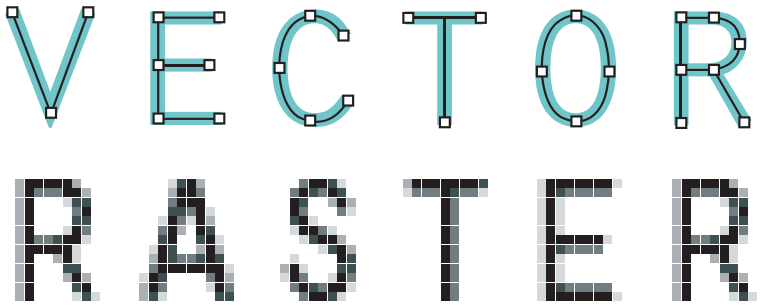
Vector Graphics

DIGITAL GRAPHICS are everywhere: from the printed design on your hoodie to the logo on the box of the new athletic footwear to the bold pattern on your new baseball cap. There are two types of digital graphics: raster and vector. The process to create, as well as the best applications of each is different. Graphics made from pixels and photographs are raster graphics. Vector graphics are made using lines and points. Vector graphics are well suited for logos, t-shirt graphic designs, and digitized printing on fabric because they can easily be made bigger or smaller while remaining well defined.



Objective:

Summarize the characteristics and uses of vector graphics in design.

Key Terms:

bitmap graphic
cloud
cloud computing
logo
pixel
pixelated
raster graphic
repeating tile
scalable graphic
vector graphic

Vector Graphics and Their Applications

Graphic files can be created, saved, shared, and applied in two different formats: raster and vector. The end use of the graphic influences the format you will used.

VECTOR AND RASTER GRAPHICS

Raster Graphics

A **raster graphic** is a composition of pixels organized to form a picture. A **pixel** (short for picture element) is a grid of color blocks. A **bitmap graphic** is a grid of color blocks cre-

ated from pixels. A raster graphic is often referred to as a 'bitmap.' Because a raster image is composed of individual pixels that cannot be resized, the image loses some integrity (clarity, definition) when enlarged.

- Photographs and many web images are created with raster graphics. Raster graphics are saved as JPG, TIFF, GIF, PNG, and other software specific file formats such as Photoshop PSD files.
- When raster graphics are enlarged they become pixelated. **Pixelated** is the enlargement of a graphic that makes the individual color blocks (pixels) visible. Pixelated images appear blurry or with jagged edges. To ensure a raster graphic is sharp and in focus the image must be at least 300 dpi, which means there are 300 pixels per inch. When an image is 300 dpi it is considered high resolution.

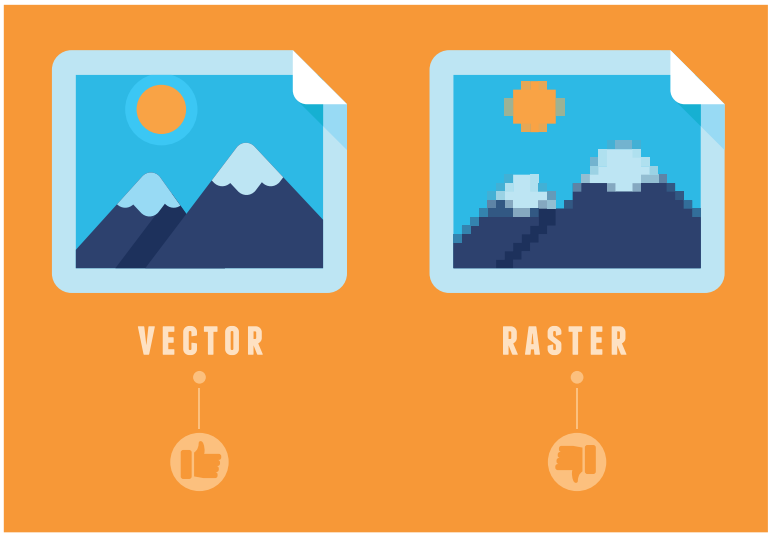


FIGURE 1. Raster graphics are created from individual color blocks called pixels, while vector graphics are created using lines and points. Unlike raster graphics, vector graphics retain the same quality of visual detail regardless of how much the graphic is enlarged.

Vector Graphics

A **vector graphic** is an image composed of lines and points. The lines and points can be manipulated individually or as a group. The advantage of using vector graphics is that the designer is able to resize the image without loss of quality.

- An image that needs to keep its clarity regardless of size must be a vector graphic. Vector graphics are saved as PDF files and other software specific file formats such as Illustrator AI.
- A **scalable graphic** is an image that remains in focus with sharp edges even when enlarged. Vector graphics are scalable graphics. This characteristic is particularly important when designing graphics for billboards or other large surface products. Vector graphics are often used for logos as the image can be scaled up and down without distortion allowing for a wider application.

VECTOR GRAPHIC APPLICATIONS

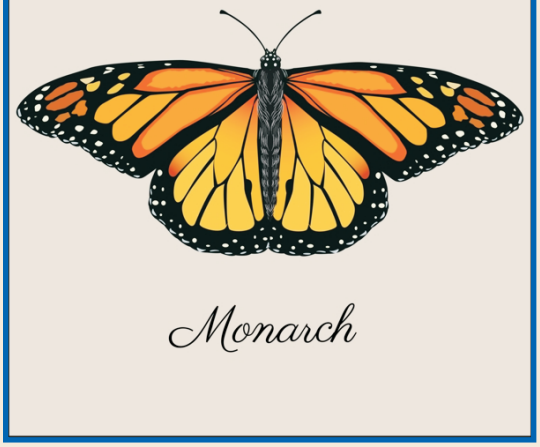
Fashion designers can use vector graphics in a variety of ways. Designers will most likely want a logo to represent their company. A vector graphic is the perfect choice as it is scalable. Or they may use a vector graphic as the design for their product. The graphic could be used to

ON THE JOB...

CAREER CONNECTION: Lauren Lein, Fashion Designer

Lauren Lein has been designing fabrics and garments for over twenty years. Her bold fabric patterns are made using vector graphics that she created. One of her most popular designs is a pattern of vividly colored monarch butterflies. She had the vector graphic digitally printed onto fabric and then designed skirts and capes to utilize the fabric.

Her website states it best; "Lauren is known for her natural, beautiful fabrics–including her self-designed digital prints–with eclectic accents, and simple but cutting-edge silhouettes." To see examples of Lauren's digital vector fabric designs, see her website at https://www.laurenlein.biz/copy-of-mostpopulardesigns.



Lauren has used a monarch butterfly as inspiration for some of her vector graphic fabrics.

create a pattern on fabric or as an embellishment to a finished product such as a t-shirt. The designer could use premade graphics that are free from sites like *Pixaby* or create their own.

Software

The leading software program for creating and using vector graphics is Adobe Illustrator. This program is usually purchased as a monthly subscription that includes file storage on the cloud. The **cloud** is services and information located on the Internet rather than on a personal computer. **Cloud computing** is using the cloud to specifically access, manipulate, and store information. Online storage is important with raster graphics because the files are very large and require significant space. Free software programs are also used to create and manipulate vector graphics including:

1. GIMP (https://www.gimp.org/)
2. Inkscape (https://inkscape.org/)
3. Sketch (https://www.sketch.com/)
4. SketchUp (https://www.sketchup.com/)

Logos

Vector graphics are the best choice for company logos as they can be sized up or down without distortion. A **logo** is a symbol or design that represents a designer, brand, or company. A logo needs to be visually appealing, as it will be placed on products, advertisements, and pro-

motional items. “People associate quality logos with brands, they take pride in having a famous monogram on their apparel, they identify their social circle with the kinds of clothes worn, bags carried, accessories used, etc., all of which carry that unique symbol of a famous brand” (110Designs, 2019 at https://www.110designs.com/).

Garment Graphics

Vector graphics are the best choice to use when creating a graphic for placement on a t-shirt or other garment. For both images and text a vector graphic will remain crisp when printed on fabric regardless of the printing method. Because editing, including color changes, is easily done on a vector graphic, the design can be quickly and simply altered to produce the desired final product. And, since the sizing can be modified without causing visual quality issues, the same design could be printed small enough to fit on the pocket of a shirt or large enough to cover the entire front and back.

FIGURE 2. Printing designs on t-shirts is a perfect use of vector graphics because the size and color of the design can easily be changed while retaining the visual quality and crispness of the design.

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Digital Printing to Fabric

Vector graphics are well suited for digital printing on fabric to produce an all-over pattern. A designer often uses a vector graphic to create a repeating tile that is used to create such a pattern. A **repeating tile** is a packet of data produced in a roughly square-shaped design that can be duplicated over and over again to produce a seamless design. Fabrics for skirts, dresses, jackets, or accessories, such a handbag or scarf, are often created using a repeating tile pattern.

FIGURE 3. A repeating tile pattern (also called a seamless pattern) is a vector graphic process that is printed on fabric and then used to make garments or accessories.

Summary:

You have now learned the difference between raster and vector graphics. Pixels make up a raster graphic, while lines and points are used to create a vector graphic. Your favorite brand's logo, or graphic designs on your t-shirt or hoodie are probably both created from vector graphics. Digital prints on fabric were most likely created from a vector graphic as well. Now that you've learned about some of the applications for vector graphics you may start to notice them everywhere you look.

Checking Your Knowledge:

1. Describe a raster graphic that includes the use of the word 'pixel.'
2. Differentiate between raster graphics and vector graphics?
3. What is a 'scalable vector graphic?'
4. What are some common applications of vector graphics?
5. How are digital seamless fabric patterns created?

Expanding Your Knowledge:

Logos are typically created from vector graphics because of their ability to be scaled. Choose a brand with a logo to examine. An example would be *Nike's* swoosh. You could find this logo on something as large as a billboard or as small as a toddler's shoe. You would find it on the box the shoes come in as well as the bags the store uses to pack your purchase. Count the number of variations of your chosen logo.

Web Links:

A Beginner's Guide to Digital Textile Printing
https://design.tutsplus.com/tutorials/a-beginners-guide-to-digital-textile-printing--vector-3189

Beginning Illustrator: Vectors vs. Pixels Explained (Video)
https://www.youtube.com/watch?v=PJFc3KlEdLM

Furious Goose: Silk Scarves and Designer Pocket Squares
https://furiousgoose.co.uk/

How to Design Your Own Fabric: Step-by-Step Fabric Design Tutorial with Final Fabric Example
https://www.youtube.com/watch?v=FPc4Xr93z5o