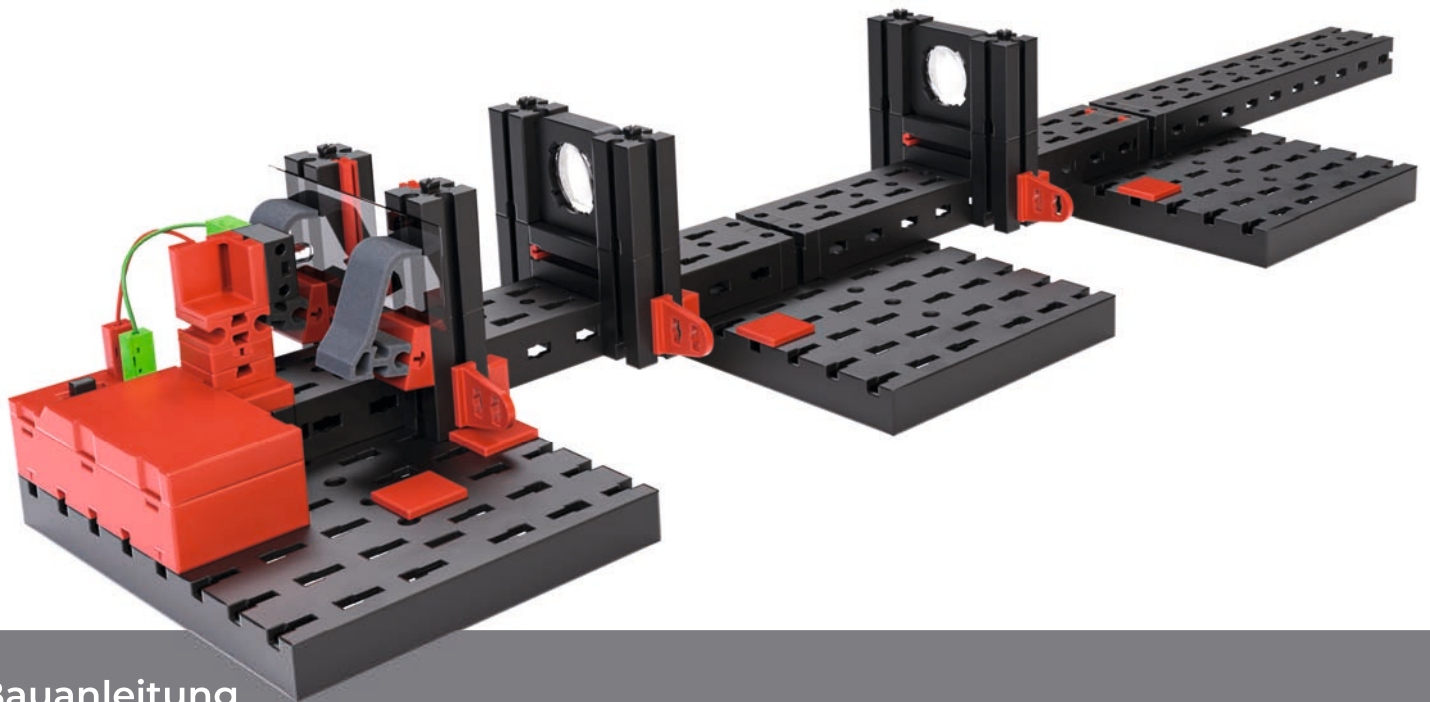


STEM Optics

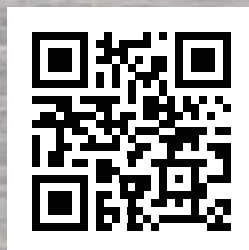
SECONDARY SCHOOL



Bauanleitung
Assembly instruction
Instructions de montage
Bouwhandleiding
Instrucciones de construcción
Manual de montagem
Istruzioni di montaggio
Инструкция по сборке
安装说明书

- Auf dem fischertechnik eLearning bieten wir Ihnen die Möglichkeit, noch mehr Hintergrundwissen zum Thema des Baukastens zu erhalten und sich umfangreiche didaktische Begleitmaterialien für den Einsatz im Unterricht herunterzuladen.
Über <https://www.fischertechnik.de/elearning-stem-optics> gelangen Sie direkt zum eLearning Portal.
- On the fischertechnik eLearning, we offer you the opportunity to obtain even more background knowledge on the subject of the construction kit and to download extensive didactic accompanying materials for use in the classroom. You can access the eLearning portal directly via <https://www.fischertechnik.de/elearning-stem-optics>.
- Avec le portail eLearning de fischertechnik, vous pouvez parfaire vos connaissances au sujet de la boîte de construction. Cliquez sur <https://www.fischertechnik.de/elearning-stem-optics> pour accéder directement à notre portail.
- Met het fischertechnik eLearning portaal geven wij u de mogelijkheid, nog meer achtergrondkennis over het thema van het modulaire systeem te verkrijgen. Via <https://www.fischertechnik.de/elearning-stem-optics> komt u direct bij het eLearning portaal.
- En el portal de eLearning de fischertechnik te ofrecemos la posibilidad de obtener aún más conocimientos de fondo sobre el tema del kit de construcción y de descargar amplios materiales didácticos de acompañamiento para utilizar en el aula. A través de <https://www.fischertechnik.de/elearning-stem-optics> podrá acceder directamente al portal de aprendizaje electrónico.
- Com o portal de eLearning da fischertechnik damos lhe a possibilidade de obter ainda mais conhecimentos aprofundados sobre os kits de construção. Em <https://www.fischertechnik.de/elearning-stem-optics> pode aceder diretamente ao portal de eLearning.
- Con il portale eLearning di fischertechnik vi diamo la possibilità di accumulare maggiori informazioni di base sul tema delle scatole di montaggio. Tramite <https://www.fischertechnik.de/elearning-stem-optics> potete raggiungere direttamente il portale eLearning.
- Обучающий Интернет-портал компании fischertechnik предлагает вам возможность получить больше базовых знаний по теме конструирования. По ссылке <https://www.fischertechnik.de/elearning-stem-optics> вы попадаете прямо на обучающий Интернет-портал.
- 通过 fischertechnik eLearning 电子学习门户网站，我们为您提供更多关于积木的背景知识。登陆 <https://www.fischertechnik.de/elearning-stem-optics> 访问我们的 elearning 门户网站。

<https://www.fischertechnik.de/elearning-stem-optics>



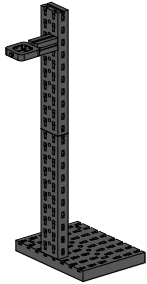
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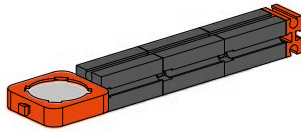
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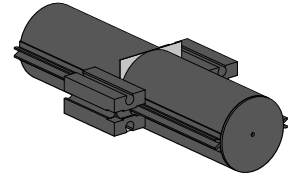
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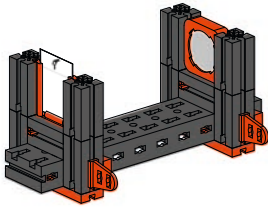
Minimale Sehweite / Minimum visual range / Distance de vision minimale / Minimaal visueel bereik / Alcance visual mínimo / Alcance visual mínimo / Distanza visiva minima / Минимальная дальность видимости / 最小视觉范围 9



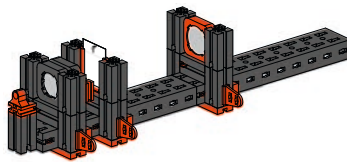
Lupe / Magnifier / Loupe / Loep / Lupa / Lupa /
Lente d'ingrandimento / Лупа / 放大镜 10



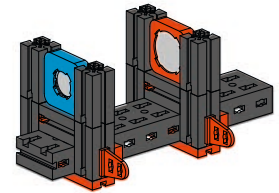
Lochkamera / Pinhole camera / Appareil photo à sténopé / Gaatjescamera / Cámara estenopeica / Câmara pinhole / Fotocamera a foro stenopeico / Камера-обскура / 针孔摄像机 11



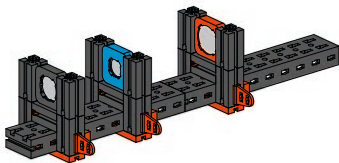
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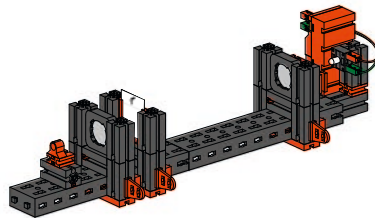
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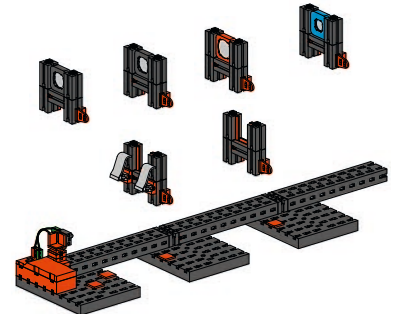
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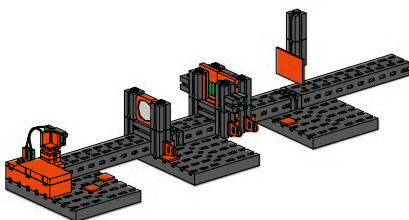
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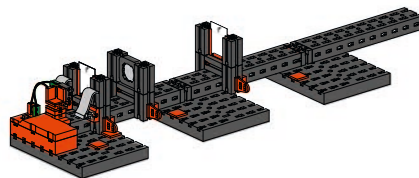
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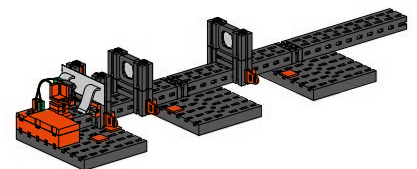
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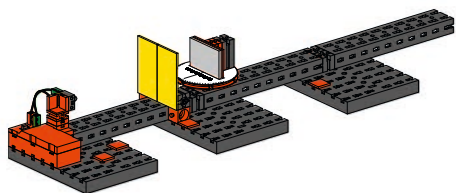


Mikroskop / Microscope / Microscopio / Microscopio /
Microscopio / Microscópio / Microscopio /
Микроскоп / 显微镜 27

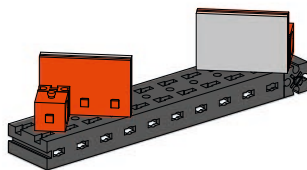
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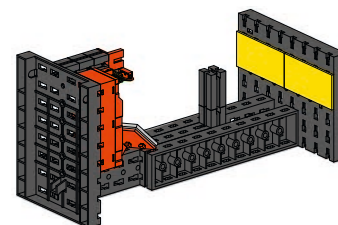
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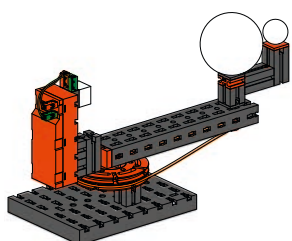
Reflexionsgesetz / Reflection law / Loi de réflexion /
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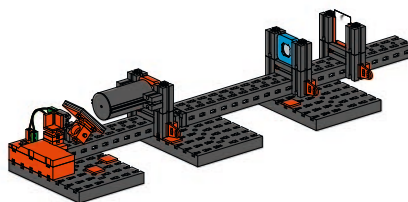
Hyperskop / Hyperscope / Hyperscope / Hyperscope /
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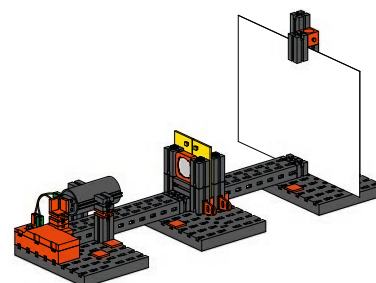
Schattenexperiment / Shadow experiment /
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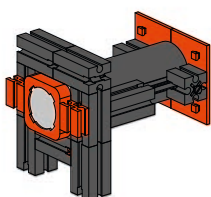
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Maanfasen / Fases de la luna / Fases da lua /
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/ Projector op zonne-energie / Projector solar /
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















Wellenlänge des sichtbaren Lichts / Wavelength
of visible light / Longueur d'onde de la lumière
visible / Golflengte van zichtbaar licht / Longitud de
onda de la luz visible / Comprimento de onda da luz
visível / Lunghezza d'onda della luce visibile /
лина волны видимого спектра /
可见光的波长40




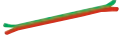






















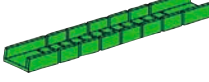



Spektroskop / Spectroscope / Spectroscope / Spectros-
coop / Espectroscopio / Espectroscópio /
Spettroscopio / Спектроскоп / 分光镜43

Einzelteilübersicht
Spare parts list
Liste des pièces détachées










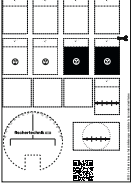


	31 011 2 x
	31 019 2 x
	31 058 2 x
	31 060 4 x
	31 061 5 x
	31 771 1 x
	31 981 6 x
	31 982 24 x
	32 071 12 x
	32 854 3 x
	32 870 1 x
	32 879 34 x
	32 881 9 x
	35 031 1 x

Onderdelenoverzicht
Lista de piezas
Lista de Componentes

	35 049 6 x
	35 086 1 x
	35 969 1 x
	36 210 1 x
	36 702 2 x
	37 034 1 x
	37 237 2 x
	37 468 7 x
	37 925 2 x
	38 240 1 x
	38 246 4 x
	38 248 4 x
	38 253 6 x
	38 413 1 x

	38 428 1 x
	38 432 2 x
	68 535 1 x
	130 593 2 x
	135 719 1 x
	136 775 1 x
	137 103 1 x
	146 373 2 x
	146 374 1 x
	146 375 1 x
	155 901 1 x
	162 135 1 x
	163 438 2 x
	181 583 2 x

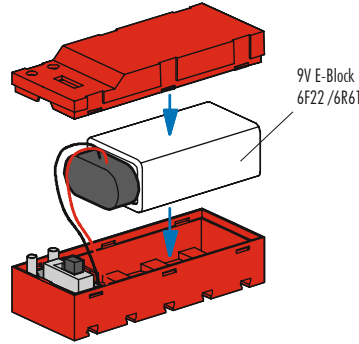
Singoli componenti
Перечень деталей
零件概览

	181 584 2 x
	182 622 3 x
	203 320 1 x
	203 321 1 x
	203 322 1 x
	203 323 1 x
	203 324 3 x
	203 325 2 x
	203 326 1 x
	203 327 1 x
	203 818 1 x
	203 827 1 x

Sicherheitshinweise Safety Information Consignes de sécurité

Veiligheidsrichtlijnen Indicaciones de seguridad Observações sobre segurança

Informazioni per la sicurezza Указания по технике безопасности 安全指南



Batterie ist nicht Inhalt der Packung
Battery not included
Batterie non comprise
De batterij wordt niet meegeleverd
La batería no está incluida en el suministro
A bateria não é o conteúdo da embalagem
La batteria non è inclusa nella confezione
Батарея в комплект не входит
包装中不含电池

- Nicht wiederaufladbare Batterien dürfen nicht geladen werden
- Aufladbare Batterien dürfen nur von Erwachsenen geladen werden
- Aufladbare Batterien sind aus dem Batteriehalter herauszunehmen, bevor sie geladen werden.
- Batterien müssen mit der richtigen Polarität eingelegt werden.
- Leere Batterien müssen aus dem Spielzeug herausgenommen werden
- Die Anschlussklemmen dürfen nicht kurzgeschlossen werden.
- Verbrauchte Batterien dem Sondermüll zuführen.
- Drähte nicht in Steckdose einführen!
- Ladegerät regelmäßig auf Schäden überprüfen. Bei einem Schaden darf das Ladegerät bis zur vollständigen Reparatur nicht mehr verwendet werden.
- Alle elektrischen Bauteile (Motoren, Lampen) dürfen ausschließlich an Stromversorgungen von Fischertechnik angeschlossen werden.

- Do not attempt to charge NON-rechargeable batteries.
- Rechargeable batteries are only to be charged by adults.
- Take rechargeable batteries out of the battery tray before charging them.
- Insert batteries with the correct polarity.
- Remove dead batteries from the toy.
- Do not short circuit the connecting terminals!
- Discard spent dry cells at special waste disposal centre.
- Do not insert the wires into an outlet!
- Regularly inspect battery charger for damage. If the battery charger has been damaged, it should not be used further until fully repaired.
- No electrical components (motors, lamps) are to be connected to any other power supply than that provided by Fischertechnik.

- Il est interdit de recharger des piles qui ne sont pas des accumulateurs
- Le chargement des accumulateurs doit toujours se faire par des adultes
- Retirer les accumulateurs du support de pile avant de les recharger.
- Veiller à la polarité correcte lors de la mise en place des piles.
- Retirer impérativement les piles ou accumulateurs vides du jouet.
- Il est interdit de court-circuiter les bornes de raccordement.
- Jeter les piles usagées dans un conteneur spécial réservé à cet effet.
- Ne pas introduire les fils dans une prise !
- Contrôlez régulièrement le chargeur en vue d'éventuelles détériorations
- En cas de détérioration, il est interdit d'utiliser le chargeur jusqu'à ce qu'il ait été intégralement réparé
- Tous les composants électriques (moteurs, lampes) ne doivent être branchés aux alimentations électriques uniquement que par la société Fischertechnik.

- Niet-oplaadbare batterijen mogen niet worden opgeladen.
- Oplaadbare batterijen mogen uitsluitend door volwassenen worden opgeladen.
- Oplaadbare batterijen moeten uit de batterijhouder worden verwijderd, voordat deze worden opgeladen.
- De batterijen moeten met de juiste polariteit worden geplaatst.
- Lege batterijen moeten uit het speelgoed worden verwijderd.
- De aansluitklemmen mogen niet worden kortgesloten.
- Afleveren gebruikte batterijen bij het klein chemisch afval (KCA).
- Geen draden in de contactdoos steken!
- Laadtoestel regelmatig controleren op schade. Bij schade mag het laadtoestel niet meer gebruikt worden tot het volledig hersteld is.
- Alle elektrische componenten (motoren, lampen) mogen uitsluitend op stroomvoorzieningen van Fischertechnik worden aangesloten.

- Las pilas no recargables no pueden ser cargadas
- Las pilas recargables sólo pueden ser cargadas por un adulto
- Las pilas recargables deben ser extraídas del compartimento de pilas antes de que sean cargadas.
- Las pilas deben ser colocadas con la polaridad correcta.
- Las pilas descargadas deben ser extraídas del juguete
- Los bornes de conexión no pueden ser puestos en cortocircuito.
- Retirar las baterías viejas, desechándolas en un depósito de basuras especiales.
- No introducir hilos en la toma de corriente!
- Comprobar con regularidad si el cargador presenta daños. En caso de presentar daños, el cargador no debe volver a ser utilizado hasta que esté completamente reparado.
- Todos los componentes eléctricos (motores, luces) deben conectarse a la alimentación de corriente de la técnica Fischer exclusivamente.

- Pilhas não recarregáveis não devem ser novamente carregadas.
- Pilhas recarregáveis somente devem ser recarregadas por adultos.
- Pilhas recarregáveis devem ser retiradas do compartimento de pilhas antes de serem carregadas.
- As pilhas devem ser colocadas com a polaridade correta.
- As pilhas descarregadas devem ser retiradas do brinquedo.
- Os terminais de conexão não devem ser curto-circuitados.
- Eliminar as baterias esgotadas como desperdício perigoso
- Nunca introduzir fios na tomada!
- Verificar regularmente se o carregador apresenta danos. Em caso de dano, o carregador não deverá ser utilizado enquanto não estiver plenamente consertado.
- Todas as peças componentes elétricas (motores, lâmpadas) só podem ser exclusivamente conectadas em abastecimentos de corrente da Fischertechnik.

- Le batterie non ricaricabili non devono essere ricaricate
- Le batterie ricaricabili devono essere ricaricate da persone adulte
- Le batterie ricaricabili si devono estrarre dal supporto prima di ricaricarle.
- Le batterie si devono inserire rispettando la polarità.
- Togliere le batterie dal giocattolo quando sono scariche
- I morsetti di allacciamento non devono essere cortocircuitati.
- Smaltire le batterie usate negli appositi contenitori per la raccolta differenziata.
- Non inserire i fili nella presa elettrica.
- Controllare periodicamente se il caricabatterie presenta dei danni. In caso di danni, il caricabatterie non deve più essere utilizzato fino alla riparazione.
- Tutti i componenti elettrici (motori, lampadine) devono essere collegati esclusivamente ad alimentatori Fischertechnik.

- Не пытайтесь заряжать неперезаряжаемые батарейки.
- Зарядку перезаряжаемых аккумуляторов разрешается выполнять только взрослым.
- Перед зарядкой перезаряжаемых аккумуляторов извлеките их из аккумуляторного отсека.
- При установке аккумуляторов на место соблюдайте полярность.
- Разряженные батарейки необходимо извлечь из игрушки.
- Не замыкайте накоротко соединительные клеммы.
- И использованные батареи утилизировать как спецотходы.
- Не вставляйте в розетку провода!
- Регулярно проверяйте зарядное устройство на отсутствие повреждений. При наличии повреждений использовать зарядное устройство до выполнения его полного ремонта не разрешается.
- Все электрические детали (электромоторы, лампочки.) можно подключать только к источникам электропитания от Fischertechnik.

- 不得给非充电电池充电
- 只允许由成年人给充电电池充电
- 在充电前必须将充电电池从电池夹中取出。
- 必须按照正负极正确放入电池。
- 必须从玩具中取出没有电的电池
- 接线柱不允许被短路。
- 用完了的电池应作为特种垃圾处理。
- 禁止将金属丝插入插座！
- 经常检查充电器是否有损坏情况。如果充电器有损，直到完全修好为止不可以再使用。
- 只允许将所有电气部件（传感器，电机，灯泡）与慧鱼技术产品的电源装置相连接

- Das Produkt darf nur mit einer der folgenden Fischertechnik Energiequellen benutzt werden:
Art.-Nr.: 135719 Batteriehalter 9V oder Art.-Nr.: 35537 Accu Pack 8,4V.
- The product may only be used with one of the following Fischertechnik energy sources:
Art No.: 135719 battery tray 9V or Art No.: 35537 Accu Pack 8.4V. You are not allowed to use 9V NiMH accu packs in this product.
- L'utilisation de ce produit n'est permis qu'avec l'une des sources d'énergie Fischertechnik suivantes: Art. n° : 135719 support de pile 9 volts ou Art. n° : 35537 pack d'accumulateurs 8,4 volts.
- Het product mag uitsluitend met een van de volgende Fischertechnik energiebronnen worden gebruikt: art.nr.: 135719 batterijhouder 9V of art.nr.: 35537 accupack 8,4V
- El producto se debe utilizar únicamente con una de las siguientes fuentes de energía:

- Art. No. 135719 soporte de pila de 9V o Art. No. 35537 paquete acumulador de 8,4V.
- O produto somente pode ser utilizado com uma das seguintes fontes de energia da Fischertechnik: art. n°: 135719 Suporte de bateria de 9 V ou art. n°: 35537 Bloco de bateria de 8,4V.
- Questo prodotto può essere utilizzato solo con le seguenti fonti di energia Fischertechnik: cod. prod.: 135719 portabatteria da 9V oppure cod. prod.: 35537 confezione batterie da 8,4V.
- Изделие можно использовать только с одним из следующих источников энергии от Fischertechnik: арт. №: 135719 держатель батареек 9В или арт. №: 35537 Accu Pack 8,4В
- 该玩具只允许使用如下的慧鱼 (Fischertechnik) 能量源：商品号：135719，9V 电池夹，或者商品号：35537，8.4V 电池套件 (Accu Pack)

Sicherheitshinweise
Safety Information
Consignes de sécurité

Veiligheidsrichtlijnen
Indicaciones de seguridad
Observações sobre segurança

Informazioni per la sicurezza
Указания по технике безопасности
安全指南



- Achtung: Erstickungsgefahr durch kleine Kugel und verschluckbare Kleinteile!
- Warning: risk of suffocation due to small balls and parts that can be swallowed!
- Attention : risque d'étouffement avec des petites billes et des petites pièces pouvant être avalées !
- Waarschuwing: verstikkingsgevaar door kleine kogeltjes en inslikbare kleine delen!

- Advertencia: riesgo de asfixia con las bolas y piezas pequeñas que pueden ingerirse!
- Advertência: perigo de asfixia devido a esferas pequenas e peças pequenas que podem ser engolidas!
- Avviso: pericolo di soffocamento a causa delle piccole sfere e dei piccoli pezzi ingoiabili!
- Внимание: Опасность удушения маленьким шариком и маленькими деталями!
- 警告：可能误吞的小球和小零件有造成窒息的危险！

- Alle Einzelteile, insbesondere bewegliche Teile sind falls notwendig zu warten und zu reinigen.
- All components, especially moving parts, should be maintained and cleaned as necessary.
- Toutes les pièces détachées et en particulier les pièces mobiles, sont, si nécessaire, à entretenir et à nettoyer.
- Alle onderdelen, vooral de bewegende delen, kunnen, indien noodzakelijk, onderhouden en gereinigd worden.
- Es necesario mantener limpio y en buen estado cada una de las piezas. Particularmente las piezas móviles.
- Todas as peças individuais, especialmente peças móveis, devem ser submetidas à manutenção e limpas se necessário.
- Se necessario, tutti i singoli componenti, soprattutto le parti mobili, si devono eventualmente sottoporre a manutenzione e pulizia.
- Все детали, особенно подвижные, требуют ухода и чистки.
- 必要时应保养和清洁所有零件，尤指运动部件。

- Achtung! Verletzungsgefahr an Bauteilen mit funktionsbedingten scharfen Kanten und Spitzen!
- Caution! Be careful not to hurt yourself on components with sharp or pointed edges!
- Attention! Risque de blessure sur les éléments comportant des arêtes et o pointes vives indispensables au bon fonctionnement!
- Let op! U kunt zich bezeren aan bouwstenen met scherpe randen of punten!
- Atención! ¡Cuidado, no te hagas daño con los componentes con bordes afilados o puntiagudos!
- Atenção! Perigo de ferimentos em peças componentes com cantos vivos e pontas obrigatórios para o funcionamento !
- Attenzione! Pericolo di lesioni dovute a componenti con spigoli vivi e punte per motivi funzionali!
- Будьте осторожны! Об острые края деталей и и наконечники можно порезаться!
- 注意！
因功能需要而带有锋利的棱边和尖角的部件可能会带来受伤危险！



Hinweise zum Umweltschutz / Instructions for Environmental Protection / Remarques de protection de l'environnement / Bescherming van het milieu / Notas con respecto a la protección del medio ambiente / Instruções para a proteção do meio ambiente / Indicazioni sulla tutela ambientale / Указания по охране окружающей среды / 有关环保的提示：

www.fischertechnik.de/environment

Montagetipps Tips for assembly Tuyaux pour le montage

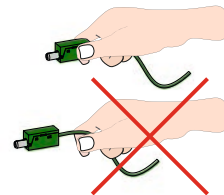
Montagetips Consejos para el montaje "Dicas" para montagem

Consigli per il montaggio Советы по сборке 装配建议

Kabel und Stecker
Plugs and cables
Fiches et des câbles

Stekkers en cables
Enchufes en cables
Cabos e contatos

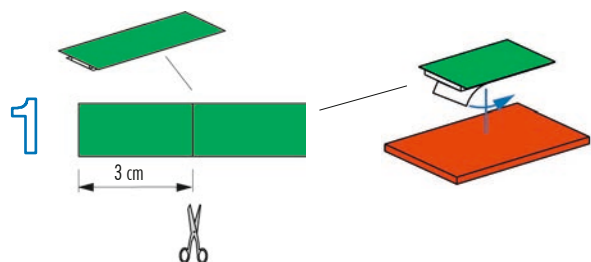
Cavi e connettori
Провода и штекеры
电缆和插头



Spiegelplatte
Mirror plate
Plaque miroitante

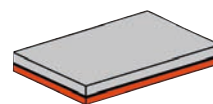
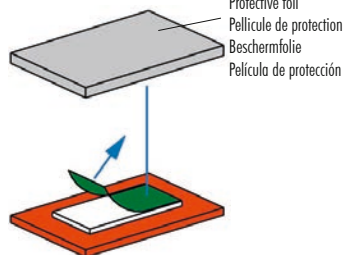
Spiegelplaat
Placa de espejo
Placa espelhada

Piastra a specchio
Зеркальная пластина
镜子



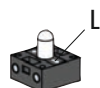
Schutzfolie abziehen
Remove protective foil
Retirer la pellicule de protection
De beschermfolie verwijderen
Desprender la película de protección

Remover o filme de proteção
Togliere la pellicola protettiva
Снять защитную плёнку
撕掉保护膜



Schutzfolie
Protective foil
Pellicule de protection
Beschermfolie
Película de protección

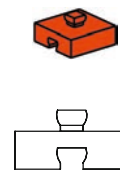
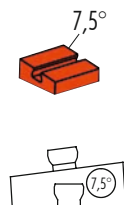
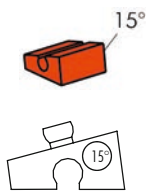
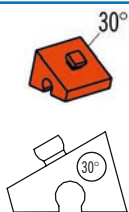
Filme de proteção
Pellicola protettiva
Защитная плёнка
保护膜



9V \pm / 0,01 A

Lichtschraken LED
Light barriers LED
LED barrières photoélectriques
Lichtsluis-LED
Barreras de luz LED
Células fotoeléctricas de LED
Barriere fotoelettriche LED
Световой барьер LED
光电LED

Achtung: Beim Anschluß auf richtige Polung achten.
Caution: Make sure the terminals are connected correctly.
Attention: lors du raccordement, veiller à ce que la polarisation soit exacte.
Pas op: let bij het aansluiten op de juiste polariteit.
Atención: al conectar, procurar que los polos estén correctamente colocados.
Atenção: Por ocasião da conexão atentar para a polaridade correta.
Attenzione: nel collegamento osservare la corretta polarità.
Внимание: при подключении соблюдать полярность.
注意: 连接时应注意极性正确。



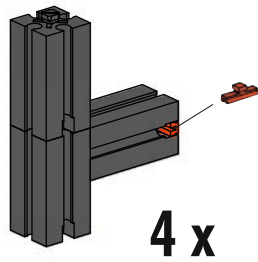
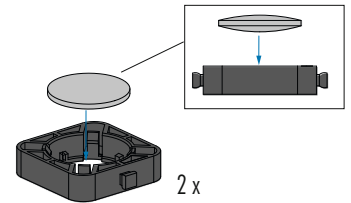
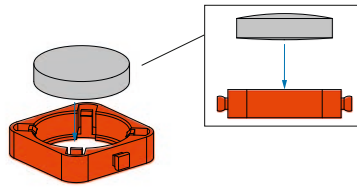
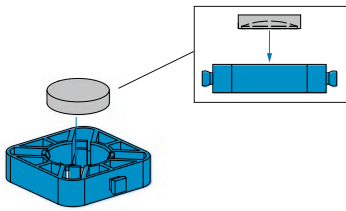
Montage der Halterungen
Mounting the brackets
Montage des supports

Montaje de los soportes
Montaje de los soportes
Montagem dos suportes

Montaggio delle staffe
Монтаж кронштейнов
安装支架

1

1x 1x 1x 1x 2x 2x



2

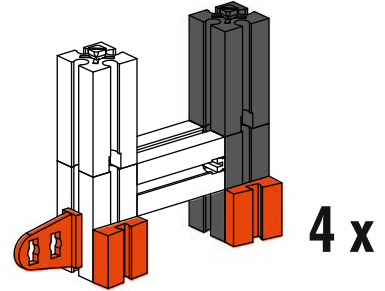
12x 4x

3

8x 4x 8x

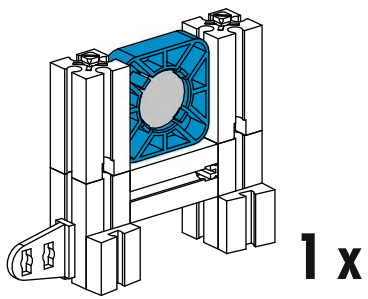
7,5°

7,5°



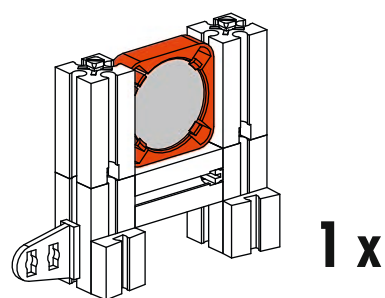
4

1x



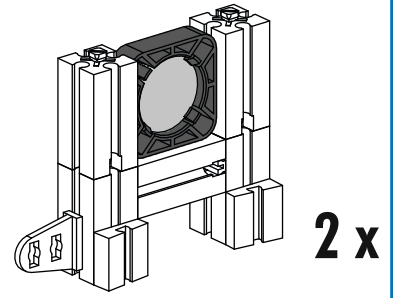
5

1x



6

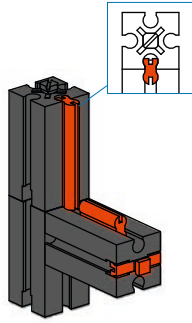
2x



Montage der Halterungen
Mounting the brackets
Montage des supports

Montaje de los soportes
Montaje de los soportes
Montagem dos suportes

Montaggio delle staffe
Монтаж кронштейнов
安装支架



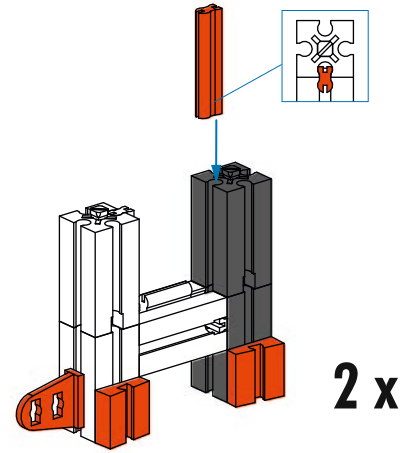
2 x

7

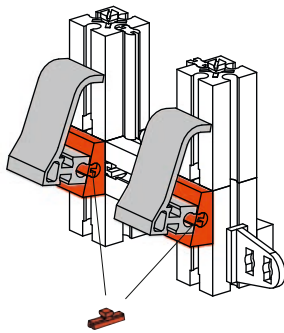
- 6 x (grey 1x3 Technic beam)
- 2 x (red 1x2 Technic pin)
- 2 x (red 1x5 Technic axle)
- 2 x (red 1x15 Technic axle)

8

- 4 x (grey 1x3 Technic beam)
- 2 x (red 1x2 Technic pin)
- 2 x (red 1x30 Technic axle)
- 4 x (red 1x2 Technic pin with 7.5° angle)



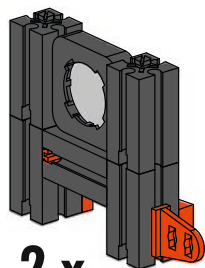
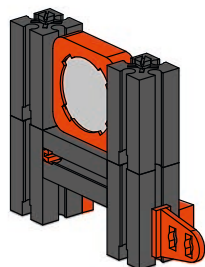
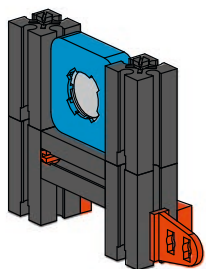
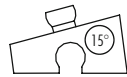
2 x



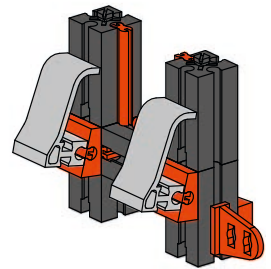
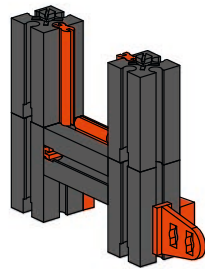
1 x

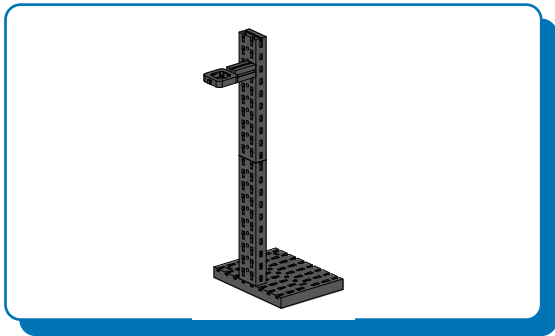
9

- 2 x (red 1x2 Technic pin with 15° angle)
- 2 x (red 1x2 Technic pin)
- 2 x (grey 1x2 Technic pin)



2 x

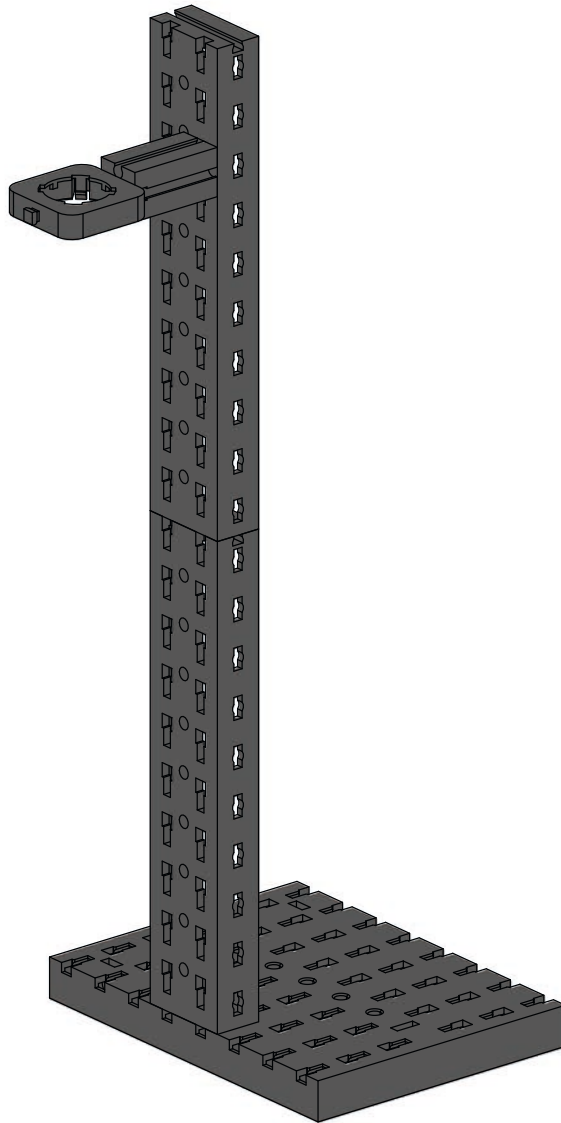
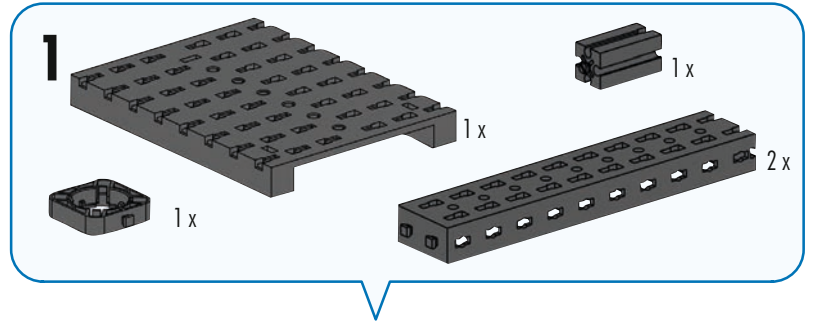


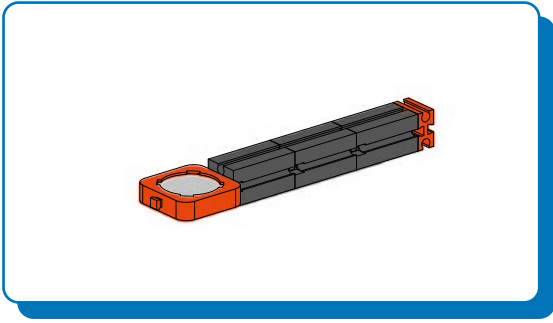


Minimale Sehweite
Minimum visual range
Distance de vision
minimale

Minimaal visueel bereik
Alcance visual mínimo
Alcance visual mínimo

Distanza visiva minimal
Минимальная
дальность видимости
最小视觉范围

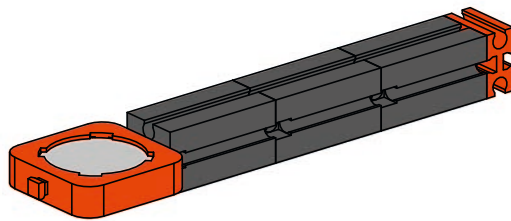
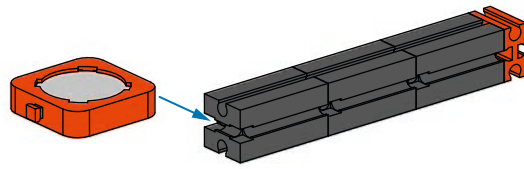
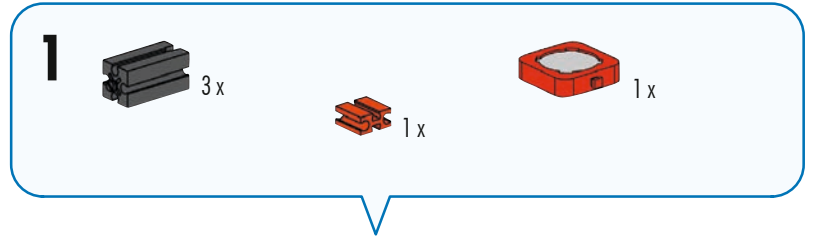


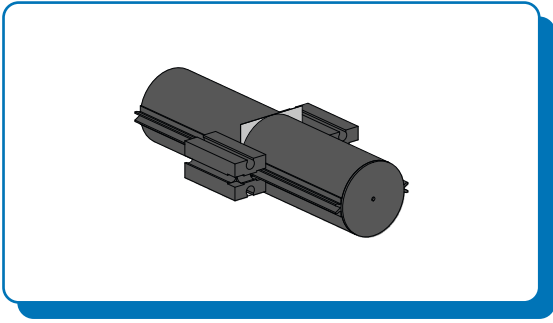


Lupe
Magnifier
Loupe

Loep
Lupa
Lupa

Lente d'ingrandimento
Лупа
放大镜

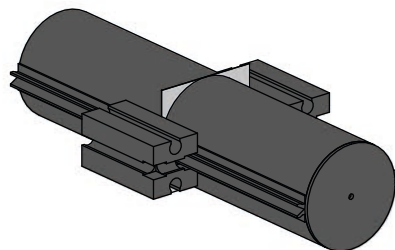
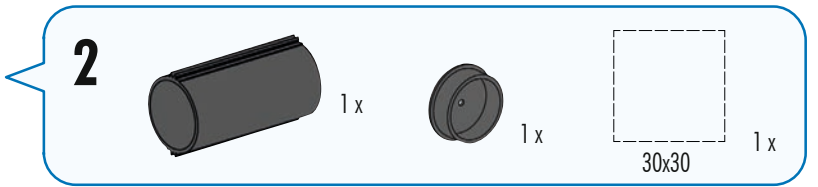
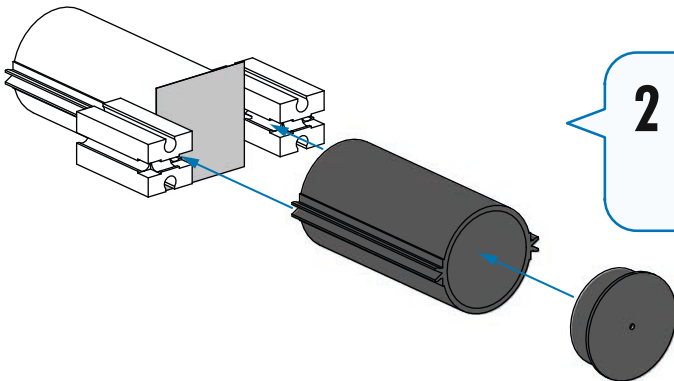
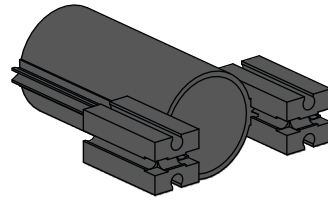
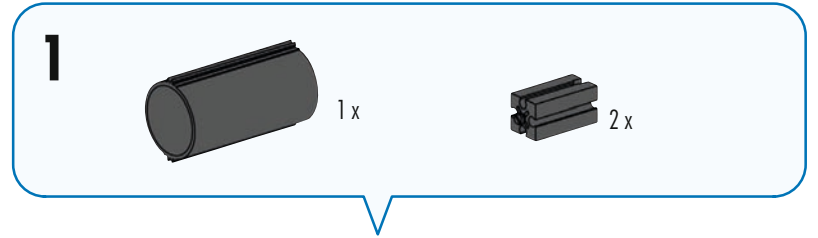




Lochkamera
Pinhole camera
Appareil photo à
sténopé

Gaafjescamera
Cámara estenopeica
Câmara pinhole

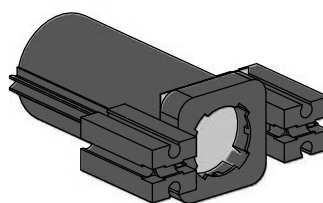
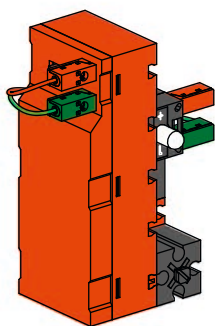
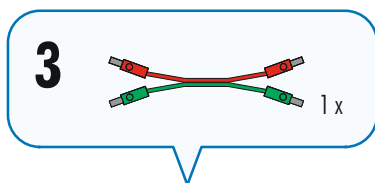
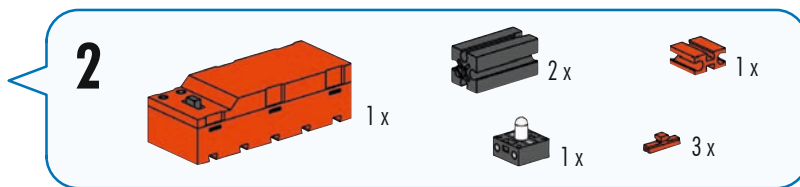
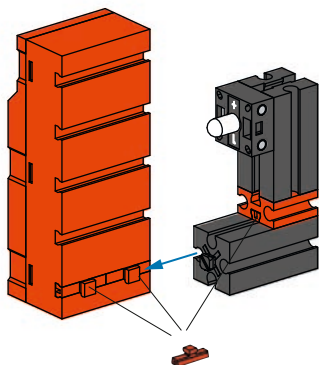
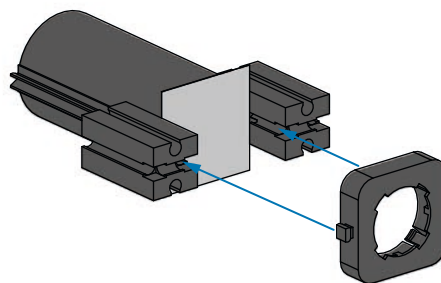
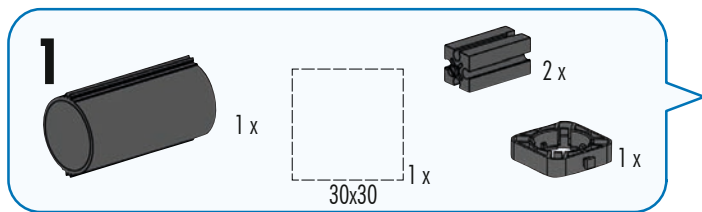
Fotocamera a foro
stenopeico
Камера-обскура
针孔摄像机



Aufgabe 2
Task 2
Exercice 2

Taak 2
Tarea 2
Tarefa 2

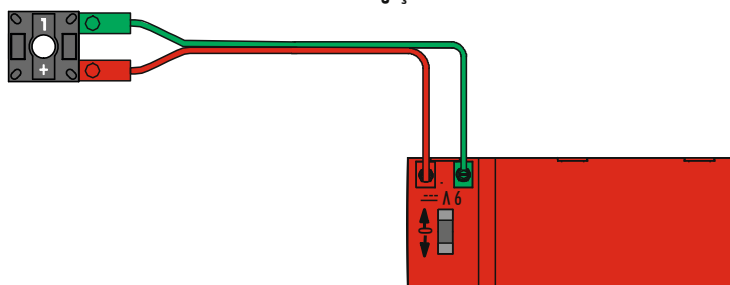
Compito 2
Задание 2
任务 2

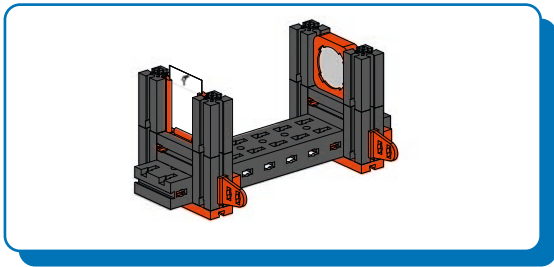


Schaltplan
Circuit diagram
Plan électrique

Schakelschema
Diagrama de circuitos
Plano elétrico de ligação

Schema elettrico
Схема подключения
电路图

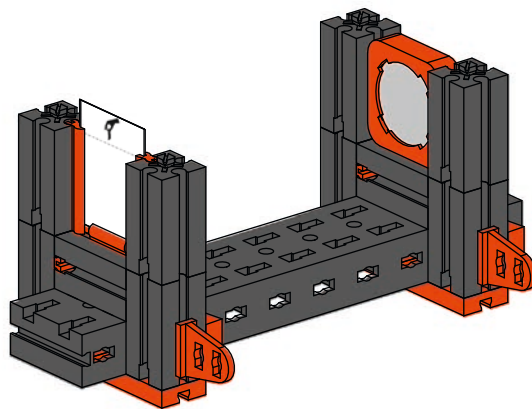
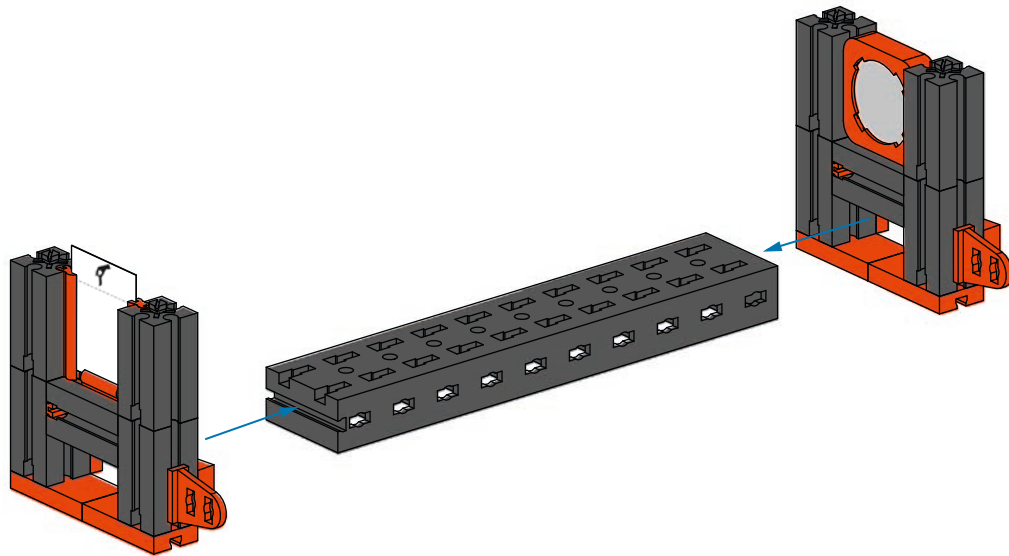
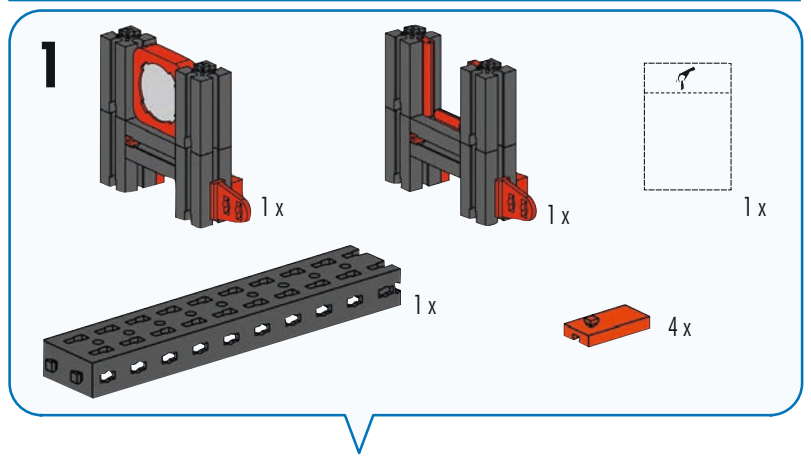


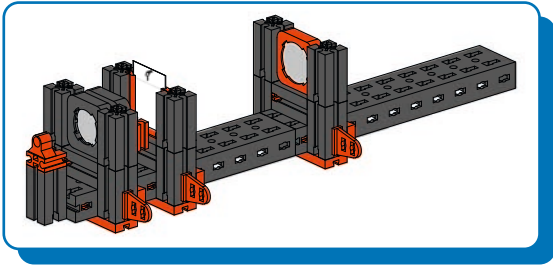


Reelles Bild
Real image
Image réelle

Echte afbeelding
Imagen real
Imagem real

Immagine reale
Действительное
изображение
真实图像

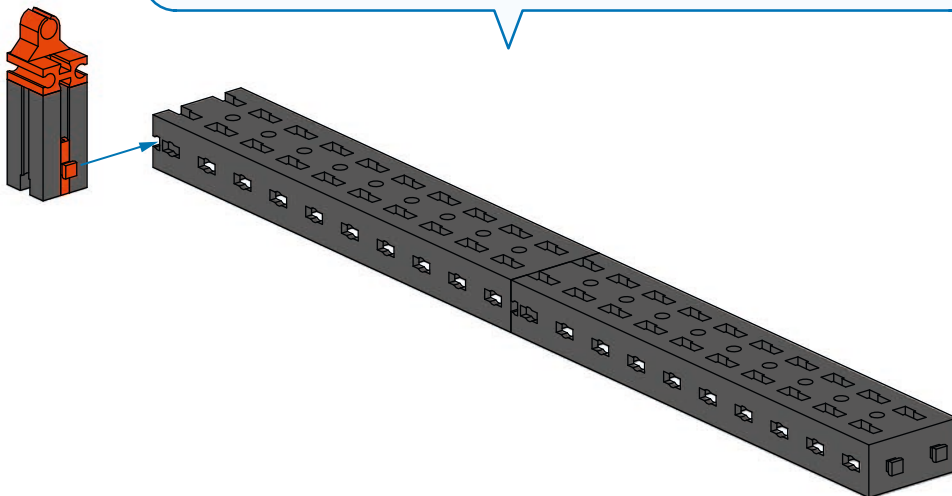
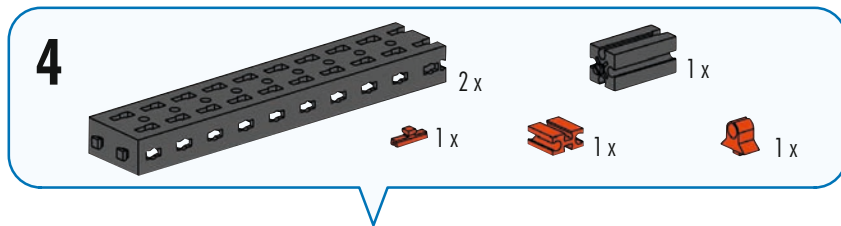
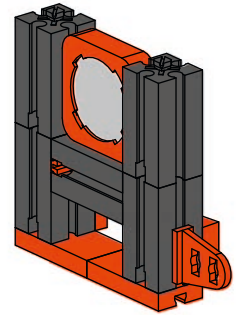
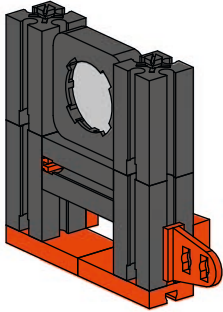
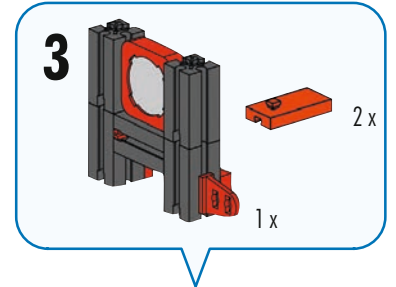
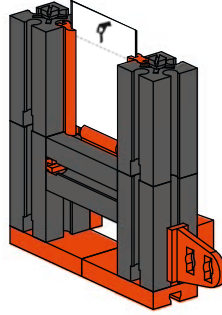
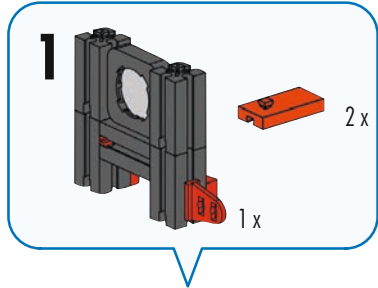
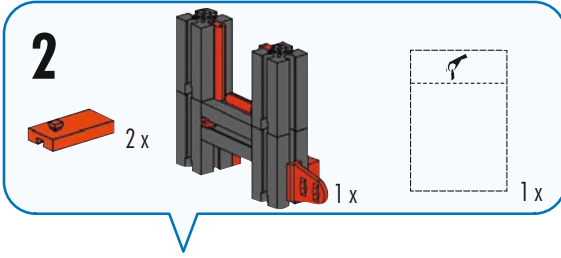


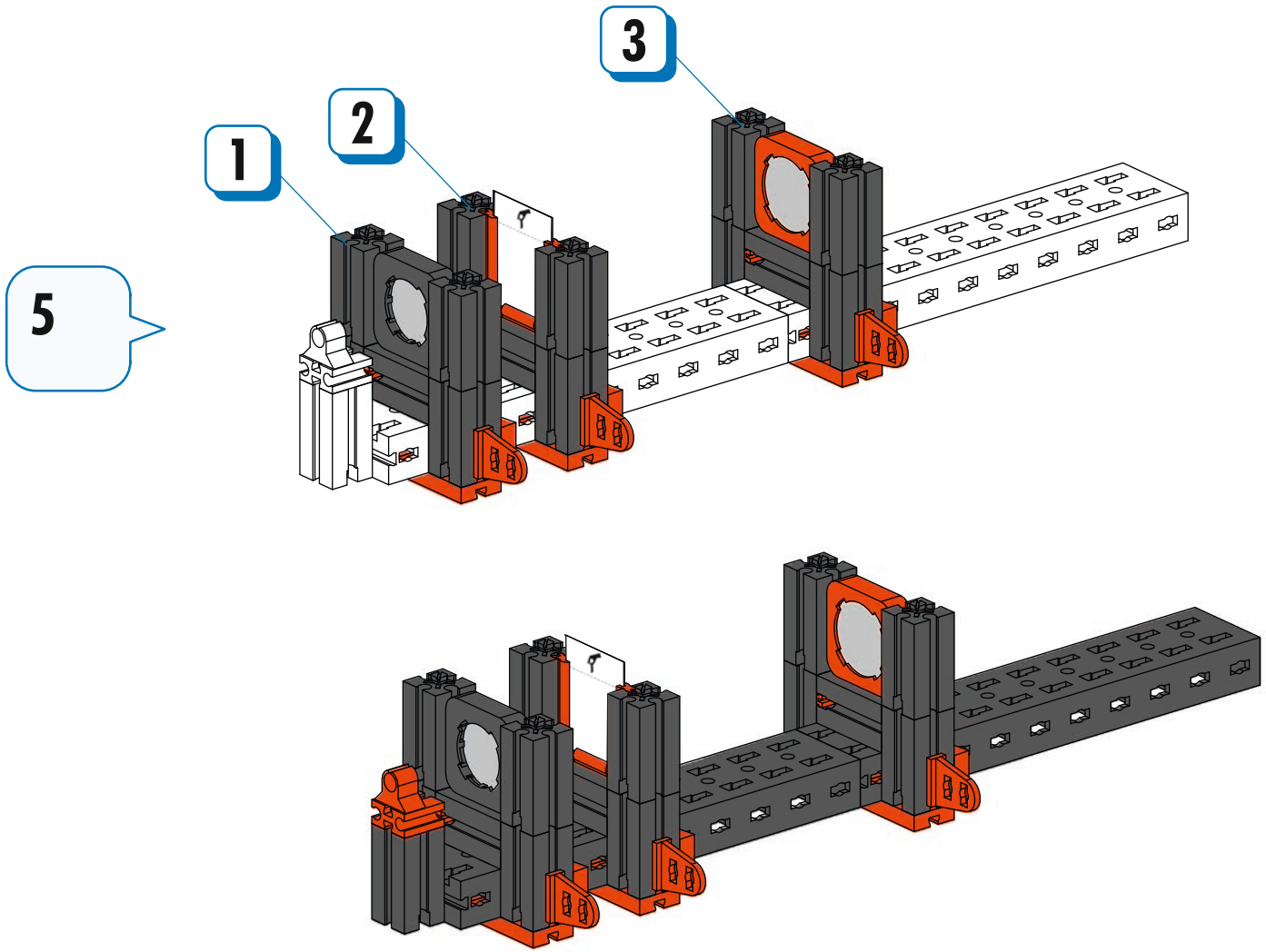


Kepler-Teleskop
Kepler telescope
Télescope Kepler

Kepler telescoop
Telescopio Kepler
Telescópio Kepler

Telescopio Kepler
Телескоп Кеплера
开普勒望远镜

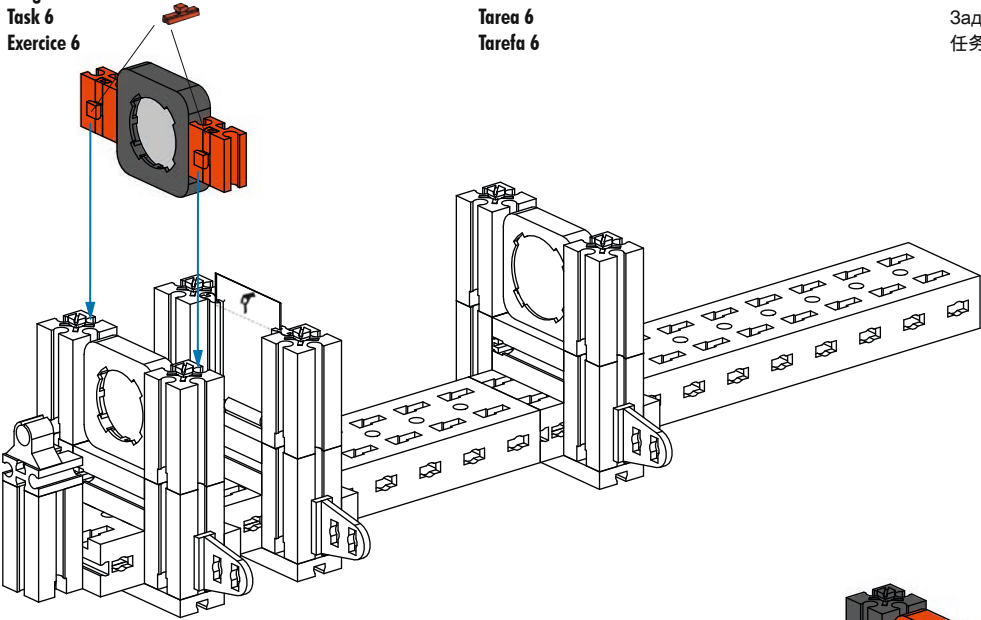




Aufgabe 6
Task 6
Exercise 6

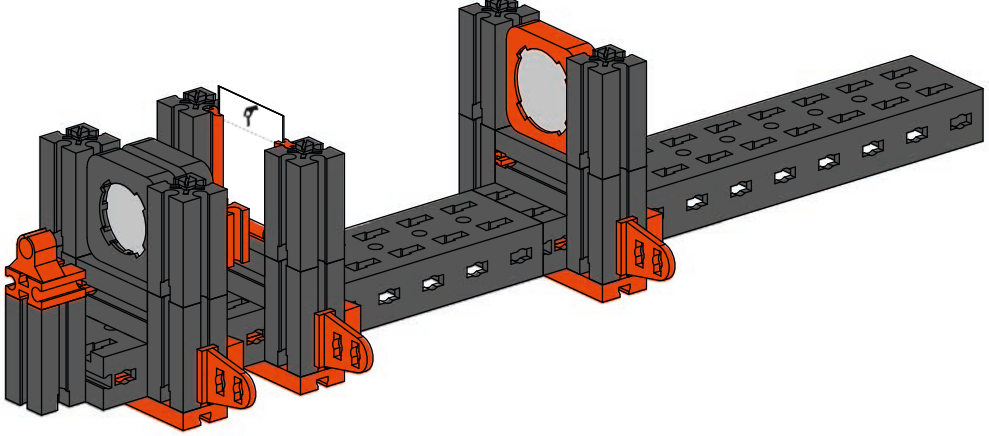
Task 6
Tarea 6
Tarefa 6

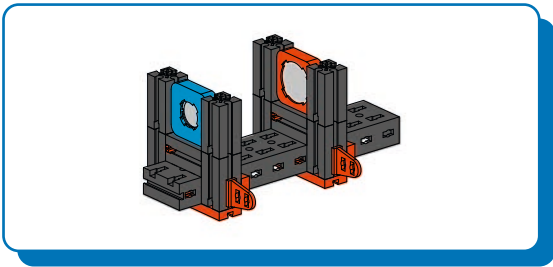
Compito 6
Задание 6
任务 6



6

	2 x		2 x
			1 x

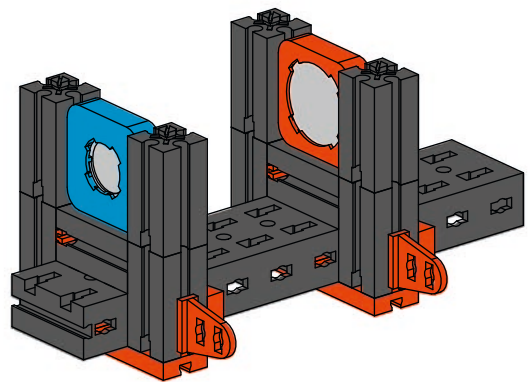
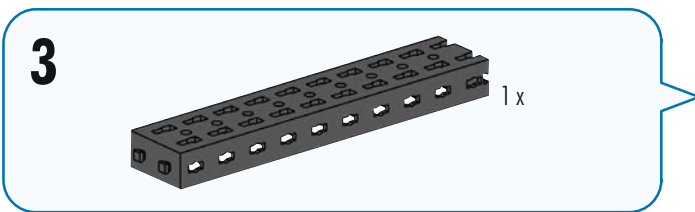
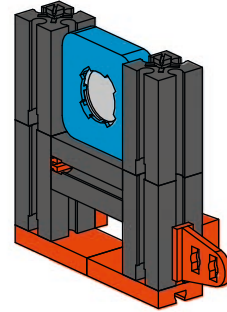
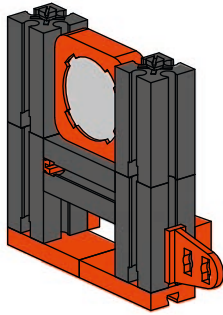
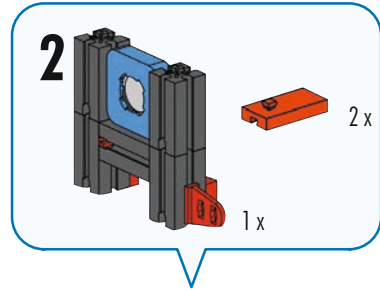
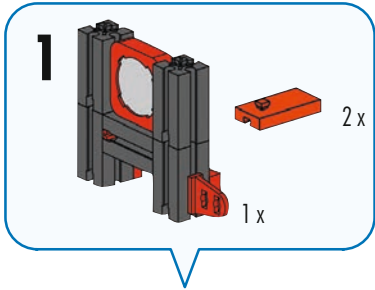


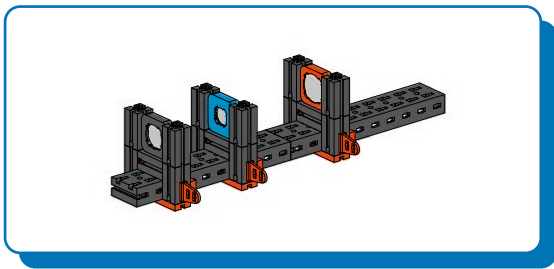


Galilei-Teleskop
Galileo telescope
Télescope Galilée

Galileo telescop
Telescopio Galileo
Telescópio Galileu

Telescopio Galileo
Телескоп Галилея
伽利略望远镜

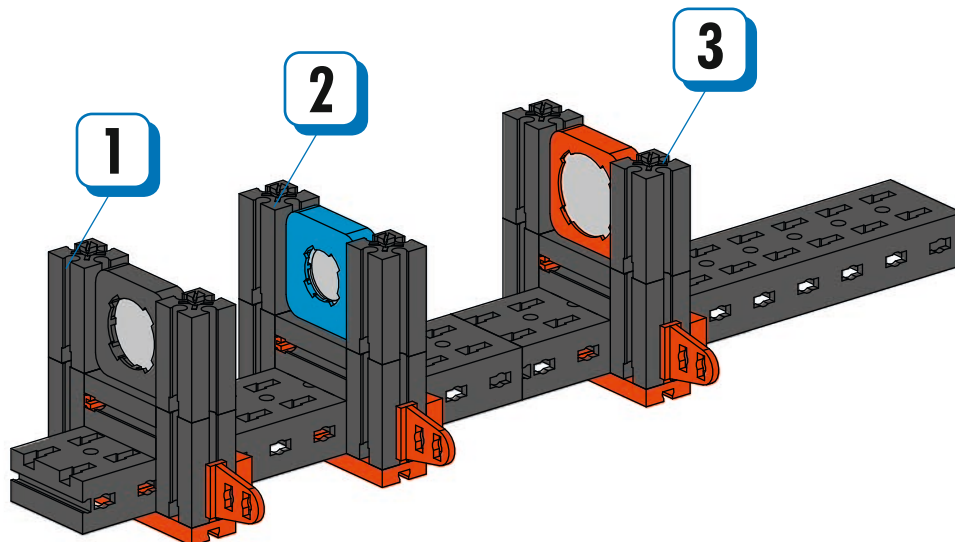
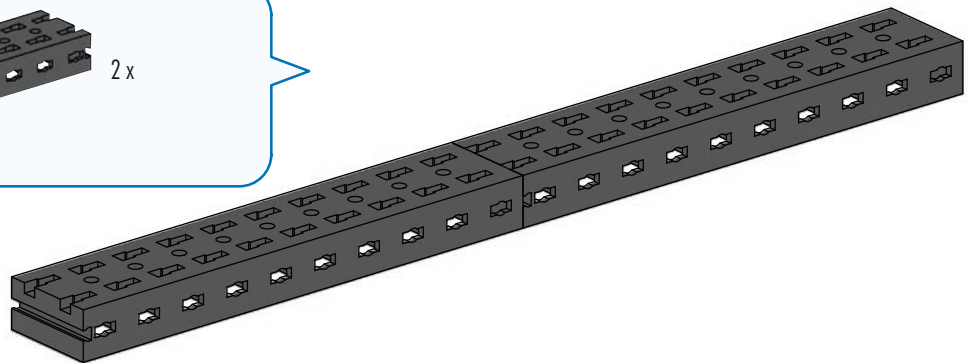
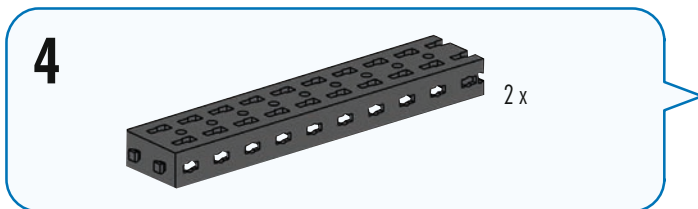
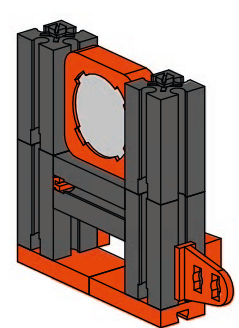
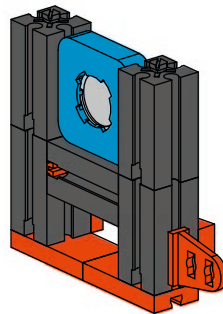
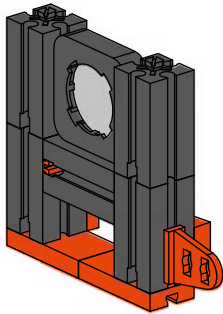
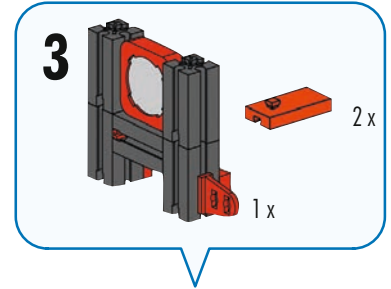
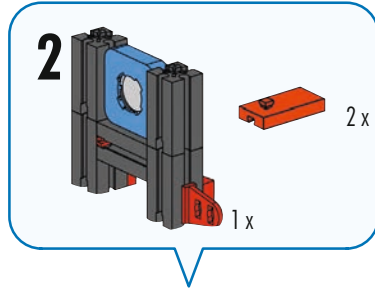
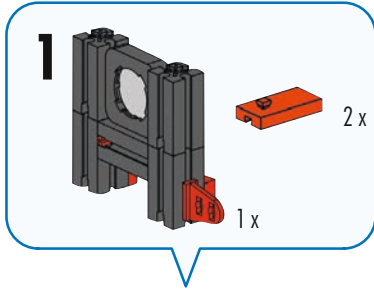


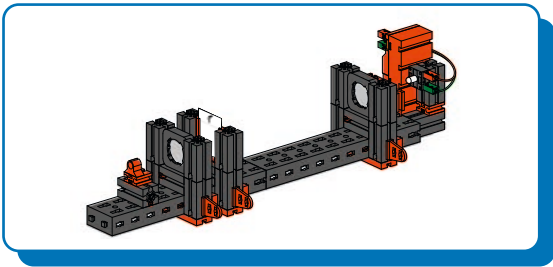


Zoom
Zoom
Zoom

Zoom
Zoom
Zoom

Zoom
Увеличитель
放大

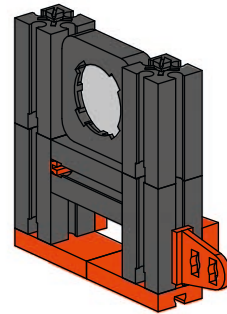
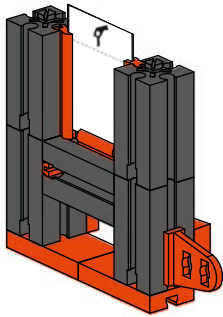
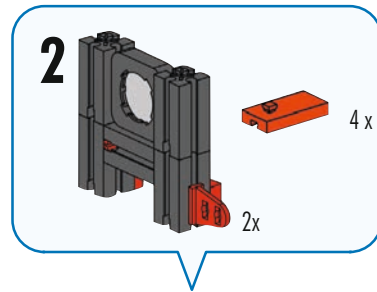
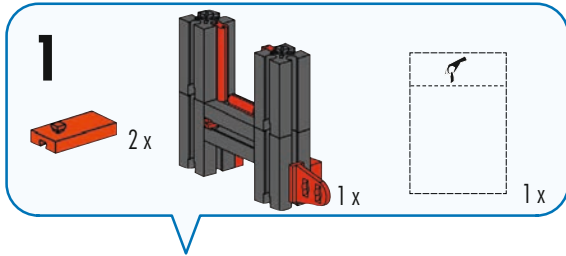




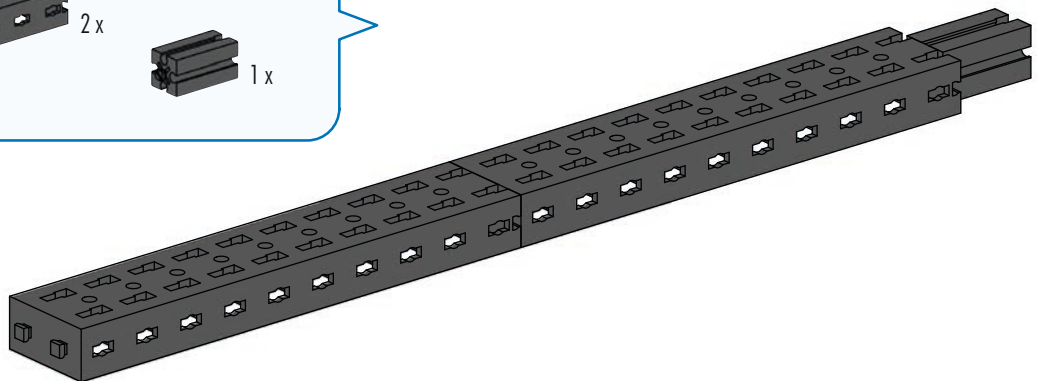
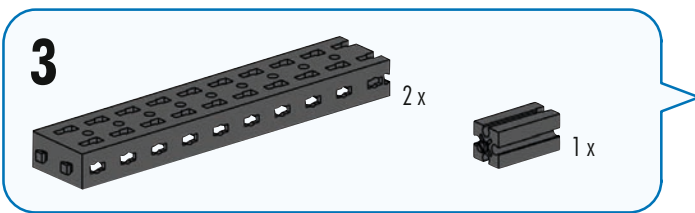
Handmikroskop
Handheld microscope
Microscope à main

Handmicroscop
Microscopio de mano
Microscópio de mão

Microscopio portatile
Ручной микроскоп
手持显微镜

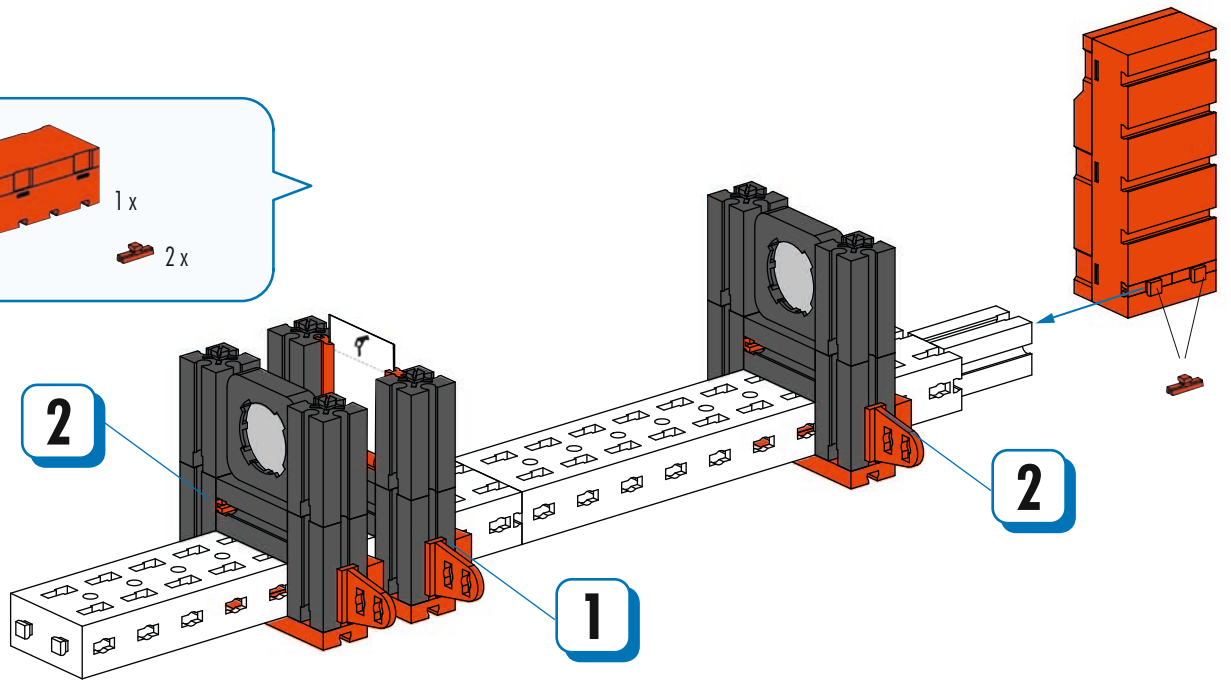


2 x



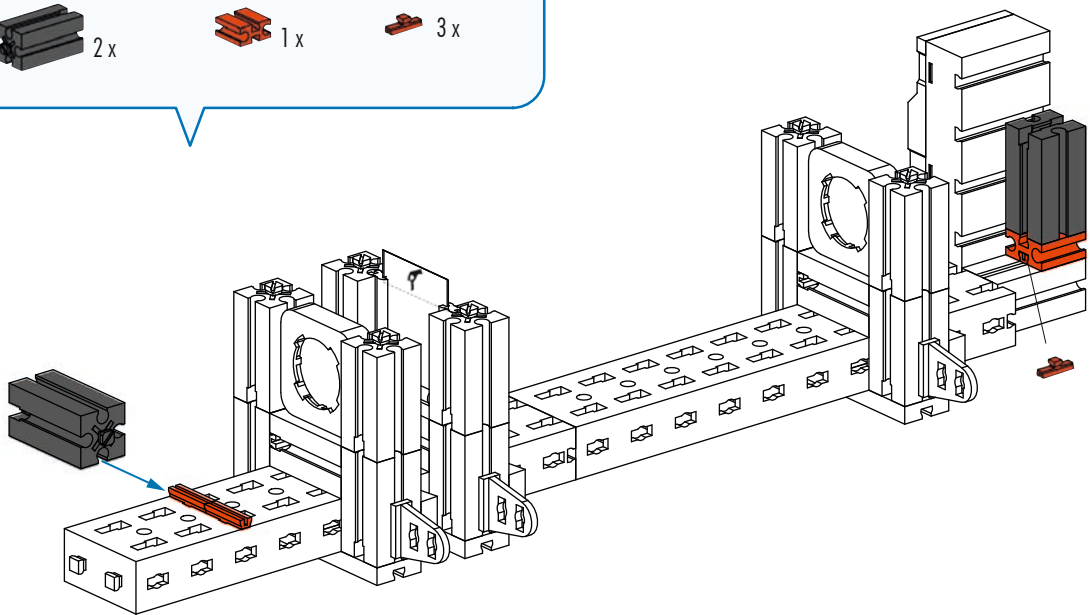
4



1x
2x

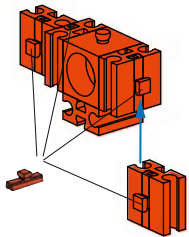







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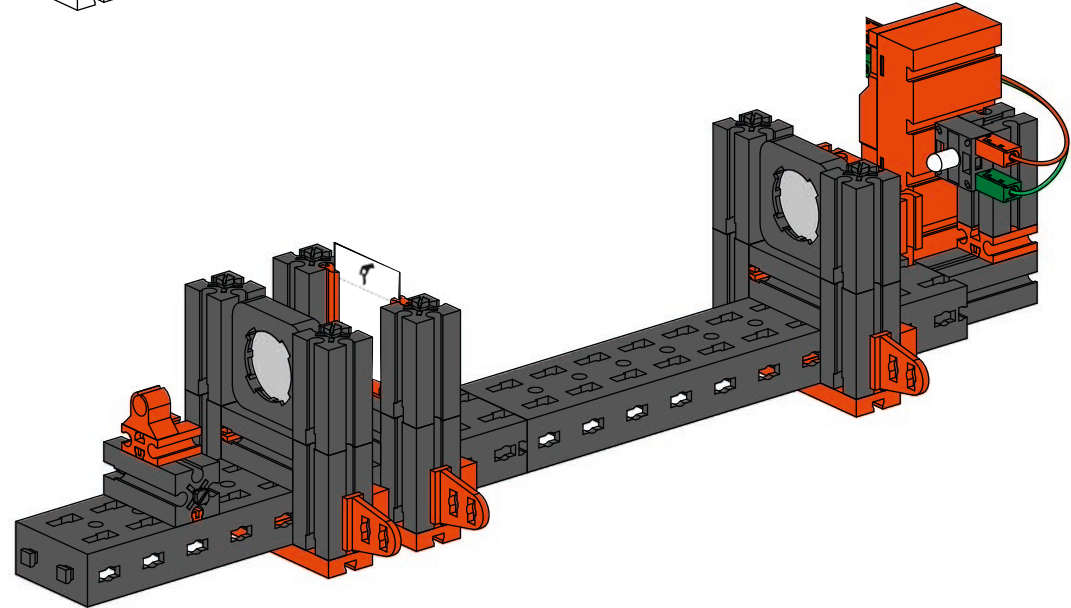
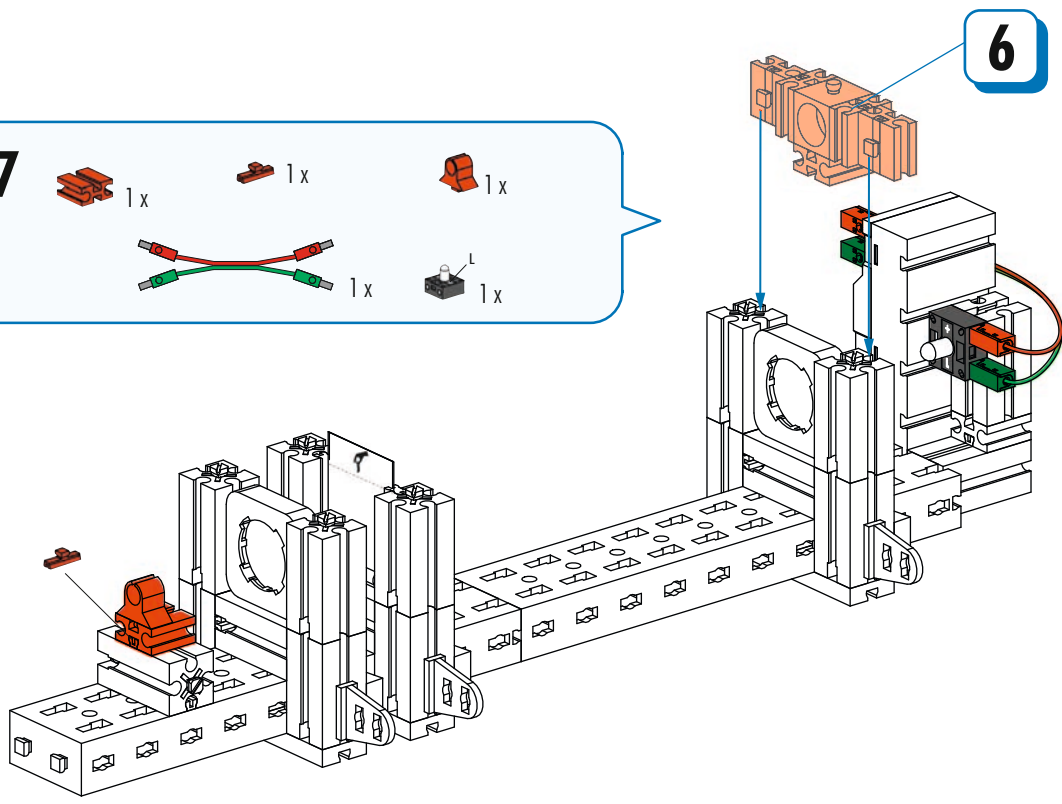
2x 1x 3x



6  1x  5x  4x



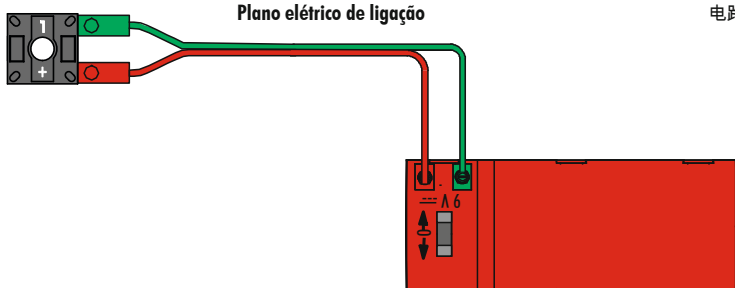
7  1x  1x  1x
 1x  1x

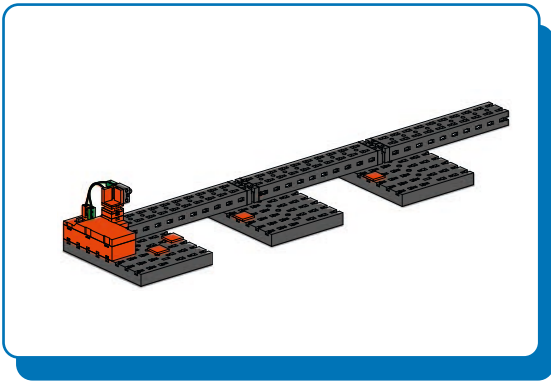


Schalplan
Circuit diagram
Plan électrique

Schakelschema
Diagrama de circuitos
Plano elétrico de ligação

Schema elettrico
Схема подключения
电路图

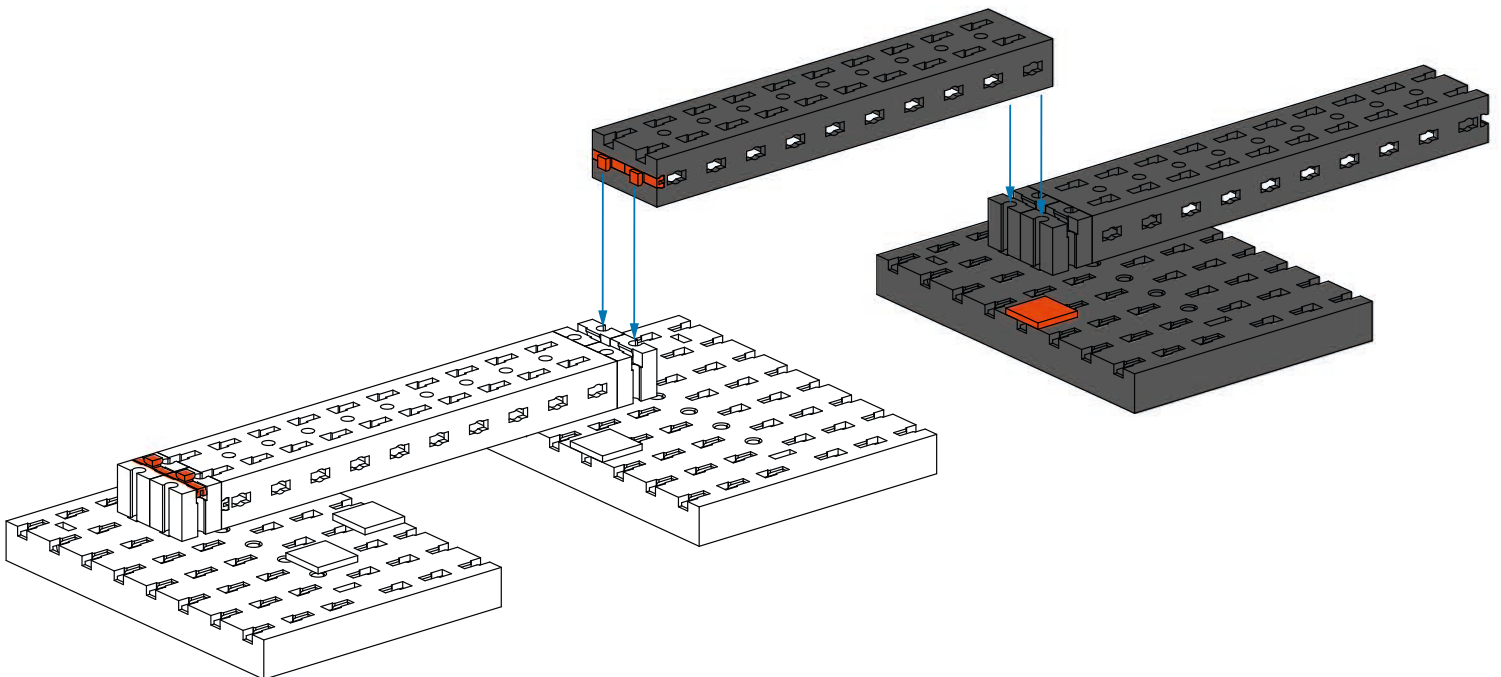
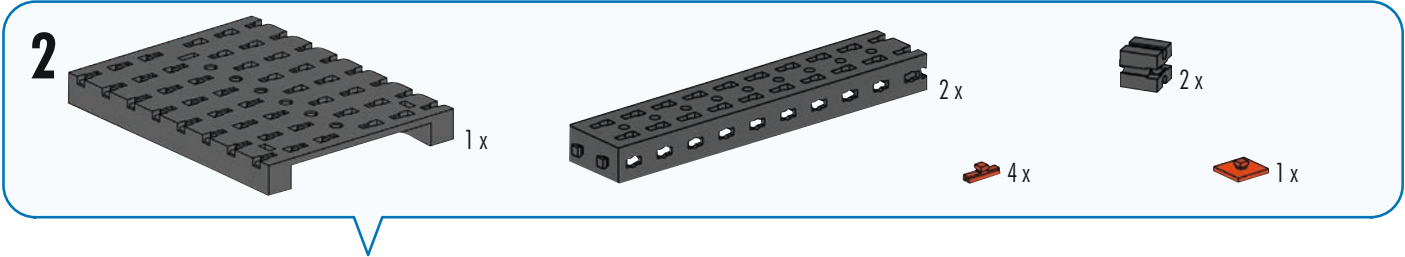
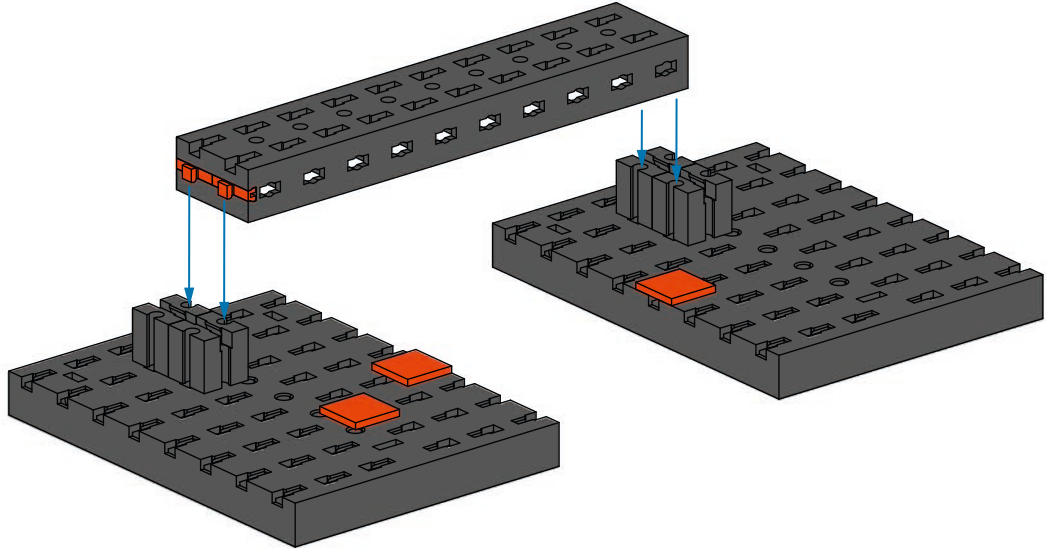
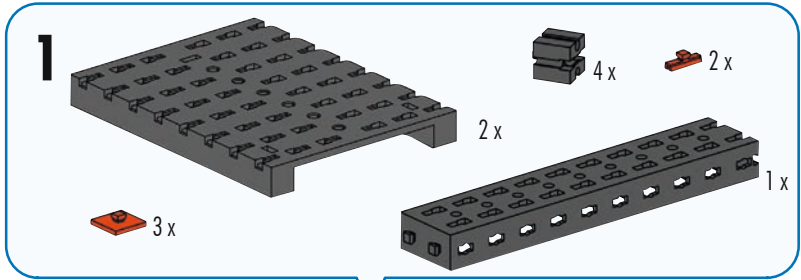









Optische Bank
Optical bench
Banc optique

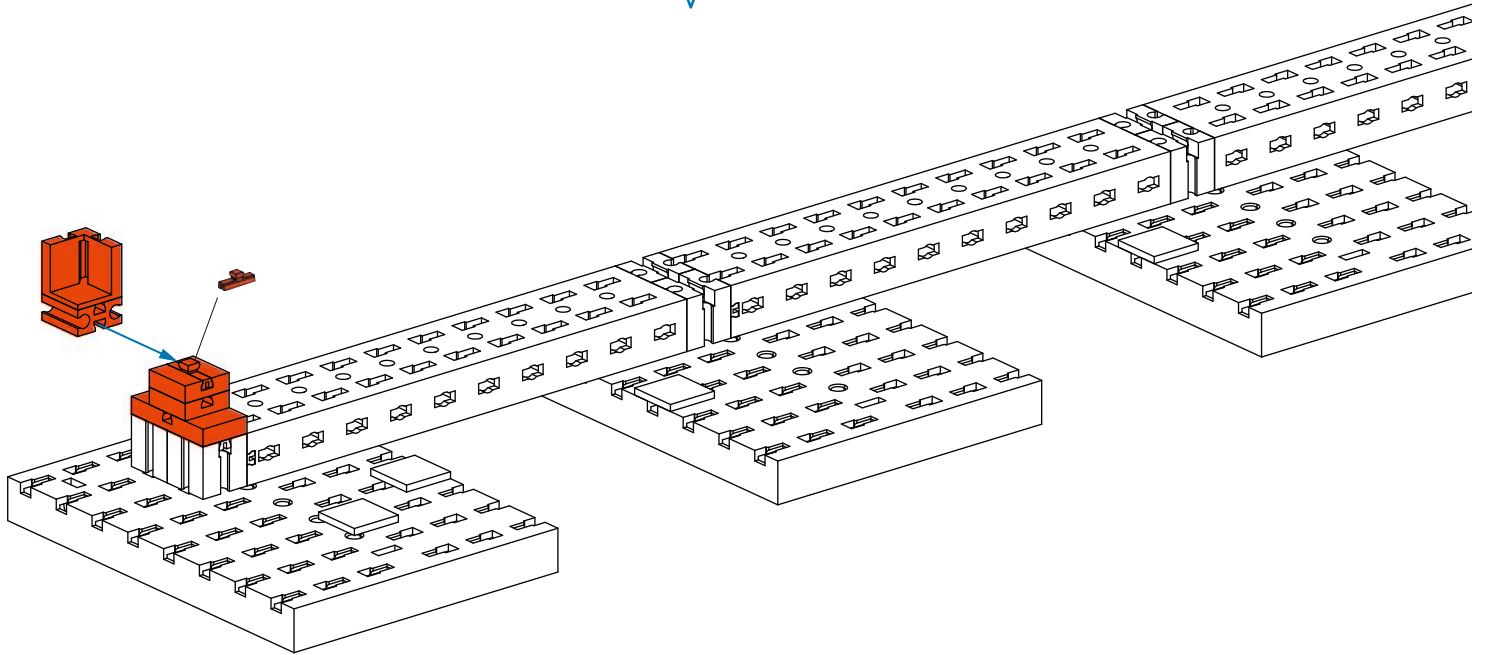
Optische bank
Banco óptico
Banco ótico

Banco ottico
Оптическая скамья
光学工作台

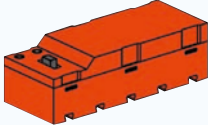



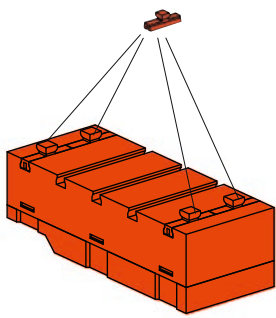
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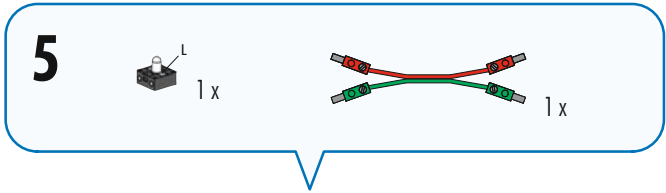
 1x
  1x
 1x
  2x
  1x



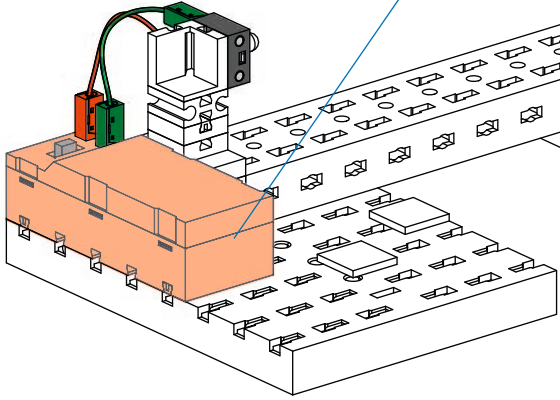
4

 1x
  4x





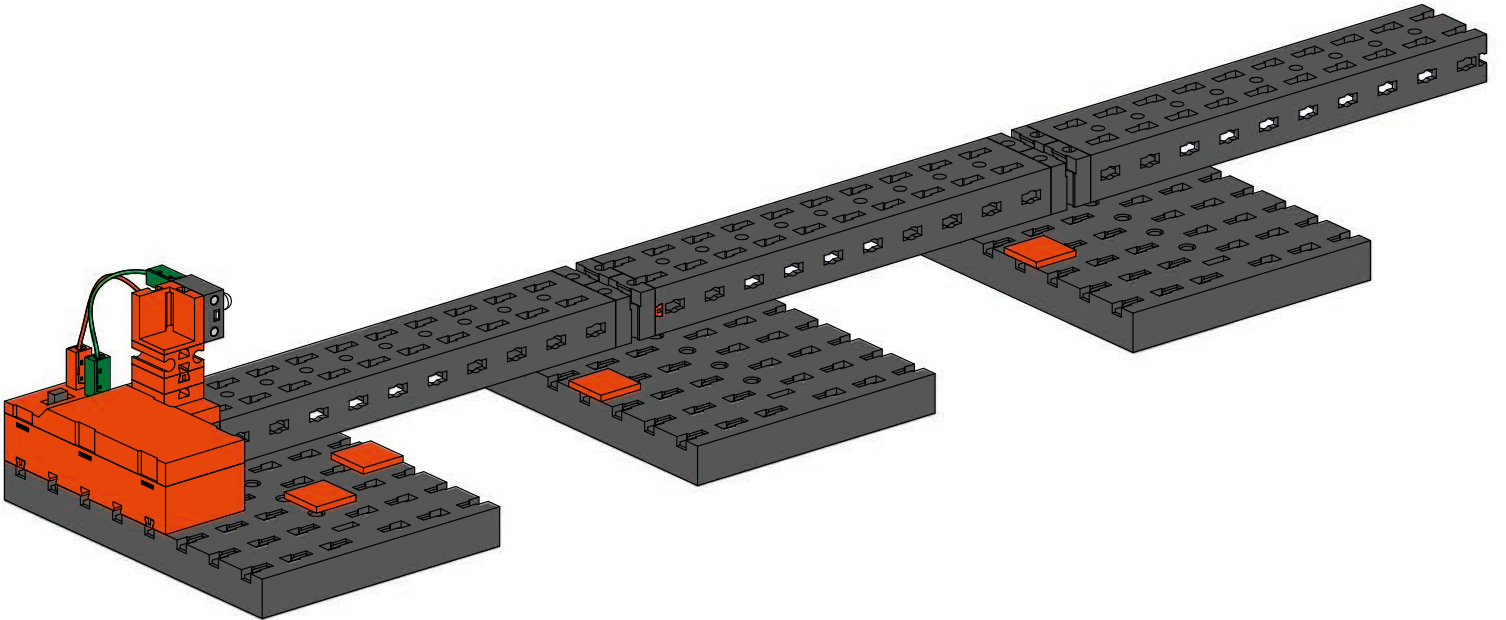
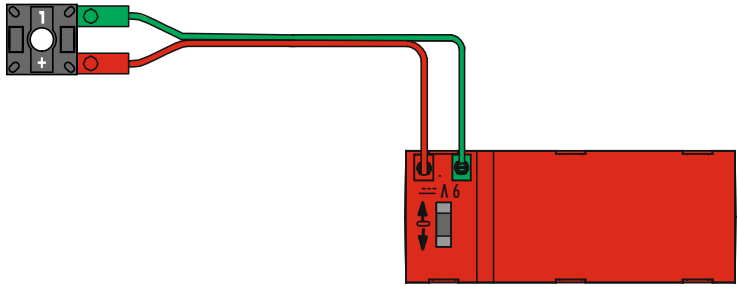
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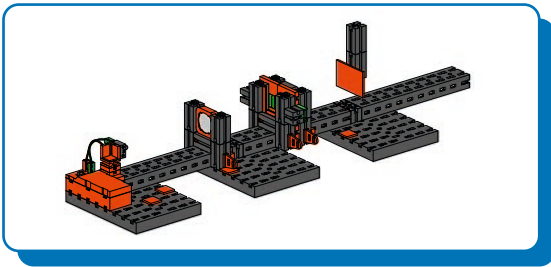


Schaltplan
Circuit diagram
Plan électrique

Schakelschema
Diagrama de circuitos
Plano elétrico de ligação

Schema elettrico
Схема подключения
电路图





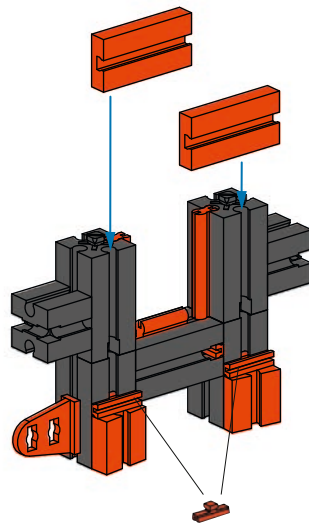
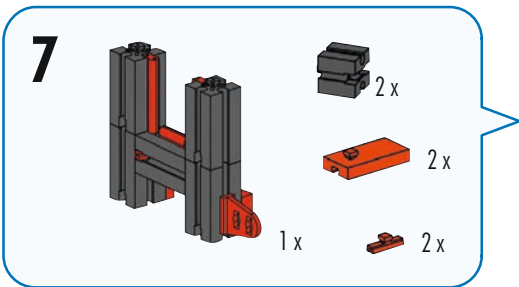
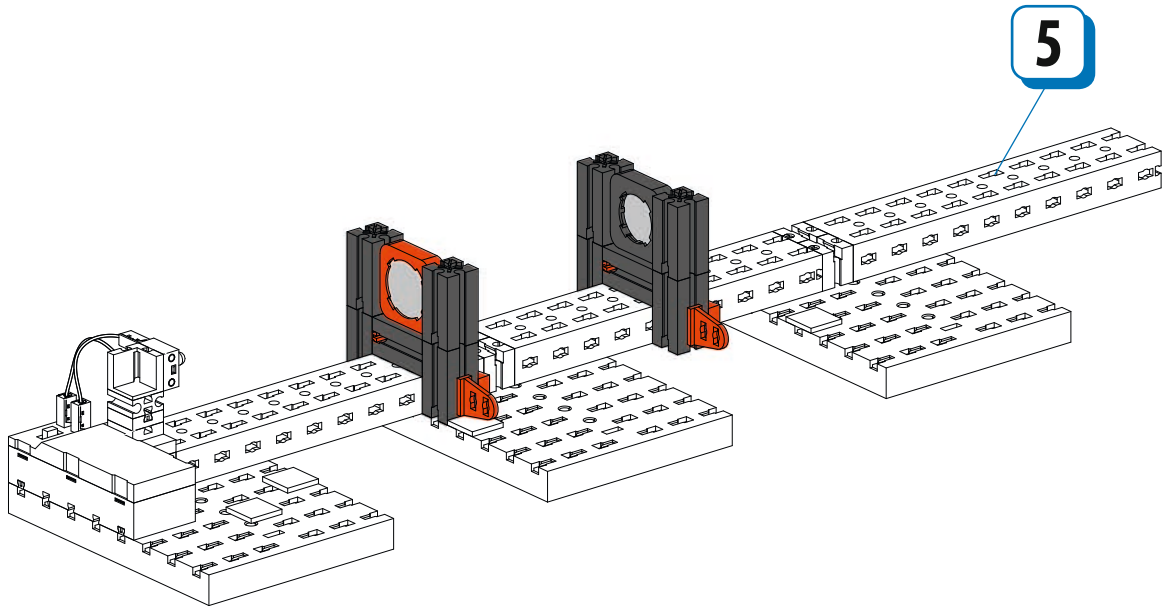
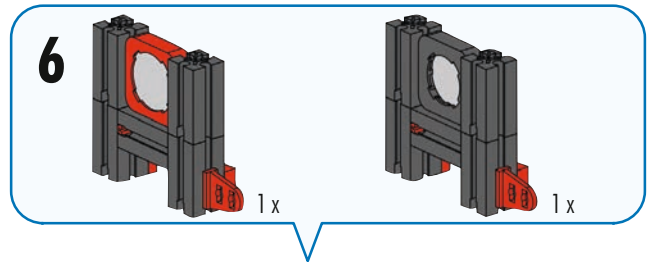
Strahlengang
Beam path
Trajectoire du faisceau

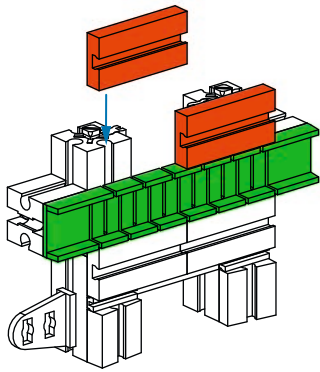
Straal pad
Trayectoria del haz
Trajectoria do feixe


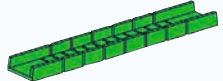
Percorso del fascio
Траектория луча
光束路径



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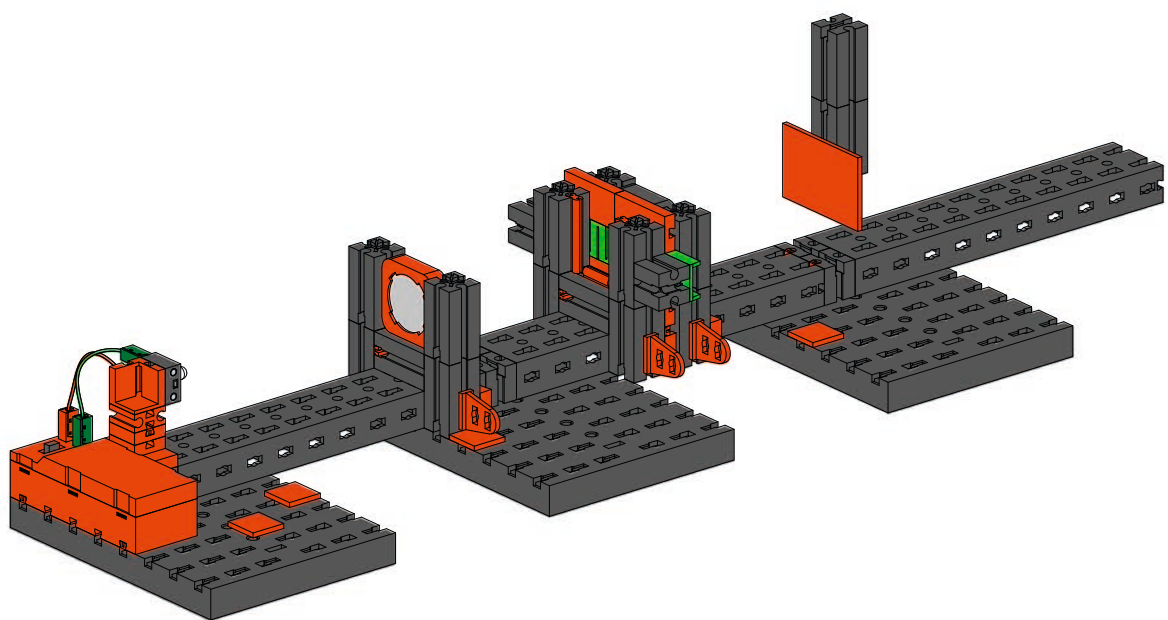
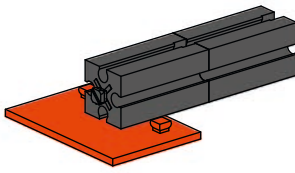
Seite 21
 Page 21
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 Pagina 21
 Pagina 21
 Страница 21
 页次 21

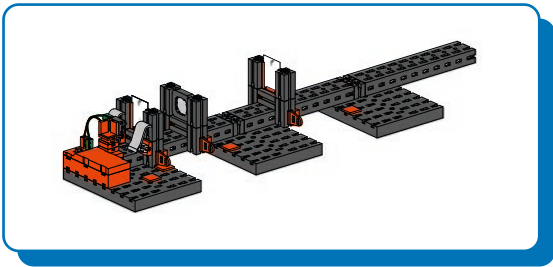




8  2x  1x

9  2x  1x





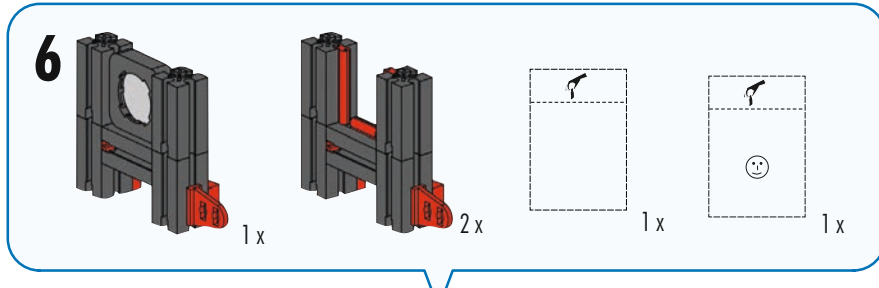
Linsengleichung
 Lens equation
 Équation de la lentille

Lensvergelijking
 Ecuación de la lente
 Equação da lente

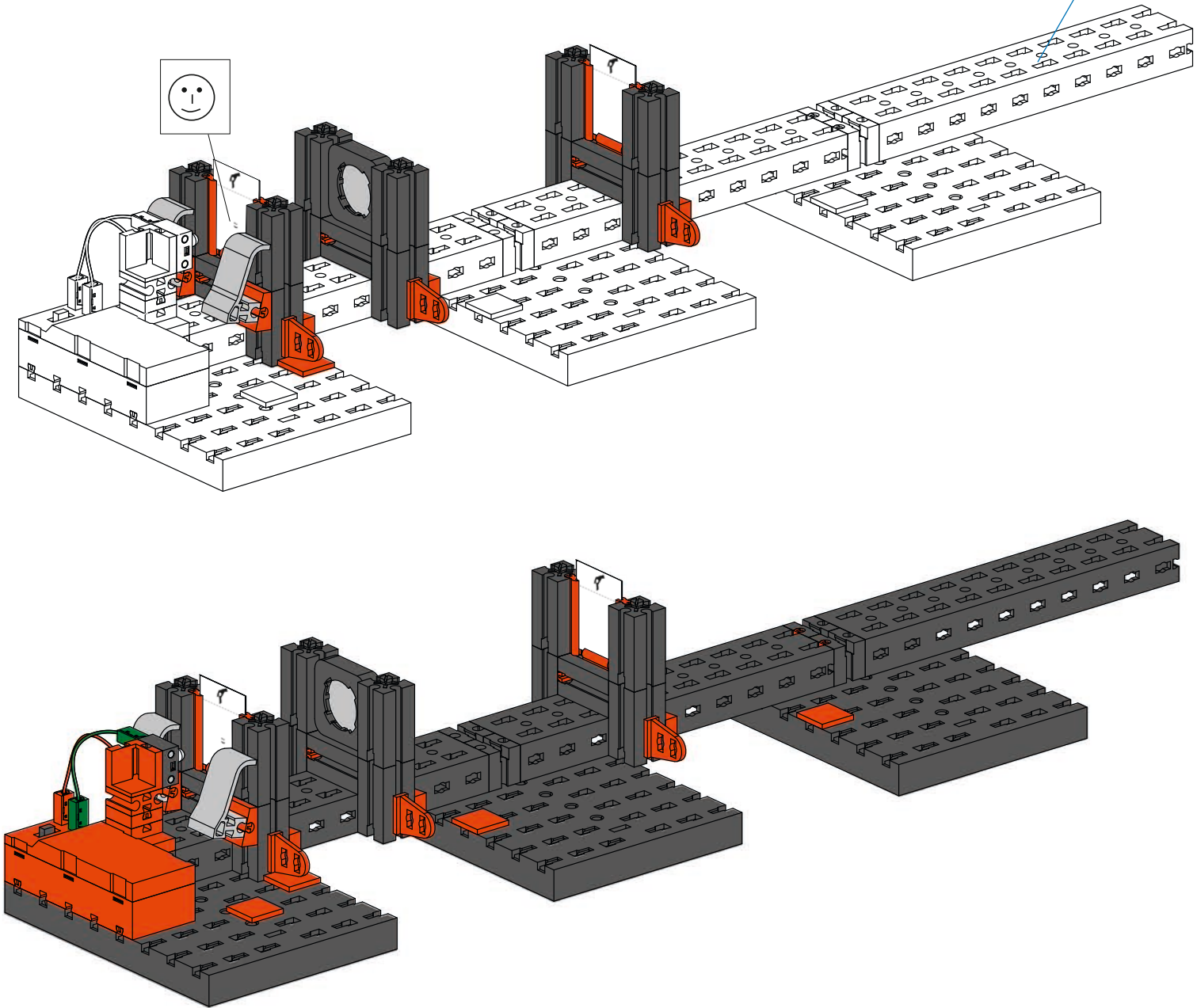
Equazione della lente
 Уравнение объектива
 透镜方程

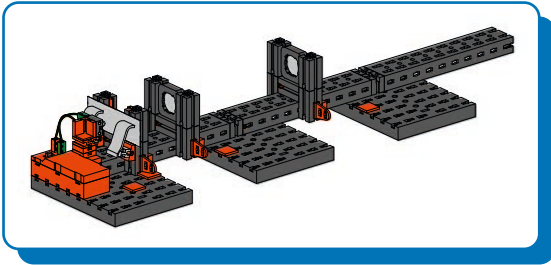
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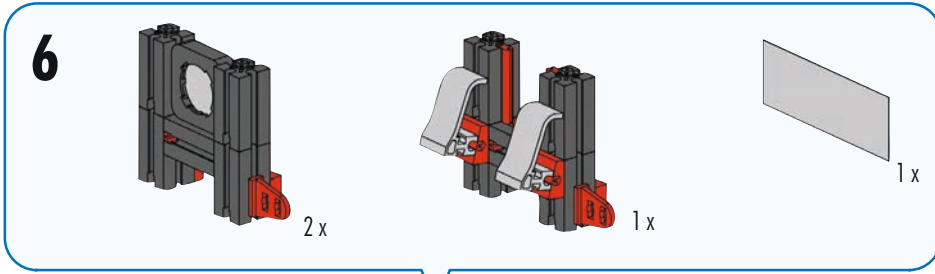
Mikroskop
Microscope
Microscope

Microscop
Microscopio
Microscópio

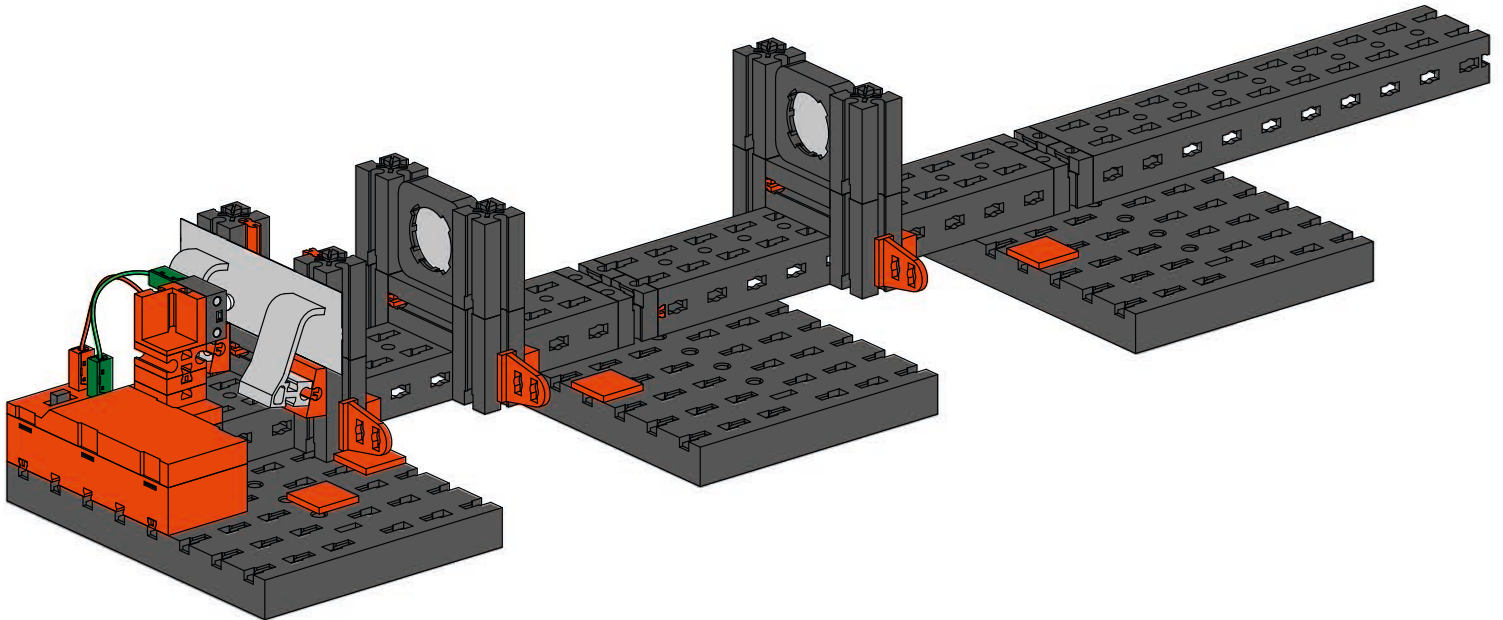
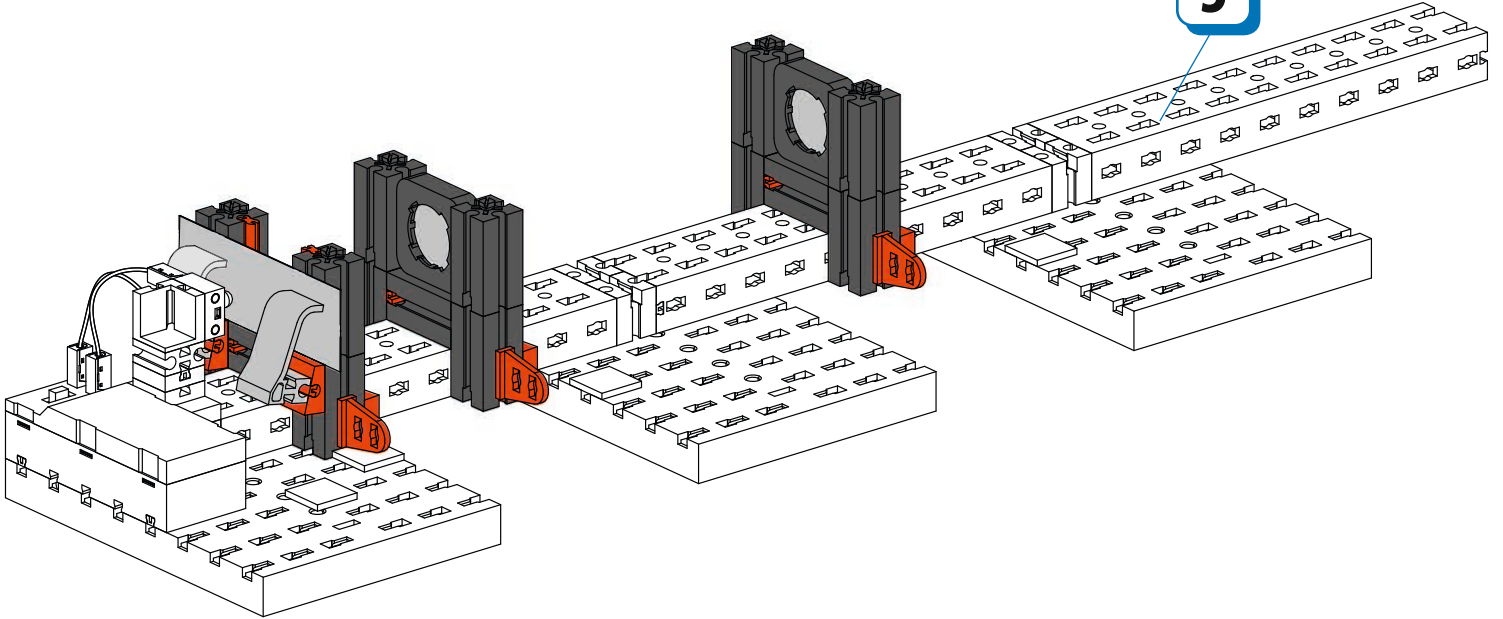
Microscopio
Микроскоп
显微镜

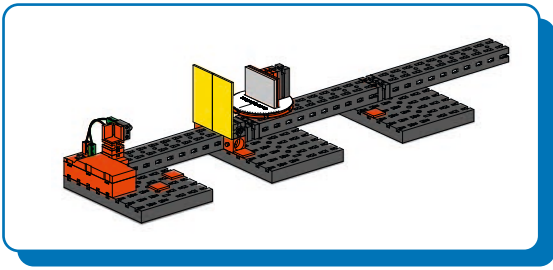
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Reflexionsgesetz
Reflection law
Loi de la réflexion

Wet van reflectie
Ley de reflexión
Lei da reflexão

Legge di riflessione
Закон отражения
反射定律

1-5

Seite 21
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Page 21
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Pagina 21
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6



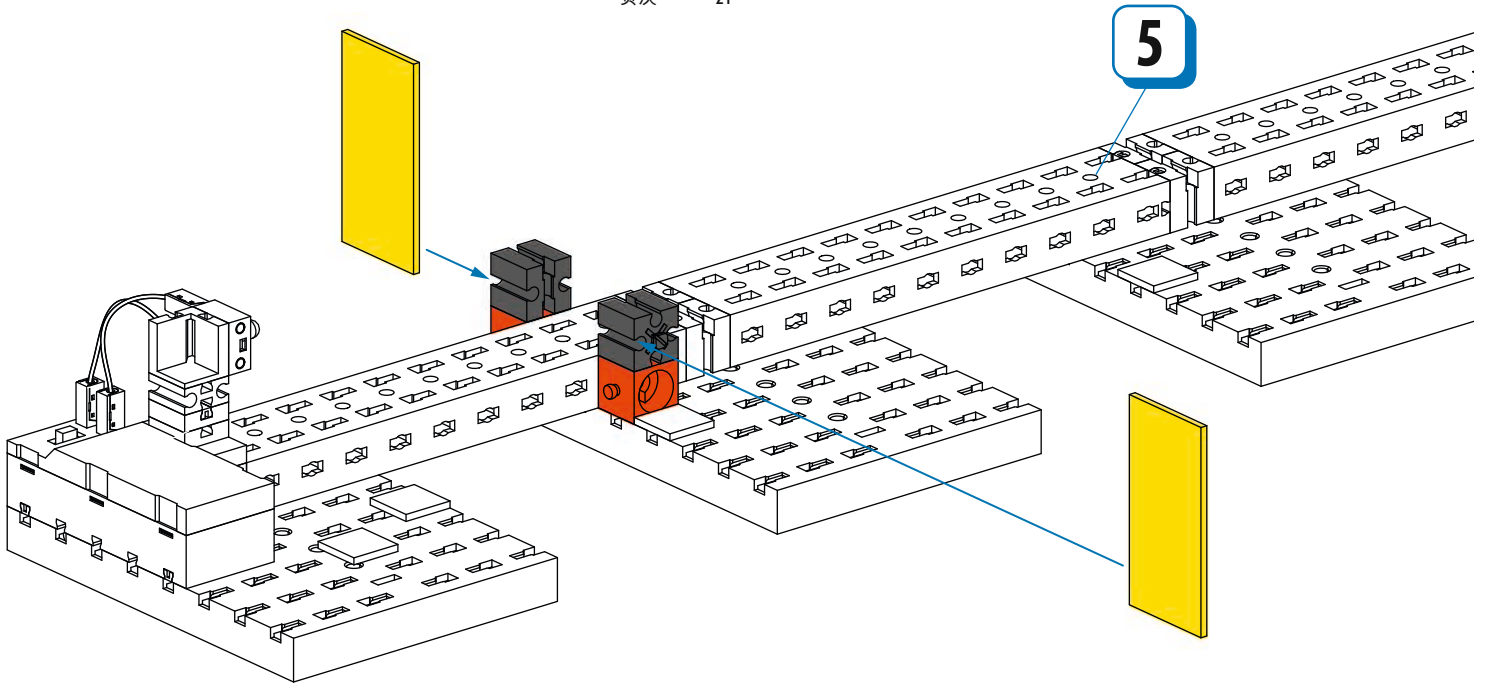
2 x



2 x



2 x



7



1 x



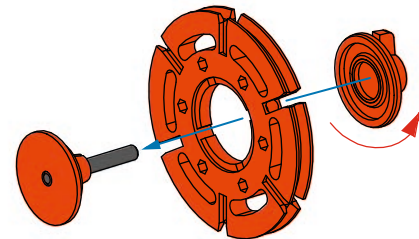
1 x



30



1 x

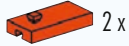


30 mm

8



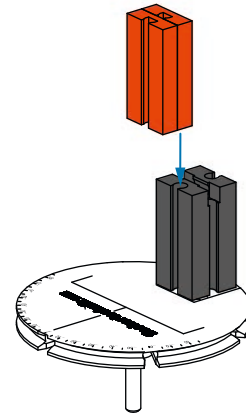
1 x



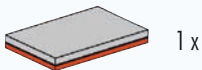
2 x



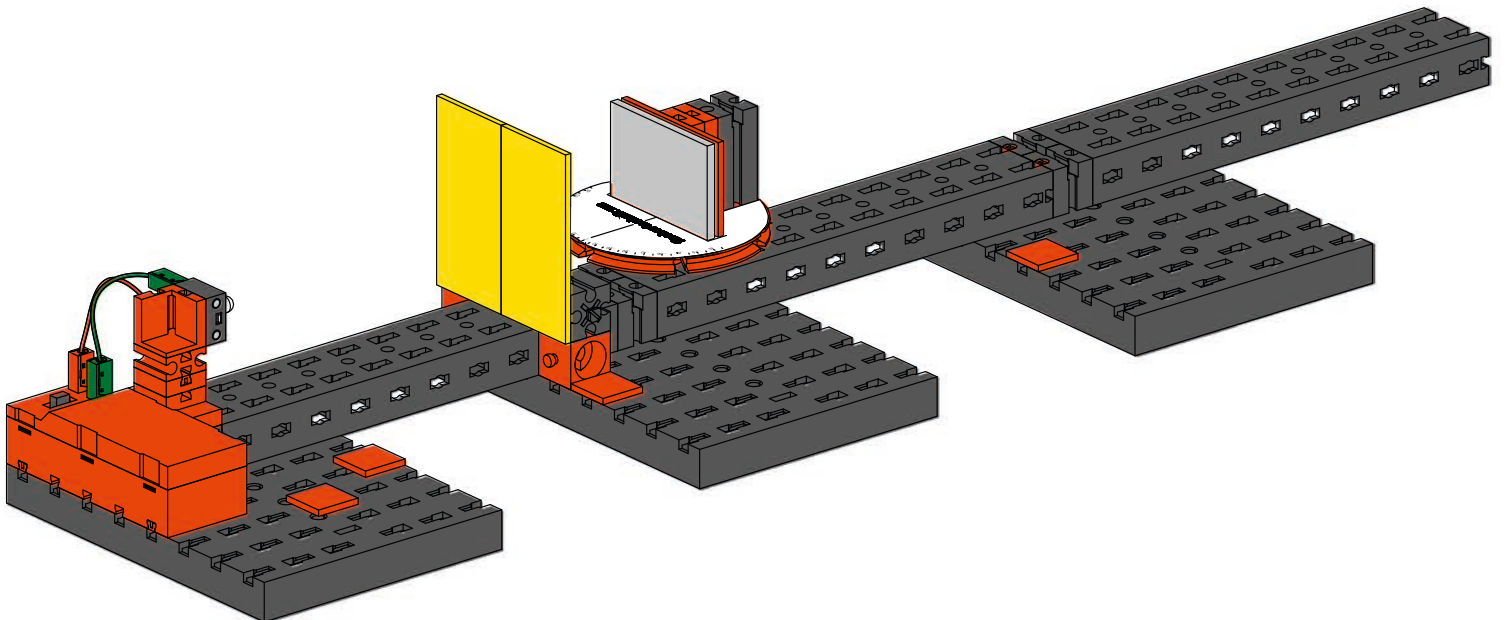
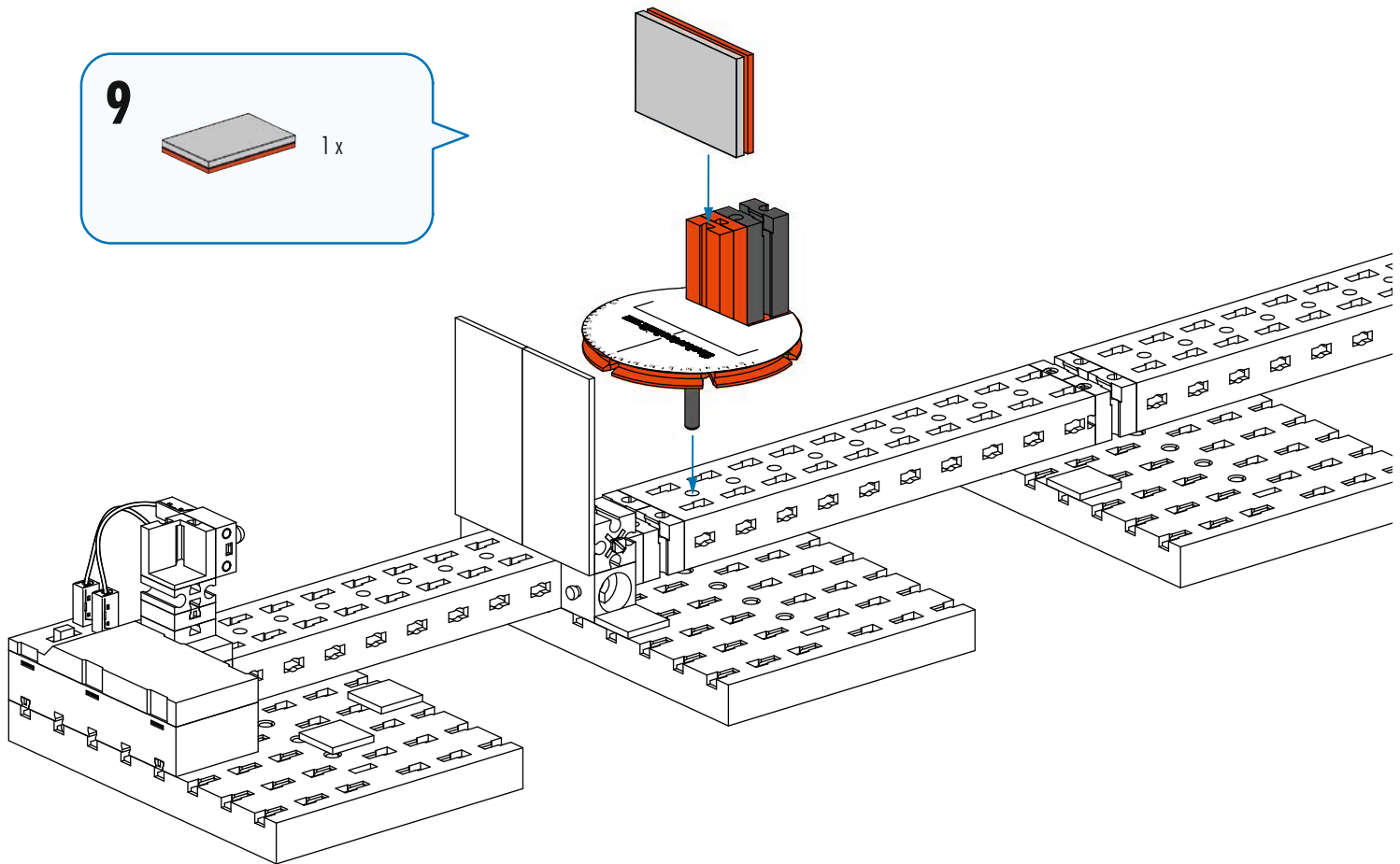
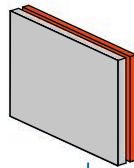
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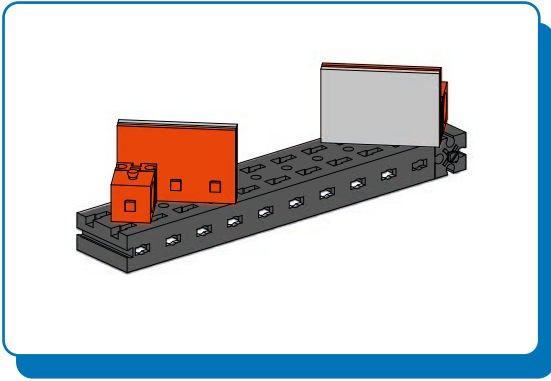


9



1 x





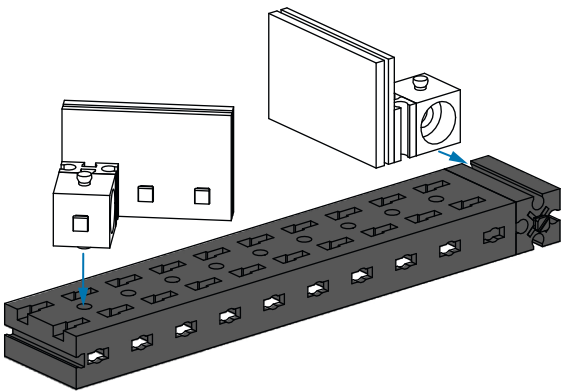
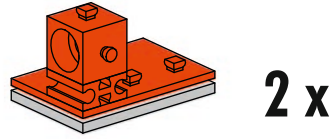
Hyperskop
Hyperscope
Hyperscope

Hyperscope
Hiperscopio
Hiperescópio

Iperscopio
Перископ
潜望镜

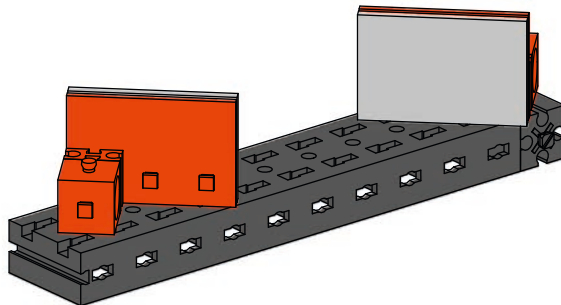
1

2x 2x 2x



2

1x 1x

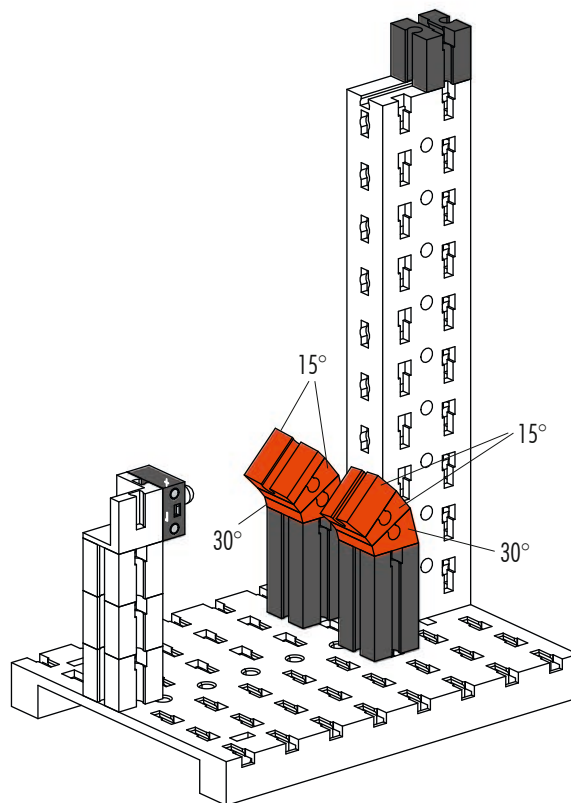
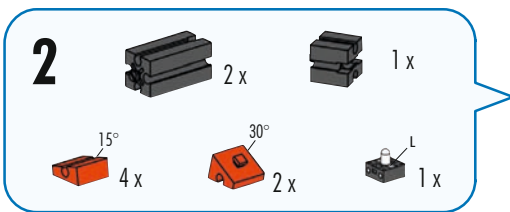
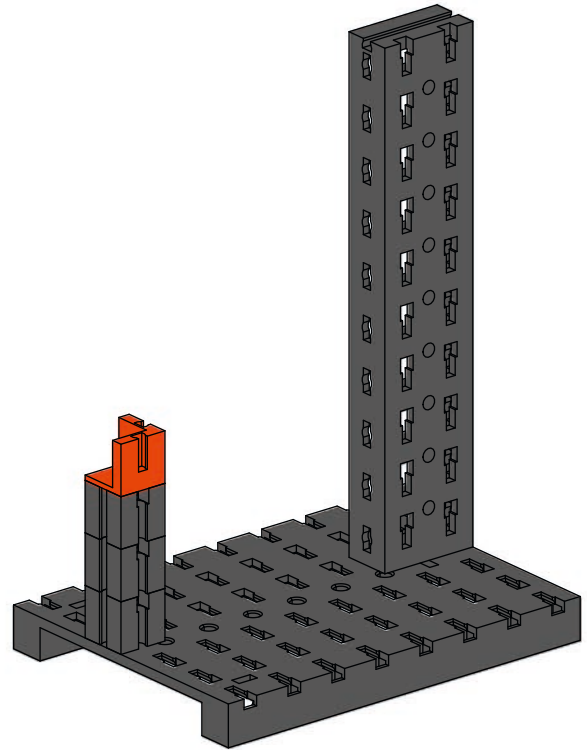
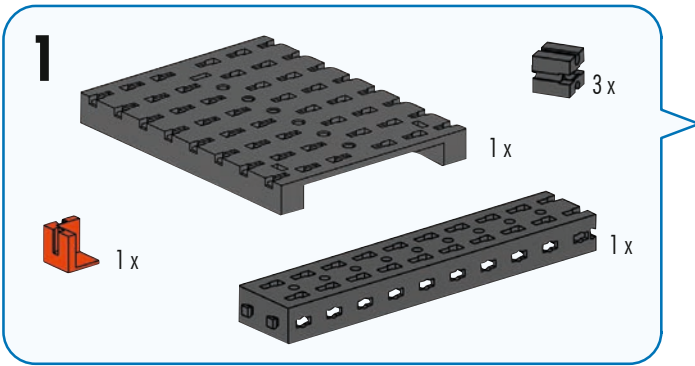
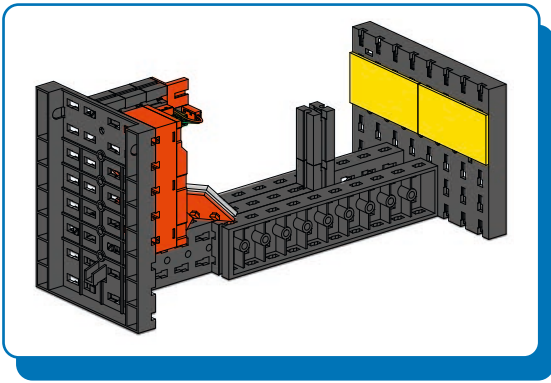


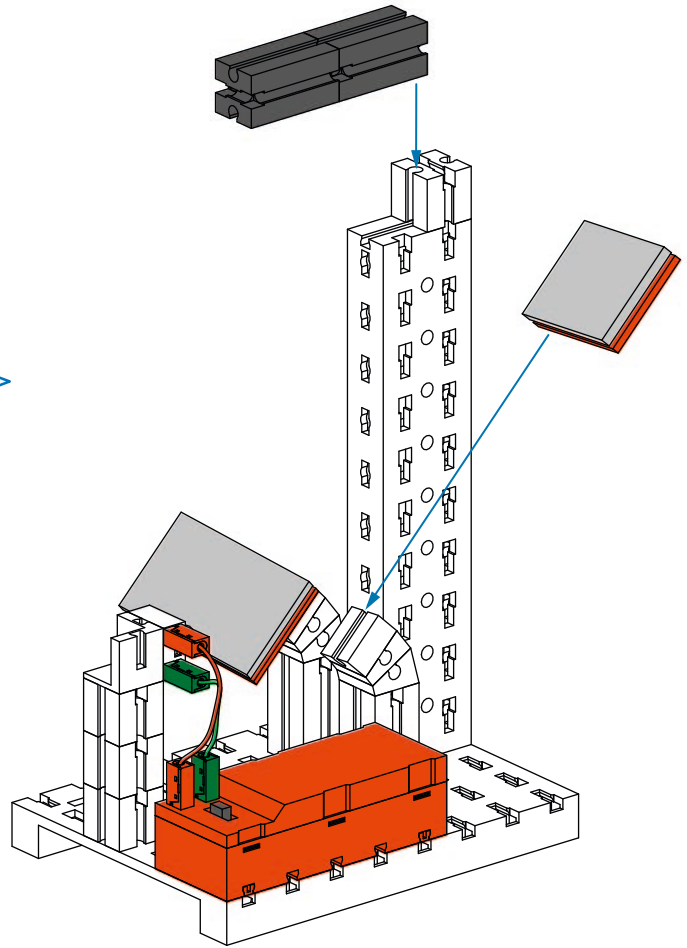
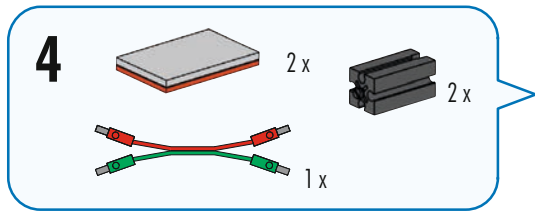
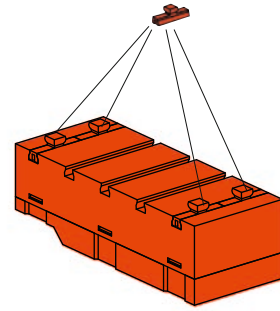
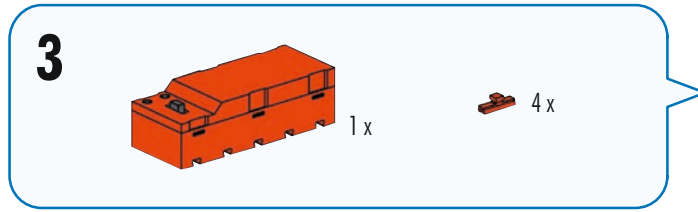
Schattenexperiment
Shadow experiment
Expérience de l'ombre

Schaduw experimert
Experimento de
sombras

Esperimento dell'ombra
сперимент с тенью
影子实验

Experimento com sombras

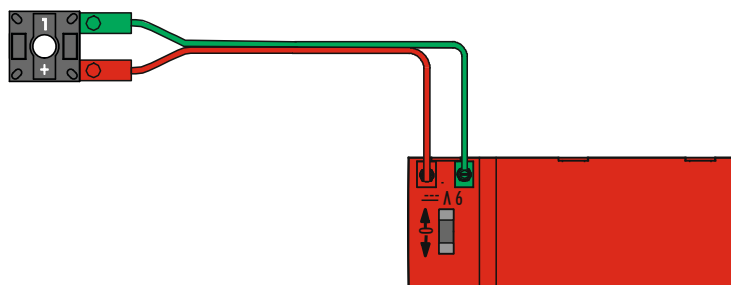


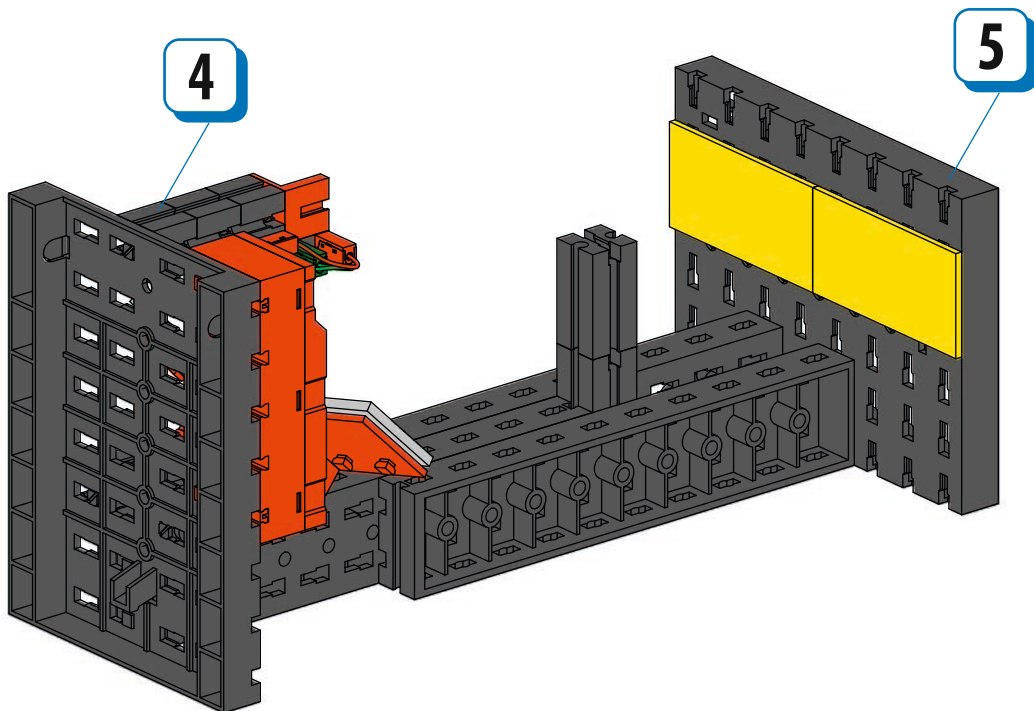
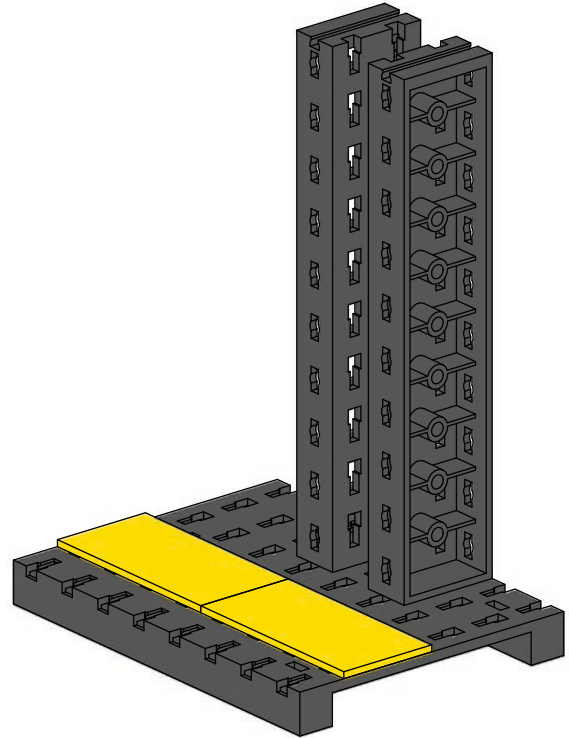
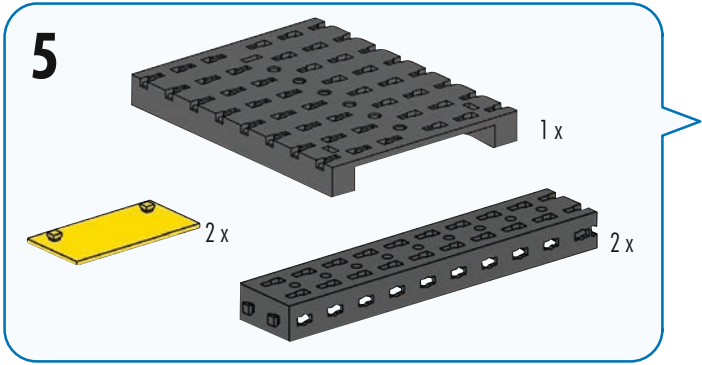


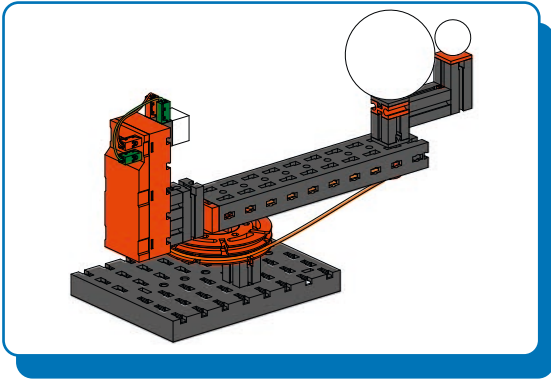
Schaltplan
Circuit diagram
Plan électrique

Schakelschema
Diagrama de circuitos
Plano elétrico de ligação

Schema elettrico
Схема подключения
电路图



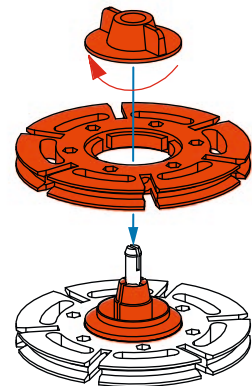
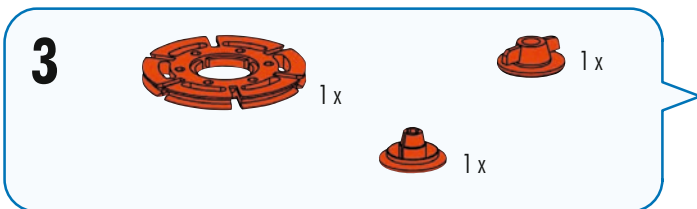
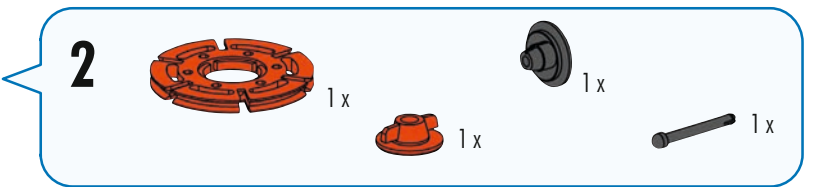
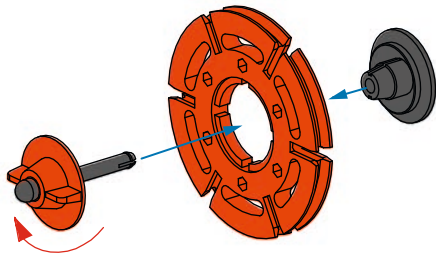
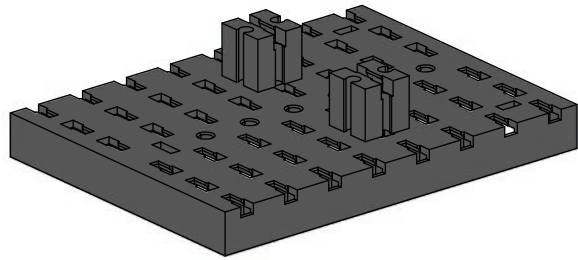
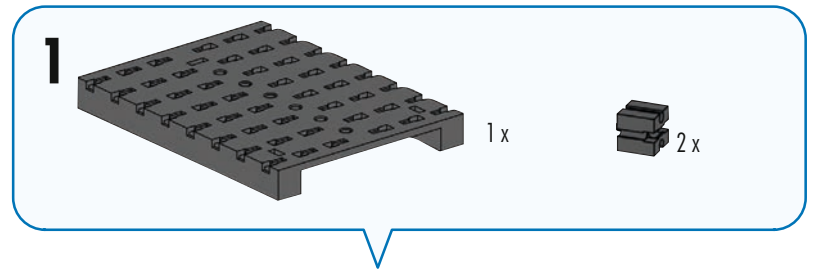





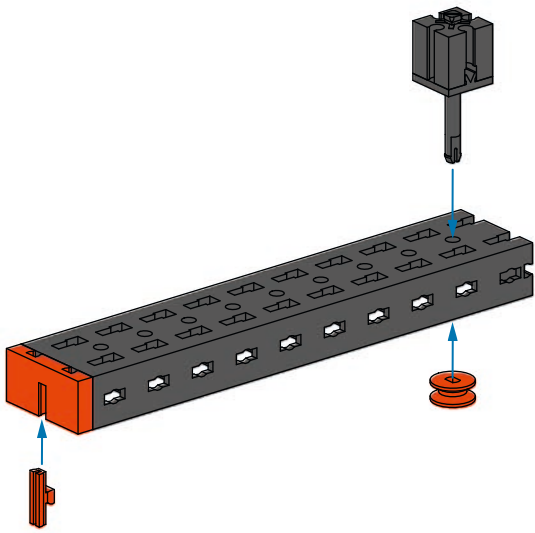
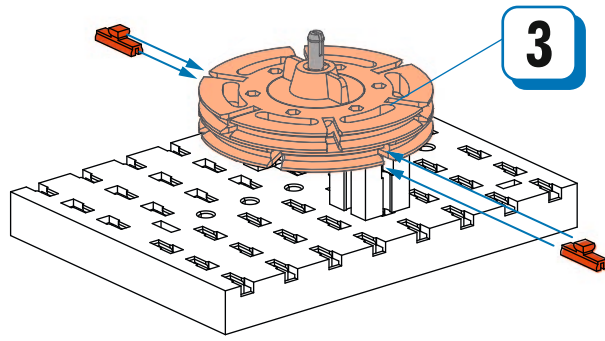
Mondphasen
Moon phases
Phases de la lune

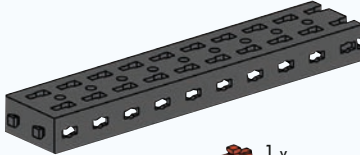





Maanfasen
Fases de la luna
Fases da lua


Fasi lunari
Лунные фазы
月相

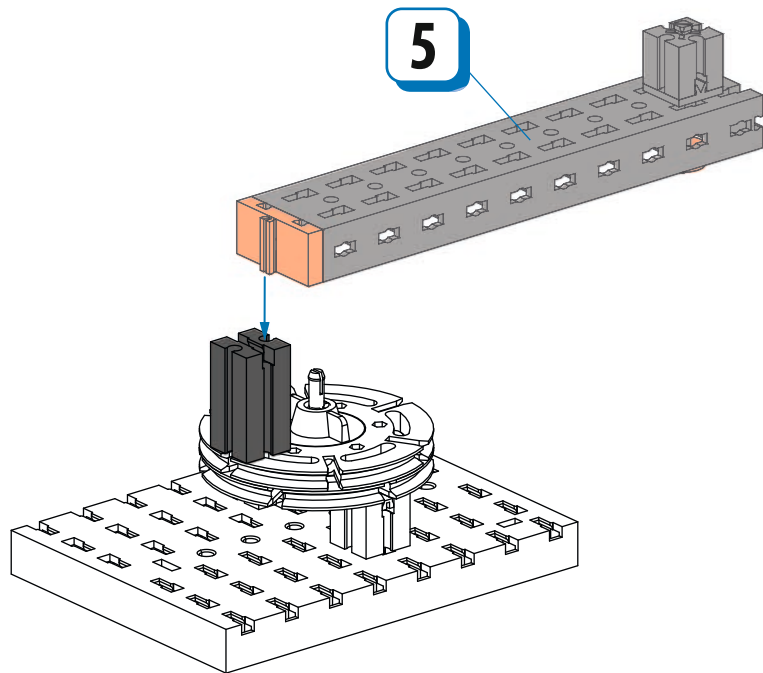


4  2x



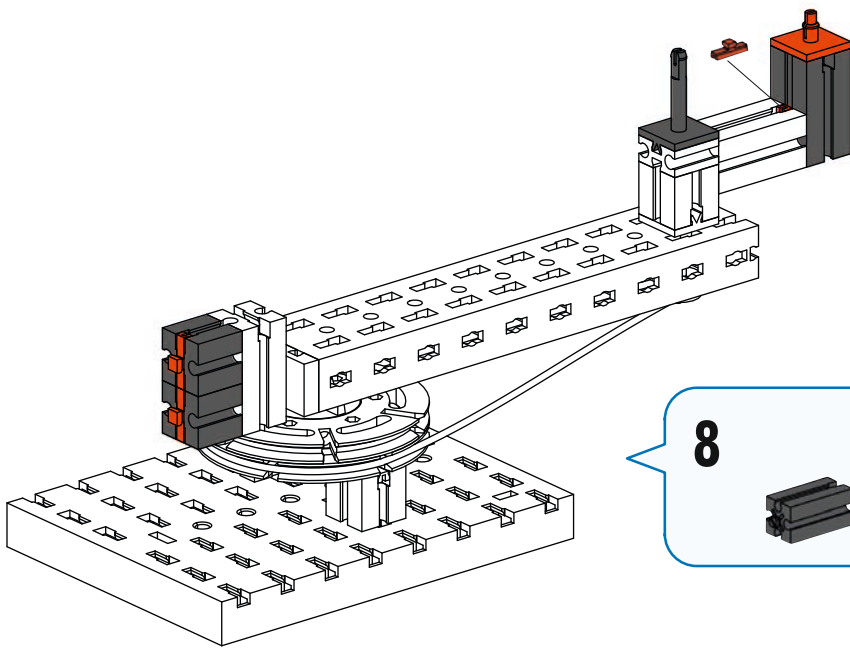
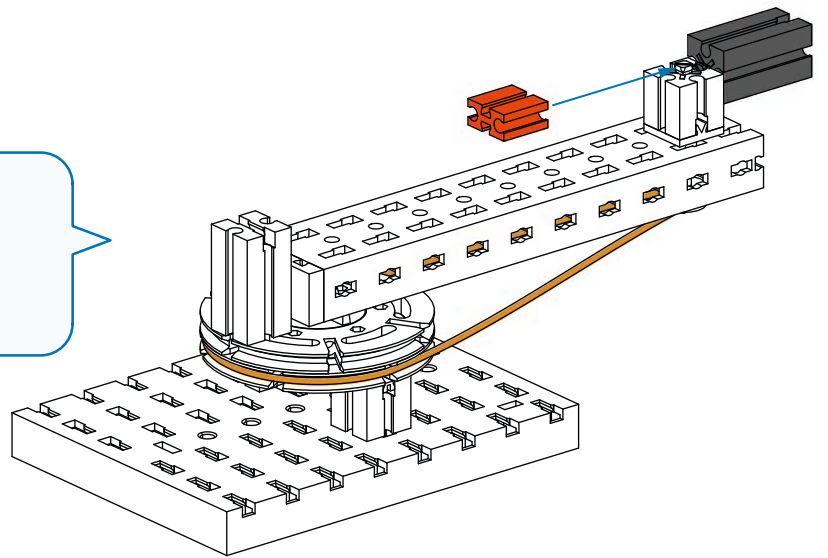
5  1x  1x  1x  1x  1x  1x

6  1x



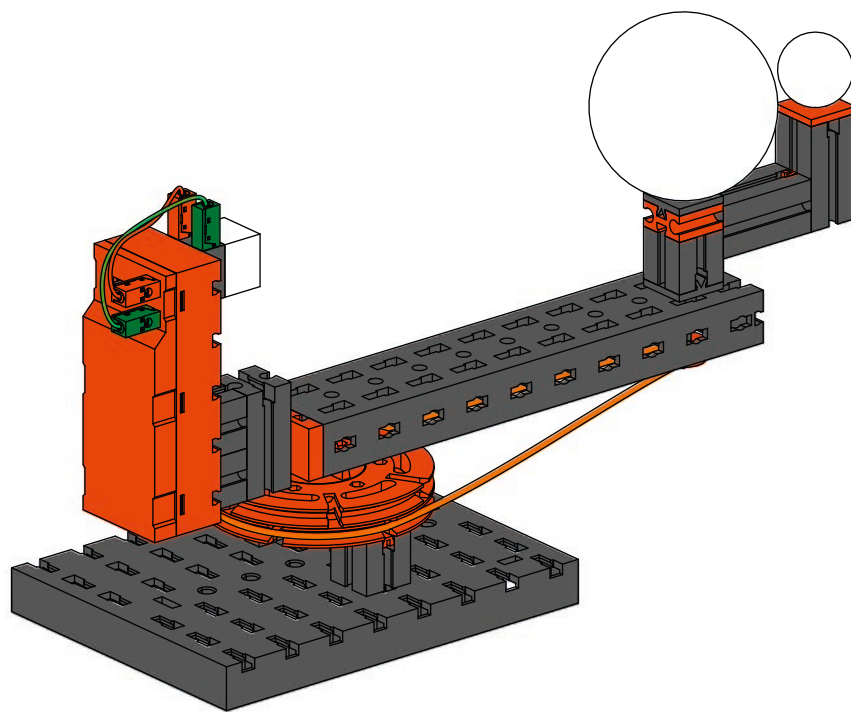
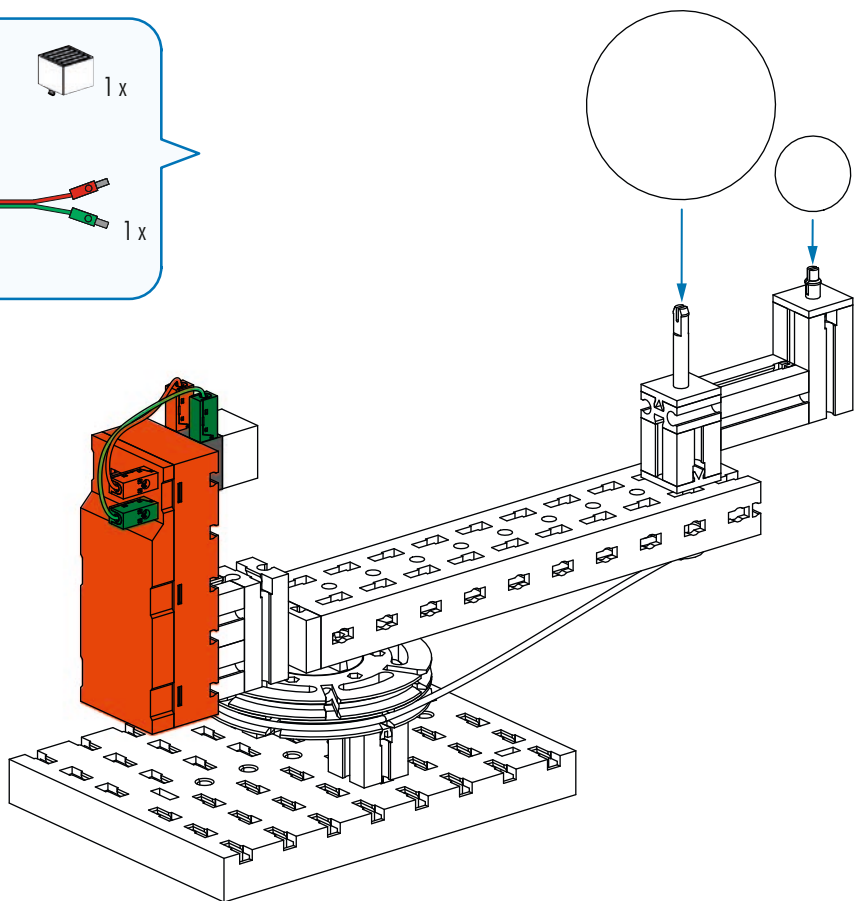
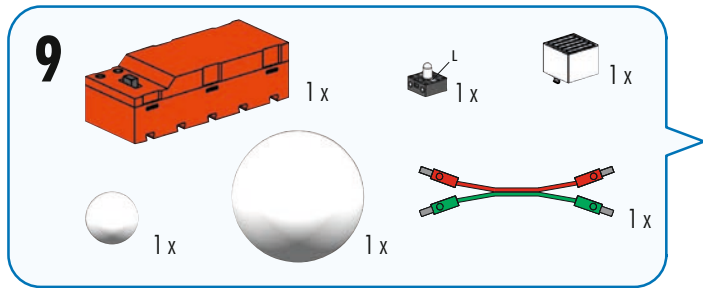
7

- 1x [Black Technic Beam 1x3]
- 1x [Orange Technic Ring]
- 1x [Orange Technic Pin]



8

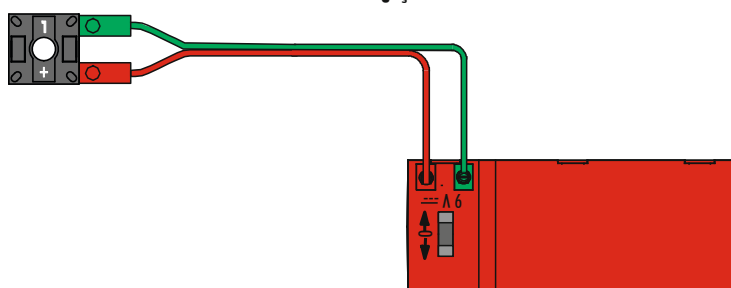
- 1x [Black Technic Beam 1x3]
- 2x [Black Technic Pin]
- 1x [Grey Technic Pin]
- 3x [Orange Technic Pin]
- 1x [Orange Technic Pin]



Schaltplan
Circuit diagram
Plan électrique

Schakelschema
Diagrama de circuitos
Plano elétrico de ligação

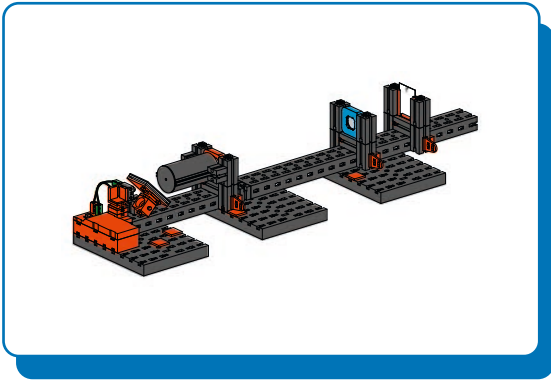
Schema elettrico
Схема подключения
电路图



Sonnenprojektor
Sun projector
Projecteur solaire

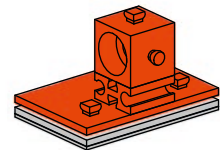
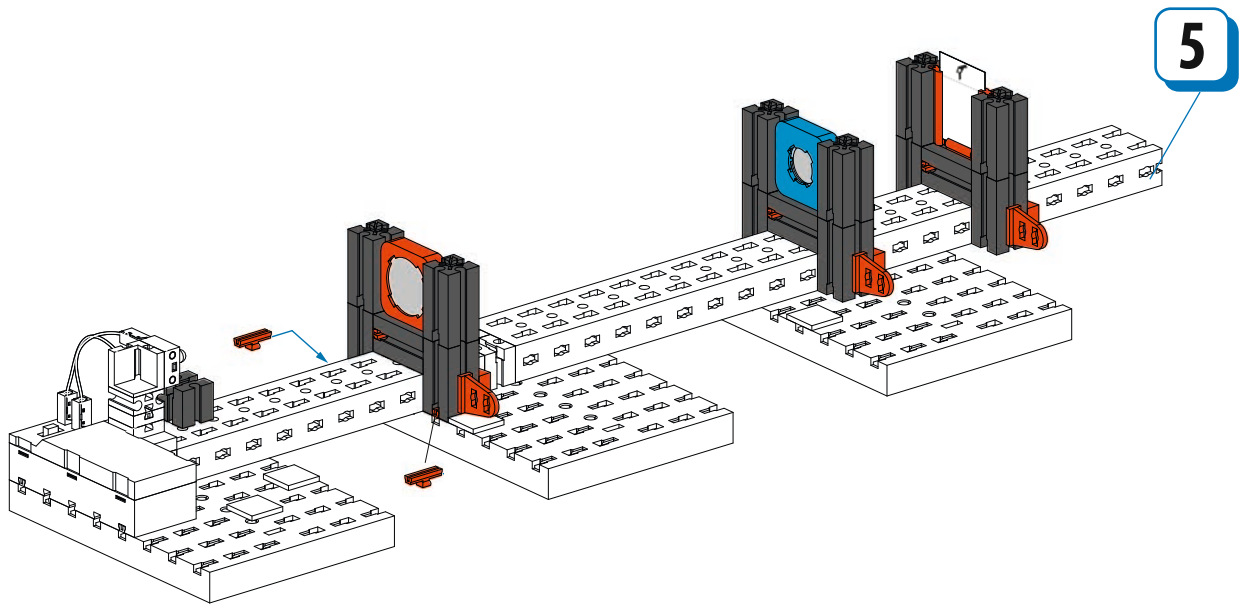
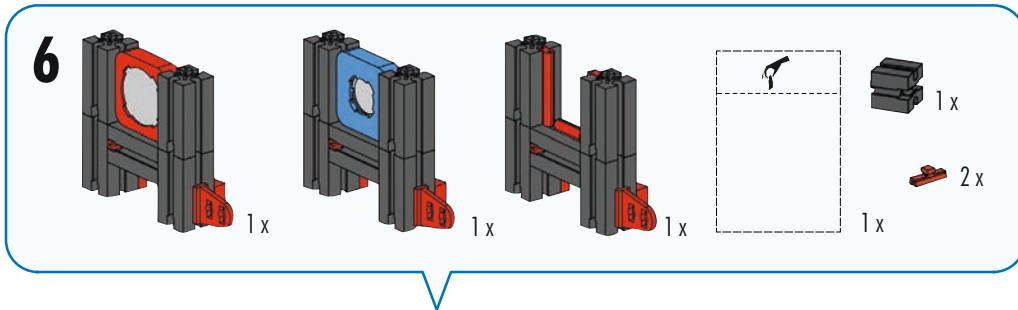
Projector op zonne-
energie
Projector solar
Projektor solar

Proiettore solare
Солнечный проектор
太阳投影仪



1-5

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Pagina 21
Pagina 21
Страница 21
页次 21



8



1 x

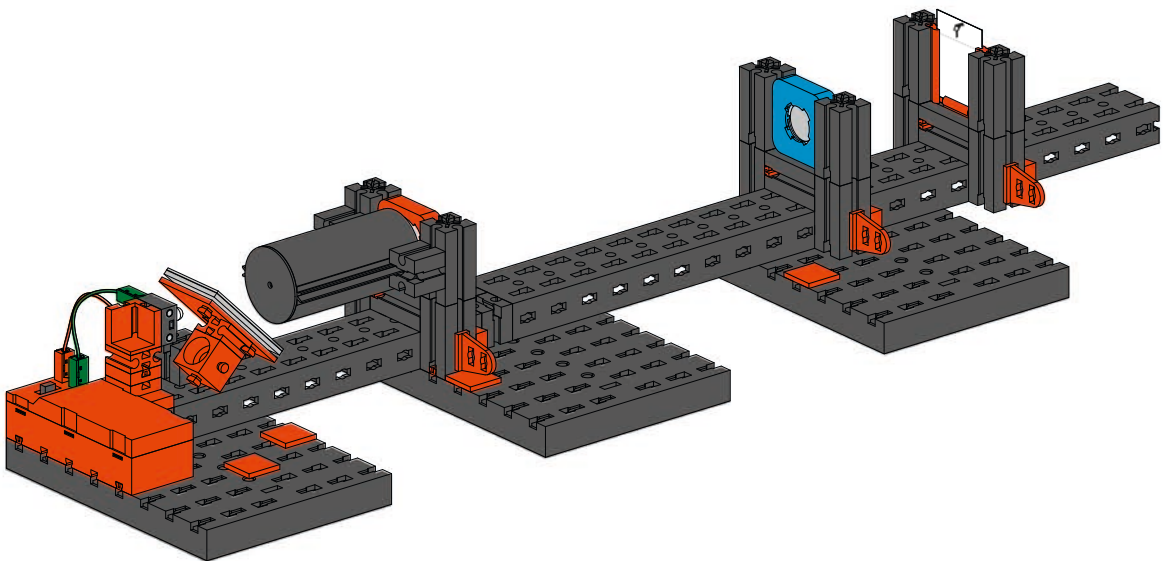
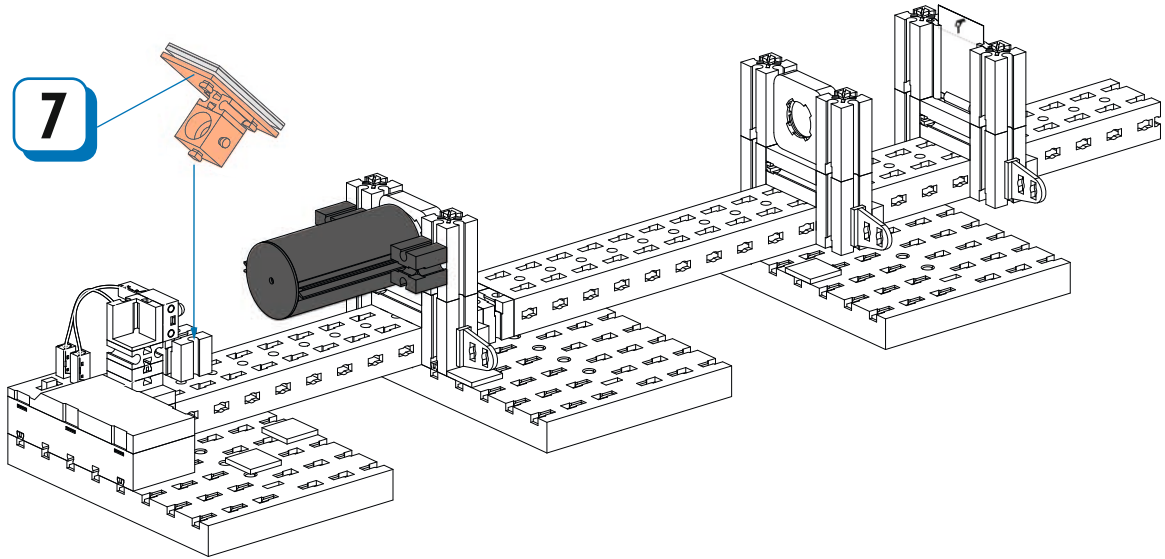


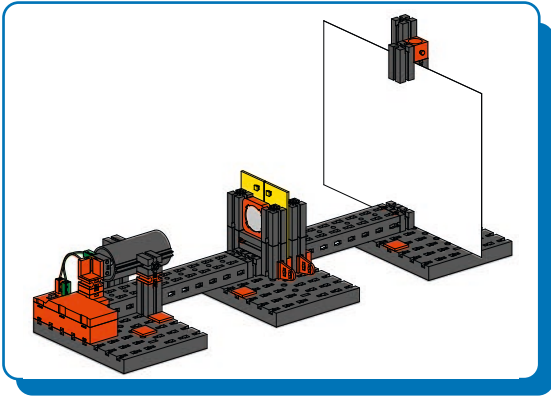
1 x



2 x

7





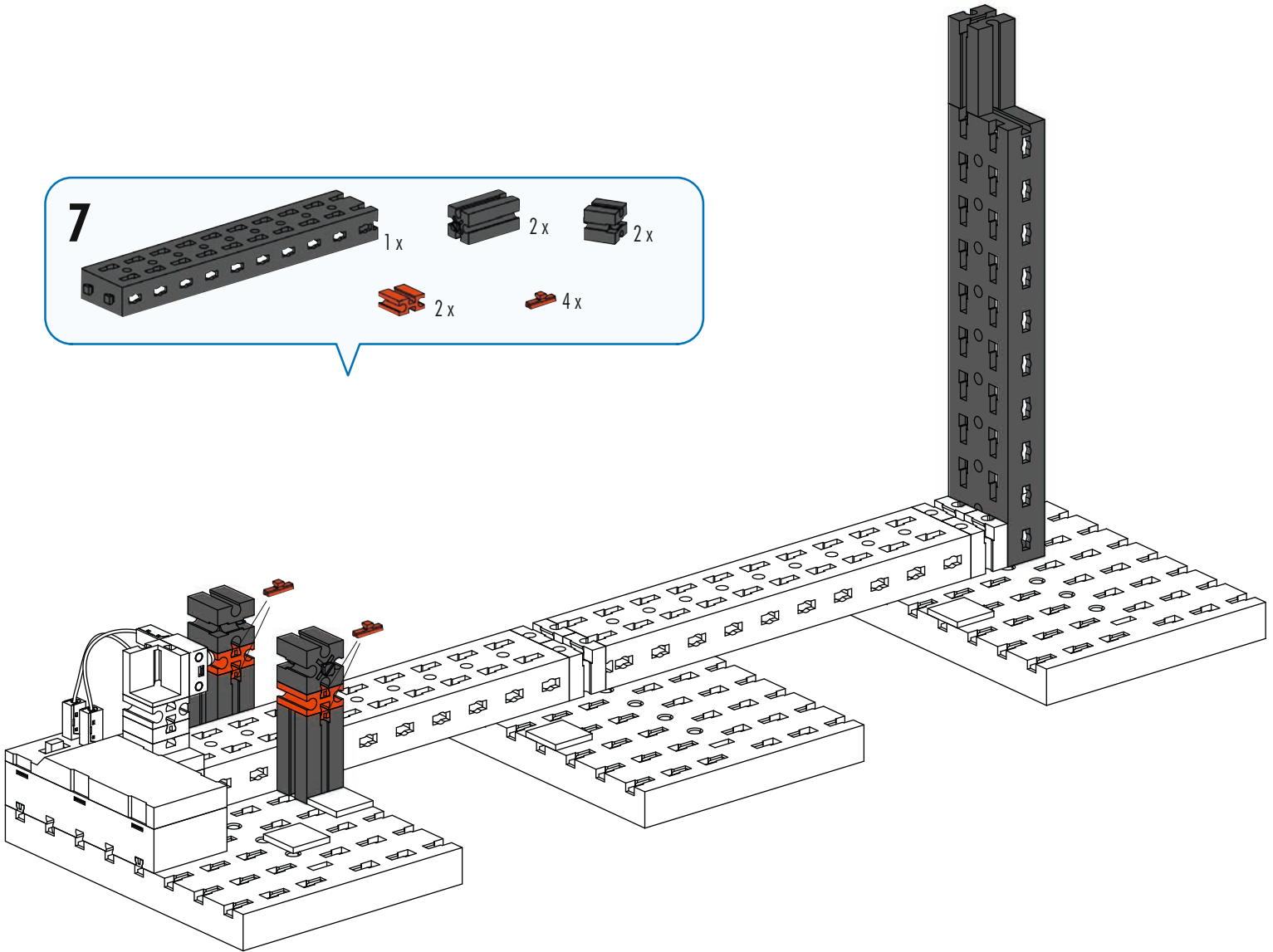
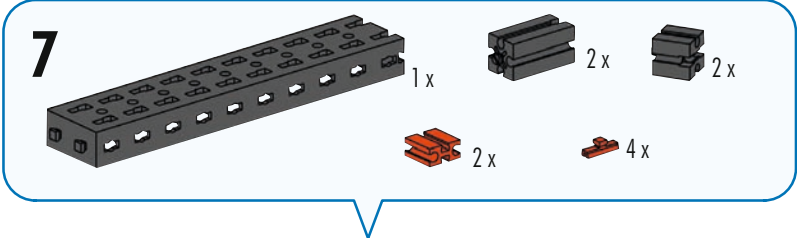
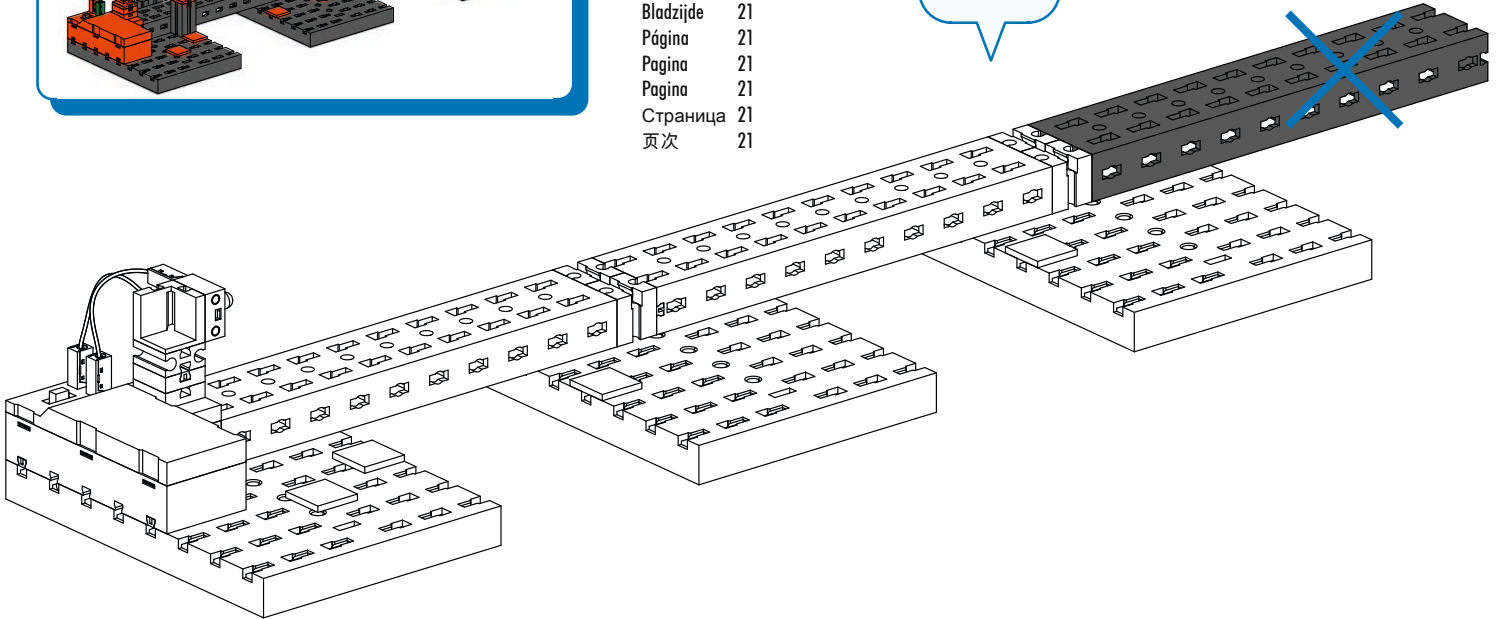
Wellenlänge des sichtbaren
Lichts
Wavelength of visible light
Longueur d'onde de la
lumière visible

Golflengte van zichtbaar licht
Longitud de onda de la
luz visible
Comprimento de onda da
luz visível

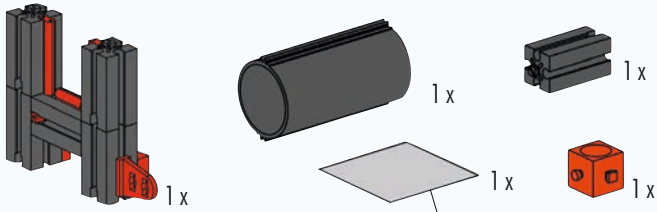
Lunghezza d'onda della luce
visibile
ЛИНА ВОЛНЫ
ВИДИМОГО СПЕКТРА
可见光的波长

1-5

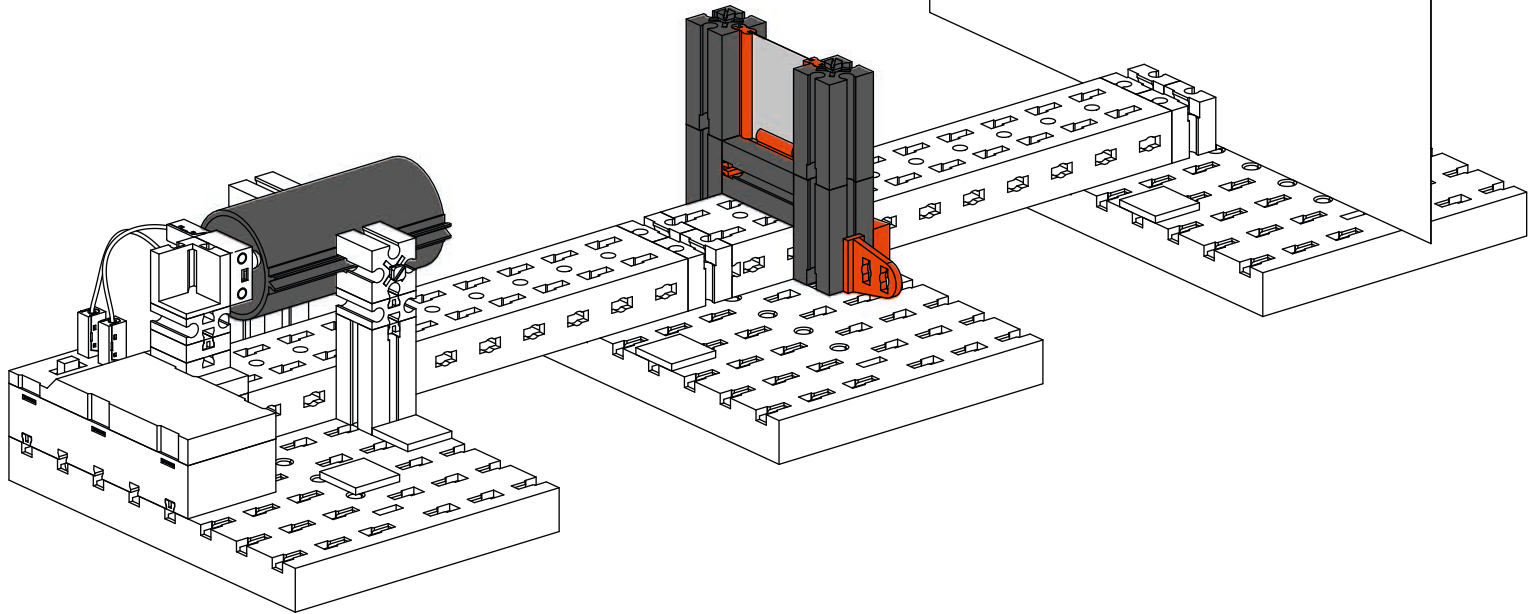
Seite 21
Page 21
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Página 21
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页次 21



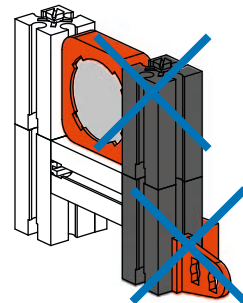
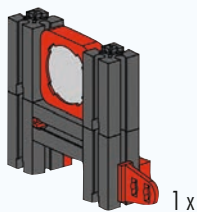
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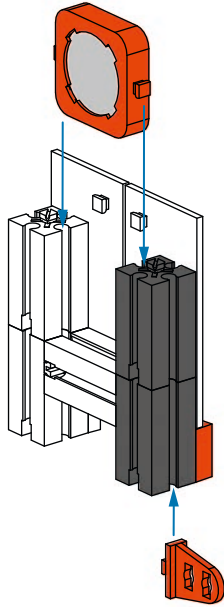
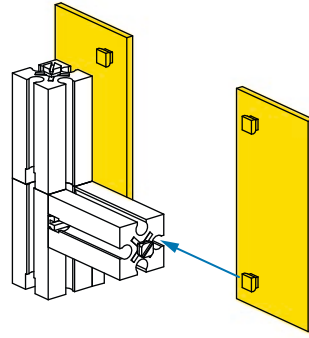
Beugungsgitter
 Diffraction grating
 Réseau de diffraction
 Diffractierooster
 Rejilla de difracción
 Grelha de difração
 Reticolo di diffrazione
 Дифракционная
 решетка
 衍射光栅




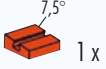



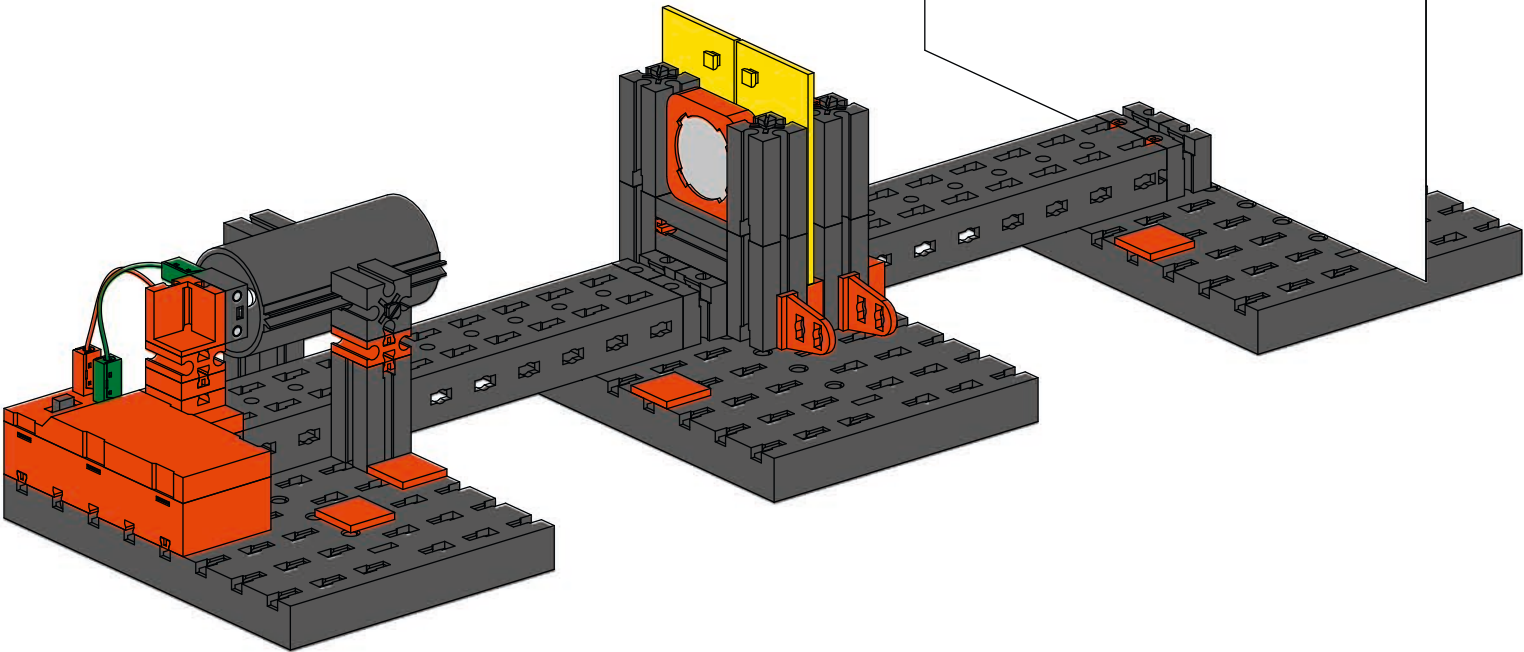
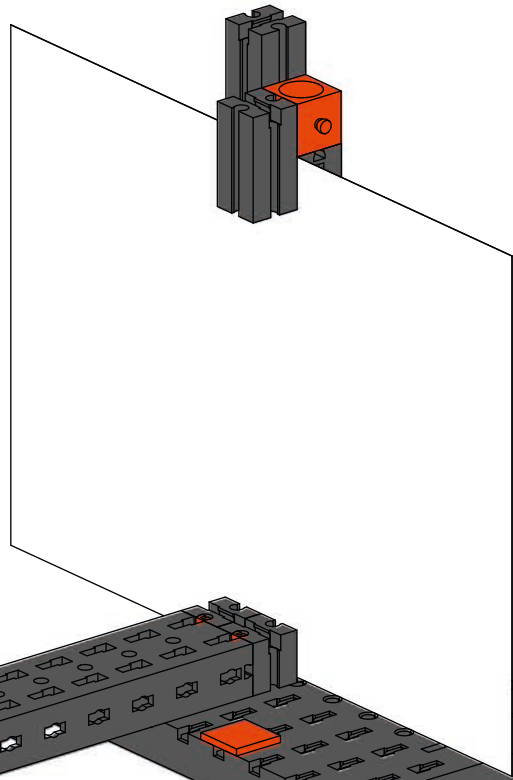
9

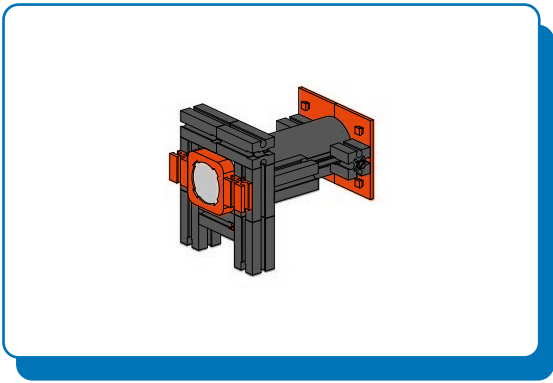


10  2 x



8  2 x  1 x  1 x  1 x  1 x

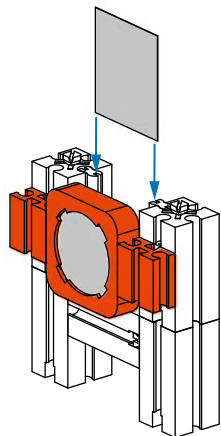
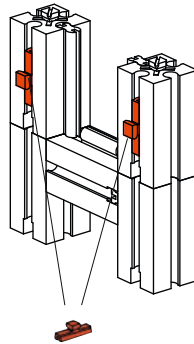
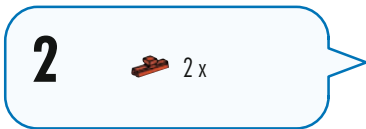
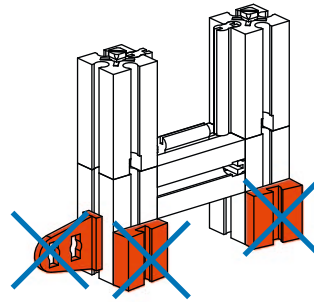
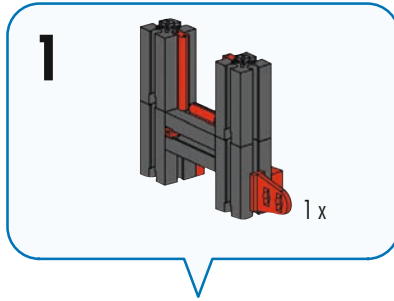




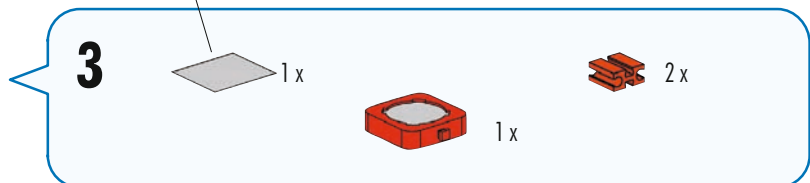
Spektroskop
Spectroscope
Spectroscope



Spectroscop
Espectroscopio
Espectroscópio

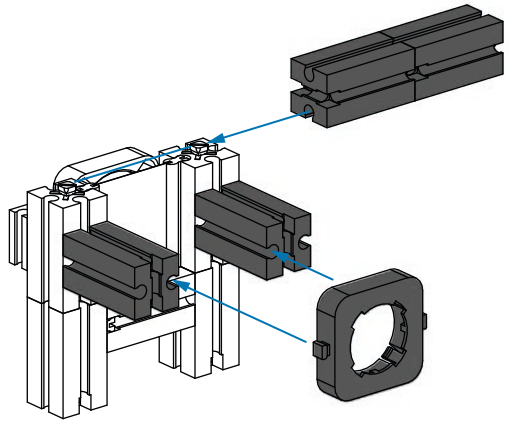
Spettroscopio
Спектроскоп
分光鏡

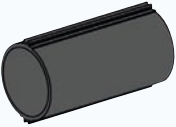




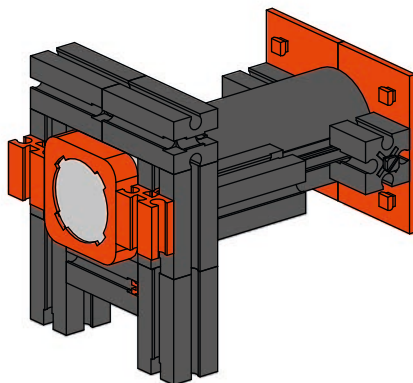
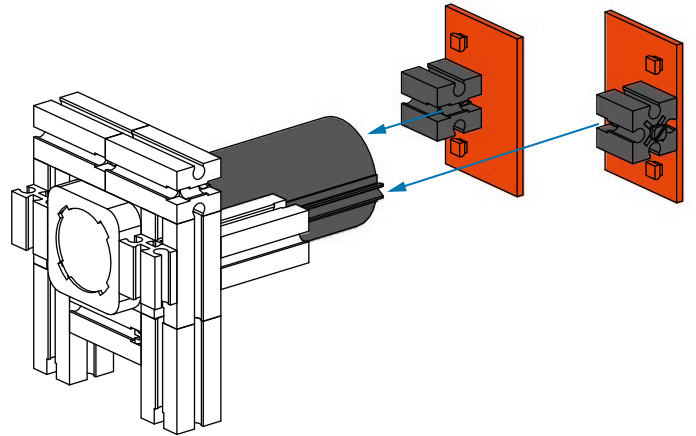
Beugungsgitter
Diffraction grating
Réseau de diffraction
Diffractierooster
Rejilla de difracción
Grelha de difração
Reticolo di diffrazione
Дифракционная
решетка
衍射光柵



4  4x  1x

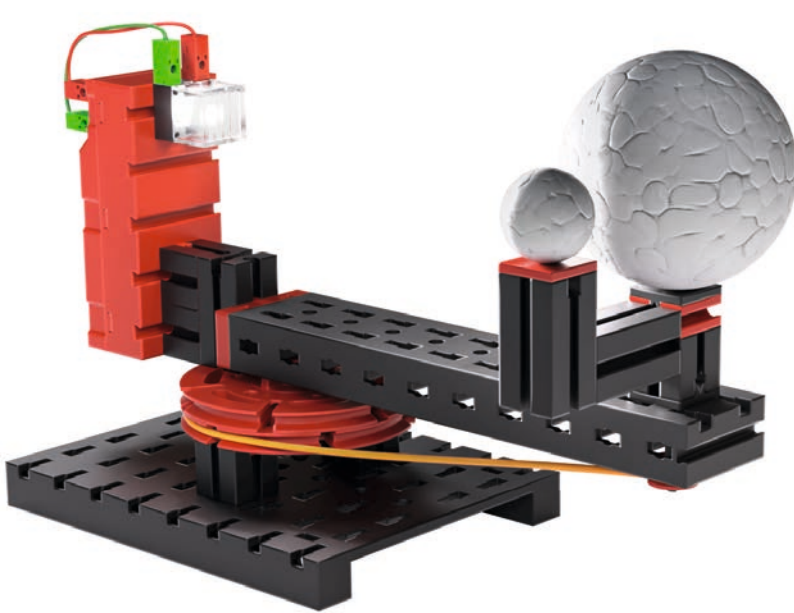


5  1x  2x  2x



STEM Optics

SECONDARY SCHOOL



fischertechnik GmbH
Klaus-Fischer-Str. 1
72178 Waldachtal
Germany
Phone: +49 74 43/12-43 69
Fax: +49 74 43/12-45 91
info@fischertechnik.de
www.fischertechnik.de

