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| Railroading Requirements | [http://meritbadge.org/wiki/images/thumb/3/33/128px-Padlock-orange.png/25px-128px-Padlock-orange.png](http://meritbadge.org/wiki/index.php/Image:128px-Padlock-orange.png) |
| 1. Do THREE of the following:  a. Name three types of modern freight trains. Explain why unit trains are more efficient than mixed freight trains.  One of the most common types on modern railways are container trains, where containers can be lifted on and off the train by [cranes](http://en.wikipedia.org/wiki/Crane_(machine)) and loaded off or onto [trucks](http://en.wikipedia.org/wiki/Truck) or [ships](http://en.wikipedia.org/wiki/Ship).  In the US this type of freight train has largely superseded the traditional [boxcar](http://en.wikipedia.org/wiki/Boxcar) (wagon-load) type of freight train, with which the cargo has to be loaded or unloaded manually. In Europe the [sliding wall wagon](http://en.wikipedia.org/wiki/Covered_goods_wagon#Sliding_wall_wagons) has taken over from the ordinary [covered goods wagon](http://en.wikipedia.org/wiki/Covered_goods_wagon).  In some countries "[piggy-back](http://en.wikipedia.org/wiki/Piggy-back_(transportation)#Rail)" trains or [rolling highways](http://en.wikipedia.org/wiki/Rolling_highway) are used: in the latter case [trucks](http://en.wikipedia.org/wiki/Truck) can drive straight onto the train and drive off again when the end destination is reached. A system like this is used through the [Channel Tunnel](http://en.wikipedia.org/wiki/Channel_Tunnel) between [England](http://en.wikipedia.org/wiki/England) and [France](http://en.wikipedia.org/wiki/France), and for the trans-Alpine service between France and [Italy](http://en.wikipedia.org/wiki/Italy) (this service uses [Modalohr road trailer carriers](http://en.wikipedia.org/wiki/Gondola_(rail)#Modalohr_road_trailer_carriers)). 'Piggy-back' trains are the fastest growing type of freight trains in the United States, where they are also known as '[trailer](http://en.wikipedia.org/wiki/Semi-trailer) on [flatcar](http://en.wikipedia.org/wiki/Flatcar)' or TOFC trains. 'Piggy-back' trains require no special modifications to the vehicles being carried. An alternative type of "inter-modal" vehicle, known as a [Roadrailer](http://en.wikipedia.org/wiki/Roadrailer), is designed to be physically attached to the train. The original trailers were fitted with two sets of wheels: one set flanged, for the trailer to run connected to other such trailers as a rail vehicle in a train; and one set tyred, for use as the [semi-trailer](http://en.wikipedia.org/wiki/Semi-trailer) of a road vehicle. More modern trailers have only road wheels and are designed to be carried on specially adapted [bogies](http://en.wikipedia.org/wiki/Bogie) (trucks) when moving on rails.  A **unit train**, also called a **block train**, is a [railroad](http://en.wikipedia.org/wiki/Railroad) (non-US: railway) train in which all the [cars](http://en.wikipedia.org/wiki/Railroad_car) (non-US: wagons) making it up are shipped from the same origin to the same destination, without being split up or stored en route. This saves time and money, as well as the hassle, delays and confusion associated with assembling and disassembling trains at [rail yards](http://en.wikipedia.org/wiki/Rail_yard) near the origin and destination. It also enables railways to compete more effectively with road and internal waterway transport systems, However, unit trains are economical only for high-volume customers. Since unit trains often carry only one [commodity](http://en.wikipedia.org/wiki/Commodity), cars are of all the same type, and sometimes the cars are all identical apart from possible variations in livery.  b. Name one Class I or regional railroad. Explain what major cities it serves, the locations of major terminals, service facilities, and crew change points, and the major commodities it carries.  The [Surface Transportation Board](http://en.wikipedia.org/wiki/Surface_Transportation_Board) (STB) defines a Class I railroad in the United States as "having annual carrier operating revenues of $250 million or more" after adjusting for inflation using a Railroad Freight [Price Index](http://en.wikipedia.org/wiki/Price_Index) developed by the [Bureau of Labor Statistics](http://en.wikipedia.org/wiki/Bureau_of_Labor_Statistics) (BLS).[[1]](http://en.wikipedia.org/wiki/Class_I_railroad#cite_note-0) According to the [Association of American Railroads](http://en.wikipedia.org/wiki/Association_of_American_Railroads) (AAR), Class I railroads had minimum carrier operating revenues of $346.8 million (USD) in 2006.[[2]](http://en.wikipedia.org/wiki/Class_I_railroad#cite_note-1)   * [BNSF Railway](http://en.wikipedia.org/wiki/BNSF_Railway)   The **BNSF Railway** ([reporting mark](http://en.wikipedia.org/wiki/Reporting_mark) **BNSF**), formerly known as the BNSF directly owns and operates over 24,000 miles (38,624 kilometers) of track. When these additional tracks are counted, the length of track which the railway directly controls rises to more than 50,000 miles (80,467 kilometers). The BNSF Railway moves more [intermodal freight](http://en.wikipedia.org/wiki/Intermodal_freight_transport) traffic than any other rail system in the world.  With BNSF's large system, it hauls many different commodities, most notably [coal](http://en.wikipedia.org/wiki/Coal) and [grain](http://en.wikipedia.org/wiki/Grain), as well as [intermodal freight](http://en.wikipedia.org/wiki/Intermodal_freight).  [System map](http://en.wikipedia.org/wiki/File:BNSF_Railway_system_map.svg)   * [CSX Transportation](http://en.wikipedia.org/wiki/CSX_Transportation)   Kansas City Southern Railway (KCSR) operates 3,226 track miles in a ten-state region of the United States, with major [hubs](http://en.wikipedia.org/wiki/Hubs) including [Kansas City, MO](http://en.wikipedia.org/wiki/Kansas_City,_MO), [Shreveport, LA](http://en.wikipedia.org/wiki/Shreveport,_LA), [New Orleans, LA](http://en.wikipedia.org/wiki/New_Orleans,_LA), and [Dallas, TX](http://en.wikipedia.org/wiki/Dallas,_TX). Among the Class I railroads, KCSR has the shortest route between [Kansas City](http://en.wikipedia.org/wiki/Kansas_City), the second largest rail hub in the country, and the [Gulf of Mexico](http://en.wikipedia.org/wiki/Gulf_of_Mexico).[[3]](http://en.wikipedia.org/wiki/Kansas_City_Southern_Railway#cite_note-cpr-2)  CSX operates the [Juice Train](http://en.wikipedia.org/wiki/Juice_Train), train numbers Q740 and Q741, a notable [unit train](http://en.wikipedia.org/wiki/Unit_train) of [Tropicana](http://en.wikipedia.org/wiki/Tropicana_Products) fresh [orange juice](http://en.wikipedia.org/wiki/Orange_juice) between [Bradenton, Florida](http://en.wikipedia.org/wiki/Bradenton,_Florida), and distribution centers in the [Greenville](http://en.wikipedia.org/wiki/Greenville,_New_Jersey) section of [Jersey City, New Jersey](http://en.wikipedia.org/wiki/Jersey_City,_New_Jersey) and [Cincinnati, Ohio](http://en.wikipedia.org/wiki/Cincinnati,_Ohio) in the [United States](http://en.wikipedia.org/wiki/United_States)  The so-called Coke Express is a train that runs between [Pittsburgh](http://en.wikipedia.org/wiki/Pittsburgh) and [Chicago](http://en.wikipedia.org/wiki/Chicago), and other places in the [rust belt](http://en.wikipedia.org/wiki/Rust_belt), carrying [Coke (fuel)](http://en.wikipedia.org/wiki/Coke_(fuel)) to industries such as power plants and steel mills.  CSX also runs daily trash trains out from New York City, bound for Florida, train numbers Q706/Q707 and Q702/Q703. These trains usually consist of about 50 cars with four 20 foot containers of trash on each.  CSX, in cooperation with the [Union Pacific](http://en.wikipedia.org/wiki/Union_Pacific), runs an extended haul perishables train, Q090; known by the railroad as the "Apple Train", from [Wallula](http://en.wikipedia.org/wiki/Wallula,_WA) to [Schenectady](http://en.wikipedia.org/wiki/Schenectady,_NY). This train typically runs with 3 UP AC44CW's and has its extended haul inspection from Wallula to Schenectady at Cleveland - Collinwood Yard on CSX headed in both directions, but on the return trip the train is labeled as a Q091. CSX Train Handling rule book is modified specially for this train to allow use of more power axles.[[2]](http://en.wikipedia.org/wiki/CSX_Transportation#cite_note-1) [System map](http://en.wikipedia.org/wiki/File:CSX_Transportation_system_map.svg)   * [Kansas City Southern Railway](http://en.wikipedia.org/wiki/Kansas_City_Southern_Railway)   Kansas City Southern Railway (KCSR) operates 3,226 track miles in a ten-state region of the United States, with major [hubs](http://en.wikipedia.org/wiki/Hubs) including [Kansas City, MO](http://en.wikipedia.org/wiki/Kansas_City,_MO), [Shreveport, LA](http://en.wikipedia.org/wiki/Shreveport,_LA), [New Orleans, LA](http://en.wikipedia.org/wiki/New_Orleans,_LA), and [Dallas, TX](http://en.wikipedia.org/wiki/Dallas,_TX). Among the Class I railroads, KCSR has the shortest route between [Kansas City](http://en.wikipedia.org/wiki/Kansas_City), the second largest rail hub in the country, and the [Gulf of Mexico](http://en.wikipedia.org/wiki/Gulf_of_Mexico).[[3]](http://en.wikipedia.org/wiki/Kansas_City_Southern_Railway#cite_note-cpr-2)  [System map](http://en.wikipedia.org/wiki/File:Kansas_City_Southern_Railway_system_map.svg)   * [Norfolk Southern Railway](http://en.wikipedia.org/wiki/Norfolk_Southern_Railway)   With headquarters in [Norfolk, Virginia](http://en.wikipedia.org/wiki/Norfolk,_Virginia), the company operates 21,500 route miles in 22 eastern states, the [District of Columbia](http://en.wikipedia.org/wiki/District_of_Columbia) and the province of [Ontario](http://en.wikipedia.org/wiki/Ontario), [Canada](http://en.wikipedia.org/wiki/Canada). The most common commodity hauled on the railroad is [coal](http://en.wikipedia.org/wiki/Coal) from mines in [Kentucky](http://en.wikipedia.org/wiki/Kentucky), [Pennsylvania](http://en.wikipedia.org/wiki/Pennsylvania), [Tennessee](http://en.wikipedia.org/wiki/Tennessee), [Virginia](http://en.wikipedia.org/wiki/Virginia) and [West Virginia](http://en.wikipedia.org/wiki/West_Virginia). The railroad also offers an extensive [intermodal](http://en.wikipedia.org/wiki/Intermodal_freight_transport) network in eastern North America.  The railroad is a major transporter of domestic and export coal in the Eastern half of the country. The railroad's major sources of the mineral are located in: [Pennsylvania](http://en.wikipedia.org/wiki/Pennsylvania)'s Cambria County, Indiana County, and Monongahela Valley; [West Virginia](http://en.wikipedia.org/wiki/West_Virginia); Appalachia regions of [Virginia](http://en.wikipedia.org/wiki/Virginia), [Kentucky](http://en.wikipedia.org/wiki/Kentucky), and [Tennessee](http://en.wikipedia.org/wiki/Tennessee). In Pennsylvania, NS also receives coal through interchange with [R.J. Corman Railroad/Pennsylvania Lines](http://en.wikipedia.org/wiki/R.J._Corman_Railroad/Pennsylvania_Lines) at [Cresson, Pennsylvania](http://en.wikipedia.org/wiki/Cresson,_Pennsylvania), originating in the so-called "[Clearfield Cluster](http://en.wikipedia.org/wiki/Clearfield_Cluster)".  At the end of 2003, the transport of coal, coke and iron ore made up 23% of the total amount of traffic hauled by NS. Intermodal containers made up 19% of the total; [autoracks](http://en.wikipedia.org/wiki/Autorack) 14%; chemical tankers 12%; metals, construction materials, agriculture commodities, and consumer products 11%; paper, clay, and forest products 10%.  [System map](http://en.wikipedia.org/wiki/File:Norfolk_Southern_Railway_system_map.svg)  c. Using models or pictures, identify 10 types of railroad freight or passenger cars. Explain the purpose of each type of car.  d. Explain how a modern diesel or electric locomotive develops power. Explain the terms dynamic braking and radial steering trucks.  **Diesel-mechanical**  A diesel-mechanical locomotive uses a [mechanical transmission](http://en.wikipedia.org/wiki/Gearbox) in a fashion similar to that employed in highway vehicles  **Diesel-electric**  In a **Diesel-electric** locomotive the Diesel engine drives an electrical [generator](http://en.wikipedia.org/wiki/Generator_(device)) whose output provides power to the [traction motors](http://en.wikipedia.org/wiki/Traction_motor). There is no mechanical connection between the engine and the wheels. The important components of Diesel-electric propulsion are the Diesel engine (also known as the [prime mover](http://en.wikipedia.org/wiki/Prime_mover_(locomotive))), the main [generator](http://en.wikipedia.org/wiki/Generator), [traction motors](http://en.wikipedia.org/wiki/Traction_motor), and a control system consisting of the engine [governor](http://en.wikipedia.org/wiki/Governor_(device)), and electrical or electronic components used to control or modify the electrical supply to the traction motors, including [switchgear](http://en.wikipedia.org/wiki/Switchgear), [rectifiers](http://en.wikipedia.org/wiki/Rectifiers), and other components. In the most elementary case, the generator may be directly connected to the motors with only very simple switchgear.  The [electric locomotive](http://en.wikipedia.org/wiki/Electric_locomotive) is supplied externally with electric power, either through an [overhead pickup](http://en.wikipedia.org/wiki/Overhead_lines) or through a [third rail](http://en.wikipedia.org/wiki/Third_rail). While the capital cost of electrifying track is high, electric trains and locomotives are capable of higher performance and lower operational costs than steam or diesel power.[[14](http://en.wikipedia.org/wiki/Locomotive#cite_note-13)  Some electric locomotives can also operate off [battery](http://en.wikipedia.org/wiki/Battery_(electricity)) power to enable short journeys or shunting on non-electrified lines or yards.[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)] Battery-powered locomotives are used in mines and other underground locations where diesel fumes or smoke would endanger crews, and where external electricity supplies cannot be used due to the danger of sparks igniting flammable gas.[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)] Battery locomotives are also used on many underground railways for maintenance operations, as they are required when operating in areas where the electricity supply has been temporarily disconnected.[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]  **Dynamic braking** is the use of the electric [traction motors](http://en.wikipedia.org/wiki/Traction_motors) of a [railroad](http://en.wikipedia.org/wiki/Railroad) vehicle as generators when slowing the vehicle. It is termed *rheostatic* if the generated electrical power is dissipated as heat in brake grid resistors and [*regenerative*](http://en.wikipedia.org/wiki/Regenerative_brake) if the power is returned to the supply line. Dynamic braking lowers the wear of friction braking components and additionally regeneration can also lower energy consumption.  Dynamic braking is particularly beneficial when operating in mountainous regions, where there is always the danger of a runaway due to overheated friction brakes during descent (see also comments in the [air brake](http://en.wikipedia.org/wiki/Air_brake_(rail)#Limitations) article regarding loss of braking due to improper train handling). In such cases, dynamic brakes are usually applied in conjunction with the [air brakes](http://en.wikipedia.org/wiki/Air_brake_(rail)), the combined effect being referred to as [blended braking](http://en.wikipedia.org/wiki/Blended_brake). The use of blended braking can also assist in keeping the slack in a long train stretched as it crests a grade, helping to prevent a "run-in", an abrupt bunching of train slack that can cause a derailment. Blended braking is also commonly used with [commuter trains](http://en.wikipedia.org/wiki/Commuter_train) to reduce wear and tear on the mechanical brakes that is a natural result of the numerous stops such trains typically make during a run.  A **bogie** (pronounced [/ˈboʊɡi/](http://en.wikipedia.org/wiki/Wikipedia:IPA_for_English), us dict: [bō′·gē](http://en.wikipedia.org/wiki/Wikipedia:United_States_dictionary_transcription" \o "Wikipedia:United States dictionary transcription)) is a [wheeled](http://en.wikipedia.org/wiki/Wheel) wagon or trolley. In [mechanics](http://en.wikipedia.org/wiki/Machine) terms, a bogie is a [chassis](http://en.wikipedia.org/wiki/Chassis) or framework carrying wheels, attached to a vehicle. It can be fixed in place, as on a cargo truck, mounted on a swivel, as on a railway carriage or locomotive, or sprung as in the suspension of a caterpillar  [http://upload.wikimedia.org/wikipedia/en/thumb/d/d4/Railroad_truck%2CFM55-20.Fig8-8.png/300px-Railroad_truck%2CFM55-20.Fig8-8.png](http://en.wikipedia.org/wiki/File:Railroad_truck,FM55-20.Fig8-8.png)  [http://en.wikipedia.org/skins-1.5/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:Railroad_truck,FM55-20.Fig8-8.png)  US-style railroad truck with [journal bearings](http://en.wikipedia.org/wiki/Journal_bearing).   |  |  |  | | --- | --- | --- | | ***Conventional*** |  | ***Patented Radial Truck*** | | http://emdiesels.com/lms/emdweb/images/radial_ill_01.jpg |  | http://emdiesels.com/lms/emdweb/images/radial_ill_04.jpg | |  |  |  | | **Wheels mounted in a conventional rigid truck cannot conform to curves. Their flanges bite into the gauge face of the rail, wearing metal from both surfaces.** |  | **The EMD radial truck reduces the angle of attack, and literally steers through curves, keeping wheels parallel to the direction of the track.** | |  |  |  |   2. Do the following:  a. Explain the purpose and formation of Amtrak. Explain, by the use of a timetable, a plan for making a trip by rail between two cities at least 500 miles apart. List the times of departure and arrival at your destination, the train number, and the type of service you want.  **DONE**  b. List and explain the various forms of public/mass transit using rail as the fixed guide path.  Rail can be a key part of mass transit. It is strongest when a large number of people need to move between a small set of points which are far apart.   * Light-rail from Eastside to Seattle – park at one end, take rail, bus to final destination. * Rail from Seattle to SeaTac airport * The Shinkansen (bullet train) in Japan serves commuters who travel to work in metropolitan areas from outlying cities.   3. Do ONE of the following:  a. Name four departments of a railroad company. Describe what each department does.  b. Tell about the opportunities in railroading that interest you most and why.  c. Name four rail support industries, Describe the function of each one.  **d. With your parent's and counselor's approval, interview someone employed in the rail industry. Learn what that person does and how this person became interested in railroading. Find out what type of schooling and training are required for this position.**  **DONE**  4. Explain the purpose of Operation Lifesaver and its mission.  **Operation Lifesaver** is an organization originally started in [Idaho](http://en.wikipedia.org/wiki/Idaho) in 1972 as a six-week, one-time public awareness campaign sponsored by the office of Governor [Cecil Andrus](http://en.wikipedia.org/wiki/Cecil_Andrus), the [Idaho Peace Officers](http://en.wikipedia.org/w/index.php?title=Idaho_Peace_Officers&action=edit&redlink=1) and [Union Pacific Railroad](http://en.wikipedia.org/wiki/Union_Pacific_Railroad) after years of increasing grade crossing accidents.  As a result of Operation Lifesaver, grade crossing-related fatalities dropped by forty-three percent. The next year, the Operation Lifesaver campaign spread to [Nebraska](http://en.wikipedia.org/wiki/Nebraska), where their collision rate was reduced by twenty-six percent. [Kansas](http://en.wikipedia.org/wiki/Kansas) and [Georgia](http://en.wikipedia.org/wiki/Georgia_(U.S._state)) established independent versions the year after that, and between 1978 and 1986, while Operation Lifesaver operated under the auspices of the [National Safety Council](http://en.wikipedia.org/wiki/National_Safety_Council), all 49 continental states started independent Operation Lifesaver programs which remain active today. In 1986, the national program was incorporated as a national, [non-profit](http://en.wikipedia.org/wiki/Non-profit) educational organization.  Operation Lifesaver provides educational material free of charge to schools and civic organizations and they actively recruit and train volunteers to speak on the subject of rail safety.  In 2006 Operation Lifesaver requested that [Disney](http://en.wikipedia.org/wiki/Disney) edit a scene of the [Pixar](http://en.wikipedia.org/wiki/Pixar) film [Cars](http://en.wikipedia.org/wiki/Cars_(film)) in which the character of Lighting McQueen races a train to a grade crossing while the crossing lights are flashing. Disney/Pixar has removed the scene in question from theater showings but the [DVD](http://en.wikipedia.org/wiki/DVD) release of the movie still includes the scene.  5. Do THREE of the following:  a. List five safety precautions that help make trains safer for workers and passengers.  b. Explain to your merit badge counselor why railroad rights-of-way are important for safety.  c. List 10 safety tips to remember when you are near a railroad track (either on the ground or on a station platform) or aboard a train.  d. Tell your counselor about the guidelines for conduct that should be followed when you are near or on railroad property. Explain the dangers of trespassing on railroad property.   * Railroad tracks, trestles, yards and equipment are private property. Walking or playing on them is illegal – trespassers are subject to arrest and fines. Too often the penalty is death. * The **ONLY** legal and safe place to cross tracks is at designated pedestrian or roadwaycrossings. Observe and obey all warning signs and signals. * In 2006, at least **362** people were killed and **999** were injured in **2,897** highway/rail grade crossing collisions (combined for public and private crossings). * At least **530** people were killed and **466** were injured while trespassing on railroad rights of way and property. * In the United States of America, approximately **every two hours** either a vehicle or a pedestrian is struck by a train. That’s 12 tragic incidents each day.   e. Tell what an automobile driver can do to safely operate a car at grade crossings, and list three things an automobile driver should never do at a grade crossing.  · **ALWAYS EXPECT A TRAIN!** Freight trains do not follow set schedules. Passenger train schedules change.  · Never drive around lowered gates – it’s illegal and deadly. If you suspect a signal is malfunctioning, look for an emergency notification number posted on or near the crossing signal, or notify your local law enforcement agency.  · Never race a train to the crossing – even if you tie, you lose.  · Do not get trapped on the tracks. Only proceed through a highwayrail  grade crossing if you are sure you can completely clear the crossing without stopping. Remember, the train is three feet wider than the tracks on both sides. A safe stopping distance from the tracks is 15 feet.  · If your vehicle stalls on a crossing, immediately get everyone out and far away from the tracks. Call your local law enforcement agency for assistance.  · Do not be fooled by the optical illusion – the train you see may be closer and faster moving than it appears to be. If you see a train approaching, wait for it to go by before you proceed across the tracks.  · At a multiple track crossing waiting for a train to pass, watch out for a second train on the other tracks, approaching in either direction.  · Be aware that trains cannot stop quickly. Even if the locomotive engineer sees you, a freight train moving at 55 miles per hour can take a mile or more to stop once the emergency brakes are applied. That’s 18 football fields!  f. Tell how to report a malfunction of grade crossing warning devices.   |  |  | | --- | --- | | Amtrak | 1-800-331-0008 | | BNSF Railway | 1-800-832-5452 | | CSX | 1-800-232-0144 | | Canadian National | 1-800-465-9239 | | Canadian Pacific | 1-800-716-9132 | | Kansas City Southern | 1-877-527-9464 or 1-800-892-6295 | | Norfolk Southern | 1-800-453-2530 | | Union Pacific | 1-888-877-7267 |   In an emergency or when responding to an incident involving railway  operations, contact the railway. Many railway companies post their emergency numbers prominently at crossings.  g. List safety precautions a pedestrian should follow at a public crossing.  6. Explain the appearance and meaning of the following warning signs and devices: advance warning sign, pavement markings, crossbucks, flashing red lights, crossing gates. Advance warning signs  * The advance warning sign is a round, yellow sign bearing the lettering RXR. * The "X" is very large, covering the full diameter of the sign. It is usually the first warning you will see that you are approaching a railroad crossing. * Slow down, look and listen for an approaching train. Look ahead to pinpoint the location of the crossing. At this point you still have plenty of time to stop if a train is coming.  Pavement markings  * As you approach the crossing you may see a large RXR painted on the pavement. * As with the advance warning sign, the "X" will be very large in comparison to the two R's. Behind this warning will be a stop line painted closer to the tracks. * Stay behind this line to be safe from a train when it passes.  Crossbuck signs  * So called "crossbuck" signs have the words "RAILROAD" and "CROSSING" in black and white assembled in a large "X" configuration. * If there is more than one set of tracks this sign will also tell how many tracks there are on a separate sign below the crossbuck. * As you approach, look and listen for an approaching train. The crossbuck sign means the same as a yield sign, which means that if a train is approaching you must yield and let the train pass. A recently enacted state law will require that a YIELD sign be placed below the crossbuck sign at crossings that do not have stop signs or red flashing light signals. This is being done to further emphasize that a crossbuck sign means that you must yield to trains.  Red flashing lights and gates  * Many crossbuck signs have red lights and bells attached. Some even have gates which cross the traffic lane. * If the lights begin to flash or the bells begin to ring, STOP! A train is coming. * You must yield to the train and remain stopped until the lights have stopped flashing and the gates have lifted. * If there are multiple tracks, make sure the train you see isn't hiding another one you don't see. * Sometimes when the lights don't stop flashing or the gate doesn't go up immediately after the passage of a train, it means there's another train approaching. In this case, impatience to get back on the road could be deadly.   7. Do EACH of the following:  a. Explain how railroad signals operate and show two basic signal types using color and configuration.  **Layout**  [http://upload.wikimedia.org/wikipedia/en/thumb/2/29/CP-98-home%2Bhut%2BC.jpg/180px-CP-98-home%2Bhut%2BC.jpg](http://en.wikipedia.org/wiki/File:CP-98-home+hut+C.jpg)  [http://en.wikipedia.org/skins-1.5/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:CP-98-home+hut+C.jpg)  Stacked searchlight dwarf at Springfield, MA  North American signals generally follow a common layout. A **high signal** consists of one to three *heads* mounted roughly in a vertical stack, each head capable of displaying one to four different aspects. Automatic signals are identified with a number plate whereas absolute signals are not. The signal's aspect is based on a combination of the aspects each individual head displays. Where a signal has multiple heads, aspects are read from top to bottom and are described as "X over Y over Z".  **Dwarf signals** are smaller signals used in low speed or restricted clearance areas. Most signaling aspect systems have a parallel set of aspects for use with dwarf signals that differ from aspects used in high signals. Dwarf signals may have multiple heads just like a high signal, but sometimes dwarf signals use so called "virtual heads" to save on space and cost. This is where a dwarf signal displays multiple lamps on what would ordinarily be a single signal head creating the effect of multiple signal heads. For example, a stack of dwarf lamps in the order Yellow/Red/Green can display plain Yellow, Red and Green as well as Yellow over Green and Red over Green.  North American signals use a standard set of colors common to other modes of transportation.   * **Green** - Used to indicate "clear" track conditions. * **Yellow** - Used to warn the engineer of an impending stop or speed reduction. Also used for low speed movements. * **Red** - Used to indicate a full stop or other restrictive condition or used as a "placeholder" light. * **Lunar White** - Blue filtered light used to indicate a restricted proceed condition. * **Amber** - Used in position light systems as an all-purpose high visibility color. * **(Plain) White** - Plain incandescent white light. Used in some position light systems.   b. Explain the meaning of three whistle signals  "o" = short sound  "-" = long sound  "\_" = sustained sound  o Apply brakes. Stop.  -- Release brakes. Proceed.  -ooo Flagman protect rear of train.  -ooo- Flagman protect adjacent track  oo Answer to any signal nor otherwise provided for.  oo\_\_\_\_ Answer to flagman's stop signals.  oooo Call for signals.  --o\_\_\_\_\_\_ Approaching public grade crossings at grade. To be prolonged or repeated until crossing is reached  \_\_\_\_\_\_\_ Approaching stations, junctions, and railroad crossings at grade.  Succesion of o's Alarm for persons or livestock on the track.  c. Describe a way to signal a train for an emergency stop.   * 1. Try to quickly locate an employee of the [railway[http://images.intellitxt.com/ast/adTypes/2.gif](http://www.ehow.com/how_2271141_stop-train.html?ref=fuel&utm_source=yahoo&utm_medium=ssp&utm_campaign=yssp_art)](http://www.ehow.com/how_2271141_stop-train.html?ref=fuel&utm_source=yahoo&utm_medium=ssp&utm_campaign=yssp_art). Instead of stopping the training on your own, you can enlist the help of a train worker. The employee will know the proper procedures to take to diffuse the situation.   2. Find the emergency brake box in your [train[http://images.intellitxt.com/ast/adTypes/mag-glass_10x10.gif](http://www.ehow.com/how_2271141_stop-train.html?ref=fuel&utm_source=yahoo&utm_medium=ssp&utm_campaign=yssp_art)](http://www.ehow.com/how_2271141_stop-train.html?ref=fuel&utm_source=yahoo&utm_medium=ssp&utm_campaign=yssp_art) car. If you're unable to enlist the help of an employee, you'll need to stop the train on your own. On each train, usually at the far end of each car, you can find an emergency brake box.   3. Open the box and pull the cord inside. In some cases, you may need to smash the glass box first in order to access the emergency brake cord. You'll want to pull it with a lot of force in order to engage the brakes.   4. Grab onto something close by to steady yourself. When you employ the emergency stop feature on a train, you're making the train fully apply its braking system. This can cause a violent jerking motion that can easily throw you about.   d. Explain the use and function of the EOTD (end-of-train device) or FRED (Flashing rear end device) used on the last car of most trains.  More than just a flashing red taillight, the FRED monitors functions such as brake line pressure and accidental separation of the train using a motion sensor, functions that would have been monitored by a crew in the caboose. The FRED transmits the data via a telemetry link to the Head-of-Train Device (HOT) in the locomotive, known colloquially among railroaders as a Wilma—the FRED is said to be "married to Wilma," a play on Fred Flintstone's wife from The Flintstones cartoon. This replaces the caboose and the crewman who mans it.  [http://upload.wikimedia.org/wikipedia/en/thumb/9/99/FRED_cropped.jpg/300px-FRED_cropped.jpg](http://en.wikipedia.org/wiki/File:FRED_cropped.jpg)  [http://en.wikipedia.org/skins-1.5/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:FRED_cropped.jpg)  A FRED on a [container](http://en.wikipedia.org/wiki/Containerization) train in [2005](http://en.wikipedia.org/wiki/2005).  8. Select ONE of the following special-interest areas and complete the requirements:  a. Model Railroading  With your parent's and counselor's approval, do TWO of the following:  1. Draw a layout of your own model railroad; or one that could be built in your home. Design a point-to-point track or loop with different routings. Include one of the following: turnaround or terminal or yard or siding.  2. Build one model railroad car kit or one locomotive kit.  3. Name the scale of four popular model railroad gauges. Identify the scale of four model cars or locomotives.  4. Locate the Web site of four model railroad - related manufacturers or magazine publishers. Print information on their products and services and discuss the information with your counselor.  5. Build one railroad structure (from scratch or using a kit), paint and weather the structure, mount it on your layout or diorama, and make the surrounding area on a diorama scenic.  6. Alone or with others, build a model railroad or modular layout, including ballast and scenery. Make electrical connections and operate a train. Describe what you enjoyed most.  7. Participate in a switching contest on a timesaver layout and record your time.  b. Railfanning  With your parent's and counselor's approval, do TWO of the following:  1. Visit a railroad museum, historical display, or a prototype railroad-sponsored public event. With permission, photograph, videotape, or sketch items of interest. Explain what you saw and describe your photos, sketches, or videotape.  [Northwest Railway Museum](http://www.trainmuseum.org/default.asp)  **38625 SE King Street in Snoqualmie**  <http://www.trainmuseum.org/Getting_here.asp>  2. Purchase tickets and ride a scenic or historic railroad. Under supervision, photograph the equipment and discuss with your counselor the historic significance of the operation.  3. Locate the Web site of four rail historical groups, then find information on the history of the rail preservation operations and purpose of each group. Talk with a member of one of the groups and find out how you might help.  4. Plan a trip by rail between two points. Obtain a schedule and explain when the train should arrive at two intermediate points. Purchase the tickets and make the trip. Explain to your counselor what you saw.  Done | |