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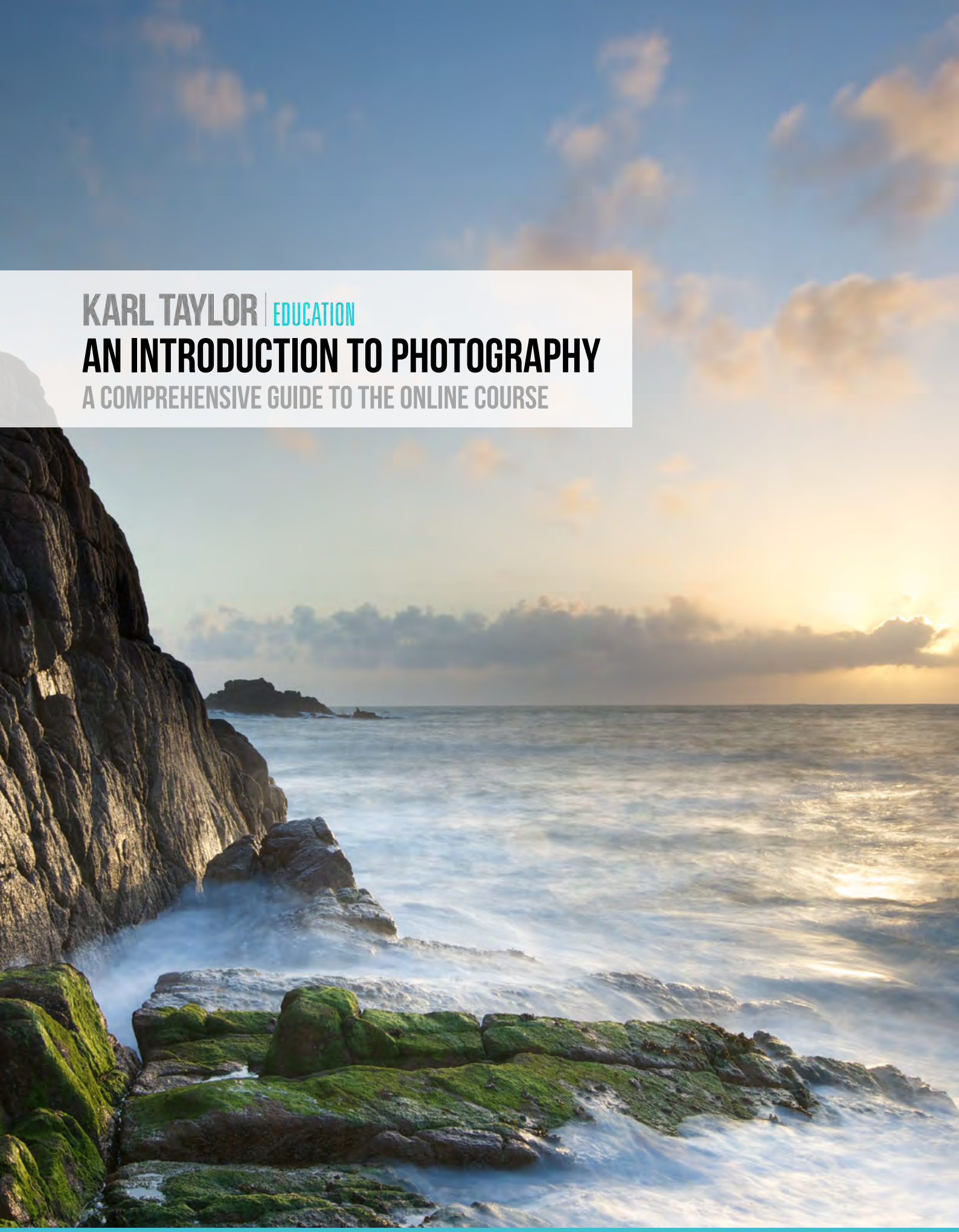
AN INTRODUCTION TO PHOTOGRAPHY

A COMPREHENSIVE GUIDE TO THE ONLINE COURSE



An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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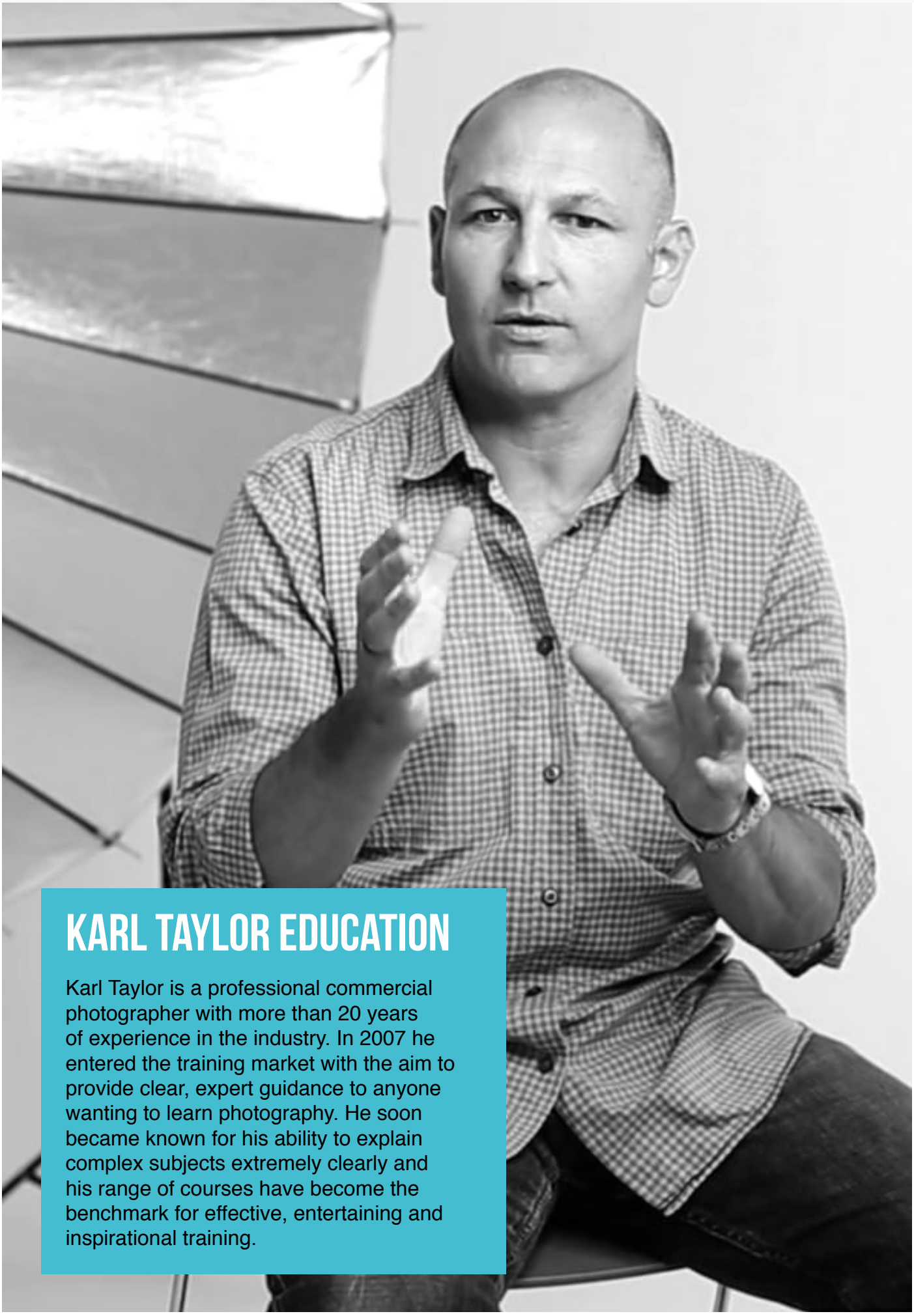

KARL TAYLOR EDUCATION

Karl Taylor is a professional commercial photographer with more than 20 years of experience in the industry. In 2007 he entered the training market with the aim to provide clear, expert guidance to anyone wanting to learn photography. He soon became known for his ability to explain complex subjects extremely clearly and his range of courses have become the benchmark for effective, entertaining and inspirational training.

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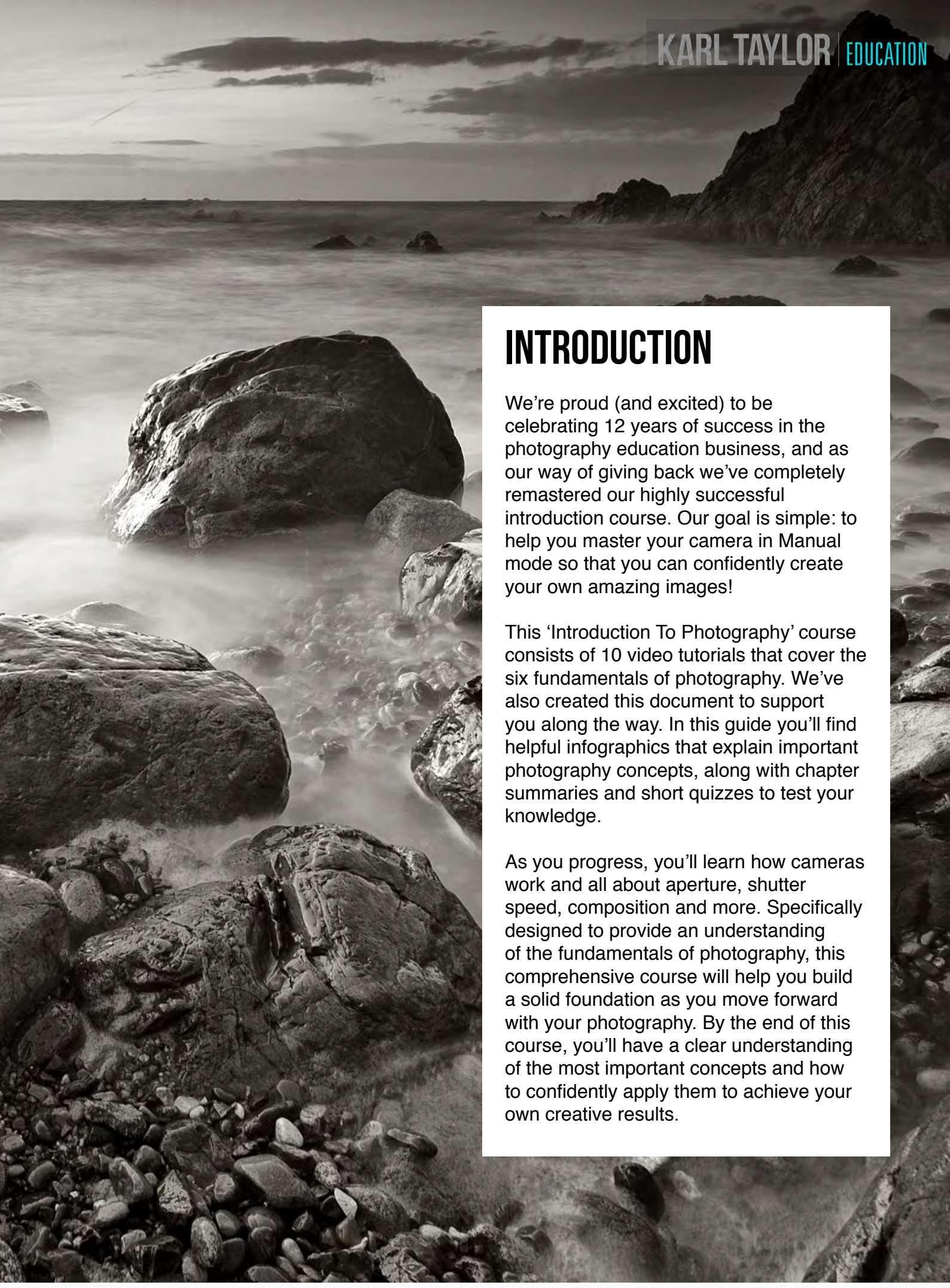
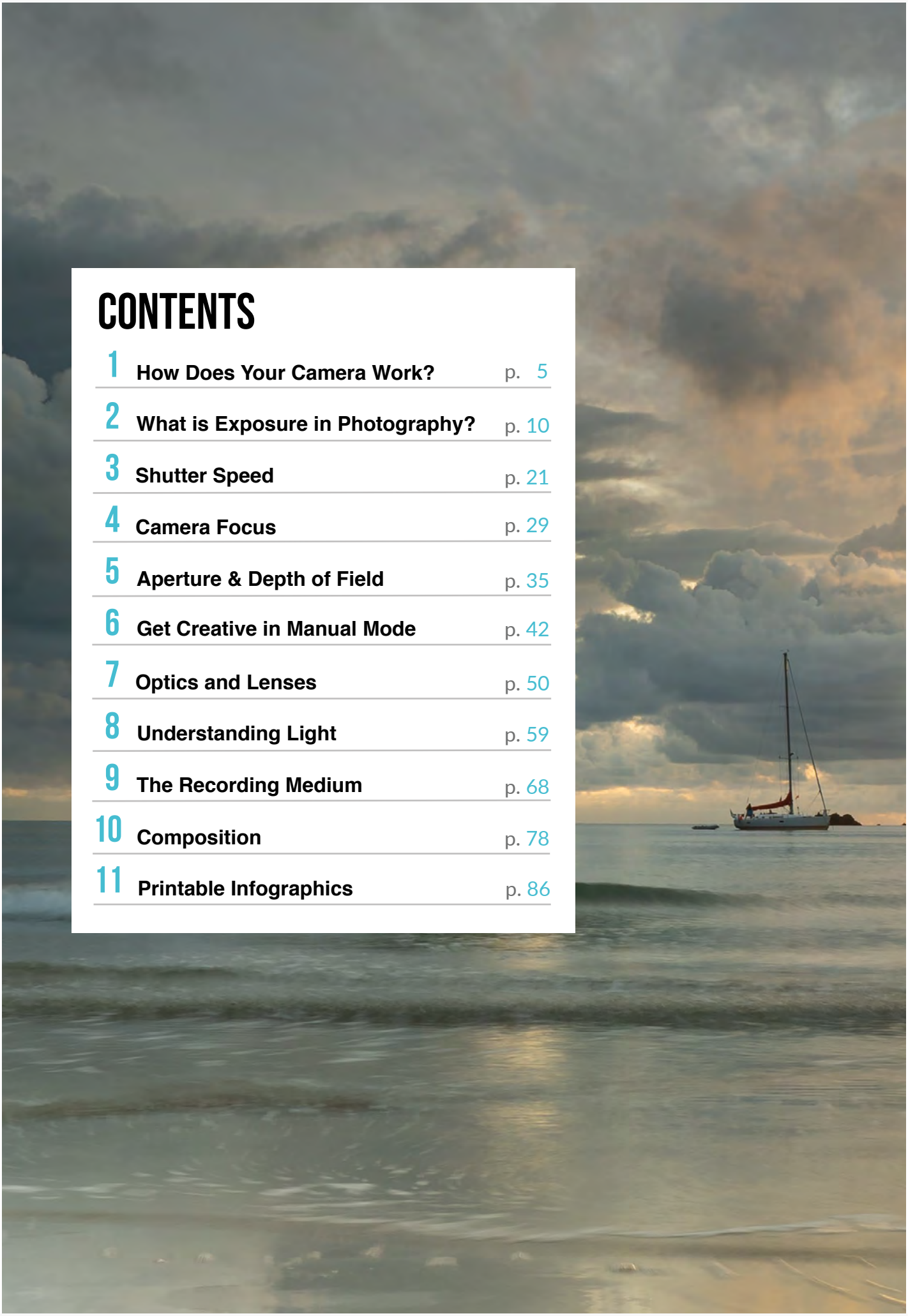


INTRODUCTION

We're proud (and excited) to be celebrating 12 years of success in the photography education business, and as our way of giving back we've completely remastered our highly successful introduction course. Our goal is simple: to help you master your camera in Manual mode so that you can confidently create your own amazing images!

This 'Introduction To Photography' course consists of 10 video tutorials that cover the six fundamentals of photography. We've also created this document to support you along the way. In this guide you'll find helpful infographics that explain important photography concepts, along with chapter summaries and short quizzes to test your knowledge.

As you progress, you'll learn how cameras work and all about aperture, shutter speed, composition and more. Specifically designed to provide an understanding of the fundamentals of photography, this comprehensive course will help you build a solid foundation as you move forward with your photography. By the end of this course, you'll have a clear understanding of the most important concepts and how to confidently apply them to achieve your own creative results.



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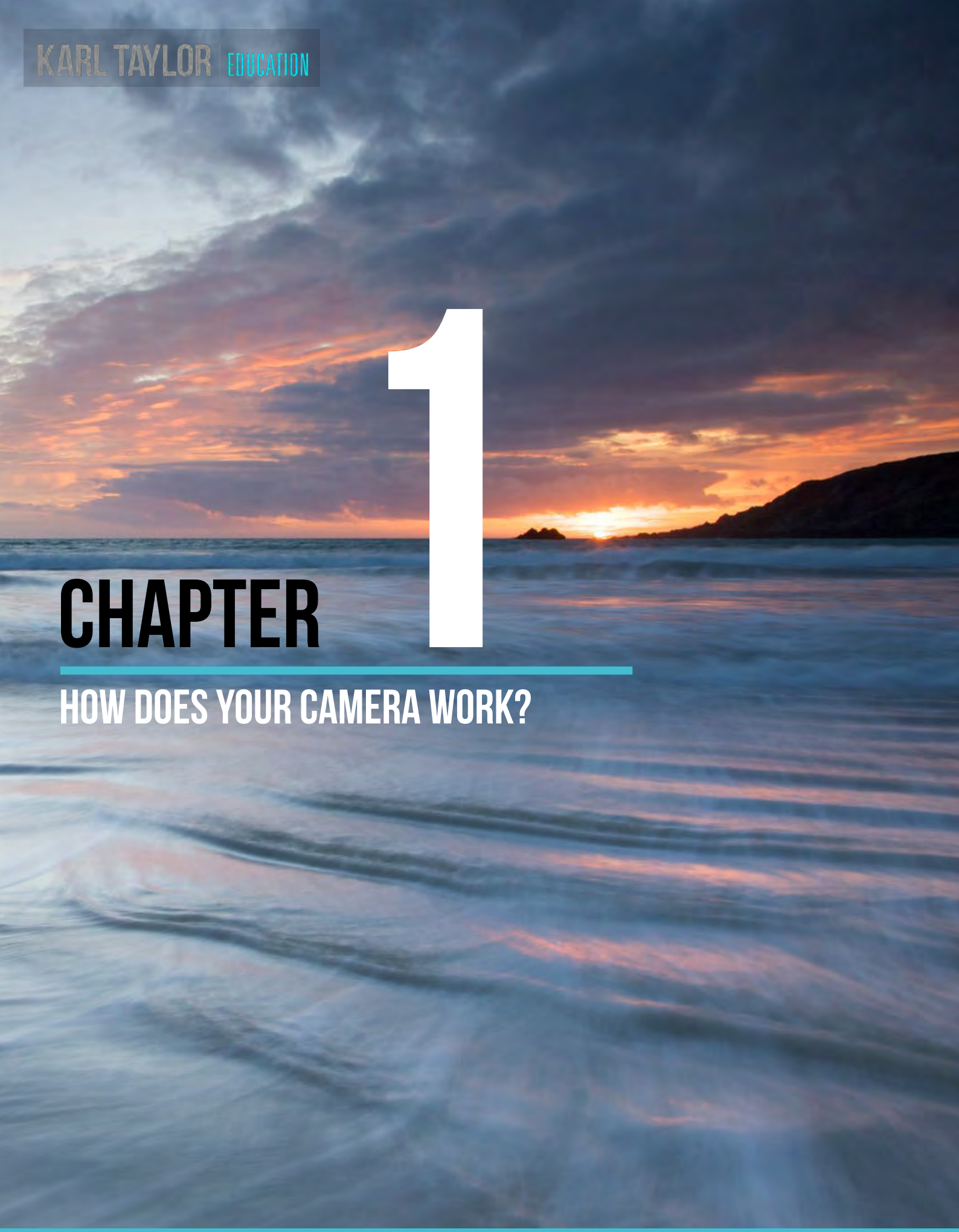

CHAPTER 1

HOW DOES YOUR CAMERA WORK?

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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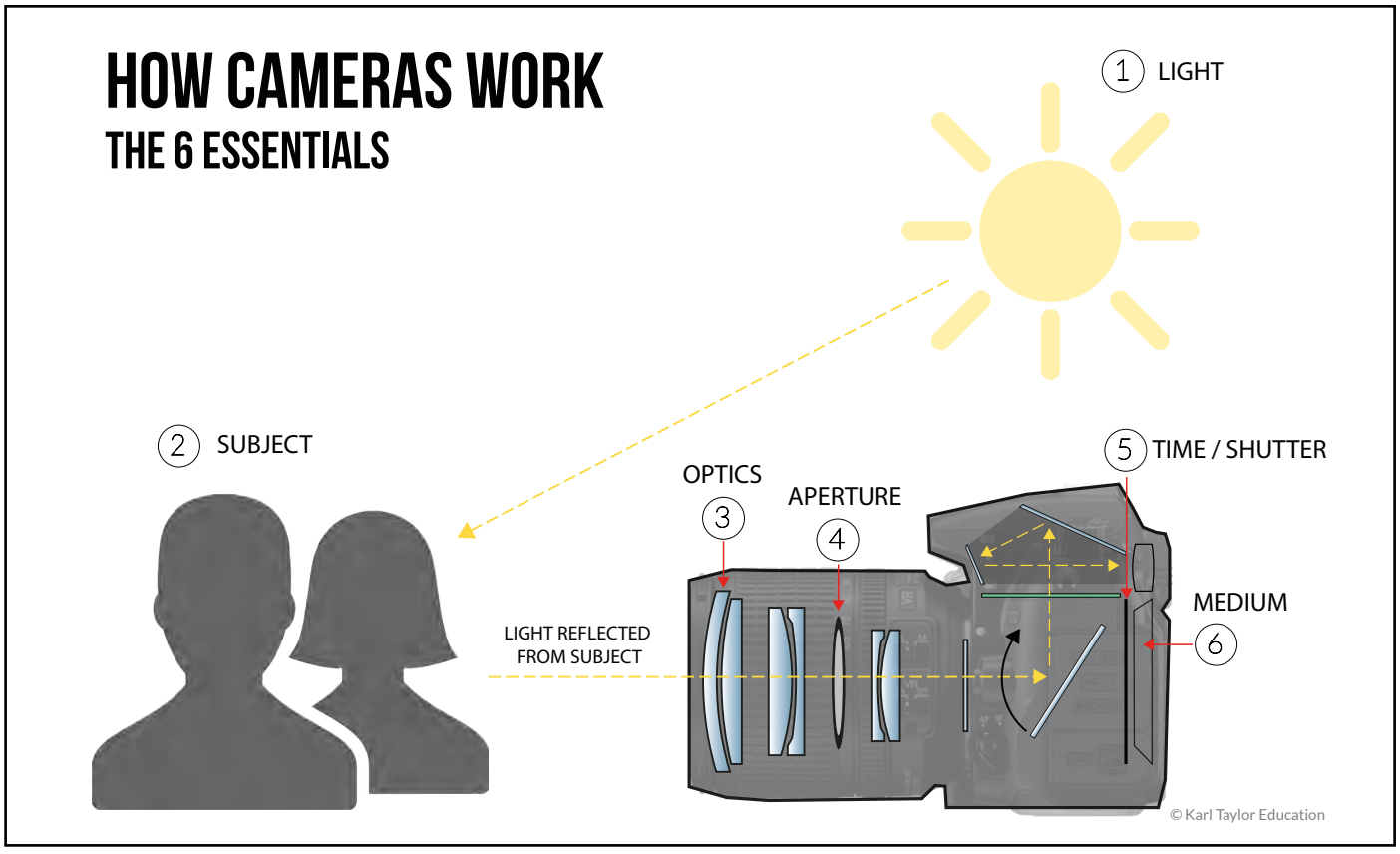
HOW DO CAMERAS WORK?

A frame from video chapter 1

THE SIX ESSENTIALS

Over time we've seen great advancements in photographic technology: cameras have shrunk to fit in our pockets, film has largely been replaced by digital and mirrorless is quickly growing in popularity. But despite these changes, cameras (no matter the cost, brand or format) still all work in roughly the same way. This can be broken into six essentials. These are: light, subject, optics, aperture, time and the recording medium. To record an image we require at least one or a combination of these six things, and throughout this course you'll see how these relate to the photographic process and how we create images. To start, we need light to record an image. This light reflects off the subject before entering the optics (or lens) and passing through the aperture. This light then hits a mirror, which bounces the light up into a prism and out through the viewfinder. Mirrorless cameras have done away with mirrors and instead have an electronic viewfinder (EVF) that creates a preview of the image. Regardless of what camera you're using, the light then has to be recorded for a certain amount of time (controlled by the shutter) before it is recorded by the medium. By pressing the shutter button, light passes through the shutter to be recorded by the medium.



1 - LIGHT

Light is an essential part of an image, and there are many different types of light. Each of these can be used to create different moods or feelings in an image. As photographers, our job is to control this light to get the best results.

A frame from video chapter 1

2 - SUBJECT

The subject is what we photograph and how we arrange elements within the frame. The subject, which also relates to composition, narrative and emotion, can be anything, and we can use compositional guidelines to create the image.

A frame from video chapter 1

3 - CAMERA OPTICS

Optics, or lenses, are what focus the available light so that it can be recorded by the medium. Different types of lenses each have their own characteristics that control the focal length, the angle of view and magnification of an image.

A frame from video chapter 1

4 - APERTURE

The aperture refers to a hole in the lens that light passes through before reaching the recording medium. Symbolised by the letter ‘f’, it controls how much light is recorded and the depth of field (how much of the picture is sharp) in an image.

A frame from video chapter 1

5 - TIME

The shutter speed refers to how long the shutter remains open and is recorded in seconds, tenths or hundredths of a second (e.g. 1”, 1/10 or 1/2000). The slower the shutter speed, the more light that is recorded (and vice versa).

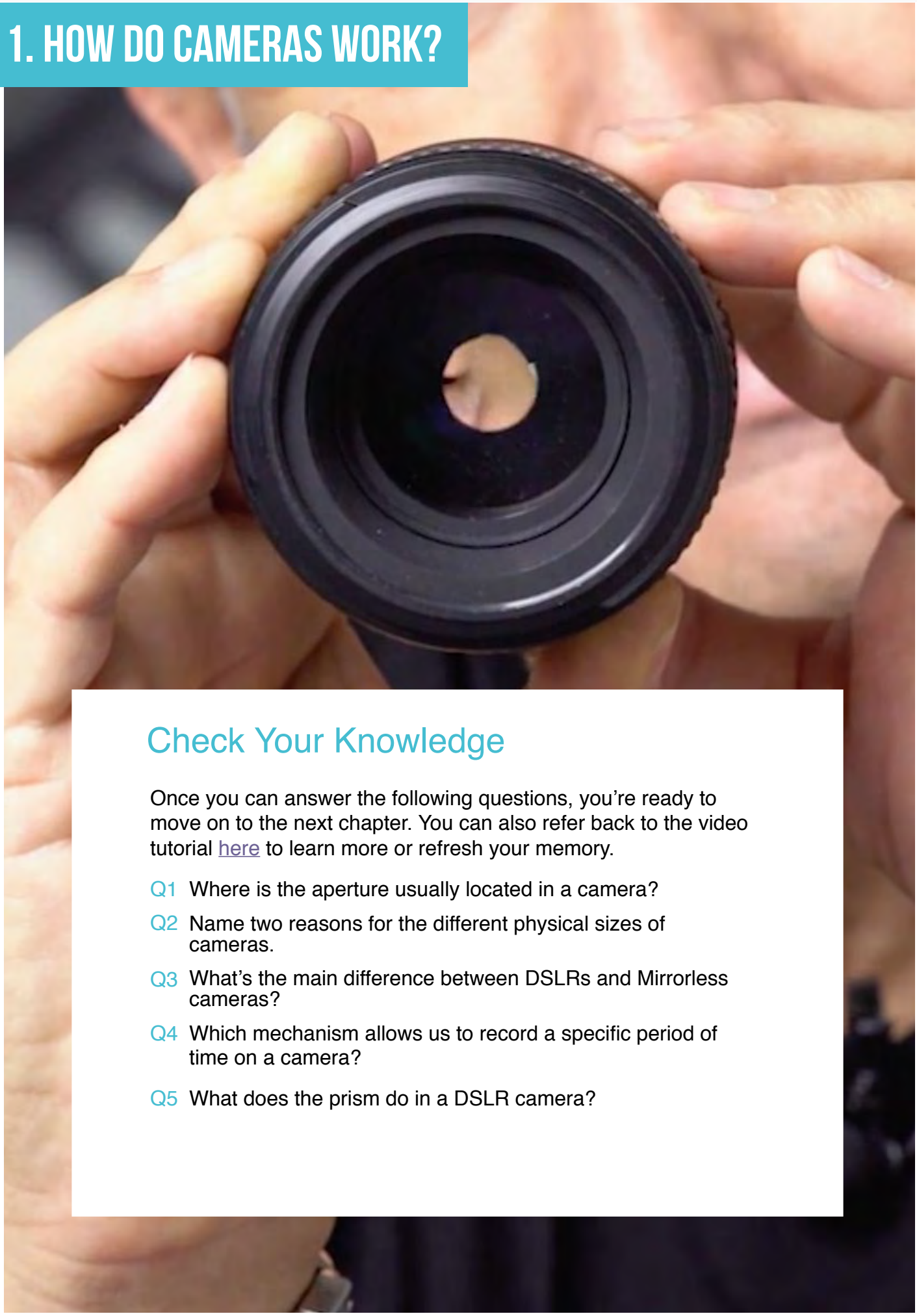
A frame from video chapter 1

6 - RECORDING MEDIUM

Once light passes through the lens, aperture and shutter, it reaches a digital sensor that records the image. Modern cameras predominantly feature sensors that are either full-frame, crop or medium format.

A frame from video chapter 1

1. HOW DO CAMERAS WORK?



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 Where is the aperture usually located in a camera?

Q2 Name two reasons for the different physical sizes of cameras.

Q3 What's the main difference between DSLRs and Mirrorless cameras?

Q4 Which mechanism allows us to record a specific period of time on a camera?

Q5 What does the prism do in a DSLR camera?

A frame from video chapter 1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CHAPTER 2

WHAT IS EXPOSURE IN PHOTOGRAPHY?

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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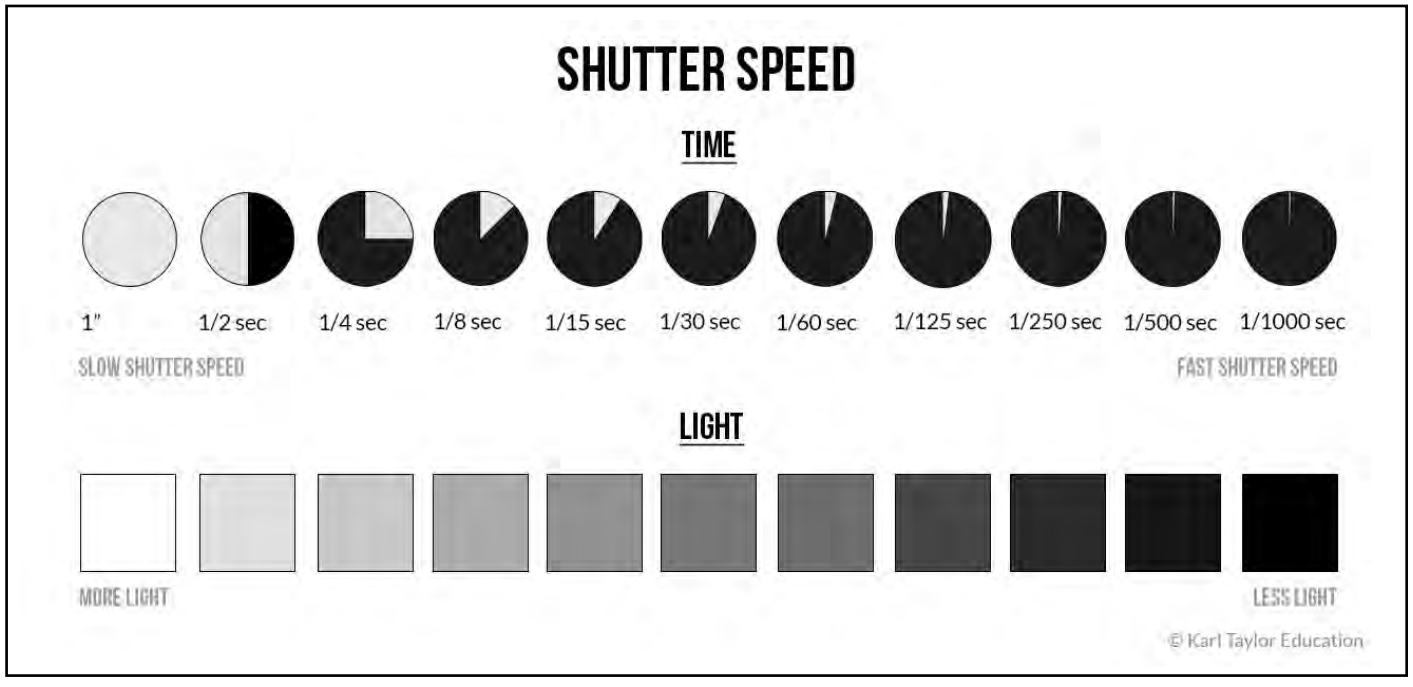
WHAT IS EXPOSURE IN PHOTOGRAPHY?

A frame from video chapter 2

SHUTTER SPEED AND EXPOSURE

Exposure simply refers to the brightness or darkness level of an image. One of the ways we can control how bright or dark an image is, is by adjusting the shutter speed. The shutter speed (referred to as time in the six essentials) is how long the shutter remains open when recording an image. The slower the shutter speed, the longer the shutter remains open. This means the medium records light for a longer amount of time, resulting in a brighter image. The faster the shutter speed, the less time the shutter stays open, which means less light will be recorded by the medium. For example, a shutter speed of 1" (one-second) will record more light than a faster shutter speed of 1/500 (one-five-hundredth of a second). This means that when working in low light conditions, to get the best exposure it's often necessary to use slower shutter speeds. The opposite is true for when photographing on a bright, sunny day. Here, it might be necessary to use a faster shutter speed to cut out some of the bright light to get the correct exposure. To achieve the correct exposure, it's necessary to select an appropriate shutter speed based on the lighting conditions and the creative effect you want.



APERTURE AND EXPOSURE

Another way to control exposure is by adjusting the aperture, which is the opening in the lens that light passes through before reaching the recording medium. A larger hole will allow more light to pass through, while a smaller hole will allow less light to pass through. This means that larger apertures (like f1.4) can be a good choice when shooting in low light conditions as they allow more light to reach the sensor, while smaller apertures can be used in bright conditions where it may be necessary to limit the amount of light reaching the sensor. A key thing to remember with apertures is that smaller f-stop numbers (like f2.8) refer to larger apertures, or larger openings in the lens. On a given lens, f1.8 may be the largest aperture, allowing the most light to enter the lens, while f32 may be the smallest aperture, allowing the least amount of light to enter the lens. For example, when photographing at twilight, a larger aperture may be useful as it will allow more light to reach the sensor. But when photographing on a bright sunny day, a smaller aperture may be needed to help cut out some of the light. We can control exposure by using the aperture or shutter speed individually, or by using the shutter speed and aperture together.

CONTROLLING EXPOSURE

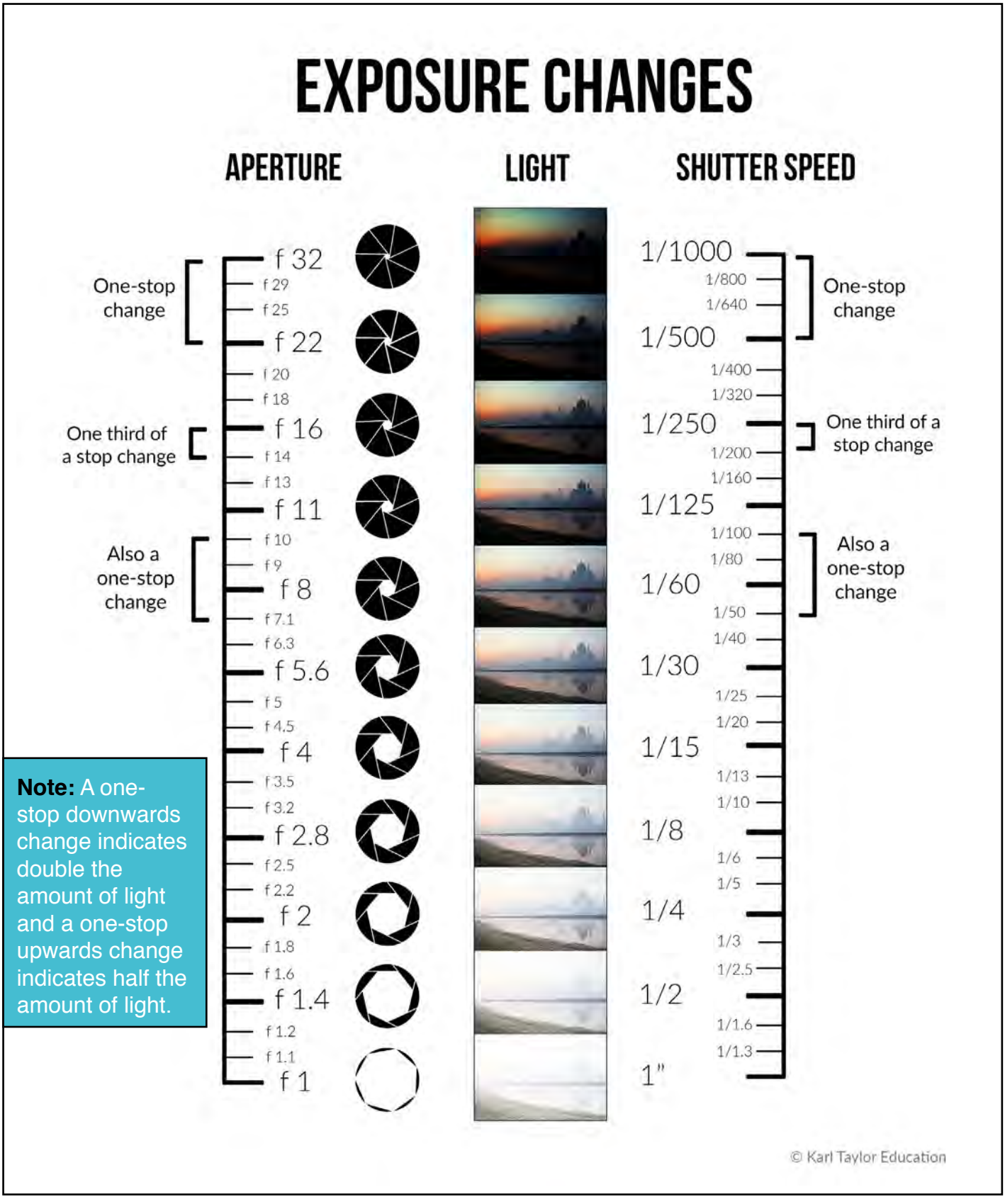
Exposure is a key part of photography, and knowing how to correctly expose an image is essential. This fundamental skill is something photographers often struggle with, especially if they don't fully understand the concept of exposure or how to control it. Measured in stops, exposure refers to the brightness or darkness of an image and is controlled by adjusting the shutter speed and/or aperture. We can increase or decrease the brightness level by adjusting the shutter speed, the aperture or a combination of both. Determining the correct exposure depends on what creative effect you'd like to achieve. For example, do you want a shallow or large depth of field, motion blur or no motion blur? Once you've decided this, it is necessary to find a balance between the shutter speed and aperture to get the correct exposure. Your camera's built-in light meter will give a good indication of your current exposure and you can use this to adjust your settings as necessary. If an image is too dark, we can either decrease the shutter speed or open the aperture. If an image is too bright, we can either increase the shutter speed or close the aperture.

ONE-STOP CHANGES

When it comes to controlling exposure, an important concept to understand is that of one-stop changes. Once you understand one-stop changes, you'll better understand how changes in light work in photography. Any change in shutter speed or aperture that doubles or halves the amount of light is known as a one-stop change in exposure. For example, a change from f32 to f22 is a one-stop increase, the same way 1/60 to 1/125 is a one-stop decrease. Aperture is measured in f-stops and most modern lenses follow the same f-stop scale: f1, f1.4, f2, f2.8, f4, f5.6, f8, f11, f16, f22, f32. Shutter speed is also measured in stops, with most cameras typically featuring speeds between 1/8000 and 30". A typical shutter speed scale may look like this: 1", 1/2, 1/4, 1/8, 1/15, 1/30, 1/60, 1/125, 1/250, 1/500, 1/1000 etc. Although one-stop changes are what are commonly referred to throughout this course, exposure can also be measured in one-third stop changes (shown in the image opposite). Although this allows for more precise control when exposing an image, we recommend that you use full one-stop changes to start with.

UNDERSTANDING ONE-STOP CHANGES

Below is a visual representation of one-stop and one-third stop exposure changes for both aperture and shutter speeds.



Note: A one-stop downwards change indicates double the amount of light and a one-stop upwards change indicates half the amount of light.

A CAMERA'S VIEW FINDER

So you've just unpacked your camera and are ready to take your first picture. But looking through the viewfinder, you're not sure what everything means! Don't panic — we've created a simple guide to explain it all. To start, let's explain what a viewfinder is. The viewfinder is what allows us to view and compose our image and it tells us what settings will be used to record the image.

These include the exposure, shutter speed, aperture and ISO. The viewfinder also allows us to see where the focus point is, what mode we're shooting in and even the battery level. Opposite are two examples of a typical viewfinder, labelled with what each part means. To start with, the most important things you should be able to identify are the exposure scale (or light meter), shutter speed and aperture. Remember, although displays might vary between camera brands, the fundamentals remain the same.

VIEWFINDER KEY:

Shutter Speed
Looking through the viewfinder, you'll see a combination of symbols and numbers. The first set of numbers you see indicates the shutter speed. A shutter speed of 1/100 will show in the viewfinder as 100, 1/50 as 50, 1/2 as 2, and so on. In addition, a one-second exposure will be shown as 1", two-seconds as 2" and so on.

Aperture
The aperture is the second set of numbers seen in the viewfinder. These numbers can vary from as low as 1 (a large aperture) to 32 (a small aperture). Larger apertures let in more light, while smaller apertures let in less light. How low this number can go depends on the lens you're using.

Exposure Scale
Also referred to as a light meter, this estimates the exposure of the image. A centred marker indicates a well exposed image. Anything to the left indicates an underexposed image and anything to the right indicates an overexposed image.

Manual Mode
The letter M showing simply means you are using your camera in Manual mode. This letter changes depending on which mode you're shooting in. For example, A may indicate Auto mode, TV may indicate shutter priority or P may indicate program (these letters and what they stand for will vary between different camera brands).

ISO
The third set of numbers represents the ISO. We recommend that you don't concern yourself with ISO settings yet and keep it on the default setting. ISO will be covered in chapter 9.

Max Bursts
The number in the square brackets indicates the max burst capabilities of the camera (the maximum number of images a camera can record in one burst).

Focus Lock
This green dot will appear to indicate that something is in focus. If the green dot is not visible, this indicates that there is no specific point of focus within the image.

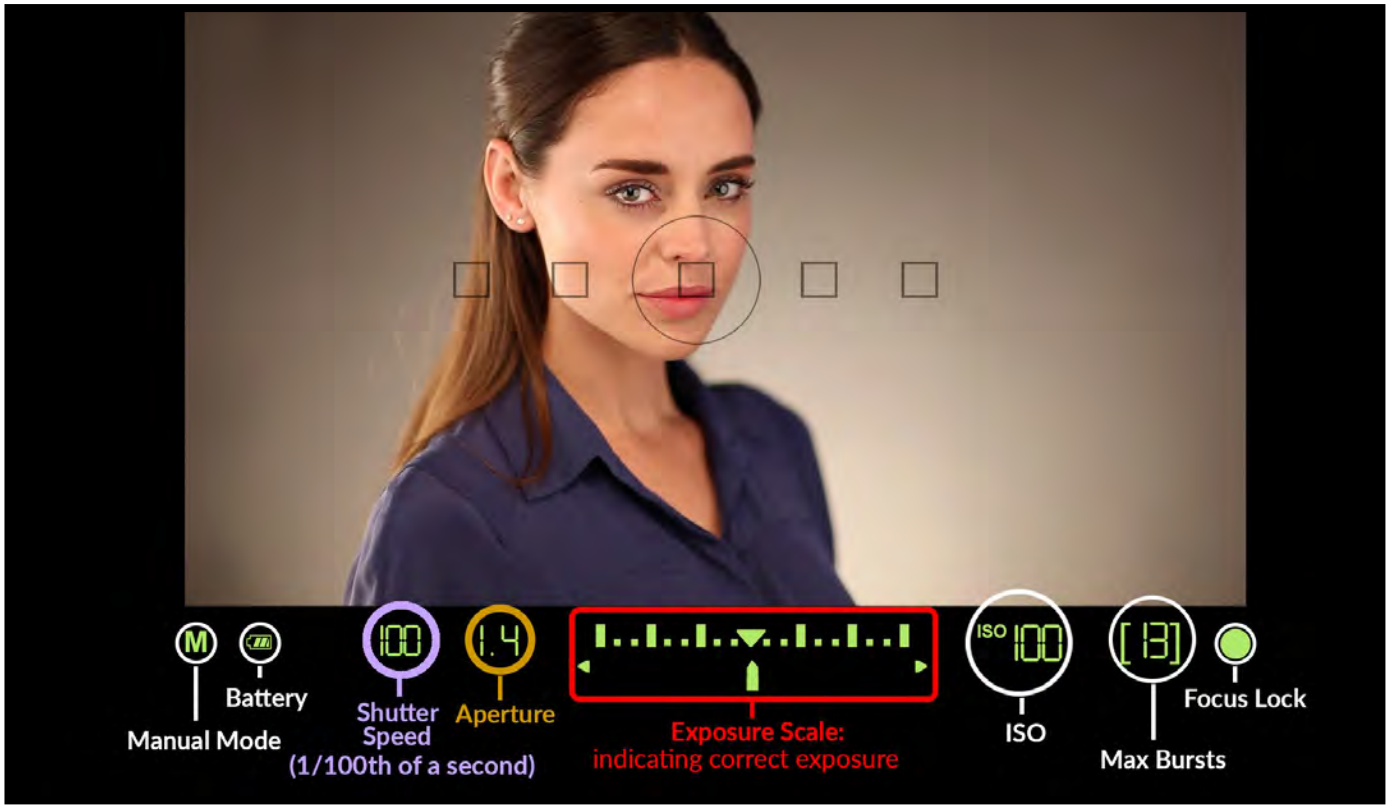
Flash Status
This indicates whether on-camera flash will be used to capture the image. If this symbol does not show, it means that the image will be taken without flash.

Focus Point
The points within the frame that the camera can use to autofocus are shown by focus points in the viewfinder. The number and layout of these points will vary from camera to camera.

AE Lock
This indicates the Auto Exposure Lock function has been enabled. This locks the exposure when shooting and is only relevant if using automatic exposure modes such as Auto, AV or TV.

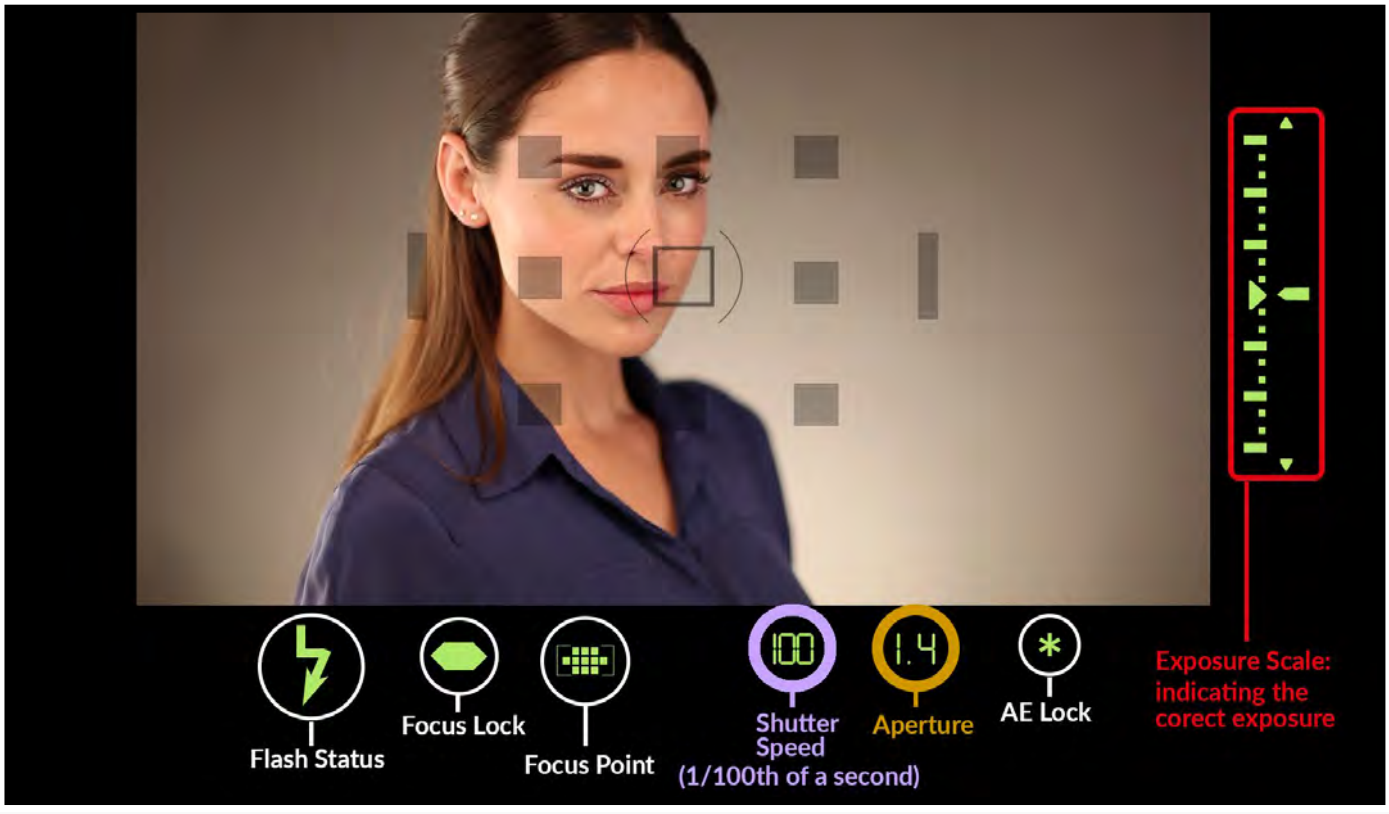
VERSION ONE:

An example of a typical viewfinder display where the different camera settings and exposure scale are shown at the bottom.



VERSION TWO:

Other viewfinder displays may look slightly different. In this example you can see the exposure scale on the right, with the camera settings shown at the bottom.

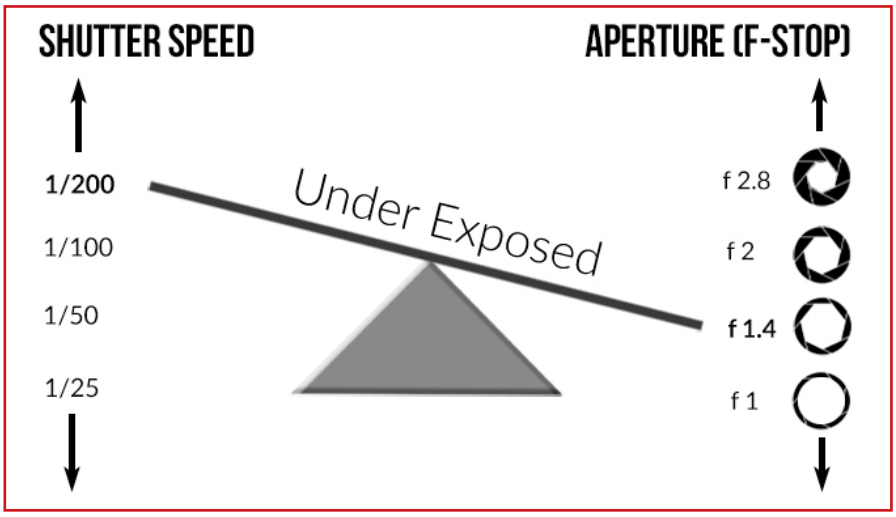


EXPOSURE SEESAWS

To help when trying to find and maintain the correct exposure, try and visualise exposure as a seesaw. If there is a change in either shutter speed or aperture, the other will have to be adjusted accordingly to maintain a balance. Any adjustment in one that is not matched by the other will result in an unbalanced or incorrect exposure. It is important to remember that different shutter speed and aperture combinations can result in the same exposure. This doesn't necessarily mean one combination is more correct than the other, it simply means that we can take advantage of the relationship between shutter speed and aperture to achieve different creative results. Let's consider an example where we might want to maintain the same exposure, but decrease the depth of field. To achieve a shallower depth of field, the aperture needs to be wider. Let's imagine a two-stop change achieves the desired result. This means that to reach the same exposure, the shutter speed would have to increase by two stops. By increasing the shutter speed, we compensate for the change in the aperture by cutting out the extra light and therefore maintain a balance. If, however, the shutter speed did not change, the final image would have a shallower depth of field, but would be two-stops overexposed.

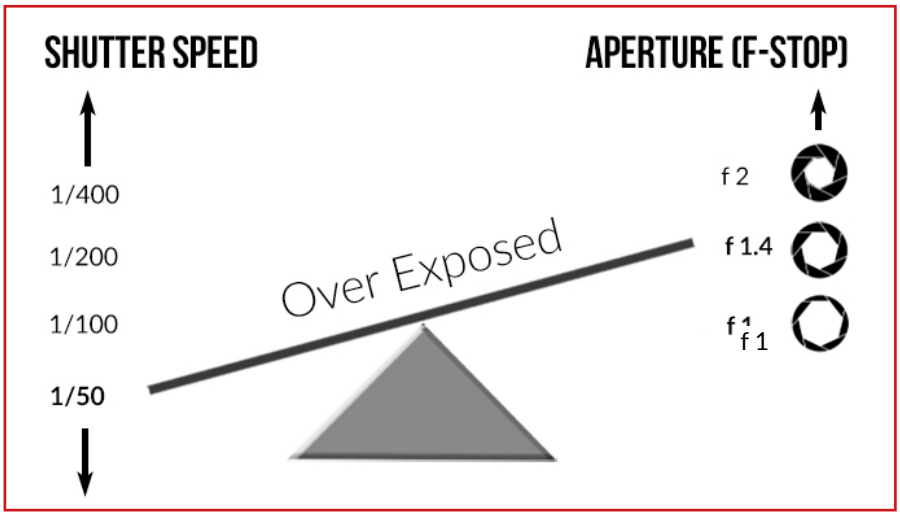
A frame from video chapter 2

A frame from video chapter 2

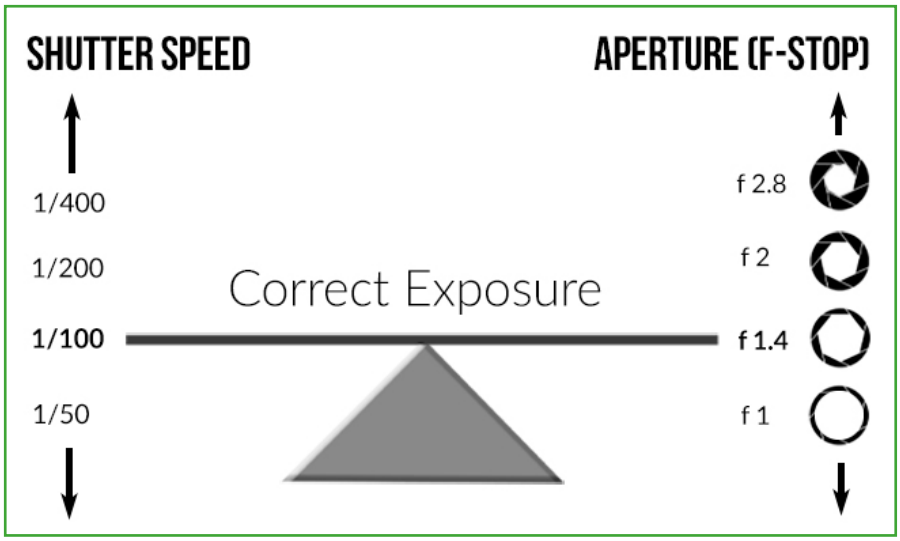


In the graphic, on the previous page, we see the combination of 1/200 at f1.4 results in a one-stop underexposed image (indicated by the camera's exposure scale or light meter). This is because this particular settings combination does not allow enough light to reach the sensor. To correct this, we could either use a slower shutter speed, or open the aperture even further.

A frame from video chapter 2



In this second example we can see that by slowing the shutter speed from 1/200 to 1/50 while keeping the aperture at f1.4, it has resulted in an image that is one-stop overexposed. By slowing the shutter speed, more light can be recorded by the sensor and as a result, this change has produced an addition of two stops of light.

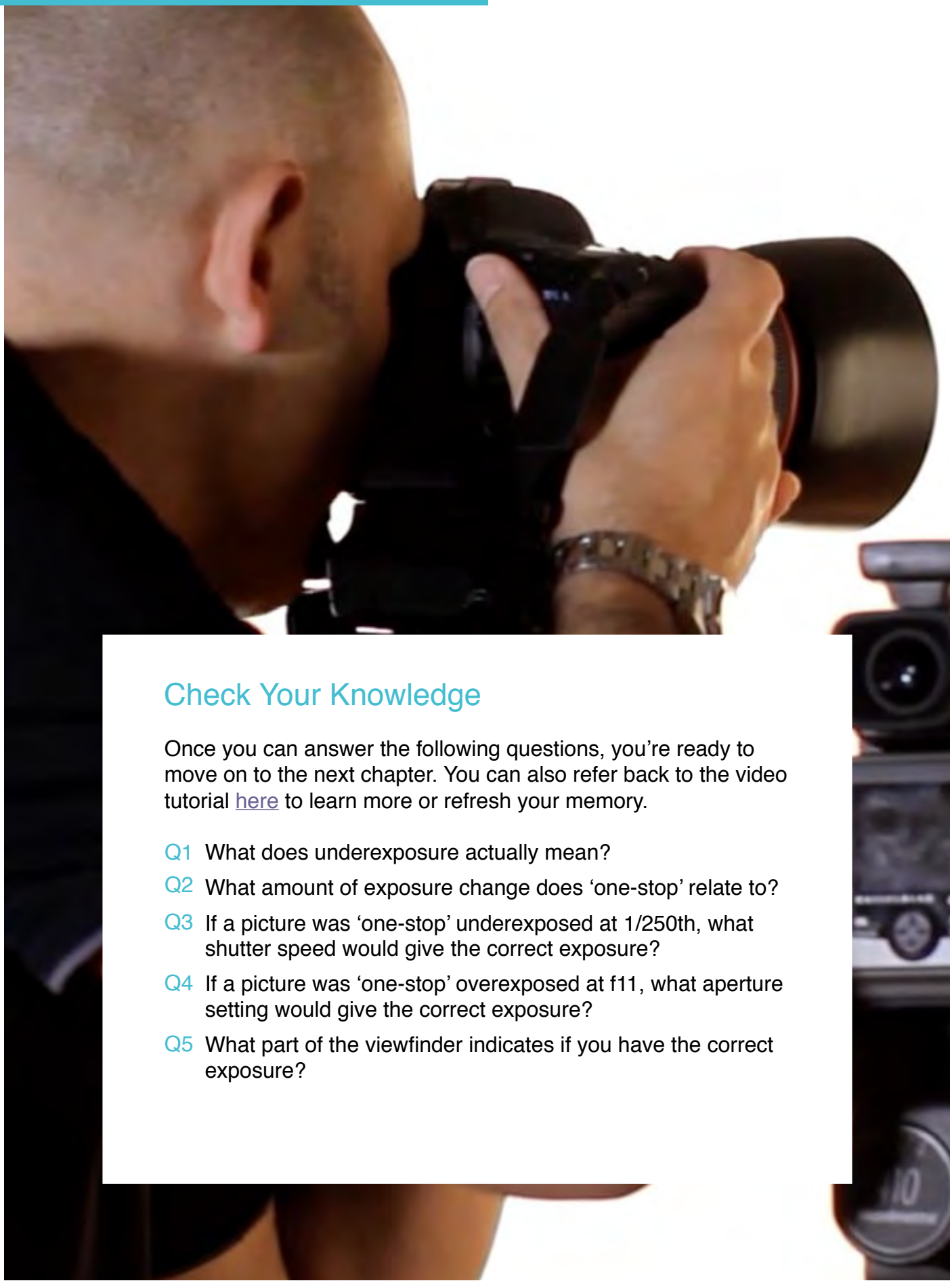


In this example we can see that a combination of 1/100 at f1.4 has resulted in the correct exposure. This could be determined based on either of the two previously incorrect results. Using the principle of a seesaw, we know the same level of brightness could also be achieved using a combination of 1/25 at f2.8, for example.

CHAPTER SUMMARY

Exposure is an important part of photography, and knowing how to control the brightness or darkness of an image is key to taking control of your camera in Manual mode. Shutter speed and aperture are the two main functions used to control exposure, and any change that results in double or half the amount of light is referred to as a one-stop change. Understanding this concept is key to getting to grips with exposure. The principle of the exposure seesaw was also introduced in this chapter. This demonstrated how an imbalance in shutter speed and aperture will result in overexposed or underexposed images.

2. WHAT IS EXPOSURE?



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 What does underexposure actually mean?

Q2 What amount of exposure change does 'one-stop' relate to?

Q3 If a picture was 'one-stop' underexposed at 1/250th, what shutter speed would give the correct exposure?

Q4 If a picture was 'one-stop' overexposed at f11, what aperture setting would give the correct exposure?

Q5 What part of the viewfinder indicates if you have the correct exposure?

A frame from video chapter 2

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“ONCE YOU UNDERSTAND EXPOSURE CHANGES IN INCREMENTS OF A STOP AT A TIME, YOU WILL BETTER UNDERSTAND MUCH OF THE PHOTOGRAPHY TERMINOLOGY THAT IS USED.”

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CHAPTER 3

SHUTTER SPEED

An Introduction To The Six Essentials of Photography

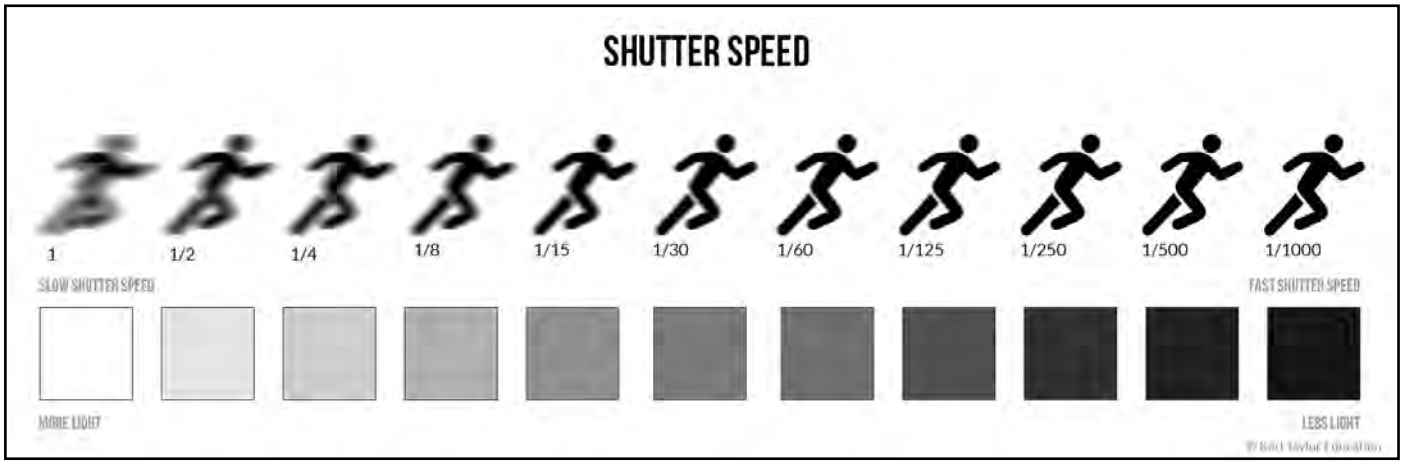
Light • Subject • Optics • Aperture • Time • Recording Medium

SHUTTER SPEED

A frame from video chapter 3

SHUTTER SPEED SCALE

The shutter speed controls the amount of time we capture light for as well as how much motion is recorded in an image. Most cameras feature shutter speeds between 1/8000 and 30". When using faster shutter speeds, the shutter remains open for a shorter length of time. This freezes motion but allows less time for light to be recorded. Slower shutter speeds mean the shutter remains open for longer, blurring motion and allowing more light to be recorded.



CHANGING THE SHUTTER SPEED

You can manually control the shutter speed when shooting in Manual mode or Shutter Priority using the control dial on your camera.

You can see what shutter speed is set either on the back screen of the camera, the top LCD panel or through the viewfinder.

SHOOTING SPEEDS

The shutter speed controls two creative aspects of photography: the exposure (the brightness or darkness level of an image) and the amount of motion blur captured in an image. Faster shutter speeds mean the shutter remains open for a shorter period of time, which means the sensor has less time to record the light once it's passed through the lens. This results in less light being recorded, which makes faster shutter speeds useful for cutting out additional light in bright, sunny conditions. Faster shutter speeds will also freeze movement and are often used when photographing fast moving subjects like sports or wildlife. When using slow shutter speeds, the shutter remains open for a greater length of time. This not only allows more light to be recorded by the sensor, it also means any moving objects will appear blurred. Slow shutter speeds are commonly used when photographing in low light conditions or when we want to capture motion blur. This can be used for creative effect when photographing a number of different subjects. Common instances where slow shutter speeds can be used creatively are when photographing star trails or running water like rivers or waterfalls. When selecting the shutter speed it's important to keep both of these factors in mind as they will have a noticeable impact on your final image. Try to decide if you want to capture more or less light and if you want to freeze or blur your subject.

FAST SHUTTER SPEEDS

An example of where a fast shutter speed has been used to freeze movement can be seen in the image on the right. By using a fast shutter speed, the motorbikes appear completely still. How fast your shutter speed needs to be to freeze movement depends on how fast the subject is moving. A faster shutter speed would be needed for motorbikes compared to, say, a child running.

Discover this course: Capturing action shots

SLOW SHUTTER SPEEDS

In this example a very slow shutter speed was used to record an image of the night sky. Using a slow shutter speed meant it was possible for the sensor to record enough light that the stars (and even lights from the nearby city) were visible. Photographing the night sky often requires very slow shutter speeds, anywhere from a couple of seconds, up to a few minutes.

Discover this course: Spectacular night skies

SHOOTING TECHNIQUES FOR CREATIVE EFFECT

When photographing action shots there are three techniques you can try. The first technique is to freeze the action and background by using a fast shutter speed. The second is panning, which can be achieved by using a slow shutter speed while following the subject with the camera. A third technique is capturing motion blur. This can be done using a slow shutter speed while keeping the camera in a static position.

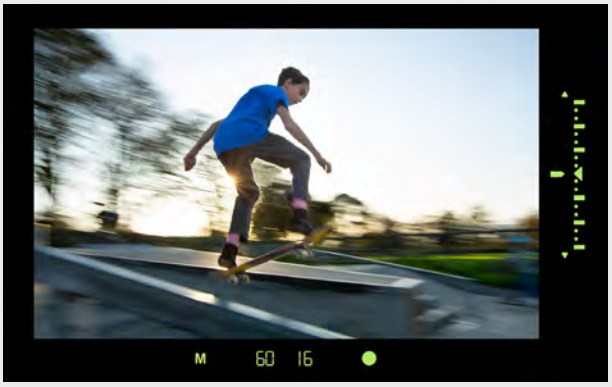
1. FROZEN ACTION

Here the subject appears stationary within the frame. This was achieved using a fast shutter speed of 1/500 while keeping the camera in a fixed position. The result is a motionless image where the subject and the background appear frozen in time.

A frame from video chapter 3

2. PANNING

This image is an example of a technique known as panning. This is when you follow the movement of the subject with the camera while using a slow shutter speed. This results in a subject that appears frozen, but with motion blur in the background.



A frame from video chapter 3

3. MOTION BLUR

In these examples below motion blur has been created by using slow shutter speeds. In the example of the girl on the bike, a shutter speed of 1/30 has resulted in the subject being blurred as they pass through the frame, but because the camera has remained in a fixed position everything else appears sharp. In the seascape shot, a four second exposure time allowed the motion of the waves to be captured, but with everything else remaining sharp. Remember motion blur can only be successful when there is no camera shake, so using a tripod is essential.

A frame from video chapter 3

A frame from video chapter 3

BALANCING EXPOSURE AND SHUTTER SPEED

When creating photos, there are often times when we want to use a particular shutter speed to capture a particular amount of motion in an image. In the video you will see as Karl shoots a number of examples, demonstrating how to balance exposure and shutter speed. In these examples an appropriate shutter speed is used to capture different levels of motion blur. Using these specific shutter speeds, it becomes necessary to use other methods to control and balance the exposure. Some examples of the results can be seen below, with further being demonstrated in the video.

UNDER EXPOSED

A frame from video chapter 3

Here, a shutter speed of 1/30 has allowed us to capture movement using the technique of panning, but at f16, the image is clearly underexposed. This is because the aperture is not allowing sufficient light to reach the sensor. Keeping the same shutter speed, this could be corrected by using a larger aperture.

OVER EXPOSED

A frame from video chapter 3

In this second example, despite using a larger aperture, there is still an imbalance in the exposure. Using a shutter speed of 1/30 at f8 has resulted in an image that is too bright. Changing to f8 provided two extra stops of light. This was more light than was actually needed and resulted in an overexposed image.

CORRECT EXPOSURE

A frame from video chapter 3

To achieve the correct exposure at 1/30 we can therefore determine that an aperture between f16 and f8 will balance the exposure. Using our knowledge of the f-stop scale, we know this is f11; and at 1/30 we can see this combination has provided the right level of light and the correct exposure has been achieved.

SHUTTER SPEED, CAMERA SHAKE & TRIPODS

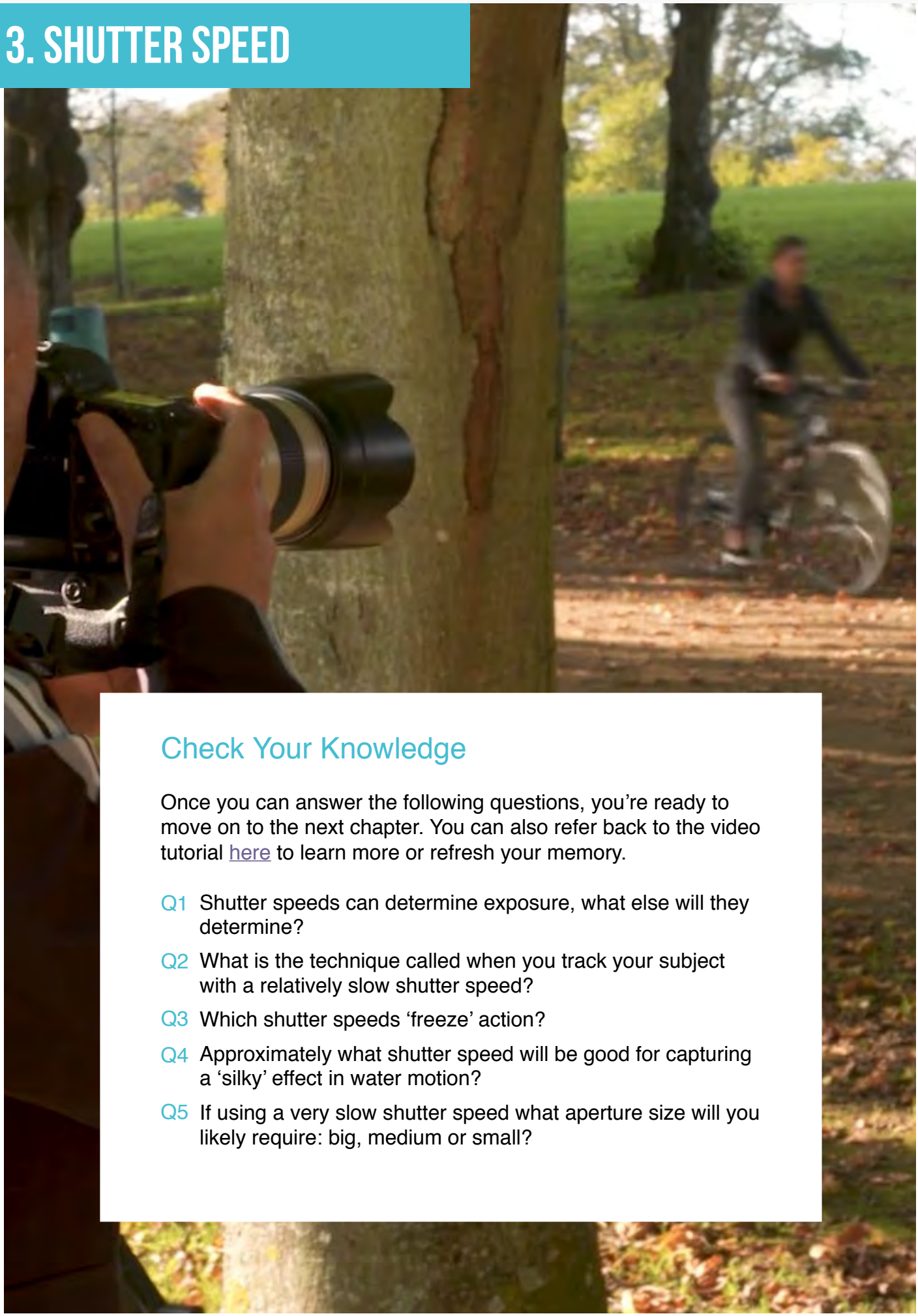
To get started with photography, you need little more than your camera and a lens. But one piece of equipment that will come in handy is a tripod. You will see numerous instances throughout this course where a tripod is used, and there is a very good reason for this. Generally, when shooting at fast shutter speeds, the short exposure time cuts out any motion blur caused by camera shake; but as this exposure time gets longer, it becomes harder to keep the camera still when taking a picture. This is where a tripod becomes necessary. By using the camera on a tripod, it allows us to fix the camera in position and therefore reduce any unwanted movement. This is especially useful when using exposure times of several seconds. To avoid camera shake when working handheld, use shutter speeds greater than the focal length. For example, if shooting with 200mm, use a shutter speed faster than 1/200.

A frame from video chapter 3

CHAPTER SUMMARY

Shutter speed refers to the length of time that the shutter remains open for the medium to record light, and is one of the key methods we can use to control exposure. Measured in fractions of a second, most cameras will have shutter speeds ranging between 30” and 1/8000. This can be adjusted simply using the control dial on the camera and can be viewed on the back of the camera, the top LCD panel or through the viewfinder. Slower shutter speeds will record more light while fast shutter speeds will record less light. In addition to controlling the exposure of the image, the shutter speed also determines how much motion is recorded in an image. Slow shutter speeds will create the effect of movement (depending on how much / how quickly the subject is moving) while fast shutter speeds will freeze movement and result in motionless looking images. This is clearly shown in the video through the examples of the cyclist and skateboarder. Slow shutter speeds are therefore often used when photographing in low light or at night or when wanting to create the effect of movement in an image, while fast shutter speeds are often used when photographing in sunny conditions or when wanting to freeze fast moving subjects. Selecting which shutter speed to use depends on what we’re photographing and the creative effect we want. There are a number of creative techniques that can be achieved by using different shutter speeds. Many of these effects and techniques are clearly demonstrated throughout this video to show exactly how shutter speed works and how you can achieve creative results by adjusting just this one setting.

3. SHUTTER SPEED



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 Shutter speeds can determine exposure, what else will they determine?

Q2 What is the technique called when you track your subject with a relatively slow shutter speed?

Q3 Which shutter speeds 'freeze' action?

Q4 Approximately what shutter speed will be good for capturing a 'silky' effect in water motion?

Q5 If using a very slow shutter speed what aperture size will you likely require: big, medium or small?

A frame from video chapter 3

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“BY USING LONG SHUTTER SPEEDS WE OPEN UP MORE CREATIVE OPPORTUNITIES.”

KARL TAYLOR

Watch related class

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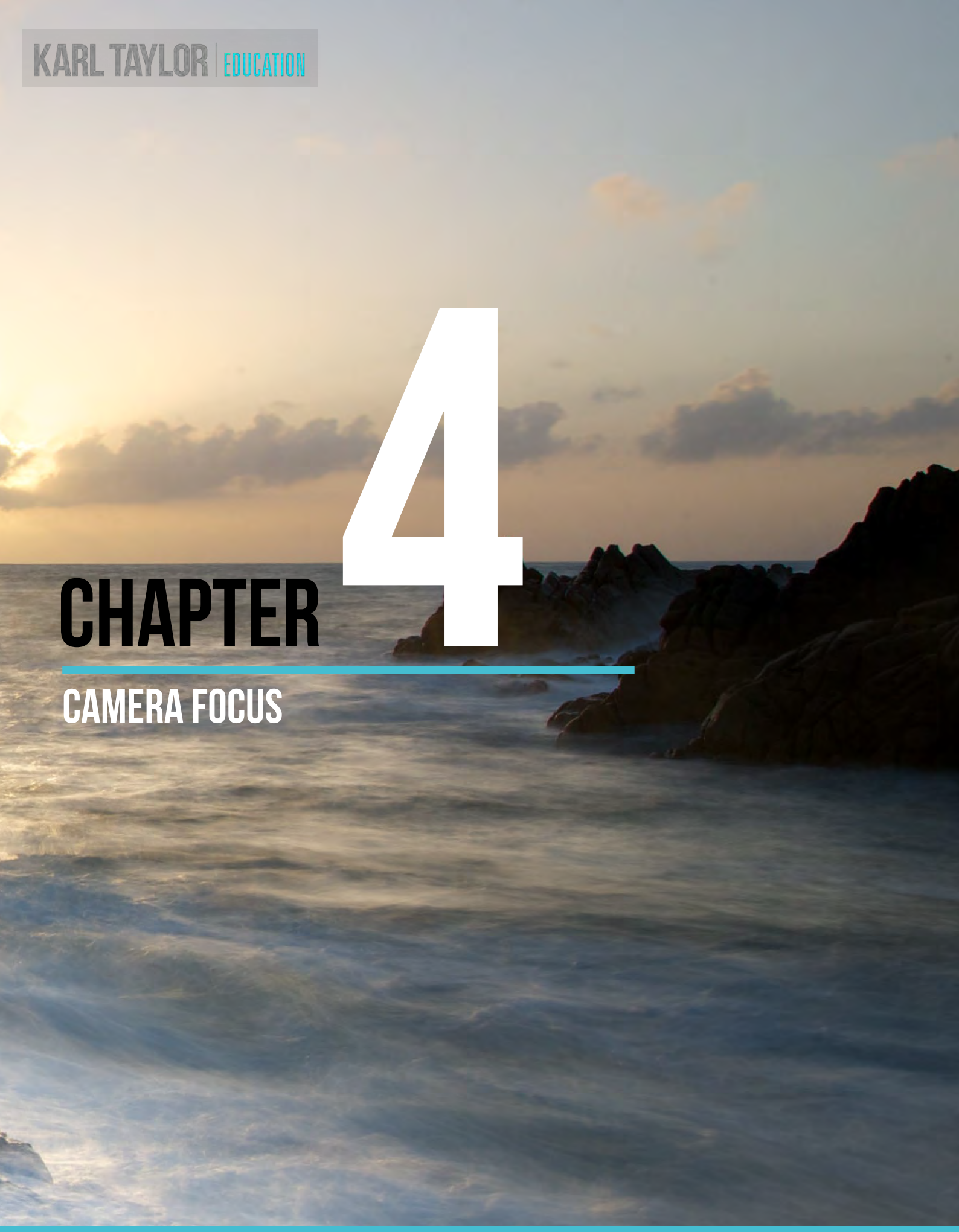
CHAPTER 4

CAMERA FOCUS



An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

CAMERA FOCUS

A frame from video chapter 4

ADJUSTING THE FOCUS

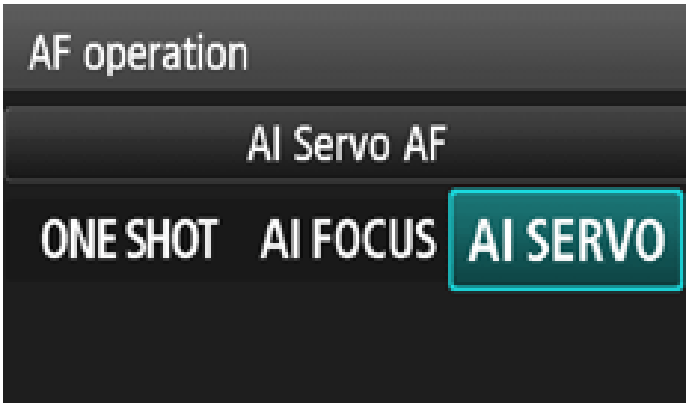
When taking a photo it is essential that at least a part of the image is in focus. To create a photo, light is directed through the lens before it reaches the recording medium. The lens, regardless of whether it's built into your camera or interchangeable, is made up of elements that focus the light. Adjusting the focus of an image can be done manually or automatically. When using manual focus, it is simply a case of rotating the focus ring on the lens until the area you want to be in focus becomes sharp. When using autofocus, there are two factors to understand: focus points and focus modes. Focus points are the squares that can be seen in the viewfinder when framing the image. These determine where the point of focus in an image will be. Using autofocus, the camera can automatically select the focus point(s) or you can select the focus point yourself. The other factor to consider is the focus mode. This is what determines how the autofocus works while the shutter button is half pressed. Focus modes vary between cameras, but most will have at least two: either a single shot focus mode or a continuous focus mode. The single shot focus mode keeps the focus point locked once the shutter is half pressed, even if you reframe the image. Continuous focusing continuously recalculates and readjusts the focus until the image is taken. All of these factors will help adjust the focus of the image until the desired area becomes sharp.

Camera focus modes

	Advantages	Disadvantages
Manual Focus	• More accurate in low light conditions • Useful in situations where there is low contrast • Good for scenes that are busy and confusing when your camera doesn't know what to focus on	• Can be slower to manually focus • Can be difficult to get focus correct • Time consuming when having to recompose and refocus often
Autofocus	• Quick • Different autofocus options for different situations • Good for scenes that are often changing (like sport or wildlife photography)	• Can be difficult to use in low light conditions • Can be difficult to use in scenes with low contrast • Not always accurate in busy or confusing scenes

AUTOFOCUS

Autofocus is a great option for those still getting to grips with their camera as it is a quick and easy method of focusing. Using autofocus, it is possible to select different focus modes. These include ‘Single shot/Single-servo’ focus mode, where one focus point is used to determine focus (this does not change until you re-focus or take the image), or ‘Continuous focusing/Continuous-servo’, where the camera continuously readjusts the focus for as long as the focus button is held down.

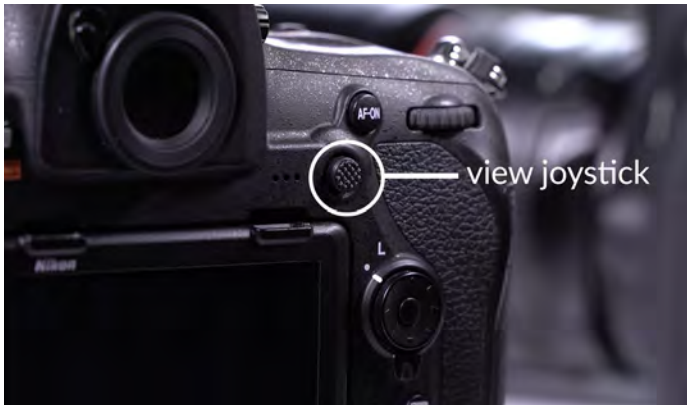


MANUAL FOCUS

Not as commonly used as autofocus, manual focus is still very relevant as it gives the user a far greater level of control in deciding where the focal point in an image should be. It can be particularly useful in situations where the camera has difficulty focusing (this can often occur in low light conditions or when the background is very busy) or when taking a series of images where you don’t want the focus point to change. This means it can still be worth knowing how to use manual focus.

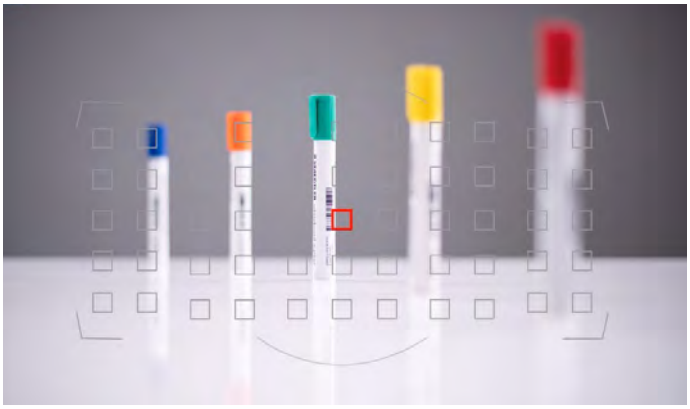
CAMERA CONTROLS

Initial focus can be achieved by pressing the shutter button halfway down. This focuses the lens according to which focus point is selected. To adjust these points, use the control wheel or buttons on the camera (some cameras have a joystick on the back for this) or in the menu system. Some cameras also have back button focusing that allows you to control the focus without pressing the shutter button (this feature may take some time to get used to, but it does have certain advantages).



SELECTION POINTS

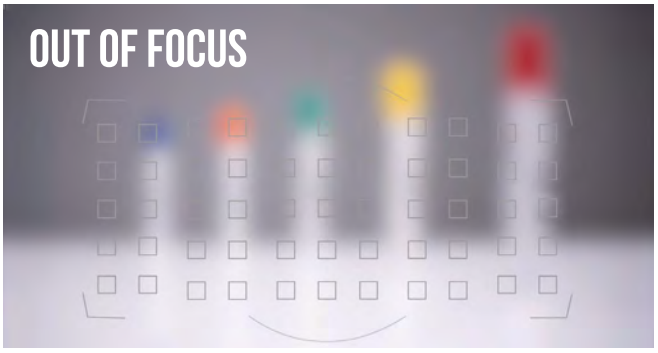
Looking through the viewfinder, you will see a number of small squares in front of the image. These are focus selection points, which is what the camera uses to determine the point of focus. Different cameras have different numbers of selection points, as well as different layouts of these points. These points make up what is referred to as the autofocus area and can be changed automatically by the camera or manually by the photographer using the controls mentioned in ‘Camera Controls’.

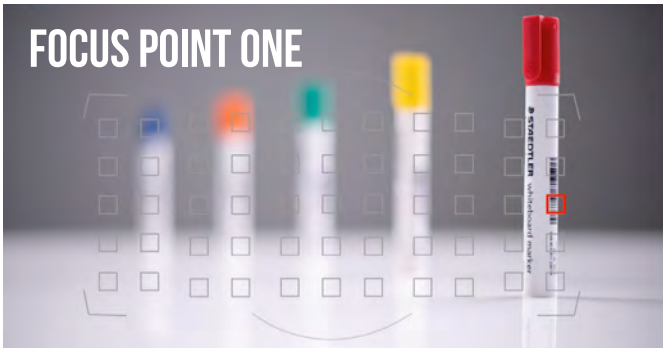


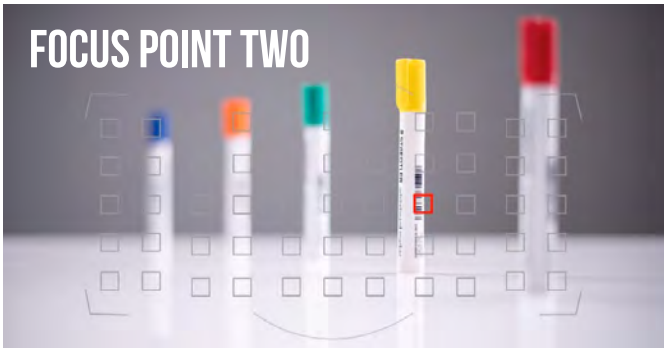
A frame from video chapter 4

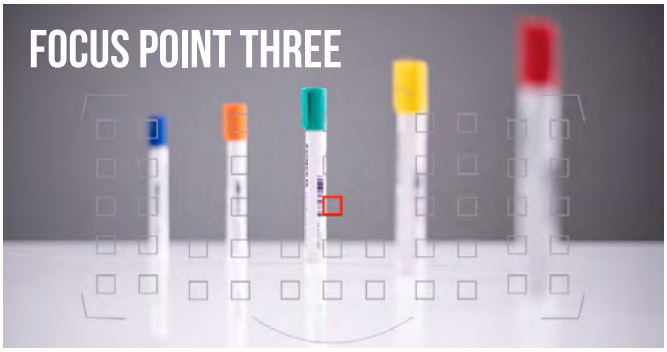
SELECTING YOUR FOCAL POINTS

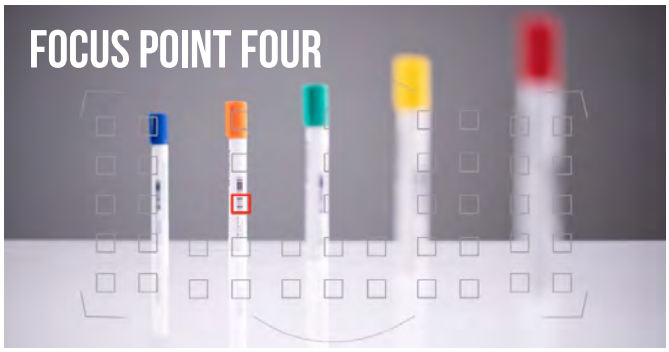
Whether you're photographing landscapes or portraits, the key is to have the focus selection point over the area that you want to be sharp. In the video you can see how the focus points are changed to shift the focus to different areas within the image. Where we choose to focus within an image can have a big impact (especially when using large apertures), so it's important to choose the best focus point.

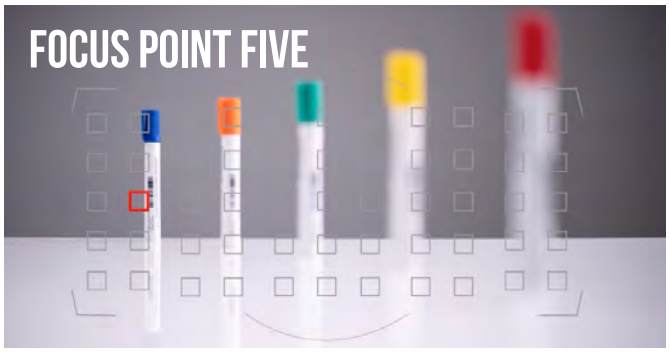










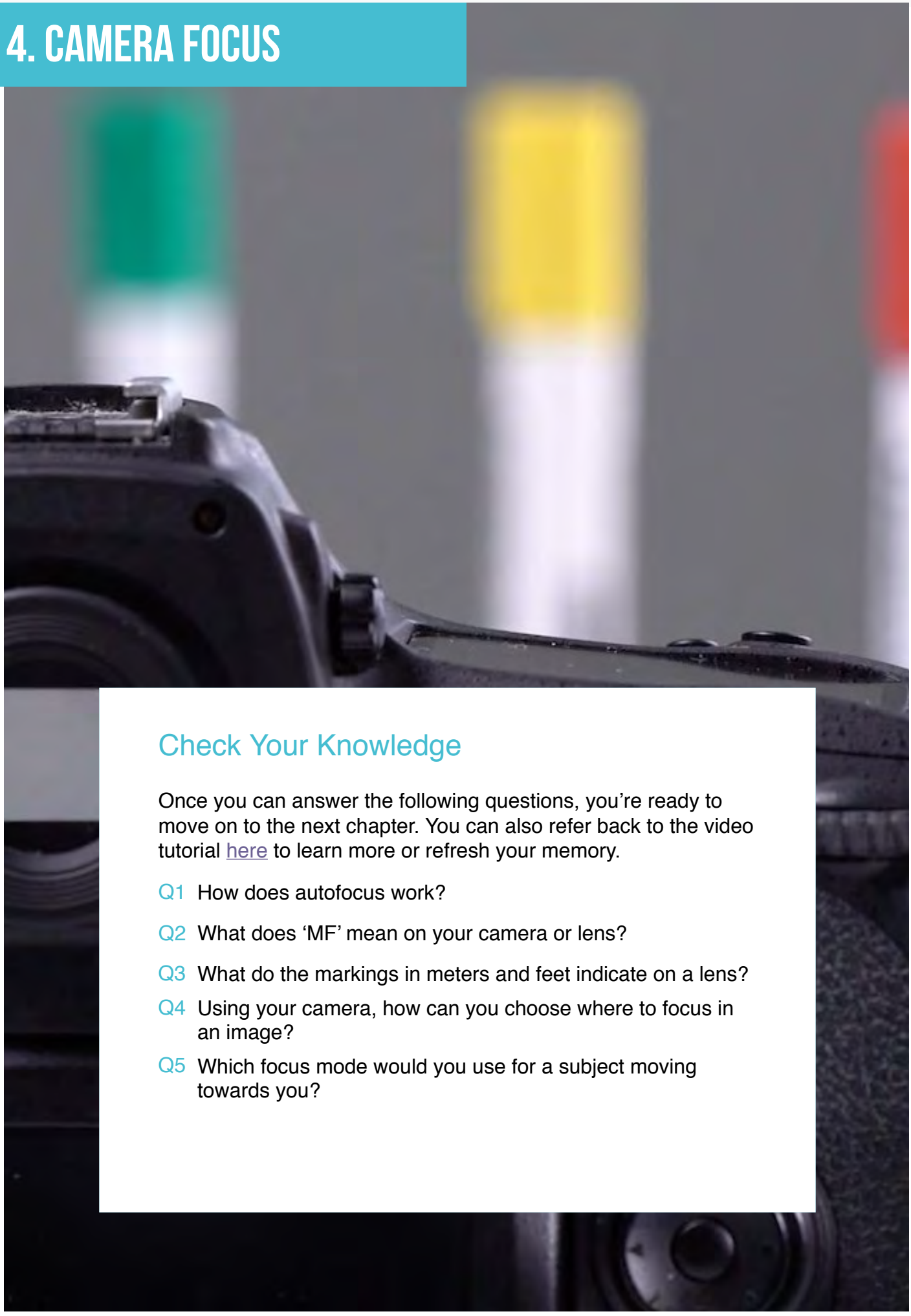


These examples are from video chapter 4

CHAPTER SUMMARY

Focus is an important concept to understand in photography as it can make or break an image. With most camera lenses we now have the option to choose between manual focus and autofocus, both of which have their advantages and disadvantages. When using autofocus, the two most important concepts to understand are focus points and focus modes. Focus points can be selected automatically or manually, and where these focus points are within an image can have a great bearing on how the final image looks.

4. CAMERA FOCUS



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 How does autofocus work?

Q2 What does 'MF' mean on your camera or lens?

Q3 What do the markings in meters and feet indicate on a lens?

Q4 Using your camera, how can you choose where to focus in an image?

Q5 Which focus mode would you use for a subject moving towards you?

A frame from video chapter 4

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“IT MATTERS LITTLE HOW MUCH EQUIPMENT WE USE; IT MATTERS MUCH THAT WE BE MASTERS OF ALL WE DO.”

SAM ABELL

Watch related class

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CHAPTER 5

APERTURE AND DEPTH OF FIELD

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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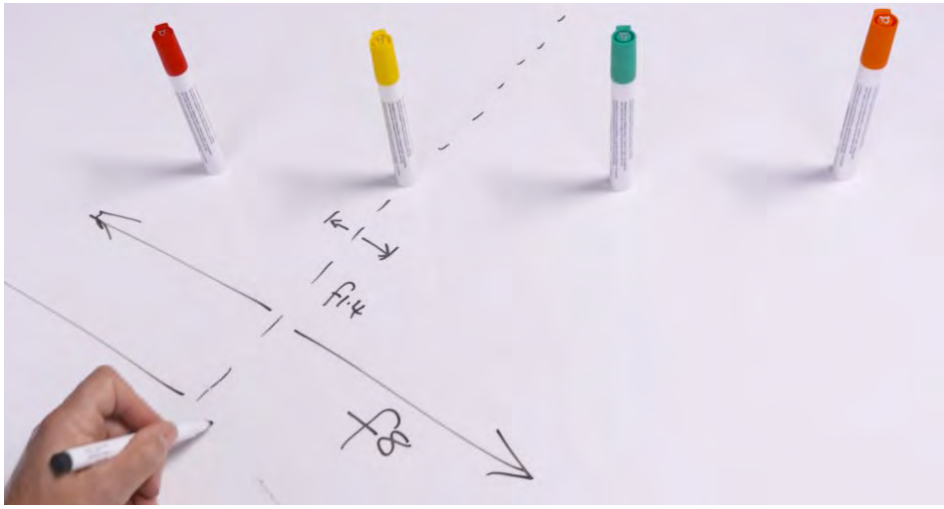
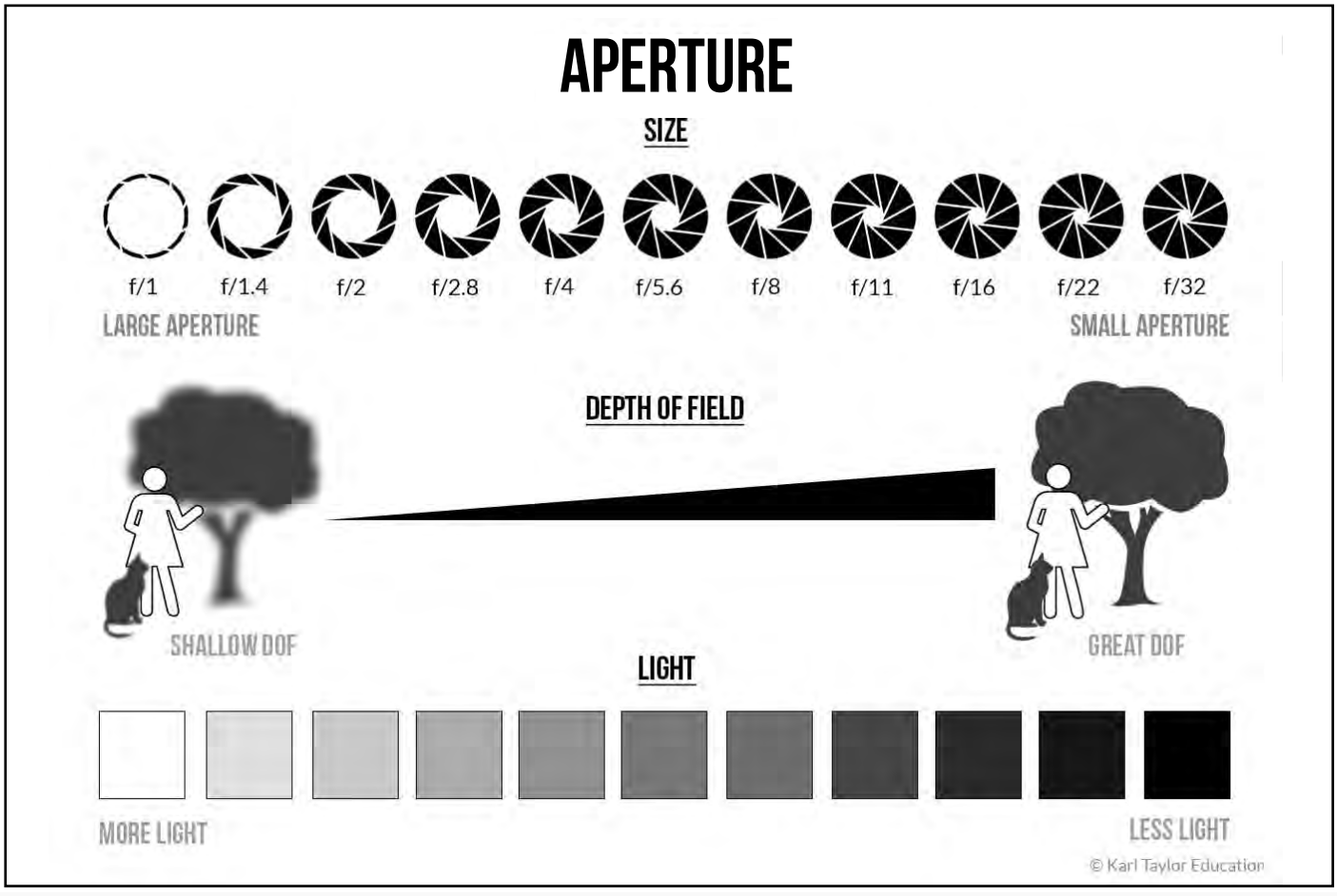
APERTURE AND DEPTH OF FIELD



A frame from video chapter 5

HOW TO CHANGE THE DEPTH OF FIELD

The aperture refers to the opening in the lens through which light passes before reaching the medium. This controls not only the amount of light recorded in an image, but also the depth of field (this is the sharpness range either side of a focus point). Adjusting the aperture is the easiest way to control the depth of field. Larger apertures, like f1.2, result in less depth of field, while smaller apertures, like f16, result in greater depth of field. Using the control wheel on the camera to adjust the aperture, we can change the depth of field. There are other factors that also influence depth of field though. These include the distance from the subject, magnification and sensor size.

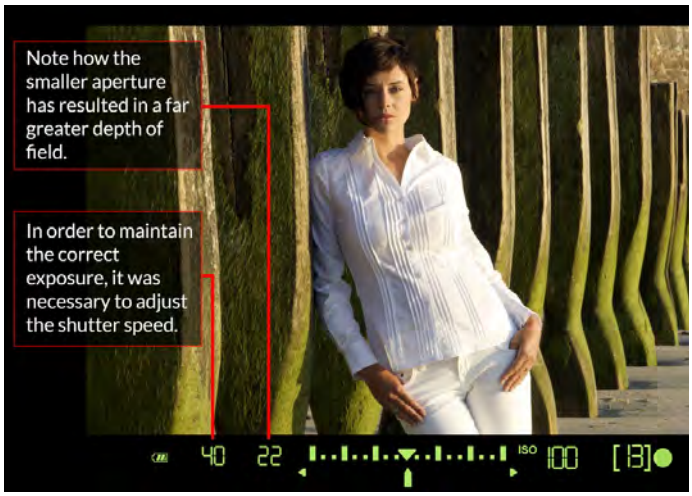


CREATIVE EFFECTS OF APERTURE

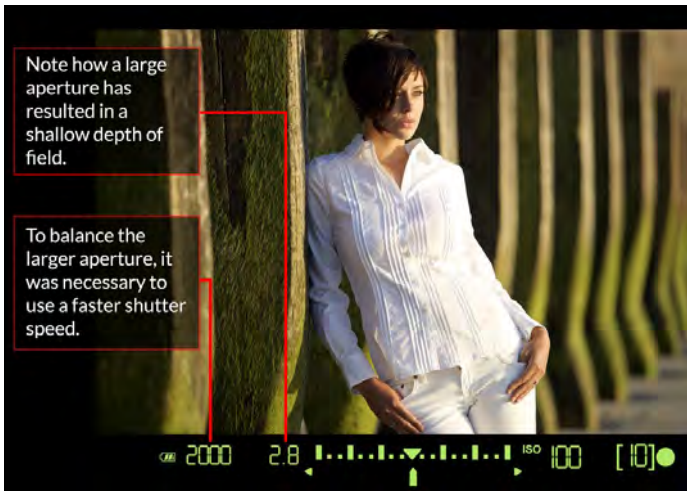
By controlling the aperture, we can control the exposure of an image as well as the depth of field. Adjusting the depth of field is one of the easiest ways to get creative in photography, but to do so it's important to understand how aperture works and how this relates to depth of field. Larger apertures, such as f1.2, allow more light to pass through the lens and reach the sensor and result in a much shallower depth of field. This means only a small part of the image will be sharp, with the remainder appearing blurry (this blurred effect is often referred to as 'bokeh'). Larger apertures are typically used in instances where we want to focus on just a small part of the image, for example a bee on a flower or the eyes of a person. Smaller apertures allow less light to pass through the lens, which, if not balanced with the shutter, can result in darker images. They also allow for greater depth of field, which makes them ideal for shooting landscapes, or images where we want detail in the background. Another creative effect that can be achieved by adjusting the aperture is what is commonly referred to as a starburst effect. This occurs when photographing focused light sources (such as a street lamp or the sun) using a small aperture. This reduced aperture causes light to reflect off the blades of the aperture, resulting in a starburst effect on the light source (an example of this is shown earlier in chapter three of the document in the skateboarder image).

A frame from video chapter 5

SMALL APERTURE: F22



LARGE APERTURE: F2.8



These are examples from video chapter 5

In this example a small aperture of f22 has been used to photograph the subject. This has resulted in a large depth of field, where both the subject and poles in the background are sharp. Small apertures like this are not often used when photographing people because the large depth of field can often make the final image appear quite busy.

Although it is not incorrect to use small apertures when photographing people, this example shows how a shallower depth of field, achieved using an aperture of f2.8, has resulted in a much more pleasing result. Using large apertures is common when photographing people as it helps to create separation between the model and the background.

BALANCING EXPOSURE AND DEPTH OF FIELD

In this chapter you will have seen how aperture can be used to control depth of field and how it can be balanced with shutter speed to achieve the correct exposure. Depending on what you want to achieve with the image, it may be necessary to change either the shutter speed or the aperture. In the following examples you can see how once we've achieved the desired depth of field, it is necessary to adjust the shutter speed to balance the exposure. In any situation where depth of field is a priority, the shutter speed has to change to find the correct exposure. For example, at f22 an image may be too dark, which means it may be necessary to use a slower shutter speed to allow in more light, the same way using a large aperture may result in an overexposed image, which means a faster shutter speed may be needed.

SHOT ONE

Large aperture and fast shutter speed

These are examples from video chapter 5

In this example, using a large aperture of f1.4 with a very fast shutter speed of 1/640 has resulted in the correct exposure. The wider aperture has been used to achieve a shallow depth of field (we can see only the yellow pen is sharp). In addition, a faster shutter speed, which does not allow very much light to be recorded by the medium, has then been used to balance the exposure.

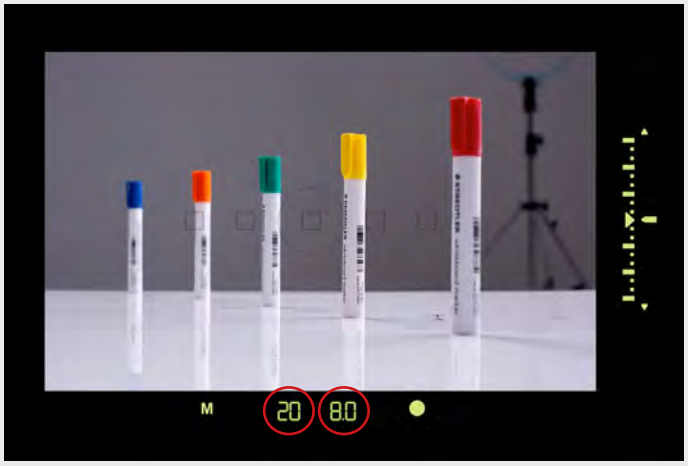
SHOT TWO

Medium aperture and fast shutter speed

In this example we have used the same fast shutter speed of 1/640 but closed the aperture by five-stops, to f8. This has resulted in an underexposed image because both the fast shutter speed and medium aperture limit the amount of light recorded by the medium. To allow in more light while maintaining the same depth of field, it would be necessary to use a slower shutter speed.

SHOT THREE

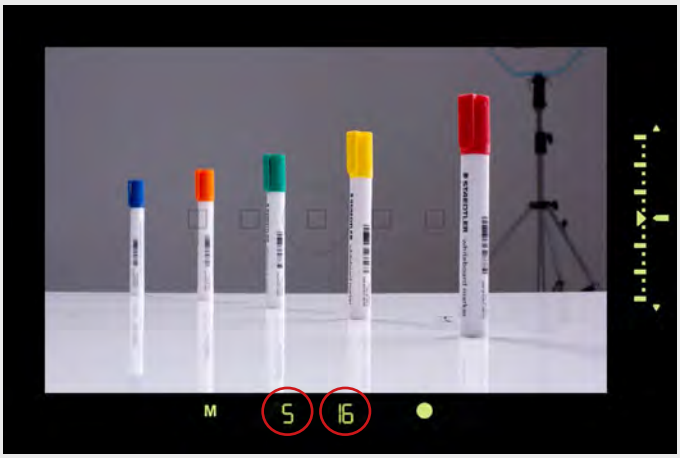
Medium aperture and slow shutter speed



In this example, using the same aperture of f8, we have achieved the correct exposure by using a much slower shutter speed. By reducing the shutter speed from 1/640 to 1/20, we have increased the amount of light by five-stops to achieve the correct exposure. This setting combination has resulted in the same exposure as shown in the first example, but with a far greater depth of field.

SHOT FOUR

Small aperture and slow shutter speed

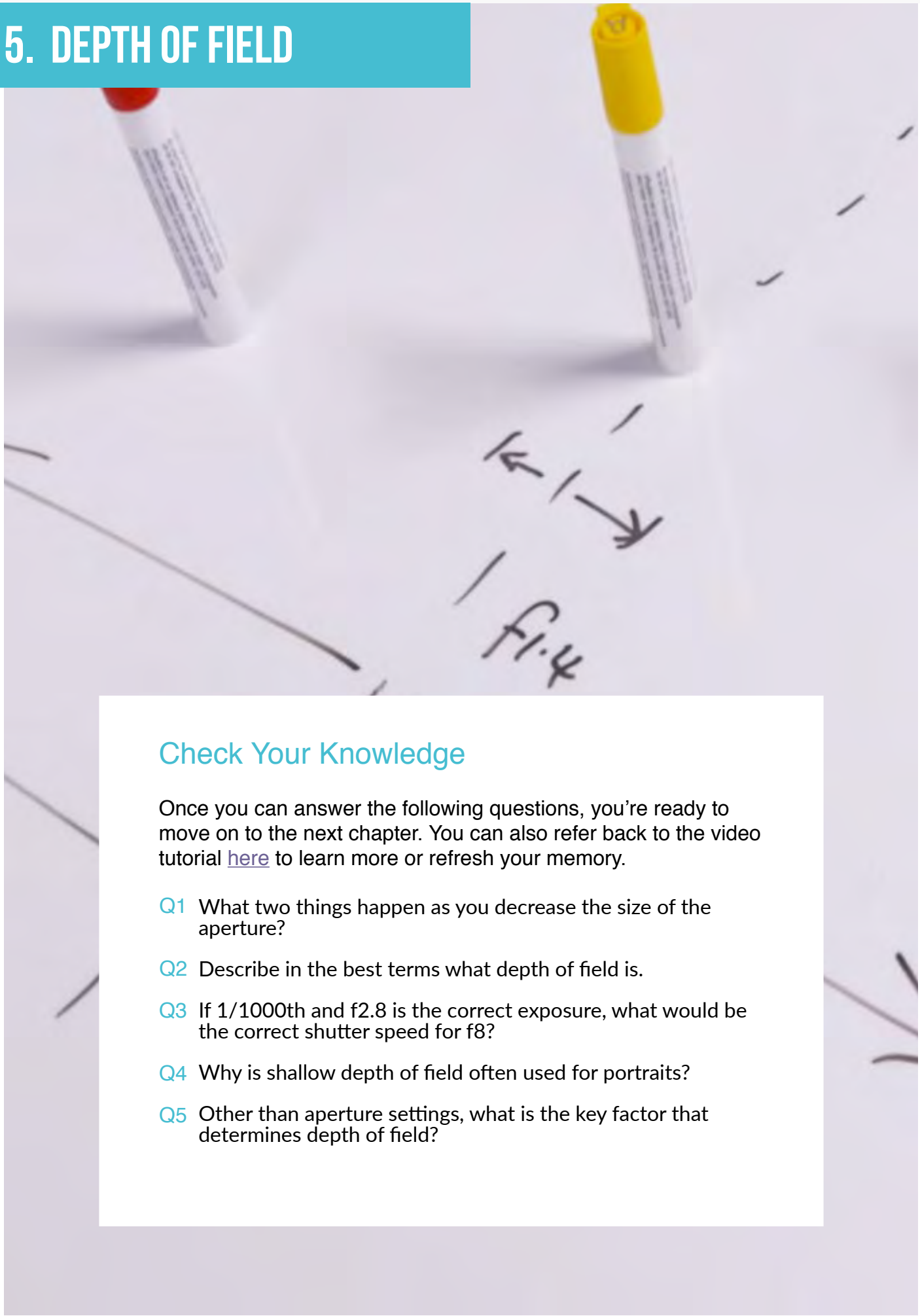


In this example we can see how a different setting combination has resulted in the same exposure, but this time with an even larger depth of field. This has been achieved using a small aperture of f16 and a slow shutter speed of 1/5. By decreasing the size of the aperture, it becomes necessary to use a slower shutter speed to compensate for the loss of light caused by the aperture change.

CHAPTER SUMMARY

The aperture is one of the easiest ways to take creative images, and with it, we can control both the exposure and depth of field of an image. Large apertures like f2 result in more light and shallow depth of field, while smaller apertures like f16 result in less light and larger depth of field. Large apertures are often used to photograph people as they help separate the subject from the background, and small apertures are popular for landscapes because of the larger depth of field. Magnification is another way to control depth of field. Distance from the subject, sensor size and lens choice also have an impact - this is because they all affect the magnification. The aperture can also be used together with the shutter speed to achieve the correct level of exposure in an image.

5. DEPTH OF FIELD



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 What two things happen as you decrease the size of the aperture?

Q2 Describe in the best terms what depth of field is.

Q3 If 1/1000th and f2.8 is the correct exposure, what would be the correct shutter speed for f8?

Q4 Why is shallow depth of field often used for portraits?

Q5 Other than aperture settings, what is the key factor that determines depth of field?

A frame from video chapter 5

“A CAMERA DIDN’T MAKE A GREAT PICTURE ANY MORE THAN A TYPEWRITER WROTE A GREAT NOVEL.”

PETER ADAMS

Watch related class

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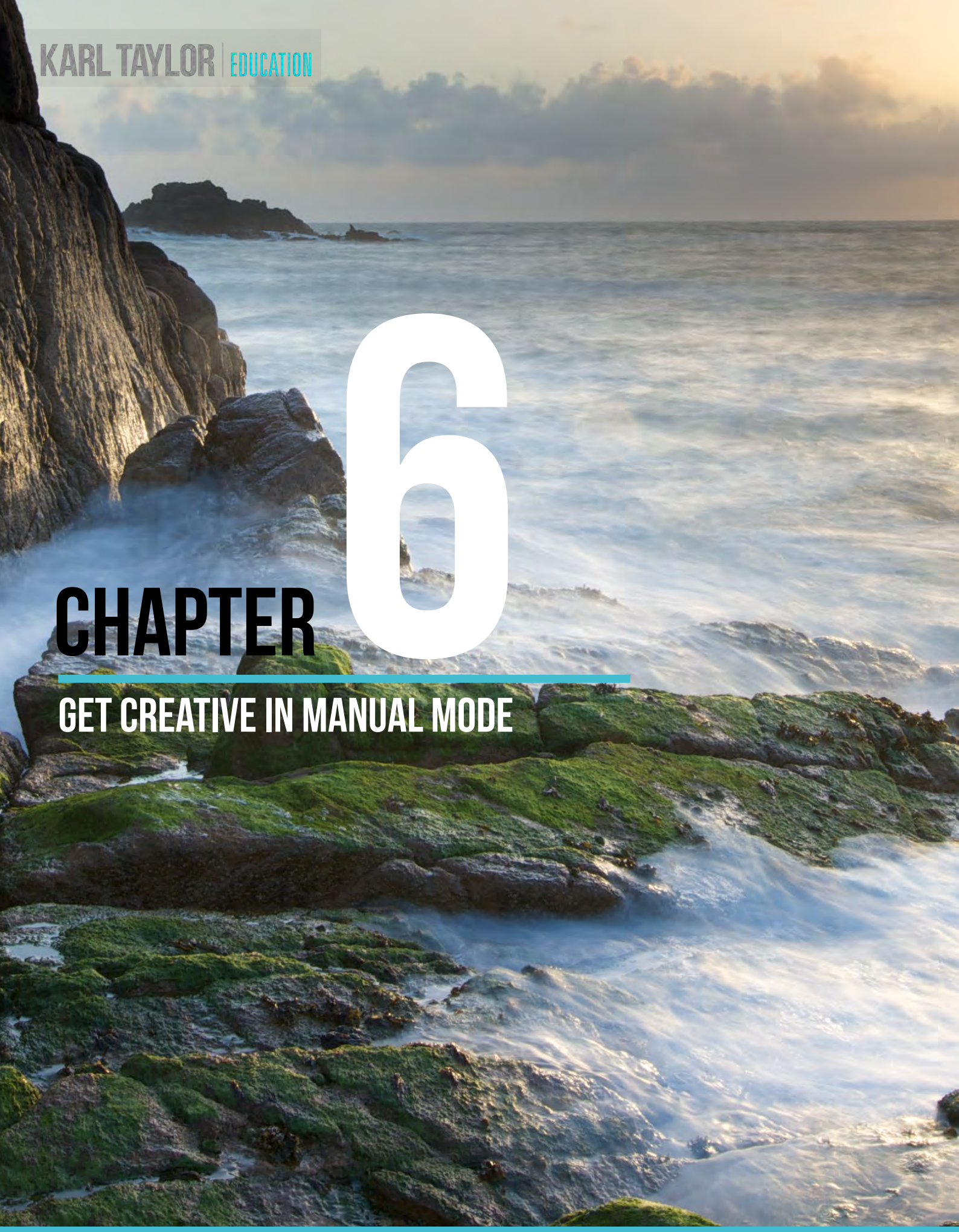

CHAPTER 6

GET CREATIVE IN MANUAL MODE

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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GET CREATIVE IN MANUAL MODE

A frame from video chapter 6

MANUAL MODE

Shooting in Manual mode may initially seem like a bit of a balancing act, but it is important to master if you want to advance your photography. In this chapter Karl explains his camera settings while shooting a seascape. He battles with changing light, maintaining depth of field and capturing the desired amount of motion in the waves. Only once you can overcome challenges like this using manual mode will you be able to achieve creative results.

EARLIER SHOT: MORE AVAILABLE

A frame from video chapter 6

LATER SHOT: LESS AVAILABLE LIGHT

A frame from video chapter 6

In the video in this chapter you will see as Karl sets out to photograph a seascape sunset. Throughout the shoot he experiences changing levels of light as the sun sets lower in the sky and he demonstrates how, by using Manual mode, you can more easily adapt to light changes in your environment while still achieving the creative results desired.

Early on in the shoot the sun was still fairly high in the sky, as seen on the left. The aperture of f16 allowed for a large depth of field. The slower shutter of 4 seconds allowed Karl to capture enough light as well as some motion. With these settings, he was able to achieve the correct exposure.

However later in the shoot, as shown on the left, the sun had dropped in the sky. Wanting to keep the same exposure time to capture the desired amount of motion in the water, adjusting the shutter speed was not an option for Karl to correct the exposure, so he opened the aperture by one third of a stop to f14 instead, to increase the exposure.

WHAT CAN BE ACHIEVED IN MANUAL MODE

Shooting in Manual mode is just like learning to drive a car - it may seem daunting at first, but once you've mastered it you'll wonder why you were ever worried! Shooting in Manual requires balancing the shutter speed and aperture to achieve the correct exposure.

In this chapter Karl touches on a few of the things you can achieve when shooting in Manual, but the truth is that these examples are just the start. What you can achieve with full control is limitless; and the fastest way to learn this is to go out and shoot in Manual.

LIGHT PAINTING WITH A LONG EXPOSURE

Light painting is a creative technique that looks far more complex than it actually is. This is where light is 'painted' into the photograph using an additional light source while shooting with a long exposure. The key to this is a slow shutter speed as this is what will allow you to record the extra light being 'painted' into the scene. This can require exposures of up to several minutes - the image on the right was taken over 18 minutes! Light painting is a great way to get creative and try something new; and doesn't require much more than your camera, a tripod and a powerful torch (for longer exposures, a shutter release cable can also be useful).

Discover this course: Painting with light

CREATIVE EXPOSURE FOR PORTRAITURE

One of the greatest benefits of shooting in Manual mode is that it enables you to create results that you wouldn't otherwise be able to achieve using any of the automatic or semi-automatic modes on a camera. This portrait is a great example of this. The dark, moody lighting is exactly what the photographer intended, but this effect would have been very difficult to achieve using Auto mode because the camera would have perceived this as 'underexposed' and either lowered the shutter speed or opened the aperture to add more light. Switching to Manual mode will give you the freedom to take those next creative steps with your camera.

Discover this course: Lighting theory

A frame from video chapter 6

BLURRED BACKGROUND

Shallow depth of field is a common choice when it comes to portrait photography and it is one of the easiest ways to add an extra level of creativity to your images. A shallow depth of field helps to draw the focus to your subject and make them stand out, which can be particularly useful when photographing against a busy backdrop. To achieve shallow depth of field it is necessary to use large apertures such as f1.2 or even f2.8 (remember magnification, distance from the subject and sensor size also have an impact on depth of field). This particular image was shot at f2.8, which has helped create a beautiful soft background with shallow depth of field.

Discover this course: Bluebell woods shoot

LARGE DEPTH OF FIELD

Wide apertures are a popular choice for photographing people, but they are not the only option. Sometimes using a small aperture for greater depth of field can produce an equally interesting result, as you can see here. This is particularly relevant when photographing scenes where we want the subject, as well as the background, to be sharp. Remember it is not only the aperture that controls depth of field, and in this case, by using a wide angle lens (covered in chapter seven of the course), the city buildings behind the subject remain sharp. This is due to the magnification of the image and the distance of the subject from the camera.

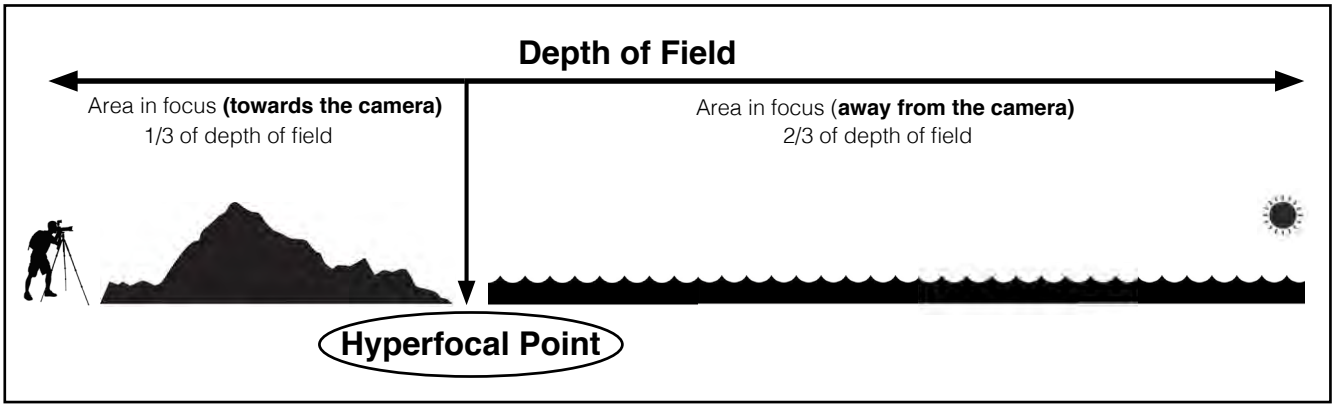
Discover this course: Stunning location lighting

MAXIMIZE DEPTH OF FIELD

As established earlier in this chapter, the simplest way to increase depth of field when photographing your subject is to use a small aperture. However, it is important to note that there are other ways to also maximise the depth of field. Later in the course Karl will introduce you to the different characteristics lenses have when it comes to depth of field. For example, lenses with longer focal lengths, like telephoto and super telephoto lenses, have less depth of field than wide angle lenses (when using the same aperture). Furthermore, in addition to the aperture and lens choice there is another factor to consider when maximising depth of field and this is the hyperfocal distance. By understanding hyperfocal distance you can maximise the depth of field available (from the aperture setting that has been selected) through a considered placement of your focal point.

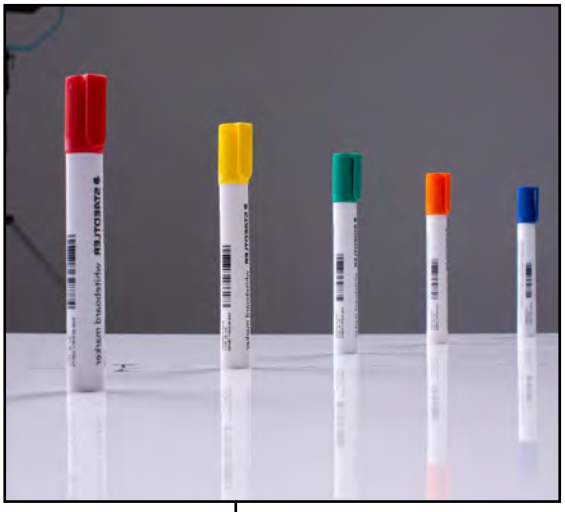
HYPERFOCAL DISTANCE

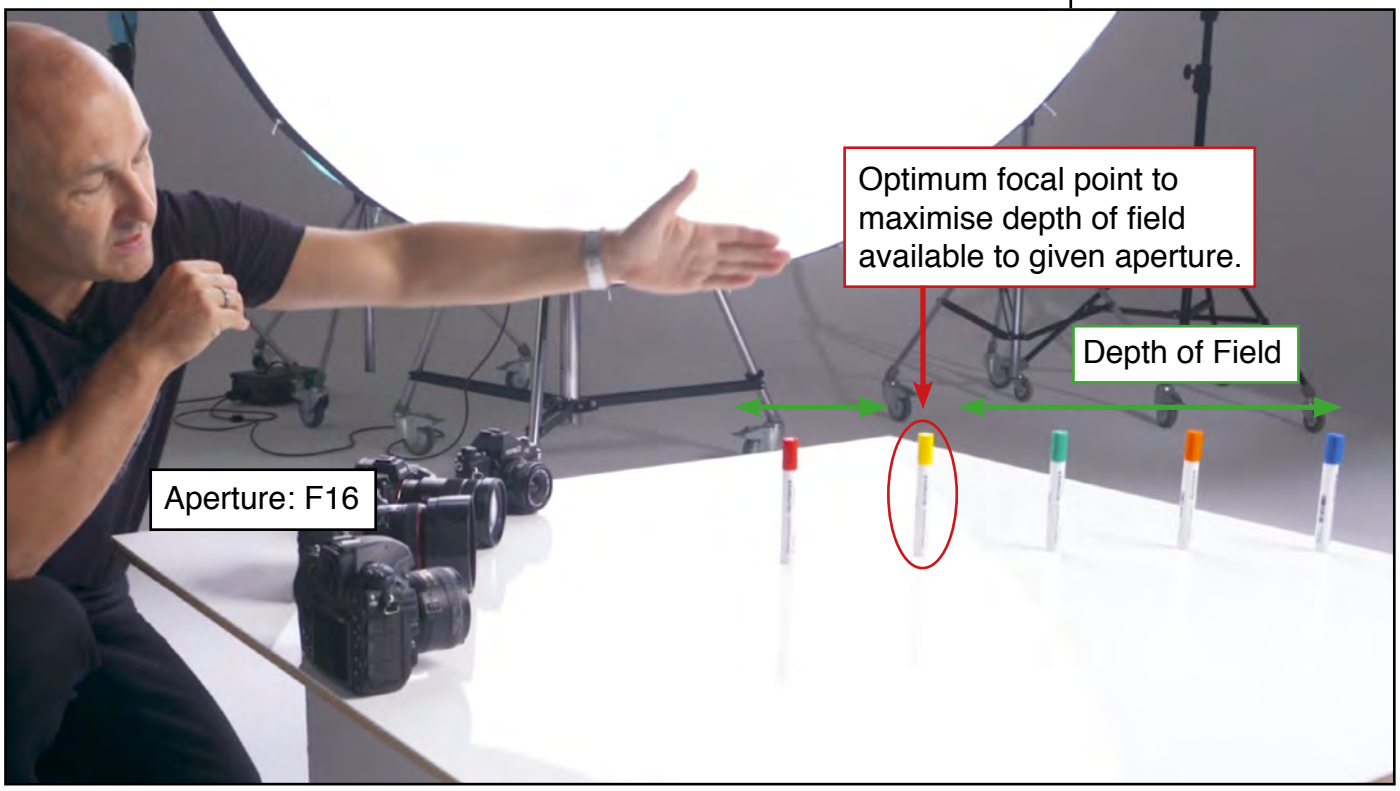
Understanding hyperfocal distance will help you select a focus point that maximises the depth of field in both directions in a shot. A key thing to remember is that focusing in the centre of a shot will not maximise sharpness in the foreground and background, since focal distance works in such a way that depth of field stretches one third of the way in front of the focus point (towards the camera) and two thirds of the way backwards (away from the camera). If used correctly, hyperfocal distance will place the furthest point of sharpness at its maximum potential at that given aperture.



FURTHER EXAMPLE OF HYPERFOCAL DISTANCE

Here is another example of hyperfocal distance, this time illustrated simply with a row of five pens. In the video tutorial you will see Karl demonstrate how to capture an image where the pens are sharp throughout by finding the optimal focal point when using a smaller aperture. As shown in the illustration below, since the depth of field stretches twice as much behind the focus point as it does in front, placing the focus point on the yellow pen allows the depth of field to run from the front to the back pen when using an aperture of f16.



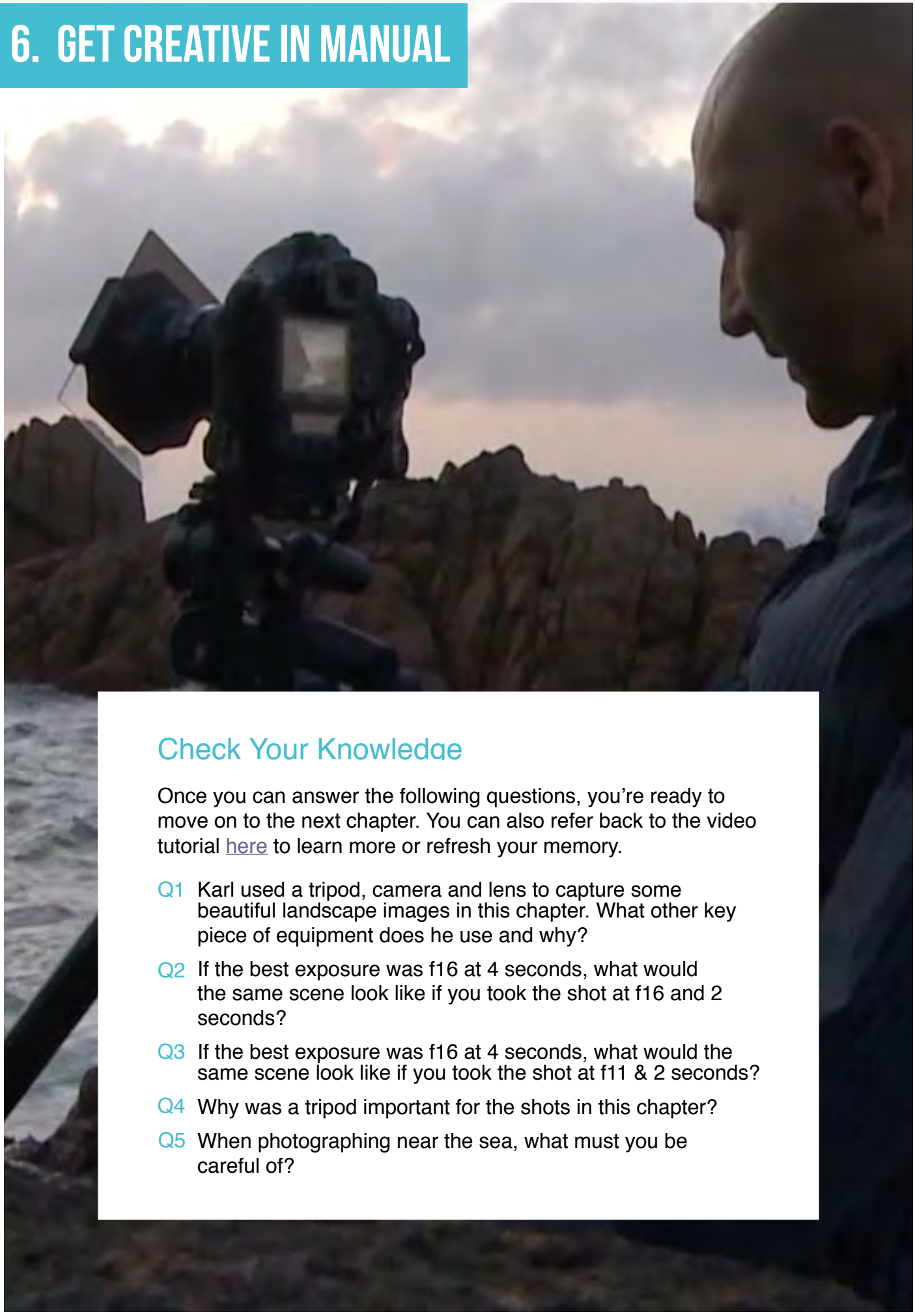


A frame from video chapter 6

CHAPTER SUMMARY

The advantages of using your camera in Manual mode are endless. It allows you to develop a far greater understanding of how your camera works and how to balance exposure using shutter speed and aperture, and it also allows you the creative freedom to take photos that otherwise wouldn't have been possible using an automatic or semi-automatic mode. This can take a little bit of time to get used to, but it will be worth it. As you would have seen throughout this chapter, it's possible to achieve very particular results once you take full control of your camera. Mastering concepts such as shutter speed, aperture, exposure, one-stop changes and hyperfocal distance are good starting points. Once you understand these and are confident using Manual mode, you will be able to make the most of your creativity and advance with your photography.

6. GET CREATIVE IN MANUAL



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 Karl used a tripod, camera and lens to capture some beautiful landscape images in this chapter. What other key piece of equipment does he use and why?

Q2 If the best exposure was f16 at 4 seconds, what would the same scene look like if you took the shot at f16 and 2 seconds?

Q3 If the best exposure was f16 at 4 seconds, what would the same scene look like if you took the shot at f11 & 2 seconds?

Q4 Why was a tripod important for the shots in this chapter?

Q5 When photographing near the sea, what must you be careful of?

A frame from video chapter 6

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“YOU CAN ONLY TRULY GET CREATIVE WITH PHOTOGRAPHY ONCE YOU HAVE MASTERED YOUR CAMERA IN MANUAL MODE. I BELIEVE NO OTHER COURSE WILL ADVANCE YOUR KNOWLEDGE AS QUICKLY.”

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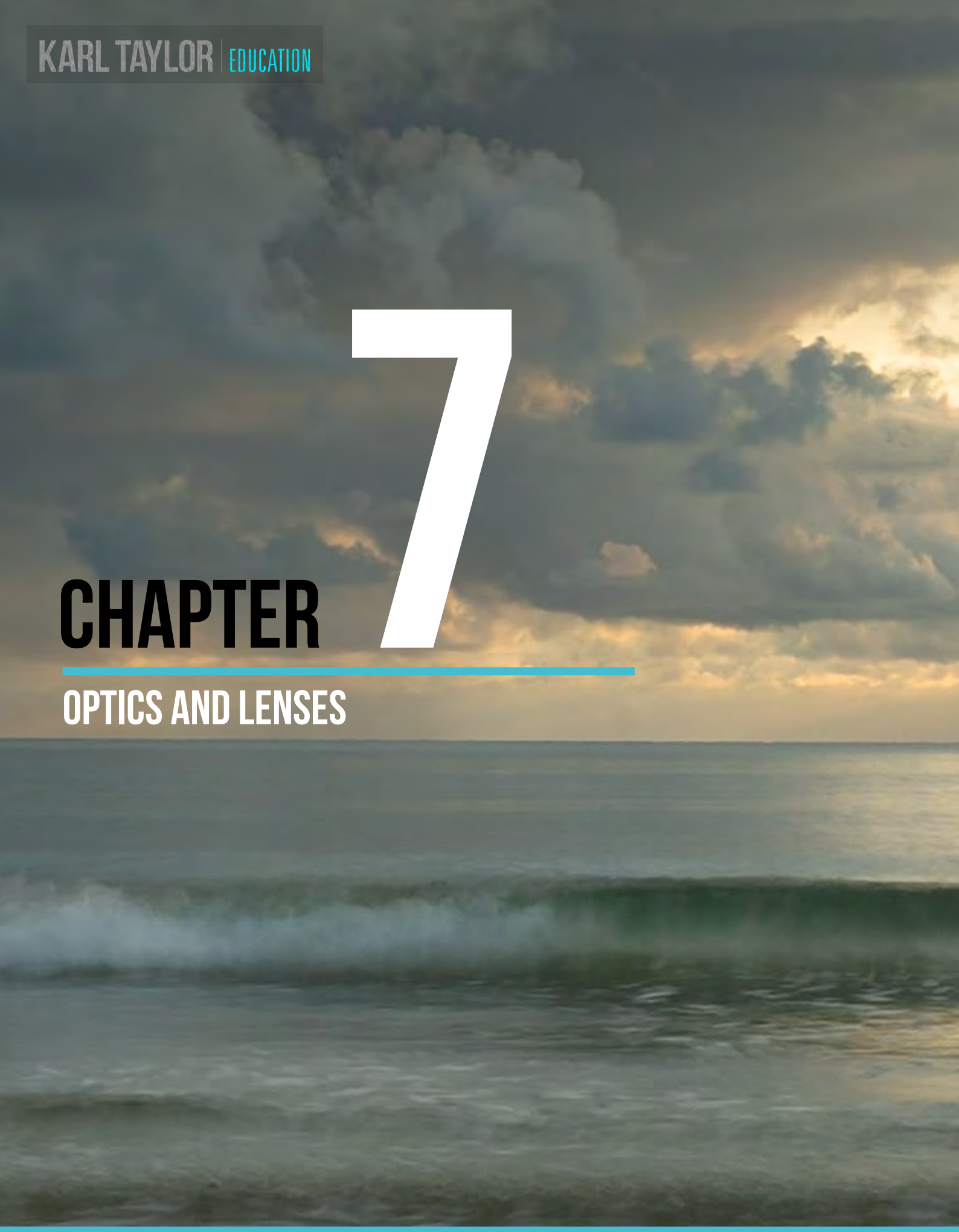

CHAPTER 7

OPTICS AND LENSES

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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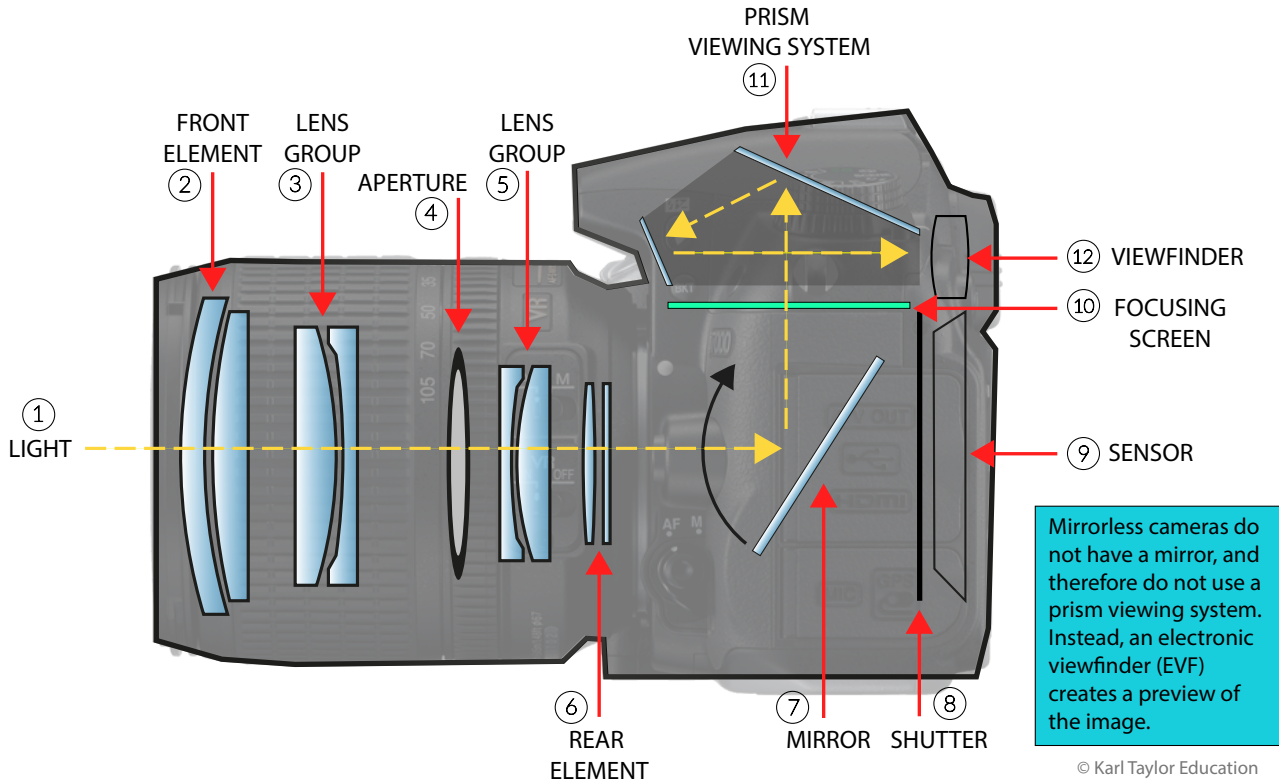
OPTICS AND LENSES

A frame from video chapter 7

UNDERSTANDING LENSES

Lenses are an important part of the photographic process as their unique characteristics are, in part, what determine the look and feel of an image. As light reflected off of the subject enters the lens, it passes through a number of elements, as well as the aperture, before passing through the shutter and reaching the sensor. These lens elements are what serve to focus the light so that it can be recorded by the medium. The arrangement of these elements determine the focal length of an image, the angle of view, the magnification and help describe the image based on their particular characteristics. Available in a variety of different focal lengths, different lenses produce very different results depending on the configurations within the lens barrel.

INTERNAL WORKINGS OF A CAMERA



Mirrorless cameras do not have a mirror, and therefore do not use a prism viewing system. Instead, an electronic viewfinder (EVF) creates a preview of the image.

© Karl Taylor Education

CAMERA LENSES

Lenses come in a variety of different shapes, sizes and focal lengths. Each one of these can be used to create very particular looking results, depending on their particular characteristics. Quite simply, lenses can be categorised into two main groups — prime or zoom lenses, both of which come in different focal lengths. Prime (or fixed) lenses feature a fixed focal length and are known for delivering high quality images. They also generally offer much wider apertures compared to zoom lenses. Zoom lenses, on the other hand, provide a variety of focal lengths in one lens. This makes them very versatile and also reduces the need for multiple lenses. Within these two groups, lenses come in a variety of focal lengths, from fish-eye to super telephoto. The focal length is one of the key characteristics of a lens as it determines the angle of view as well as the magnification of an image.

A frame from video chapter 7

LENS TYPES

CHOOSING A LENS

Lenses play an important part in photography — some may even argue that they're equally, if not more important, than the choice of camera, so choosing the right lens is critical. Selecting which lens to use depends on a variety of factors. Once you reach the point of buying your next lens, think about what you'll be using the lens for. Do you need the ability to quickly change focal length, in which case a zoom lens will be better than a prime lens. Do you often work in low light conditions where a large aperture will come in handy? If so, you'll need a lens with a larger aperture. Do you like photographing landscapes more, or people? These points will help you determine which lens will be best suited for what you want to photograph.

UNDERSTAND THE DESCRIPTIONS ON YOUR LENS

Looking at a lens, there is a variety of numbers, letters and symbols that, at first, can look quite confusing. Each of these numbers and letters tell you essential information like focal length, maximum aperture, lens version and focusing motor. Other features specified include stabilisation and filter diameter (this is usually found on the front of the lens and indicated by the symbol ø).

MACRO LENSES

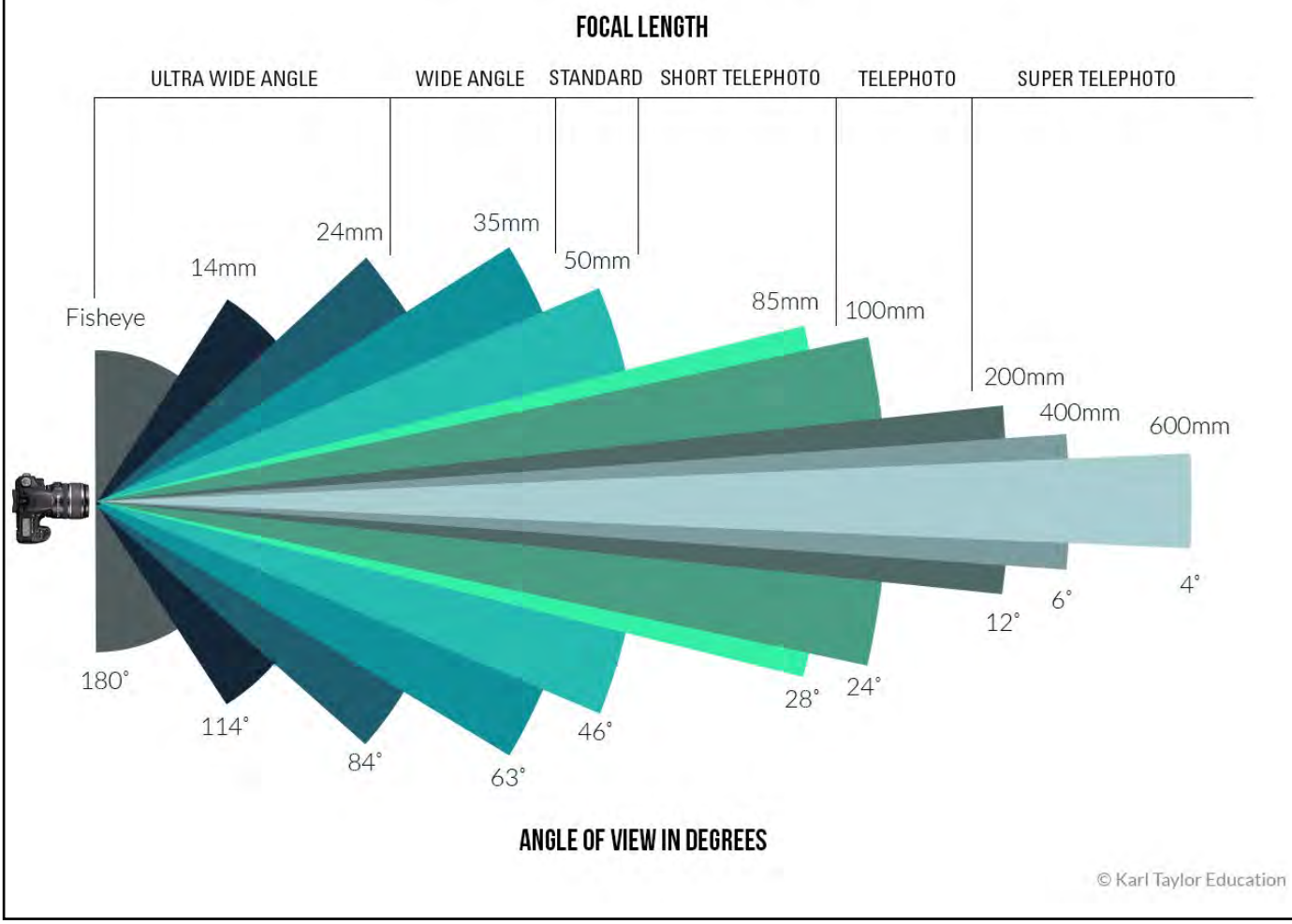
You've possibly already heard the term 'macro photography'. If not, macro photography is extreme-close up photography, usually of small objects. This type of photography often requires using specially designed macro lenses. These are lenses that are designed for photographing small subjects at very close distances - they have lower minimum focus distances and 1:1 magnification (this means that the size of the image in real life is the same size as it's reproduced on the sensor). Macro lenses can also be used for other types of photography.

© Nick Després

FOCAL LENGTH AND FIELD OF VIEW

Focal length is one of the defining characteristics of a lens, as this determines the angle of view as well as the magnification. How focal length is determined requires an understanding of the physics of light and of concave or convex lenses; but very simply, when light enters a lens, glass elements within the lens serve to converge the light to a single point, known as 'focus'. The focal length is determined by the position of this focus point in relation to certain lens elements. This is usually indicated on the side of the lens barrel and sometimes on the front of the lens, along with the lens diameter. Ranging anywhere from 8mm to 2000mm, there is a wide variety of focal lengths to choose from, each of which are better suited to different genres of photography. Lenses with shorter focal lengths provide a much wider angle of view and are better suited to landscapes than product photography, for example. The opposite is also true for longer focal lengths, which may be better suited to sport or wildlife photography than architectural photography. Lenses with shorter focal lengths also provide less magnification than those with larger focal lengths. This is illustrated in the image below and explained in the video in this chapter, where you can also see examples shot using different focal length lenses for comparison.

FOCAL LENGTHS AND FIELD OF VIEW



LENSES AND APERTURE

Although not specifically a type of lens, aperture is another important feature of lenses. As you'll already know from the previous chapters, aperture refers to the opening in the lens that controls how much light reaches the sensor. This is indicated in the format 1:2.8, for example, with the second set of numbers indicating the maximum aperture. Some lenses will feature two maximum apertures (shown as 1:4-5.6). What this means is that as you zoom, the aperture capability changes. So at the shortest focal length, you may be able to shoot at f4, but once you zoom to the longest focal length, the widest aperture you'll be able to shoot at will be f5.6. Generally lenses with wider apertures are favourable due to their increased light capturing capabilities. There is also a category of lenses that feature a fixed aperture. Catadioptric, or mirror lenses, which used to be fairly common, usually feature a longer focal length, such as 500mm at a fixed aperture of f6.3. As an example, most (but not all) telescopes are catadioptric.

SUMMARY OF LENSES

FISHEYE LENS

Fisheye lenses produce a unique perspective due to an ultra-wide 180 degree field of view. Most notably, they produce strong distortion and a large depth of field. These lenses are usually only used when a very wide angle of view is required.

SUPER WIDE ANGLE LENS

While a super wide angle lens also offers a very wide angle of view, it does not distort in the same way fisheye lenses do. This lens also has the advantage of being able to offer greater depth of field than larger focal length lenses.

A frame from video chapter 7

A frame from video chapter 7

WIDE ANGLE LENS

Wide angle lenses are those that have greater focal distances compared to fisheye and ultra-wide angle lenses, but not as great as standard and other lenses. These lenses are commonly used by landscape and architectural photographers.

STANDARD LENS

As the name suggests, a standard lens offers a standard focal length and a standard field of view. These are good lenses to start with as they offer great versatility and can be used for a variety of different types of photography.

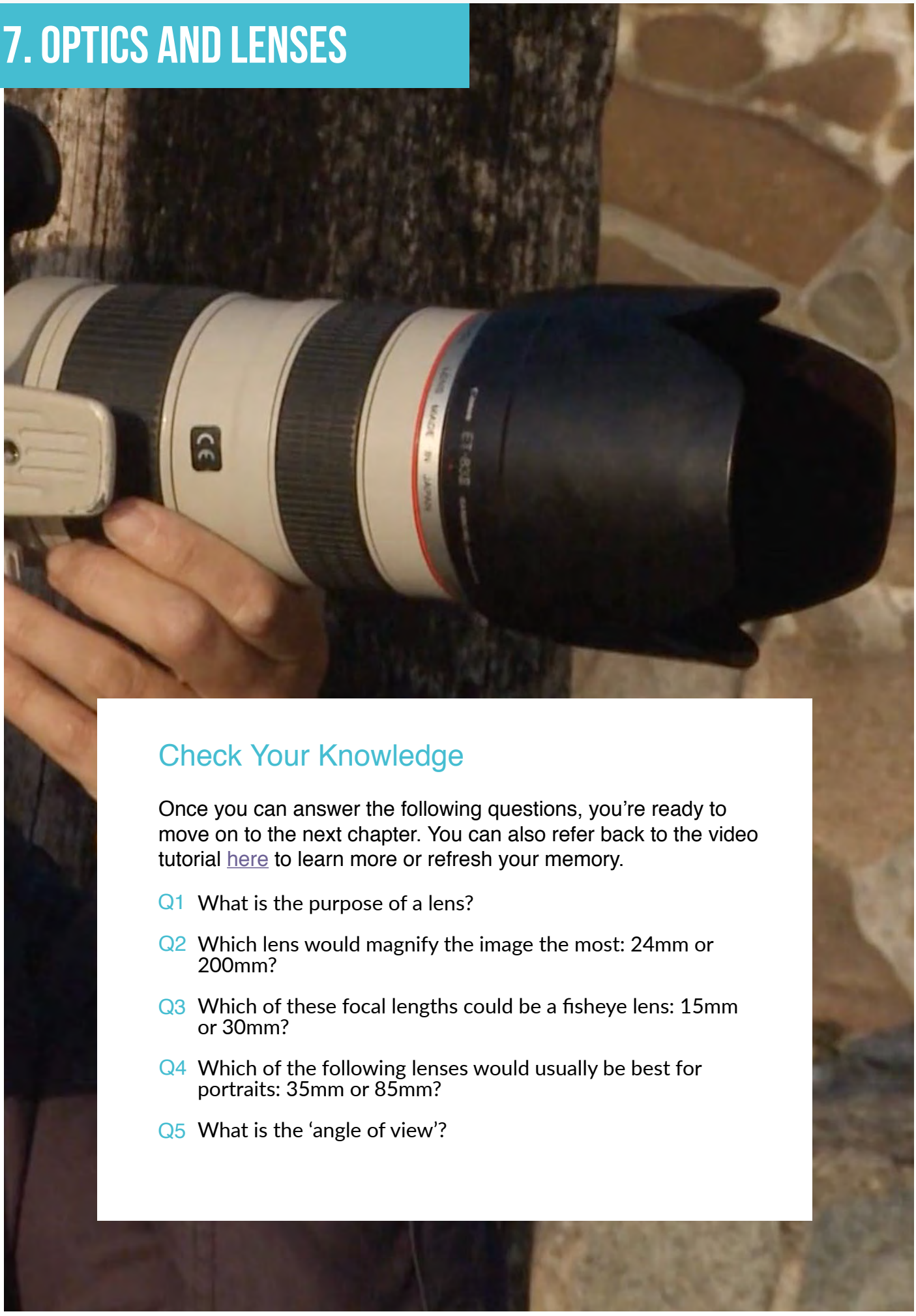
SHORT TELEPHOTO LENS

As you can see in the image below, short telephoto lenses allow you to photograph objects that are slightly further away as they offer larger focal lengths. As a result, their field of view is less compared to the lenses mentioned previously.

SUPER TELEPHOTO LENS

Super telephoto lenses offer extremely long focal lengths and are typically associated with wildlife or sports photography, where it is not always possible to get close to the subject. However, they have a very limited field of view.

7. OPTICS AND LENSES



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 What is the purpose of a lens?

Q2 Which lens would magnify the image the most: 24mm or 200mm?

Q3 Which of these focal lengths could be a fisheye lens: 15mm or 30mm?

Q4 Which of the following lenses would usually be best for portraits: 35mm or 85mm?

Q5 What is the 'angle of view'?

A frame from video chapter 7

KARL TAYLOR | EDUCATION

“I WAS ALWAYS FASCINATED BY LENSES AND OPTICS WHEN I WAS A KID, AND TO BE HONEST I STILL AM. I WAS ALWAYS AMAZED AT HOW LENSES COULD MAGNIFY THINGS THAT WERE FAR AWAY AND BRING THEM RIGHT UP INTO VIEW.”

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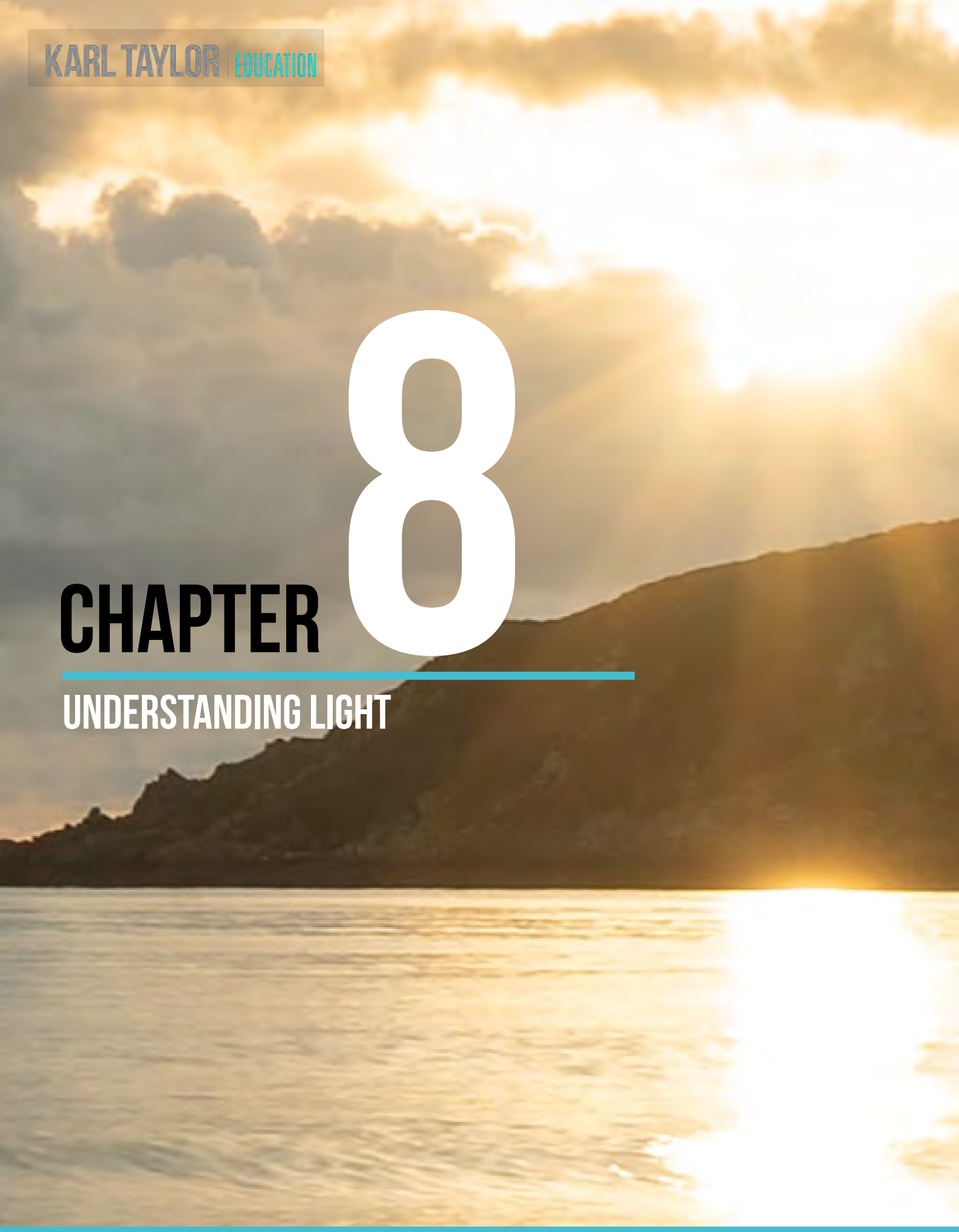

CHAPTER 8

UNDERSTANDING LIGHT

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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UNDERSTANDING LIGHT

A frame from video chapter 8

TYPES OF LIGHT

There are countless ways photographers can utilise light in their images and it's important to start recognising these in the world around you (and in other photographer's images) in order to develop an understanding of the effect of light in your own photography.

Once you understand light, you will have a far better idea of how to use it to achieve creative results. In this chapter explanations and examples are given on the following: common lighting terms, simple combinations of light, colour temperature, white balance and the Kelvin scale. You'll also see examples of how to combine light to achieve creative results.

HARD LIGHT

Hard light comes from a small, or 'point', light source. The sun on a clear day is a perfect example, which may, at first, seem confusing as it is obviously very large. However, when it comes to lighting in photography, the size of the light source is relative to the subject. The distance of the sun therefore makes it small in relation to the subject.

Discover this course: Two light harsh lighting

SOFT LIGHT

Soft light is the opposite of hard light and is produced by any light source that is very large (remember, this is from the subject's perspective). This results in even light with little to no shadows. An example of soft lighting would be the sky on a cloudy day as the clouds act to diffuse the sun, turning it into a very large light source.

Discover this course: Soft side lighting and fill

NATURAL LIGHT

Natural light refers to any light emitted from the sun and is an essential tool for many photographers. Best of all, it's free and all around us! For the most pleasing natural light, photographers typically prefer to shoot in what is called the 'magic hour'. This is usually around an hour before and after sunset or sunrise.

Discover this course: Natural light portraiture

AMBIENT LIGHT

Ambient light refers to any light that is already present in a scene, or, in other words, it is the available light that could already be seen in the environment. This is also commonly known as 'general lighting' and could be anything from light from street lamps to light reflected off of a building or sunlight entering a room.

Discover this course: Office space portrait

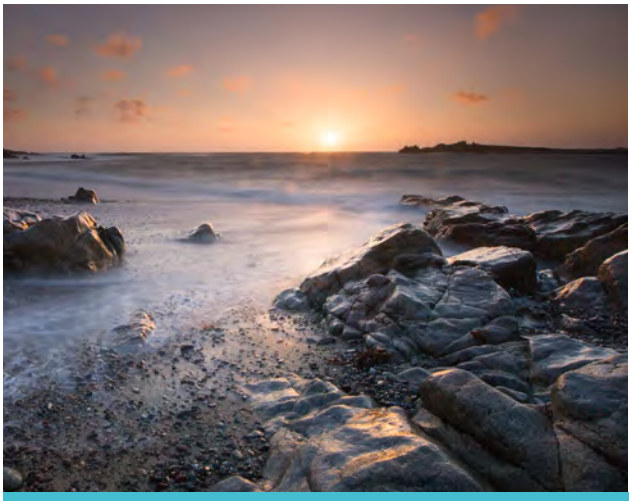
REFLECTED LIGHT

Reflected light occurs when light reflects off the surface of an object. Variations in the surface and texture of objects causes light to reflect differently. For example, light will reflect more evenly off a mirror compared to sand. Very few objects completely absorb light, which means almost all of the photos we take capture reflected light.

Discover this course: Get creative in manual

TRANSMITTED LIGHT

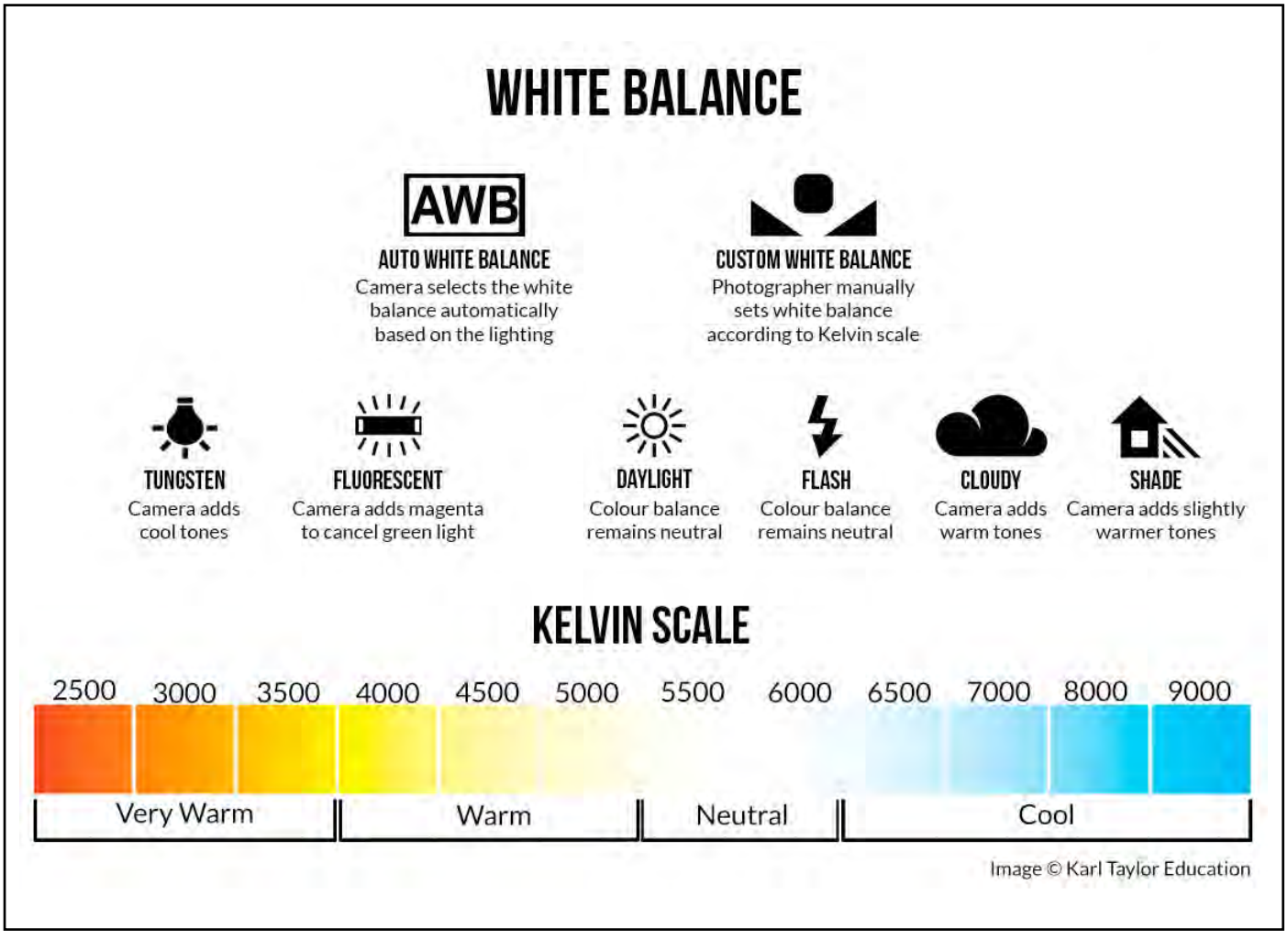
Transmitted light is light that you can see emitted from its source. This means that we can see the light source directly in the picture. Examples of this could be candlelight or even the sun. It is also light that has passed through something before reaching the subject. This could be glass, water or even the atmosphere.



Discover this course: Sunset seascape

COLOUR TEMPERATURE

To understand colour temperature, let's first look at light and the colour of light. Light consists of three primary colours: red, green and blue. Light in these colours can be added together to make secondary colours or, if all three three primary colours are combined, white light. Different light sources will all have their own colour temperature. Candlelight, for example, is a warmer colour with more red and orange tones than the cool, bluer light seen on a cloudy day. This light is registered by our eyes and by our cameras, but the way these two systems perceive light is different. So why do the scenes we see in front of us often look very different to what we capture with our camera? When we see a white object (like paper) in tungsten lighting, it looks white; the same way a white t-shirt in shade also looks white. This is because our brains automatically correct this for us. This is essentially what the Auto White Balance function on our cameras does too. As photographers, we can use this feature to correct the colour temperature, or by using other white balance settings or the Kelvin scale. White balance refers to the process of correcting inaccurate colour cast caused by different light sources. Most cameras feature presets such as Tungsten, Fluorescent, Daylight, Flash, Cloudy, Shade or Custom White Balance settings, each of which will apply the appropriate colour correction to the image, based on the colour temperature of the scene.

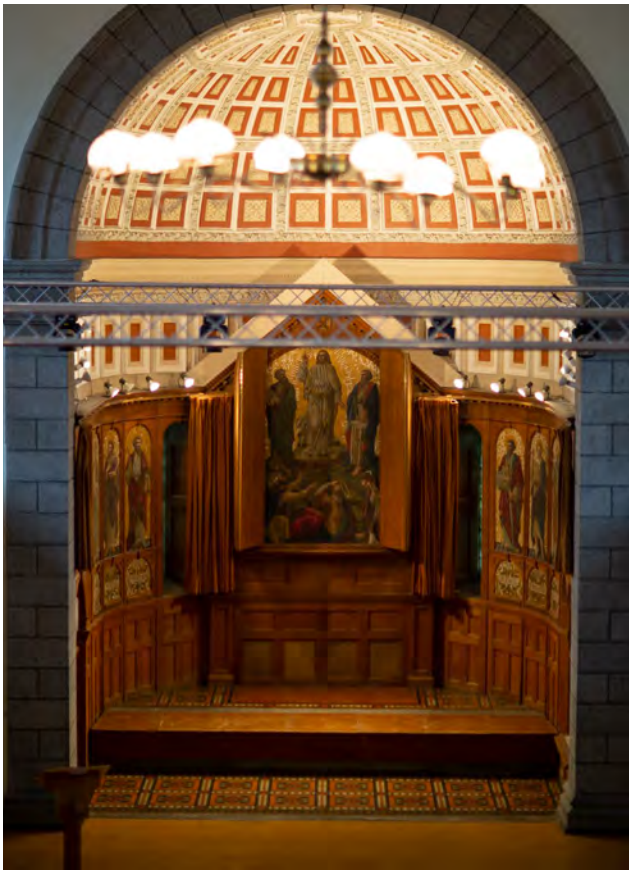


THE KELVIN SCALE

Colour temperature is measured according to the Kelvin scale, which, when used in photography, ranges from 1000K to 10000K, with 1000K being the warmest tones and 10000K being the coolest. For example, if you were sat in a room lit by candlelight, the colour temperature would be around 1500K. If you were sat in the sun on a clear, sunny day, the colour temperature would be around 5600K. The Kelvin scale can be used to fix incorrect colour cast manually by selecting the current / matching colour temperature. To neutralise candlelight, it would therefore be necessary to adjust the Kelvin value to the same approximate temperature as the light source to make the image more neutral.

CORRECT WHITE BALANCE

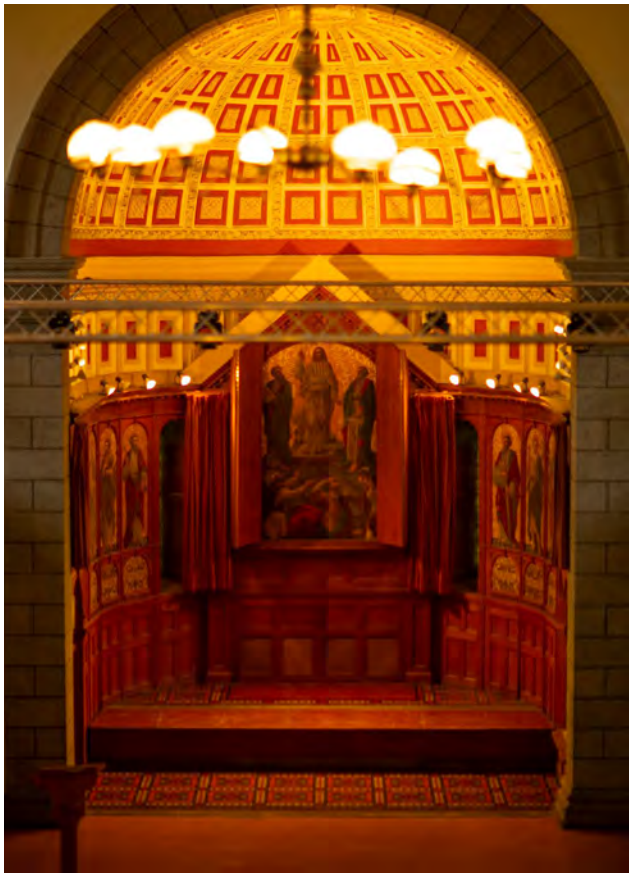
In this chapter we see how using the right white balance settings on your camera can have a big impact on the final shot. Here we can see that by using the appropriate white balance setting on the camera (in this case Tungsten) it has resulted in a far more natural looking image. This is because the Tungsten setting has shifted the Kelvin scale to compensate and therefore correct the colour. By doing this, the overly orange tones in the image to the right have been cancelled out.



A frame from video chapter 8

INCORRECT WHITE BALANCE

Here we can immediately see the difference between this example and the image on the left. This image appears much warmer, with a much more orange tone to the image. This is because the incorrect colour balance was used to take the image. In this case using the Daylight white balance setting did not correct the warm colour cast from the tungsten lighting, resulting in a distinct orange tint to the final image. This is why it's important to understand colour balance and how it can affect your images.



A frame from video chapter 8

COMBINING LIGHT

Take the time to identify types of light. This will help you understand how light works, how it interacts with different surfaces and mixes with other types of light. Once you've got your head around this, you can start thinking about how you can combine light. In this section different two-light combinations are identified and explained to give you an idea of how light works, but it's important to note that many images, including some of those below, will actually have more than two types of light present in them.

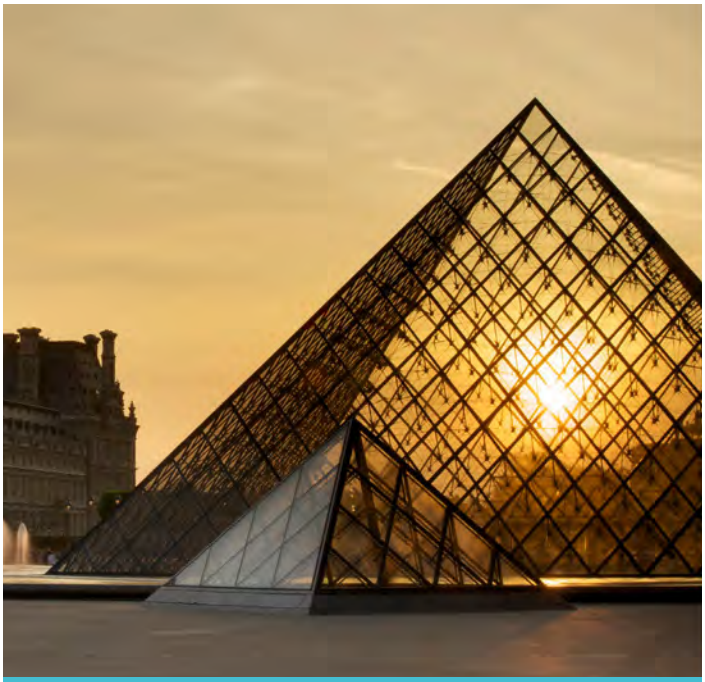
COMBINATION: HARD AND SOFT LIGHT

When hard light and soft light are combined, the result is dynamic lighting that has a little less contrast than a photograph featuring exclusively hard light. This is because the image contains both harsher shadows and/or strong highlights from the hard light and also has areas of softness from the soft light. In the image across, the hard lighting can be identified on both sides of the model, in the effect of rim lighting, where strong highlights can be seen. The soft lighting can be identified as the light that is hitting the model from a frontal perspective which is casting soft shadows and softer highlights.

Discover this course: High key fashion

COMBINATION: TRANSMITTED AND REFLECTED LIGHT

Another example, this time of a different combination of light, can be seen in this image of the historic Louvre museum in Paris. In this example, both transmitted and reflected light can be seen. The transmitted light (a light source that is visible in the image and has travelled through an object) is the setting sun that is visible shining through the glass of the Louvre. The image also features reflected light (light that reflects off the surface of an object). This is clearest on the floor of the structure. Here we see the sun reflecting in the shiny surface of the floor, and there is also light reflecting off the floor between the camera and the structure.



Discover this course: Sunset photography

A frame from video chapter 8

COMBINATION: NATURAL LIGHT AND ARTIFICIAL LIGHT

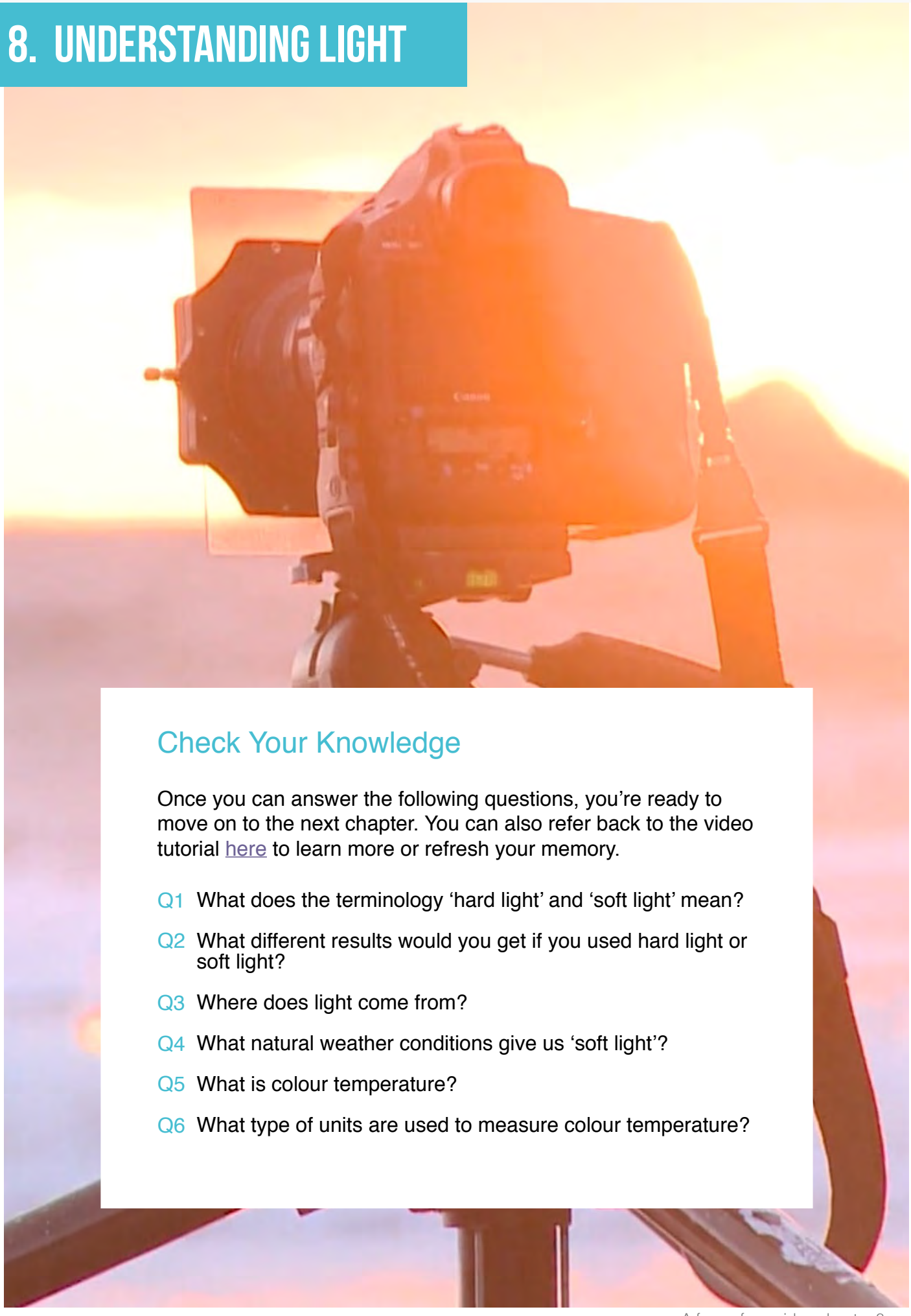
Once you become more confident with identifying and controlling light, one of the next steps is combining natural light and artificial light - this could be either studio lights or speedlites. This combination of light can produce very creative effects, as you can see here. In this example the subject is clearly lit from the front while also being backlit by the sun. Backlighting can be a creative way to use natural light, but it does require extra light to achieve the right exposure. A balance was achieved in this image by also using artificial light, in this case speedlites. Without the addition of artificial light, the subject would have been silhouetted.

Discover this course: Speedlite fashion shoot

CHAPTER SUMMARY

The importance of light in photography cannot be overstated. It is light that we use to create images (without it, photography would not be possible) and it is also light that establishes the mood and feel of an image (and therefore a connection with the viewer). Once you understand light, you will have the key to photography. Throughout this chapter you would have seen a number of examples of different types of light (including hard light, soft light, transmitted light and reflected light) and how they can be used to invoke certain emotions. We have also covered how the magic hour is usually the best time of day to photograph as it produces a mixture of hard and soft light, but it's not the only time of day to photograph in. Also shown are ways that we can control light to get the best results, be it using accessories such as reflectors, or even studio lights. The colour of the light and the colour temperature also have an impact on the mood and feel of an image and we can control this using the different white balance settings on the camera and by understanding the Kelvin scale.

8. UNDERSTANDING LIGHT



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 What does the terminology 'hard light' and 'soft light' mean?

Q2 What different results would you get if you used hard light or soft light?

Q3 Where does light come from?

Q4 What natural weather conditions give us 'soft light'?

Q5 What is colour temperature?

Q6 What type of units are used to measure colour temperature?

A frame from video chapter 8

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“LIGHT IS THE MAGICAL STUFF THAT WE USE TO CREATE OUR PICTURES. WITHOUT LIGHT, PHOTOGRAPHY WOULD BE IMPOSSIBLE.”

KARL TAYLOR

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CHAPTER 9

THE RECORDING MEDIUM

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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RECORDING MEDIUM

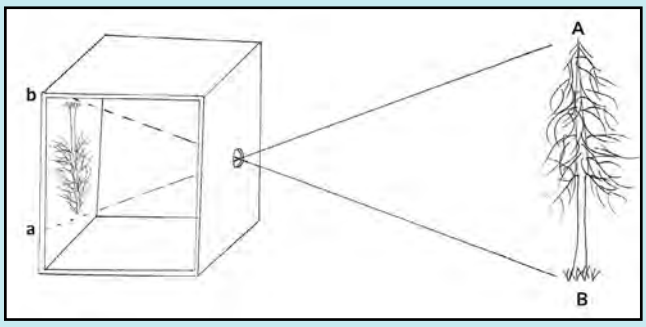
A frame from video chapter 9

WHAT IS THE RECORDING MEDIUM?

In its most simple terms, the recording medium is what is used to record an image. Once the light has passed through the optics of the camera, the aperture and shutter, an image is recorded. Traditionally in the days of film an image would be recorded through a chemical reaction triggered by the light when exposed to the photographic film. In today's cameras photographic film has been replaced by digital sensors. There are two types of sensors (CMOS and CCD) and a variety of sensor sizes: crop-sensor, full-frame and medium format. These were briefly mentioned in chapter one and are further explained later in this chapter. However, in principle, they all function in the same way. An image is created from millions of pixels (tiny dots of colour, essentially). These pixels are recorded by an array of millions of tiny light sensitive photosites on the camera's sensor. During the exposure, photons (which are the fundamental particles of light) strike these photosites and this interaction is recorded as an electrical signal, which is then recorded in a binary format that describes the image.

THE CAMERA OBSCURA

The camera obscura, in Latin, means "dark chamber" and was used in the 16th century as a visual aid for artists. The light enters the dark space through a tiny hole and is projected as an inverted image onto the back wall of the camera obscura. By the 19th century, it became possible to record the projected image using photosensitive materials, such as film. In the most simplistic terms, similar mechanics are replicated today in modern cameras. The small hole has been replaced by the aperture and the back wall of the camera obscura has been replaced by the camera sensor to record the image.



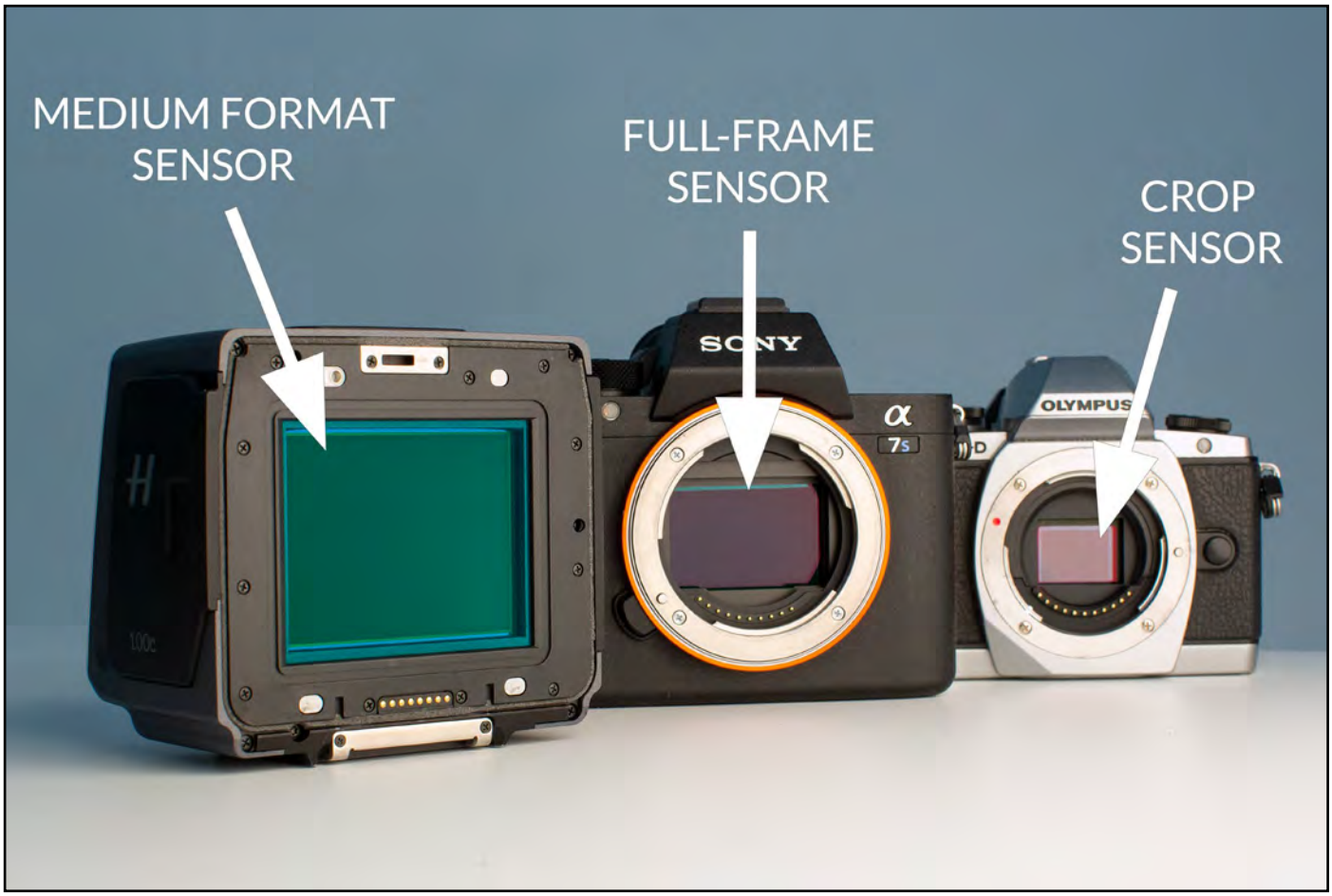
TYPES OF RECORDING MEDIUMS

Depending on your camera, there are different types of sensors. The two main types of sensors are CCD (Charge-Coupled Device) and CMOS (Complementary Metal-Oxide Semiconductor) sensors. CCD sensors, until recently, used to be the most commonly used type of sensor due to their superior image quality, dynamic range and noise control at the time. However, as technology has progressed, CMOS sensors have now taken over. Generally speaking, larger sensors offer the highest quality while smaller sensors provide a more economic option, but still deliver great results. Image quality is partly determined by factors such as sensor type (and size), the resolution (number of megapixels) and ISO. To understand the effect of these, this chapter shows a number of comparisons to illustrate how these factors influence image quality, as well as the differences between sensor sizes, the megapixel capabilities of various cameras, the variations in ISO settings and JPEG and RAW file types.

CAMERA SENSORS

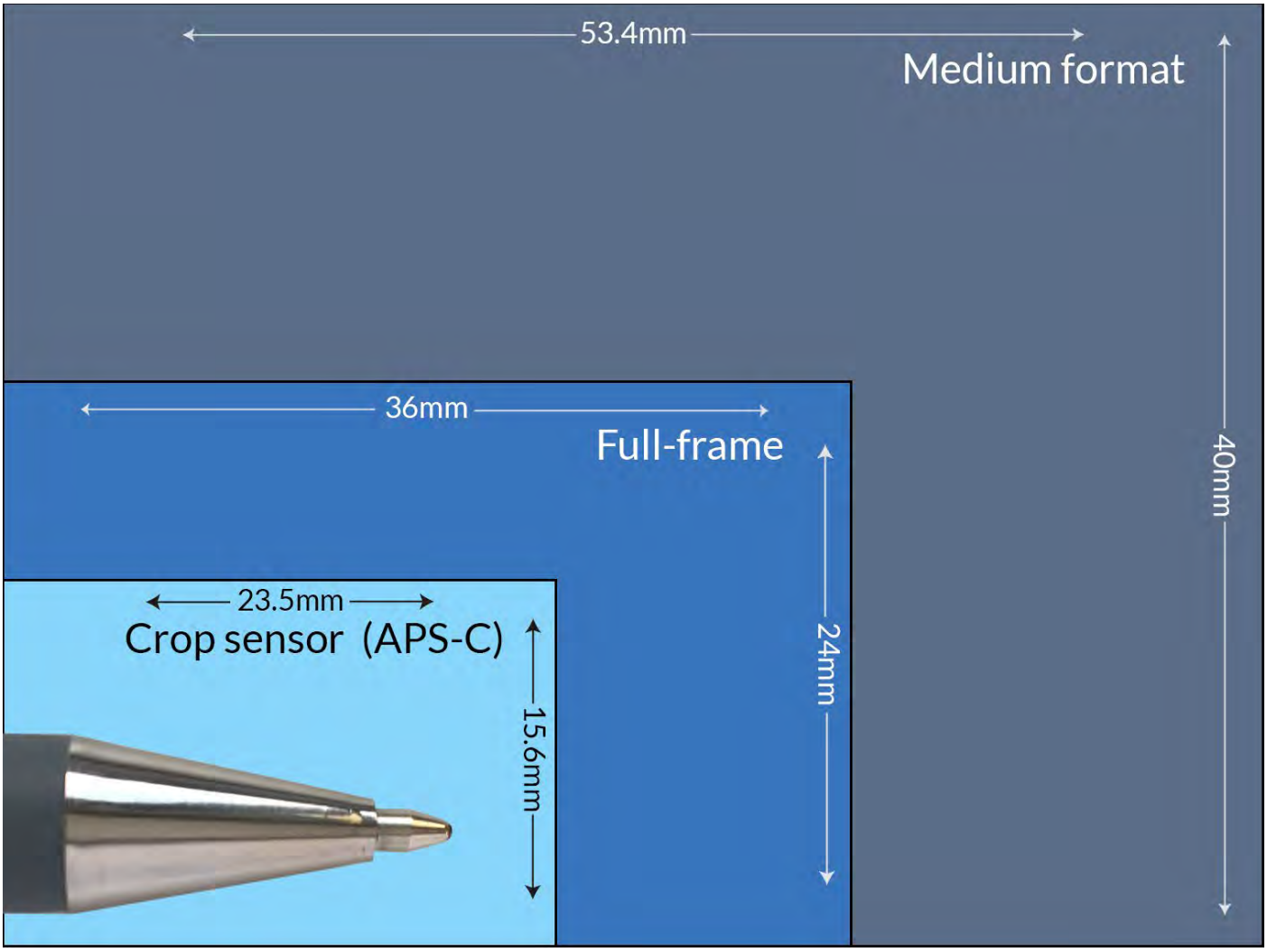
Camera sensors also come in a few different sizes (also referred to as 'formats'), with smaller sensor sizes generally offering lower image quality compared to that of larger sensors.

Most commonly, you're likely to have heard of full-frame, crop sensor and medium format cameras, with the smallest of these being crop-sensor cameras (shown below).



SENSOR SIZES

Crop sensor cameras, also referred to as APS-C, are the smallest of the sensor sizes, measuring approximately 23.5mm x 15.6mm compared to the 36mm x 24mm full-frame sensor. This makes them smaller, lighter and more affordable than their full-frame counterparts. Full-frame sensors, due to their larger sensor size, are bigger and generally offer better image quality and enhanced performance in low light. Medium format cameras offer the largest sensor of the three. The larger 53.4mm x 40mm sensor allows for much higher resolution and greater tonal range and colour accuracy. Mostly used by professionals, this quality does come with a much higher price tag than crop sensor or full-frame cameras.



FILM

Digital camera sensors are not the only way to record an image: film cameras remain an option to photographers today. Just as sensor size varies, so does film size; from 35mm (which is what today's 35mm cameras were based on) to larger 6x4.5 medium format and even 10x8 large format film.

MEGAPIXELS AND RESOLUTION

Although used interchangeably, the terms megapixels and resolution actually mean two very different things, and it is important to understand the difference if you want to get the most out of your images. The number of megapixels vary from camera to camera, which results in varying pixel size and image quality. Resolution, on the other hand, refers to the camera's ability to capture and record detail in images. Resolution, although related to the number of megapixels, is not solely dependent on this, but rather on how well the camera and the lens can resolve detail.

PIXELS

One megapixel is made up of a million pixels, which means that a 24 megapixel camera will record an image that is made up of 24 million pixels, while a 16 megapixel camera will record an image with only 16 million pixels. Each of these individual pixels contain information that makes up the final image. When determining image quality, it's not only the number of megapixels that matters, but also the size of the photosites (these are what record pixels). Photosites are measured in microns (μm), and their size is largely determined by the sensor size. Cameras with smaller photosites may perform worse in low light conditions and also feature more diffraction when shooting at small apertures, whereas larger photosites allow for a larger transitional tonal value, greater tonal accuracy and better colour accuracy. A comparison of images taken on a 12, 22 and 100 megapixel camera can be seen in the video.

COMPARING 12, 22 & 100 MEGAPIXEL CAMERAS

As explained in this chapter, different cameras have different numbers of megapixels, and depending on the size of the sensor and how many megapixels there are, the size of the pixels can vary. This has great bearing on the level of detail captured in an image, and to better demonstrate this, this video shows a comparison between three cameras: a 12 megapixel camera, a 22 megapixel camera and a 100 megapixel camera. Shot using the same settings, the results initially all looked very similar. It was only upon further inspection that the differences started to become more apparent. Having zoomed in to closely inspect each image, the differences were much more obvious and the variations in the level of detail were immediately clear. These are clearly shown and discussed in the video chapter.

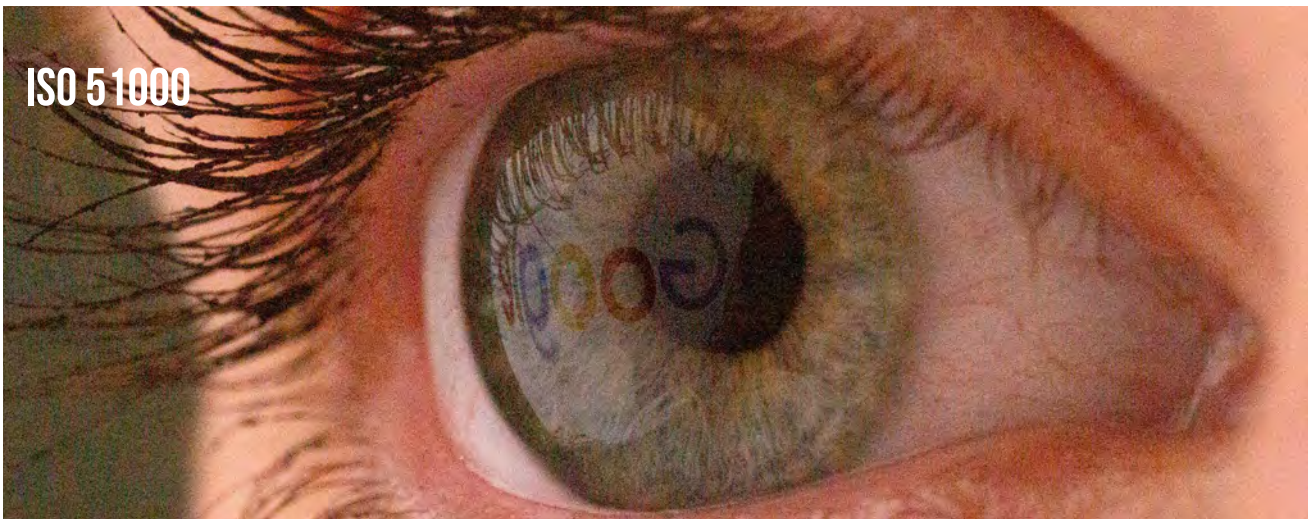
A frame from video chapter 9

RESOLUTION

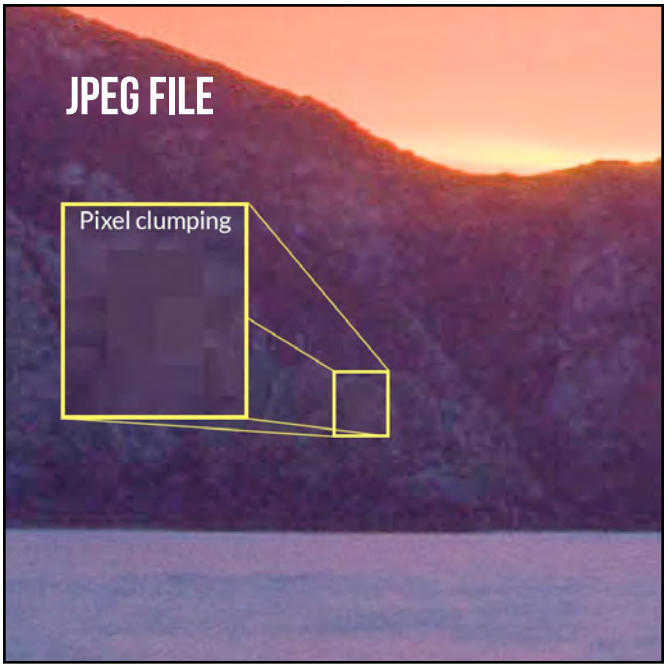
Often used interchangeably with megapixels, resolution does not only refer to the number of pixels within an image. It refers to how clearly the medium can capture and record detail - this is determined by the sensor type and quality of the lens. Although megapixels relate to resolution, they are not the defining characteristic. This means that while images with more megapixels will generally have a higher resolution, images with the same number of megapixels can have different resolution. By simply using two different versions of the same lens on the same camera, we could change the resolution. For example, an image shot with an older model lens will have a lower resolution than the same image shot with a newer model lens with better optical design. The same number of megapixels will be recorded (because it's the same camera), but the newer lens will produce better contrast, colour fidelity and overall sharpness.

ISO

ISO measures how sensitive the recording medium is to light. We can adjust our cameras to be more or less sensitive to light by simply adjusting the ISO. Higher ISO numbers are more sensitive to light, whereas lower ISO numbers will be less sensitive to light. While increased sensitivity may sound good in theory, the main drawback is that higher ISOs result in a degradation of image quality, which often appears in the form of 'noise', especially in the shadow tones (as you would have seen in the video).



JPEG VS RAW

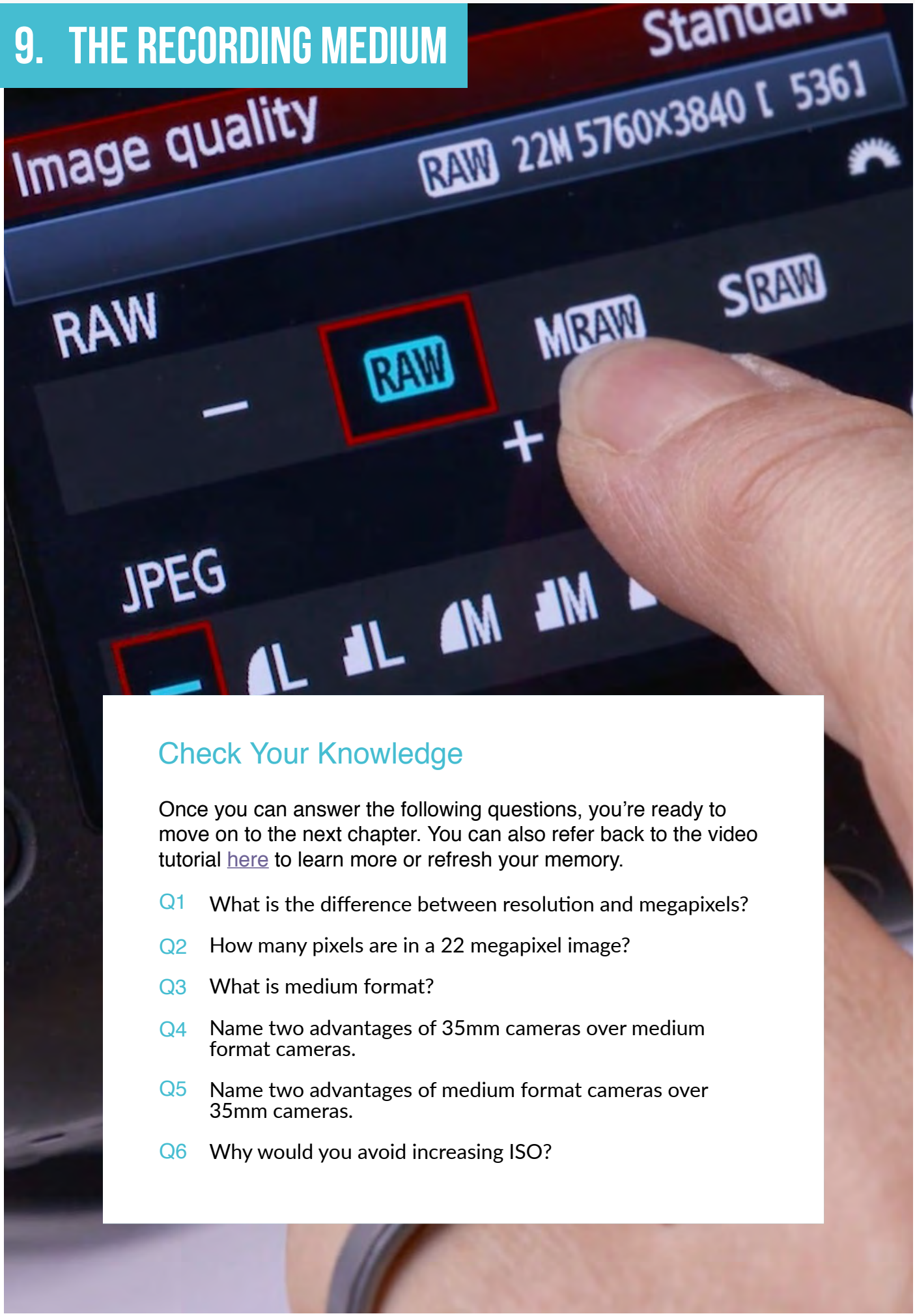


Another factor that relates to image quality is the type of file format you shoot in. This is most commonly either JPEG or RAW (some camera brands have their own file formats). Although both file types contain the same number of pixels, RAW images store far more information within those pixels than JPEG images do. This means we have far more control in the post production stage with a RAW image file, which can be very useful if you want to make changes to your pictures after shooting. Shooting in RAW file formats is particularly beneficial if there is a need to adjust the colour (either the colour temperature or tint) in the editing stages later. This is because, with RAW files, you have complete control over the colour. As explained in the video, one of the main drawbacks of JPEG files is that the file compression can sometimes result in what is known as 'pixel clumping'. This is when pixels of a similar tone are grouped together. Although this may not initially seem apparent, it does become more obvious when we start to adjust colours and exposure in post production. On the left are two exact same images, the top being a RAW file, the bottom being a JPEG. Immediately you can see instances of pixel clumping in the JPEG file, but not the RAW image. Although JPEGs may not allow us to extract as much tonal information, especially in highlight or shadow areas, they are still a common file type for those who shoot high volumes of images (such as wedding or sport photographers) because, due to their compression, JPEGs produce much smaller file sizes.

CHAPTER SUMMARY

Each of these factors contribute to image quality, but it's not to say that you have to shoot with the camera with the largest sensor, with the most megapixels and at the lowest ISO. The points above will help you understand image quality, but you shouldn't in any way be put off if you don't have a top end camera. Most of the cameras on the market today are of exceptionally high quality, far greater than those from the days of film - and those film cameras produced some of the most iconic images of our time! If you have the right knowledge, you can create amazing quality images with any camera.

9. THE RECORDING MEDIUM



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 What is the difference between resolution and megapixels?

Q2 How many pixels are in a 22 megapixel image?

Q3 What is medium format?

Q4 Name two advantages of 35mm cameras over medium format cameras.

Q5 Name two advantages of medium format cameras over 35mm cameras.

Q6 Why would you avoid increasing ISO?

A frame from video chapter 9

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“NEVER FORGET THAT ALL THE GREAT PHOTOGRAPHS IN HISTORY WERE MADE WITH MORE PRIMITIVE CAMERA EQUIPMENT THAN YOU CURRENTLY OWN.”

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CHAPTER 10

COMPOSITION

An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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COMPOSITION

A frame from video chapter 10

WHAT MAKES A GOOD COMPOSITION?

It is clear when an image is well composed, but it is not always understood why this is the case. There are many elements that make up a strong composition and it can take years of study and practice to master the complexities, through a deeper understanding of human visual perception. Nevertheless, there are some simple guides that you can follow to help start you on your journey of understanding composition. However, it is important to note that many of the rules and guidelines relating to composition are not as decisive as many would have you believe. What works in some images, doesn't always work in others. That is why these points should always be considered as more of a guide than as rules. This chapter will explore visual examples that work compositionally and how elements like leading lines, framing and symmetry (typically used to guide the eye to the main focus point of the image) can be used to enhance composition. The benefits of particular colour combinations are examined as well as common 'rules' of composition - the rule of thirds and the golden spiral - which are demonstrated and explained.

A frame from video chapter 10

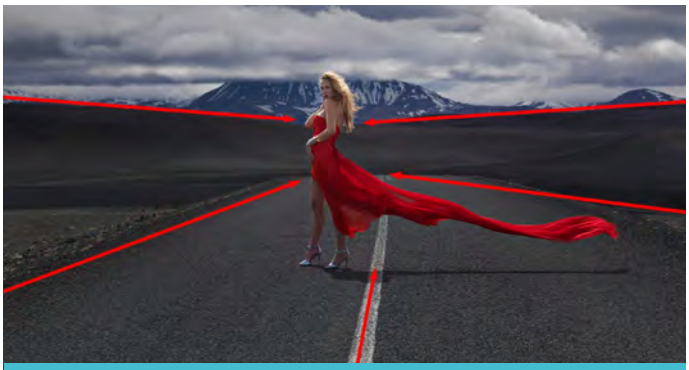
GUIDLINES TO CONSIDER

The implementation of the compositional guidelines explored in this chapter outlive the practice of photography. They were in fact initially explored in more detail by the French Impressionist painters from the 19th century. They explored compositional techniques - such as lines, shapes, tones and colours - in order to arrange a painting in such a way that would lead the eye to the focal point of the painting. So how does this apply to photography? Firstly, when taking an image, it is important to identify what the subject of focus is. For example, in its most simple form, in portrait photography this is typically the eyes of the subject; in seascape photography it is typically the sun as it rises or sets; in architectural photography it is the building; in fashion photography it is the model and outfit; in reportage photography it is the narrative and in product photography it is the product. Secondly, as a photographer, it is then your job to consider the perspective of the shot that is going to best make the subject the main focus point of the picture.

LEADING LINES

Leading lines are lines (or curves) that guide the viewer's eye to the subject. Anything from fence posts to winding roads, leading lines can be straight, curved, diagonal or converging. These lines help keep our eye in the frame and draw attention to the subject. Here are just a few examples of where leading lines have been implemented (you can see further examples in the video). In the top image the model, standing just off centre, is the focal point. Our eye is guided into the image from both the left, right and centre by different leading lines. Leading lines in the image are created by the edges of the road, the mountains in the background and by the white, painted line down the middle of the road.

Alternatively, in the image below of the model in a yellow dress, the steps that she is stood on serve to draw your eye towards the subject. Coming in from the left of the image, the lines guide you through the picture (this also relates to left-to-right bias, which links to the science of human visual perception). This photo also makes use of other compositional elements, namely colour (colour theory is something that is discussed more in the video in this chapter).



Discover this course: Coastal sunset shoot

Discover this course: Simple fashion on location

FRAMING

As the name suggests, framing is when you use other elements within the image to frame the subject. As shown below, examples of framing can be anything from the shape of the light, to a thoughtfully constructed backdrop, but you could use almost anything to frame your subject. This compositional technique is often used as it can help add additional elements of interest and it can also enhance perspective and a sense of scale to your photographs.

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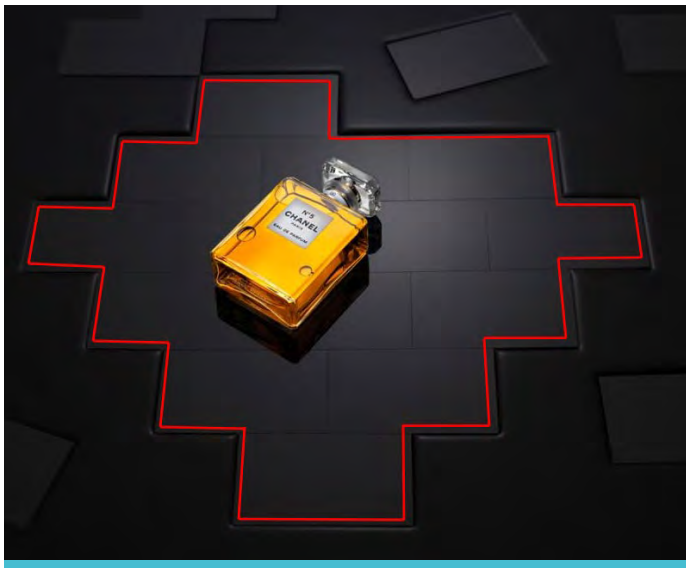

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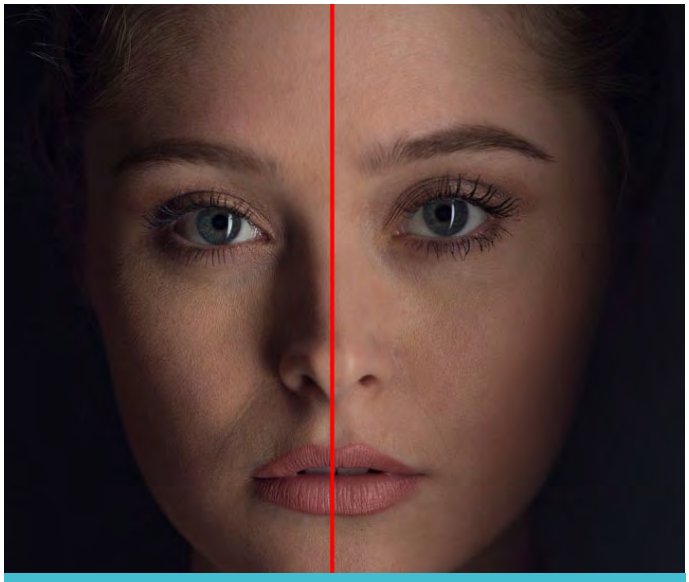
SYMMETRY

Symmetry can be observed all around us in nature and is commonly associated with beauty. Symmetry - or the line of symmetry - refers to a line that splits an image in half either vertically or horizontally. If both sides of the line mirror each other, then the image is understood to be symmetrical. Symmetry can be very effective when used correctly. Often quite striking, it can help remove or minimise additional distractions and focus the eye on the subject of the image.



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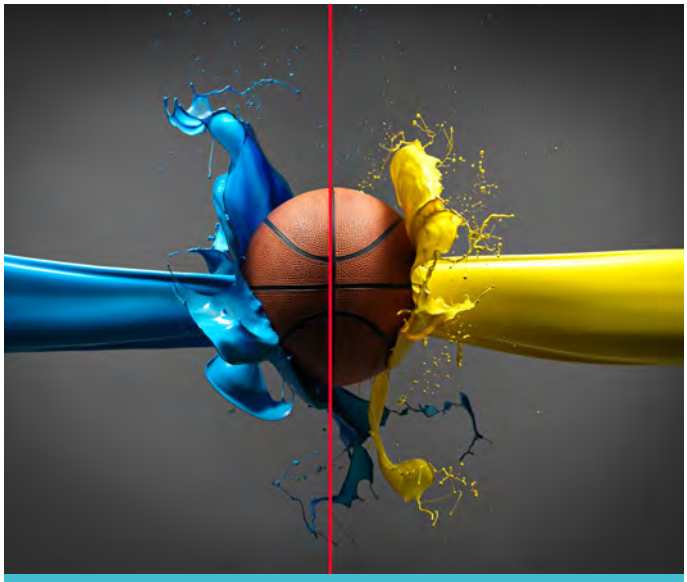

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COLOUR

Colour is an important part of photography and we can use this to even greater effect with some careful thought. Colours can be used to change or influence the mood and feel of an image or to draw attention to particular elements. Using juxtaposing colours (or other colour schemes) can be an effective way of catching the viewer's attention, as shown in the video.

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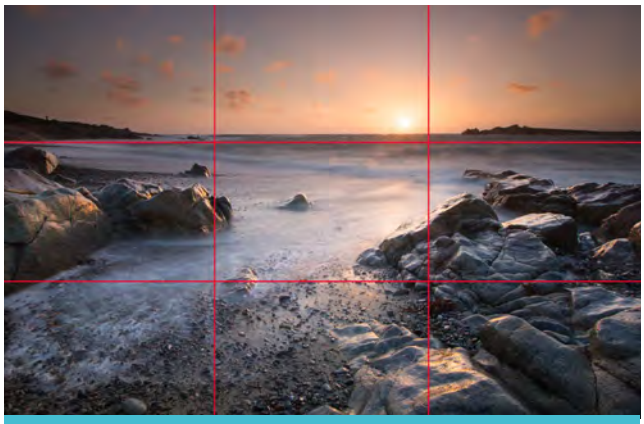
Discover this course: Shooting car trails

THE RULE OF THIRDS

One of the most well known compositional rules, the rule of thirds divides the image into three rows of three, splitting the image into nine equal blocks. The idea is to position important elements on the dividing lines or points of intersection. This helps to place objects at strategic points in the frame, creating more interesting composition than if the subject was centralised.



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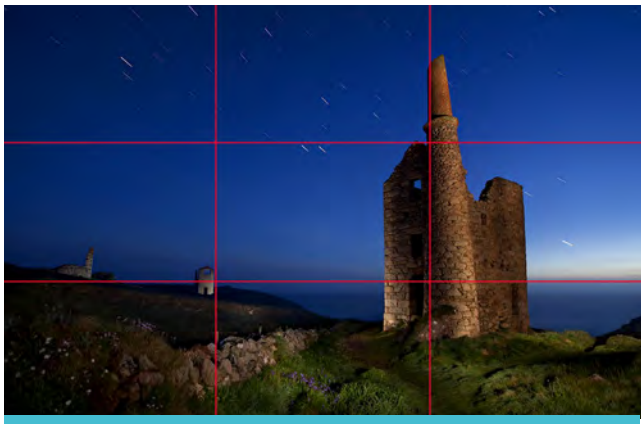

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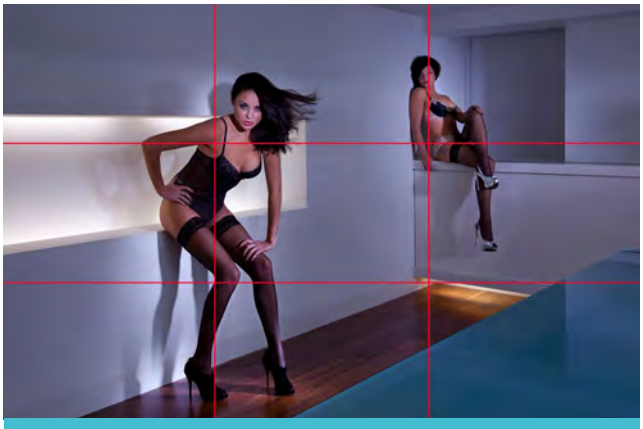

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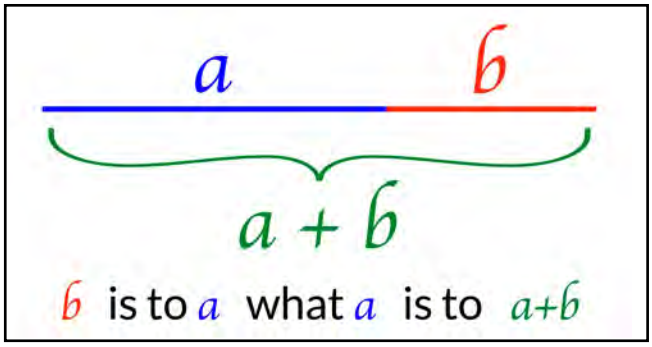
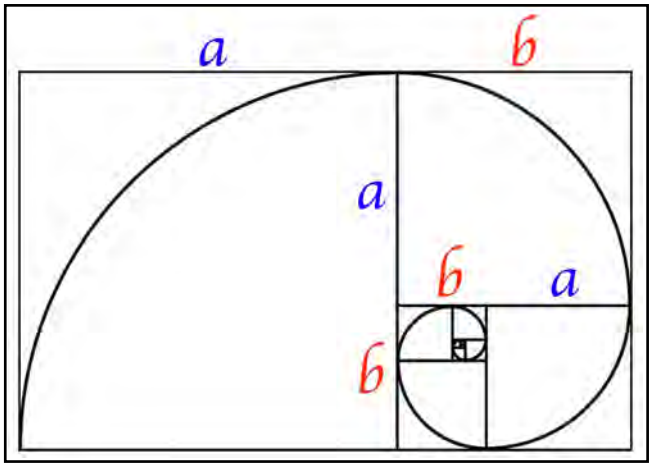
THE GOLDEN SPIRAL

The golden spiral is another compositional rule, deriving from the golden ratio. The golden ratio is a mathematical formula that relates to Phi (1.6180339…). Two quantities (*a* and *b*) fit the golden ratio if *b* is to *a* what *a* is to the sum of *a* + *b*. In this ratio, *a* is 1.6180339 times bigger than *b*. This formula forms the basis for other compositional rules, such as the golden spiral and to some extent the rule of thirds.

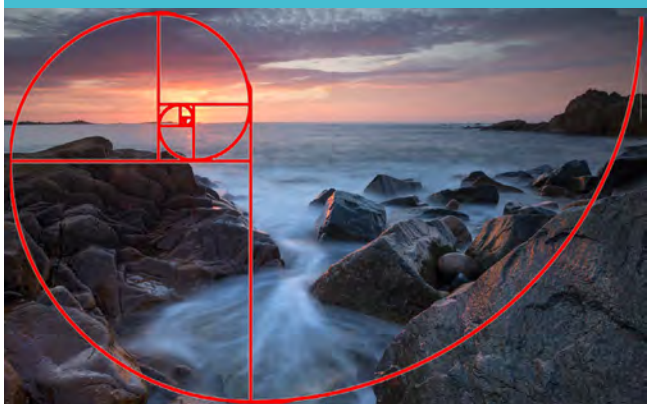


The golden spiral, developed by Fibonacci, is, contrary to its' name, composed out of a series of Phi Grids (formed using the principle outlined above). These grids determine the path of a snail-shaped spiral (known as the Fibonacci Spiral), which guides your eye around the image to the focal point. You can see exactly how this works in the accompanying image.



While it's important to keep these compositional rules in mind, these 'rules' are not the be-all-and-end-all of good composition.

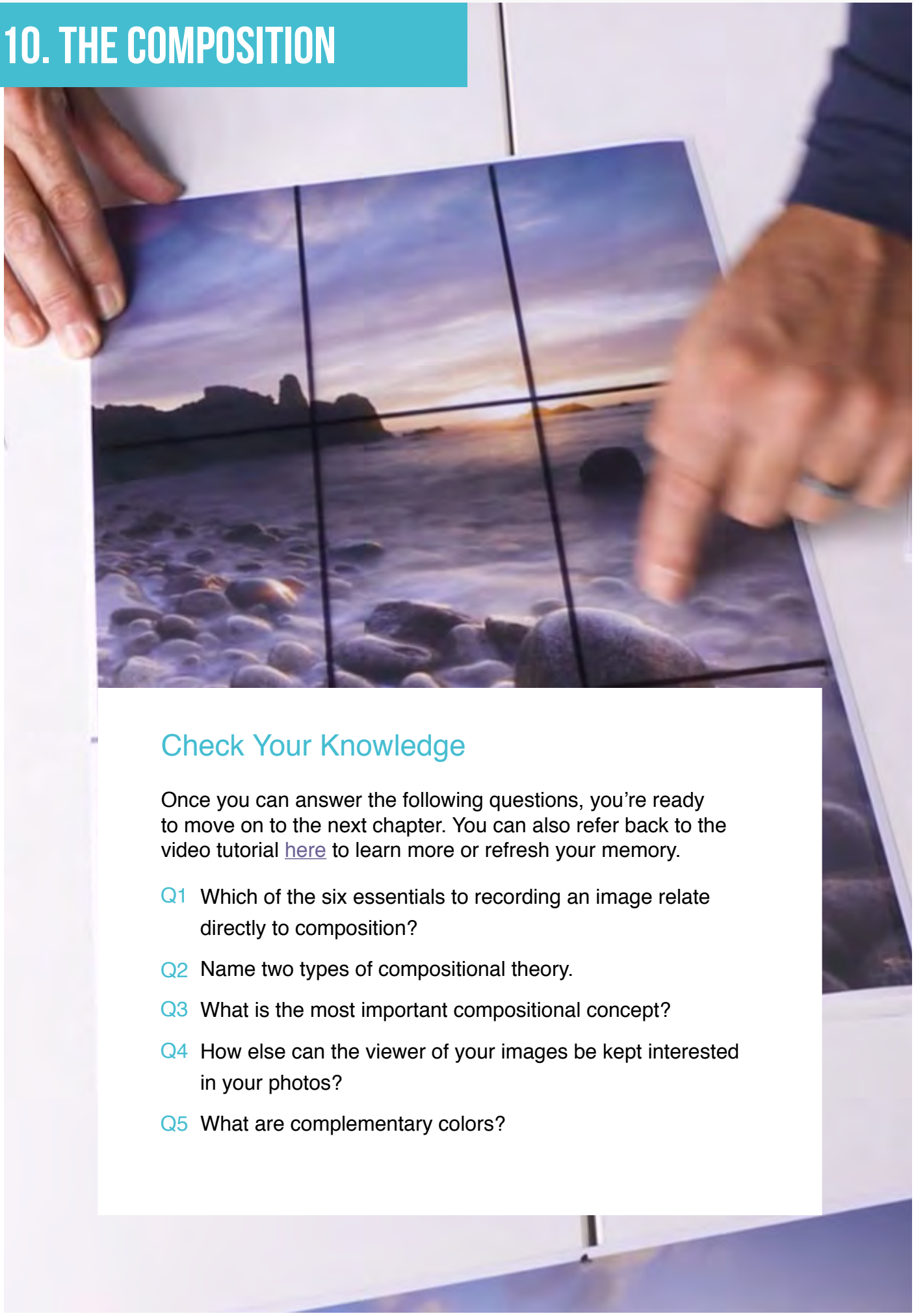
The most important thing is to maintain your viewer's attention and keep their eye within the frame. This can be done using other techniques that relate to the human visual system. By understanding the science of human visual perception and concepts such as left to right bias, contrast, colour, juxtaposition, narrative etc we can keep the viewer's attention with subtle, yet highly effective application of the science.



CHAPTER SUMMARY

As photographers, our goal is to keep the viewer connected with our images, and while it can be beneficial to try and follow compositional guidelines, good photography comes down to far more than just good composition. Many photographers get caught up and fixate on composition, but there are other methods that can be used to ensure strong, creative imagery. Use the rules and concepts discussed to guide you, but don't take them as gospel. There is more to good imagery than the rule of thirds or golden spiral. It's therefore important to make sure you understand the concepts covered in this course: how cameras work, how time and aperture can be used together for creative imagery, optics and their differences, the importance of light for conveying emotion, the subject and what you want to say with your photographs, and the different types of recording mediums.

10. THE COMPOSITION



Check Your Knowledge

Once you can answer the following questions, you're ready to move on to the next chapter. You can also refer back to the video tutorial here to learn more or refresh your memory.

Q1 Which of the six essentials to recording an image relate directly to composition?

Q2 Name two types of compositional theory.

Q3 What is the most important compositional concept?

Q4 How else can the viewer of your images be kept interested in your photos?

Q5 What are complementary colors?

A frame from video chapter 10

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“THE MOST IMPORTANT OBJECTIVE IS TO KEEP YOUR VIEWER CONNECTED THROUGH EMOTION, ANTICIPATION, CURIOSITY AND NARRATIVE. THESE ARE OFTEN ELEMENTS I DELIBERATELY INCLUDE IN MY WORK TO FURTHER ENHANCE THE VIEWER’S EXPERIENCE.”

KARL TAYLOR

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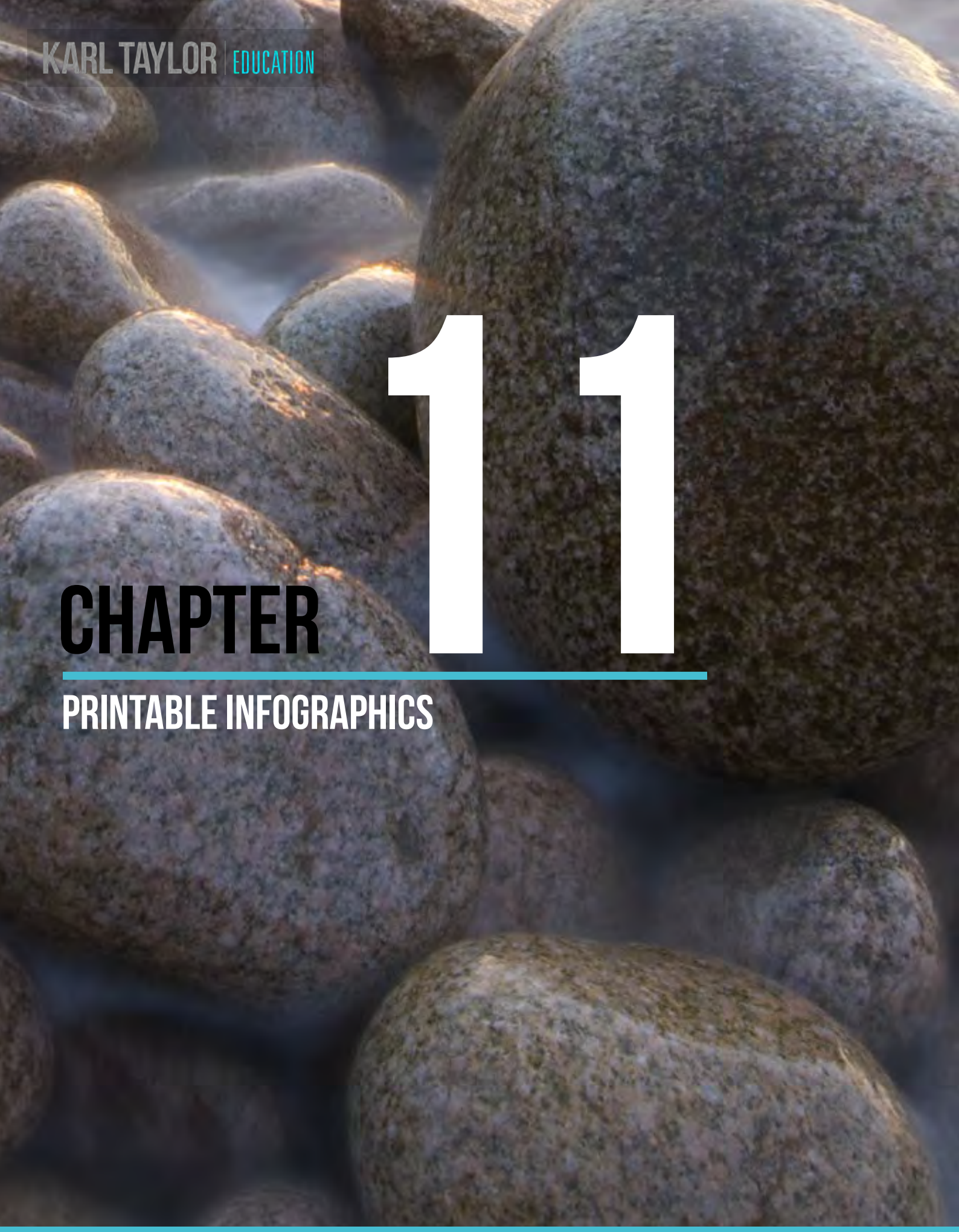
CHAPTER 11

PRINTABLE INFOGRAPHICS



An Introduction To The Six Essentials of Photography

Light • Subject • Optics • Aperture • Time • Recording Medium

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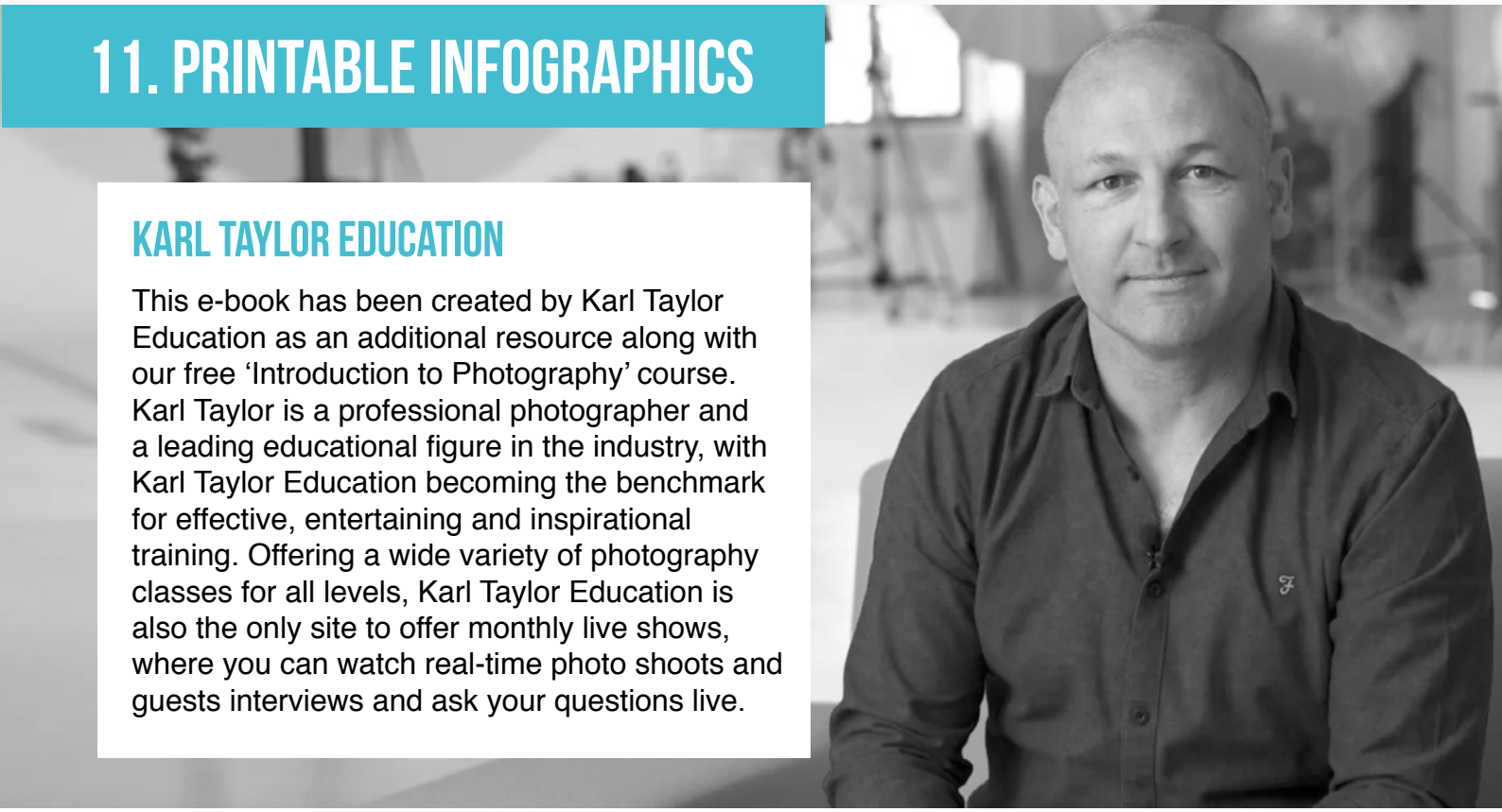
11. PRINTABLE INFOGRAPHICS



KARL TAYLOR EDUCATION

This e-book has been created by Karl Taylor Education as an additional resource along with our free 'Introduction to Photography' course. Karl Taylor is a professional photographer and a leading educational figure in the industry, with Karl Taylor Education becoming the benchmark for effective, entertaining and inspirational training. Offering a wide variety of photography classes for all levels, Karl Taylor Education is also the only site to offer monthly live shows, where you can watch real-time photo shoots and guests interviews and ask your questions live.

A frame from a video on Karl Taylor Education website introducing Karl Taylor

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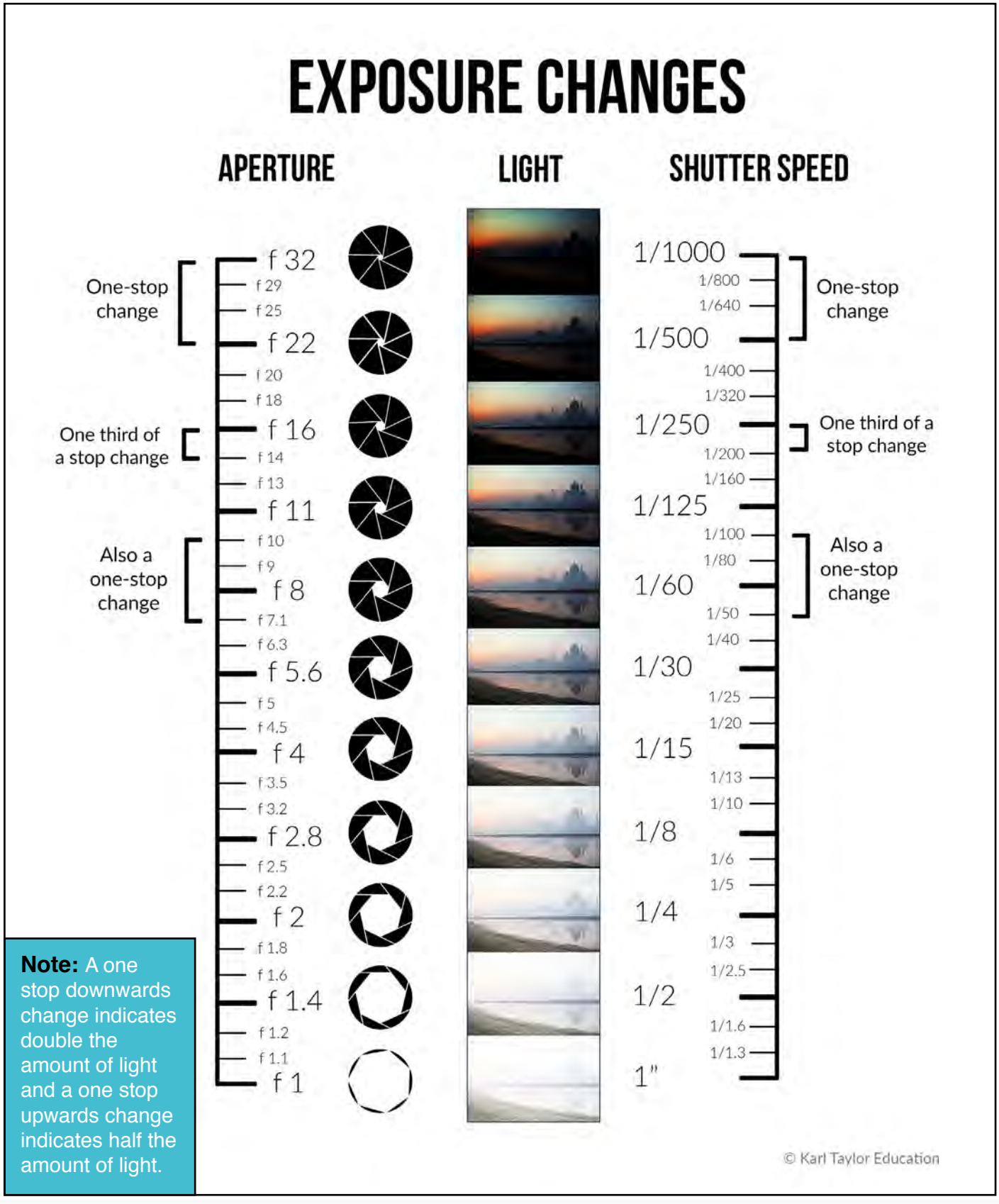
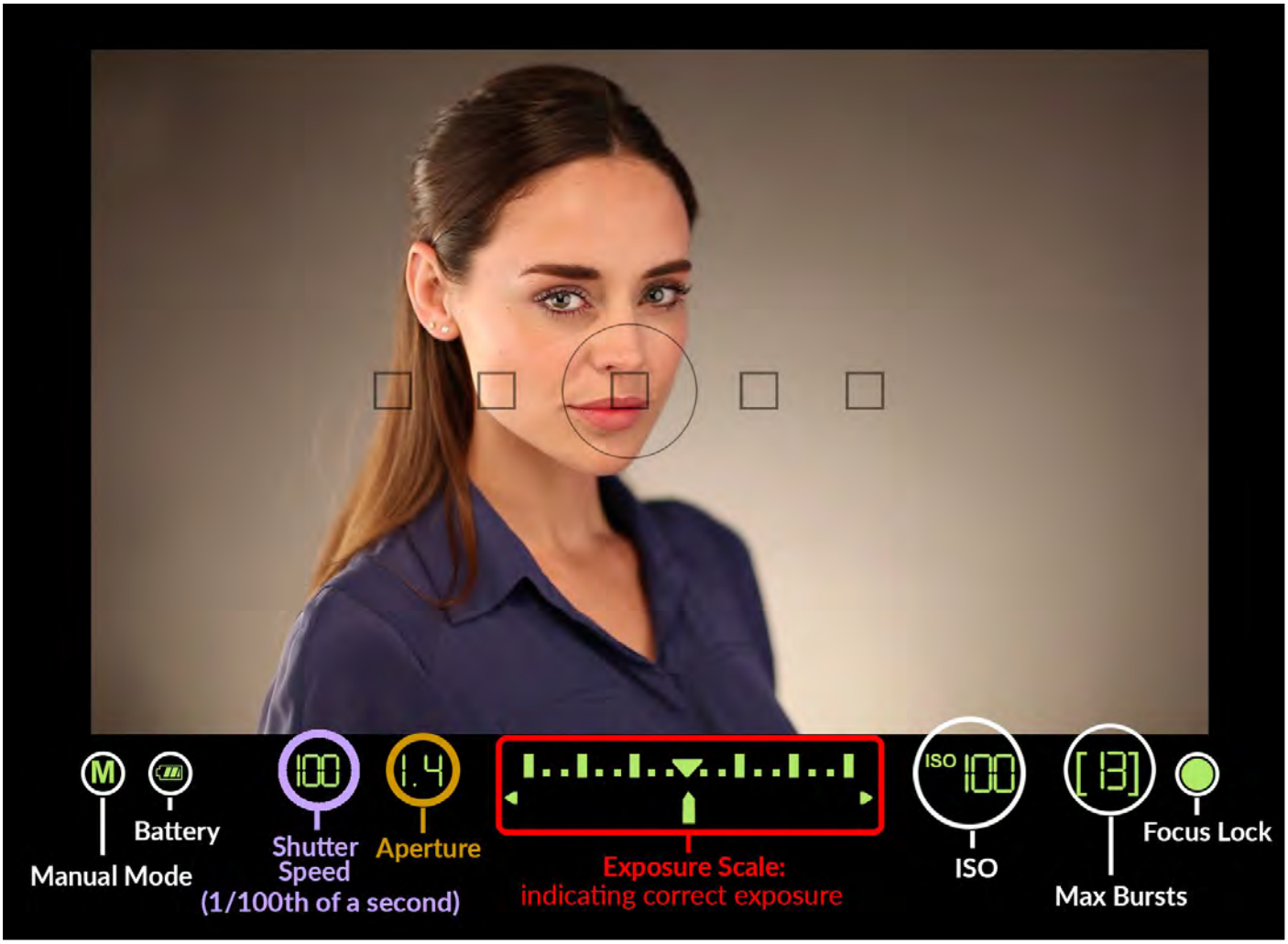
PRINTABLE INFOGRAPHICS

We have put together everything you might need to refer to while out shooting in the last pages of this guide, so you can print a copy of the key concepts to take along with you. Good luck with your continuing photography education, and we look forward to offering you further support and guidance over on karltayloreducation.com.

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Battery
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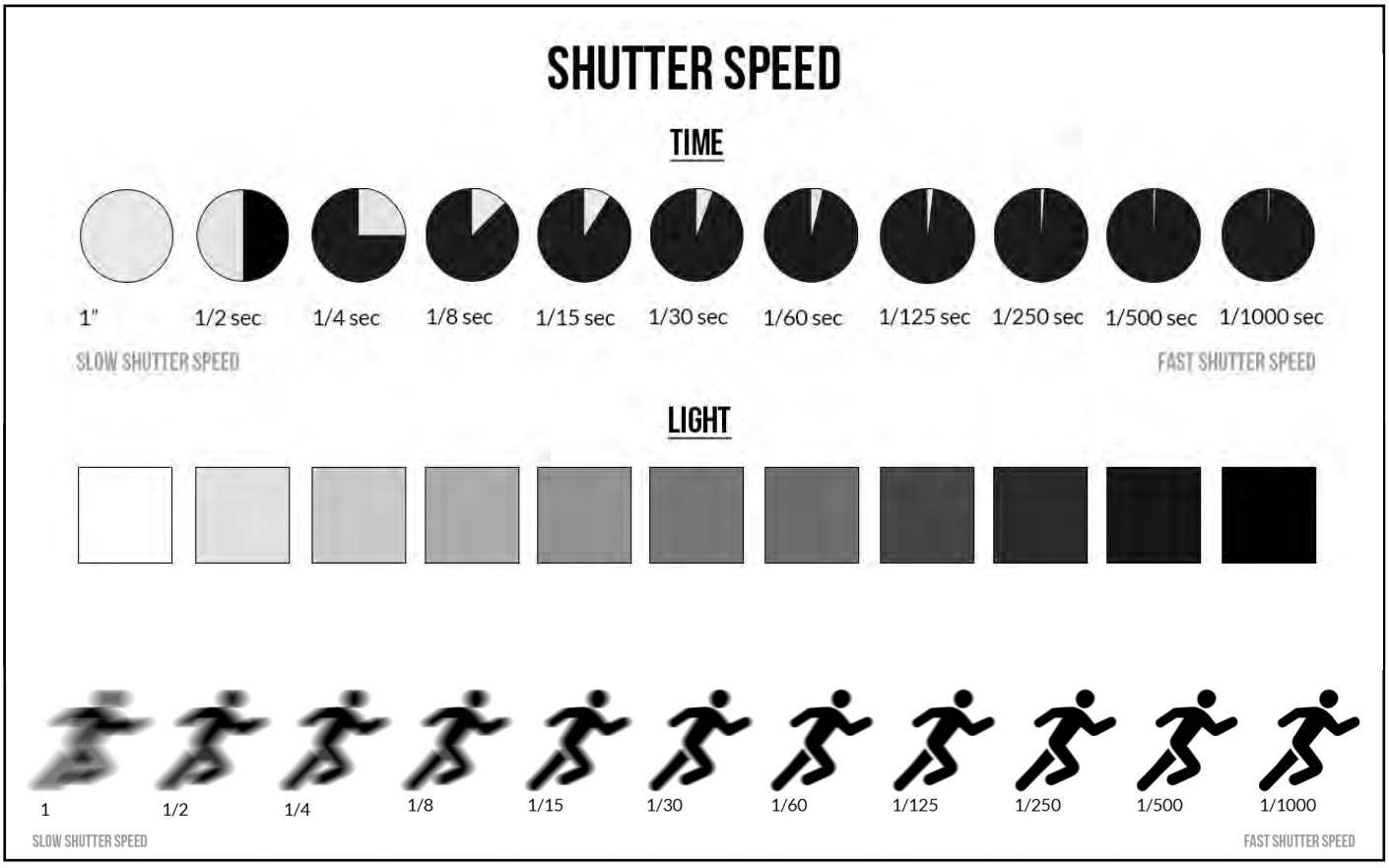
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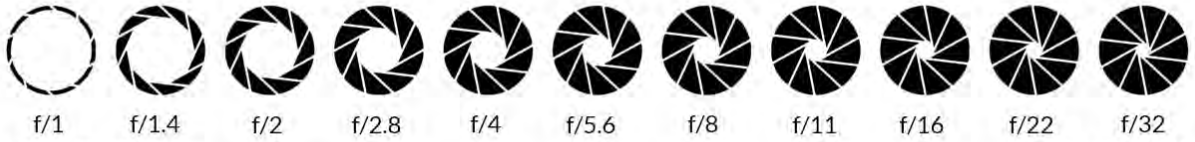
SLOW SHUTTER SPEED
FAST SHUTTER SPEED

APERTURE

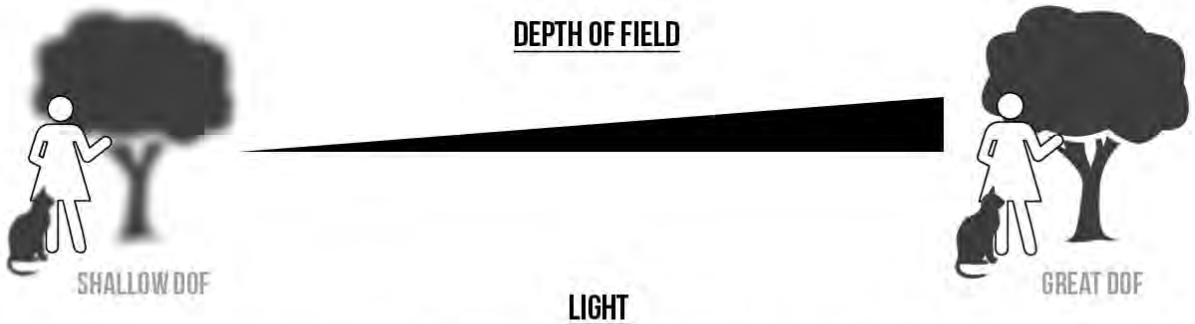
SIZE



f/1 f/1.4 f/2 f/2.8 f/4 f/5.6 f/8 f/11 f/16 f/22 f/32

LARGE APERTURE — SMALL APERTURE

DEPTH OF FIELD



SHALLOW DOF — GREAT DOF

LIGHT

MORE LIGHT — LESS LIGHT

WHITE BALANCE

AUTO WHITE BALANCE
Camera selects the white balance automatically based on the lighting

CUSTOM WHITE BALANCE
Photographer manually sets white balance according to Kelvin scale

TUNGSTEN
Camera adds cool tones

FLUORESCENT
Camera adds magenta to cancel green light

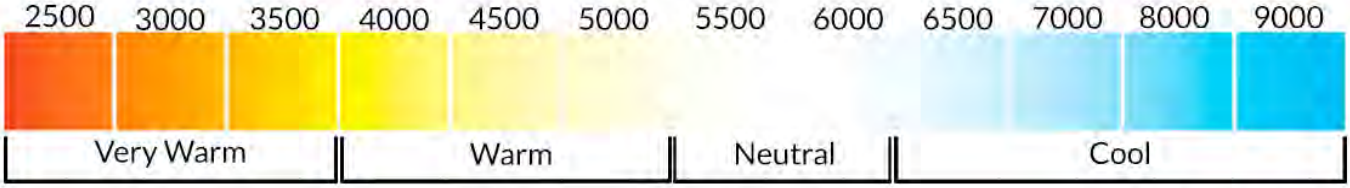
DAYLIGHT
Colour balance remains neutral

FLASH
Colour balance remains neutral

CLOUDY
Camera adds warm tones

SHADE
Camera adds slightly warmer tones

KELVIN SCALE



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