan surface features had already been resolved using the Hubble Space Telescope and ground-based telescopes (e.g., the Keck Observatory).[68] The arrival of Dawn in July 2011 revealed the complex surface of Vesta in detail.[69] Geologic map of Vesta (Mollweide projection).[70] The most ancient and heavily cratered regions are brown; areas modified by the Veneneia and Rheasilvia impacts are purple (the Saturnalia Fossae Formation, in the north)[71] and light cyan (the Divalia Fossae Formation, equatorial),[70] respectively; the Rheasilvia impact basin interior (in the south) is dark blue, and neighboring areas of Rheasilvia ejecta (including an area within Veneneia) are light purple-blue;[72][73] areas modified by more recent impacts or mass wasting are yellow/orange or green, respectively. Main articles: Rheasilvia and Veneneia Northern (left) and southern (right) hemispheres. The "Snowman" craters are at the top of the left image; Rheasilvia and Veneneia (green and blue) dominate the right. Parallel troughs are seen in both. Colors of the two hemispheres are not to scale,[j] and the equatorial region is not shown. South pole of Vesta, showing the extent of Rheasilvia crater. The most prominent of these surface features are two enormous impact basins, the 500-kilometre-wide (311 mi) Rheasilvia, centered near the south pole; and the 400-kilometre-wide (249 mi) Veneneia. The Rheasilvia impact basin is younger and overlies the Veneneia.[74] The Dawn science team named the younger, more prominent crater Rheasilvia, after the mother of Romulus and Remus and a mythical vestal virgin.[75] Its width is 95% of the mean diameter of Vesta. The crater is about 19 km (12 mi) deep. A central peak rises 23 km (14 mi) above the lowest measured part of the crater floor and the highest measured part of the crater rim is 31 km (19 mi) above the crater floor low point. It is estimated that the impact responsible excavated about 1% of the volume of Vesta, and it is likely that the Vesta family and V-type asteroids are the products of this collision. If this is the case, then the fact that 10 km (6 mi) fragments have survived bombardment until the present indicates that the crater is at most only about 1 billion years old.[76] It would also be the site of origin of the HED meteorites. All the known V-type asteroids taken together account for only about 6% of the ejected volume, with the rest presumably either in small fragments, ejected by approaching the 3:1 Kirkwood gap, or perturbed away by the Yarkovsky effect or radiation pressure. Spectroscopic analyses of the Hubble images have shown that this crater has penetrated deep through several distinct layers of the crust, and possibly into the mantle, as indicated by spectral signatures of olivine.[58] Subsequent analysis of data from the Dawn mission provided much greater detail on Rheasilvia's structure and composition, confirming it as one of the largest impact structures known relative to its parent body size.[74] The impact clearly modified the pre-existing very large, Veneneia structure, indicating Rheasilvia's younger age.[74] Rheasilvia's size makes Vesta's southern topography unique, creating a flattened southern hemisphere and contributing significantly to the asteroid's overall oblate shape.[69] Rheasilvia's ~22 km (14 mi) central peak stands as one of the tallest mountains identified in the Solar System.[74] Its base width of roughly 180 km (110 mi) and complex morphology distinguishes it from the simpler central peaks seen in smaller craters.[77] Numerical modeling indicates that such a large central structure within a ~505 km (314 mi) diameter basin requires formation on a differentiated body with significant gravity. Scaling laws for craters on smaller asteroids fail to predict such a feature; instead, impact dynamics involving transient crater collapse and rebound of the underlying material (potentially upper mantle) are needed to explain its formation.[77] Hydrocode simulations suggest the impactor responsible was likely 60–70 km (37–43 mi) across, impacting at roughly 5.4 km/s.[78] Models of impact angle (around 30-45 degrees from vertical) better match the detailed morphology of the basin and its prominent peak.[77] Crater density measurements on Rheasilvia's relatively unmodified floor materials and surrounding ejecta deposits, calibrated using standard lunar chronology functions adapted for Vesta's location, place the impact event at approximately 1 billion years ago.[79][70] This age makes Rheasilvia a relatively young feature on a protoplanetary body formed early in Solar System history. The estimated excavation of ~1% of Vesta's volume[74] provides a direct link to the Vesta family of asteroids (Vestoids) and the HED meteorites. Since Vesta's spectral signature matches that of the Vestoids and HEDs, this strongly indicates they are fragments ejected from Vesta most likely during the Rheasilvia impact.[27][79] The Dawn mission's VIR instrument helped to confirm the basin's deep excavation and compositional diversity. VIR mapping revealed spectral variations across the basin consistent with the mixing of different crustal layers expected in the HED meteorites. Signatures matching eucrites (shallow crustal basalts) and diogenites (deeper crustal orthopyroxenites) were identified, which usually correlate with specific morphological features like crater walls or slump blocks.[80][27] The confirmed signature of olivine-rich material, which were first hinted at by Hubble observations is strongest on the flanks of the central peak and in specific patches along the basin rim and walls, suggesting it is not uniformly distributed but rather exposed in distinct outcrops.[81][80] As the dominant mineral expected in Vesta's mantle beneath the HED-like crust,[10] the presence of olivine indicates the Rheasilvia impact penetrated Vesta's entire crust (~20–40 km (12–25 mi) thick in the region) and excavated material from the upper mantle.[81] Furthermore, the global stresses resulting from this massive impact are considered the likely trigger for the formation of the large trough systems, like Divalia Fossa, that encircle Vesta's equatorial regions.[82][69] The crater Aelia Feralia Planitia, an old, degraded impact basin or impact basin complex near Vesta's equator (green and blue). It is 270 km (168 mi) across and predates Rheasilvia (green at bottom) Several old, degraded craters approach Rheasilvia and Veneneia in size, although none are quite so large. They include Feralia Planitia, shown at right, which is 270 km (168 mi) across.[83] More-recent, sharper craters range up to 158 km (98 mi) Varronilla and 196 km (122 mi) Postumia.[84] Dust fills up some craters, creating so-called dust ponds. They are a phenomenon where pockets of dust are seen in celestial bodies without a significant atmosphere. These are smooth deposits of dust accumulated in depressions on the surface of the body (like craters), contrasting from the Rocky terrain around them.[85] On the surface of Vesta, we have identified both type 1 (formed from impact melt) and type 2 (electrostatically made) dust ponds within 0˚–30°N/S, that is, Equatorial region. 10 craters have been identified with such formations.[86] The "snowman craters" are a group of three adjacent craters in Vesta's northern hemisphere. Their official names, from largest to smallest (west to east), are Marcia, Calpurnia, and Minucia. Marcia is the youngest and cross-cuts Calpurnia. Minucia is the oldest.[70] "Snowman" craters by Dawn from 5,200 km (3,200 mi) in 2011Detailed image of the "Snowman" craters The majority of the equatorial region of Vesta is sculpted by a series of parallel troughs designated Divalia Fossae; its longest trough is 10–20 kilometres (6.2–12.4 mi) wide and 465 kilometres (289 mi) long. Despite the fact that Vesta is a one-seventh the size of the Moon, Divalia Fossae dwarfs the Grand Canyon. A second series, inclined to the equator, is found further north. This northern trough system is named Saturnalia Fossae, with its largest trough being roughly 40 km (25 mi) wide and over 370 km (230 mi) long. These troughs are thought to be large-scale graben resulting from the impacts that created Rheasilvia and Veneneia craters, respectively. They are some of the longest chasms in the Solar System, nearly as long as Ithaca Chasma on Tethys. The troughs may be graben that formed after another asteroid collided with Vesta, a process that can happen only in a body that is differentiated,[82] which Vesta may not fully be. Alternatively, it is proposed that the troughs may be radial sculptures created by secondary cratering from Rheasilvia.[87] A section of Divalia Fossae, with parallel troughs to the north and southA computer-generated view of a portion of Divalia Fossae Compositional information from the visible and infrared spectrometer (VIR), gamma-ray and neutron detector (GRaND), and framing camera (FC), all indicate that the majority of the surface composition of Vesta is consistent with the composition of the howardite, eucrite, and diogenite meteorites.[88][89][90] The Rheasilvia region is richest in diogenite, consistent with the Rheasilvia-forming impact excavating material from deeper within Vesta. The presence of olivine within the Rheasilvia region would also be consistent with excavation of mantle material. However, olivine has only been detected in localized regions of the northern hemisphere, not within Rheasilvia.[32] The origin of this olivine is currently unclear. Though olivine was expected by astronomers to have originated from Vesta's mantle prior to the arrival of the Dawn orbiter, the lack of olivine within the Rheasilvia and Veneneia impact basins complicates this view. Both impact basins excavated Vestian material down to 60–100 km, far deeper than the expected thickness of ~30–40 km for Vesta's crust. Vesta's crust may be far thicker than expected or the violent impact events that created Rheasilvia and Veneneia may have mixed material enough to obscure olivine from observations. Alternatively, Dawn observations of olivine could instead be due to delivery by olivine-rich impactors, unrelated to Vesta's internal structure.[91] Pitted terrain has been observed in four craters on Vesta: Marcia, Cornelia, Numisia and Licinia.[92] The formation of the pitted terrain is proposed to be degassing of impact-heated volatile-bearing material. Along with the pitted terrain, curvilinear gullies are found in Marcia and Cornelia craters. The curvilinear gullies end in lobate deposits, which are sometimes covered by pitted terrain, and are proposed to form by the transient flow of liquid water after buried deposits of ice were melted by the heat of the impacts.[71] Hydrated materials have also been detected, many of which are associated with areas of dark material.[93] Consequently, dark material is thought to be largely composed of carbonaceous chondrite, which was deposited on the surface by impacts. Carbonaceous chondrites are comparatively rich in mineralogically bound OH.[90] Cut-away schematic of Vestan core, mantle, and crust Eucrite meteorite A large collection of potential samples from Vesta is accessible to scientists, in the form of over 1200 HED meteorites (Vestan achondrites), giving insight into Vesta's geologic history and structure. NASA Infrared Telescope Facility (NASA IRTF) studies of asteroid (237442) 1999 TA10 suggest that it originated from deeper within Vesta than the HED meteorites.[94] Vesta is thought to consist of a metallic iron–nickel core, variously estimated to be 90 km (56 mi)[63] to 220 km (140 mi)[10] in diameter, an overlying rocky olivine mantle, with a surface crust of similar composition to HED meteorites. From the first appearance of calcium–aluminium-rich inclusions (the first solid matter in the Solar System, forming about 4.567 billion years ago), a likely time line is as follows:[95][96][97][98][99] Timeline of the evolution of Vesta 2–3 million years Accretion completed 4–5 million years Complete or almost complete melting due to radioactive decay of 26Al, leading to separation of the metal core 6–7 million years Progressive crystallization of a convecting molten mantle. Convection stopped when about 80% of the material had crystallized Extrusion of the remaining molten material to form the crust, either as basaltic lavas in progressive eruptions, or possibly forming a short-lived magma ocean. The deeper layers of the crust crystallize to form plutonic rocks, whereas older basalts are metamorphosed due to the pressure of newer surface layers. Slow cooling of the interior Vesta is the only known intact asteroid that has been resurfaced in this manner. Because of this, some scientists refer to Vesta as a protoplanet.[100] Composition of the Vestan crust (by depth)[101] A lithified regolith, the source of howardites and brecciated eucrites. Basaltic lava flows, a source of non-cumulate eucrites. Plutonic rocks consisting of pyroxene, pigeonite and plagioclase, the source of cumulate eucrites. Plutonic rocks rich in orthopyroxene with large grain sizes, the source of diogenites. On the basis of the sizes of V-type asteroids (thought to be pieces of Vesta's crust ejected during large impacts), and the depth of Rheasilvia crater (see below), the crust is thought to be roughly 10 kilometres (6 mi) thick.[102] Findings from the Dawn spacecraft have found evidence that the troughs that wrap around Vesta could be graben formed by impact-induced faulting (see Troughs section above), meaning that Vesta has more complex geology than other asteroids. The impacts that created the Rheasilvia and Veneneia craters occurred when Vesta was no longer warm and plastic enough to return to an equilibrium shape, distorting its once rounded shape and prohibiting it from being classified as a dwarf planet today.[citation needed] Vesta's surface is covered by regolith distinct from that found on the Moon or asteroids such as Itokawa. This is because space weathering acts differently. Vesta's surface shows no significant trace of nanophase iron because the impact speeds on Vesta are too low to make rock melting and vaporization an appreciable process. Instead, regolith evolution is dominated by brecciation and subsequent mixing of bright and dark components.[103] The dark component is probably due to the infall of carbonaceous material, whereas the bright component is the original Vesta basaltic soil.[104] Some small Solar System bodies are suspected to be fragments of Vesta caused by impacts. The Vestian asteroids and HED meteorites are examples. The V-type asteroid 1929 Kollaa has been determined to have a composition akin to cumulate eucrite meteorites, indicating its origin deep within Vesta's crust.[28] Vesta is currently one of only eight identified Solar System bodies of which we have physical samples, coming from a number of meteorites suspected to be Vestan fragments. It is estimated that 1 out of 16 meteorites originated from Vesta.[105] The other identified Solar System samples are from Earth itself, meteorites from Mars, meteorites from the Moon, and samples returned from the Moon, the comet Wild 2, and the asteroids 25143 Itokawa, 162173 Ryugu, and 101955 Bennu.[29][k] Animation of Dawn's trajectory from 27 September 2007 to 5 October 2018 Dawn · Earth · Mars · 4 Vesta · 1 Ceres First image of asteroids (Ceres and Vesta) taken from Mars. The image was made by the Curiosity rover on 20 April 2014. Animation of Dawn's trajectory around 4 Vesta from 15 July 2011 to 10 September 2012 Dawn · 4 Vesta In 1981, a proposal for an asteroid mission was submitted to the European Space Agency (ESA). Named the Asteroidal Gravity Optical and Radar Analysis (AGORA), this spacecraft was to launch some time in 1990–1994 and perform two flybys of large asteroids. The preferred target for this mission was Vesta. AGORA would reach the asteroid belt either by a gravitational slingshot trajectory past Mars or by means of a small ion engine. However, the proposal was refused by the ESA. A joint NASA–ESA asteroid mission was then drawn up for a Multiple Asteroid Orbiter with Solar Electric Propulsion (MAOSEP), with one of the mission profiles including an orbit of Vesta. NASA indicated they were not interested in an asteroid mission. Instead, the ESA set up a technological study of a spacecraft with an ion drive. Other missions to the asteroid belt were proposed in the 1980s by France, Germany, Italy and the United States, but none were approved.[106] Exploration of Vesta by fly-by and impacting penetrator was the second main target of the first plan of the multi-aimed Soviet Vesta mission, developed in cooperation with European countries for realisation in 1991–1994 but canceled due to the dissolution of the Soviet Union. Artist's conception of Dawn orbiting Vesta In the early 1990s, NASA initiated the Discovery Program, which was intended to be a series of low-cost scientific missions. In 1996, the program's study team recommended a mission to explore the asteroid belt using a spacecraft with an ion engine as a high priority. Funding for this program remained problematic for several years, but by 2004 the Dawn vehicle had passed its critical design review[107] and construction proceeded.[citation needed] It launched on 27 September 2007 as the first space mission to Vesta. On 3 May 2011, Dawn acquired its first targeting image 1.2 million kilometres (0.75×10^6 mi) from Vesta.[108] On 16 July 2011, NASA confirmed that it received telemetry from Dawn indicating that the spacecraft successfully entered Vesta's orbit.[109] It was scheduled to orbit Vesta for one year, until July 2012.[110] Dawn's arrival coincided with late summer in the southern hemisphere of Vesta, with the large crater at Vesta's south pole (Rheasilvia) in sunlight. Because a season on Vesta lasts eleven months, the northern hemisphere, including anticipated compression fractures opposite the crater, would become visible to Dawn's cameras before it left orbit.[111] Dawn left orbit around Vesta on 4 September 2012 11:26 p.m. PDT to travel to Ceres.[112] NASA/DLR released imagery and summary information from a survey orbit, two high-altitude orbits (60–70 m/pixel) and a low-altitude mapping orbit (20 m/pixel), including digital terrain models, videos and atlases.[113][114][115][116][117][118] Scientists also used Dawn to calculate Vesta's precise mass and gravity field. The subsequent determination of the J2 component yielded a core diameter estimate of about 220 km (140 mi) assuming a crustal density similar to that of the HED.[113] Dawn data can be accessed by the public at the UCLA website.[119] Albedo and spectral maps of 4 Vesta, as determined from Hubble Space Telescope images from November 1994 Elevation map of 4 Vesta, as determined from Hubble Space Telescope images of May 1996 Elevation diagram of 4 Vesta (as determined from Hubble Space Telescope images of May 1996) viewed from the south-east, showing Rheasilvia crater at the south pole and Feralia Planitia near the equator Vesta seen by the Hubble Space Telescope in May 2007 The 2006 IAU draft proposal on the definition of a planet listed Vesta as a candidate.[120] Vesta is shown fourth from the left along the bottom row. Vesta comes into view as the Dawn spacecraft approaches and enters orbit: Vesta from 100,000 km(1 July 2011) Vesta from 41,000 km(9 July 2011) In orbit at 16,000 km(17 July 2011) In orbit from 10,500 km(18 July 2011) The northern hemisphere from 5,200 km(23 July 2011) In orbit from 5,200 km(24 July 2011) In orbit from 3,700 km(31 July 2011) Full rotation(1 August 2011) Composite greyscale image Cratered terrain with hills and ridges(6 August 2011) Densely cratered terrain near terminator(6 August 2011) Vestan craters in various states of degradation, with troughs at bottom(6 August 2011) Hill shaded central mound at the south pole of Vesta(2 February 2015) Detailed images retrieved during the high-altitude (60–70 m/pixel) and

low-altitude (~20 m/pixel) mapping orbits are available on the Dawn Mission website of JPL/NASA.[121] Annotated image from Earth's surface in June 2007 with (4) Vesta Its size and unusually bright surface make Vesta the brightest asteroid, and it is occasionally visible to the naked eye from dark skies (without light pollution). In May and June 2007, Vesta reached a peak magnitude of +5.4, the brightest since 1989.[122] At that time, opposition and perihelion were only a few weeks apart.[123] It was brighter still at its 22 June 2018 opposition, reaching a magnitude of +5.3.[124] Less favorable oppositions during late autumn 2008 in the Northern Hemisphere still had Vesta at a magnitude of from +6.5 to +7.3.[125] Even when in conjunction with the Sun, Vesta will have a magnitude around +8.5; thus from a pollution-free sky it can be observed with binoculars even at elongations much smaller than near opposition.[125] In 2010, Vesta reached opposition in the constellation of Leo on the night of 17–18 February, at about magnitude 6.1,[126] a brightness that makes it visible in binocular range but generally not for the naked eye. Under perfect dark sky conditions where all light pollution is absent it might be visible to an experienced observer without the use of a telescope or binoculars. Vesta came to opposition again on 5 August 2011, in the constellation of Capricornus at about magnitude 5.6.[126][127] Vesta was at opposition again on 9 December 2012.[128] According to Sky and Telescope magazine, this year Vesta came within about 6 degrees of 1 Ceres during the winter of 2012 and spring 2013.[129] Vesta orbits the Sun in 3.63 years and Ceres in 4.6 years, so every 17.4 years Vesta overtakes Ceres (the previous overtaking was in April 1996).[129] On 1 December 2012, Vesta had a magnitude of 6.6, but it had decreased to 8.4 by 1 May 2013.[129] Conjunction of Ceres and Vesta near the star Gamma Virginis on 5 July 2014 in the Constellation of Virgo. Ceres and Vesta came within one degree of each other in the night sky in July 2014.[129] 3103 Eger 3551 Verenia 3908 Nyx 4055 Magellan Asteroids in fiction Diogenite Eucrite List of former planets Howardite Vesta family (vestoids) List of tallest mountains in the Solar System ^ Marc Rayman of the JPL Dawn team used "Vestian" (analogous to the Greek cognate Hestian) a few times in 2010 and early 2011 in his Dawn Journal, and the Planetary Society continued to use that form for a few more years.[2] The word had been used elsewhere, e.g. in Tsiolkovsky (1960) The call of the cosmos. However, otherwise the shorter form "Vestan" has been used by JPL.[3] Most modern print sources also use "Vestan".[4][5]Note that the related word "Vestalian" refers to people or things associated with Vesta, such as the vestal virgins, not to Vesta herself. ^ Calculated using the known dimensions assuming an ellipsoid. ^ Calculated using (1) the known rotation period (5.342 h)[6] and (2) the equatorial radius Req (285 km)[10] of the best-fit biaxial ellipsoid to Asteroid 4 Vesta. ^ a b topocentric coordinates computed for the selected location: Greenwich, United Kingdom[14] ^ On 10 February 2009, during Ceres perihelion, Ceres was closer to the Sun than Vesta, because Vesta has an aphelion distance greater than Ceres's perihelion distance. (10 February 2009: Vesta 2.56 AU; Ceres 2.54 AU) ^ 維斯塔 wéisītǎ is the closest Chinese approximation of the Latin pronunciation westa. ^ Some sources contemporaneous to Gauss invented more elaborate forms, such as and .[43][44] A simplification of the latter from c. 1930, ,[45] never caught on. ^ This symbol can be seen in the top of the most elaborate of the earlier forms, . It dates from 1973, at the beginning of astrological interest in asteroids.[46] ^ The data returned will include, for both asteroids, full surface imagery, full surface spectrometric mapping, elemental abundances, topographic profiles, gravity fields, and mapping of remnant magnetism, if any.[53] ^ that is, blue in the north does not mean the same thing as blue in the south. ^ Note that 6 Hebe may be the parent body for H chondrites, one of the most common meteorite types. ^ "Vesta". Dictionary.com Unabridged (Online). n.d. ^ "Search Results". Planetary Society. Archived from the original on 27 July 2020. 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Interactive 3D gravity simulation of the Dawn spacecraft in orbit around Vesta Archived 11 June 2020 at the Wayback Machine Vesta Trek – An integrated map browser of datasets and maps for 4 Vesta JPL Ephemeris Views of the Solar System: Vesta HubbleSite: Hubble Maps the Asteroid Vesta Encyclopædia Britannica, Vesta – full article HubbleSite: short movie composed from Hubble Space Telescope images from November 1994. Adaptive optics views of Vesta from Keck Observatory 4 Vesta images at ESA/Hubble Archived 22 January 2009 at the Wayback Machine Dawn at Vesta (NASA press kit on Dawn's operations at Vesta) NASA video Archived 22 April 2021 at the Wayback Machine Vesta atlas 4 Vesta at AstDyS-2, Asteroids—Dynamic Site Ephemeris · Observation prediction · Orbital info · Proper elements · Observational info 4 Vesta at the JPL Small-Body Database Close approach · Discovery · Ephemeris · Orbit viewer · Orbit parameters · Physical parameters Portals: Stars Spaceflight Outer space Science Retrieved from " 4 The following pages link to 4 Vesta External tools (link count transclusion count sorted list) · See help page for transcluding these entries Showing 50 items. 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Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. We love to teach kids in our community, and we love to share these activities and lessons with you, so you can pass on the knowledge in your own community. That's why we have compiled all our lesson plans and activities into one post! These lessons are short, fun, and easy to execute without expensive supplies or planning. We designed each activity to help kids (and adults) learn about the importance of fruits, vegetables and balanced eating. Browse our list, click the links to see full descriptions, and try one or two of these activities in your office, your house, and your kids' classrooms. Ready? Here we go! Story-based Nutrition. Teach balanced eating through books, discussions, and classroom cooking with this five-day lesson plan for grades K-2.Red Light/Green Light. Use this tool at home to help younger kids make choices about food.Eat the Rainbow. Use the colors of the rainbow to shape your meal plan and encourage your kids to branch out.8 MyPlate Activities. Use these activities and food tastings in a K-2nd grade classroom to enhance lessons about balance and the MyPlate.Roll the Dice. Build a giant colorful dice to spark conversations about a rainbow of foods.ABC Vitamins. Teach kids about vitamins in food, and use science to show vitamins in action.Advertise a Whole Grain. Provide supplies for kids to craft their own poster about a whole grain they like to eat, or one they have never tried.Sugar demo. Ask kids to compare grams of sugar in packaged foods that look the same on the outside, but are not the same on the inside. Complex Carbohydrate Craft. Build model molecules out of construction paper to teach the difference between simple and complex carbohydrates.MyPlate Printable. Stick this comprehensive list of foods on the refrigerator to get kids involved in planning healthful meals.Nutrition History Powerpoint. See the vintage visuals of the USDA's icons throughout history.Fun, Fit and Healthy. Teach nutrition basics to high schoolers with this 26-page presentation. Healthy Valentine Party. Host a heart-healthy Valentine's party with games, snacks and crafts.Healthy Habits Raffle. Create a jar and add tickets for every healthy behavior. Then draw a winner!Keep a Food Journal. Teach kids about balanced eating with a journaling exercise. We hope you found some useful exercises and activities to use with the kids in your community here. Looking for PE lesson plans? Check out this resource. What are your favorite ways to teach nutrition? Essential nutrients are those that must be provided through a balanced diet as the body cannot make them or make them in sufficient amounts. Every food we eat is made up of nutrients. Trying to get teenagers to understand the importance of eating key nutrients and what they do for our bodies can be challenging as there is so much information and sometimes only a limited time in which to teach it. So in order to give students an overview of the key nutrients without taking several weeks to cover the materials, I developed a combination of teacher directed and student directed activities. To help students understand the amount of nutrients in the foods they choose, I have students participate in a Tater Topper lab and then "Profile Their Potato" for essentials nutrients using the My Recipe portion of Supertracker. PA Standards 11.3.9 D Analyze relationship between diet and disease and risk factors (e.g., calcium and osteoporosis; fat, cholesterol and heart disease; folate and birth defects; sodium and hypertension). 11.3.9 E Analyze the energy requirements, nutrient requirements and body composition for individuals at various stages of the life cycle. Set Show students the PPT slide of deficiencies and excesses and ask them what they are and what causes them. Discuss whether these health and nutrition ailments preventable. If so, how? So what makes a healthy person? Discuss that good nutrition makes a healthy person and this begins with a healthy diet. A healthy diet needs to include the six essential nutrients: Carbohydrates, Fats, Protein, Vitamins, Minerals and Water. To give an overview about nutrition show the Bill Nye The Science Guy: Nutrition video. Materials Projector Colored Pencils or Markers 6 Different Colors of Copy Paper Glue Laptops Lab Supplies Activities Create a "Pac-Man" style foldable for the Nutrient Chain Foldable assignment using six different colors of copy paper and glue. Attached you'll find a PPT demonstrating the paper folding compliments of FACS teacher Sharon Allen of Indiana. Once assembled, it's time to go over the requirements. Our school has a community portal that teachers can post templates, assignments and PPTs for students to access from home or school. Since I wanted students to be more self-directed with their notes, I had them work through the PPT and take notes on their own instead of me lecturing. They were instructed to ask questions if they did not understand and then we discussed it. This foldable Nutrient Chain will be their working resource of information for upcoming assignments and tests. I like to attach labs to nutrition topics when I can so I decided to do a Tater Toppings style lab where students prep their potatoes the day before, and select topping choices (this helps me know how much to purchase). The next day I bake the potatoes so they are ready for class. Student lab groups prepare the toppings for the actual buffet or "bar". As students choose their toppings they are to document the amounts they take of each topping and there are limits to how much they can take. For the follow-up lab assignment, students must "Profile their Potato" by analyzing it's nutritional value using the recipe nutrion calculator. After they get a nutritional printout of their potato recipe, they complete a short writing assignment. For review students complete the "Nutrient Sort" and "Nutrient Match -Up" which are based on the information in their nutrient chain foldable. Attachments Tags: High School Middle School 100%(12)100% found this document useful (12 votes)21K views7 pagesThe document provides a detailed lesson plan on the importance of proper nutrition for technology and livelihood education students. The lesson plan covers the objectives, subject matter, an...AI-enhanced title and descriptionSaveSave DETAILED LESSON PLAN IN TLE For Later100%100% found this document useful, undefined100%(12)100% found this document useful (12 votes)21K views7 pagesThe document provides a detailed lesson plan on the importance of proper nutrition for technology and livelihood education students. The lesson plan covers the objectives, subject matter, and procedures for the class. It discusses key topics like the three basic food groups, characteristics of a healthy individual, and qualities of nutritious food. The lesson concludes with an evaluation and assignments for students to apply what they've learned about promoting proper nutrition.100%(12)100% found this document useful (12 votes)21K views7 pagesThe document provides a detailed lesson plan on the importance of proper nutrition for technology and livelihood education students. The lesson plan covers the objectives, subject matter, an...AI-enhanced title and description Description of the course of instruction for a lesson A lesson plan is a teacher's detailed description of the course of instruction or "learning trajectory" for a lesson. A daily lesson plan is developed by a teacher to guide class learning. Details will vary depending on the preference of the teacher, subject being covered, and the needs of the students. There may be requirements mandated by the school system regarding the plan.[1] A lesson plan is the teacher's guide for running a particular lesson, and it includes the goal (what the students are supposed to learn), how the goal will be reached (the method, procedure) and a way of measuring how well the goal was reached (test, worksheet, homework etc.).[2] The "Triple A" model for planning arranges a lesson in a sequence of activating learning, acquiring new learning, and applying the learning. While there are many formats for a lesson plan, most lesson plans contain some or all of these elements, typically in this order: Title of the lesson Time required to complete the lesson List of required materials List of objectives, which may be behavioral objectives (what the student can do at lesson completion) or knowledge objectives (what the student knows at lesson completion) The set (or lead-in, or bridge-in) that focuses students on the lesson's skills or concepts—these include showing pictures or models, asking leading questions, or reviewing previous lessons An instructional component that describes the sequence of events that make up the lesson, including the teacher's instructional input and, where appropriate, guided practice by students to consolidate new skills and ideas Independent practice that allows students to extend skills or knowledge on their own A summary, where the teacher wraps up the discussion and answers questions An evaluation component, a test for mastery of the instructed skills or concepts—such as a set of questions to answer or a set of instructions to follow A risk assessment where the lesson's risks and the steps taken to minimize them are documented An analysis component the teacher uses to reflect on the lesson itself—such as what worked and what needs improving A continuity component reviews and reflects on content from the previous lesson[3] According to Herbart, there are eight lesson plan phases that are designed to provide "many opportunities for teachers to recognize and correct students' misconceptions while extending understanding for future lessons." These phases are: Introduction, Foundation, Brain Activation, Body of New Information, Clarification, Practice and Review, Independent Practice, and Closure.[4] Preparation/Instruction: It pertains to preparing and motivating children to the lesson content by linking it to the previous knowledge of the student, by arousing curiosity of the children and by making an appeal to their senses. This prepares the child's mind to receive new knowledge. "To know where the pupils are and where they should try to be are the two essentials of good teaching." Lessons may be started in the following manner: a. Two or three interesting but relevant questions b. Showing a picture/s, a chart or a model c. A situation Statement of Aim: Announcement of the focus of the lesson in a clear, concise statement such as "Today, we shall study the..." Presentation/Development: The actual lesson commences here. This step should involve a good deal of activity on the part of the students. The teacher will take the aid of various devices, e.g., questions, illustrations, explanation, expositions, demonstration and sensory aids, etc. Information and knowledge can be given, explained, revealed or suggested. The following principles should be kept in mind. a. Principle of selection and division: This subject matter should be divided into different sections. The teacher should also decide as to how much he is to tell and how much the pupils are to find out for themselves. b. Principle of successive sequence: The teacher should ensure that the succeeding as well as preceding knowledge is clear to the students. c. Principle of absorption and integration: In the end separation of the parts must be followed by their combination to promote understanding of the whole. Association comparison: It is always desirable that new ideas or knowledge be associated to daily life situations by citing suitable examples and by drawing comparisons with the related concepts. This step is important when we are establishing principles or generalizing definitions. Generalizing: This concept is concerned with the systematizing of the knowledge learned. Comparison and contrast lead to generalization. An effort should be made to ensure that students draw the conclusions themselves. It should result in students' own thinking, reflection and experience. Application: It requires a good deal of mental activity to think and apply the principles learned to new situations. Knowledge, when it is put to use and verified, becomes clear and a part of the student's mental make-up. Recapitulation: Last step of the lesson plan, the teacher tries to ascertain whether the students have understood or grasped the subject matter or not. This is used for assessing/evaluating the effectiveness of the lesson by asking students questions on the contents of the lesson or by giving short objectives to test the student's level of understanding; for example, to label different parts on a diagram, etc. A well-developed lesson plan reflects the interests and needs of students. It incorporates best practices for the educational field. The lesson plan correlates with the teacher's philosophy of education, which is what the teacher feels is the purpose of educating the students.[5] Secondary English program lesson plans, for example, usually center around four topics. They are literary theme, elements of language and composition, literary history, and literary genre. A broad, thematic lesson plan is preferable, because it allows a teacher to create various research, writing, speaking, and reading assignments. It helps an instructor teach different literature genres and incorporate videotapes, films, and television programs. Also, it facilitates teaching literature and English together.[5] Similarly, history lesson plans focus on content (historical accuracy and background information), analytic thinking, scaffolding, and the practicality of lesson structure and meeting of educational goals.[6] School requirements and a teacher's personal tastes, in that order, determine the exact requirements for a lesson plan. Unit plans follow much the same format as a lesson plan, but cover an entire unit of work, which may span several days or weeks. Modern constructivist teaching styles may not require individual lesson plans. The unit plan may include specific objectives and timelines, but lesson plans can be more fluid as they adapt to student needs and learning styles. Unit Planning is the proper selection of learning activities which presents a complete picture. Unit planning is a systematic arrangement of subject matter. "A unit plan is one which involves a series of learning experiences that are linked to achieve the aims composed by methodology and contents," (Samford). "A unit is an organization of various activities, experiences and types of learning around a central problem or purpose developed cooperatively by a group of pupils under a teacher leadership involving planning, execution of plans and evaluation of results," (Dictionary of Education). Criteria of a Unit Plan Needs, capabilities, interest of the learner should be considered. Prepared on the sound psychological knowledge of the learner. Provide a new learning experience; systematic but flexible. Sustain the attention of the learner til the end. Related to social and physical environment of the learner. Development of learner's personality. Lesson planning is a thinking process, not the filling in of a lesson plan template. A lesson plan is envisaged as a blue print, guide map for action, a comprehensive chart of classroom teaching-learning activities, an elastic but systematic approach for the teaching of concepts, skills and attitudes. The first thing for setting a lesson plan is to create an objective, that is, a statement of purpose for the whole lesson. An objective statement itself should answer what students will be able to do by the end of the lesson. The objective drives the whole lesson plan; it is the reason the lesson plan exists. The teacher should ensure that lesson plan goals are compatible with the developmental level of the students. The teacher ensures as well that their student achievement expectations are reasonable.[5] The following guidelines were set by Canadian Council on Learning to enhance the effectiveness of the teaching process: At the start of teaching, provide the students with an overall picture of the material to be presented. When presenting material, use as many visual aids as possible and a variety of familiar examples. Organize the material so that it is presented in a logical manner and in meaningful units. Try to use terms and concepts that are already familiar to the students. Maximize the similarity between the learning situation and the assessment situation and provide adequate training practice. Give students the chance to use their new skills immediately on their return home through assignments. Communicate the message about the importance of the lesson, increase their motivation level, and control sidelining behaviors by planning rewards for students who successfully complete and integrate the new content. To sustain learning performance, the assessments must be fair and attainable. Motivation affects teaching outcomes independently of any increase in cognitive ability. Learning motivation is affected by individual characteristics like conscientiousness and by the learning climate. Therefore, it is important to try to provide as much realistic assignments as possible. Students learn best at their own pace and when correct responses are immediately reinforced, perhaps with a quick "Well done." For many Generation Z students, the use of technology can motivate learning. Simulations, games, virtual worlds, and online networking are already revolutionizing how students learn and how learning experiences are designed and delivered. Learners who are immersed in deep experiential learning in highly visual and interactive environments become intellectually engaged in the experience. Research shows that it is important to create a perceived need for learning (Why should I learn, the realistic relatable objective) in the minds of students. Then only students can perceive the transferred "how and what to learn" part from the educator. Also, provide ample information that will help to set the students' expectations about the events and consequences of actions that are likely to occur in the learning environment. For example, students learning to become adept on differential equations may face stressful situations, high loads of study, and a difficult environment. Studies suggest that the negative impact of such conditions can be reduced by letting students know ahead of time what might occur and equipping them with skills to manage. Creating a reliable lesson plan is an important part of classroom management. Doing so requires the ability to incorporate effective strategies into the classroom, the students and overall environment. There are many different types of lesson plans and ways of creating them. Teachers can encourage critical thinking in a group setting by creating plans that include the students participating collectively. Visual strategies are another component tied into lesson plans that help with classroom management. These visual strategies help a wide variety of students to increase their learning structure and possibly their overall comprehension of the material or what is in the lesson plan itself. These strategies also give students with disabilities the option to learn in a possible more efficient way. Teachers need to realize the wide range of strategies that can be used to maintain classroom management and students. They should find the best strategies to incorporate in their lesson planning for their specific grade, student type, teaching style, etc. and utilize them to their advantage. The classroom tends to flow better when the teacher has a proper lesson planned, as it provides structure for the students. Being able to utilize class time efficiently comes with creating lesson plans at their core.[7] Assignments are either in-class or take-home tasks to be completed for the next class period.[8] These tasks are important because they help ensure that the instruction provides the students with a goal, the power to get there, and the interest to be engaged in rigorous academic contexts as they acquire content and skills necessary to be able to participate in academic coursework.[9] Experts cite that, in order to be effective and achieve objectives, the development of these assignment tasks must take into consideration the perceptions of the students because they are different from those of the teacher's.[10] This challenge can be addressed by providing examples instead of abstract concepts or instructions. Another strategy involves the development of tasks that are specifically related to the learners' needs, interests, and age ranges.[10] There are also experts who cite the importance of teaching learners about assignment planning.[11] This is said to facilitate the students' engagement and interest in their assignment. Some strategies include brainstorming about the assignment process and the creation of a learning environment wherein students feel engaged and willing to reflect on their prior learning and to discuss specific or new topics.[11] There are several assignment types so the instructor must decide whether class assignments are whole-class, small groups, workshops, independent work, peer learning, or contractual: Whole-class—the teacher lectures to the class as a whole and has the class collectively participate in classroom discussions. Small groups—students work on assignments in groups of three or four. Workshops—students perform various tasks simultaneously. Workshop activities must be tailored to the lesson plan. Independent work—students complete assignments individually. Peer learning—students work together, face to face, so they can learn from one another. Contractual work—teacher and student establish an agreement that the student must perform a certain amount of work by a deadline.[5] These assignment categories (e.g. peer learning, independent, small groups) can also be used to guide the instructor's choice of assessment measures that can provide information about student and class comprehension of the material. As discussed by Biggs (1999), there are additional questions an instructor can consider when choosing which type of assignment would provide the most benefit to students. These include: What level of learning do the students need to attain before choosing assignments with varying difficulty levels? What is the amount of time the instructor wants the students to use to complete the assignment? How much time and effort does the instructor have to provide student grading and feedback? What is the purpose of the assignment? (e.g. to track student learning; to provide students with time to practice concepts; to practice incidental skills such as group process or independent research) How does the assignment fit with the rest of the lesson plan? Does the assignment test content knowledge or does it require application in a new context?[12] Does the lesson plan fit a particular framework? Curriculum Syllabus Bloom's Taxonomy Instructional Materials No Child Left Behind ^ O'Bannon, B. (2008). "What is a Lesson Plan?". Innovative Technology Center * The University of Tennessee. Archived from the original on July 29, 2011. Retrieved May 17, 2011. ^ "What Is A Lesson Plan?". English Club. Retrieved 15 October 2014. ^ "Writing Lesson Plans Archived 2011-07-22 at the Wayback Machine." Huntington University 15 Mar. 2009. ^ Cunningham, Gini. 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