

Bicycle

Planning information: Intervention definition

Project Title - SCORM 2004 Learning Content Package in S1000D: The Bike Example

This learning is sponsored by the National Bike Courier association.

Client: National Bike Courier Association (NBCA)

The NBCA's mission statement is to promote unity and solidarity within the messenger community and to raise the status of our profession.

Learning Plan Title: Getting to Know Your Bike

This lesson plan describes the learning needs and instructional strategies for teaching the parts of a bike and bike maintenance.

Course Identification Number:

N00174-05-D-0003

Delivery Date:

20091228

Learning Plan Subject Matter:

Bike description and general maintenance

Learning Plan Description:

The goal of the S1000D Bike Example is show and help the public understand how learning modules work and how they are compiled into SCORM 2004.

Learning Plan Prerequisites:

There are no prerequisites for this Learning Plan.

Instructional Interventions

Instructional measures designed to ease or resolve job performance problems in the workplace.

Intervention Items

Interventions that will be used in this course include: stimulate learner interest by gaining attention and building on prior knowledge; inform the learner of expectations via learning objectives; provide material chunked into manageable pieces; sequence material appropriately for the learner; create interactive media and exercises to maintain interest; create interactive exercises (Knowledge Checks) to reinforce content; provide feedback.

Learning Strategies:

This course will consist of six modules - one introductory module and five content modules.

Module 1 consists of one SCO. This SCO is designed to gain learner attention and provide the purpose for the course. No teaching points are presented; therefore, there is no learning objective for the SCO. This SCO will not be assessed.

Modules 2 - 6 each contain two SCOs. These SCOs present teaching points that support the module objectives. Each module has one terminal learning objective (TLO); and each SCO has one enabling objective (ELO). SCOs will contain instructional elements to keep the learner mentally and actively engaged. To reinforce the material, SCOs include content review questions. These ungraded questions will be imbedded throughout each SCO and may be in the form of multiple-choice single answer, multiple-choice multiple answer, ordering, matching, or hotspot image. Learners are given two attempts to achieve correct answers. Learners receive immediate feedback after each answer, correct or incorrect.

Objectives:

Module 1 - Getting to Know Your Bike

Module 2 - Bike Overview

Terminal Objective - Given a bike, you will be able to name the main parts of a bike.

SCO 1 - Bike Description

Enabling Objective - Given a photograph of a bike, you will be able to identify the main parts with 80 percent accuracy.

Module 3 - Steering System

Terminal Objective - Given a bike, you will be able to perform the steps to remove and install the parts of a bike's steering system.

SCO 1 - Bike Description

Enabling Objective - Given a photograph of a bike, you will be able to identify the main parts with 80 percent accuracy.

SCO 2 - Steering System Installation and Removal

Enabling Objective - Given a bike, you will be able to describe how to install and remove a bike's steering system with 80 percent accuracy.

SCO 3 - Assessment

Module 4 - Drive Train

Terminal Objective - Given a bike, you will be able to perform the steps to maintain the drive train.

SCO 1 - Parts of the Drive Train

Enabling Objective - Given a photograph of a bike, you will be able to identify the main parts with 80 percent accuracy.

SCO 2 - Drive Train Preventive Maintenance

Enabling Objective - Given a bike, you will be able to describe how to install and remove a bike's steering system with 80 percent accuracy.

SCO 3 - Assessment

Module 5 - Wheels

Terminal Objective - Given a bike, you will be able to perform the steps to maintain the wheels.

SCO 1 - Parts of a Bike Wheel

Enabling Objective - Given photograph of a bike's wheels, you will be able to identify each part with 80 percent accuracy.

SCO 2 - Bike Wheel Maintenance

Enabling Objective - Given a bike, you will be able to describe how to maintain a bike's wheels with 80 percent accuracy.

SCO 3 - Assessment

Module 6 - Brake System

Terminal Objective - Given maintenance tools, you will be able to perform the steps to maintain the brake system.

SCO 1 - Parts of the Brake System

Enabling Objective - Given photographs of a bike's brake system, you will be able to identify each part with 80 percent accuracy.

SCO 2 - Brake System Maintenance

Enabling Objective - Given maintenance procedures, you will be able to describe how to maintain a bike's brake system with 80 percent accuracy.

SCO 3 - Assessment

Module 7 - Bike Operation

Terminal Objective - Given a bike, you will be able to perform pre- and post operation procedures.

SCO 1 - General Maintenance

Enabling Objective - Given general maintenance procedures, you will be able to describe how to maintain a bike for operation with 80% accuracy.

SCO 2 - Pre and Post Operation Procedures

Enabling Objective - Given pre and post operation procedures, you will be able to prepare a bike for operation.

SCO 3 - Assessment

Assessment:

Each content module will contain a post assessment. These assessments will contain questions that are directly related to the module's content SCOs. Questions will address each of the module's ELOs. Each test bank will be randomized and contain at least 3 questions per ELO. The passing score for the assessments is 80%. The number of attempts to pass the assessments will be unlimited.

Delivery:

The Getting to Know Your Bike course will meet SCORM 2004 standards. It will reside on the SumTotal LMS located at the National Bike Courier Association (NBCA) headquarters in New York City. Learners will have access the course using a link from the SumTotal Virtual Campus.

Bicycle

Planning information: Performance analysis

Tasks:

Identify the main parts of a bike.

Identify the parts of a bike's steering system.

Describe the steps for installing and removing a bike's steering system.

Identify the parts of a bike's drive train.

Describe the procedures for maintaining a bike's drive train.

Identify the parts of a bike's wheels.

Describe the procedures for maintaining a bike's wheels.

Identify the parts of a bike's brake system.

Describe the procedures for maintaining a bike's brake system.

Describe general bike maintenance procedures.

Describe pre and post operation bike procedures.

Knowledge:

Learners must understand the importance of bicycle maintenance and upkeep in order to do their job safely and effectively.

Skills:

Learners must know how to maintain their own bikes.

Attitude:

In order to support the company, learners must be agreeable to take the training prior to being added to the courier roster and given a route.

Bicycle

Environmental analysis - Work environment: Organizational analysis - Vision statement

Organizational Analysis

Like many courier companies, Speedy Couriers, Inc. is merely a hub for its couriers to check-in for pick-up and delivery requests. The more a courier checks-in, the more money he or she makes. The company deposits paychecks directly into each couriers personal bank account. Couriers are responsible for providing and maintaining their own bikes.

Goals:

The organization's success is dependent on the success of its couriers. A courier's success is dependent on the condition of his or her bike. The goal of this course is to provide training so that couriers can maintain their own bikes and avoid breakdowns. This allows the couriers the ability to make more pick-ups and deliveries.

Needs:

Couriers must meet the customers' expectations. Packages are to be picked up as scheduled and delivered to the appropriate party in a timely manner. In order to accomplish this, the courier's bike must be in good working order.

Values:

Couriers should be goal oriented. They must exhibit the desire to meet the organization's expectations by completing their job tasks as assigned. The company believes this can be accomplished more effectively if couriers take and pass the Bike course.

Constraints:

There are no organizational constraints.

Bicycle

Planning information: Environmental analysis - Work environment

Work Environment

The environment in which bike couriers work is typically outside, where the courier and his or her bike are subject to atmospheric conditions such as sun, rain, sleet, snow, etc. Bike maintenance will most likely be performed inside the courier's dwelling or a garage.

Resources:

Learners will have access to a desktop or laptop PC, a bike, bike parts, and tools.

Processes:

Pre-operation inspection, troubleshoot as necessary, maintenance as necessary, operation, post operation inspection, troubleshoot as necessary, maintenance as necessary

Bicycle

Planning information: Performer analysis - Worker

Audience Profile

Skill levels for entry level bike couriers can vary from none to novice experience levels, which range from 0 to 1 year in service. Couriers have typically learned the skills needed through trial and error.

Education Level:

High school diploma, some college

Age:

Adults aged 18 to 21

Background:

The target audience for this course includes bike couriers who are responsible maintaining their own bicycles.

Skills:

The audience has little to no experience with bike maintenance. Skills are mainly in bike operation.

Knowledge:

General bike functions, simple maintenance

Motivation:

Bike couriers must ensure that their bikes are in safe working order for them to perform their jobs effectively.

Bicycle

Planning information: Cause Analysis

Many of Speedy Couriers, Inc. job applicants are college students that have never been messengers before. All messengers have their own bikes but do not necessarily know how to keep them maintained. Speedy Couriers provides a ""breakdown"" pickup service for messengers who cannot continue their routes because of some type of mechanical failure on their bikes. Many of the failures include: flat tires; drive train jams; damaged brake levers, etc. Recently, there has been a rise in calls for ""breakdown"" pickups, because the couriers do not know how to fix mechanical failures. This problem leads to increased workload on other carriers and late deliveries and pickups, which in turn leads to unsatisfied customers. Speedy Couriers, Inc. would like for all of its messengers to know how to perform general bike maintenance to reduce the number of ""breakdown"" pickups."

Gap Item: Bike Maintenance

Currently, Speedy Couriers, Inc. does not provide bike maintenance training for its couriers. In order to perform their jobs efficiently and effectively couriers must be able to maintain their bikes.

Plan Objective:

The learning plan objectives will require the learners to identify bike parts and systems as well as describe the procedures for general and specific bike maintenance.

Gap Item Delta:

Entry level bike couriers do not necessarily possess the skills required to maintain their bikes. This may prohibit them from completing job tasks as assigned.

Bicycle

Planning information: Intervention implementation

Technical Requirements

This section lists the technical requirements needed to complete the instruction.

LMS:

Lesson content packages will be tracked in the Sum Total LMS.

No LMS:

The courseware does not require any special considerations when it is running outside of an LMS

Classroom:

Instruction will be taken in the Learning Lab at Speedy Courier's main office. The training is part of the employee's first day orientation and is required. No courier assignments will be given until the employee completes the orientation and the training.

OJT:

There are no technical requirements for OJT

Constraints:

There are no constraints

W3C Conformance:

This courseware meets W3C Web Accessibility Initiative Guidelines Priority 1 checkpoints

Players and Plug-ins:

The courseware will make use of the following players and plug-ins:

Adobe Flash Player

Acrobat Reader

Content Viewers:

Standard viewers will be used

Screen Resolution:

Although the courseware can be viewed using different resolutions, it is best viewed in 1024x768 resolution

Security:

Security level is unclassified.

Bike

Planning Information: Organizational analysis - Goal statement

Introduction to the Bike

Background

Department of Defense programs are preparing to make investments into making S1000D a common digital data format for all of its technical information. S1000D 4.0 can support a strategy for all program technical information to be mapped to products and their subcomponents. This project demonstrates that mapping while highlighting how technical learning content can be instructionally designed for structured markup and reuse. The intent of the project is to gain universal acceptance.

Scope

The goal is to provide a sampling of S1000D Learning Data Modules (LDM) that contain learning content samples compiled into Sharable Content Object Reference Model (SCORM) 2004. The purpose of the sample is to help the public understand how the learning modules work and how they are compiled into SCORM 2004.

The curriculum addresses all aspects of the publicly available S1000D Bike technical manual in S1000D.

Project Requirements

Use the entire LDM schema in the training.

Create Sharable Content Object (SCOs) to cover the operation and maintenance of the bicycle.

Use S1000D 4.0 and SCORM 2004.

Maximize reuse of Data Modules (DMs) and illustrations that populate the bicycle manual.

Use the S1000D SCORM Content Package Module (SCPM) to aggregate all data modules prior to content transformation and formatting.

Apply a LDM coding analysis to the bicycle curriculum, which is consistent with and based upon the existing DM coding in the bicycle Technical Manual (TM) DMs.

Apply the appropriate "learnCode" in the DM code to represent the chosen instructional learning strategy.

Use all branches of the LDM.

Develop a learning plan according to the options within the learnPlan branch of the LDM.

Create assessments using all interaction types.

Demonstrate that the deliverable shall support real-time updates of all SCOs in the content package regardless of distributed format.

Demonstrate that DMs will be transformed using a combination of Adobe Flash, Hyper Text Markup Language (HTML), Cascading Style Sheets (CSS), and Extensible Stylesheet Language Transformation (XSLT). Flash Actionscript will be used to transform the DMs to flash-based SCOs.

Develop so that content packages will comply with SCORM 2004.

Develop so that content packages will operate on the Navy Learning Management System (LMS).

Provide strategic consulting and advisement on promoting S1000D-SCORM harmonization as part of a suite of logistics and life cycle solutions to Navy management and key policy makers.

Learn Schema

The learn schema is made up of five branches. These include the:

Learning Plan

Learning Overview

Learning Content

Learning Summary

Learning Assessment

Each of the learning types is represented in the Bike Example course.

Learning Plan

The learning plan information model is the first branch in the learning schema. It contains content, such as learning objectives, that drives course strategy and development. The learning plan structure covers four essential components to the lesson planning process: course administrative details, needs analysis gap analysis, instructional design, and technical requirements.

Learning Overview

The learning overview information model is the second branch in the schema. It contains introductory information and identifies the learning objectives for the related content.

Learning Content

The learning content information model is the third branch in the learning schema. It provides the bulk of the learning content. This includes learning objectives and activities and language that forms the learning materials. It holds the most potential for the appropriate reuse of technical data where content supplements are useful.

Learning Summary

The learning summary information model is the fourth branch in the learning schema. It recaps and provides context for the achievement or accomplishment of the learning objectives, provides guidance to reinforce learning and long-term memory, and can pose questions to enhance encoding and verification of learning content.

Learning Assessment

The learning assessment information model is the fifth branch in the learning schema. It presents questions or interactions that measure progress, encourage recollection, and stimulate reinforcement of the learning content.

Learn Codes

Learn Event Codes

Learn codes are optional codes that are applied on to human performance technology (HPT) and training DMs for projects that have a requirement to be SCORM conformant or wish to use the functionality brought about by the learn code. There are two types of learn codes: H and T. The H code is for HPT, which can be used to identify information regarding the human performance system. The T code is used for training, which can be used to identify the type of information related to training but is associated with the standard numbering system (SNS) and information code. The codes describe the type of HPT or training information that is in the content of the DM. Each learn code represents a category of HPT or training information. When used, the learn code must be used with a learn event code.

Content Development

Learn event codes are optional codes that are applied only to HPT and training DMs for projects that have a requirement to be SCORM conformant or wish to use the functionality brought about by the learn event code. Learn event codes describe which branch of the learn schema is being used.

Content Development

A multifaceted approach was used to develop the content for the Bike Example Course. From direct reuse to the use of Flash animations, Cascading Style Sheets (CSS), and Extensible Stylesheet Language Transformation (XSLT), the course showcases how DMs can be used for training purposes.

Module 2, Bike Overview, is an example of complete reuse. All the technical DMs were used as provided. None of the text or drawings were manipulated.

A variety of strategies was used for the development of Modules 3-7:

In these modules, some of the technical DMs were divided into multiple LDMs to ensure that the content was presented in manageable chunks. The text for all of the technical DMs was modified in some fashion as the LDMs were created. This was done to promote recall of the information and to ensure clarity.

To develop an accurate frame of reference, photographs of actual equipment were used when available. In order to promote realism, Adobe Photoshop was used to modify furnished drawings. Flash animations were used throughout to organize, bring relevance to, and assess the content.

A combination of XSLT and CSS was used to render the LDM data and media within a browser.

In addition to periodic, unscored "knowledge check" type assessments, each module includes an associated assessment that is taken after the module has been completed. These are graded assessments that were created entirely in Flash. ActionScript is used in the assessments to render the LDM data.

Data Module Codes

Each training DMC or content screen contains an "Additional Information" link that provides the InfoName, TechName, and the alpha numeric DMC containing a corresponding H or T code. The short definition of the H or T code selected for the content is included in the InfoName.

Bicycle

Description of how it is made

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Physical description of a bicycle

A bicycle (refer to) is a frame and a number of movable components with mechanical parts that are completely open. There are no covers or sheet metal panels that prevent access to the mechanical parts.

Thus, you can disassemble the different components of a bicycle (refer to) to do:

an inspection

a maintenance task

a repair task

Complete bicycle

The parts that you can immediately identify on a bicycle are given in Table 1.

Item

Refer to

Definition

Bicycle parts

Frame

A bicycle frame is made of metal tubes that are welded together.

Wheels

The wheels include these parts:

Hub

Spokes

Metal rim

Rubber tire

Rear wheel

Front wheel

Seat and seat post

These install into the seat tube with a mechanism you can use to change the height.

Handle bars

A horizontal bar that attaches to the stem with grips at the ends that attach to the brake levers and the shifters.

Handle bar stem

This attaches the handle bar to the steering tube (head set).

Crank

A lever that extends from the bottom of the bracket to the pedal.

Pedals

The two platforms for the feet that attach to the crank.

Chain

A circular set of links that connect the chain ring to the cogs on the freewheel.

Gears

The gears include:

Front chain ring

Rear freewheel

Front and the rear derailleur

Shift lever on the handle bars

Cables

Brakes

The brakes include:

Actuators on the handlebars

Brake cable

Brake callipers

Brake pads

Bicycle

Description of function

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Frame

Description of how it is made

Wheel

Description of how it is made

Handlebar

Install procedures

Shifters

Description of how it is made

Stem

Install procedures

Stem

Remove procedures

Gears

Description of how it is made

Brake system

Description of how it is made

Handlebar

Remove procedures

Chain

Clean with chain cleaning fluid

Mechs

Description of how it is made

Functional description of a bicycle

Below is a list of the different bicycle components and a functional description of them. Frame

The frame is the skeleton of the bicycle. Refer to for a functional description of the frame system.

Wheel

The wheel is the point of contact between the bicycle and the road for the bicycle to have movement.

Refer to for a functional description of the wheel.

Spokes

The spokes are thick wires with tension applied that connect the hub to the rim. You can adjust the tension with the nipple on the rim side.

Hub

The hub attaches to the center of the wheel where the axle and the bearings are.

Metal rim

The metal rim is a metal ring that has a U-shaped cross section to hold the spokes on the inner side and the tire on the outer side.

Seat

The Seat, which is also known as the 'saddle', is used as the support platform for the person to sit on the bicycle.

Seat post

The Seat post is used as a support post for the seat and to change the height of the seat for the rider.

Handle bar

The handle bar is a horizontal bar with handles on each end. The handle bar is a steering mechanism that the rider uses to change the direction of the bicycle. The brake levers are also on the handle bar. Refer to for information on how to install the handle bar. Refer to for information on removing the handlebar.

Handle bar stem

The handle bar stem (the stem) attaches the handle bar to the steering tube. Refer to for information on how to install a stem. Refer to for information on how to remove the stem.

Brake levers

When you operate the brake lever, the brake pads move against the wheel to decrease the speed. The brake lever on the left side operates the front brake. The brake lever on the right side operates the rear brake.

Brakes

When you operate the brakes, the brake pad moves against the wheel to decrease the speed of the bicycle. Refer to for a description of the braking system.

Shifters

The shifters are the mechanisms that you use to change the gears on the bicycle. There are 7 different types of shifters that have been developed over the years, but they all have the same functionality. When you operate the shifters, they pull the control cable to move the derailleur towards a larger diameter chain ring. The shifters can also loosen the cable to let the derailleur move towards a smaller diameter chain ring. Refer to for a functional description of the shifters.

Crank

The crank moves the power to the chain rings when the pedals operate.

Pedals

The pedals move the force of movement from the feet to the cranks.

Chain

The chain moves the power from the chain rings to the cogs on the freewheel. Refer to for the procedure on how to clean the chain.

Gears

The gears have different mechanisms that function together to change the speed of the bicycle. These mechanisms include:

the sprockets

the chain

the derailleur

Refer to for a functional description of the gear system.

Chain rings

The chain rings (also known as the 'chain wheel') pull on the chain when the cranks turn.

Derailleur

A derailleur moves the chain from one sprocket to another to change the gears. There are two different types of derailleur, the front and the rear. The highest ratio (highest gear) is when the chain is on the largest sprocket on the front and the smallest at the rear. To get the lowest gear, the smallest sprocket is at the front and the largest at the rear. Refer to for a functional description of the derailleur system.

Bicycle

Description attributed to crew

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Shifters

Description of how it is made

Introduction

Data about the bicycle and its control system is given in this document. This data will help you operate the bicycle.

Controls

Data about the controls that follow is given in this document:

Steering

Shifters

Brakes

Pedals

Steering

The handlebars are used to steer the bike. They are at the front of the bicycle. You hold one of the handlebar grips with each hand and move the handle bar to change the direction of the bike.

Shifters

The gears control the ratio of pedal rotation to wheel rotation. You can change this with the shifters .

The shifters are on the handlebar.

A description of the two shifters follows.

Shifter Location

Affected Gears

shifter correlation

Left

The buttons on the left shifter changes the gears on the front derailleur.

Right

The buttons on the right shifter changes the gears on the rear derailleur.

Brakes

If you operate the front brake without the rear brake you can cause a crash.

You can decrease the speed of the bike with the brakes. You operate the brakes with the brake levers on the handlebar.

A description of the brake levers follows.

Brake Lever Location

Affected Brake

brake lever correlation

Left

This lever operates the front brake.

Right

This lever operates the rear brake.

Pedals

The pedals are at the bottom of the seat tube. You operate the pedals to move the bicycle forward.

Bicycle

Pre-operation procedures (crew)

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Chain

Clean with chain cleaning fluid

Operator 0,3 Tire pressure gauge KZ666 BSK-TLST-001-01 1 Specialist toolset KZ666 BSK-TLST-001 1

General lubricant KZ222 LL-001 As required

Examine the condition of the brakes.

Open the brake quick release.

Examine the condition and the thickness of the brake pads.

Make sure that there is a large quantity of rubber left.

Make sure that the pad is not too hard.

Clean all the unwanted material.

Do an inspection of the installation of the brakes.

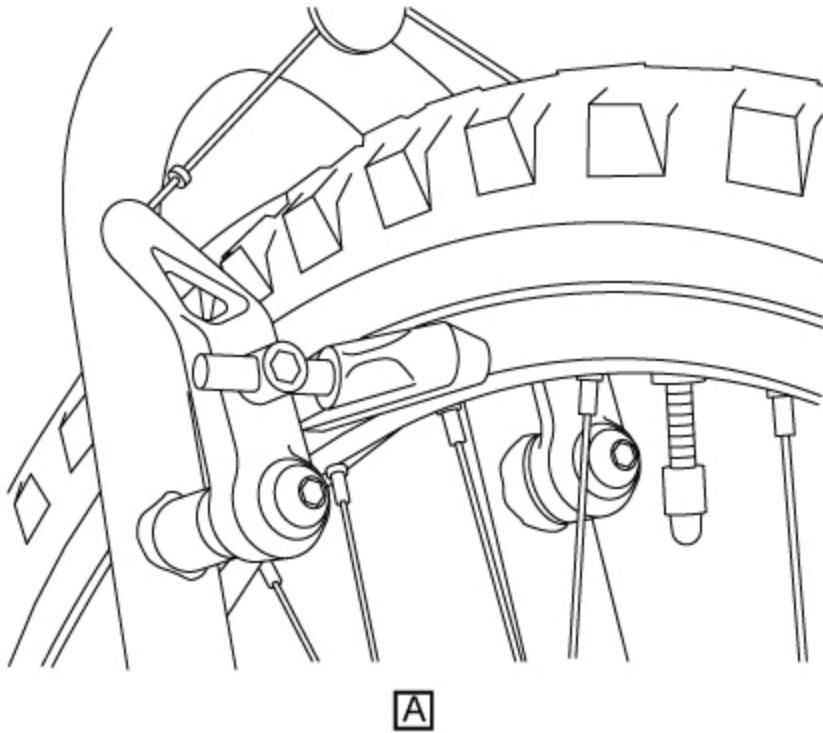
Check the hydraulic brake system function.

Hydraulic brake function

Make sure that there is sufficient clearance between the pad and the inner diameter of the brake surface.

If the position of the pads is too low on the rim, as shown in , the pads can move. This could cause the separation of the spokes from their mountings., they could slip off causing the spokes to be torn out of their mountings.

Brake pad seating



Make sure that the pads are correctly installed in the center of the inner diameter of the brake surface.
Do a check of the tire pressure.

Do a check of the tire pressure with the .

Compare the value you read with the recommended pressure that is shown into the sidewall of the tire.
Add the necessary air.

Examine the condition of the wheels.

Examine the rims for bulges and dents.

Examine for splits at the seam where an extruded rim is bonded.

Do a check of the headset bearings.

Straddle the bicycle.

Apply the front brakes and push the handle bars forward.

Make sure that the headset bearings are tight.

Do the checks on the chain.

Visually examine the chain.

If the chain is too dirty, clean it as specified in the clean chain task (refer to).

Visually examine the chain for links that are frozen or that do not move easily.

Apply the necessary .

Do a check of the chain to make sure that it is tight.

Make sure that the play of the chain is not too much.

Move the chain on the largest chain ring.

Try to pull the chain away from the front of the chain ring.

Make sure that the chain is not loose. Tighten the chain if, when you pull it away from the chain ring, you can see a full tooth.

Tighten the chain with the Allen wrench from the .

Wheel

Description of how it is made

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The bicycle wheel

The wheel (refer to) of a bicycle is a complex structure. The wheel assembly has these parts:

the tire

the tube

the spokes

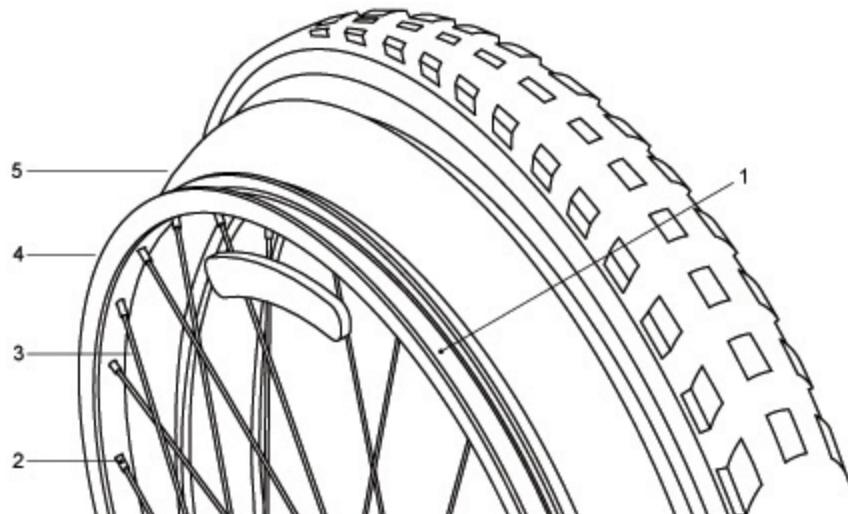
the spoke nipples

the valve

the hub

On their own, the individual components are not very strong. But, when they are installed together, the components make the complete wheel (refer to). The complete wheel is resistant to almost any type of heavy loads and operation.

Parts of the wheel



[A]

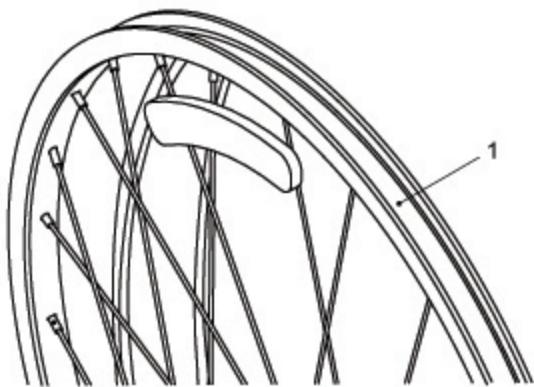
Spokes

The spokes go out from the hub and go across and below each other. The spoke nipples attach the spokes to the rim with the threads on the end of the spokes. You can use the spoke nipples to adjust the tension of the spokes. The tension on each of the spokes must be equal.

Wheel rim

The rim (refer to) of the wheel has a lining of rim tape. This tape protects the tube from damage that the rough edges on the spoke nipples can cause.

The tire and rim

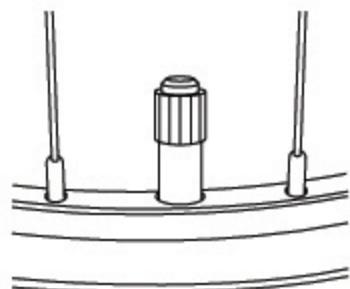
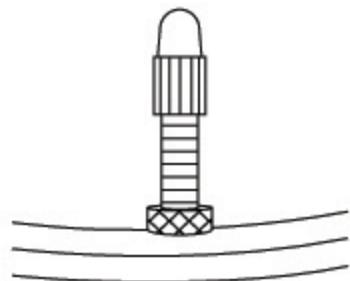


[A]

Tube and tire

The tube and the tire install on the rim. The sidewalls of the tire have markings on them. These which are used to indicate the correct direction of rotation. The markings also make sure the tire installs on the rim and that the directional arrows points in the correct direction. You install the tube into the tire before you inflate it. The tube has a valve (refer to) which you put through the hole in the rim. This valve (refer to) is used to inflate the tube and the tire to the correct pressure. A dust cap installs on the valve (refer to) to prevent damage that dust and debris can cause.

Valve



[A]

Rear wheel

Remove procedures

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Hold the rear of the bicycle.

Push the wheel forwards and down to disengage the chain from the sprocket.

Turn the wheel to the side and lift it away from the frame.

Put the frame on the floor.

Brake system

Description of how it is made

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Brake system

The most important part of the bicycle is the brake system. Only a minimum maintenance of the brake system is necessary. But, when a problem does occur, make sure you to do the necessary maintenance as quickly as possible. If you do not do this the bicycle will be dangerous to use.

There are nine different types of brake systems. The one found on most bicycles is the cantilever brake (refer to).

Cantilever brake

The brake system (refer to) has these primary components:

the brake lever (refer to)

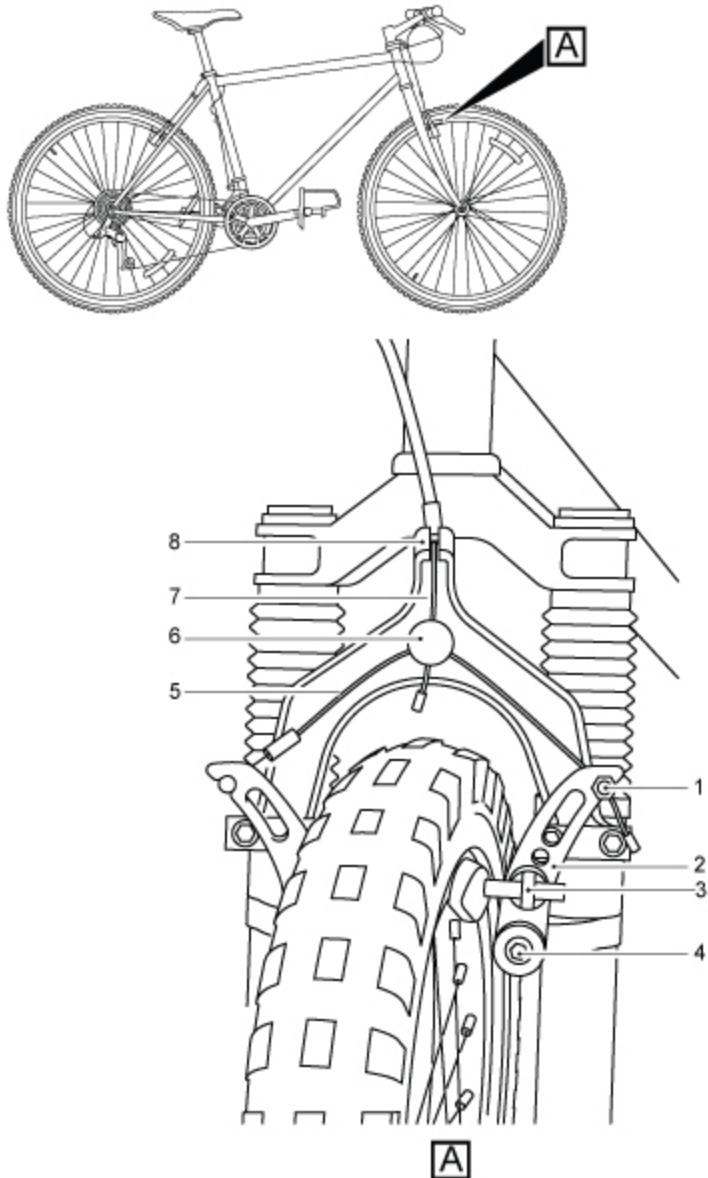
the brake cable

the brake arm

the brake clamp (also known as callipers)

the brake pads (refer to)

Cantilever brake with straddle cable

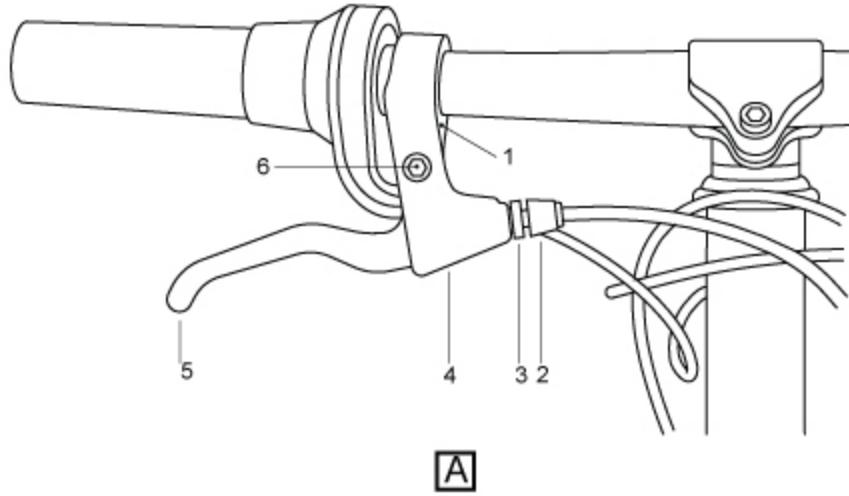


A cable that goes from the brake levers on the handlebars pulls the two levers on the brakes together. This presses the brake pads against the outer rim of the wheel, which decreases the speed of the bicycle.

Brake pads

There are four brake pads (refer to) on the bicycle. Two are found on the front wheel and two on the rear wheel. The brake pads are made out of hard wearing rubber. The pads press against the rim of the wheel to cause friction when you operate the brake levers.

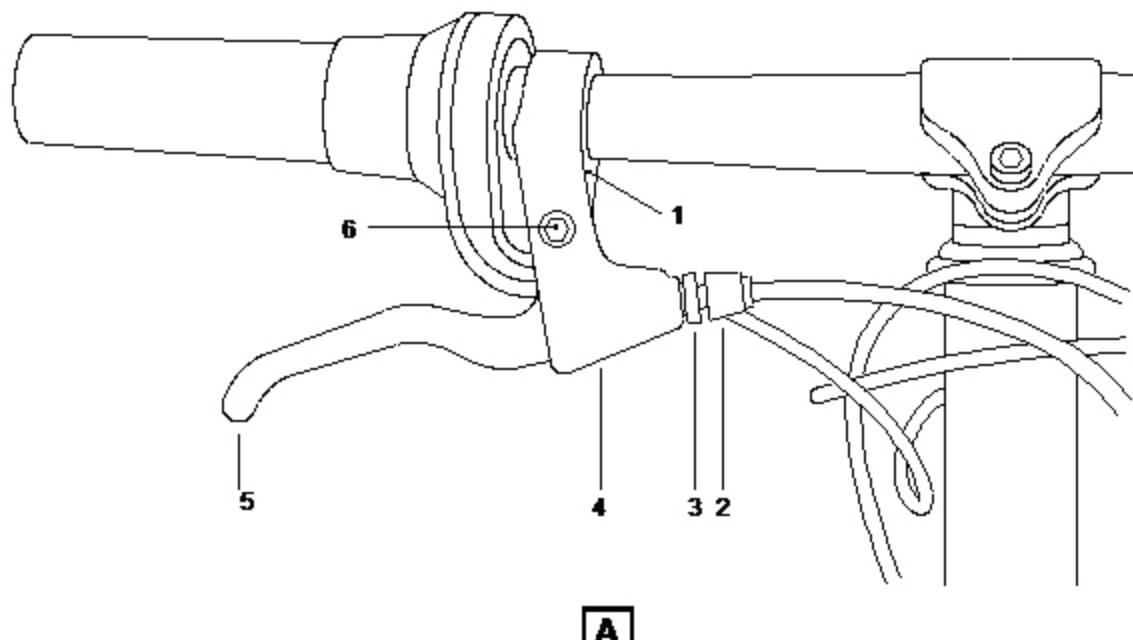
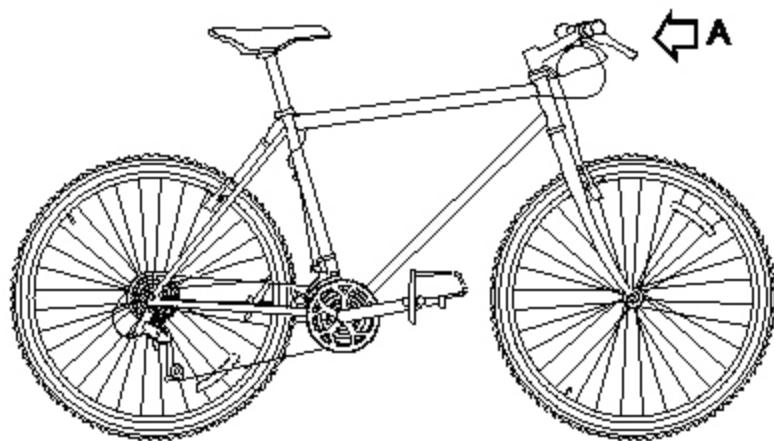
Exploded diagram of a brake



Brake lever

The brake levers (refer to) are easily damaged. The lever is installed in the mount. A clamp bolt holds the mount. This bolt is not visible because it is found in the mount. The lever turns on a lever pivot bolt. The adjuster lock nut holds the brake cable. This lock nut adjusts the tension of the cable.

Typical components of a mountain bicycle lever



The left brake lever holds the brake pads on the front wheel and the right brake pads hold the brakes on the rear wheel.

Stem

Remove procedures

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Handlebar

Remove procedures

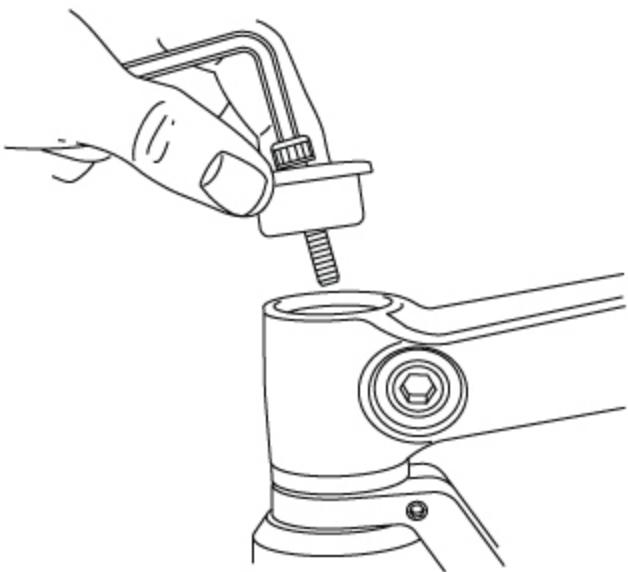
Safety the bicycle in a bicycle stand and hold the front wheel off the ground Operator 1,5 Set of Allen wrenches KZ666 BSK-TLST-001-13 1 Work stand KZ555 Stand-001 1 It is not necessary to remove the handlebar when you remove the stem to get access to the headset.

Remove the handlebar

Remove the stem.

Remove the bolt in the center of the stem cap.

Remove the bolt



A

Loosen the stem clam bolt with a .

Remove the stem from the steerer tube.

Note: It is not necessary to remove the handlebar if you remove the stem to get access to the headset.

Stem

Install procedures

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Handlebar

Install procedures

Make sure the bicycle is held safely on a work stand with the front wheel free of the ground Operator 1,0 Clean dry cloth KZ666 BSK-TLST-001-12 1 Work stand KZ555 Stand-001 1 Rubbing alcohol KZ222 LL-002 1 General lubricant KZ222 LL-001 1 Stem KZ555 St-001 1 Stem bolt KZ555 St-001-01 1 Do not tighten the stem bolt too much. You can cause damage to the headset bearings if you tighten the stem too much. The stem bolt does not safety the stem. The stem must point forward in alignment with the wheel.

Remove all the rust and the corrosion with a and .

Install the stem.

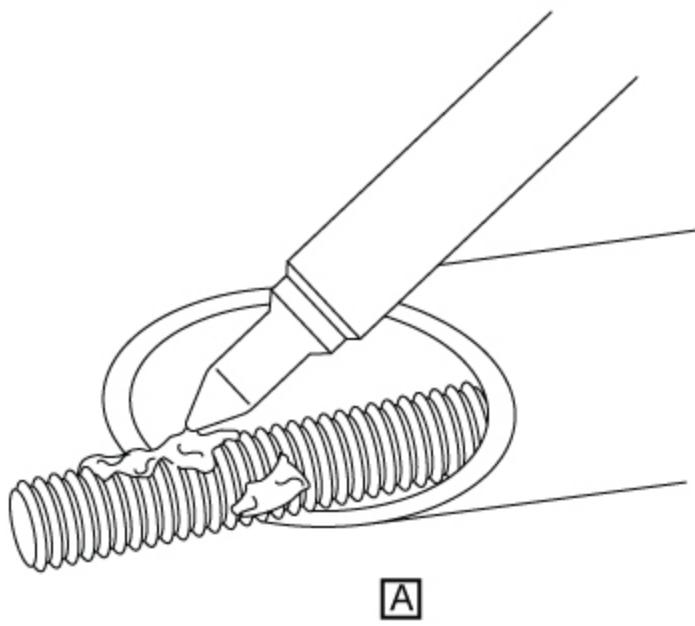
Use a and lubricate:

the threads of the and

the sides

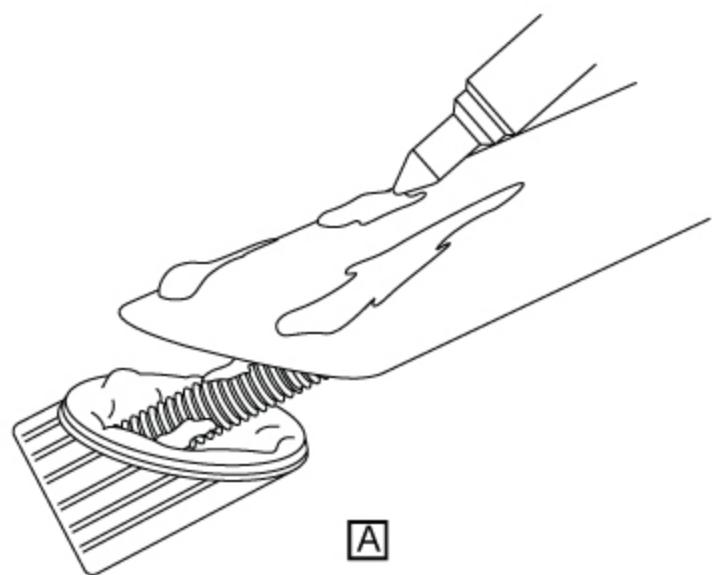
the top of the wedge

Lubricate the thread



A

Install the in the steerer tube.
Tighten the bolt



Adjust to align the with the wheel and tighten the firmly.
Install the handlebars (refer to).

Handlebar

Install procedures

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Put the in the stem and tighten the clamp bolt with a . Make sure the handlebar is correctly aligned in the center of the stem. Tighten the clamp bolt.

Put the and on the handlebar.

Move the on the again and make sure you do not catch the cables.

Tighten the clamp bolt.

Move the and the brake lever on the again.

Tighten the clamp screw.

Replace the .

Apply with the to the area of the .

Before the becomes dry, move the into the correct position. Make sure the grip protects the end of the or install a .

Handlebar

Remove procedures

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Remove the grips

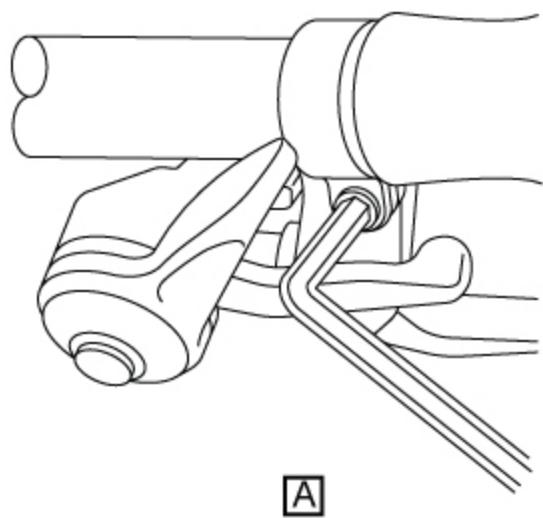
Put a long thin screwdriver below the grip and apply water between the grip and the handle bar.

Turn the grip forwards and rearwards to loosen it and then pull it off the end of the handlebar.

Remove the brake and the shift levers from the handlebars

Loosen the clamp screw (refer to) which is behind or below the brake lever (as shown).

Loosen the clamp screw with the Allen wrench



Remove the lever and the mount from the handlebar.

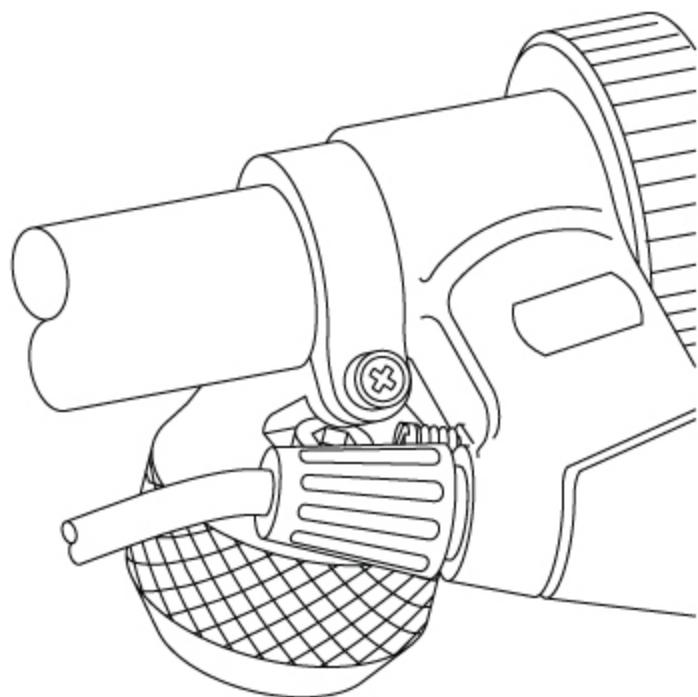
Loosen the clamp bolt and remove the shifter from the handlebar.

Remove the handlebar

This is a dummy paragraph, inserted only for Svante's strange requests.

Use a and loosen the clamp bolt (refer to). To remove, move the handlebar out of the stem.

Loosen the clamp bolt



A

Frame

Description of how it is made

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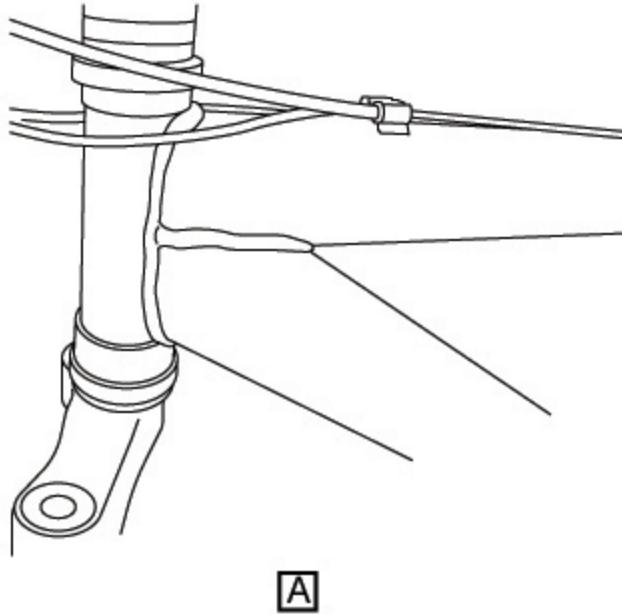
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The bicycle frame

The frame is the skeleton, the primary part of your bicycle. Its structure makes the bicycle resistant to large forces.

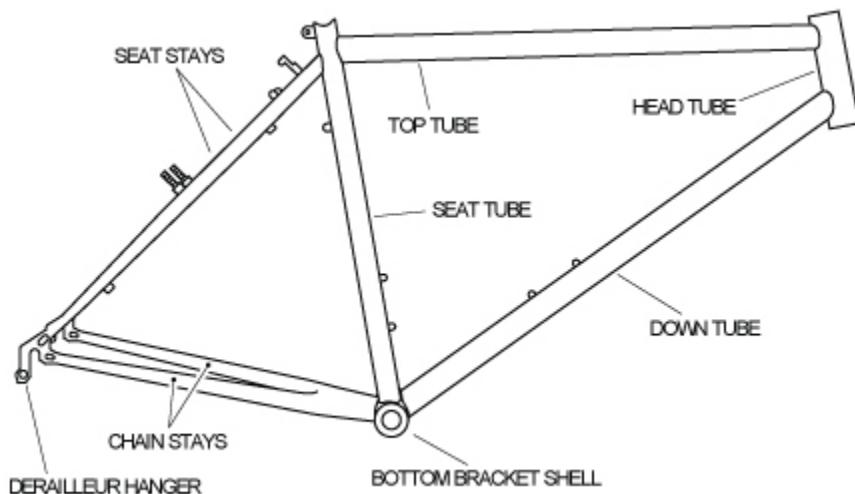
The initial frames (refer to) were tubes of aluminum or steel welded together.

Welded frame joints



Subsequent frames (refer to) can be made out of a wide variety of materials, including aluminium, titanium, or chrome moly.

Frame



are different and can also be of different materials (for example, titanium or chrome moly). Some bicycle frames are of carbon fiber. To get this material, it is necessary to put sheets of carbon fiber cloth on foam forms and epoxy them in position. This procedure gives a very light, strong structure that can have different shapes.

The frame includes the parts that follow:

- the top tube (the higher bar of the bicycle frame)*
- the down tube (the section of the frame that extends from the stem to the bottom bracket)*
- the head tube (the part of the frame that the fork steerer tube goes through)*
- the seat tube (the vertical part of the frame that is the rear of the front triangle and that is between the bottom bracket and the top tube)*
- the seat stay (the tube that includes the distance between the seat tube and the rear dropouts)*
- the chain stay (the tube that is the bottom part of the rear triangle)*

Chain

Clean with chain cleaning fluid

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Bicycle

Pre-operation procedures (crew)

Stiff bristle brush KZ666 BSK-TLST-001-02 1 Chain cleaning fluid KZ222 LL-003 As required Chain cleaning tool KZ666 BSK-TLST-001-03 1 Floor covering KK999 PPP-001 1 General lubricant KZ222 LL-001 As required

Inspect the chain.

Do the inspection of the chain as given in the pre-ride checks (refer to).

Prepare the cleaning area.

Put the on a satisfactory floor area.

Put the bicycle on the floor covering.

Clean debris from the chain.

Use the and loosen as much unwanted material as possible.

Make sure that you remove all the unwanted material from the chain.

Clean the chain.

Open the and fill with the .

Move the chain to the middle chainring and the middle sprocket at the rear.

Put the chain in the chain guides of the chain cleaning tool and lock the tool on the chain.

Hold the tool with the left hand and slowly turn the rearwards with the right hand.

Press the button on the cleaning tool to make sure that cleaning fluid flows until the tool is empty.

If necessary, remove the unwanted chain cleaning fluid.

Lubricate the chain.

Use the and lubricate the chain.

Unlock and remove the cleaning tool.

If necessary, remove the unwanted lubricant.

Move the bicycle to its storage area and remove the floor covering.

Gears

Description of how it is made

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Mechs

Description of how it is made

Shifters

Description of how it is made

Gears

The gears include the mechanism, the hubs and the shifters.

The description of the mechanisms is given in

The description of the shifters is given in

The bicycles of these days can have 27 gears or more. The mountain bikes use a set that includes:

Three socket sprockets of different dimension on the front

Nine socket sprockets of different dimensions at the rear

This set gives the gear ratios.

The shifters installed on the handlebars change the gears and operate the mechanisms (also known as derailleurs). These derailleurs are cable-actuated mechanisms. They move the chain from the different sprockets.

The hub is the center of the wheel and contains the axle and bearings.

The gears let the rider crank at the pedals at a constant movement on slopes of different angles.

Mechs

Description of how it is made

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Derailleur

There are two different types of derailleur, the front and the rear.

Front derailleur

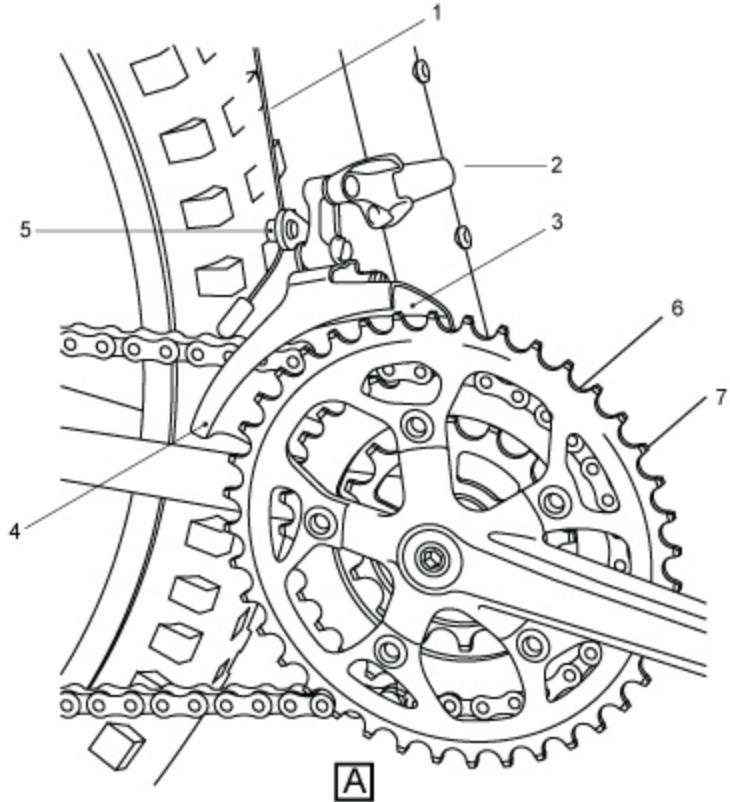
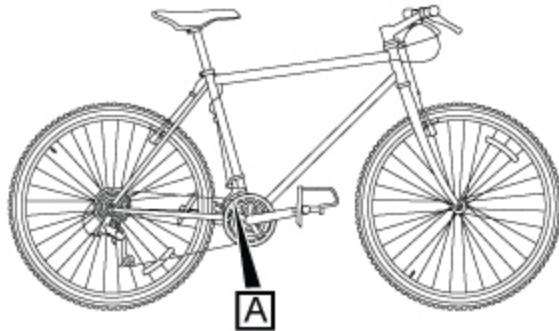
The front derailleur (refer to) contains two types of screws to keep the movement of the derailleur to a minimum. These screws are:

the stop screw low-gear

the stop screw high-gear

The function of these screws is to prevent the rider from over shifting . If this occurs, the chain will go out of the chain wheel.

Front derailleur



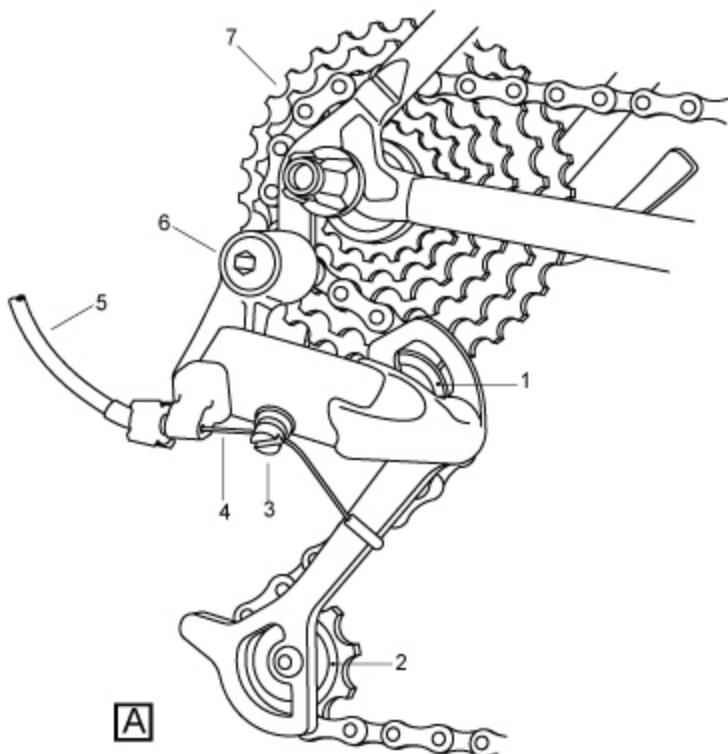
The derailleur is installed on the bicycle seat tube with a clamp and is parallel to the three front sprockets.

The shift cable is connected between the shifters on the handle bars and the cable clamp bolt on the front derailleur. This operates the derailleur. On the sprockets there is an inner and outer cage. The clamp attaches the cage.

Rear derailleur

The rear derailleur (refer to) section contains the sprockets for the different gear changes. When the cable clamp bolt is tight, it holds the shift cable in its position. A screwed bolt holds the tension wheel.

Rear derailleur



The derailleur mounting bolt connects the derailleur to the frame. When the user attaches this bolt, this makes sure that the cage plates are parallel with the chain rings.

The guide wheel has the function to move the chain with the derailleur. It moves the chain from one sprocket to the other. The guide wheel must not move on its axis. If this occurs, there will be wear on the wheel. The position of the guide wheel is below the largest sprocket.

Shifters

Description of how it is made

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Shifters

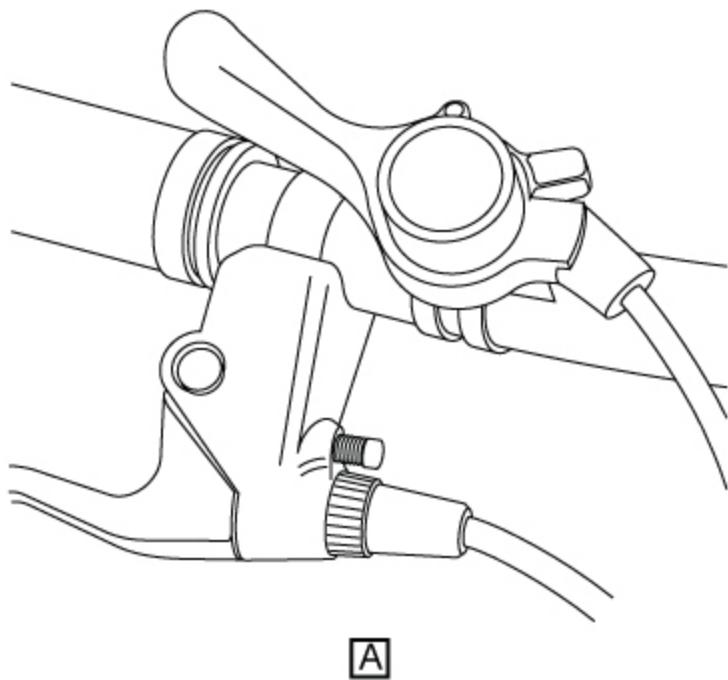
The thumb shifter is a usual type in modern bicycles. It is possible to adjust this type of shifter for operation in the index position or in the friction position. The differences between the two are:

The index shifters change the gears with a click of a lever.

The friction shifters hold the derailleur in its position by friction.

The thumb shifters (refer to) are held on the bicycle with a screw. The paragraph that follows gives a description of a thumb shifter.

Thumb shifter index type

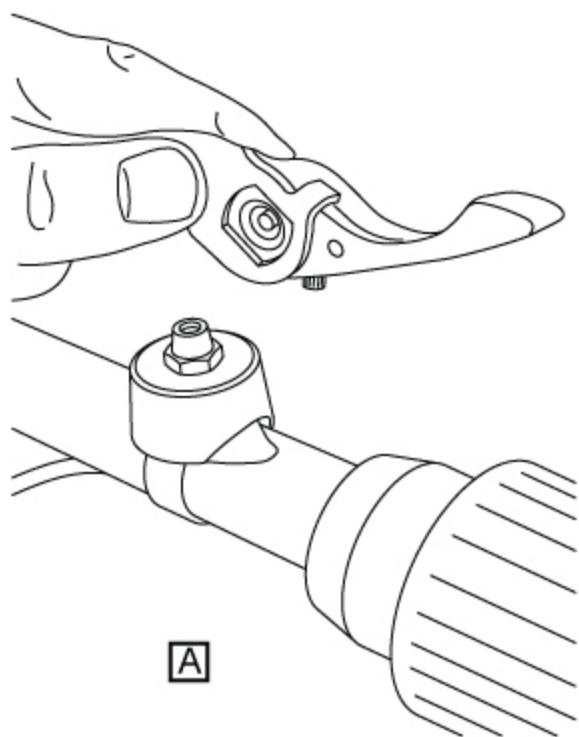


A

How a thumb shifter is made up

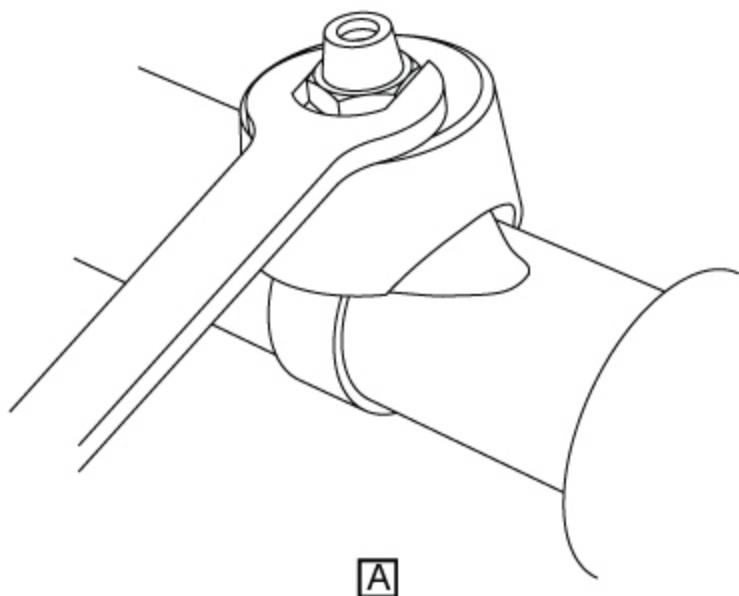
A wing nut (refer to) from the top of the lever holds the thumb shifter. The lever is on top of the mount and the mount is on the handle bar with a nut. To remove the mount, it is necessary to loosen the nut of two turns (refer to), then the mount can move from the handle bar from the top of the lever. The lever sits on top of the mount and the mount is fixed into place on the handle bar by a nut.

Unscrew wingnut



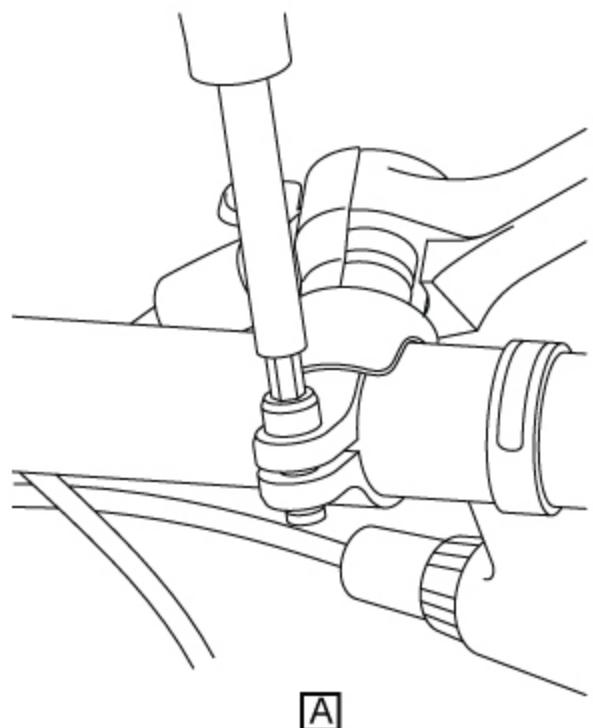
A

Loosen the nut



On modern models of this shifter, there is a clamp bolt that holds the shifter in its position (refer to). The user can loosen the clamp bolt with an applicable tool. This lets the shifter release the handlebar.

Loosen the shifter clamp bolt



A

Steering

Introduction: Attention



Steering System **Steering System Description**

Steering

Description of how it is made: Enabling objective - Verbal information - Facts

Introduction

In order for a rider to keep his or her bike moving in a given direction, he or she must steer the bike. A bike's steering system offers input, which helps the bike and rider to remain upright. Additionally, the rider's balance affects the bike's steering. If the rider's center of gravity sways more to the left or right of the wheels, the bike will lean. This lean causes the handlebar to turn in the direction of the lean, pulling the bike in that direction. In order to rebalance, the rider uses inertia and the steering system.



This topic provides information related to the physical description of a bike's steering system.

Objective: Given a photograph of a bike's steering system, you will be able to identify each part with 80 percent accuracy.

Steering

Description of how it is made: Recall

Steering System



The steering system enables a bike to maneuver in a given direction during travel. It is comprised of the following three parts:

Handlebar

Headset

Stem

Steering

Description of how it is made: Knowledge Check

Knowledge Check

Identify the headset by clicking on it in the image.



Steering

Description of how it is made: Static content - Fact Expositive

Handlebar

A bike's handlebar is designed for specific types of riding. A standard bike's handlebar is a horizontal bar that is attached to the bike's stem. At the end of the handlebar, there are typically handgrips.

Handgrips provide the rider traction and protection from vibration. Also attached to the handlebar, although they do not serve any part in the steering mechanism, are brake levers and shifters, horn, and headlight.

Used as a bike's means of steering, the handlebar's maneuverability is a sideways swiveling action. The handlebar itself does not provide this swiveling; the headset (also known as the steerer tube) is the mechanism that enables the handlebar to swivel.

Click PLAY to view the handlebar's maneuverability.

Steering

Description of how it is made: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

A standard bike's handlebar is a vertical bar that is attached to the bike's stem.

True

False

Headset

Description of how it is made: Static content - Fact Expositive

Headset

A headset is a group of components that provide a rotatable interface between the bicycle fork and the frame. There is a pair of bearings on the two ends of the frame's head tube that permits the fork to turn rearward and forward, allowing the rider to turn the handlebar for steering.

The headset includes the following parts:

Upper and lower head tube races

Bearing races that push into the head tube

Crown race

Bearing race that pushes on the fork steerer tube

Adjustable upper race

Two sets of ball bearings

Locknut

Washer

Seal

A headset has two cups that are pushed into the head tube and a ring on the fork. All three must be precisely aligned. It is often necessary to remove rough paint to get all three in alignment.

The upper race installs onto the steerer tube with a thread. A locknut is used to secure the upper race.

A clamp bolt holds the stem to the steerer tube.

The fourth remaining bearing race is part of a nut that installs on the threaded top end of the fork. This is done after it is installed in the head tube. It is sometimes necessary for some headsets to have more thread at the top of the head tube. If the fork is too long, spacer rings can be installed. If it is too short, there is a limit to the number of headsets you can use.

Click PLAY to view the headset assembly.

Steering

Description of how it is made: Static content - Fact Expositive

Stem

The bike stem is a component that attaches the handlebar to the steerer tube. Basically, the stem is just a threaded stem bolt situated inside the steerer tube. It attaches the handlebar to the headset.



Steering

Description of how it is made: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

The stem attaches the _____ to the _____.

headset / fork

fork / handlebar

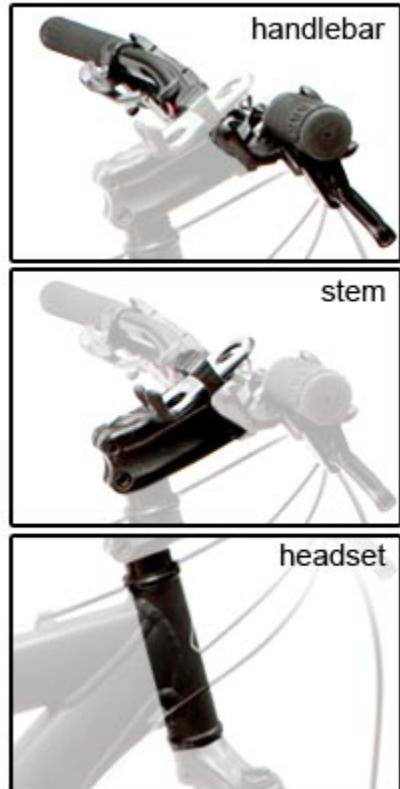
handlebar / headset

frame / handlebar

Steering

Description of how it is made: Prerequisite concept review

Summary



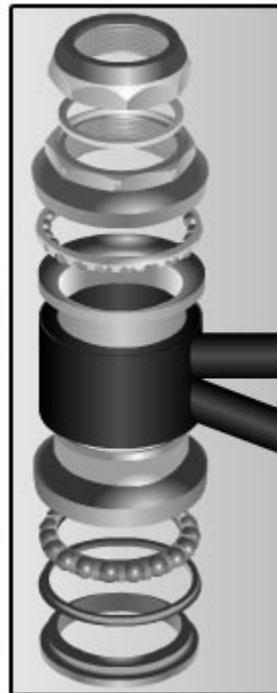
Recall that a bike's steering system is comprised of a group of components that allow the rider to maneuver the bike in a desired direction. Steering system components include the handlebar, headset, and stem. The stem connects the handlebar to the headset. The headset provides the swiveling motion required for steering, and the handlebar is used to control the direction.

Now that you have completed this topic, you should be able to identify a bike's steering components.

Steering

Change = Remove and install: Enabling objective - Motor skill

Introduction



Removing and installing a bike's steering system is not considered typical bike maintenance. This does not mean, however, that you would never have to remove or install one or more of its components. Recall that a bike's steering system is made up of the handlebar, headset, and stem. Any of these components could be damaged in a fall or some other type of accident and need replacing. This topic will provide you the information you will need to remove and install a bike's steering system.

Objective: Given installation and removal procedures, you will be able to describe how to install and remove a bike's steering system with percent accuracy.

Handlebar

Remove Procedures: Static content - Procedure Expositive

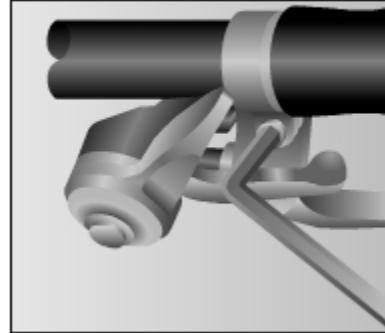
Removing the Handlebar

Do not ride a bicycle with no grips on the handlebar. This can cause your hands to slip.

In order to remove the handlebar, you must first remove any attachments. Begin by removing the grips. Place a long, thin screwdriver below the grip, and apply water between the grip and the handlebar. Turn the grip forward and backward to loosen, and then pull it off the end of the handlebar.

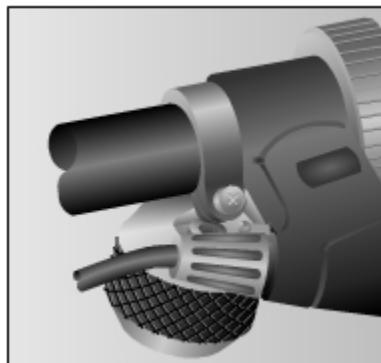
Next, you need to remove the brake and the shift levers. To do this, loosen the clamp screw. The clamp screw can be found either behind or below the brake lever. Loosen the clamp screw with the Allen wrench, and remove the lever and the mount from the handlebar. Loosen the clamp bolt, and remove the shifter from the handlebar.

Loosen the clamp screw with the Allen wrench.



To remove the handlebar, use an Allen wrench to loosen the clamp bolt. Move the handlebar out of the stem.

Loosen the clamp bolt.



Handlebar

Install Procedures: Static content - Procedure Expositive

Installing the Handlebar

Do not ride the bicycle until the grips have become dry and are firmly held in position. If the grips are wet, your hands can move off the grips when you ride the bicycle. Do not ride a bicycle with no grips on the handlebar. Do not ride a bicycle with no grips on the handlebar.



Step 1:

Insert the handlebar into the stem, and tighten the clamp bolt with an Allen wrench. Make sure the handlebar is correctly aligned in the center of the stem, and tighten the clamp bolt.

Step 2:

Once the handlebar is in place, you can replace the brake levers and shifters. Slide the brake and shifter levers on the handlebar. Be sure that you do not catch the cables in either of the assemblies. Tighten the clamp bolt.

Step 3:

Place the brake lever mount on the handlebar, and tighten the clamp screw.

Step 4:

Now you can replace the handlebar grips. Apply extra-firm-hold hairspray to the handlebar grips area of the brake lever mount. Before the hairspray becomes dry, move the grips into the correct position. Make sure each grip protects the end of the handlebar. If they don't, install handlebar plugs.

Handlebar

Remove Procedures: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

In order to remove the handlebar, you must first remove the:

stem

grips

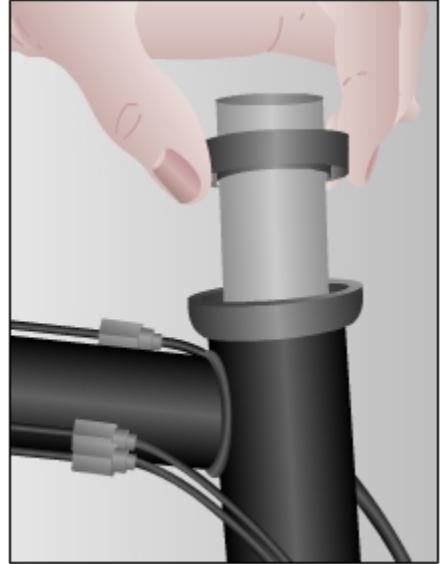
brakes

shifter levers

Headset

Remove Procedures: Static content - Procedure Expositive

Removing the Headset



When removing the headset, you will need to remove the stem (refer to **Stem**).

Remove procedures

).

It is not necessary, however, to remove the handlebar from the stem when removing the headset.

In order to remove the headset, you will remove the following:

Spacers

Brake cable hangar

Dust seals

Conical expansion washer(s) from the steerer tube

Lift the upper bearing cup off, and then remove the fork from the frame.

Headset

Install Procedures: Static content - Procedure Expositive

Installing the Headset

Install the frame fork on the frame.

Install the upper bearing cup.

Install the components that follow on the steerer tube:

Brake cable hangar

Dust seal

Conical expansion washer(s)

Install the stem (refer to

Stem

Install procedures

).

Click PLAY to view the video.

Headset

Remove Procedures: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

When removing the headset, it is necessary to remove the:

handlebar

fork

grips

stem

Stem

Remove Procedures: Static content - Procedure Expositive

Removing the Stem

To remove the stem, first remove the handlebar (refer to

Handlebar

Remove procedures

).

Next, remove the bolt in the center of the stem cap. Use an Allen wrench to loosen the stem cap bolt.

Remove the clamp bolts.

Remove the stem from the steerer tube.

Do not tighten the stem bolt too much. You can cause damage to the headset bearings if you tighten the stem too much.

Click PLAY to view the video.

Stem

Install Procedures: Static content - Procedure Expositive

Installing the Stem

Do not tighten the stem bolt too much. You can cause damage to the headset bearings if you tighten the stem too much. The stem bolt does not secure the stem safely in place. The stem is held in place by the clamping bolts.

Before installing the stem, be sure to remove any rust and corrosion with a clean, dry cloth and rubbing alcohol.

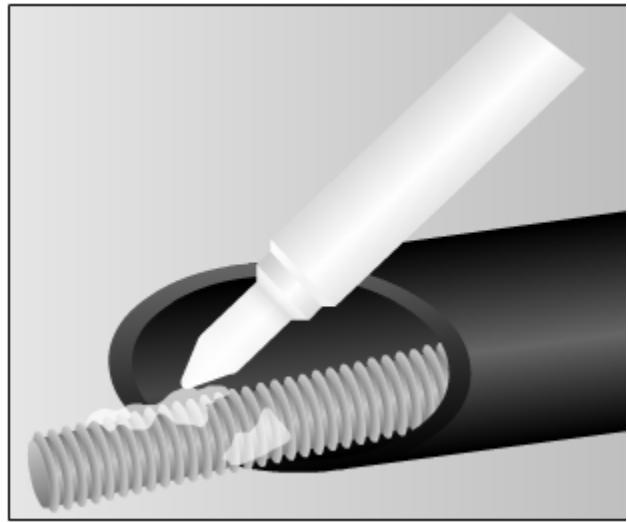
Use a general lubricant and lubricate the following:

Threads of the stem and stem bolt

Sides

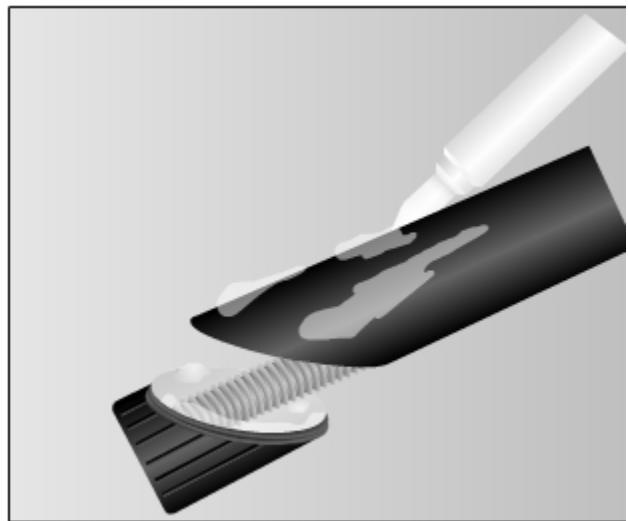
Top of the wedge

Lubricate the thread.



Install the stem in the steerer tube.

Tighten the bolt.



Adjust to align the stem with the wheel, and firmly tighten the stem bolt.

Install the handlebar (refer to

Handlebar

Install procedures

).

The stem must point forward in alignment with the wheel.

Steering

Change = Remove and install: Prerequisite concept review

Summary

Handlebar



Headset



Stem



Damage to any of a bike's steering system components could render the system inoperable. Therefore, you should know how to remove and install each piece. The handlebar, stem, and headset all play a vital role in steering. This topic provided the information you will need to remove and install the components of a bike's steering system.

Now that you have completed this topic, you should be able to describe the procedures for installing and removing a bike's steering system.

Steering

General: Terminal objective - Motor skill



Steering System Assessment

Terminal Objective: Given a bike, you will be able to perform the steps to remove and install the parts of a bike's steering system.

Steering

Description of how it is made: Post-test

Steering System - Assessment

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the stem?



- A.
- B.
- C.
- D.

Steering System - Assessment

Select your answer, and then click NEXT.

A standard bike's handlebar is a _____ bar that is attached to the bike's _____.

horizontal / headset

horizontal / stem

horizontal / steerer tube

horizontal / fork

Steering System - Assessment

Select your answer, and then click NEXT.

Which part of the steering system supplies the sideways swiveling action that allows the rider to steer the bike?

Frame

Stem

Headset

Fork

Steering System - Assessment

Select your answer, and then click NEXT.

The stem attaches the handlebar to the _____.

grips

frame

fork

headset

Steering System - Assessment

Place the steps for removing a bike's stem in the correct order. Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Remove the handlebar.

Remove the bolt in the center of the stem cap.

Remove the clamp bolts.

Remove the stem.

Steering System - Assessment

Place the steps for installing a bike's stem in the correct sequence. First, select a step. Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Remove any rust and corrosion with a clean, dry cloth and rubbing alcohol.

Lubricate the stem threads and bolt, sides, and top of the wedge.

Install the stem in the steerer tube.

Adjust to align the stem with the wheel.

Firmly tighten the stem bolt.

Install the handlebar.

Steering System - Assessment

Place the steps for removing and installing a bike's handlebar in the correct order. First, select a step.

Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Remove the grips

Remove the brake and shift levers.

Remove the handlebar.

Insert the handlebar into the stem.

Center the handlebar in the stem, and tighten the clamp bolt.

Replace the brake and shift levers.

Replace the grips.

Steering System - Assessment

Select your answer, and then click NEXT.

A headset is a group of components that provide a rotatable interface between the bicycle _____ and the _____.

fork / handlebar

stem / frame

stem / handlebar

fork / frame

Steering System - Assessment

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the headset?



- A
- B
- C
- D

Steering System - Assessment

Select your answer, and then click NEXT.

The headset consists of many components. Which component permits the bike's fork to turn rearward and forward, allowing the rider to turn the handlebar for steering?

- Ball bearings
- Bearing races
- Crown race
- Washer

Steering System - Assessment

Select your answer, and then click NEXT.

When removing the headset, it is necessary to remove which of the following?

- Handlebar
- Fork
- Grips
- Stem

Steering System - Assessment

Place the steps for installing a bike's headset in the correct order. First, select a step. Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Install the fork on the frame.

Install the upper bearing cup.

Install the components on the steerer tube.

Install the stem.

Drive train

Description of how it is made: Attention



Drive Train

Drive Train Description

Drive train

Description of how it is made: Enabling objective - Verbal information - Facts

Introduction

The drive train is a group of components that is necessary for the operation of the bicycle. It is the primary system for the movement. A typical drive train is made up of the:

Shifters

Gear mechanism

Chain rings

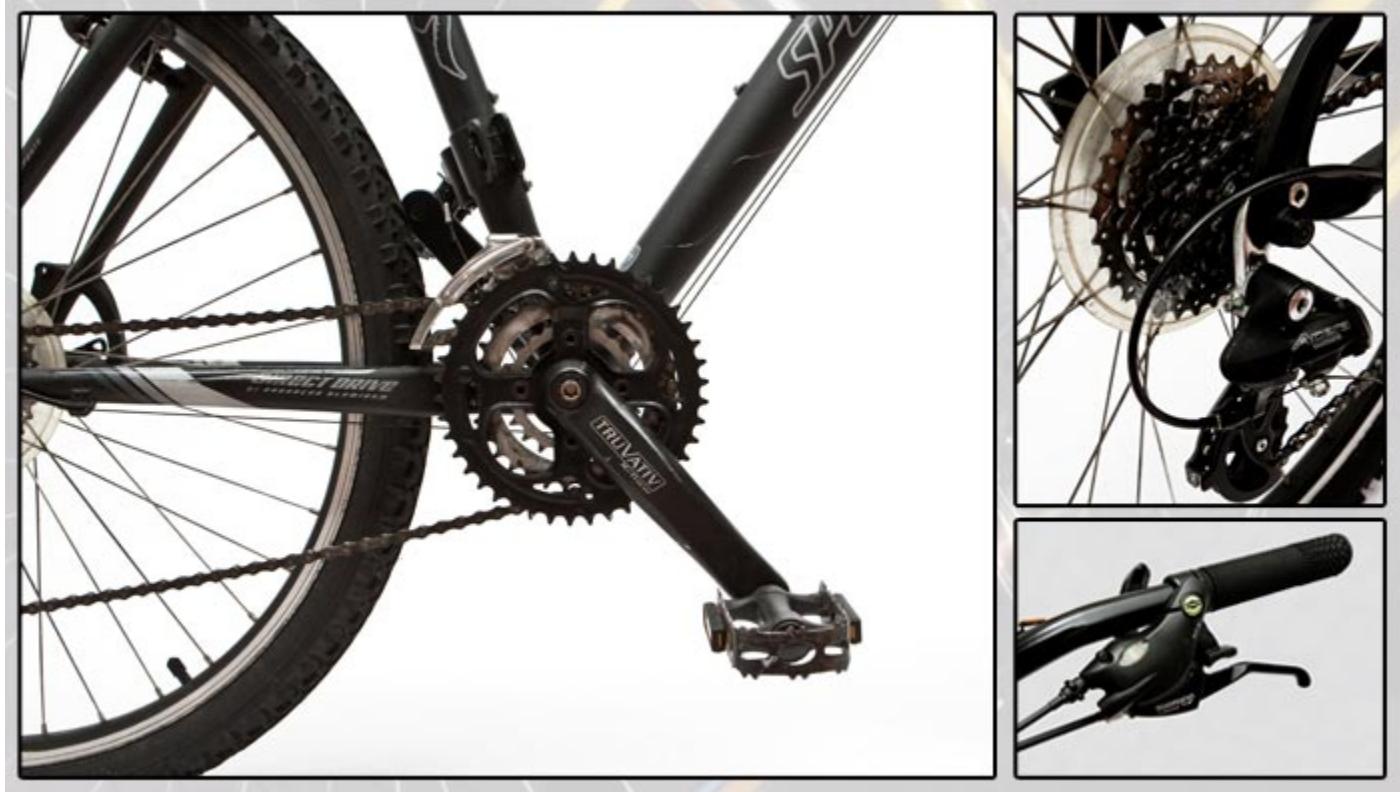
Cogsets (cassette and freewheel)

Derailleurs

Chain

Pedals

This topic provides information related to the physical description of a bike's drive train.



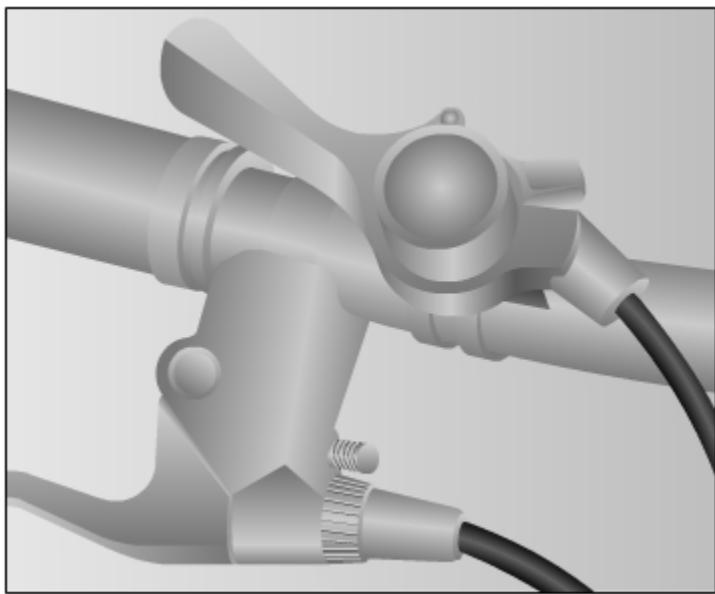
Objective: Given a photograph of a bike's drive train, you will be able to identify each part with percent accuracy.

Shifters

Description of how it is made: Static content - Procedure Expositive

Shifters

Thumb Shifter



Your bike's shifters are used to control its gearing mechanisms and allow you to select your preferred gear ratio.

The shifters alternatively tighten or relax the shifting cables attached to the front and rear derailleurs. Varying tension on the derailleur mechanisms cause them to move in or out along a perpendicular axis in relation to the frame. Inward and outward movement of the derailleurs causes the chain to progressively climb or descend the chain rings and cassette cogs. Movement of the chain along the cassette cogs and chain rings caused by manipulating the shifters is known as "shifting gears." The combination of the rider-selected front chain ring and rear cassette cog is known as the riding "gear." There are four types of bike shifters: down tube, thumb, dual lever, and grip. Your bike's shifter(s) depend on the type of bike. The thumb shifter is the most common type on modern bicycles.

Bikes that feature thumb shifters may have one or two levers. Some thumb shifters have a switch that allows the rider to adjust its operation in either the index position or in the friction position. The differences between the two are:

Index shifters change the gears with a click of a lever.

Friction shifters hold the derailleur in its position by friction.

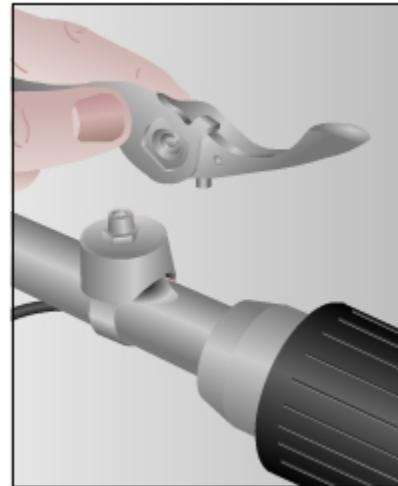
Thumb shifters are held on the bicycle's handlebar with a screw.

Shifters

Description of how it is made: Static content - Fact Expositive

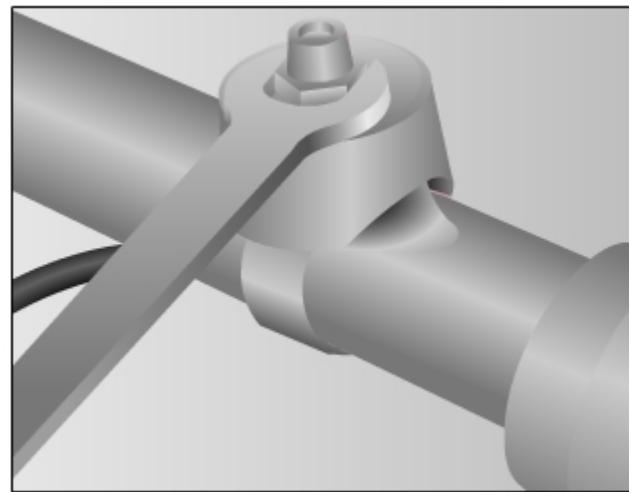
Thumb Shifter Makeup

Unscrew wing nut.



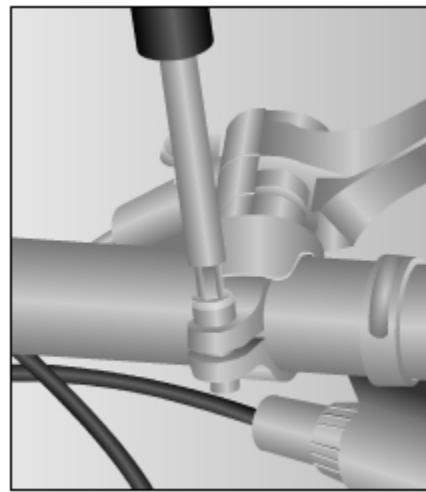
A wing nut, on the top of the thumb shifter's lever, holds the shifter in place on the mount. The shifter's lever is situated on top of the mount, and the mount is attached to the handlebar with a standard nut. To remove the mount, it is necessary to loosen the nut.

Loosen the nut.



On modern thumb shifter models, there is a clamp bolt that holds the shifter in position. The user can loosen the clamp bolt with an applicable tool. This releases the shifter from the handlebar.

Loosen the shifter clamp bolt.



Shifters

Description of how it is made: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

What is the function of a bike's thumb shifters?

Select the preferred chain tension.

Control the bike's gearing mechanisms.

Control the bike's speed.

Select the preferred gear ratio.

Gears

Description of how it is made: Interactive content - Fact

Gears - Description of how it is made



The purpose of a bike's gear system is to select gear ratios that will allow maximum efficiency and/or comfort for the rider. The gears let the rider crank the pedals at a constant movement on slopes of different angles.

Shifters

Shifters are installed on the handlebar and allow the gears to be changed. They also operate the derailleurs.

Derailleurs

The derailleurs are cable-actuated mechanisms that move the chain from the different sprockets.

Hubs

The hub is the center of the wheel and contains the axle and bearings.

Modern bikes can have 27 gears or more. Mountain bikes use a set that includes:

*Three socket sprockets, or chain rings, of varying dimensions; small, medium, and large; at the front
Nine socket sprockets, or cassettes/cogs, of varying dimensions at the rear*

These provide the gear ratios.

Roll mouse over each image for more information.

Gears

Description of how it is made: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

What are the gear components?

Brake lever

Shifters

Derailleurs

Hubs

Mechs

Description of how it is made: Static content - Fact Expositive

Derailleurs

Typically, derailleurs come in pairs: one on the front of the drive train and one on the rear.

Front Derailleur

The front derailleur contains two types of screws. The screws, stop screw low-gear and stop screw high-gear, are intended to keep movement of the derailleur to a minimum. The function of these screws is to prevent the rider from over shifting. If this occurs, the chain will go out of the chain wheel.

Click PLAY to view the video.

The derailleur is installed on the bicycle seat tube with a clamp and is parallel to the three front sprockets. The shift cable is connected between the shifters on the handlebar and the cable clamp bolt on the front derailleur. This operates the derailleur. There is an inner and outer cage on the sprockets. A clamp attaches the cage to the sprockets.

Rear Derailleur

The rear derailleur area houses the sprockets for the different gear changes. When the cable clamp bolt is tight, it holds the shift cable in its position. A screwed bolt holds the tension wheel.

Click PLAY to view the video.

The derailleur mounting bolt connects the derailleur to the frame. Attaching the bolt ensures that the cage plates are parallel with the chain rings.

The guide wheel moves the chain with the derailleur. It moves the chain from one sprocket to the other. The guide wheel must not move on its axis. This causes unwanted wearing on the wheel. The guide wheel is positioned below the largest sprocket.

Mechs

Description of how it is made: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

What is the purpose of the stop-screws on the front derailleur?

To prevent the rider from over shifting

To hold the derailleur tightly in place

To ensure the shift cable stays in place

To attach the derailleur to the sprocket

Drive train

Description of how it is made: Prerequisite concept review

Summary

Drive train components include the shifters, gears, derailleur, chain, and pedals. Each of these components works in unison to provide the bike's rider with a smooth ride. Most of the drive train components are located toward the bottom of the bike's frame. The exceptions to this are the shifters. The shifters can be found on the handlebar.



As you know, the rider uses the shifter to adjust the bike's gear ratio. This adjustment puts the derailleurs in motion, moving the chain from the different sprockets. This is done as the pedals turn the cranks, which, in turn, rotates the chain ring. The chain ring drives the chain, which rotates the rear wheel via the cassette or freewheels.

Now that you have completed this topic, you should be able to identify a bike's drive train components.

Drive train

Description of how it is made: Enabling objective - Motor skill

Introduction



Since the drive train has many components, it is necessary to conduct regular maintenance. Maintenance is fairly simple, and you should be able to easily follow the required maintenance practices. Most of the maintenance required for the drive train is preventive. Keeping your drive train clean and lubricated will prevent component failure.

Objective: Given a bike, you will be able to perform the procedures to clean and lubricate a bike's drive train with 80 percent accuracy.

Bicycle

Other procedures to clean: Static content - Procedure

Cleaning the Drive Train

The drive train is an area where dirt and grime will build up over time. Taking some time every week or so to clean it will prolong the life of your bike. Tools and supplies you will need to clean the drive train include:

Degreasing agent

Plastic container

Old rags and toothbrushes

Clean caked grime from the chain and the sprockets. Apply degreasing agent to the chain. Use a toothbrush and rag to wipe away any dirt and grease. Repeat the process until the chain is completely clean. Do the same for the sprockets.

Next, move to the back of the bike, and remove the grease from the freewheel assembly with the degreasing agent as shown in 'Degreasing the freewheel.'

Degreasing the freewheel.



Use a brush to remove the grease from the:

Sprockets

Guide and tension wheels of the derailleur

Chain ring teeth

Rinse the drive train by flushing the components with water, and then dry them with a clean, dry cloth. If necessary, repeat the flush procedure prior to drying

Bicycle

Other procedures to clean: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

Why is it important to periodically clean your bike's drive train?

To make the bike travel faster

To determine if any of the components need replacing

To make the assembly look good

To prolong the life of the bike

Chain

Oil: Knowledge check: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

Before lubricating a bike's chain, you should ensure that the chain is _____ and _____.

Straight

Clean

Dry

Tight

Drive train

Other procedures to clean: Prerequisite concept review

Summary

Regular preventive drive train maintenance will prevent component failure. Proper cleaning and lubrication of the assembly will keep it in good working order.

Remember to remove any excess dirt and grime prior to degreasing the assembly. Once the assembly is clean, you will degrease its components. Remove as much grease as possible, and then flush the assembly. You will then wipe it down with a clean, dry cloth.

Now that the drive train is clean and dry, you can apply the grease. Apply a liberal amount of grease, and wipe away any excess.

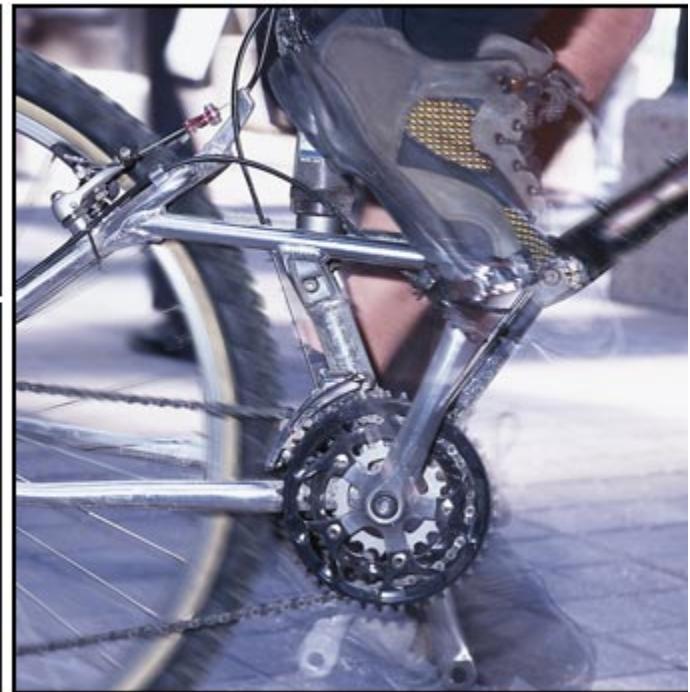
Performing these simple steps will keep your bike running smoothly.



Now that you have completed this topic, you should be able to clean and lubricate your bike's drive train.

Drive train

General: Terminal objective - Motor skill



Terminal Objective: Given a bike, you will be able to perform the steps to maintain the drive train.

Drive train

Description of how it is made: Assessment

Post Test

Select all answers that apply, and then click CHECK.

What do you need to do to clean the drive train?

Dry the components with a clean, dry cloth.

Remove excess dirt from the saddle.

Apply grease to the chain.

Remove caked on grime from the chain and sprockets.

Apply degreasing agent to the chain, sprockets, derailleurs, and chain ring teeth.

Rinse the components with water.

Select your answer, and then click NEXT.

The drive train is a bike's primary system for _____.

Braking

Movement

Steering

Balance

Select all answers that apply, and then click CHECK.

A typical drive train is composed of the:

Shifters

Brake levers

Derailleurs

Chain

Select all answers that apply, and then click CHECK.

You have just cleaned your bike's drive train. What do you need to do to lubricate it?

Ensure the frame is clean and dry.

Ensure the chain is clean and dry.

Apply lubricant to each roller of the chain.

Apply lubricant to the headset.

Apply lubricant to the derailleur pivots and tension.

Leave excess lubricant on the components to ensure full coverage.

Select all answers that apply, and then click CHECK.

Mountain bikes use a set of gears that include:

Chain rings

Brake lever

Cassettes/cogs

Stem

Select your answer, and then click CHECK.

The front derailleur is installed on the bike's _____.

Chain

Pedal

Seat Tube

Shifter

Select your answer, and then click CHECK.

A mounting bolt connects the rear derailleur to the _____.

Frame

Seat Tube

Chain

Wheel

Select your answer, and then click CHECK.

Thumb shifters are attached to the bike's _____.

Frame

Handle Bar

Fork
Stem

Wheels

Description of how it is made: Attention



wheels

Wheel Description

Wheels

Description of how it is made: Recall

Introduction

The wheel of a bicycle is a complex structure. Each wheel assembly consists of the:

Tire

Tube

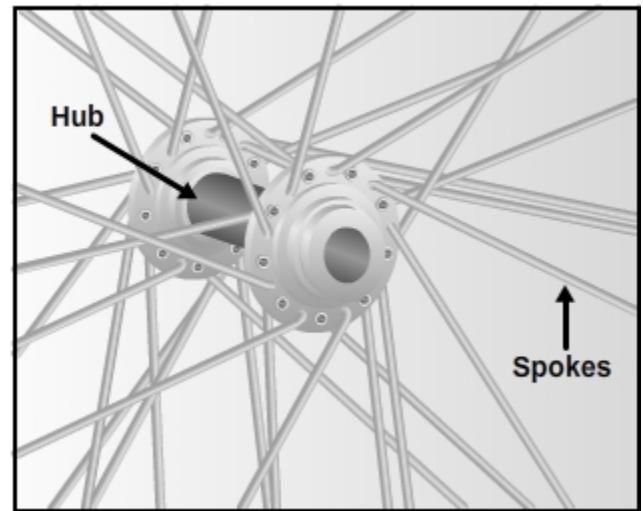
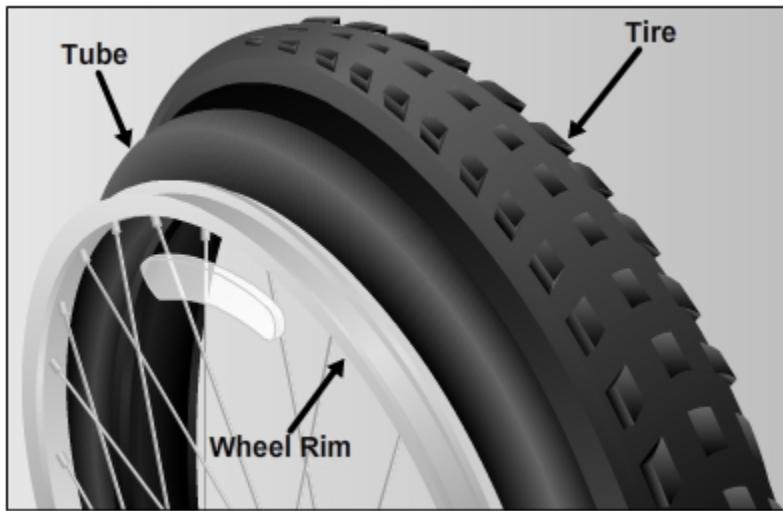
Wheel rim

Hub

Spokes

On their own, the individual components are not very strong. When they are installed together, however, they make the complete wheel. The complete wheel is resistant to almost any type of heavy load and operation.

Parts of the Wheel



Objective: Given photograph of a bike's wheels, you will be able to identify each part with 80 percent accuracy.

Wheels

Description of how it is made: Static content - Fact Expositive

Tires, Tubes, and Rims

Bike tires come in a variety of sizes. The type of tire installed on a bike depends on how the bike is used. For example, you would not install road racing tires on a mountain bike. Road racing bikes use tires that are light-weight and aerodynamic, whereas mountain bike tires are chunkier and reinforced for greater durability for those off-road treks.

Generally, tires have markings on the sidewalls that indicate the correct direction of rotation. These markings also specify the correct direction for installation on the wheel rim.



Today, most wheel rims are made of metal. They are shaped into a hoop to accommodate the bike's tubes and tires. The inner part of the rim may have spoke holes; if this is the case, the rim will need a lining of rim tape. Rim tape is usually made of rubber, cloth, or tough plastic. This tape protects the tube from damage.



Bike tires may or may not require a tube. Bike tubes are fitted into the tires before they are inflated. Attached to the tube is a valve that fits through a hole in the wheel rim. This valve is used to inflate the tube and the tire to the correct pressure. On the valve is a dust cap that is used to prevent damage caused by dust and debris.



Wheels

Description of how it is made: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

What do the markings on the sidewalls of a bike tire indicate?

The year the tire was made

Correct direction of rotation

Direction for installation on the wheel rim

How much weight the tire will support

Wheels

Description of how it is made: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

Rim tape is applied to the inside of the rim to protect the _____.

Rim

Tire

Spoke holes

Tube

Wheels

Description of how it is made: Interactive content - Fact Exploratory

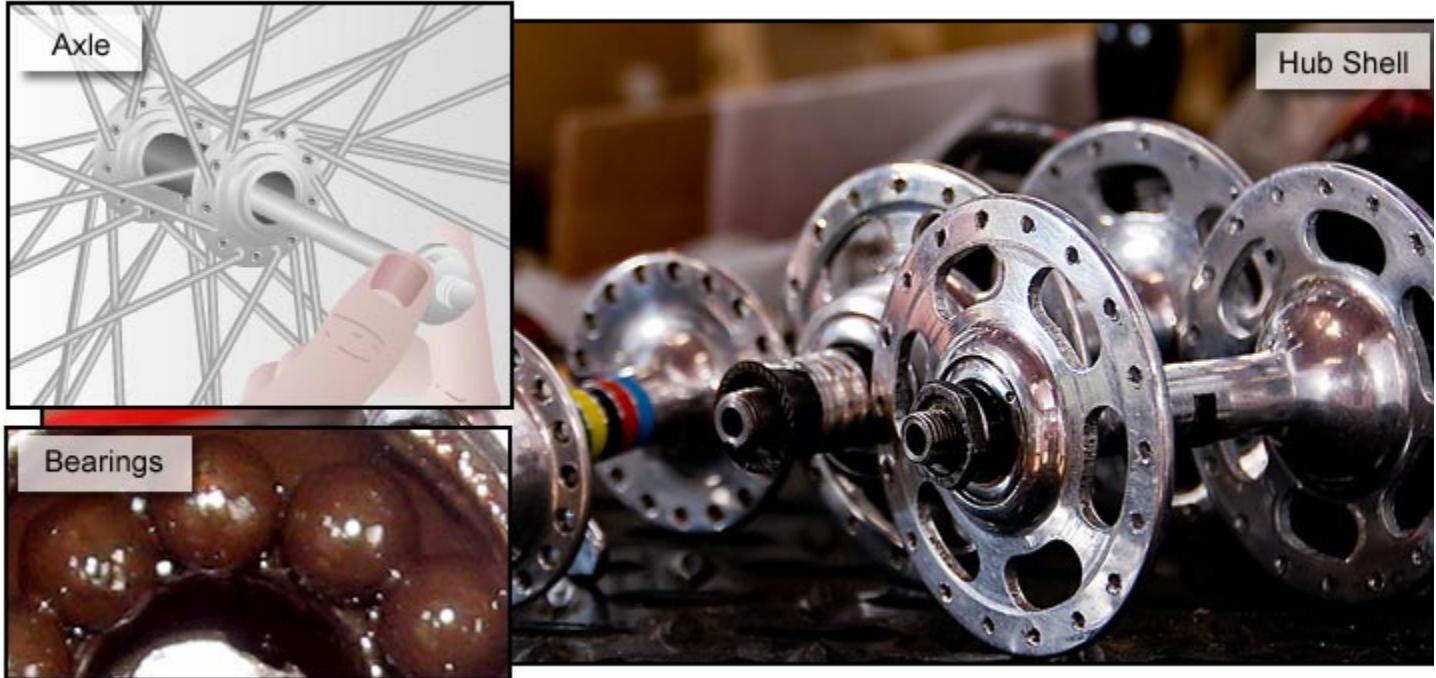
Hubs and Spokes

A bike's hubs are located at the center of each wheel and consist of an axle, bearings, and a hub shell.

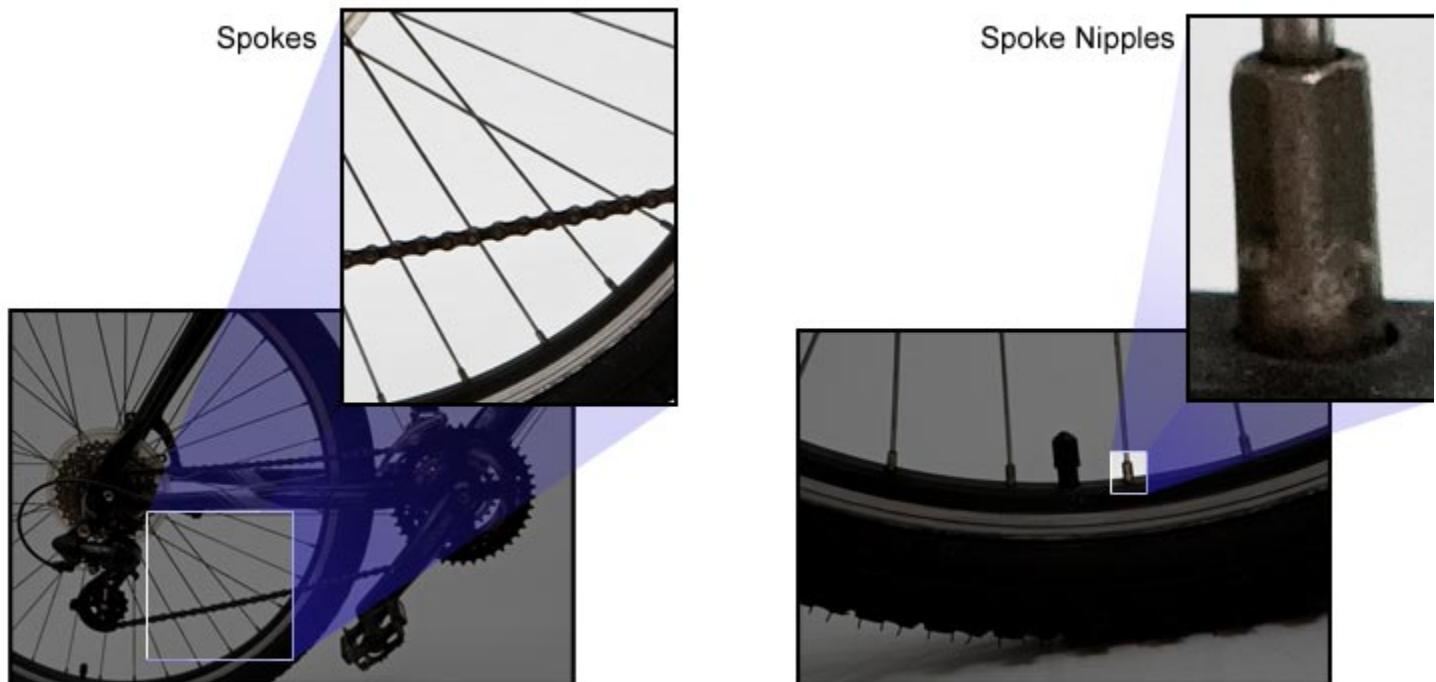
Axle - attached to the dropouts either on the fork or the frame. Attaches using a quick release, nut, bolt, and thru axle or female axle.

Bearings - allow the hub shell and other wheel components to rotate freely around the axle.

Hub shell - the part of the hub where the spokes attach.



The wheel rim is connected to the hub via the spokes. Held in place under tension, the spokes go out from the hub and go across and below each other. At the rim, the spokes are held in place by specialized nuts called the spoke nipples. The spoke nipples allow you to adjust the tension of the spokes. Ensure, however, that the tension on each of the spokes is equal.



Wheels

Description of how it is made: Knowledge Check

Knowledge Check

Use the drop-down menus to answer the questions, and then click CHECK

Which part of the hub assembly allows wheel components to rotate freely around the axle?

Bearings

To which part of the assembly are the spokes attached?

Hub shell

Which part of the hub assembly is attached to the dropouts?

Axle

Wheels

Description of how it is made: Prerequisite concept review

Summary



As noted previously, a bike's wheels are complex devices that are composed of several components. Individually, none of these components can operate as intended. Each is dependant on one or more of the others.

Working from the center outward there is the hub, which is comprised of the axle, bearings, and hub shell. Extending from the hub shell are the spokes. The spokes attach to the wheel rim where they are threaded to the rim through the spoke nipples. Lining the exterior of the rim is the tube. To complete the assembly, the tire surrounds the tube. Together, these components make it possible to transport the bike's rider from one place to another.

Now that you have completed this topic, you should be able to identify a bike's wheel components.

Wheels

Introduction: Enabling objective - Motor skill

Introduction

Any number of things can cause damage to a bike's wheel sets. For example, riding on under-inflated tires can cause them to go flat and damage the wheels. Riding on over-inflated tires may make them more susceptible to punctures from small rocks or bits of glass. Collisions with curbs may bend the rim and spokes. Simple use over time promotes wear. To keep your bike on the road longer, be sure to follow some simple maintenance procedures.

This topic will provide you the information you will need to maintain your bike's wheels.

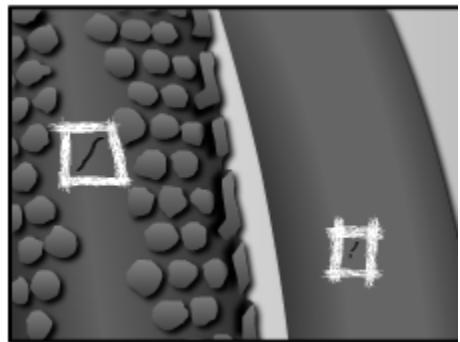
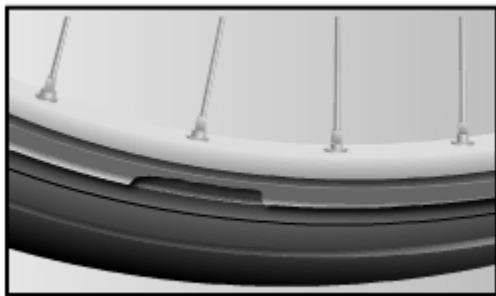


Objective: Given a bike, you will be able to describe how to maintain a bike's wheels with 80 percent accuracy.

Front wheel

Fault reports and isolation procedures: Interactive content - Procedure

Front Wheel



When the front wheel does not function properly, you should first visually inspect the entire assembly to see if you can determine the source of the malfunction. See if the tire is over or under inflated by checking the pressure with a tire-pressure gauge. Refer to your bike's user manual for the appropriate pressure for your particular bike.

If the tire is over inflated, deflate it as necessary. If the tire is under inflated, inflate the tire (refer to

Tire

Fill with air

).

Check the tire for damage.

Does the tire need to be replaced (Refer to

Tire

Remove and install a new item

)

Does the inner tube need to be replaced (Refer to

Inner tube

Remove and install a new item

)

Front wheel

Remove procedures: Interactive content - Procedure

Front Wheel Removal

To remove your bike's front wheel, place the bike on a stand. If you do not have a stand, you can still remove the tire. It will just take a little coordination on your part.

Begin by either deflating the front tire slightly or disconnecting the front brakes. This is done so the wheel can come out easily and not get stuck at the brake pads.



If your bike has a quick-release lever, push the lever outward and turn it in a counterclockwise motion for several revolutions.



If your bike does not have a quick-release lever, you will need a wrench to loosen the nuts on either side of the hub.



Remove the wheel.



Use the arrows to view the slide show.

Rear wheel

Detected fault: Static content - Procedure

Rear Wheel



Just as you did with the front wheel, when the rear wheel does not operate correctly, you should first visually inspect the entire assembly to see if you can determine the source of the malfunction. The outcome of your inspection will determine if you need to prepare the rear wheel for the removal of the tire.

Rear wheel

Remove procedures: Interactive content - Procedure

Rear Wheel Removal

There will probably come a time when you will need to remove your bike's rear wheel. If possible, place the bike on a bike stand. If you do not have a bike stand, you can turn the bike upside down. Make sure it is stable before you begin.

Release the brake or deflate the tire so that the tire will move freely and not bump the brake pads.



Shift the bike gear onto the smallest cog and smallest ring. This will make removing the wheel easier.



Open the quick release, and loosen the nut on the opposite side of the wheel.



If necessary, move the rear derailleur out of the way.



Remove the wheel.



Use the arrows to view the slide show.

Front wheel

Fault reports and isolation procedures: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

How should you check your bike's tire pressure?

Press the tire with your thumb and forefinger.

Apply your weight by sitting on the bike.

Use a tire-pressure gauge.

Visually compare to another bike tire.

Hubs

Clean with degreasing agent: Static content - Procedure Expositive

Maintaining the Hubs

The axle, bearings, and hub shell make up the hubs. To clean the hubs, first remove the axle. Begin by using the cone wrench from the specialist tool set, and remove the locknut from one side of the axle. Remove the washer and the cone from the axle.

Pull the axle out from the other side as shown in the figure below. Take care when removing the axle, because the bearings may fall out. Be prepared to catch them if they do. You do not want to lose any of the bearings from the hub. Missing bearings can cause damage to the hub.

Removing the axle.



Once the axle is removed, remove the bearings. Use a small screwdriver from the specialist tool set, and remove the bearings from their races. Make sure that each side of the hub has the same number of bearings.

Use the degreasing agent, and clean all the parts of the hub.

Before you put the hub back together, check the axle to make sure it is straight. Examine the bearing contact area on the cones and the races in the hub for pitting and other signs of damage. Be sure to check the ball bearings for any signs of damage.

After you have cleaned and inspected the hub components, apply a large quantity of general grease on each hub race.

Now you are ready to assemble the hub. Place the ball bearings into the races, and push them into the grease. Apply more grease on the tops of the bearings.

Replace the axle by sliding it through the hub. Install the cone, washer, and locknut on the other side of the axle. Using the cone wrench from the specialist tool set, carefully tighten the locknut.

Hubs

Clean with degreasing agent: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

What would you use to clean the hubs?

Bleach

Degreasng agent

General purpose cleaner

Ammonia

Inner tube

Remove and install a new item: Interactive content - Procedure

Remove and Install the Inner Tube

Be careful with sharp or hard tools. They can cause damage to the inner tube.

Before you can remove the inner tube, you will first need to remove the wheel.



Once you have the wheel free of the bike, deflate the tube completely.



To remove the old inner tube, take a tire lever and carefully place it between the tire and the wheel rim. Carefully pry the tire over the wheel rim.



Continue around the rim, using another tire lever, until the tire comes off. Now you can remove the inner tube. Some tubes have a nut at the base of the valve that needs to come off before the inner tube can be removed.



To install a new inner tube, partially inflate the tube. A few pumps of air will do. Over inflating will make it difficult to install the tube.



Next, place the tire over the tube, and insert the valve through the hole in the rim.



the valve is situated, reinstall the tube and tire onto the rim.



Attach the pump, and inflate the tire with air. Be sure to inflate to the appropriate pressure.



Use the arrows view the slide show.

Tire

Fill with air: Interactive content - Procedure

Filling Your Tires



To inflate your bike's tires, place the bike on a repair stand if one is available.

Locate the deflated tire, and attach the outlet valve of the pump, from the specialist tool set, to the valve of the deflated tire. Operate the pump to inflate the tire.

Check the tire's pressure. Refer to (

Tire

Check pressure

).

Tire

Check pressure: Interactive content - Procedure

Check Tire Pressure

Maintaining the appropriate bike tire pressure can save you money, improve safety, and increase your riding comfort. Over-inflated tires tend to wear unevenly and quicker, while under-inflated tires generate more friction. Friction produces heat, and over time this heat can damage the tire's structure.

It's a good idea to check your bike's tire pressure regularly. To do so, locate the valve stem of the tire. Use a pressure gauge to check the tire's pressure. Check your user's guide to determine the appropriate pressure.

If your tire's pressure is less than recommended, inflate the tire. Refer to (

Tire

Fill with air

).

If a tire cannot maintain pressure, replace the inner tube. Refer to (

Inner tube

Remove and install a new item

).

Inner tube

Remove and install a new item: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

You have discovered that your rear tire has a slow air leak and decide to replace the inner tube. What tool should you use to remove the tire, so you can make the replacement?

Spoon

Screw driver

Crowbar

Tire lever

Tire

Remove and install a new item: Interactive content - Procedure

Remove and Install Tires



To remove a bike's tires, you will first lift the bicycle and turn it upside down. Place the bike on the floor, and make sure it is secure.

Once the bike is secure, remove the wheel or wheels.

To remove the front wheel, refer to (

Front wheel

Remove procedures

).

To remove the rear wheel, refer to (

Rear wheel

Remove procedures

).

Deflate the inner tube.

Use the tire lever from the specialist tool set to remove the old tire from the wheel. Once the tire is removed, use the tire lever from the specialist tool set to attach the new tire to the wheel. Now you can inflate the tire; refer to (

Tire

Fill with air

).

Install the wheel. Tighten the axle bolt and brake caliper.

Lift the bicycle and turn it to its correct position.

Wheels

Servicing: Prerequisite concept review

Summary



As you know, a bike's wheel system is composed of several components and is fairly complex. Any one of these components is vulnerable to damage that can render the system inoperable. In order to keep your bike wheels functioning as intended, you should take care when riding and be prepared to perform routine maintenance as necessary.

To prevent damage to the tires, always keep them inflated to the appropriate pressure. A bike's wheels can be damaged if the tires are under inflated, and the tires are susceptible to punctures and wear when over inflated. When riding, be alert at all times. Hitting potholes and curbing can bend the rim and spokes.

Being cautious and performing regular maintenance on the wheel systems will help to prevent damage and wear with daily use.

Now that you have completed this topic, you should be able to maintain your bike's wheels.

Wheels

General: Terminal objective - Motor skill

Wheels Assessment



Terminal Objective: Given a bike, you will be able to perform the steps to maintain the wheels.

Wheels

Assessment: Post test

Post Test

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the spoke?



- A
- B
- C
- D

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the wheel rim?



- A
- B
- C
- D

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the wheel tire?



A

B

C

D

Select your answer, and then click NEXT.

Look at the image of the bike. Which pointer is pointing to the spoke nipple?



A

B

C

D

Select your answer, and then click NEXT.

All bike tires require an inner tube?

True

False

Select your answer, and then click NEXT.

What is the function of the valve attached to a bike's inner tube?

Holds the inner tube in place

Indicates the correct direction of rotation

Allows Inflation of the tube and tire to the correct pressure

Protects the tube from damage

Select your answer, and then click NEXT.

A bike's spokes are attached to which part of the hubs?

Bearings

Hub shell

Wheel rim

Axle

Select your answer, and then click NEXT.

Which part of a bike's wheel assembly allows you to adjust the tension of the spokes?

Valve

Bearings

Wheel rim

Spoke nipples

Select your answer, and then click NEXT.

When one of your bike's wheels does not operate correctly, what should you do first?

Immediately remove the entire assembly.

Ride the bike to the nearest bike shop.

Remove and install a new inner tube.

Visually inspect the entire assembly.

Place the steps for removing a bike's rear wheel in the correct order. First, select a step. Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Release the brake and/or deflate the tire.

Shift the bike gear onto the smallest cog and smallest ring.

Open the quick release, and loosen the nut on the opposite side of the wheel.

If necessary, move the rear derailleur out of the way.

Remove the wheel.

Place the steps for removing and installing a bike's inner tube in the correct order. First, select a step.

Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Remove the wheel.

Deflate the tube completely.

Using a tire lever, remove the tire from the rim.

Partially inflate the new tube.

Place the valve through the hole in the rim.

Place the tire over the tube, and feed the tube into the tire.

Reinstall the tire into the rim.

Inflate the tube to the appropriate pressure.

Brake system

Description of how it is made: Attention



Brake System

Brake System Description

Brake system

Description of how it is made: Enabling objective - Verbal information - Facts

Introduction

A bike's brake system is used to slow down and stop the bike. Because of its association with rider safety, the brake system is considered to be one of a bike's more important systems.

The type of bike you ride and how it is used will determine the type of brake system that is installed.

Types of brake systems include, but are not limited to:



Center-Pull



Cantilever



Dual-Pivot



Single-Pivot U

Cantilever brakes are the most common on modern bikes. Therefore, this training will focus on the cantilever brake system.

This topic provides information related to the physical description of a bike's brake system.

Objective: Given photographs of a bike's brake system, you will be able to identify each part with 80 percent accuracy.

Brake system

Description of how it is made: Interactive content - Procedure Exploratory

Cantilever brake

A cantilever brake is a type of caliper brake. The name cantilever comes from the arms on either side of each rim. Each of these cantilever arms pivots on a post that is a part of either the bike's frame or fork.

Cantilever brake systems are made up of these primary components:

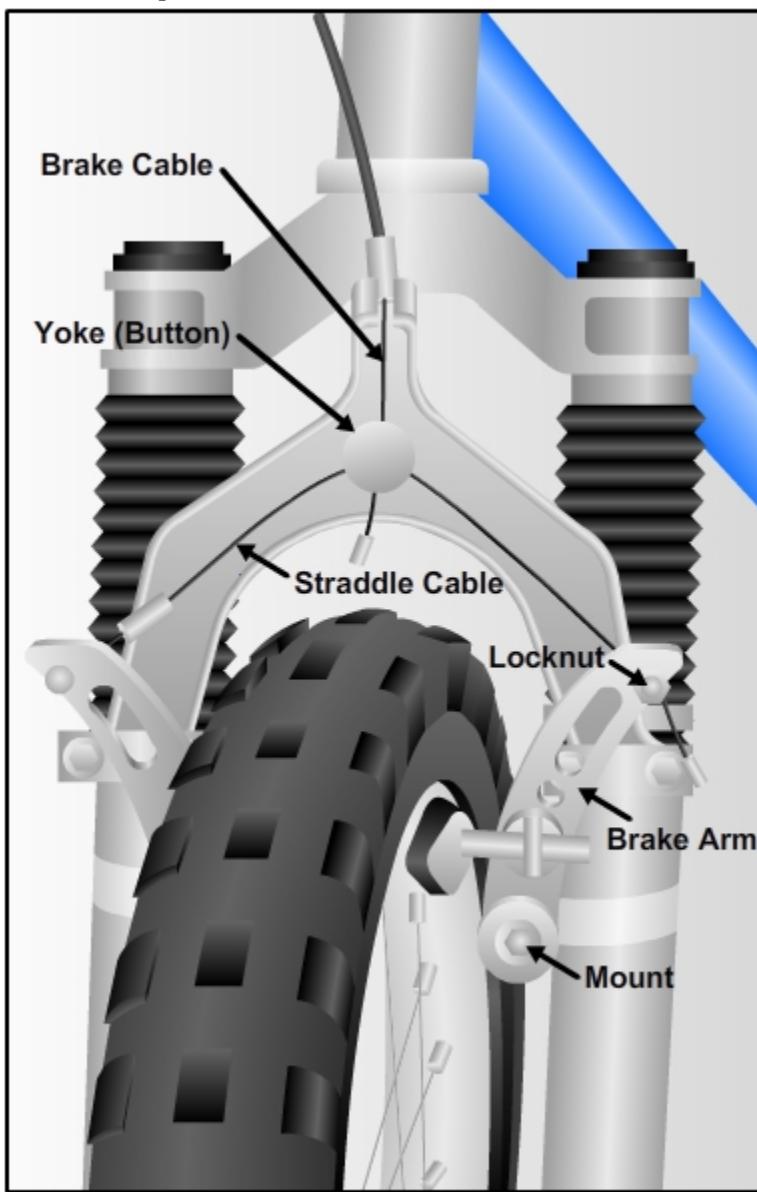
Brake hand lever

Brake cable

Brake arm

Brake clamp, or calipers

Brake pads



Brake system

Description of how it is made: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

What type of brake is a cantilever brake?

Disc

Delta

Caliper

Hydraulic

Brake system

Description of how it is made: Static content - Fact Expositive

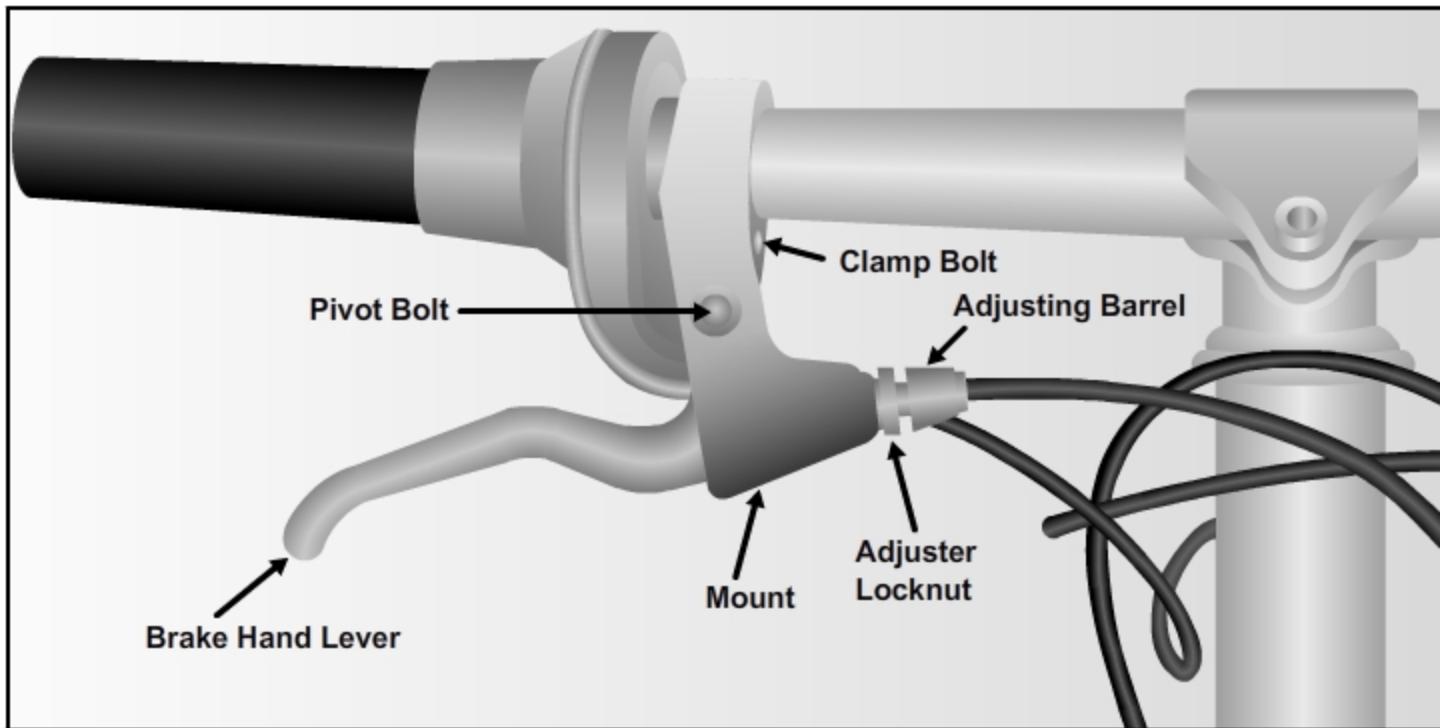
Brake Levers

The brake lever assemblies are typically installed on the handlebar, where they can be easily reached.

There are two types of brake levers: standard pull and long pull. Standard pull levers are designed to work with caliper or center-pull brakes. Long pull levers are designed to work with direct-pull cantilever brakes.

The levers themselves are installed in a mount. The mount is held in place by a clamp bolt that is found in the mount. A pivot bolt allows the lever to turn. The adjuster lock nut holds the brake cable and is used to adjust the tension of the cable.

Each lever has a specific job to do. The left brake lever holds the brake pads on the front wheel and the right brake lever holds the brakes on the rear wheel.



Brake system

Description of how it is made: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

The two types of brake levers are _____ pull and _____ pull.

Standard

Custom

Long

Short

Brake system

Description of how it is made: Content

Brake Pads

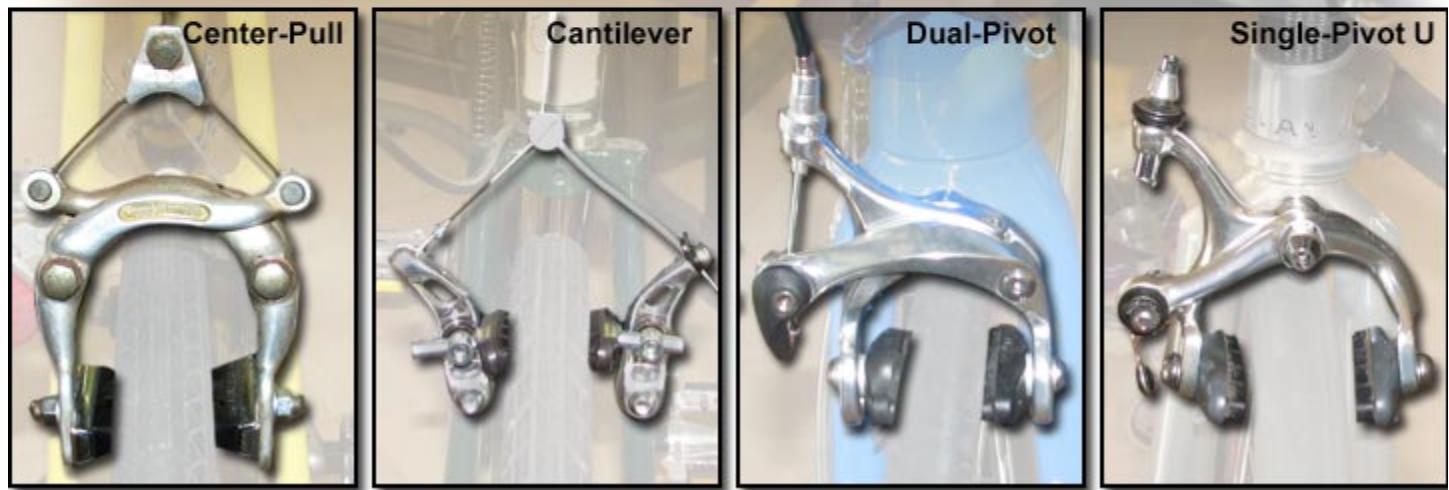
There are four brake pads on the bike. Two are found on the front wheel and two on the rear wheel. Brake pads are made out of hard-wearing rubber and are attached to the brake shoes. The pads press against the rim of the wheel to cause friction when you operate the brake levers.

Click PLAY to view the video.

Brake system

Description of how it is made: Prerequisite concept review

Summary



As you know, a bike's brake system is used to slow down and stop the bike. Without this system, riding could be dangerous.

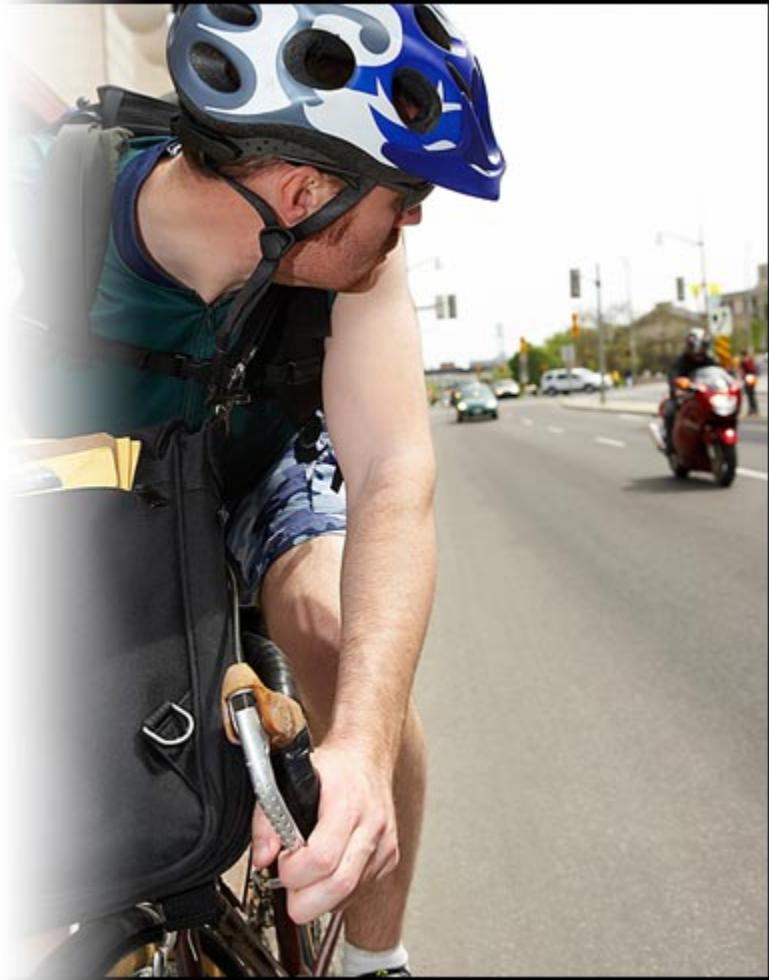
There are many types of brake systems, and each is composed of several small parts. In this topic, you reviewed information regarding the main parts of the cantilever brake system. Cantilever brakes are considered to be the most common on modern bikes. Your bike's brake system, however, may look different, but they all work basically the same.

Now that you have completed this topic, you should be able to identify a bike's brake system components.

Brake system

Description of how it is made: Enabling objective - Motor skill

Introduction



Only minimum maintenance is required for the brake system. However, when a problem does occur, make sure you take care of it immediately. Failing to do so may make the bicycle dangerous to use. This topic will provide you the information you will need to maintain your bike's brake system.

Objective: Given maintenance procedures, you will be able to describe how to maintain a bike's brake system with 80 percent accuracy.

Brake system

Visual examination: Interactive content - Procedure Exploratory

Brake System Inspection

To keep your brake system running like it should, it's a good idea to periodically give it a thorough inspection.

Check the brake levers; they should be tight. When applied, they should work smoothly, and there should be a 1-inch clearance from the handlebar.



The brake cables should be taut and free of damage. There should be no breaks or frayed ends. Open the brake lever, and check for fraying near the anchor ball at the end of the cable.



Look closely at the brake pads. Ensure that they are not worn and are hitting the wheels evenly. There should be at least 3/16-inch of rubber on the brake shoes.



Check all of the assembly's hardware, such as nuts and bolts, to ensure none is missing and each is held securely in place.



Use the arrows to view the slide show.

Brake system

Visual examination: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

How much space should there be between the brake lever and the handlebar when the lever is fully engaged?

At least 1/2 inch

At least 2 inches

At least 1 inch

At least 1/4 inch

Brake system

Manual test: Static content - Procedure

Manual Brake System Test

Once you have completed an inspection of your bike's brake system, you need to test its operability. To manually test your bike's brake system, hold the handlebar as if you were riding the bike. Push the bicycle forward, and apply the brakes

Make sure that the wheels lock and the bicycle stops.

Click PLAY to view the video.

Brake system

Manual test: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

How would you manually test your bike's brake system?

Hold the handlebar.

Start riding the bike, and apply the brakes.

Push the bike, and apply the brakes.

Ensure the wheels lock and the bike stops.

Brake system

General maintenance procedure: Interactive content - Procedure Exploratory

Maintaining Your Brake System

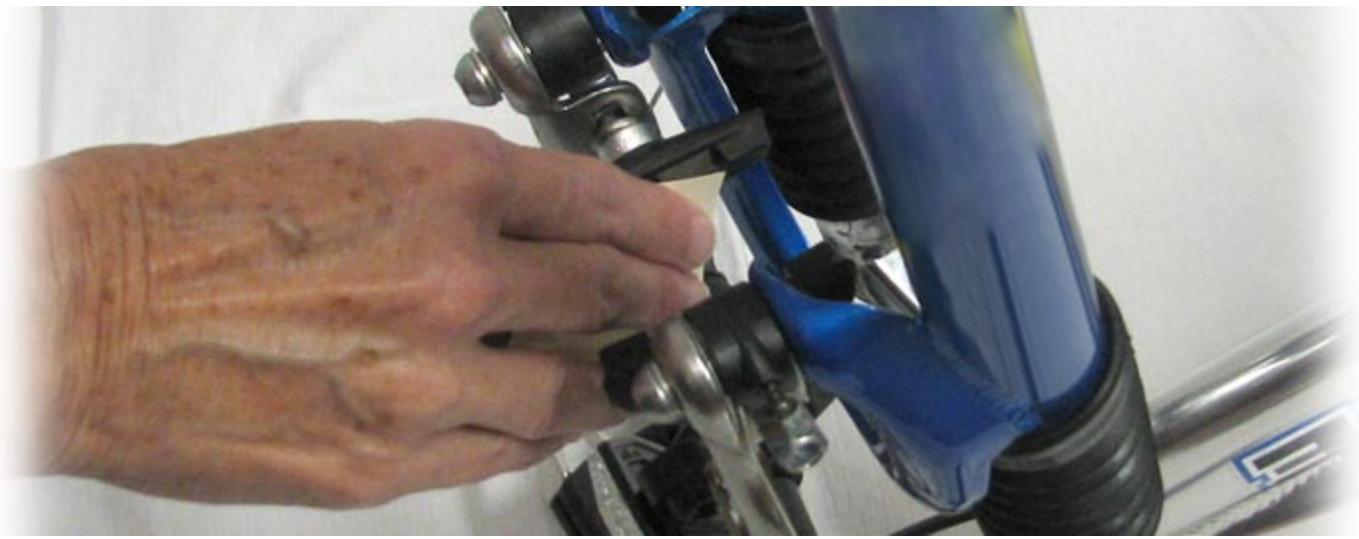
General brake system maintenance begins with the brake pads. To keep them functional, you should be prepared to perform the following maintenance steps as necessary.



Using a scrubbing pad, clean the outside of the wheel rim where the brake pads make contact.



Next, check the condition of the brake pads. If the pads are too worn, replace them. If you find that you can get more use out of the pads, you should simply reface them. To reface the brake pads, remove the wheel from the bike. Take a file or a piece of sandpaper to the pad. Rub the face of the pads to give them a fresh surface to brake against the rim. This will also level the pads in case they have worn unevenly.



Once you have refaced the brake pads, reinstall the wheel. Check to make sure it is straight and centered. Ensure that the brake pads line up on the rim. If they don't, loosen the backing nut, reposition the pads, and then retighten.



As brake pads wear, you will feel the brake lever come closer and closer to the handlebar, making it feel as if the brakes are failing. You can pull the brake closer to the rim via the barrel adjuster, located at the brake lever. This is done by rolling the barrel adjuster out using the knurled nut to take up slack in the cable.

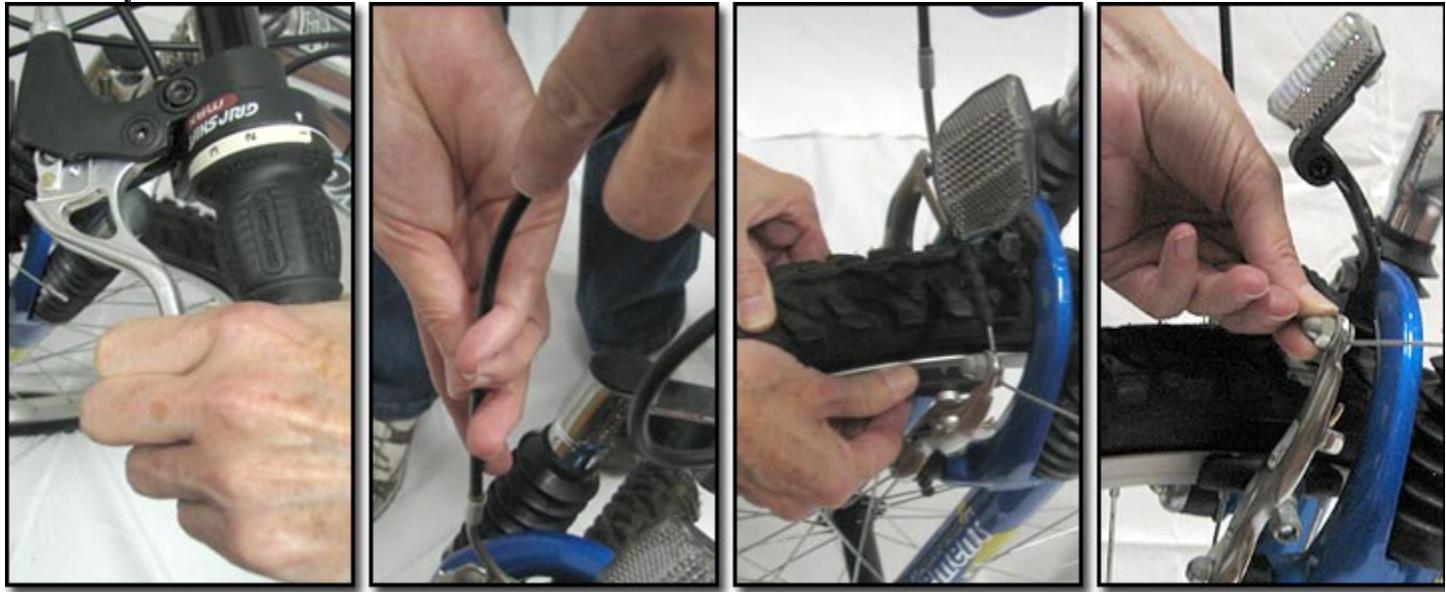


Use the arrows to view the slide show.

Brake system

General maintenance procedure: Prerequisite concept review

Summary



To keep your bike's brake system operational, you only need to conduct minimal maintenance on the system. For safety reasons, you should always be aware of the condition of your bike's brakes. Conducting periodic inspections and performing general maintenance will keep your brakes in good working order.

Regularly check the brake levers, cables, brake pads, and mounting hardware to ensure the parts are securely installed and do not have signs of damage or too much wear.

Now that you have completed this topic, you should be able to identify a bike's brake system components.

Brake system

General: Terminal objective - Motor skill



Brake System **Assessment**

Terminal Objective: Given maintenance tools, you will be able to perform the steps to maintain the brake system.

Brake system

General maintenance procedure: Post-test

Post Test

Select your answer, and then click NEXT.

A cantilever brake is a type of _____ brake.

Disc

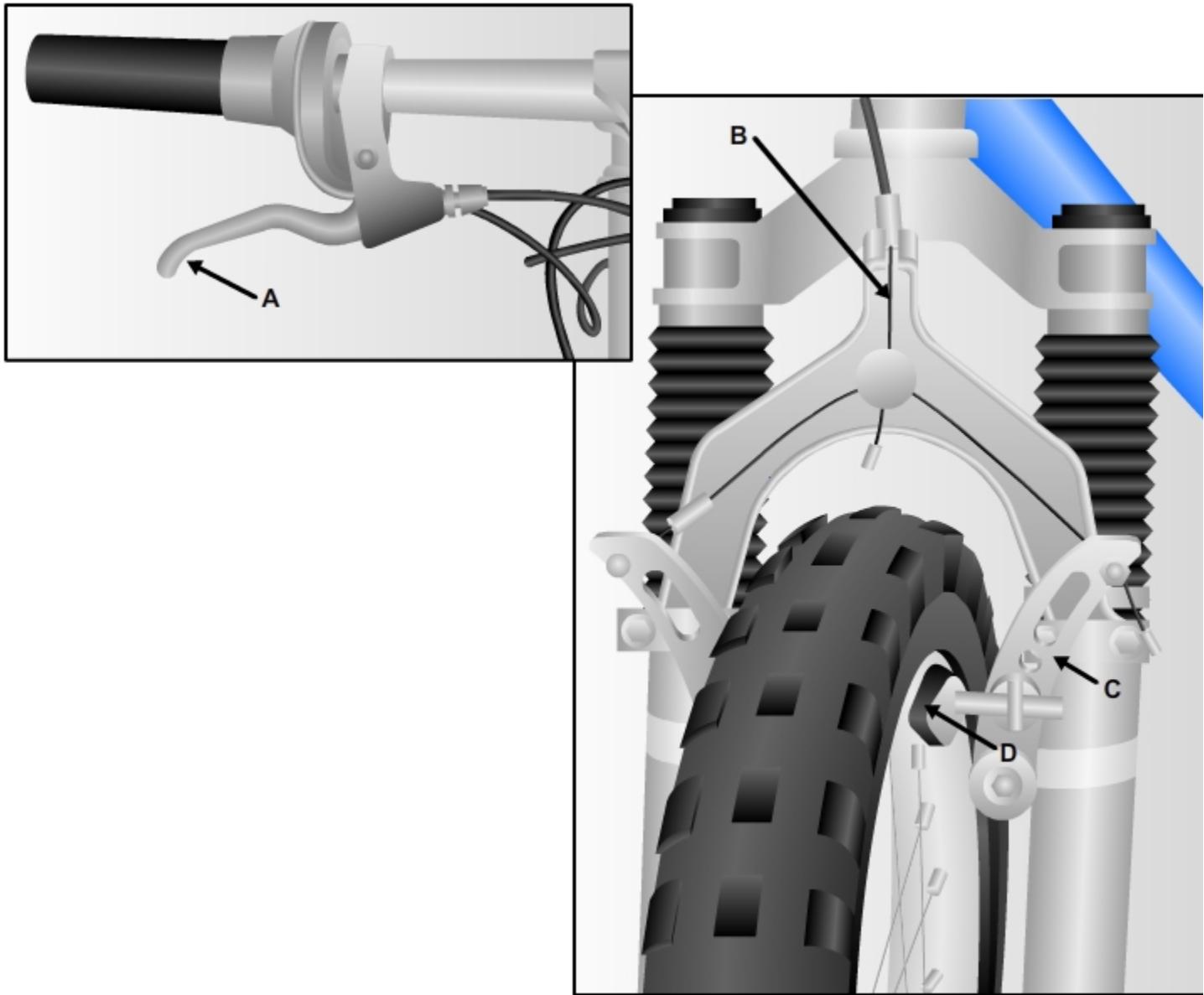
Drum

Hydraulic

Caliper

Select your answer, and then click NEXT.

Look at the image of a bike's brake system. Which pointer is pointing to the brake lever?



A

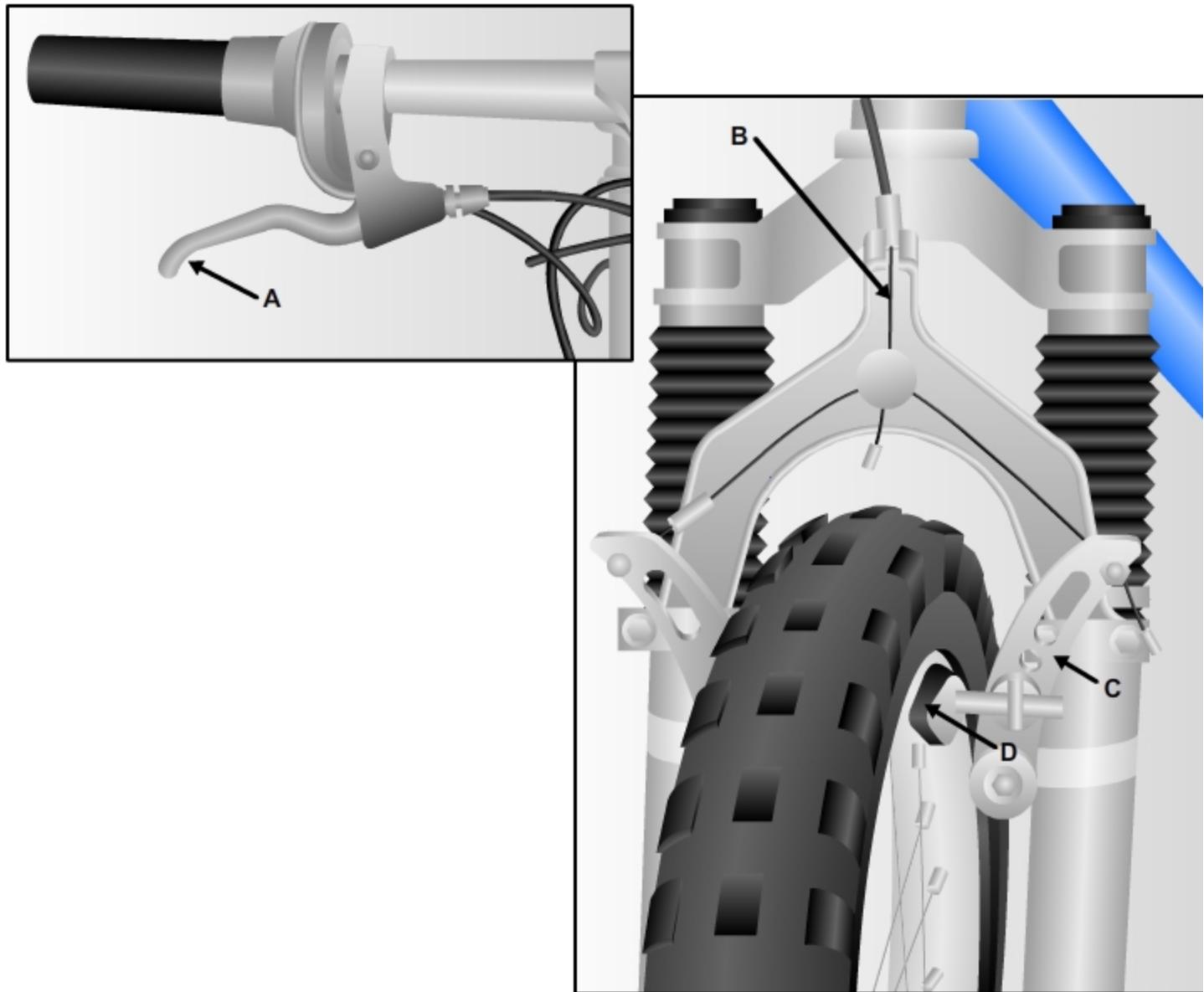
B

C

D

Select your answer, and then click NEXT.

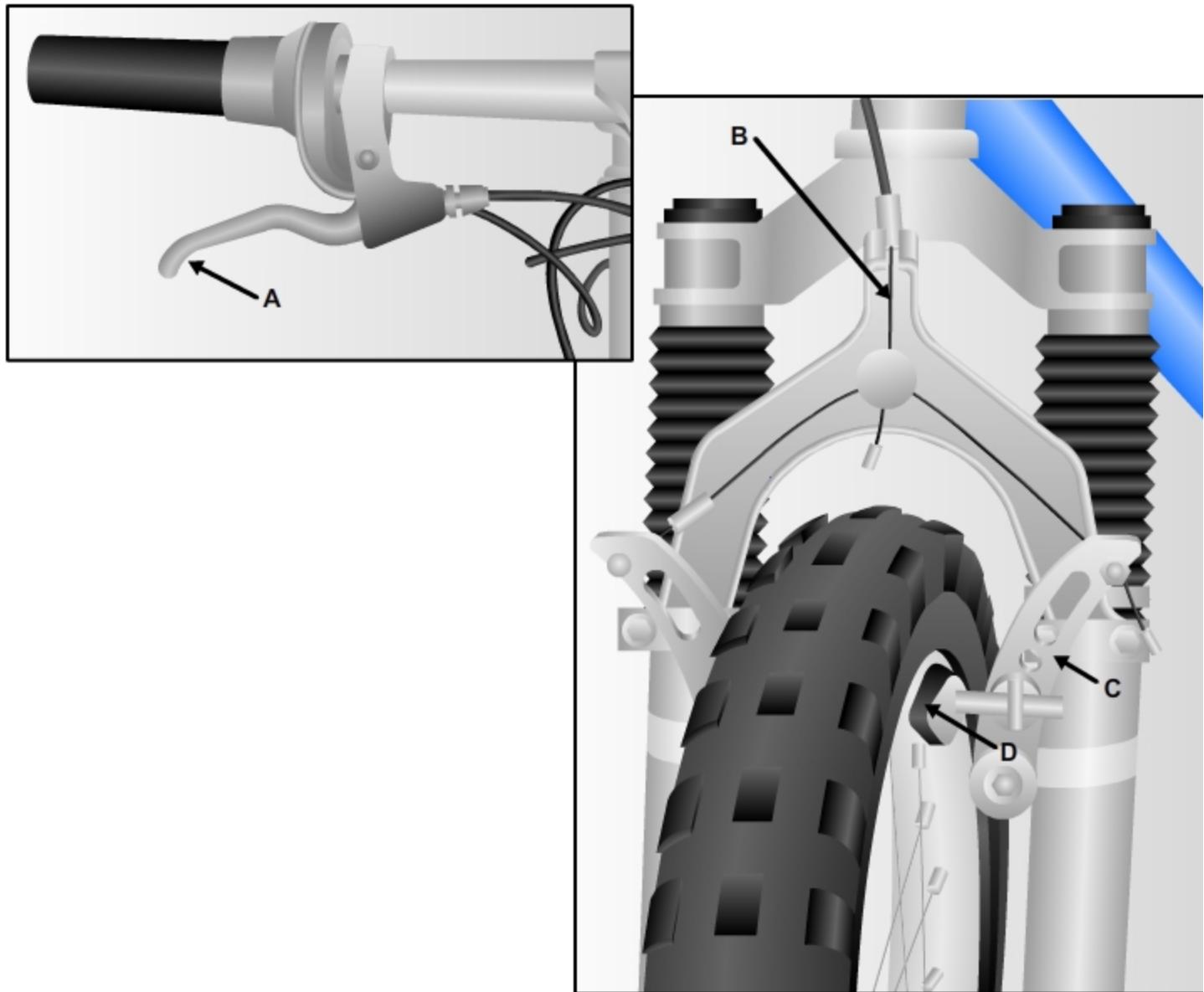
Look at the image of a bike's brake system. Which pointer is pointing to the brake pad?



- A
- B
- C
- D

Select your answer, and then click NEXT.

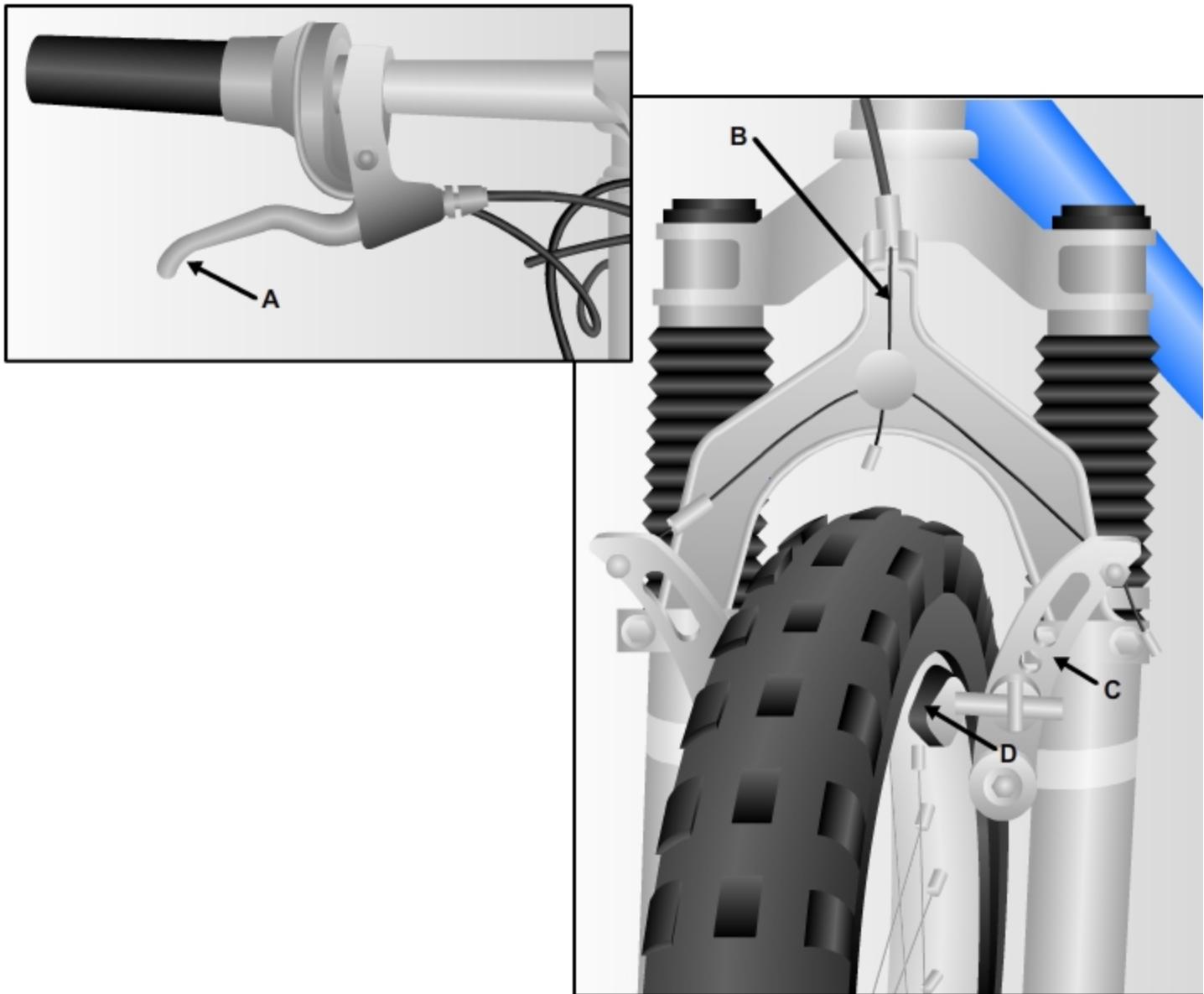
Look at the image of a bike's brake system. Which pointer is pointing to the brake cable?



- A
- B
- C
- D

Select your answer, and then click NEXT.

Look at the image of a bike's brake system. Which pointer is pointing to the brake arm?



A
B
C
D

Select your answer, and then click NEXT.

Which cable is used to pull the brake arms together in order to press the brake pads against the bike rim?

Straddle

Brake

Lever

Pivot

Select your answer, and then click NEXT.

There are two types of brake levers: one is the standard pull, and the other is _____-pull.

short

long

center

specialized

Select all answers that apply, and then click CHECK.

Each brake lever has a specific job to do. Which of the statements below are true?

The left brake lever holds the brake pads on the front wheel.

The left brake lever holds the brake pads on the rear wheel.

The right brake lever holds the brakes on the front wheel.

The right brake lever holds the brakes on the rear wheel.

Select your answer, and then click NEXT.

When activated, the brake pads press against the _____ to cause friction that slows and stops the bike.

Rim

Tire

Frame

Fork

Select all answers that apply, and then click CHECK.

When conducting an inspection of the brake levers, what should you be checking for?

They should be tight.

There should be at least 1/2 inch clearance from the handle bar.

They should operate smoothly.

All hardware should be securely in place.

Select all answers that apply, and then click CHECK.

Steps for conducting brake system maintenance should include which of the following?

Scrubbing the outside of the tires.

Replacing or refacing the brake pads.

Adjusting the brake pads if they do not align with the rim.

Adjusting the brake lever once it is completely touching the handlebar.

Taking up slack in the cable by rolling the barrel adjuster out using the knurled nut.

Bicycle
Servicing: Attention



Bike Operation
General Maintenance

Bicycle

Servicing: Enabling objective - Motor skill

Introduction



Regular maintenance will keep your bike in good working condition and make it safer and more enjoyable to ride. The first step to maintaining your bike is to keep it clean. Pay particular attention to the moving parts. These parts are likely to rust if they are not kept clean. You will also need to keep them lubricated.

Keep your tires' inner tubes inflated according to the manufacturer's guidelines. Over- or under-inflated tires can cause the bike to malfunction.

This topic provides information related to general bicycle maintenance.

Objective: Given general maintenance procedures, you will be able to describe how to maintain a bike for operation with 80 percent accuracy.

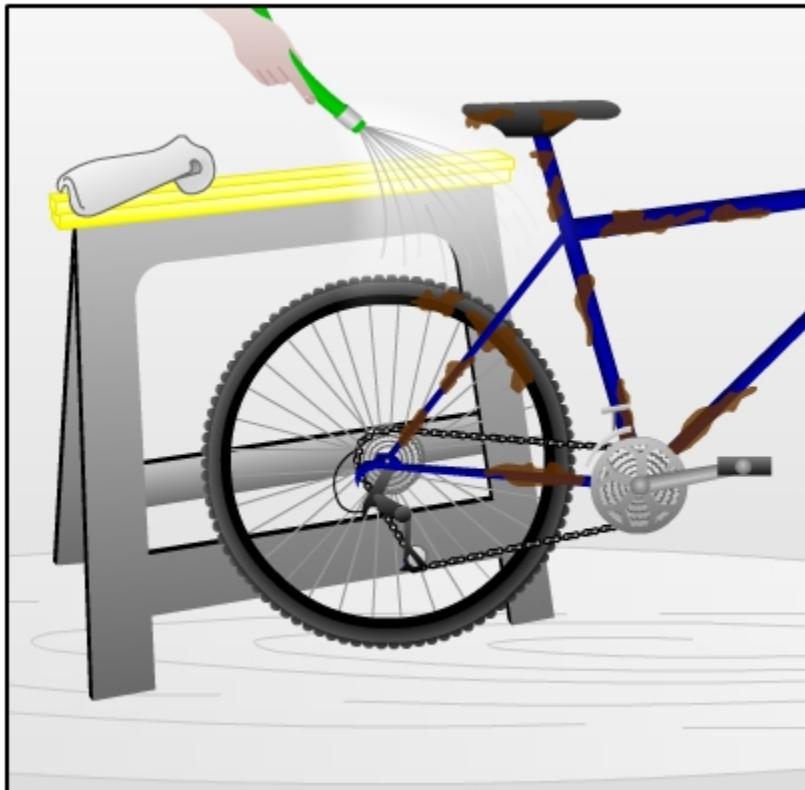
Bicycle

Other procedures to clean: Static content - Procedure Expositive

Cleaning Your Bike

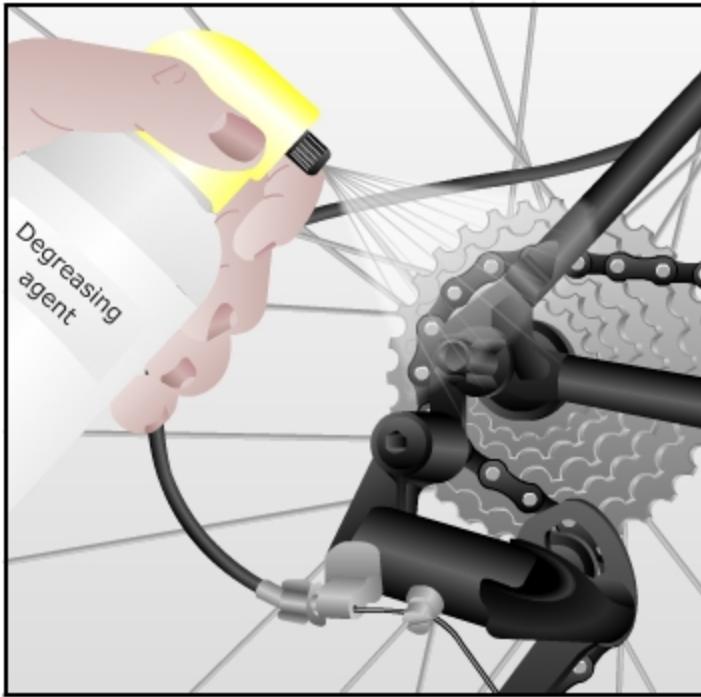
Do not get detergent A into your eyes. If it gets into your eyes, wash them immediately in clean, warm water. Do not get detergent B into your eyes. If it gets into your eyes, wash them immediately in clean, warm water. Do not use a water hose that has high pressure. A water hose that has high pressure can cause some parts to become loose or full of water. Do not point the hose directly at the hub or at the bottom bracket bearings. This can cause damage to the parts. Apply detergent B in accordance with the instructions on the container. The substance may cause damage to the bike paint if it is not applied correctly.

To clean your bike, begin by rinsing it with water to remove any loose dirt. See the figure below.



Use a stiff-bristled brush to remove caked-on dirt and to reach hard-to-clean areas. Hard-to-clean areas include but are not limited to the shift levers, knobby tires, and brakes.

Clean the grime from the chain and the sprockets with a small-bladed screwdriver. Remove any grease from the freewheel assembly using the degreasing agent as shown in the figure below. Then use a brush to remove grease from the sprockets, derailleur guide and tension wheels, and chain ring teeth.



Flush the sprockets, derailleurs, chain rings, and chain with water. Repeat, as necessary.

Soak your sponge in detergent A and water. Completely rub down the bike with the soaked sponge.

Flush the bicycle, and make sure that all of the detergent is removed.

Bounce the bicycle up and down on its tires to remove the excess water.

Next, soak your sponge in detergent B and water. Wash the bicycle with the sponge.

Once you have washed the bike with detergent B, soak the sponge in detergent A and water, and fully clean the bike again. Rinse the bike with water, making sure that all detergents are removed.

Bounce the bicycle up and down on its tires to remove the excess water. Use a clean, dry cloth to finish drying all parts of the bike.

Lubricate the bike (refer to

Chain

Other procedures to clean

).

Bicycle

Other procedures to clean: Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

A degreasing agent is used to dissolve grease from the freewheel assembly. Once applied, use a stiff-bristled brush to remove the grease from the:

Sprockets

Spokes

Chain ring teeth

Derailleur guide and tension wheels

Bicycle

Place on test stand: Static content - Fact Expositive

Placing the Bike on a Test Stand



There are many types of bike test stands. You can make one yourself or purchase one online or from a bike shop. It is not necessary to own or use a test stand, but it sure makes cleaning and maintaining your bike easier.

When using a test stand, ensure that it is level. Then, place the bicycle in the test stand grip(s). Tighten the clamps until the bike is securely attached.

Bicycle

Standard repair procedures: Interactive content - Procedure Exploratory

Repair a Puncture

When you remove the rear wheel to repair a puncture, disconnect the brake arm from the chain stay.

To repair a tire puncture, first remove the wheel.

Next, make sure that there is no air in the tube. To deflate the tube, loosen the cap on the valve stem, and push the valve stem core down to release all the air.



Use a tire lever to move the tire bead out of its seat. Lift the tire bead above the lip of the rim.



Remove the tube, and then partially inflate it with the foot pump. Examine the tube for leaks. If you find one, circle the puncture site with a marking pen.



Release most of the air, and then use a piece of sandpaper, from the tube patch kit, to roughen the area on and around the hole. This will help the patch bond correctly.



Apply a thin layer of glue from the patch kit on and around the puncture. Make sure that the glue spreads out past where the patch will sit. This will ensure that the edges of the patch adhere securely.



Allow the glue to set for several minutes. It will become tacky and dim. Remove the rear foil from the patch, and push the patch into position. Push it with your thumbs from the center of the patch outward. Remove the cover from the patch. Put a very thin layer of talcum powder on and around the patch.



Now that the puncture is patched, you are going to reinstall the tube. Partially inflate the repaired tube with the foot pump. Starting with the valve stem, push it through the hole in the rim. Make sure that the valve stem is straight. Align the tube on the rim, and install the tire over the tube.



Use the arrows to view the slide show.

Bicycle

Standard repair procedures: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

When repairing a tire puncture, what should you do first?

Remove the tire.

Remove the valve.

Remove the wheel.

Remove the inner tube.

Electrical system

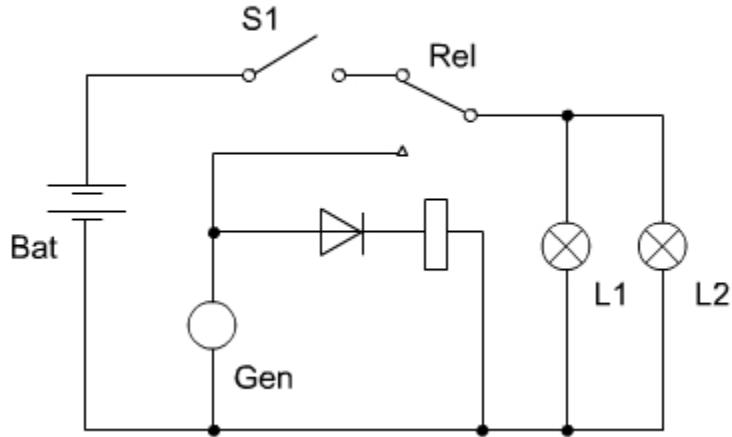
Description of how it is made and its function: Static content - Fact Expositive

Lighting system

The lighting system is an accessory assembly that your bike may or may not have. It's a good idea to install a lighting system if you will be riding your bike in the evening, once the sun has gone down.

The illustration below shows a typical bike lighting system.

Lighting System



Lights

Manual test: Static content - Procedure

Testing the Lighting System

You should periodically test your bike's light system, especially if you will be riding at night. To do this, simply set the lights to the on position.

Check to ensure that all the lights operate correctly.

Click the black button on the light to turn it on and off.

Lights

Observed fault: Static content - Fact

Light Fault

If during a test you discover that one or more of your lights are not functioning properly, your first step to resolving the problem should be to change the light bulbs. If this does not take care of the problem, you will need to either troubleshoot the system more closely or take the bike to a professional for correction.

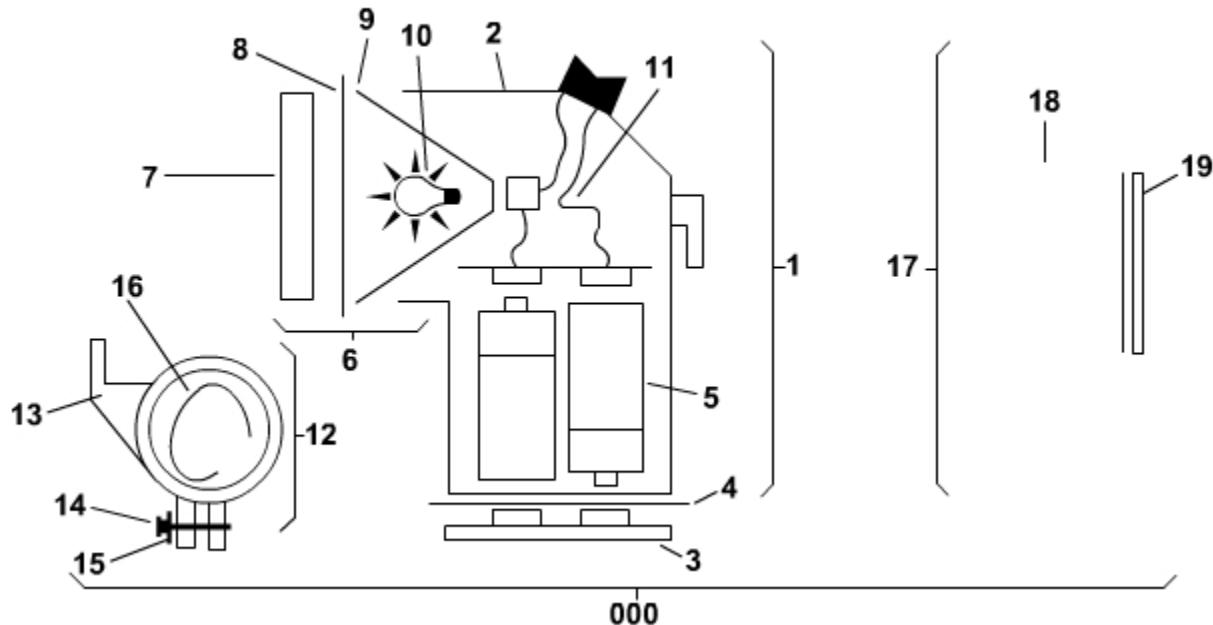
Lights

Assemble, install and connect procedures: Static content - Procedure

Install the Lighting Assembly

Remove the lighting system from the packaging. Make sure that the package contains all of its components.

Lighting Assembly



shifter correlation

1.
Light, sub-assembly front

11.
Loom wiring

2.
Light, main body

12.
Bracket, light mounting

3.
Light, main body

13.
Clip

4.
Seal

14.
Screw, special

5.
Battery

15.
Washer, flat

6.
Lens, assembly

16.
Grip, strip

7.
Lens, sub-assembly

17.

Light, sub-assembly rear

8.

Seal

18

Light, main body

9.

Reflector

19.

Lens, assembly rear

20.

Bulb

Install the light bulbs for the front and rear lights (refer to

Lighting

Remove and install a new item

).

Attach the front light fitting on the top of the handlebar. Begin by applying the protective strip around the handlebar. Next, pull the clamp open, and put it around the protective strip with the light connector at the top.

Install the washer on the screw. Use the correct screwdriver from the specialist tool set, and tighten the screw into the hole at the bottom of the clamp. This safeties the clamp to the handlebar.

Attach the rear light fitting to the rear triangle of the bike frame. Apply the protective strip around one of the two rear triangle up-tubes. Pull the clamp open and put it around the protective strip. Make sure the light connector points rearwards. Install the washer on the screw. Use the correct screwdriver from the specialist tool set, and tighten the screw into the hole at the bottom of the clamp. This secures the clamp to the tube.

Attach the light with the white glass to the front connector.

Attach the light with the red glass to the rear connector.

Lighting

Assemble, install and connect procedures: Knowledge Check

Knowledge Check

Select your answer, and then click CHECK.

During a test of your bike's lighting system, you discover that your lights are not functioning properly.

What is the first step you should take to resolve the problem?

Replace the wiring.

Replace the light bulb.

Replace the light fixture.

Replace the switch.

Horn

Remove and install a new item: Static content - Procedure

Removing and Installing a Bike Horn

The horn is another accessory assembly that your bike may or may not have. Typically, when a horn fails it is best just to remove the old horn and install a new one.

If your bike does have a horn and it needs to be removed, be sure to hold the bike securely.

To remove the horn, use an 8mm Allen wrench from the specialist tool set, and remove the two Allen screws. This will allow you to remove the horn.

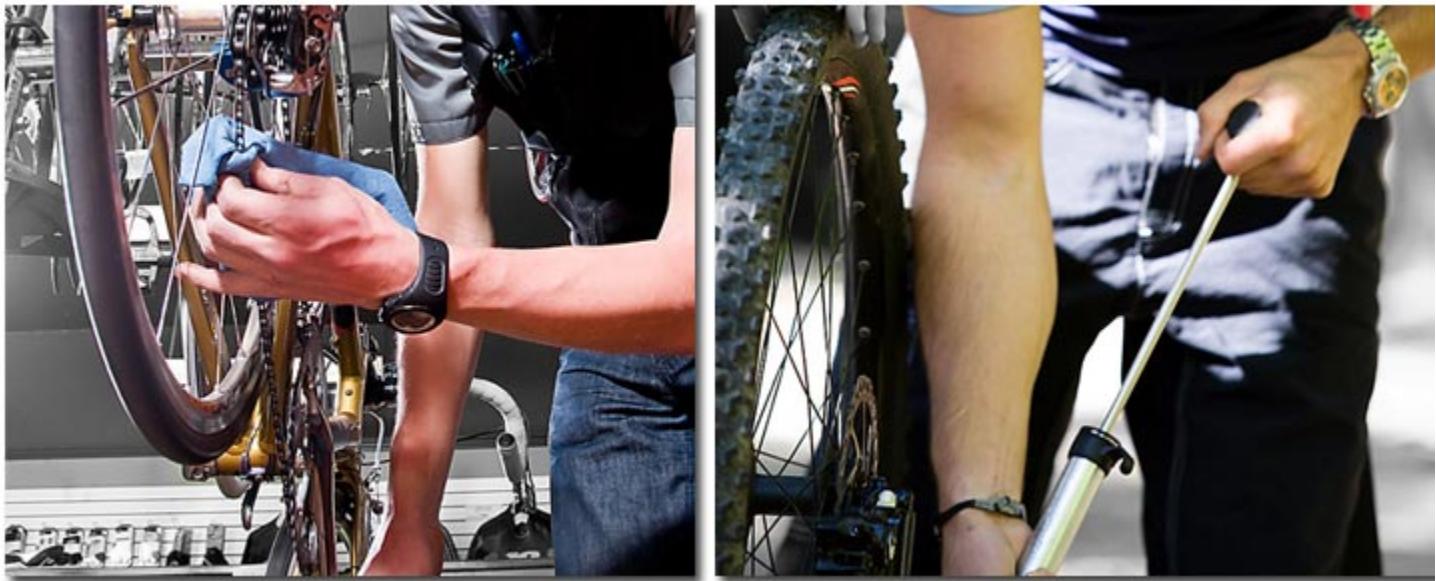
To install a new horn, remove the item from its packaging, and place it on the handlebar. Use the 8mm Allen wrench from the specialist tool set to tighten the two Allen screws.

Safely discard the old horn in accordance with local disposal procedures.

Bicycle

Servicing: Prerequisite concept review

Summary



Regular cleaning and testing of your bike's systems are part of keeping your bike maintained. Over time, your bike's moving parts become susceptible to dirt and grime and will eventually fail to operate correctly if they are not maintained. Because the bike has so many moving parts, it is important that you know how to keep the bike clean and lubricated.

It is also important to know how to patch an inner tube puncture. As you are riding, you never know what you might run over. A nail or a tack can cause quite a bit of aggravation.

Now that you have completed this topic, you should be able to perform some general maintenance on your bike.

Bicycle

Operation: Enabling objective - Motor skill

Introduction



Whether you are riding your bike for business or pleasure, you should always follow a few pre-operation procedures prior to each ride. A routine pre-operation inspection will help you avoid breaking down during your ride. Pre-operation inspections typically include a check of the brakes, the wheels and the tires, and the chain. These components should all be in good working order.

Once you've completed your ride, you should check your bike to see if it needs cleaning and/or lubricating. A clean, well-lubricated bike will last much longer than one that is left neglected.

This topic provides information related to pre- and post-operation procedures.

Objective: Given pre and post operation procedures, you will be able to prepare a bike for operation with 80 percent accuracy.

Bicycle

Pre-operation procedures (crew): Interactive content - Procedure Exploratory

Pre-Operation Procedures

If it has been a while since you rode your bike or you are planning an extra-long ride, it's a good idea to conduct a pre-ride inspection.

Completely inspect the brakes and their functionality. Open the brake quick release, and check the overall condition of the brakes. Ensure that they are correctly installed in the center of the inner diameter of the brake surface. Examine the condition and the thickness of the brake pads. Make sure that there is plenty of rubber left on the shoes and that the pad is not too hard. Clean away any dirt or debris (refer to **Brake Pads**)

Clean with chemical agent

). Check to see that there is sufficient clearance between the pads and the inner diameter of the brake surfaces. Pads positioned too low on the rim, as shown in the image below, can move off of the rim and into the spokes causing the spokes to become separated or torn completely from their mountings. Apply the brakes, and push the handlebar forward to ensure that the brakes are operating correctly.

Click PLAY to view the video.

Check the condition of the wheel assemblies. Look closely at the rims to see if there are any bulges and/or dents, and examine for splits at the seam where the extruded rim is bonded. Ensure that all of the spokes are straight and held securely in place. Check the tire pressure. Ensure that the pressure reading on the tire pressure gauge matches the recommended pressure shown on the sidewall of the tire. If necessary, add air.

Straddle the bicycle, and move the handlebar from side to side to check the headset bearings. Make sure that they are tight.

Examine the chain. If it is excessively dirty, clean it as specified in the chain-cleaning task (refer to

Chain

Clean with chemical agent

). Check the chain for frozen or tight links, and apply lubricant as necessary. Ensure that the chain is tight. There should not be excessive play in the chain. To check this, move the chain to the largest chain ring, and try to pull the chain away from the front of the chain ring. Make sure that it is not loose. If you can see a full tooth when you pull the chain away from the chain ring, it needs to be tightened. Tighten the chain with the Allen wrench from the specialist tool set.

Bicycle

Pre-operation procedures (crew): Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

What are some important things to look for when conducting a pre-ride inspection?

Appropriate tire pressure

Rust on the handlebar

Condition of the brake pads

Tight chain

Bicycle

Post-operation procedures (crew)

Post-Operation Procedures

After a long day of riding or after several short rides, you should clean your bicycle. Clean the bicycle with water. Use a brush from the specialist tool set to clean the brakes, shift levers, sprockets, and tires.



Allow the bicycle to dry, and lubricate those areas that require lubrication.

Spray the lubricant onto the following moving parts:

Brake pivots

Derailleur pivots

Derailleur tension guides

Brake-lever pivots

Control cables

Gear sprockets

Chain

Wipe away any excess lubricant.

A clean bike is easier to maintain, is smoother to operate, and will last longer.

Bicycle

Post-operation procedures (crew): Knowledge Check

Knowledge Check

Select all answers that apply, and then click CHECK.

Which of the following bike parts require lubrication?

Spokes

Control cables

Chain

Wheel rims

Bicycle

Operation: Prerequisite concept review

Summary



Following a few pre- and post-operation procedures is important for your safety and to keep your bike in good working order. Now if you are like most riders, when it's time to ride, you just want to ride. You don't want to fool with checking this and that on the bike. You should, however, strive to make it a habit to quickly check your bike's brakes, wheels and tires, and chain. By checking your bike in those areas where there are common mechanical failures, you will be taking steps to ensure your safety each time you ride.

After your ride, quickly check your bike's brakes, wheels and tires, and chain again. Once you have determined that everything is still working well, you may want to clean and lubricate your bike.

Remember, a clean bike is easier to maintain, is smoother to operate, and will last longer.

Now that you have completed this topic, you should be able to perform bike pre- and post-operation procedures.

Bicycle

General: Terminal objective - Motor skill



Bike Operation Assessment

Terminal Objective: Given a bike, you will be able to perform pre- and post-operation procedures.

Bicycle

Operation: Post test

Bicycle Operation: Post-test

Select your answer, and then click NEXT.

To remove excess dirt from your bike, you will use a hose that has high pressure.

true

false

Select all answers that apply, and then click NEXT.

Hard-to-clean areas on your bike include:

Shift levers

Spokes

Brakes

Stem

Select all answers that apply, and then click NEXT.

A degreasing agent is used to dissolve grease from the freewheel assembly. Once applied, use a stiff-bristled brush to remove the grease from the:

Frame

Chain ring teeth

Sprockets

Derailleur guide and tension wheels

Place the steps for finding and repairing a puncture in the correct order. First, select a step. Then use the up and down arrows to move the step to the correct position. Repeat for each step, and then click NEXT.

Remove the wheel.

Unseat the tire.

Examine tube for leak.

Mark puncture.

Sand patch application area.

Apply the glue.

Reinstall the tube.

Reinstall the tire.

Select your answer, and then click NEXT.

What tool would you use to remove a bike horn?

Phillips head screwdriver

Standard head screwdriver

4mm Allen wrench

8mm Allen wrench

Select all answers that apply, and then click NEXT.

When conducting a pre-ride inspection, what are some things you should be looking for?

Malfunctioning horn

Loose spokes

Frozen or tight chain links

Tight headset bearings

Select all answers that apply, and then click NEXT.

To clean your bike's brake pads, use:

Ammonia

Scrubbing pad

Rubbing alcohol

Steel wool

Select your answer, and then click NEXT.

Once you have cleaned and dried the chain, you will need to apply _____.

Lubricant

Degreaser

Rubbing alcohol

Water

Select all answers that apply, and then click NEXT.

Which of the following bike parts require lubrication?

Brake-lever pivots

Gear sprockets

Derailleur pivots

Stem