TEACH YOURSELF PHOTOGRAPHY

lessons from a self-taught photographer

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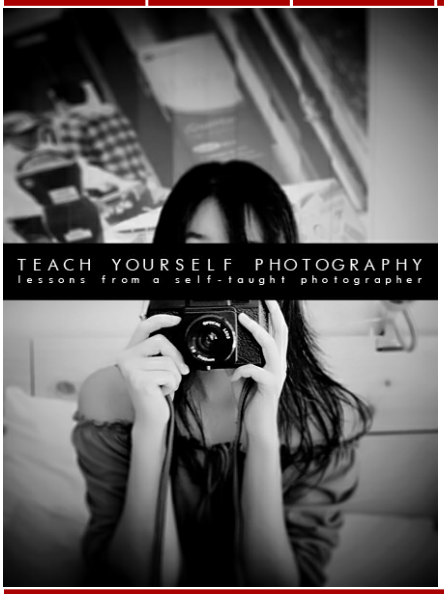

Tutorials

Welcome to JFotography's tutorial section and e-book
Teach Yourself Photography - lessons from a self-taught photographer

This section provides various tutorials in an e-book format so you can learn how to take great photos. Tutorials range from finding the right camera for you to basic post-editing techniques to in-depth protocols for specific photo set-ups.

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Teach Yourself Photography - lessons from a self-taught photographer

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Words from the Author

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The goal of this e-book is not necessarily to make you a phenomenal photographer though you may choose to make that your personal goal if you wish. The goal of this book is to simply inspire an attitude of self learning and self education. The internet has become a goldmine of information and resources. If you want to do something and have the capacity to teach yourself how to do it, then you can accomplish just about anything.

The alternative goal of this e-book is to spread a general philosophy of free knowledge. This e-book is provided to you for free in the hopes that you may also take what you've learned either from this e-book or from elsewhere in life and pass that knowledge freely on to others.

Learn willingly. Teach generously. Thanks for reading.

- Jean Fan

Tips and Advice

for photography and for life

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1. Stay curious

- **Ask why:** If you see a photo you like, ask yourself why you like it. *Do I like this photo because of the colors? Or maybe it's the way the elements of the photo are arranged?* This will help you become more aware of your own aesthetic tastes and preferences as well as give you insight into that of others such as your audience.
- **Ask how:** If you see an effect you like, ask yourself how that effect was achieved and read into it! Search engines are your best friends. *How can I get my background to be blurry like that?* Just putting this question into Google gives me *the wider your aperture the more blurry your background* from the first hit article. *How can I give my photos that warm feel?* Again a quick search gives me a plethora of post editing tutorials to achieve such an effect.

2. Try it out

- **Don't just read. Do:** Don't just read about how things are done. Try them out for yourself! Go take photos with a wider aperture and see how that affects your photo's background. Follow one of those post editing procedures and see how they're done. What you learn from reading will stick with you much longer if you supplement with doing.
- **Experiment:** You definitely don't need to limit yourself online the techniques you've read about. Make up your own concoction of techniques.

3. Try again

- **Tweak and repeat:** If at first you don't succeed, try try again. But make sure to tweak your procedure a bit. It's insanity to do the same thing over and over again and expecting a different outcome. Maybe your wide aperture shot just caused the entire photo to become overexposed. Try it again with a faster shutter speed.
- **Don't get discouraged:** If you're having a hard time, it's not because you're dumb or incompetent, it's because you're trying to do something hard! Failure happens for a reason. If it was easy, everyone would be super skilled at it already.

4. Be critical

- **Challenge what you read:** Don't trust everything you read online or even what you learn from others. We're all prone to making a few mistakes here or there and may accidentally suggest misinformation. Follow up on your sources to make sure they're credible and what they assert is replicable. If many sites claim that a wider aperture leads to a blurrier background, then there's a higher likelihood that the statement is true. However, if only one site claims that a smaller aperture actually leads to a blurrier background, then there's a higher likelihood that the author got his facts wrong.
- **Logic it out:** If you feel like something may be wrong, logic it out. Synthesize what you've learned to deduce whether something new makes sense. If you know some basic optics, it will be clear why a wider aperture leads to a blurrier background.
- **Challenge yourself:** Take pride in your accomplishments but never forget that there's always room for improvement. You can always aspire to even greater heights.

5. Keep an open mind

- **Be open to change:** Understand that nothing is set in stone: Your personal tastes will likely change. Industry standards may change. Audience demographics and preferences may change. Whether you let the latter two changes influence your work is up to you. But be ready and willing to adapt to new changes.
- **Be open to new ideas:** You never know when you're going to encounter an idea from a perspective that makes you challenge your own. Maybe that perspective will teach you a few new things about how to view photography and how to view life.

Free Your Knowledge

why I share what I know and why you should too

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1. The golden rule

The first and foremost reason for why I share what I know and why you should too is the golden rule: *do unto others as you would have them do unto you*. When someone asks you know how you achieved that effect in your photos, share what you know in the same way that you hope others may share what they know when you ask for help. Be the change you wish to see.

2. A Mark of True Confidence

Secondly is a less sensible reason but a personal favorite nonetheless: sharing what you know is a mark of confidence. You share what you know about photography because you are truly confident in your abilities as a photographer. Even if your competition has access to the same information as you, you can still outperform your competition because of your ability to synthesize information more efficiently and effectively and therefore produce a better final photo.

3. Information does not equal ability

The important realization out of this perhaps overly self-centered and egotistical perspective is that information is not the equivalent to ability. What you share is the information on how to compose a shot, to take a photo, and to post-edit that photo properly. What you can never share is your ability to compose a shot, to take a photo, and to post-edit that photo properly. So don't worry; you're not giving away, and never will be able to give away, what makes your photography special and what makes you unique as a photographer.

4. For the greater good

The list of reasons for why we should all try to share what we know is rather long. Perhaps it's to inspire a more educated and civilized society. Perhaps it's to help others while helping ourselves. Perhaps it's just to be nice. But ultimately, what good is all that information locked up in your head anyway? Why not share it with someone who could really use it and would really appreciate it? Sharing what you know only takes a bit of your time but it could make a life long impression and difference for someone else.

Someone once said to me in response to the promotion of free knowledge, "Lunch isn't free. I have to work for it. And therefore I'm deciding to keep my knowledge to myself." But knowledge does not equal ability. Just as teaching people how to make lunch for free does not equal giving them a free lunch. But in the long run, it does help ensure that we all get to have lunch, perhaps even together.

Canon or Nikon?

or Olympus or Sony or Panasonic or etc?

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For the beginner photographer and even the advanced non-professional photographer, the camera body actually makes little to no impact on the final photo. Unless you're shooting for a billboard print, whether your camera body has 14 effective megapixels or 6, a full sized sensor or not is not going to make such a big difference since you'll likely be scaling down the photo for display anyway. And the brand of that camera body is of even lesser concern. This claim will be analyzed in further depth in the next chapter: *camera comparison - does your camera really matter?*

The brand of the camera comes into some concern when considering lens and accessory compatibility. Canon and Nikon simply have a much wider array of lenses, flashes, and other accessories to select from. But for the beginner photographer not looking for a camera with exchangeable lenses or speedlights, this should pose no problem.

popular Nikon and off-brand lenses, flashes, and accessories for Nikon

popular Canon and off-brand lenses, flashes, and accessories for Canon

At the end of the day, you're looking to buy a camera, not a brand. Each brand has its share of great cameras and complete duds. Don't fall for branding. Do your research on the cameras you want based on the features and capabilities you want. Make your own decision about which camera is the right one for you regardless of brand.

Camera Comparison

does your camera really matter?

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This is a comparison among 4 different types of digital cameras - a semi-professional dSLR, an entry-level dSLR, an advanced compact, and a point-and-shoot - of varying costs. This comparison attempts to elucidate whether the type and/or cost of digital camera used to take a photo makes a significant impact on the final photo assuming proper adjustments in aperture, shutter speed, exposure, etc and post-editing.

Camera: Nikon D80
Type: semi-professional dSLR
Lens: Nikon AF-S DX Zoom Nikkor 18-55mm F/3.5-5.6 G ED II
Megapixels: 10.2 MP
Cost: $1100

Camera: Olympus E-410
Type: entry-level dSLR
Lens: Olympus Zuiko Digital 14-42mm 1:3.5-5.6 ED
Megapixels: 10 MP
Cost: $600

Camera: Konika Minolta dImage Z6
Type: advanced compact
Lens: Built-in
Megapixels: 6 MP
Cost: $200

Camera: Canon Powershot S100 Digital Elph
Type: point-and-shoot
Lens: Built-in
Megapixels: 2 MP
Cost: $50

Aperture: F/5.0
Shutter Speed: Auto - 1/30
ISO: 100
Exp +/-: 0.0
White balance, Tone, Sharpness, Color, and Saturation: Auto
Flash: Off
Post-editing: Curves on GIMP for contrast

Aperture: F/5.3
Shutter Speed: Auto - 1/60
ISO: 100
Exp +/-: 0.0
White balance, Tone, Sharpness, Color, and Saturation: Auto
Flash: Off
Post-editing: Curves on GIMP for contrast

Aperture: F/5.0
Shutter Speed: Auto - 1/80
ISO: 100
Exp +/-: 0.0
White balance, Tone, Sharpness, Color, and Saturation: Auto
Flash: Off
Post-editing: Curves on GIMP for contrast and color

Aperture: Unavailable
Shutter Speed: Unavailable
ISO: 100
Exp +/-: Unavailable
White balance, Tone, Sharpness, Color, and Saturation: Unavailable
Flash: Off
Post-editing: Curves on GIMP for contrast and color

Overall similar results among all cameras. This comparison does not provide a clear-cut answer to whether your camera really matters. Acknowledge the underlying confounding factors such as megapixels, brand, etc, that may affect the results. It is up to you to use this comparison with other resources to come to a final conclusion.

Similar favorite photos taken using each camera
photo taken by camera from left to right: Nikon D80, Olympus E-410, Konica Minolta dImage Z6, Canon Powershot S100 Digital Elph

The Best Beginner Cameras

a guide to finding the right camera for the beginner photographer

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My first camera was the Konica Minolta dImage Z6. It's an advanced compact camera that cost about ~$200 USD back when I bought it. My Minolta for me was an excellent beginner camera and if given the option of rechoosing my first camera I would make the same choice. Unfortunately the Konica Minolta dImage Z6 has since been discontinued. However I still strongly recommend advanced compact cameras in general over dSLRs and tiny point and shoots as the best choice for a beginner camera.

Konica Minolta dImage Z6

Why advanced compact cameras are the best beginner cameras:

1. Advanced features without going overboard - Advanced compact cameras have essentially all the important features dSLRs have including the ability to set the aperture, shutter speed, ISO, white balance, exposure, etc. For beginners particularly, I believe it's very very important to master at least these basic settings before venturing onto features such as shooting in RAW, communicating with slave flashes, and other advanced features more typical of dSLRs. Many tiny point and shoots do not have any of these features and would thus greatly limit the degree of control you have over your photos.

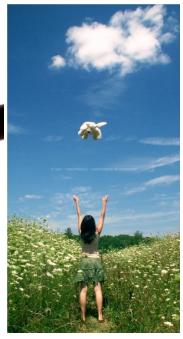
2. Amazing lenses - Most advanced compact cameras have great lenses in the sense that they can zoom really really far (many can do >11x zoom) yet also zoom really really close (using macro mode). With a dSLR, to zoom equally far you would need to purchase a separate dedicated telephoto lens and to zoom equally close you would need to purchase a seperate dedicated macro lens. Plus you'd have to learn how to change lenses, deal with sensor-cleaning procedures if you get dust into your camera, and other maintanence procedures less relevant when you're starting out in photography.

some examples of advanced compact cameras

3. Price - Advanced compact cameras are generally a bit more costly than tiny point and shoots but they are still generally much cheaper than dSLRs. So if you do later decide that maybe photography just isn't for you, your wallet won't be so heavily dented. They're simply less of a financial commitment.

4. Similar look and feel without the complications - The way advanced compact camera look and feel are fairly similar to that of dSLRs. For example, the way an advanced compact camera's pop-up flash is operated is very similar to that of a dSLR. Little similarities like this goes a long way and will make adapting to a dSLR, if you choose to do so in the future, much easier.

Some of my favorite photos taken with my advanced compact camera:



Of course there are always exceptions where circumstances would strongly influence my recommendation. If you know you want to pursue photography as a career or serious hobby right off the bat, maybe it's worth investing in a dSLR in the very beginning since you'll eventually get one anyway. If advanced compacts are really out of your price range, maybe it's better to sacrifice some of the advanced features of an advanced compact and just settle for a tiny point and shoot. Do your research. Read reviews. Judge for yourself.

Ultimately, every camera has the ability to take good photos. Some cameras just make it easier to take good photos than others. Whatever camera you decide to go with, if you think it's a great camera then it will be for you.

Useful Camera Features

features to look for when choosing a new camera
to ensure you'll have the degree of control you need to take great photos

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Advanced lens control

Aperture Priority Mode
- typically designated A or Av
- needed to control depth of field
- used for bokeh (wide aperture), panorama (small aperture), shooting in low lighting conditions (wide aperture), etc

Shutter Priority Mode
- typically designated S or Tv
- needed to control duration of exposure
- used for light painting (slow shutter speed), preventing shutter delay (fast shutter speed), etc

Macro Mode (non-dSLRs)
- typically built into the camera controller or under digital settings
- useful for shooting close-ups and macros

Manual Focusing
- typically built into the lens or under digital settings
- used for focusing in low lighting conditions, focusing in photos with a shallow depth of field, etc

Advanced camera settings

Exposure Compensation
- typically built into the camera as a separate button or under digital settings
- needed to prevent over and under exposure
- used when shooting with backlighting (increase exposure compensation), under low lighting conditions (decrease exposure compensation), etc

ISO Control
- typically under digital settings
- used when shooting in low lighting conditions (high ISO), minimize grain (low ISO), etc

Manual White Balance
- typically under digital settings
- used when shooting in toned lighting conditions, to adjust hues

Accessory capabilities

Adapter Ring (non-dSLRs)
- consult a search engine for the proper adapter ring for your camera model
- needed to attach filters and accessories to a non-dSLR lens

Composition Rules

explained through example

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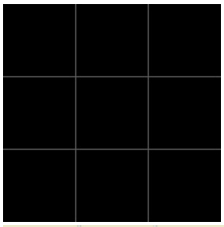
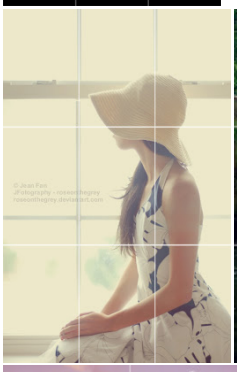
Rule of Thirds

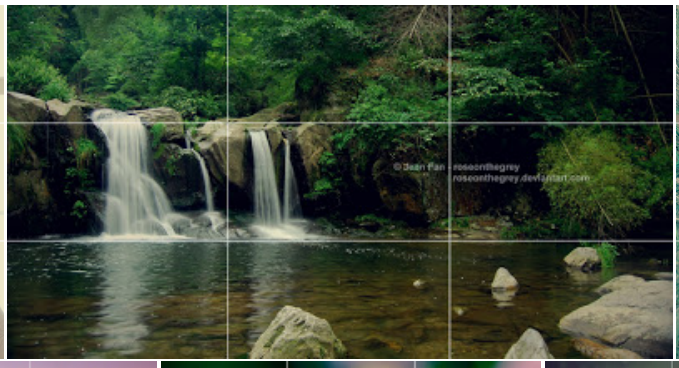


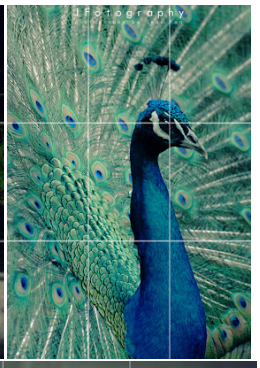
The rule of thirds suggests that an image should be composed as if divided into nine equal parts by two equally-spaced horizontal lines and two equally-spaced vertical lines with important elements of interest placed on or close to these lines or their points of intersection.

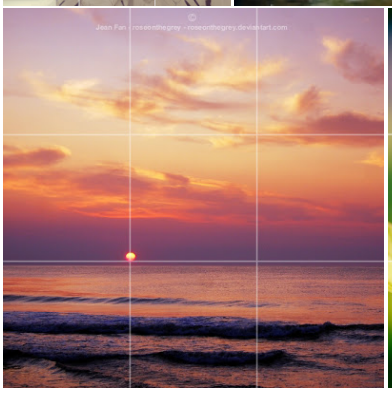
The rule of thirds grid on the left can be overlayed onto images to determine whether the rule of thirds is being satisfied. Below are also various examples that follow the rule of thirds.

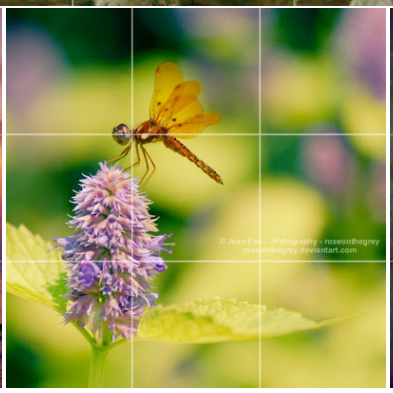
To learn more about the history of the rule of thirds, and the theory behinds its effectiveness or to see more examples of its application, consult a search engine.

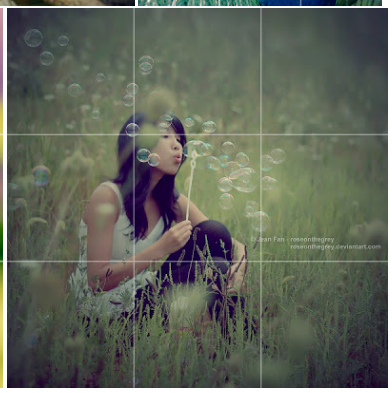




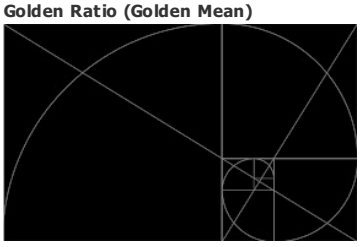








Golden Ratio (Golden Mean)



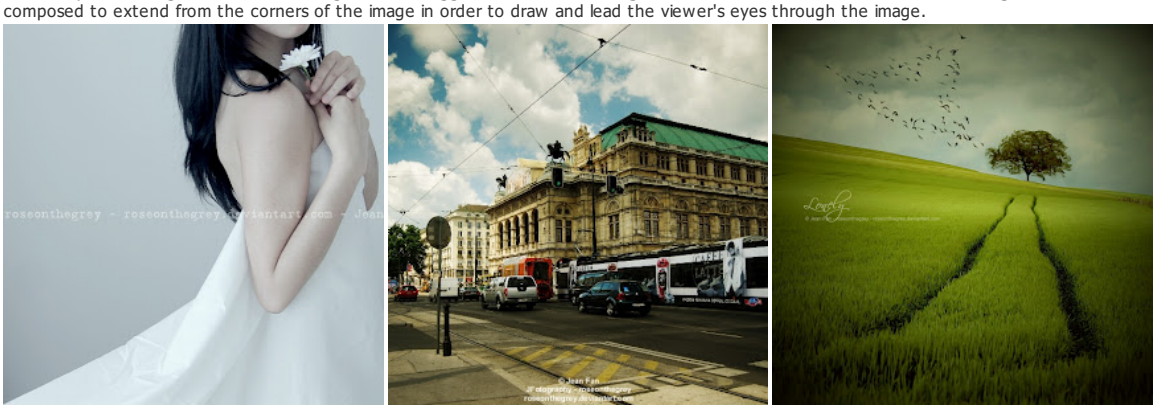
The like rule of thirds, the golden ratio suggests that an image should be composed as if divided into a series of geometrically similar rectangles with important elements of interest placed on or close to these lines formed by the rectangles or their points of intersection.

The golden ratio grid on the left can be overlayed onto images to determine whether the golden ratio is being satisfied. Below are also various examples that follow the golden ratio.

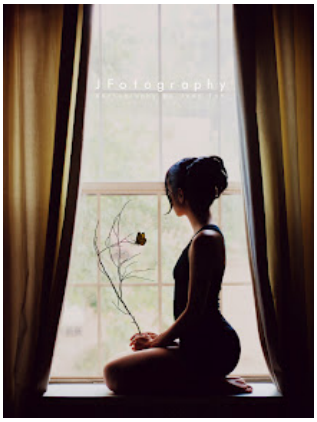
To learn more about the history of the golden ratio and the mathematics behinds its calculation or to see more examples of its application, consult a search engine.

Diagonal Rule
The diagonal rule suggests that important elements of interest should be placed on or close to diagonal of the image.

Leading Lines Rule
A corollary of the diagonal rule, the leading lines rule suggests that the natural geometric elements such as the lines of an image should be composed to extend from the corners of the image in order to draw and lead the viewer's eyes through the image.



Framing Within the Frame
Framing within the frame suggests that an image may be enhanced by using natural elements such as doors, curtains, trees, etc to provide an additional border or enclosure.


Other Composition Rules
Composition rules are not limited to only those explained and demonstrated here. For information on more composition rules such as the rule of odds, rule of space, rule of symmetry and geometry, etc consult a search engine.

Keep in mind that composition rules serve merely as a guide to help you properly compose a photo. Once you become familiar with how to properly compose a photo either through studying these rules or through analyzing photos and seeing what compositions appeal to you, you can compose your photos without referencing these rules. Often you will find that your final compositions intuitively fall close to those dictated by these rules.

Breaking the Rules

explained through example

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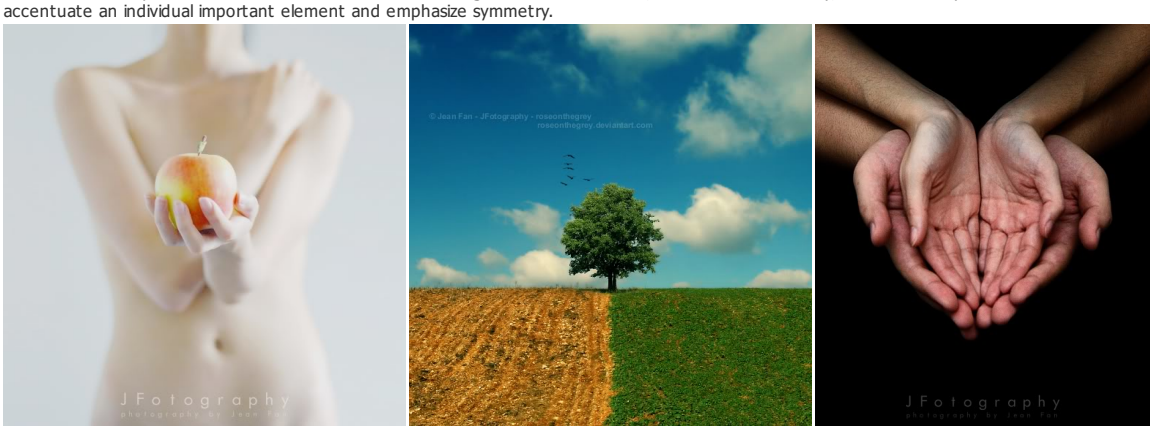
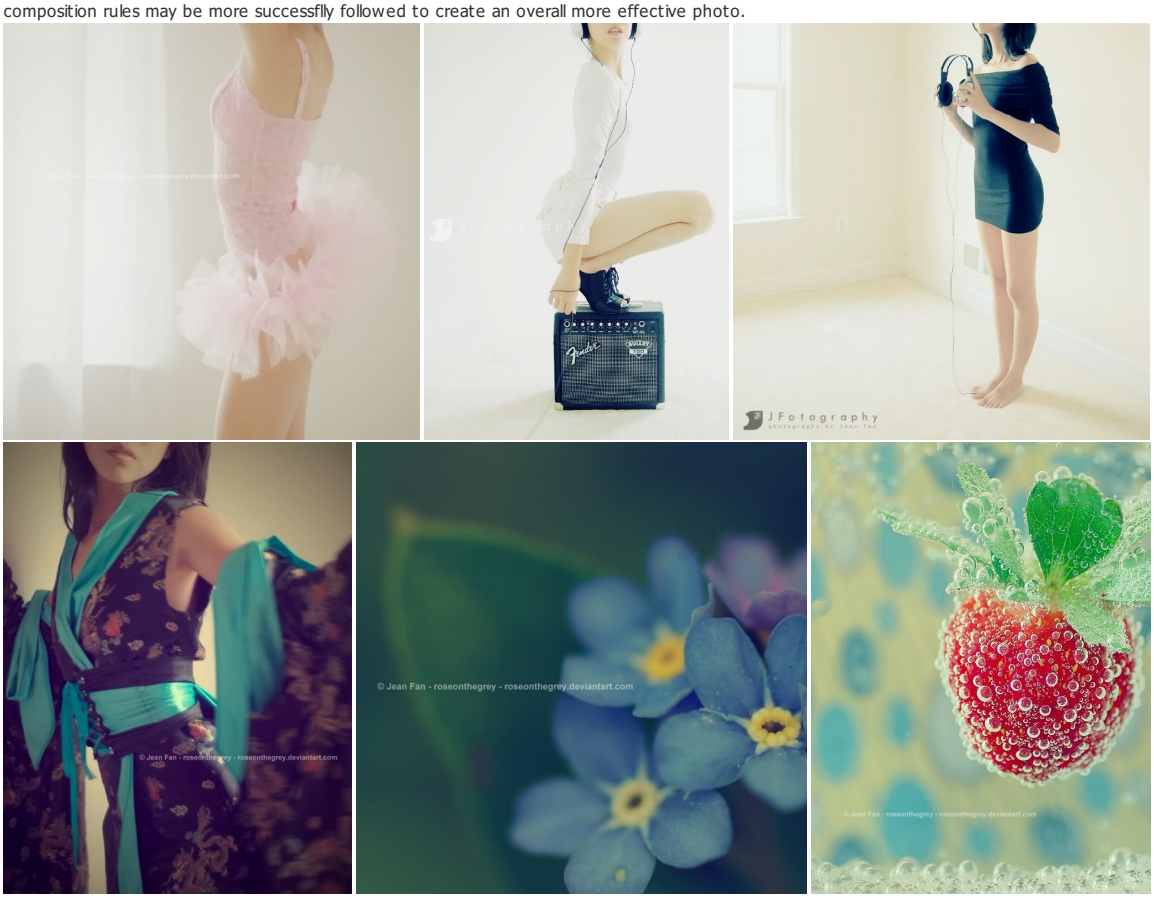
Centered Composition
When used ineffectively, centered composition may be regarded as unimaginative and boring. Composition rules generally recommend employing off centered compositions such as the rule of thirds or the golden ratio. However, when used effectively, centered composition can be used to accentuate an individual important element and emphasize symmetry.



Cutting Off Your Subjects
Composition rules generally recommend including your entire subject in the frame of the photo. However, cutting off your subjects can be used to create a degree of anonymity, to evoke a sense of movement, to convey a feeling of departure, or simply as a compromise so that other composition rules may be more successfully followed to create an overall more effective photo.



Other Ways to Break the Rules
Each composition rule may be followed or broken. These are but a few demonstrations of instances where breaking the rule was desired in order to create a better photo. For more information on instances where breaking the rules may be desired consult a search engine.

Again, keep in mind that composition rules serve merely as a guide to help you properly compose a photo. Ultimately, it is up to you to decide

whether to adhere to these rules or to break them.

Natural Lighting

using the power of the sun (with diagrams)

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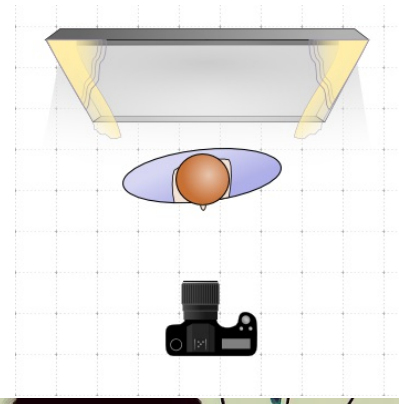
The total luminous energy outputted by a professional studio light set is about 100 to 1000 watts and will easily cost a few hundred dollars. The total luminous energy outputted by the sun and received by earth is about 174 petawatts or 174,000,000,000,000,000 watts and is free.

For Silhouettes Indoors

Pose your model or object directly in front of a window. Add some sheers or light-colored curtains to diffuse the light for more even back-lighting as well as to hide any distracting components visible outside the window.

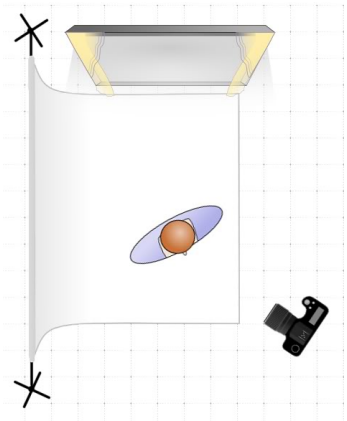
Decrease your camera's exposure bias by -1.0 to -3.0 steps to ensure that the silhouette will be dark. Contrast adjustments will likely be necessary in post-editing to darken the silhouette as well as lighten the background and create better contrast.

To the right is a lighting diagram of the indoor lighting setup I regularly use for silhouettes with some results below.



For Dramatic Indoor Lighting

Use a window like a soft box for some dramatic lighting. Cover all windows except one with a dark curtain such that there is only one light source through one window. Do not cover the one light source window with any sheers in order to allow for harsh shadows and dramatic lighting. Pose your model or object sufficiently far away from the one light source window to prevent a silhouetting effect. Below is a lighting diagram of the dramatic indoor lighting setup I generally use with some results.

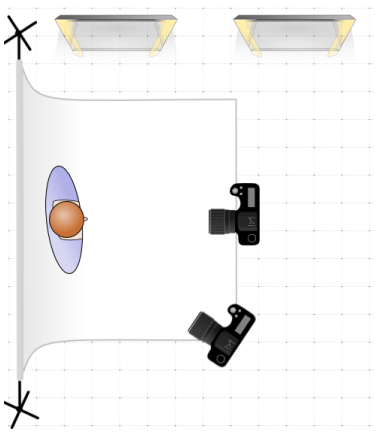


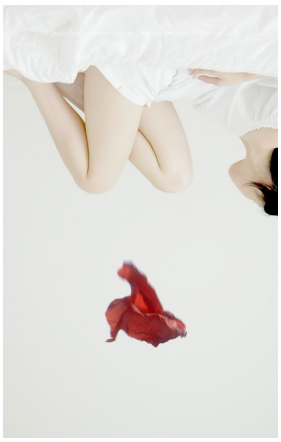
For Even Indoor Lighting

Let the sunlight shine through those windows! More windows, more light. Add some sheers and light-colored curtains to diffuse the light for more even lighting. Light-colored walls will also help create more even lighting by allowing light to bounce.

To the right is a lighting diagram of the indoor lighting setup I regularly use for even lighting with some results.

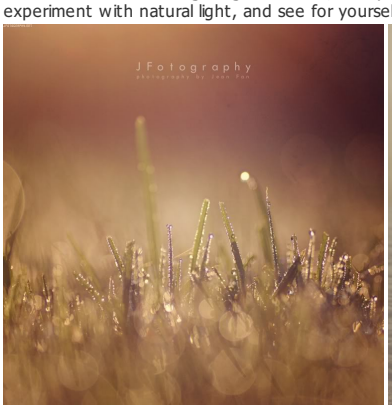
Try adding a backdrop for some color. No need for everything to be so white as in these examples.

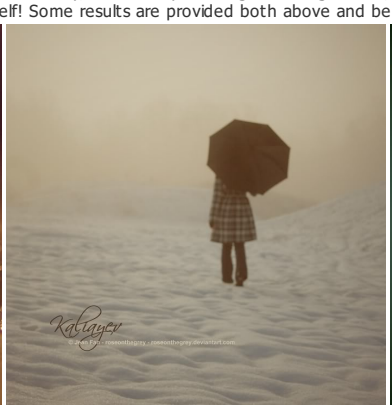




For Outdoor Lighting
Just go outside and start taking photos! There's no better outdoor natural lighting than on a partly cloudy day when the sun is strong enough to ensure no shutter delay but the clouds dense enough to diffuse the harsh rays and provide really nice even lighting.

But all outdoor natural lighting conditions, sunny or cloudy, in the early mornings or at high noon, can have great outcomes. So just go outside, experiment with natural light, and see for yourself! Some results are provided both above and below if you're still not sure.





Other Uses For Natural Lighting
Go experiment with natural lighting. Its uses are definitely not limited to just portraits or the results shown here. The possibilities are endless. Plus there's no cost to you! Use the power of the sun and have fun with it!

Bounce Lighting

using a single, simple flash unit (with diagrams)

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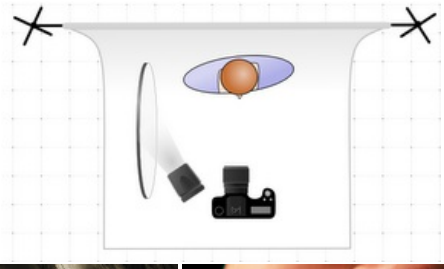
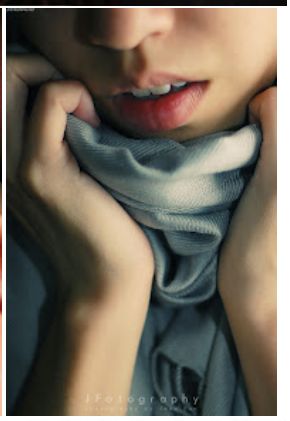
Off the wall!

Direct flash is extremely harsh and often casts unwanted shadows. Try bouncing the flash off of a reflector next to the model for a much softer light.

The following results used an SB-600 external flash unit attached to a Nikon D80 angled towards and bounced off a wall.



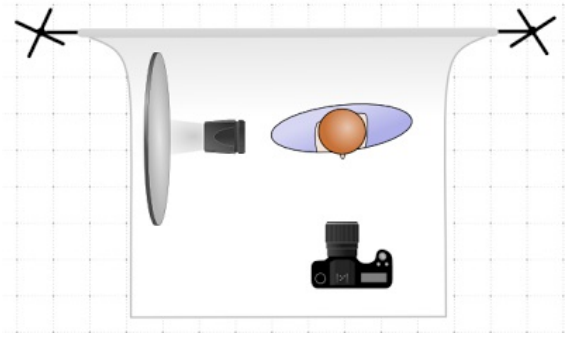


For different lighting effects, try adjusting:

- the angle of the flash unit towards the reflector
- the angle of the model towards the reflector
- the distance between the flash and reflector
- the distance between the reflector and model
- the color of the reflector

Experiment with different angles, distances, and placements! Try it out and see for yourself.

Again, you can substitute a reflector with a wall. The external flash can be attached to your camera or separated and attached to a stand for more flexibility in angle, distance, and placements.



Off the ceiling!

Try bouncing the flash off of the ceiling above the model instead for a much softer and natural looking light as achieved in the results on the right.

This technique works great with an external flash unit or a pop-up flash. Just use a note card to bounce the pop-up flash lighting towards the ceiling. Refer to a search engine for more ways to bounce light with a pop-up flash.

Of course bounce lighting is not limited to portraiture. It's great for any indoor shoot where walls are plentiful or even outdoor shoots where reflectors are available.

Before and After

post-editing comparisons with tips

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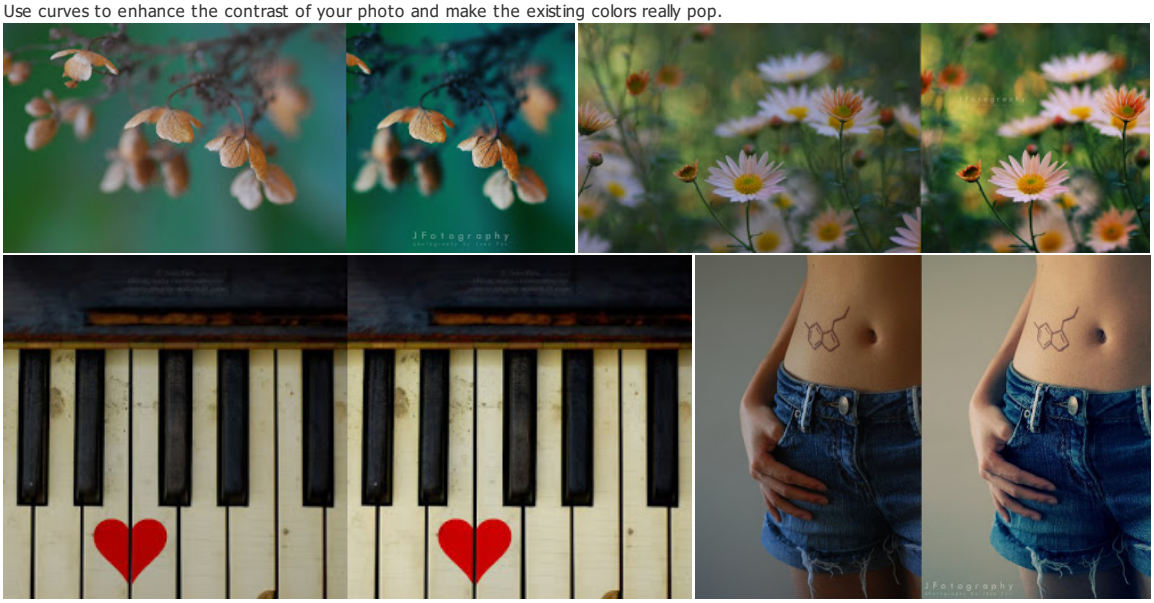
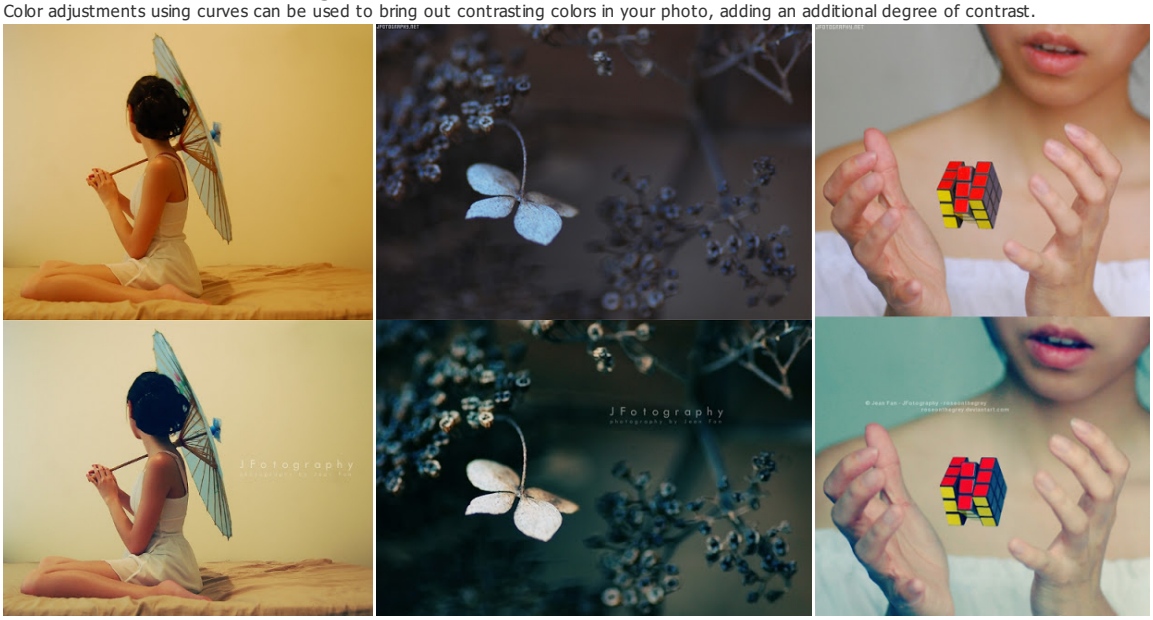
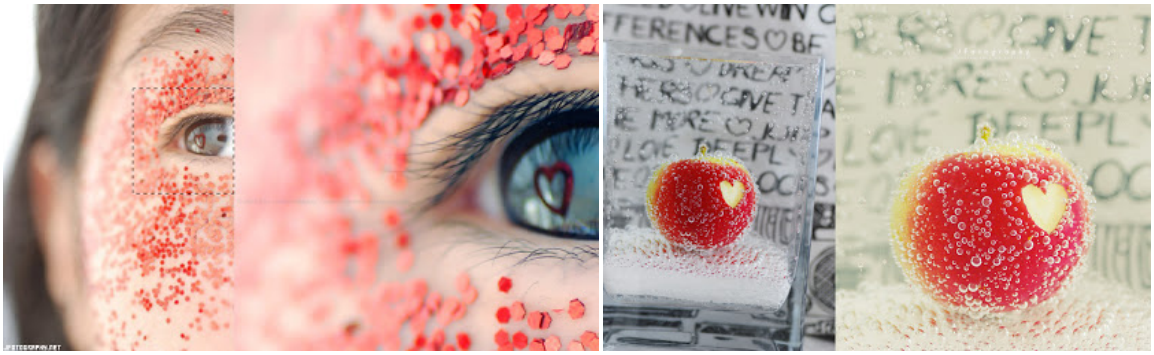
1. A little contrast goes a long way
Use curves to enhance the contrast of your photo and make the existing colors really pop.



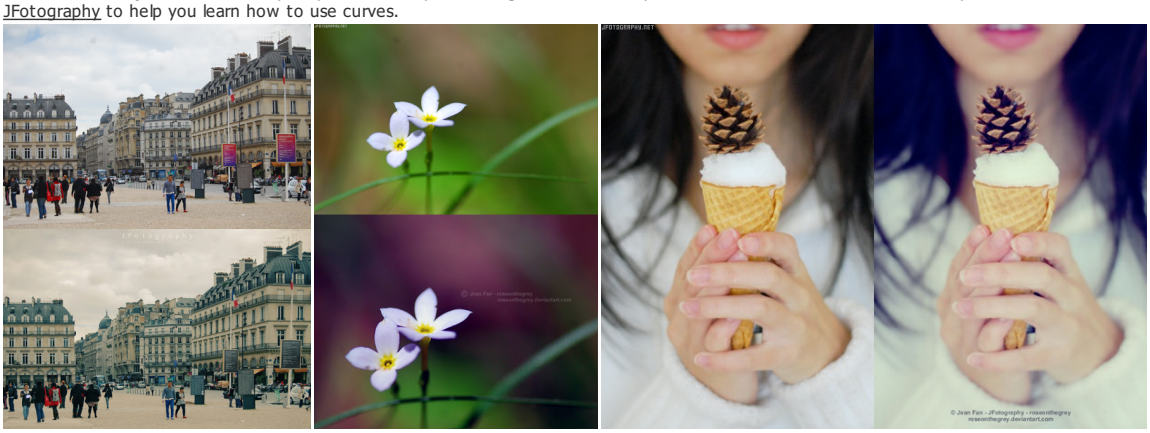
2. Use color to add an additional degree of contrast
Color adjustments using curves can be used to bring out contrasting colors in your photo, adding an additional degree of contrast.



3. Rotate and crop into the proper composition
If you didn't properly compose a photo when it was taken, just rotate and crop the photo into the proper composition perhaps by follow composition rules or perhaps by breaking the rules.



4. Add a touch of color with curves
Use curves to adjust the colors of your photos. Free post-editing actions and scripts are available for download in the scripts/actions section of JFotography to help you learn how to use curves.



5. Clone and heal if necessary
Use the clone and heal tools sparingly to tuck in that shirt, fix up that hair, or remove that small piece of over-exposure in the background. Minimize your use to minimize the chances of a Photoshop disaster or the fake-over-processed look.

More before and after post-editing comparisons
For more post-editing comparisons from JFotography, check out JFotography's Facebook page. You can learn a lot about post-editing just by observing how others post-edit and how a photo may be enhanced through post-editing. So consult a search engine to find more examples.

Warm/Vintage Edit

how to give your photos that warm, vintage feel

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This tutorial teaches you how to post-edit your photos to give them a warm, vintage feel such as in the before and after comparison photo on the left.

This post-editing tutorial was made using GIMP, a free photo editing software. However the terms and techniques used in this tutorial can be generalized to other post-editing software such as Photoshop, etc.

For more post-editing actions and script for Photoshop and GIMP, visit JFotography's actions/scripts section.

Procedure

1. Begin with any photo.

   This photo should already be well tone balanced and contrast edited for best results.

2. Make a new layer. Fill the layer with yellow #fbf2a3.

3. Set the yellow layer's property to MULTIPLY at 70% to 100% opacity.

   The specific opacity of the yellow layer will depend on the colors of your original photo. Adjust accordingly.

4. Make a new layer. Fill the layer with purple #ac56b3.

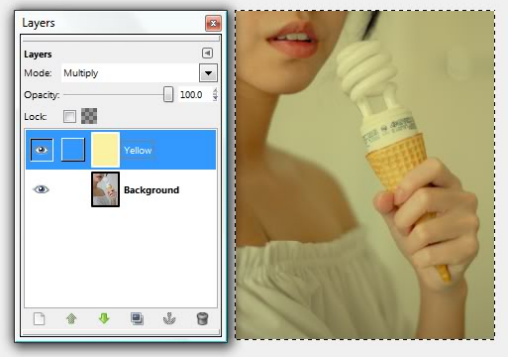
5. Set the purple layer's property to SCREEN at 15% to 30% opacity.

   Again, adjust the specific opacity accordingly based on your photo's original colors.

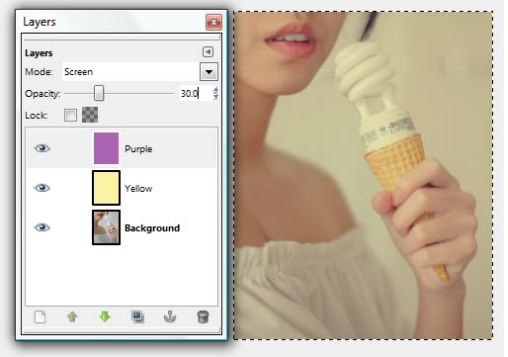
6. With some minor contrast adjustments, you should get your desired final result. Re-adjust the layer opacities as needed.

Results

Yellow #fbf2a3



Purple #ac65b3



DIY Backdrops

simple backdrop solutions with things from around your home

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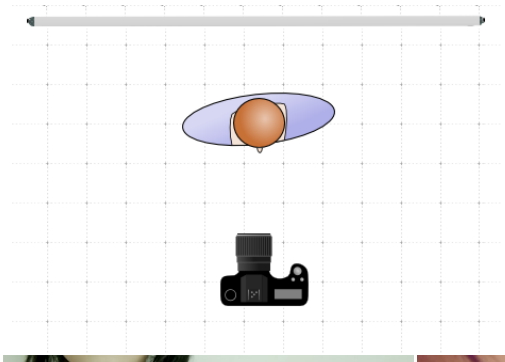
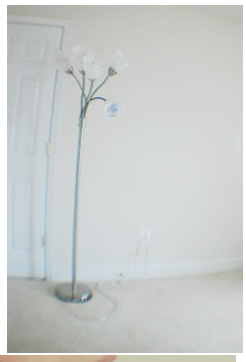
Just a Wall!

Perhaps the simplest backdrop is the plain ol' boring wall. It's simple, it's clean, it works. If less is more, the plain wall is probably as minimalistic as you can go.

If you don't a super large wall, don't worry. Just pose your model or object closer to the wall. For head shots, you won't even need more than a 3 feet by 3 feet wall clearing.

Simple painted and wallpapered walls work too. My walls just happen to be white.



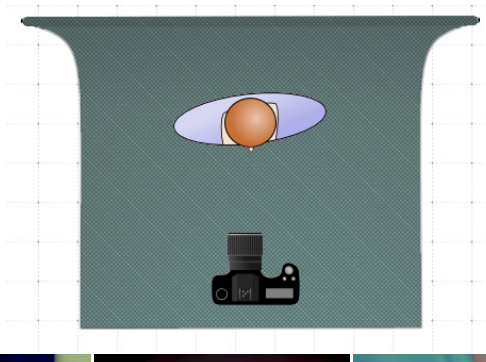


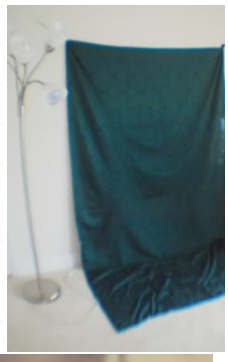
Fabric Backdrops

Fabric backdrops are simple, cheap, alternatives to professional muslin backdrops.

They're really convenient if you don't have a clean wall; just drape fabric over a door or hang it from the ceiling. And there's a lot of variety to choose from, so it's easy to change the color to whatever suits your photo.

Plus, most fabric backdrops don't cost you a thing: just recycle your bed sheets, a blanket, that couch throw, or even a large shirt.



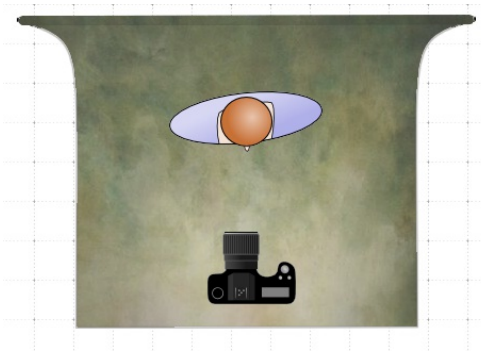


Muslin Backdrops

The most common backdrop is the muslin backdrop. You can handpaint or tie-dye your own. Refer to a search engine to find tutorials on how to make your own muslin backdrops.

I purchased my muslin backdrop on Ebay for $35 as seen on the right.

Muslin backdrops are classic. If you are looking into portraiture, a nice handpainted muslin backdrop is a worthwhile investment.



DIY Light Tent

all you need is paper

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You will need
- 4 pieces of white paper
- an external flash (preferably) for lighting

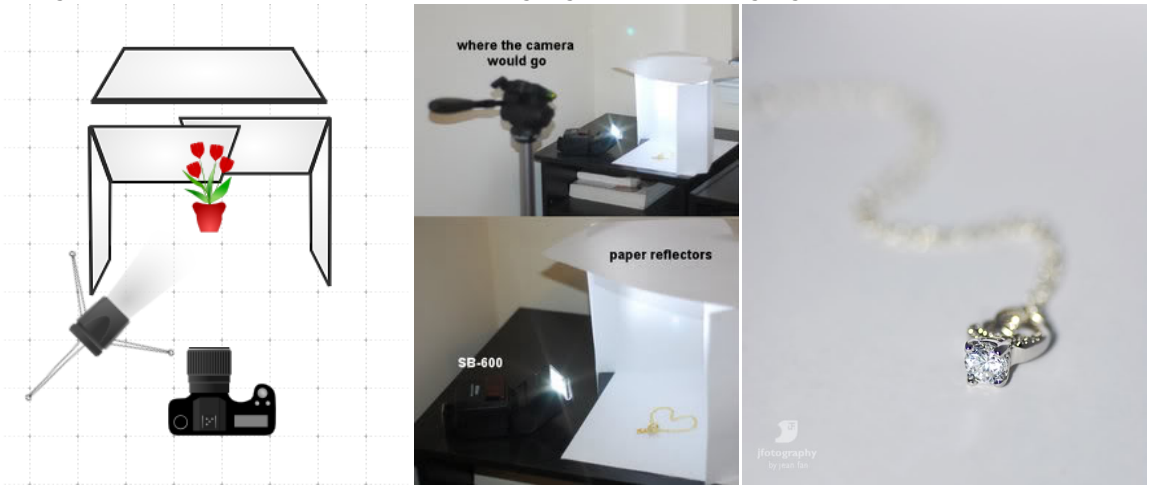
Procedure
- Fold 2 pieces of paper to create the sides of the light tent
- Stack 1 piece of paper on top and place 1 piece of paper below

Tips
- Try arranging the pieces of paper at different angles to allow the light to bounce and diffuse differently for different effects

Results (light tent diagram → light tent constructed → results using light tent)

1. Using an external flash unit attached to the camera

2. Using an external flash unit not attached to the camera allowing for greater control of the lighting



3. Using natural lighting

Too simple? Add your own spin!

These simple paper light tents have worked well for me for the few times I've had to do product photography or stock photography with objects isolated from the background.

There are many more DIY light tent tutorials available online. Some are more complicated but durable, some require more craftsmanship while others are simpler. All you have to do is search a little:
- How to make an inexpensive light tent
- IKEA Hackers DIY light tent
- and more

Home Made TLR Camera

a practical introduction to optics and how to build your own TLR camera

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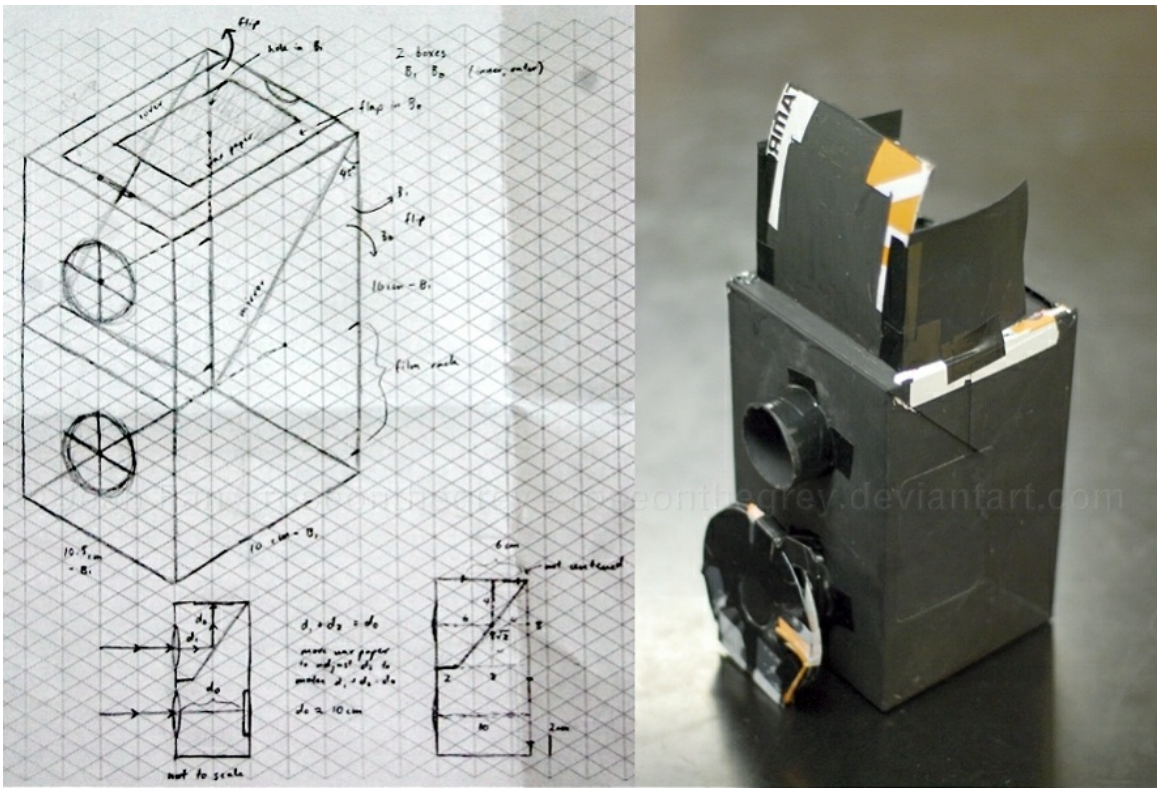

This project took me about 2 weeks to design and build the camera, 2 to 3 days per week, about an hour or two per day. It is not a hard project but it will require some attention to detail particularly for preventing serious light leaks, simple calculations such as the Pythagorean Theorem for proper focusing, and of course patience especially when taking photos.

Background
In Optics class we were assigned to make from scratch a functional film camera out of whatever supplies were available in the Research and Engineering room and from home.

For my camera, I went with a twin lens reflex (TLR) design so I wouldn't have to deal with the moving mirror component were I to have chosen a single lens reflect (SLR) design.

Unlike an SLR, a TLR uses two objective lenses at the same focal length. One lens is used for the viewfinder system (viewfinder lens) and the other is used for taking the photo (photographic lens). For more information on TLRs, see Wikipedia.

Camera Body (exterior)
I used my Tamron 90mm F2.8 lens box as the basis for the camera. The good thing about the Tamron box is that it has two layers of boxes, originally for better protection of the lens. Two layers also helps prevent light leaks. The box design also allows for easy opening and closing of the camera for film replacement. I also considered using wood to make a box for the basis of the camera. However, I was working on a time limit and figured cutting wood would take a lot longer than cutting cardboard. If you have the time, I suggest using wood for a more durable product since cardboard falls apart with prolonged use.

The entire box was painted black. The inside was painted black to absorb and prevent internal reflections of light were any light to get in. The outside was painted black for aesthetic purposes.

Lenses
For the lenses, I used two double convex lenses with a focal length of about 105mm. Double convex lenses can be purchased online for about $5. If you buy them online, the manufacturers will probably tell you the focal length. Old glasses should also make decent lenses. You will just have to do calculations to determine the focal length. An easy way to estimate the focal length of your lens is to hold the lens up to a light source such as a window. Allow light to go through the lens and project an upside-down image of the window onto a piece of paper. Move the piece of paper or lens until the image of the window comes into focus. When the image comes into focus, measure the distance from the paper to the lens and that will be your estimated focal length. Having a friend help is strongly suggested. If you can't get the projected image onto the paper or if the projected image is so small you can't tell if it's focused, try adjusting your distance to the window. For more information, find an introductory optics lab assignment.

The lenses were attached to wrapping paper rolls like really thick toilet paper rolls. Two holes were cut in front of the Tamron box to fit the wrapping paper rolls. Simple calculations were made to determine where the holes should be cut. The holes should be cut such that the distance traveled by light entering through the viewfinder lens, bouncing off the internal mirror, and up to the viewfinder is the same distance as the distance traveled by light through the photographic lens to the film. See the bottom left portion of the drawing above for more detail. This ensures that the focus seen through the viewfinder lens is a proper estimate of the focus achieved by the photographic lens and that will

appear on film.

The wrapping paper rolls fit tightly into the holes in the Tamron box as to not allow light leaks but were still theoretically movable to allow focusing. However, both lenses were not designed to move simultaneously. This is something that should be fixed in the future. For now, just treat it like a fixed focus TLR.

Viewfinder
A hole was cut out of the top of the Tamron box. Translucent wax paper covered the hole to make the viewfinder. Do not use transparent plastic wrap or normal white paper. The translucent wax paper allows light to pass through diffusely such that light entering the viewfinder lens can properly project an image on to the viewfinder.

Note cards were used to surround the viewfinder on three sides to prevent reflections and get better contrast on the viewfinder.

Camera Body (interior)
The inside of the camera was divided into upper and lower compartments with cardboard and a lot of black tape. Light must not be exchanged from upper to lower compartments and vice versa. Preventing light leaks from the top compartment to the bottom compartment does take some time, trial and error but it is necessary. Otherwise light will leak in from the top compartment to the lower compartment where your film is stored and ruin the film.

In the upper compartment, an internal mirror was attached at a 45 degree angle to reflect the incoming image from the viewfinder lens to the viewfinder. Again, place the mirror such that the distance traveled by light entering through the viewfinder lens, bouncing off the internal mirror, and up to the viewfinder is the same distance as the distance traveled by light through the photographic lens to the film

The lower compartment housed the film which would capture the incoming image from the photographic lens. The image that appear on the viewfinder from the viewfinder lens was assumed to be negligibly close enough to the image that was captured on film from the photographic lens. However, there are still some differences between the two images simply due to the different placements of the two lenses so proper composition is fairly difficult.

Shutter
A rubber-band loaded leaf shutter was made from three floppy disks, rubbed bands and black tape. The shutter was attached in front of the photographic lens with a lot of black tape. I kept the shutter on the outside since putting the shutter inside would require more cutting, potentially causing light leaks. I won't describe how the shutter was made since you can find that general information on Wikipedia under *Leaf shutters*. The only difference between my design and the Wikipedia described leaf shutter is I used rubber bands to pull instead of springs to push the leaf blade.

And that's essentially how to make a twin lens reflex camera.

Taking Photos
Photos were taken on generic 3.5x5 (5x7 cut in half) B&W sheet film. I forgot the exact brand, but you can find them at B&H:[link] . If you don't want to buy sheet film, you can use normal roll film too. You will have to cut the film into small manageable pieces in a darkroom.

To take a photo, in a darkroom cut the film and secure it in the camera. I just put some tape on the back of the film to secure it to my camera. Make sure your camera does not have any serious holes where light may leak in before you exit the darkroom. All film handling should be done in a darkroom to prevent ruining the film. But you do not need a professional darkroom. We just used our classroom and turned all the lights off except for one safe light. At home, I just use a dark closet. Then just open the shutter to take one photo and return to the darkroom. I strongly suggested that you develop your own film for more instant gratification. It took me a couple trials and errors to determine the proper exposure time.

Photos taken using the TLR I made

Set Up For Bubbly Photos

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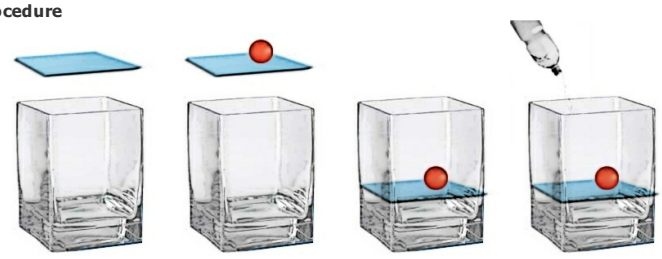
You will need

- A clear container (such as a square vase)
- An object to make bubbly (such as a fruit)
- Optional: some Styrofoam and a needle to secure the object to prevent floating
- And the key ingredient responsible for all the bubbles: some **plain seltzer water/carbonated water/sparkling water/etc** (you can also use sodas but because of their sugar content, clean-up can get quite sticky)

Procedure



1. Cut a rectangular piece of Styrofoam that is a bit bigger than the clear container. The bigger size will allow the Styrofoam to push against the container. The resulting tension should hold the Styrofoam in place.
2. Place the object on the Styrofoam piece at the desired location. Secure the object in place with a needle, small nail or pin. The needle should penetrate the object at an angle to most effectively secure the object and keep it from floating. Bending the needle will also help secure the object.
3. Push the Styrofoam into the square vase. Be careful not to crack the Styrofoam! Push on the sides and edges of the Styrofoam for the best results. Use a pencil or blunt object to help with deeper containers. Adjust and cut the Styrofoam as needed.
4. Add the seltzer water. Wait a few minutes for bubbles to form. The longer you wait, generally the larger the bubbles. Do not shake or move the square vase! Movement will keep bubbles from forming on the object's surface.
5. Set up your camera, preferably on a tripod and shoot. A macro setting or macro lens is preferred. If you do not have a macro lens, a small magnifying glass can create a great macro effect.

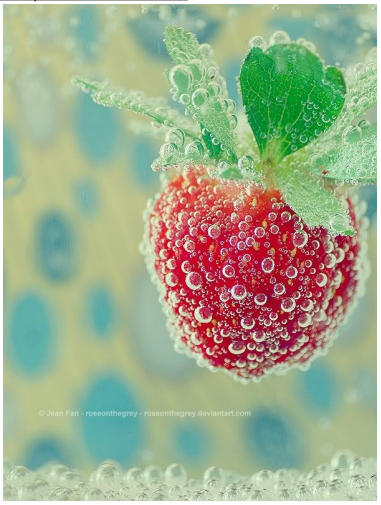
Set up with strawberries pinned on Styrofoam pushed into a square vase, a background placed behind the vase, towels lining the vase to assist in clean-up, and of course seltzer water ready to be applied.

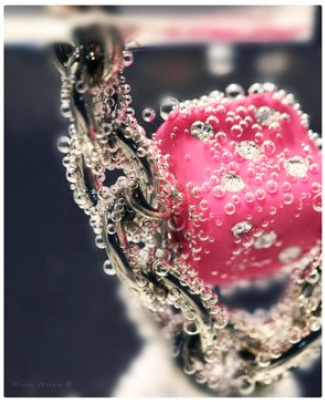
Tips

- Try letting your object just float in the seltzer water!
- If you must use a soda, pick a soda that does not have food coloring. Food coloring tends to make the water appear really murky (so choose Sprite not Mountain Dew).
- Clean your vase! With proper lighting and cleaning, the glass of the vase should not affect the picture noticeably.
- Bubbles can form on the sides of the vase. If they do, just brush them off with a pencil of straw.
- Line your vase with towels to assist in the clean-up.

Results

If you've taken a photo using this tutorial and would like your work featured here, feel free to share your results with us.




Light Painting with Portraiture

combining light painting with portraiture using slow sync flash

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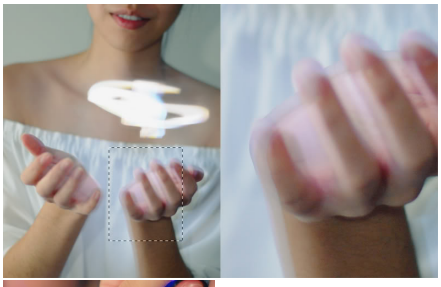
You will need

- **a camera with Shutter Priority or Manual Mode**
  - Your camera should be equipped with a shutter priority and/or manual mode. Refer to your camera's manual or a search engine for more information.
  - You will need either of these modes to control your camera's shutter speed and exposure duration for the light painting component.

- **a Built-In Flash or External Flash + Slow Sync Mode**
  - Your camera should be equipped with a slow sync mode capable of communicating with either its built-in flash or any external flash unit. Refer to your camera's manual, your external flash's manual, or a search engine for more information.
  - Your will need a flash to assist with the portraiture component.

- **a Tripod**
  - Since a slow shutter speed and long exposure will be used, a tripod is necessary to help prevent any unwanted motion blur.
  - Consult JFotography's tutorial on How to Take Self-Portraits for tips on choosing the right tripod for you and your camera.

- **a Movable Light Source**
  - A small LED light is recommended though a flash light, laser, or cell phone will also work.
  - You will need this movable light source for the light painting component.



Above: 6. Limit movement after the initial flash to prevent motion blur.

Left: 7. Introduce the movable light source after triggering the flash, else the hand moving the light, etc, will be visible.

Below: Tip. Try using different light sources. Below: white light = cell phone blue light = extension cord

Procedure

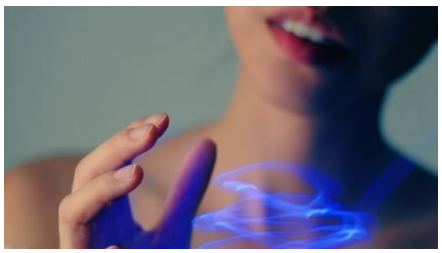
1. Pose the model to the desired position.
2. Set your camera to either Shutter Priority or Manual mode.
3. Set a slow shutter speed. 10 to 30 seconds should be sufficient.
4. Set your flash to Slow sync mode.
   - This will allow you to trigger the flash at the beginning of the exposure to capture the model prior to the introduction of the movable light source.
5. Turn off all lights such that the room or studio is completely dark.
   - Any additional lights to the flash and movable light source will cause over-exposure.
6. Take the photo and start the long exposure.
   - Note this is when the flash should also go off.
   - The model will appear non-blurry in the final photo due to this initial flash.
   - The model should remain relatively still for the duration of the long exposure since the movable light source will be hitting the model and registering on the camera sensor.
7. Introduce the movable light source after the light from the flash dissipates.
8. Wave the movable light source around the model for the duration of the long exposure.
   - The path of the light will be "recorded" by the camera sensor and will appear in the configuration in which the light was waved.
   - Achieving the proper configuration of the light path will likely be what takes the most amount of time to get right.
   - Try to keep the light source moving for the entire long exposure. That way, the hand waving the light and other extraneous components on the light source such as cords will not end up in the photo.

Tips

- Remember if light does not hit an object, the object cannot register on the camera sensor and will not be visible in the photo. If you're still confused about how this technique works, think about how a camera sensor or even your eye reacts to light or a lack of light. Or consult a search engine to learn more about how camera sensors or your eyes work.
- Try using different light sources for different light intensities and effects.
- Light painting and slow sync flash by themselves are common and fun techniques worth trying out. Consult a search engine for more information, examples, and tutorials for just light painting and/or just slow sync flash.

Results

- Camera model: Nikon D80
- Lens: Nikon AF Nikkor 50mm F/1.8D
- Focal length: 50mm
- Mode setting: Manual Mode
- F-stop (aperture): f/1.8
- Exposure time (shutter speed): 10 seconds
- ISO speed: ISO-100
- Exposure bias: 0 step
- White balance: auto



- Flash maker and model: Nikon SB-600 AF Speedlight
- Flash setting: Slow
- Lighting technique: bounced flash light
- Flash trigger: IR remote (not necessary)

- Movable light source: extension cord LED light

- Number of trials to achieve desired configuration of the light path with sufficiently minimal motion blur: 40 shots

- Post-editing program: GIMP 2.6.5

Take Self-Portraits

portraits of yourself by yourself

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You will need

- **a Tripod**
  - Although many light-weight aluminum tripods are cheap (less than $10), they are not made to support heavier cameras. If you have a small point-and-shoot then a lightweight aluminum tripod will work just fine. If you have a heavier advanced compact camera or DSLR, you will need a heavier and generally more expensive tripod.
  - If you have a heavy camera, do not skimp and try to use a cheaper, lighter tripod. When you set your camera on your tripod, run in front of the camera, and a breeze comes by, your tripod will likely tip and your camera will break.
  - Consider a tripod with quick release plates so you don't have screw and unscrew your camera onto your tripod every time.

the tripod I use: the SUNPAK 7500-pro with quick release

- **a Self-Timer**
  - Your camera should be equipped with a self-timer function. Refer to your camera's manual for more information.
  - Note that when using the self-timer, your camera will not autofocus when you are in front of the camera. The focus is set when the timer is set.

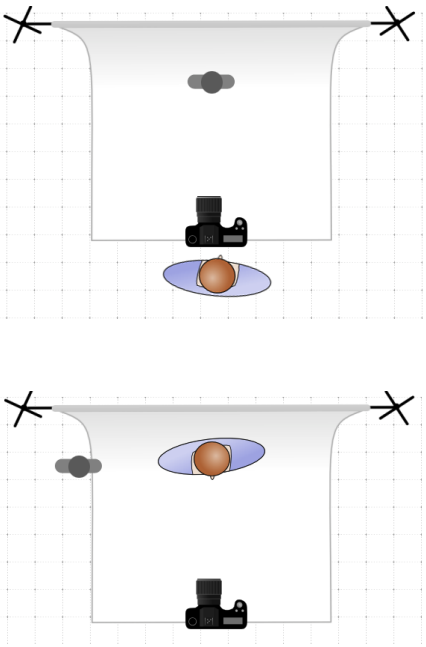
- **an IR remote** (recommended)
  - An IR remote allows you to trigger the camera shutter and, more importantly unlike the self-timer, focus when you are in front of the camera.
  - I recommend IR remotes over cabled remote controls for self-portraiture. IR remotes may have a lower success rate in triggering the shutter compared to cabled remotes but they can go a lot further and, of course, there are no ugly cables to get in the way.
  - Consult a search engine for more differences between IR and cable remote controls to see which choice is right for you and your needs.
  - Consult a search engine for the IR remote suited for your camera brand and model.

the IR remote I use: the ML-L3

- **a Placeholder** (recommended especially with self-timers)
  - When using self-timers, put the placeholder where you will be to assist with achieving the proper focus and composition.
- **Mirrors** (optional)
  - For closer self-portraits, place a mirror behind the camera, angled such that you can see the LCD screen from in front of the camera as you pose to help with composition.

Procedure

1. Put a placeholder and aim your camera towards where you will be.
2. Compose the shot and adjust the focus accordingly from behind the camera.
3. Set and activate the self-timer if you're using a self-timer. Leave enough time to get in front of the camera and pose.
4. Then get in front of the camera, toss the placeholder aside, take its place, and pose.
5. Trigger the IR remote if you're using an IR remote.
6. Check the photo you just took.
7. Adjust your pose and repeat if necessary.



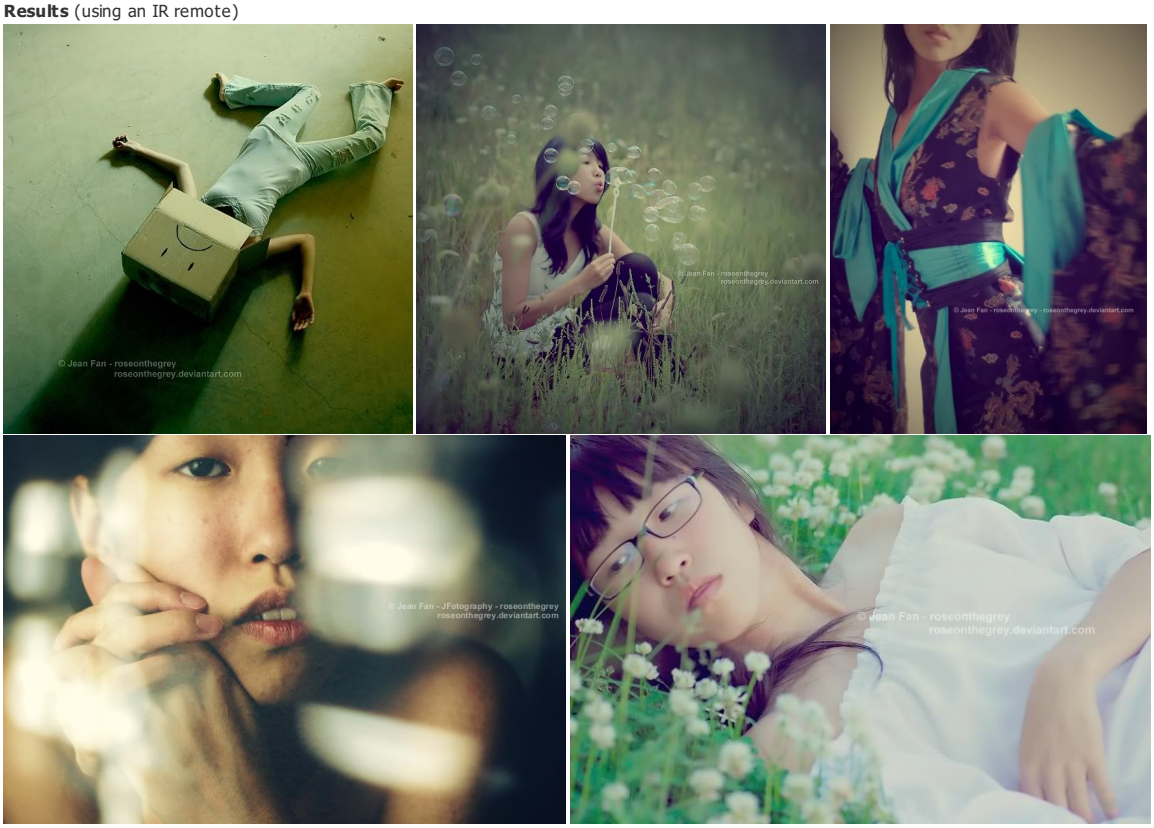
Tips

- If you still end up with a blurry photo, try using a smaller aperture for a deeper DOF.
- Use a wider lens and include more in each photo than what you want in the final photo. Then crop into the proper composition in post-editing.
- You will most likely have to repeat this procedure many times to get the desired composition.

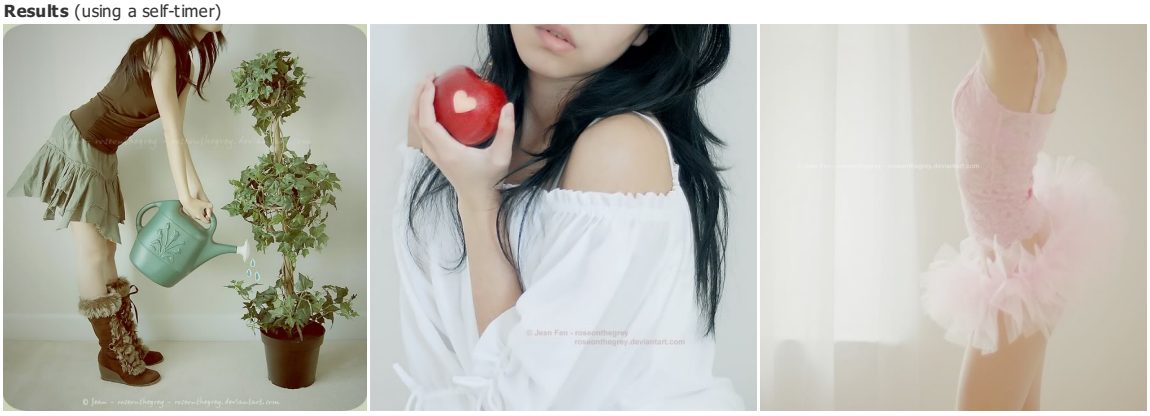
Repetition is easiest with an IR remote. Just pose, click, alter your pose slightly, click, and repeat, each time altering your pose slightly and hopefully one shot will result in the desired composition. Repetition is more difficult with a self-timer and will require a lot of systematic trials. Set your timer, pose, then see how the photo turns out. If it's not in the composition you want, set your timer, then pose in basically the same manner but slightly adjusted based on how the last photo turned out.

- Try using an IR remote with a 2 second timer. Activate the timer with the remote and place the remote aside. Now you can use your hands freely in the composition as opposed to having to hold an ugly remote.

Results (using an IR remote)



Results (using a self-timer)



Levitate Small Objects

even in low lighting conditions with slow shutter speed

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To make an object appear as if it is levitating, you could simply toss an object and take the photo while it's still in midair. These shots are generally referred to as actions shots and require very fast shutter speeds.

For more information on action shots, consult a search engine.

The action shot depicted on the right was taken at f/1.8, ISO 800 with a shutter speed of 1/320th of a second.

However, shutter lag when attempting to take action shots will often result in unwanted blur. You can generally achieve a sufficient shutter speed by widening the aperture, raising ISO, etc. But sometimes, the lighting conditions are just too low to take action shots. Or maybe you hate raising ISO because it causes grain. Or maybe your widest aperture is not wide enough. Whatever the reason, this tutorial explores a way to compensate for all that and "fake" an action shot by using clear strings.

You will need

- clear strings (such as fishing strings)
- a place to hang or hook the string (such as from the ceilings)

Procedure

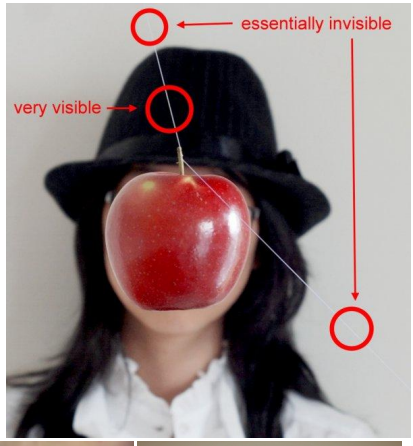
- Instead of tossing the object and trying to take a photo of it while it's in midair, tie it to some clear strings and hang it from the ceiling.

Tips

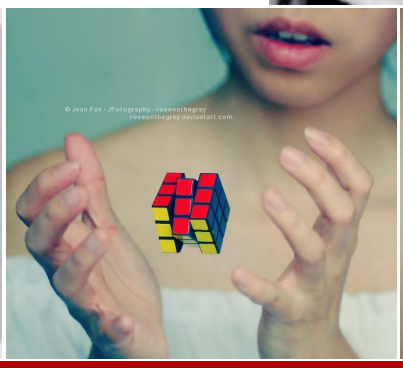
- Clear strings are nearly invisible against a light background.
- Or you may just edit the strings out in post-editing.

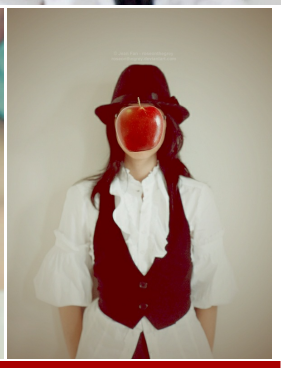
Notes on Benefits and Limitations

- The benefit of using fishing strings is that the object stays in place. Therefore achieving the desired composition a lot easier.
- However, fishing strings do have many limitations. They can't be used outdoors. Some objects are too heavy. Setup can be difficult. For those types of shots, fast shutter speed is still the way to go.



Results





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Photograph Eye Reflections

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You will need

- An object to reflect
- A macro lens or a camera with a macro setting
- A strong light source (such as a large window on a sunny day)
- A tripod (if you are doing this alone)

Procedure

1. Sit close to a strong light source.
2. Make sure your sitting arrangement allows light to directly hit the object you intend to reflect for the best reflection.
3. Hold or place the object you intend to reflect to the side of your eye. The object should be facing the light source.
4. Adjust the object's distance from your eye accordingly depending on your object's size for the desired composition of the reflection. For most house-hold hand-sized objects, hold the object directly against the side of your face for the best results.
5. Look towards the side of your face, towards your ear, keeping the object you want to reflect in your peripheral vision. This will allow the object to form a reflection in the dark iris portion of your eye as opposed to the white scelera portion.
6. If you are doing this shot alone and using a tripod, keep the camera at roughly arms length for best results.

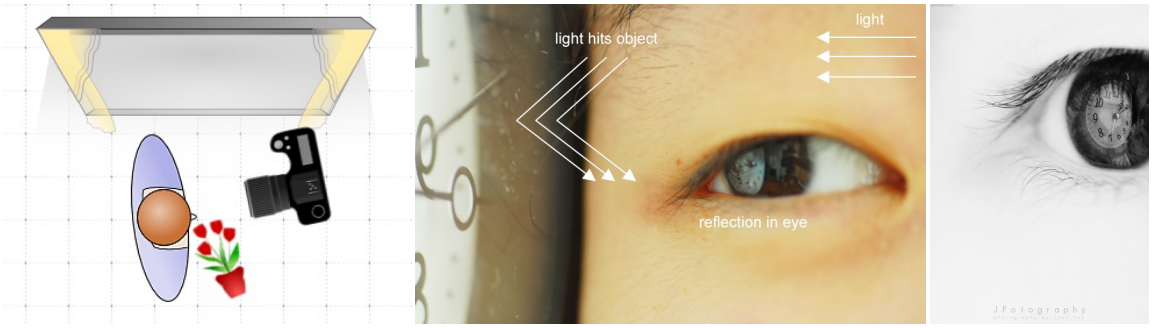
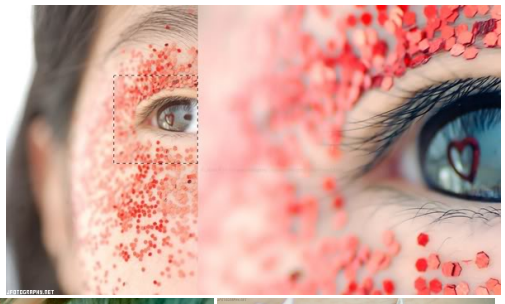


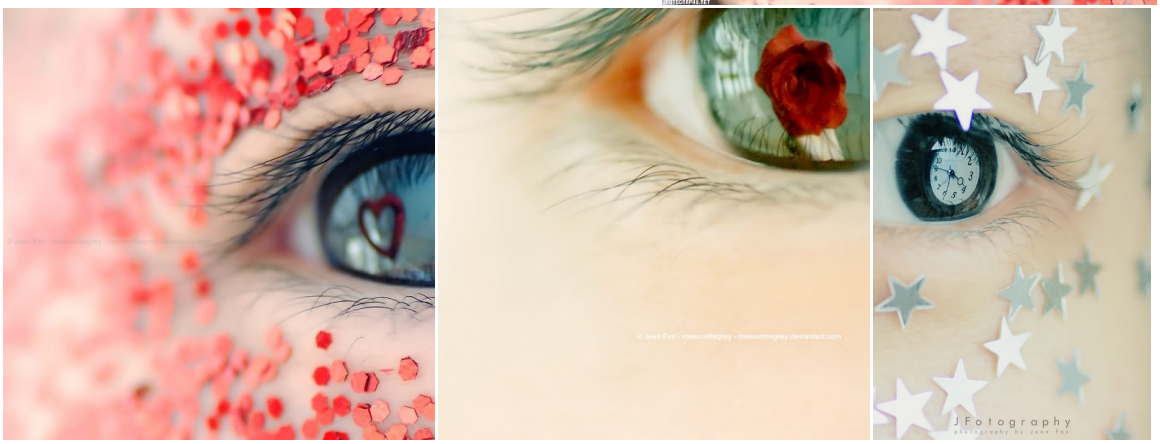
diagram of set up → graphical explanation of technique → final result after many repeated trials

Tips

- Though it is very helpful to have a friend with you to help you with composition, you can do this by yourself with a tripod and repeated trials. Keep your camera and tripod at arm's length to simplify and speed up the process.
- Experiment with your angle and the angle of the object you intend to reflect with respect to the light source. Progressively turn towards the light source and see if it improves the reflection.
- You will likely need to crop the final image into the proper composition as seen in the image on the right.
- Try this outside on a sunny day!



Results



Forced Perspective with Bokeh

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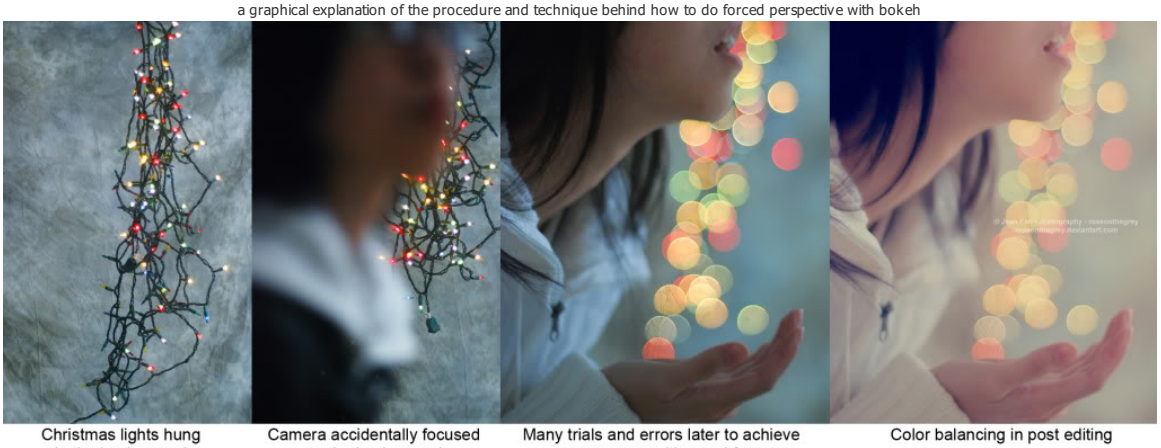
You will need

- **Christmas lights (Holiday lights, Noel lights)**
  - Christmas lights will appear as bokeh "bubbles" viewed from an unfocused camera.
  - Use ties and hooks to arrange the Christmas lights into the desired shape.
  - The photo comparison on the right depicts Christmas lights when the camera is focused on the lights and then unfocused.
  - For more information about bokeh, consult a search engine.
- **a wide aperture lens (f/1.4 to f/2.8 recommended)**
  - A wide aperture is necessary to achieve the shallow depth of field so that the foreground (where the model is) will be sharp while the background (where the Christmas lights are) will be blurry thereby creating bokeh bubbles.
  - The photo comparison on the right demonstrates the difference between taking a photo at f/2.8 vs f/22.
  - For more information on how aperture relates to depth of field, consult a search engine.
- **a Tripod and a placeholder (optional)**
  - Consult JFotography's tutorial on How to Take Self-Portraits if you are doing this kind of shoot alone.

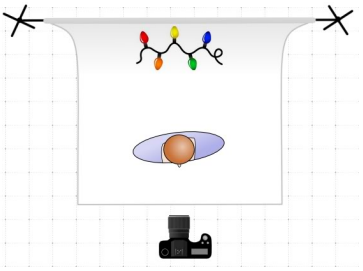
a graphical explanation of the procedure and technique behind how to do forced perspective with bokeh

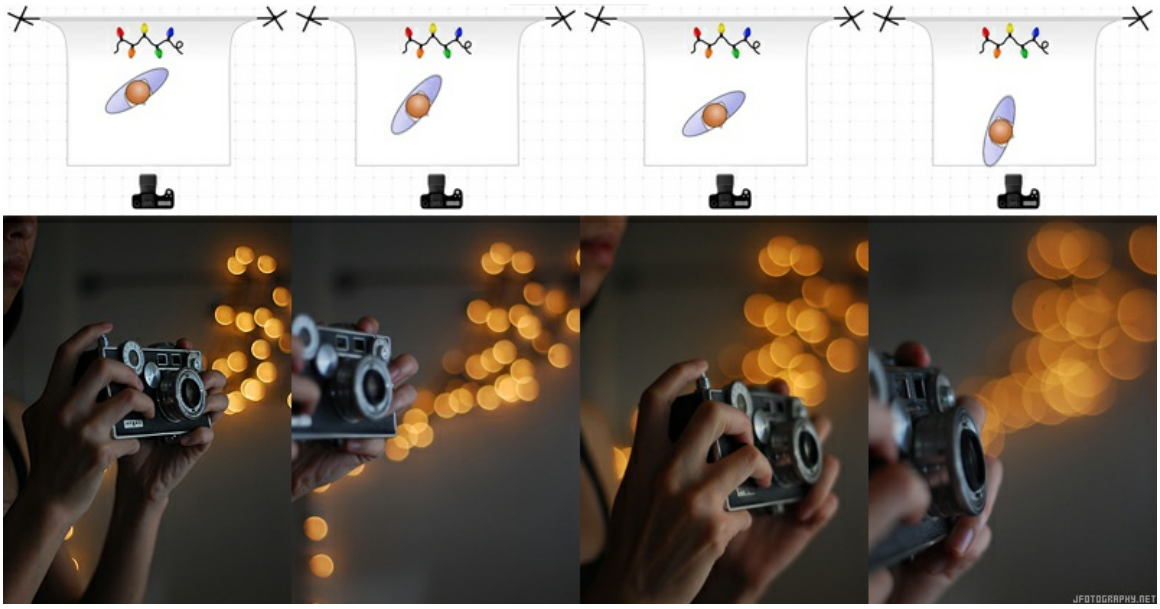


Christmas lights hung in the background | Camera accidentally focused on the background | Many trials and errors later to achieve proper composition and focus | Color balancing in post editing

Procedure

1. Setup the Christmas lights in the background.
2. Position the model (or object) at least a few feet in front of the Christmas lights.
3. Focus your camera on the model.
4. Christmas lights should now appear as bokeh bubbles through the viewfinder. If not then, widen your aperture, increase the distance between the Christmas lights and the model and/or decrease the distance between the model and the camera. Then refocus the camera on the model.
5. Compose your shot through the viewfinder to see the bokeh bubbles. The rest is just some creative composition to integrate the bokeh bubbles with the model's pose.





a graphical explanation on how adjusting the distance between the model and the Christmas lights then refocusing the camera affects bokeh

Tips

- If you're doing this kind of shoot alone, a placeholder can help determine where you should stand relative to the camera and Christmas lights to achieve the best bokeh. Consult JFotography's tutorial on How to Take Self-Portraits for more information.
- Make your own aperture disk (as seen on the right) or purchase them online to get custom shaped bokeh. For more information on how to make your own aperture disk for custom bokeh or the optics behind why this technique works, consult a search engine.

Results

If you've taken a photo using this tutorial, feel free to share your results with us or on JFotography's Facebook page.