



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

HND / BA COMPUTER GAMES DESIGN / ANIMATION & VFX

EVOLVING YOUR CREATIVE CRAFT

Orthographic Projections



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Orthographic Projections

Orthographic Projections

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Overview



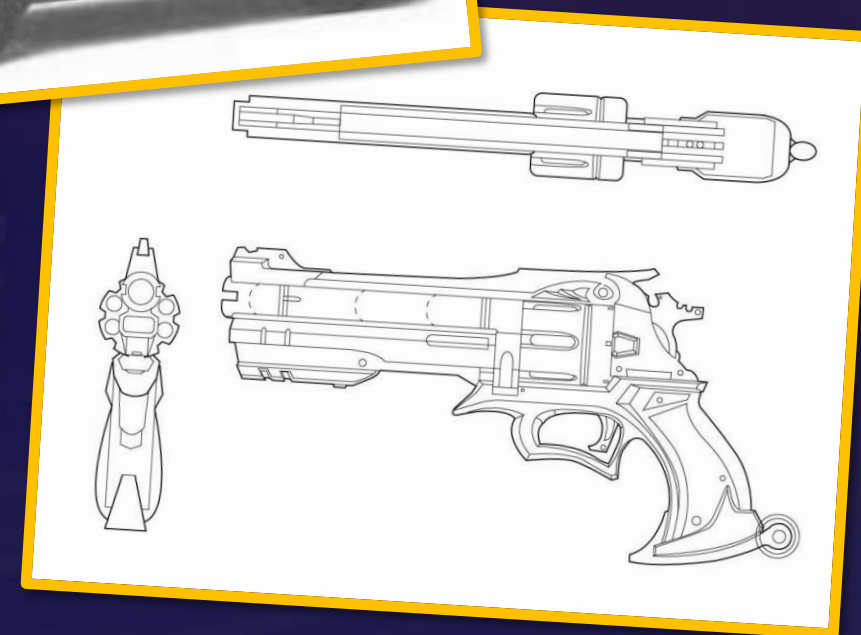
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Orthographic Projections

Overview

Orthographic projections / Orthographic drawing is a method used to **represent the concept and design** of a **three-dimensional object** on a **two-dimensional image** [1].

Orthographic projections allow concepts and designs to be presented with relative **accuracy and scale** – this is essential for 3D modelling!



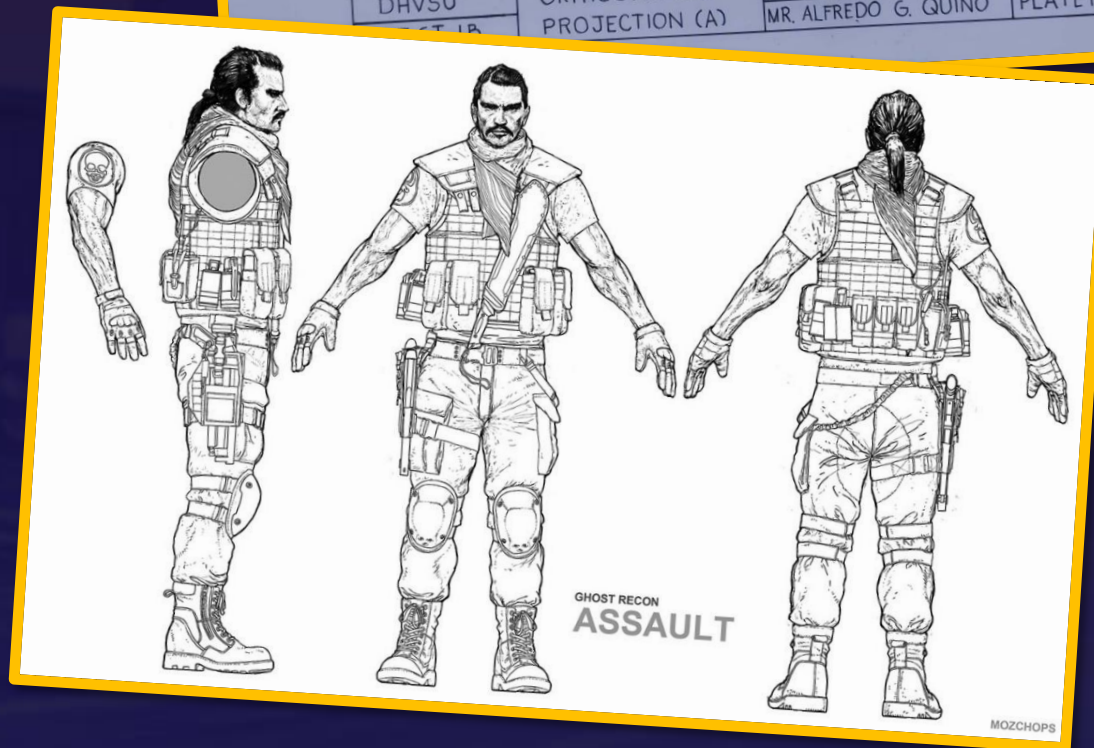
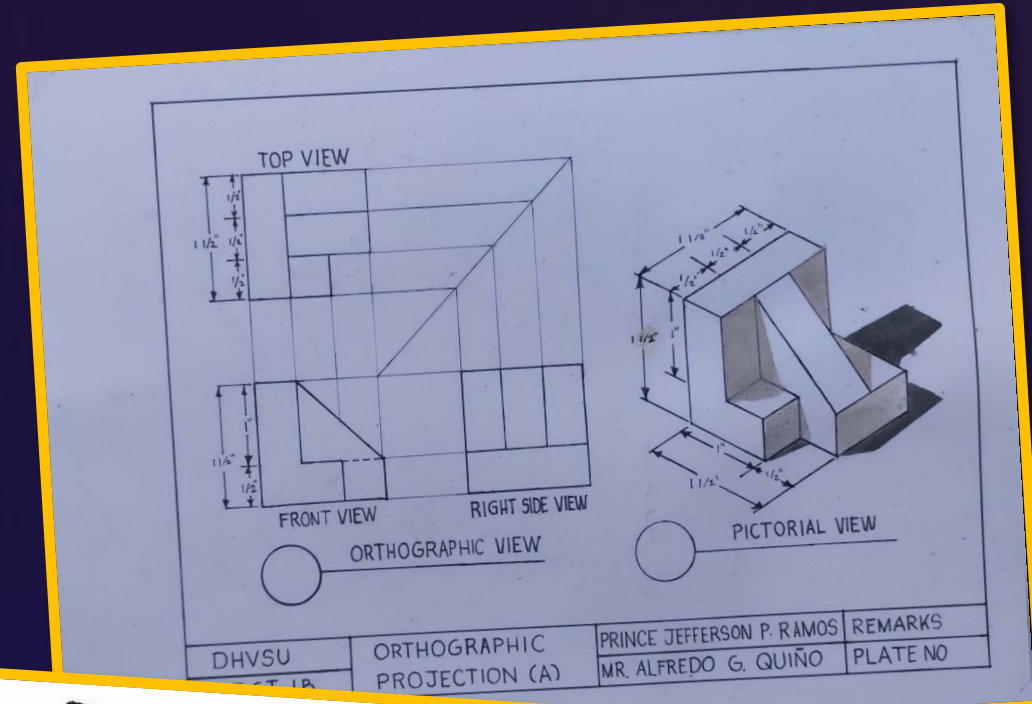


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Orthographic Projections

Overview

Orthographic projections are typically drawn in a minimum of **three different angles** in order to represent the subject of the drawing [1].





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Orthographic Construction



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This method of Orthographic construction is documented in **Adobe Photoshop**. Traditionally, other programs such as CAD tools specifically intended for engineering are often used.

However, this method was once taught as a **traditional approach** using **hand-drawn techniques and tools**.





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While the method presented here is completed in Photoshop, the **principles will still apply to other software and traditional approaches** for orthographic projection.





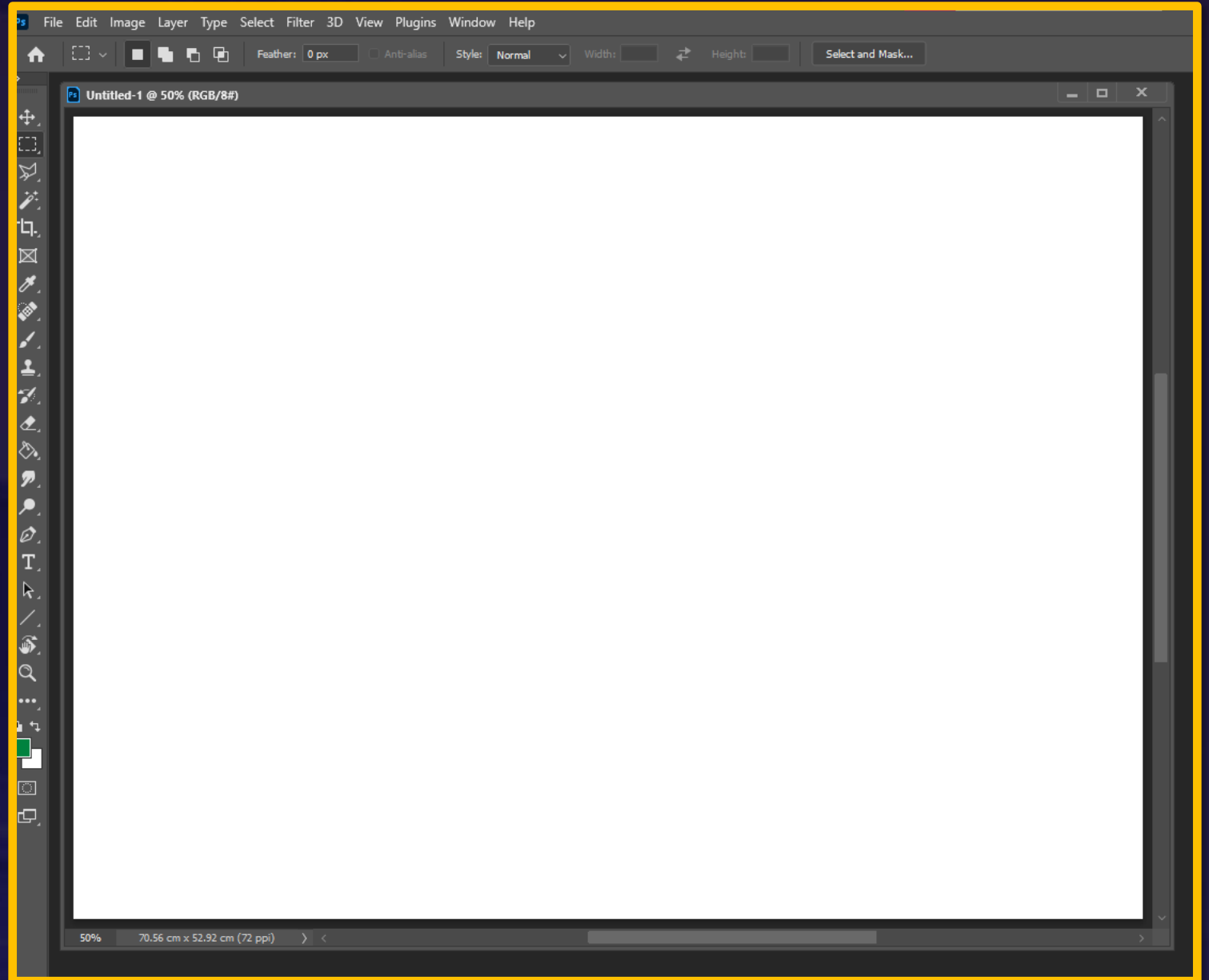
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1. Create a **blank document** in Adobe Photoshop.

Try to make this image large enough for multiple projections. You will be producing at least **three drawings** in this space.





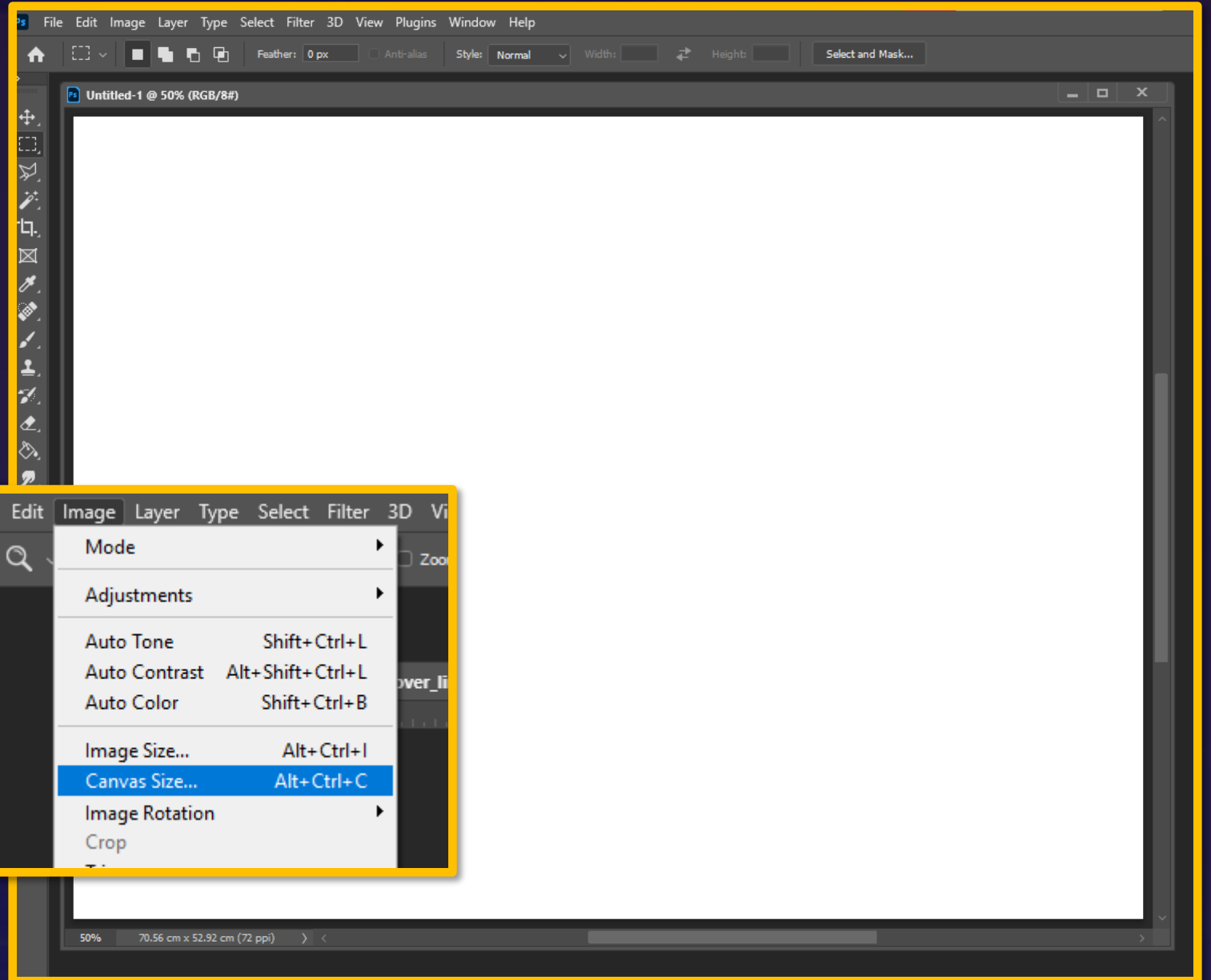
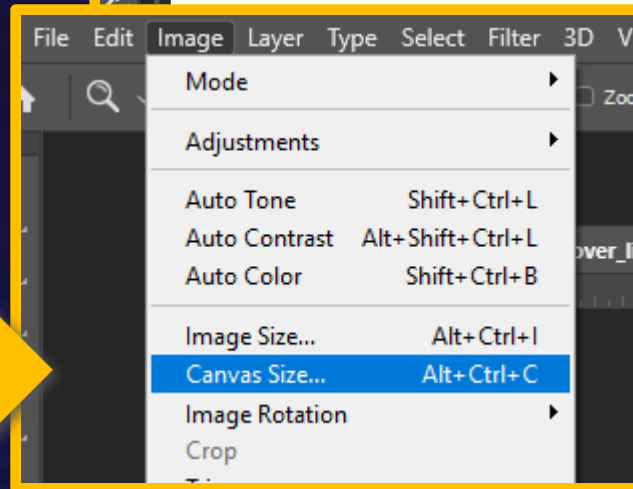
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Orthographic Construction

1. Create a **blank document** in Adobe Photoshop.

Image > Canvas Size can help increase the size of the canvas if you need to amend this.





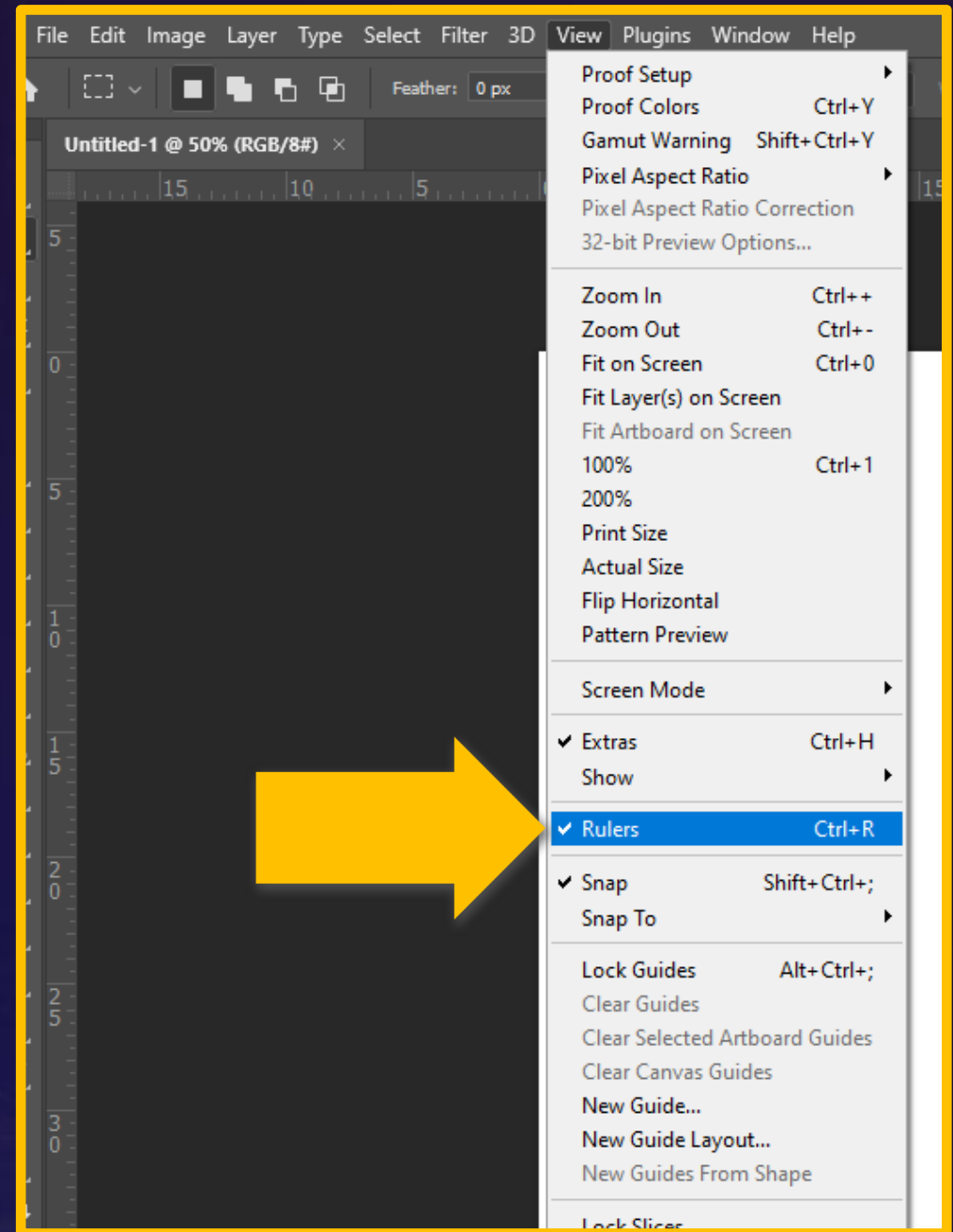
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2. If rulers do not appear on the **top and left side of your image**, you need to make them active. Without these you will not be able to create guides on your canvas.

To toggle rulers on and off, go to **View > Rulers**.





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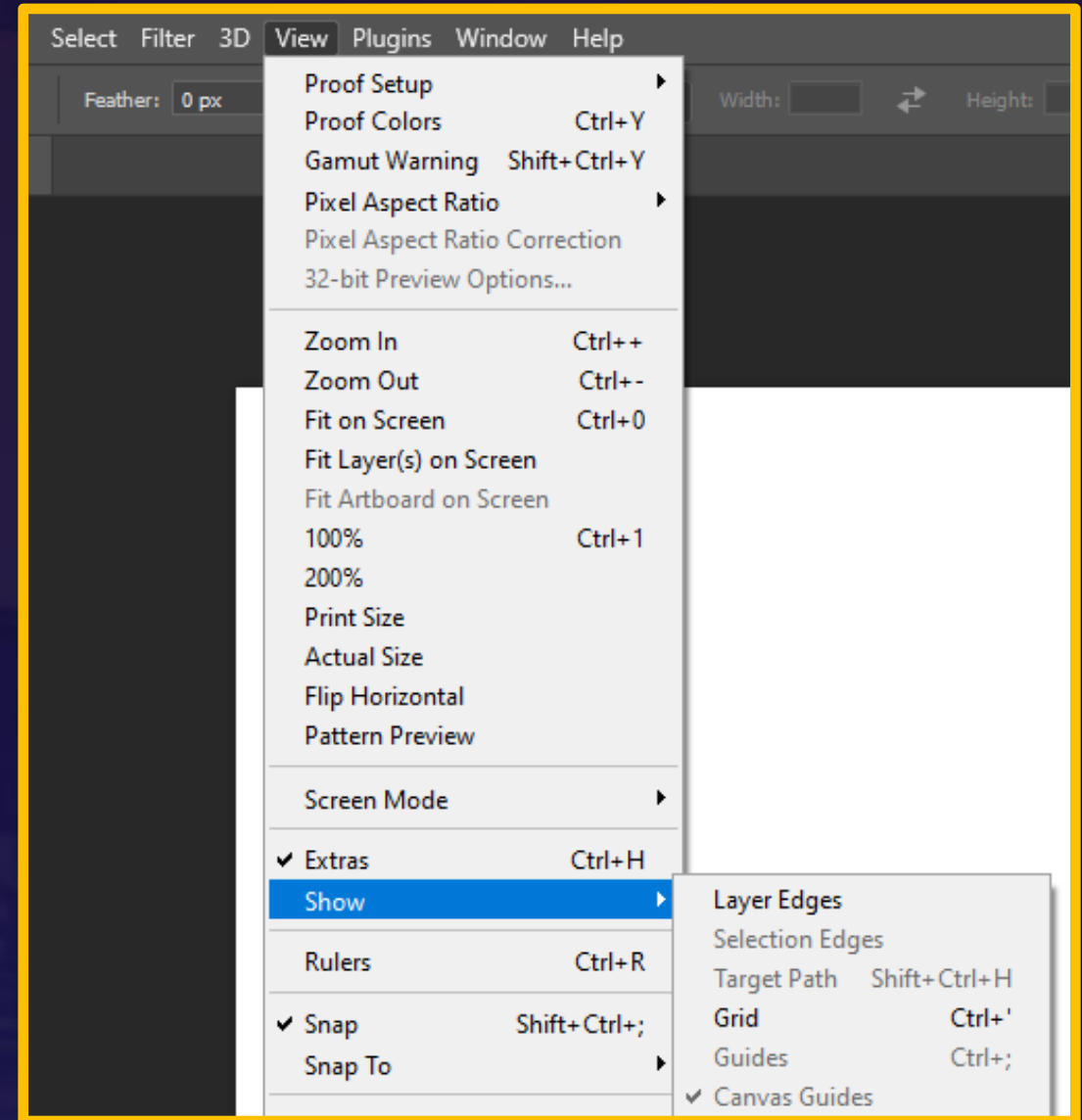
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3. If needed, select **View > Show > Guides**.

Guides (light blue lines) can be **left-click dragged from the rulers** visible on the sides of the document.

Guides will not show up on an exported or printed documents – they are visible within Photoshop only.





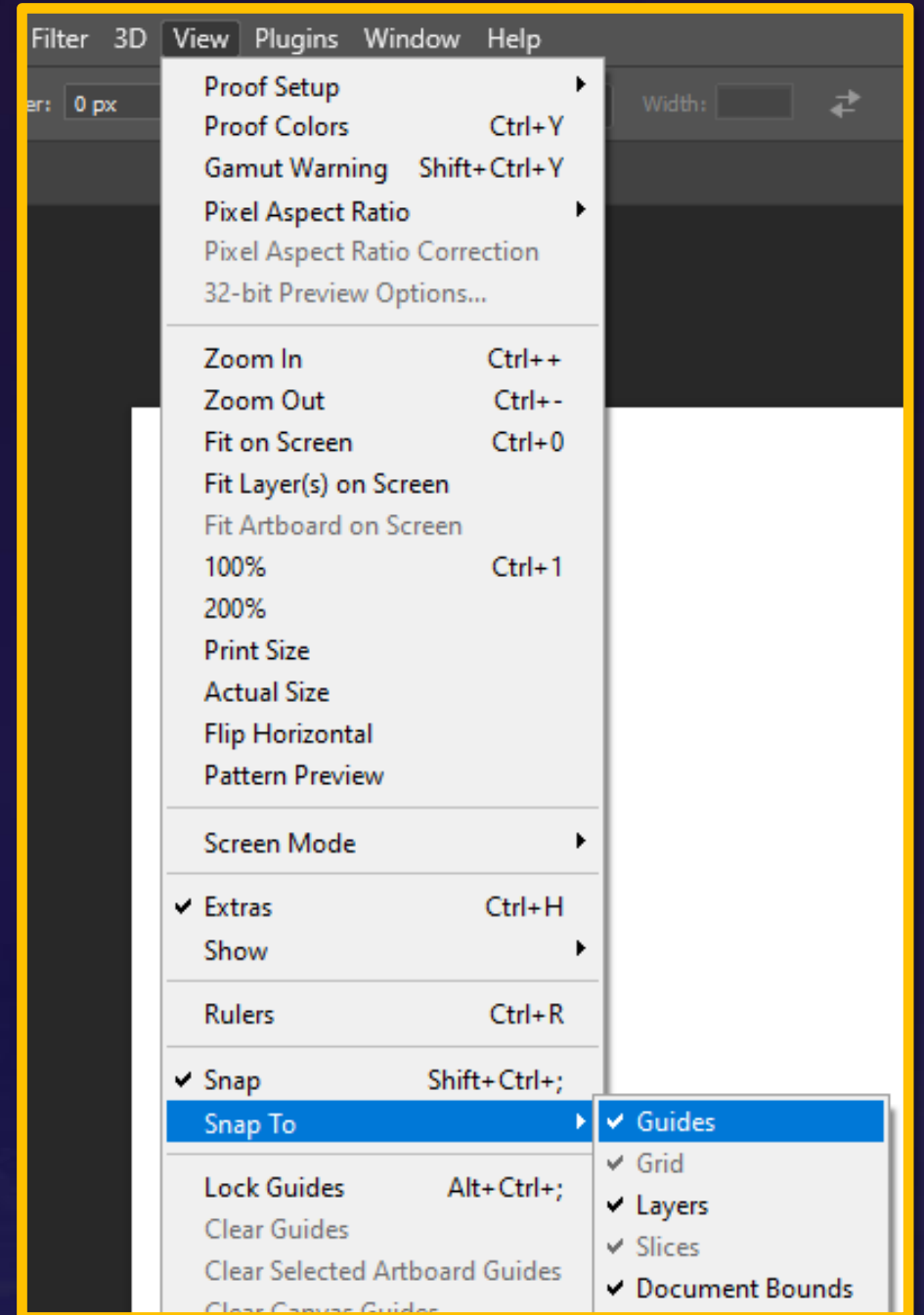
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4. Set **Snap** to On, and **Snap To > Guides**.

This will allow guides and other layered elements to snap to certain elements within your document.

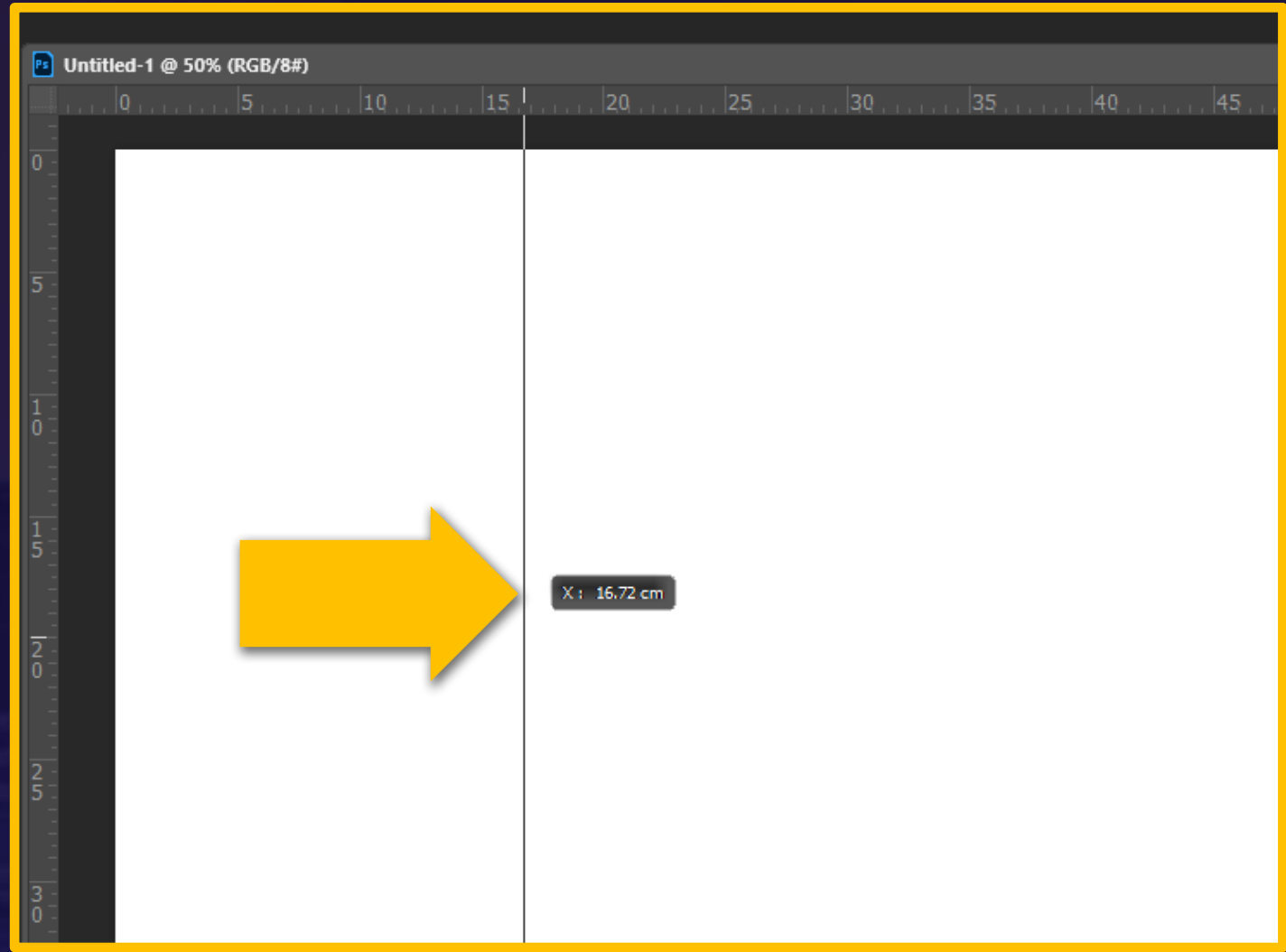




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5. Drag guides from the **Top ruler** and **Left side ruler** to find the centre of your image.

The lines should feel like they 'snap' at the **halfway point of your image** (both vertically and horizontally).



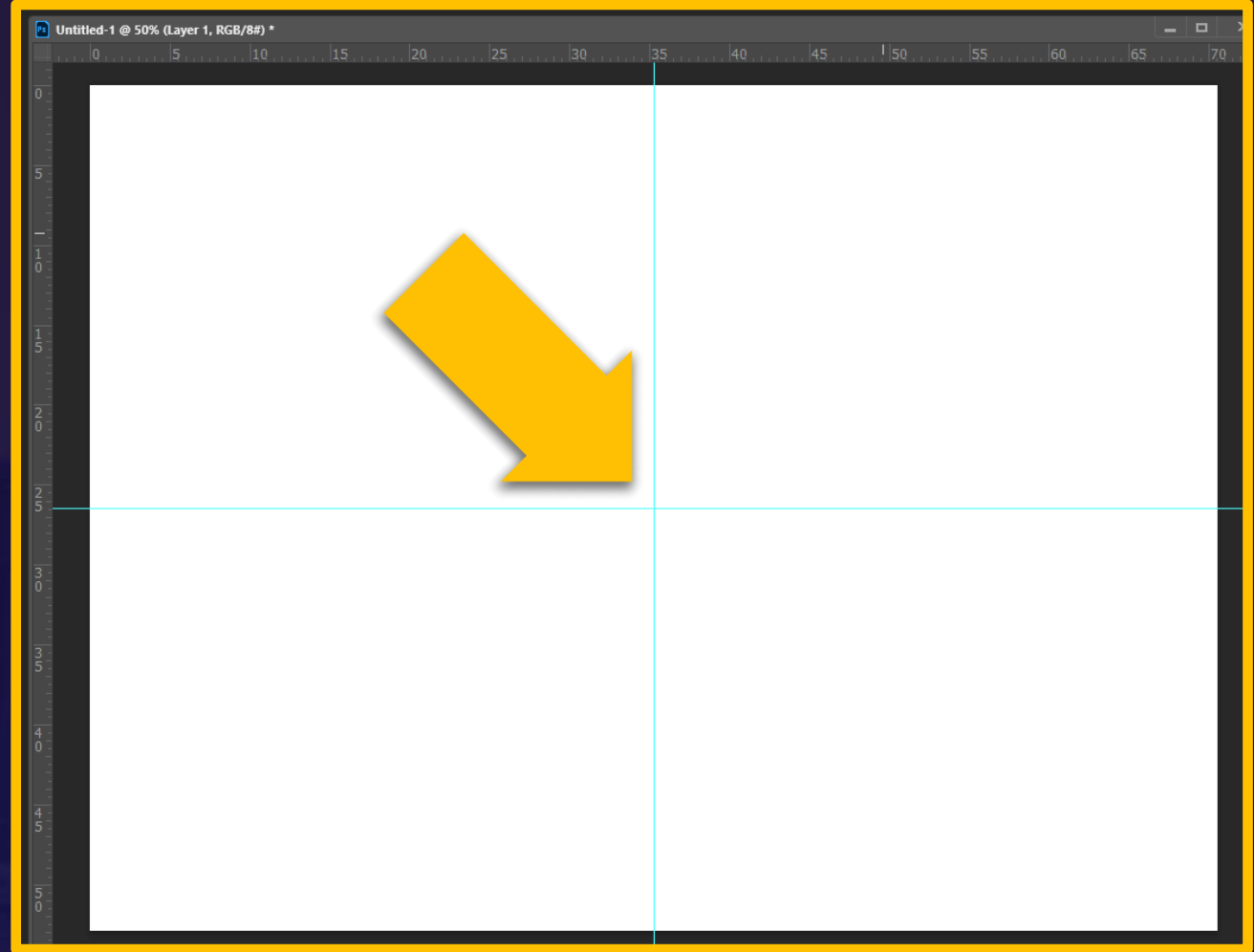


Orthographic Construction

6. You should now have **guides that intersect** at the centre of your image.

We will be producing **three images** initially for the orthographic projection. **Keep each image within the guides.**

These guides can also be **drawn on a layer manually** – either approach will work here.





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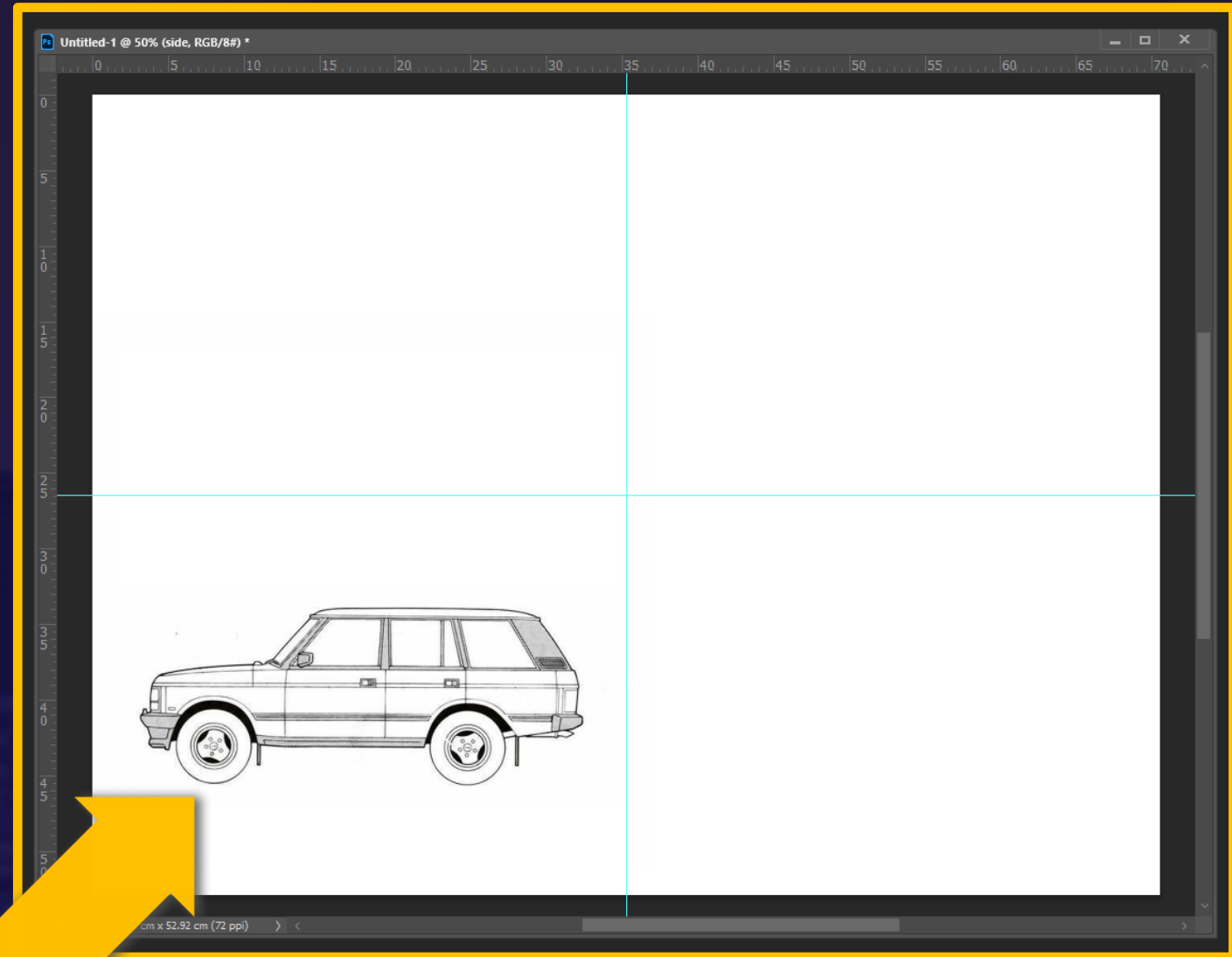
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7. Create a new Layer and Produce your **first projection**.

Drawing on a **new layer** will make things easier to correct if needed.

This **first image may take some time** as it determines the scale of the other projections.





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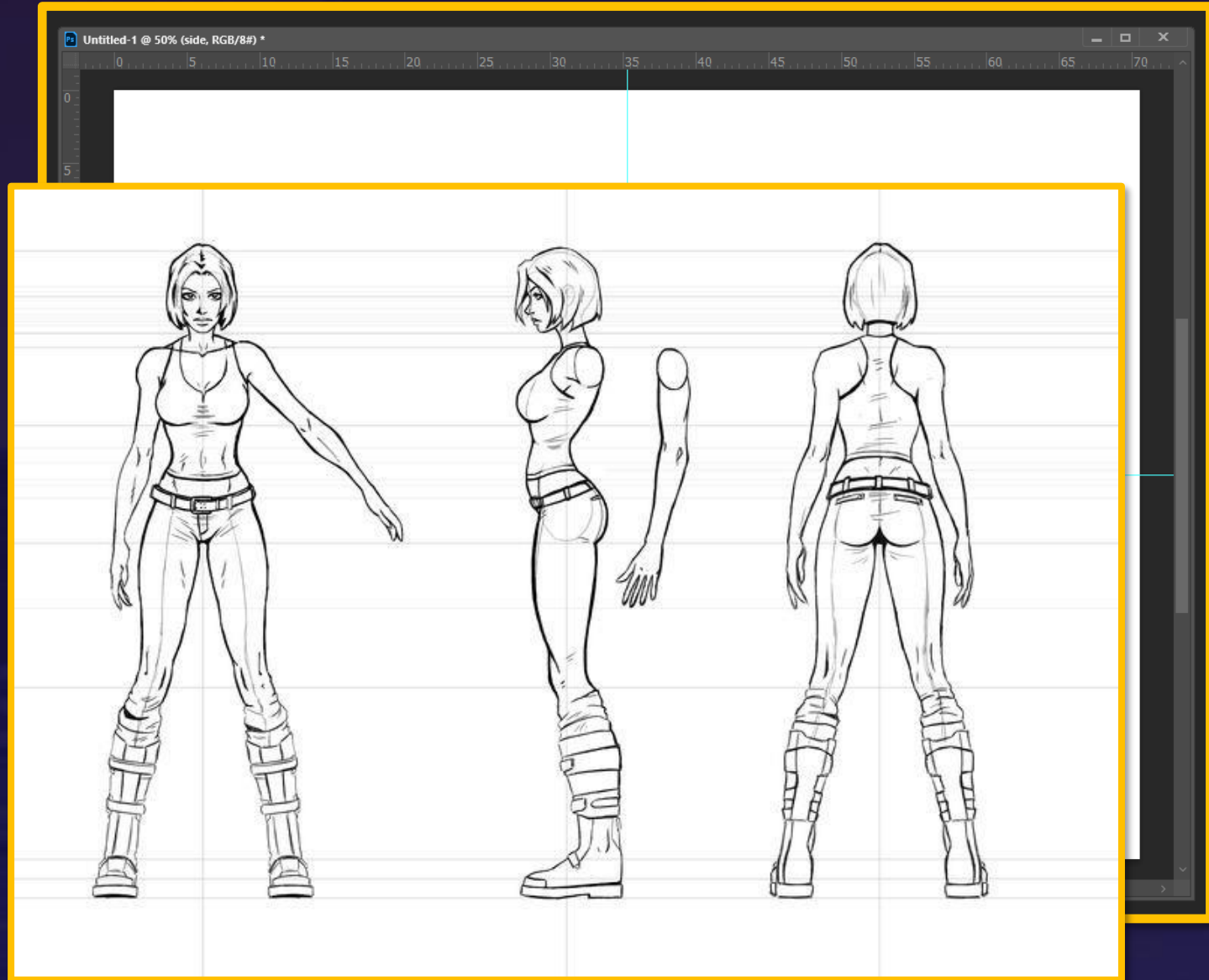
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7. Create a new Layer and Produce your **first projection**.

It is recommended to start with the **front view**, particularly for **characters**.

For 3D models, it is also recommended that the character is drawn in an **'A'-pose**.





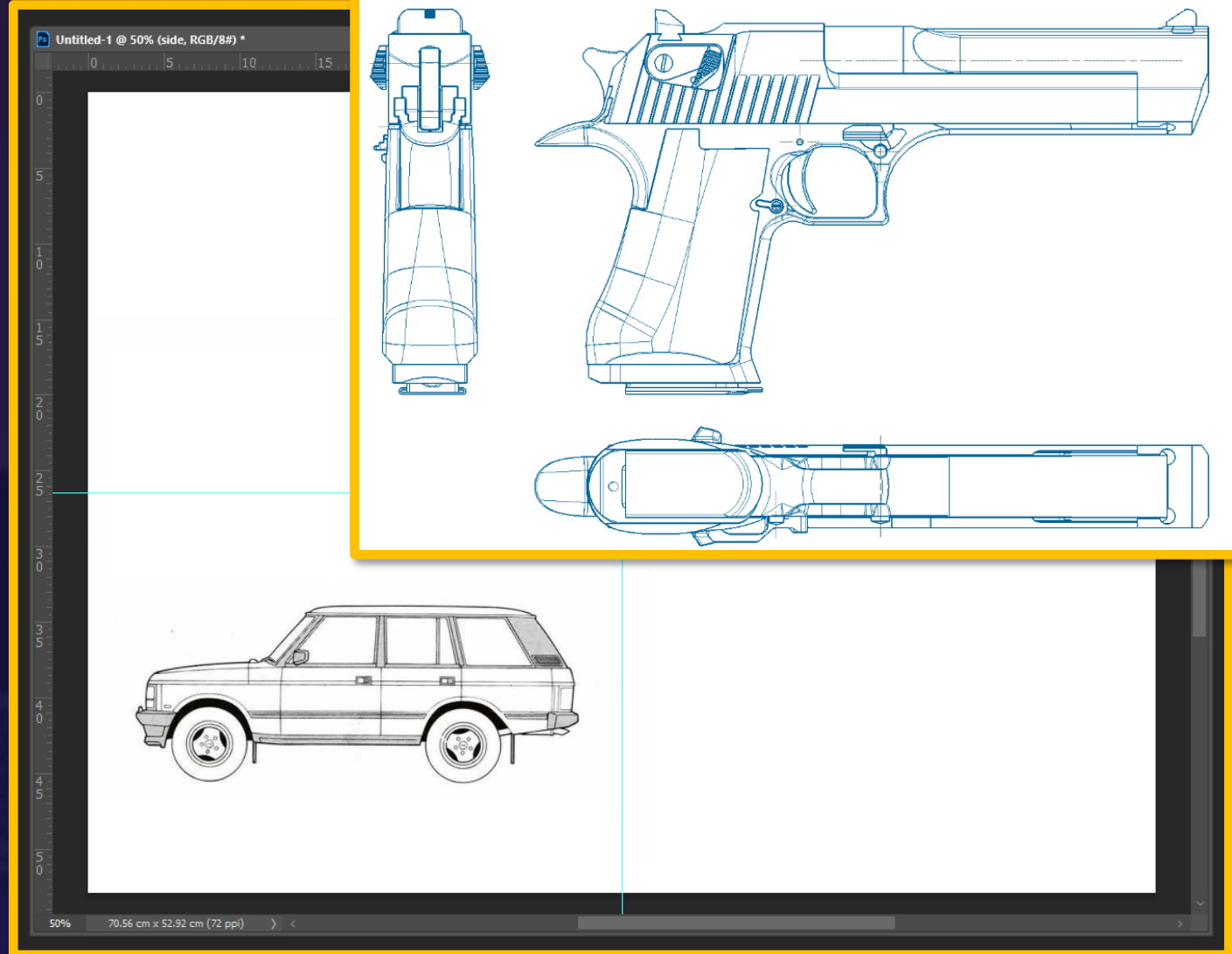
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7. Create a new Layer and Produce your **first projection**.

Vehicles and weapons can sometimes be easier with a **side view** produced first.





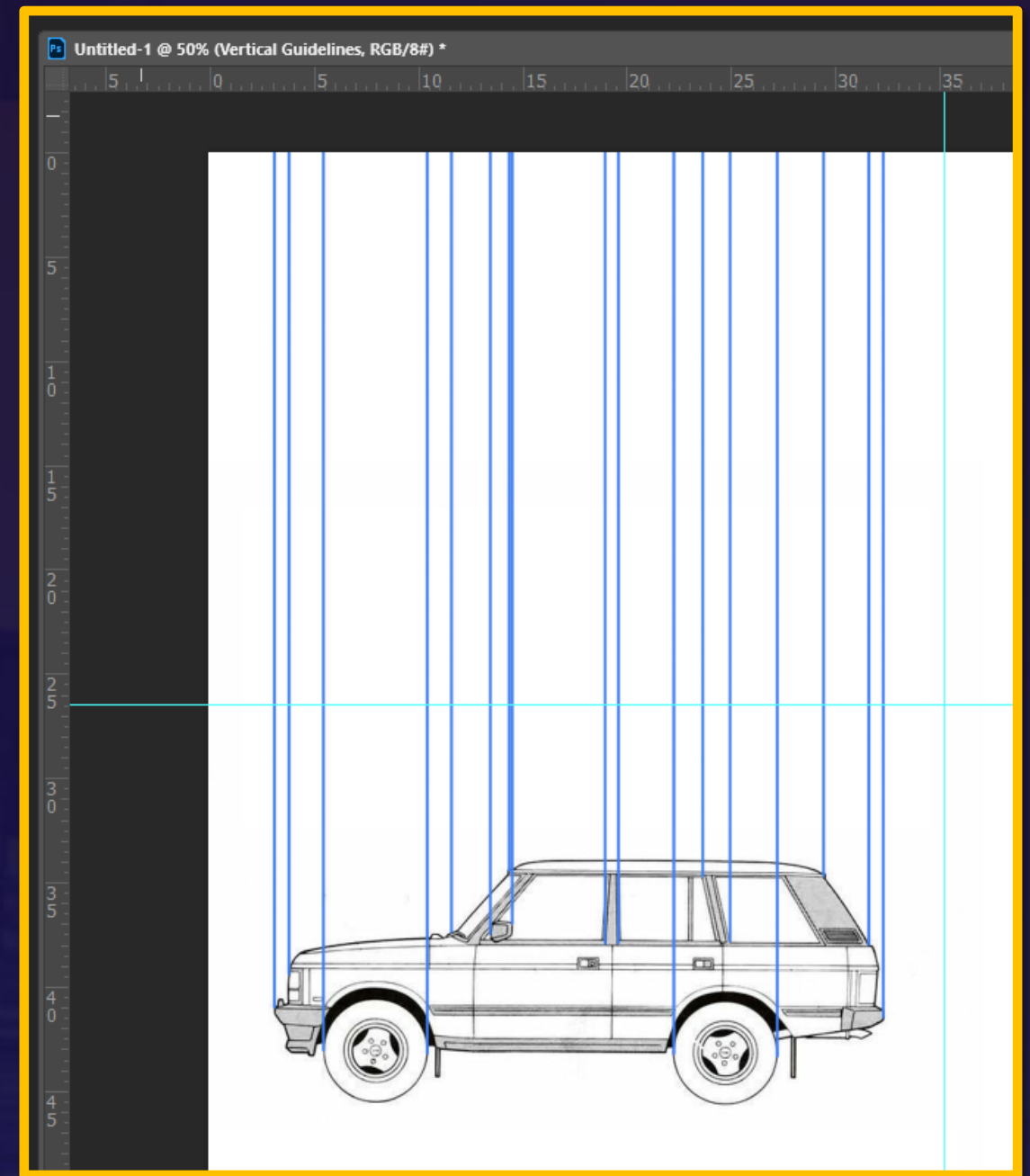
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8. On another new layer, **use the line tool** or **hold the Shift Key down on the paint tool** with a small radius of brush selected to **draw straight horizontal and/or vertical lines based on key elements of your first image** (e.g. top of wheelarches, roofline, chassis, door pillars, wing mirrors, etc.)

Use a **different colour** for this which does not interfere with the detail of the first drawing. A light **blue** or **green** work well.



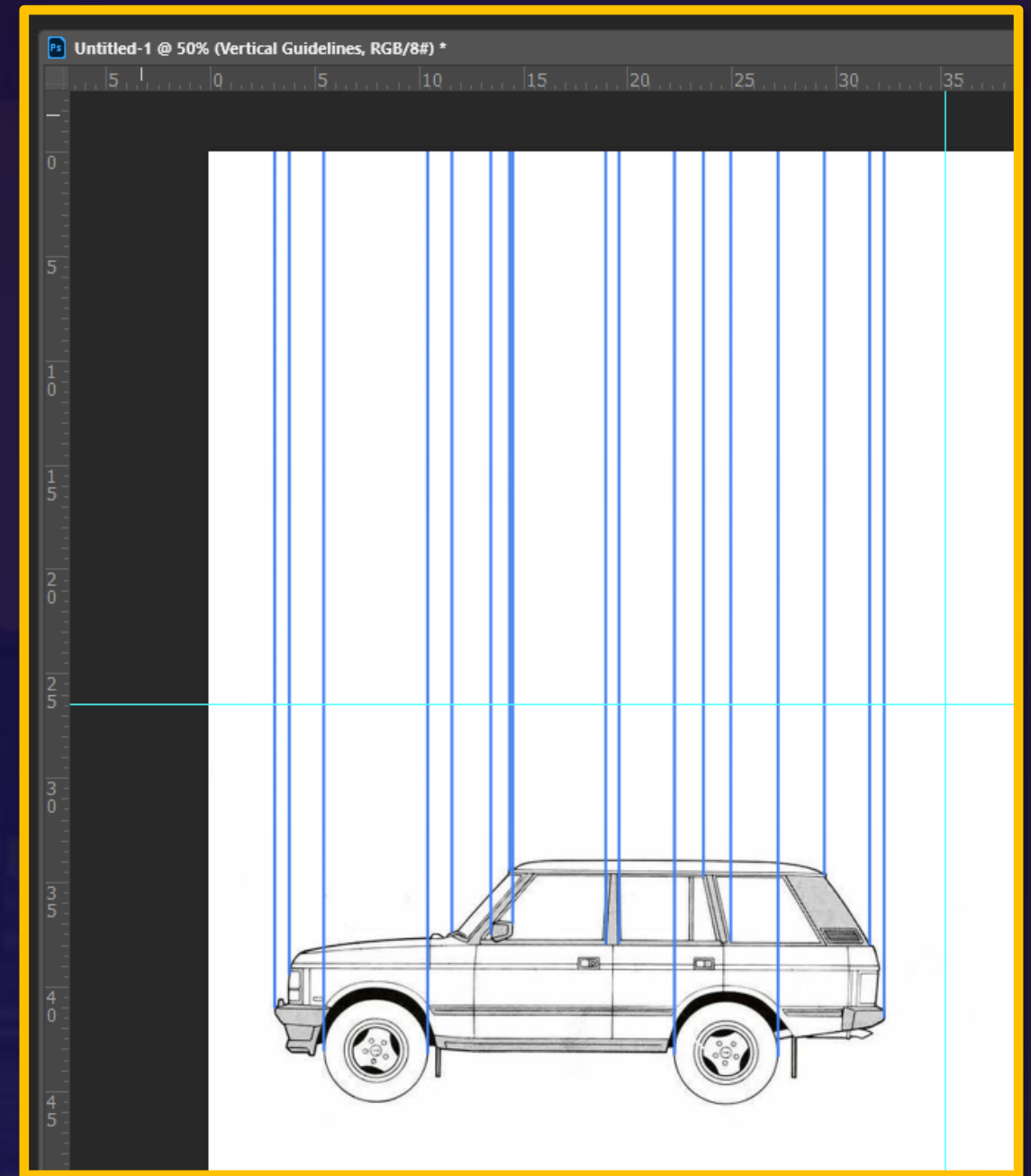


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8. You may also want to use **different layers for both horizontal and vertical lines**, as you can then toggle their visibility on and off to help.

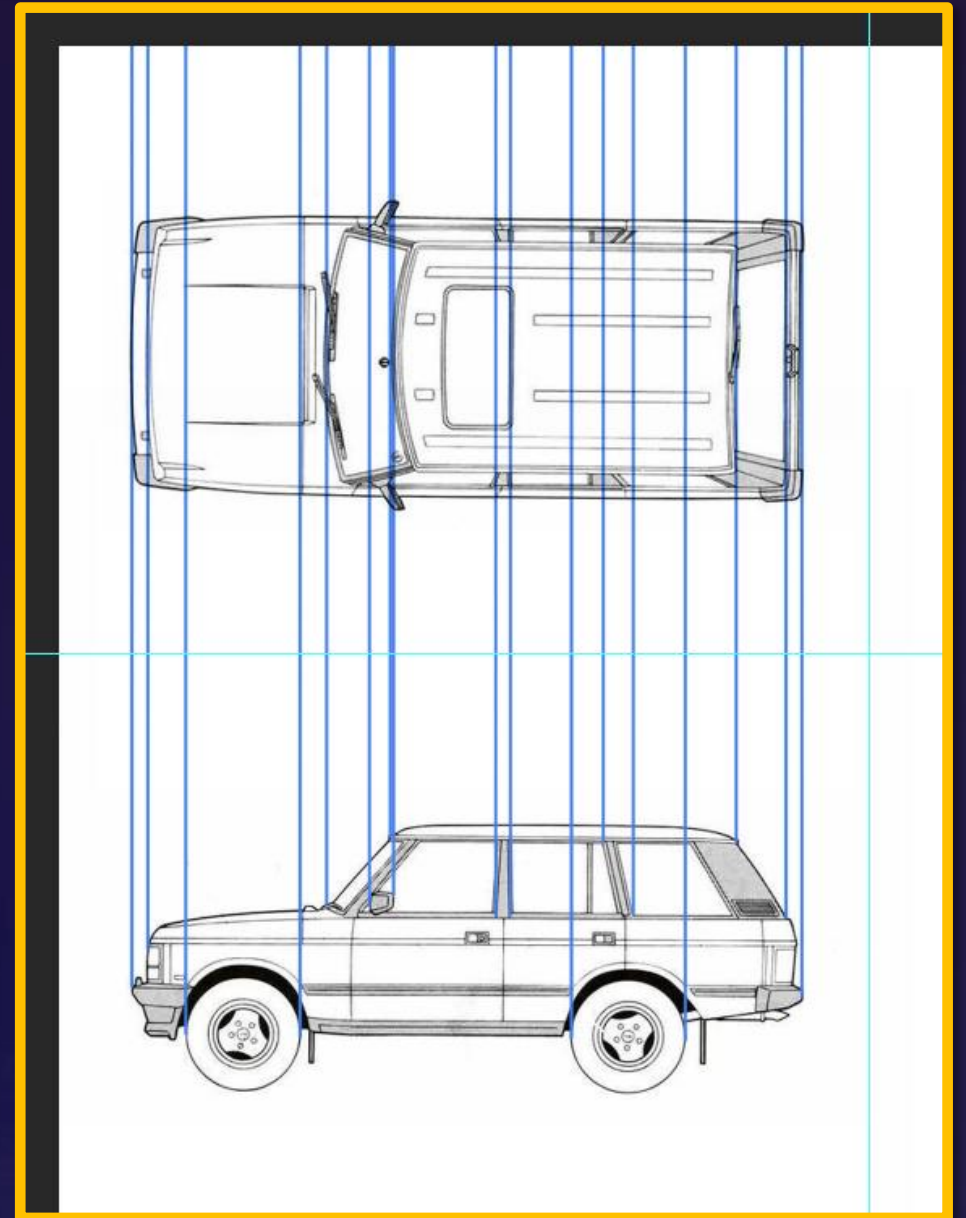




Orthographic Construction

9. Draw your **second projection** (again on a **new layer**) in a different quarter of your canvas using the **guidelines you previously constructed** to maintain the scale. Each component should **match up with the guidelines from the first image** (e.g. roof length, wheel size, position of wing mirrors, etc).

Give yourself a **good amount of space** between both projections, as this makes the final projection easier.





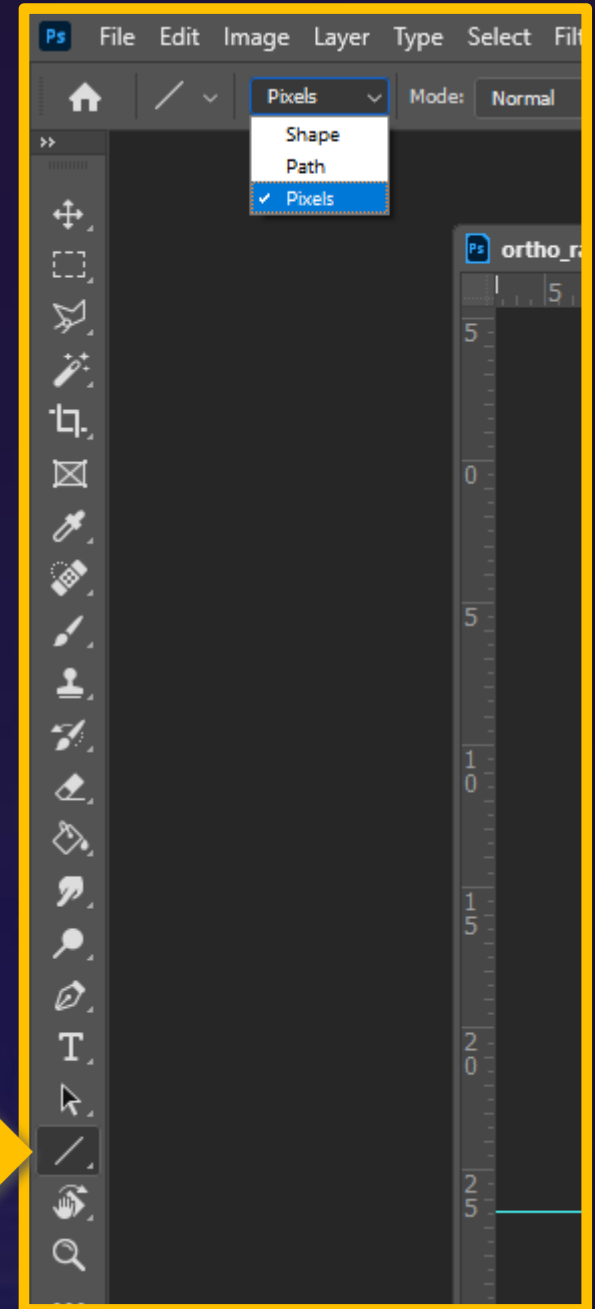
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10. Select the **Line tool** and set its drop-down menu to 'Pixels'.

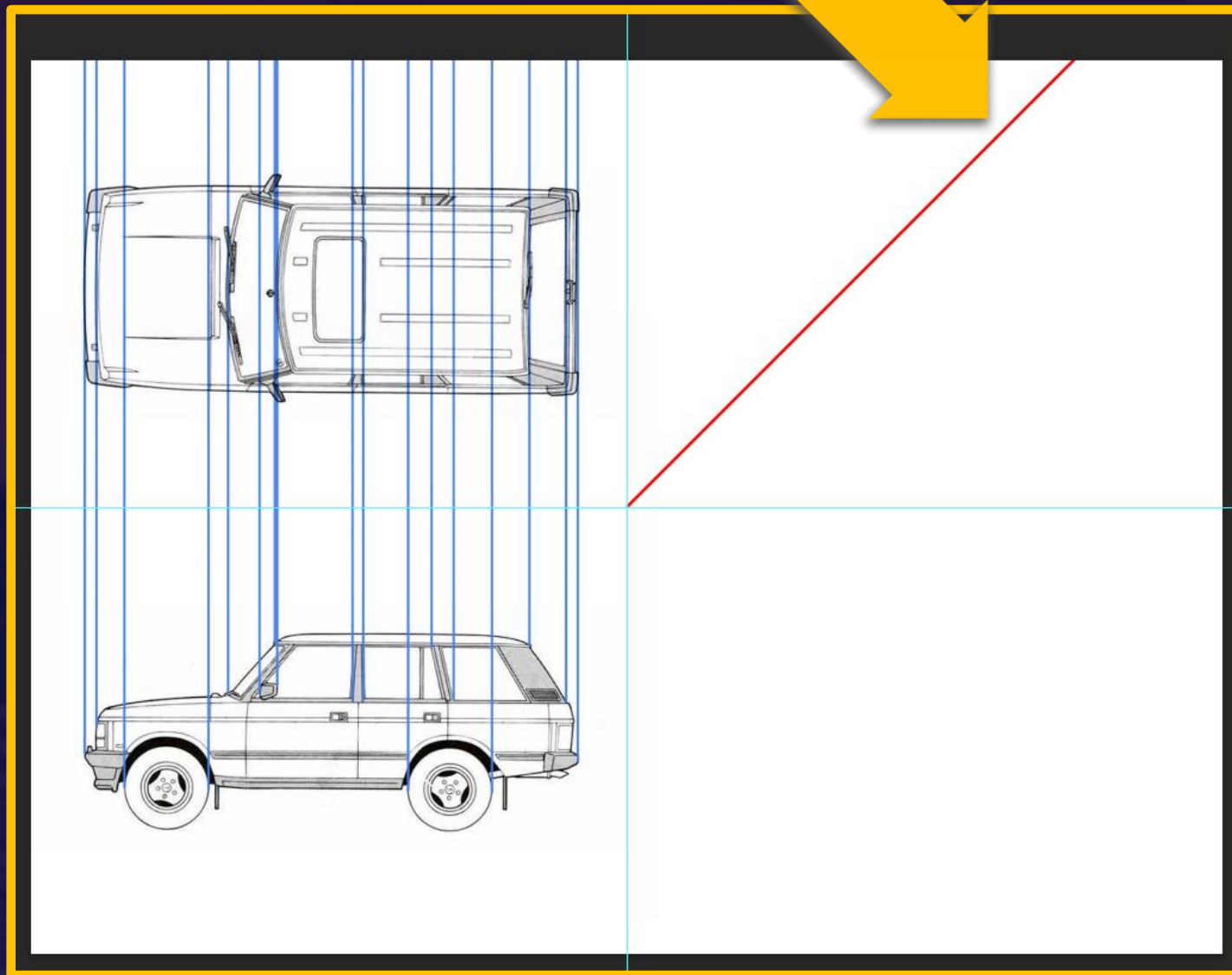
Line tool





Orthographic Construction

11. Change your primary colour to something at contrast to your projection lines (e.g. red) and from the centre of the guides in your image, **draw a 45-degree angle line** from the middle of the image to the top-right.

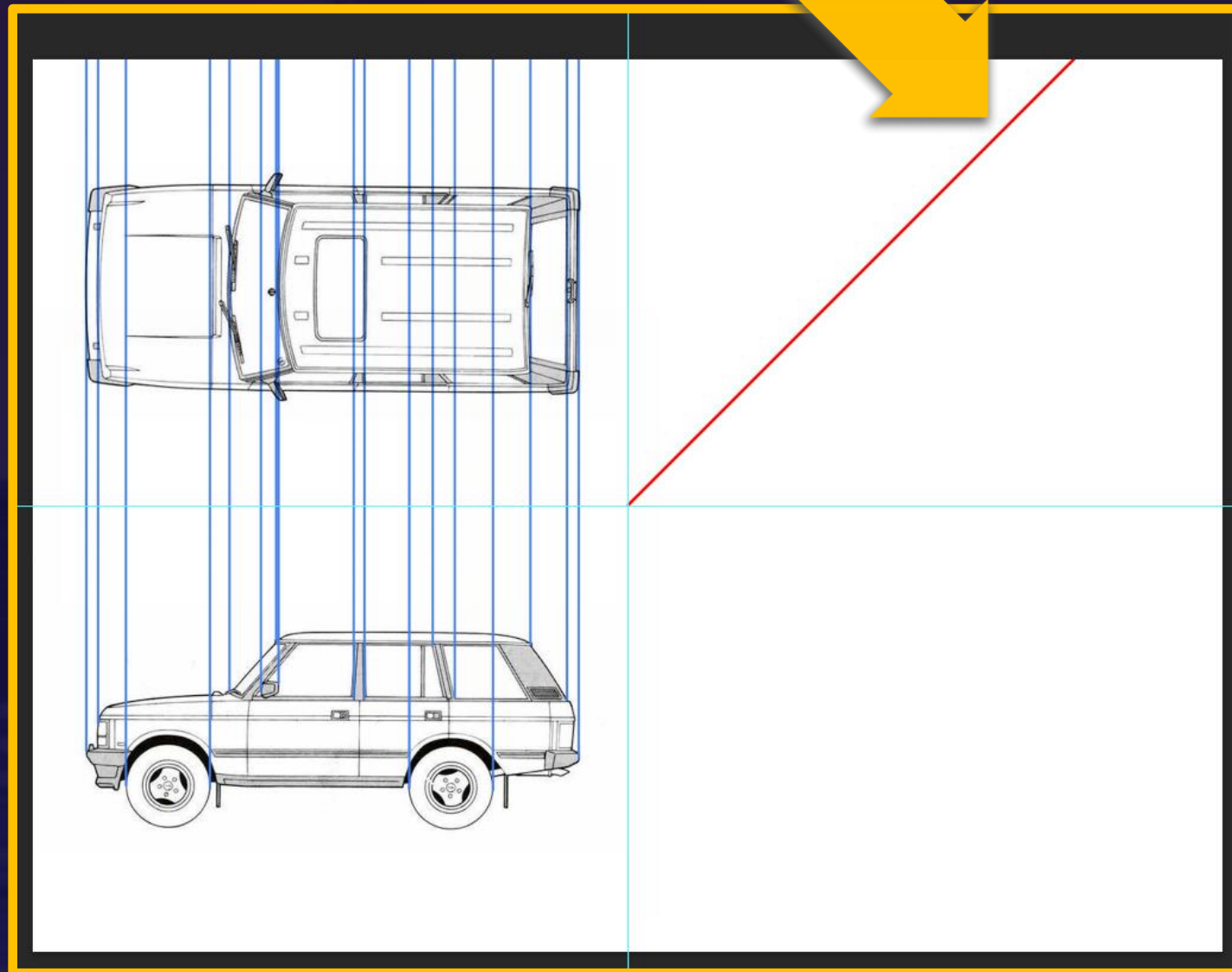




Orthographic Construction

11. To ensure the angle is correct, **hold the Shift key while dragging the line diagonally.** The angle **MUST** be 45 degrees or your final projection will not be produced accurately.

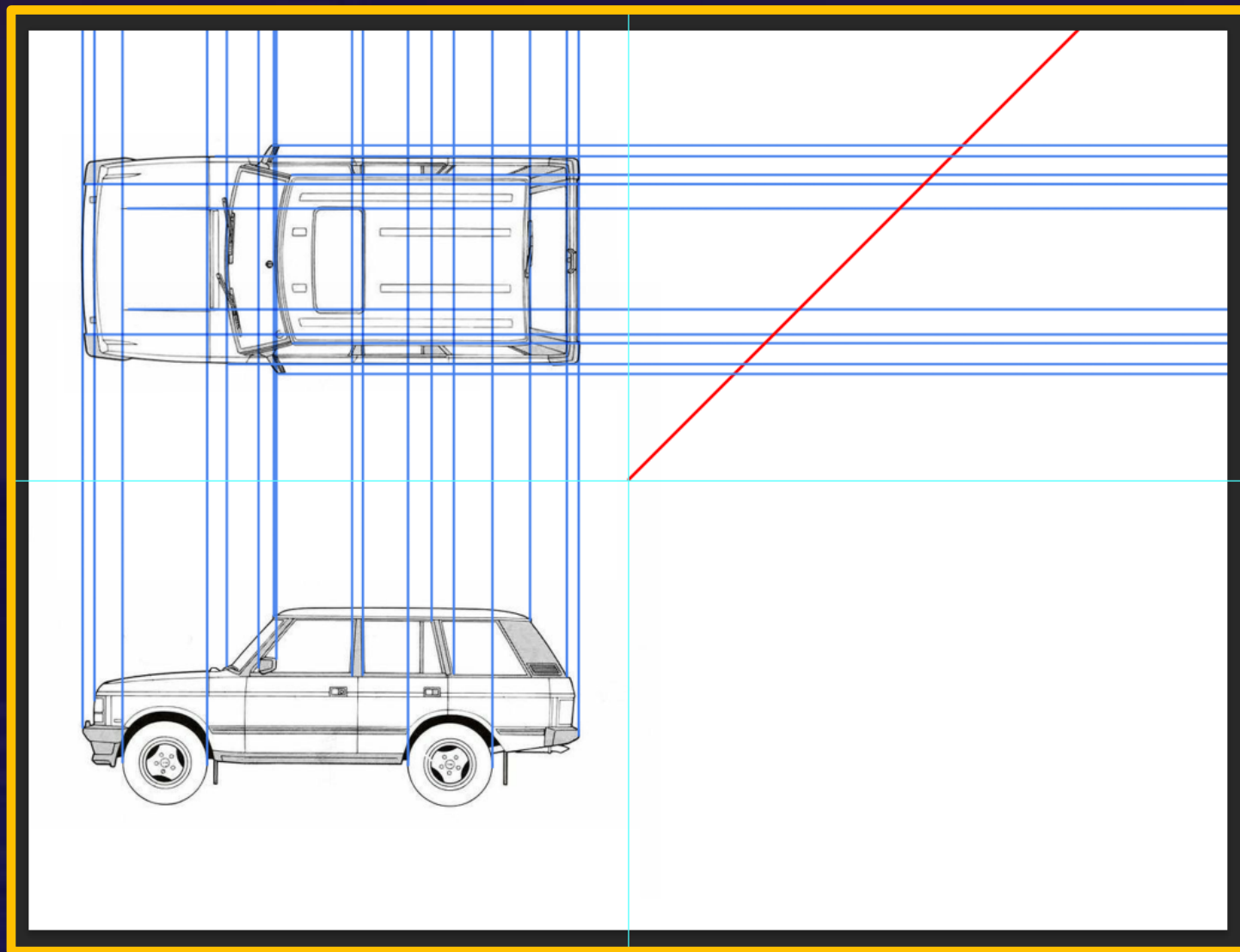
Note that your diagonal line **may not match up to the corner of the image** – this is normal.





Orthographic Construction

12. Using your **second projection** as a guide, create another new layer and **draw guidelines at key points horizontally**.

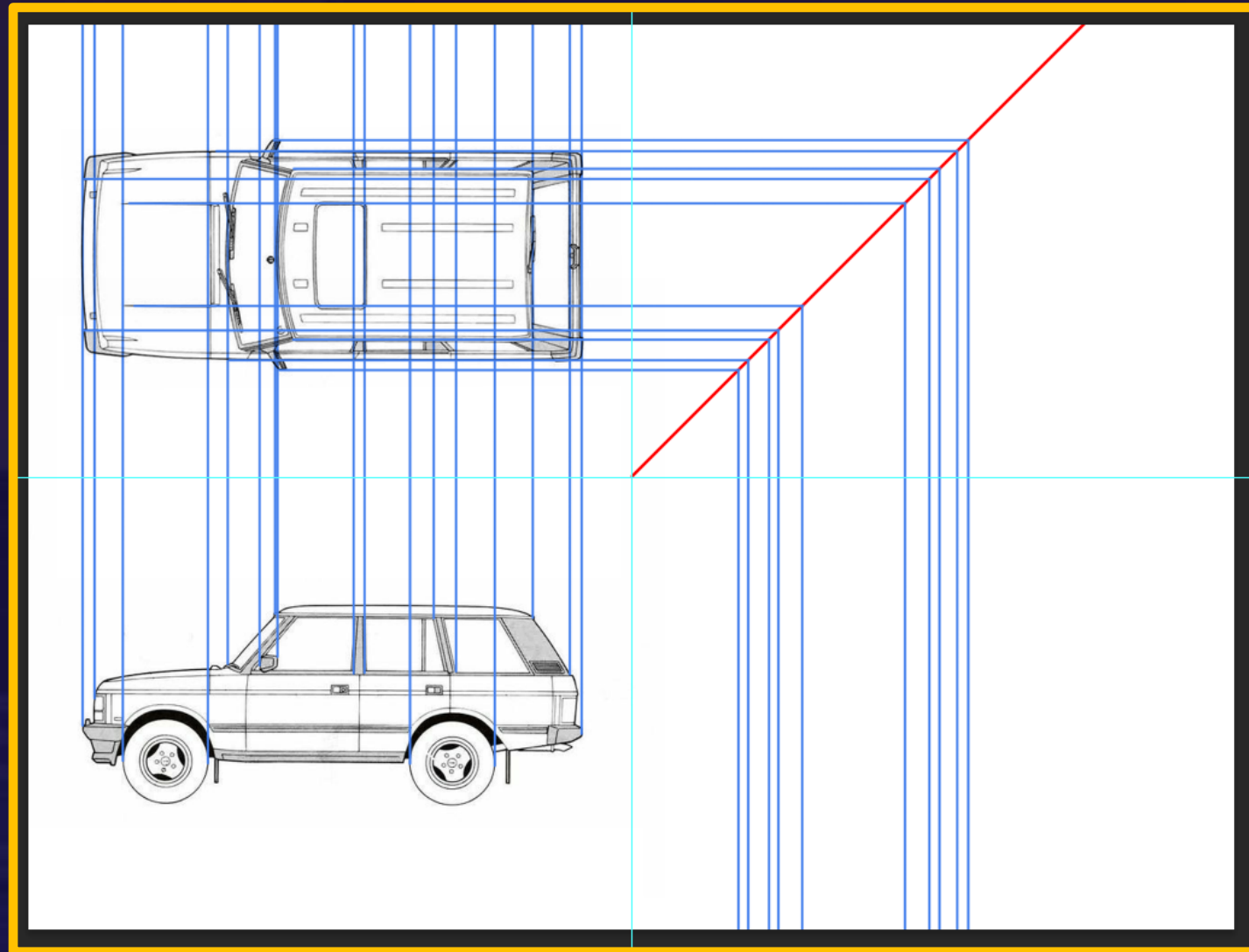




Orthographic Construction

13. Where your **guidelines intersect the red 45-degree line**, drop each one **vertically**. Once again, doing this on a new layer can help with clarity or allow you to **return to a previous step** if you make a mistake.

You may find it easier to **erase the lines** beyond the 45-degree intersection for **clarity**.

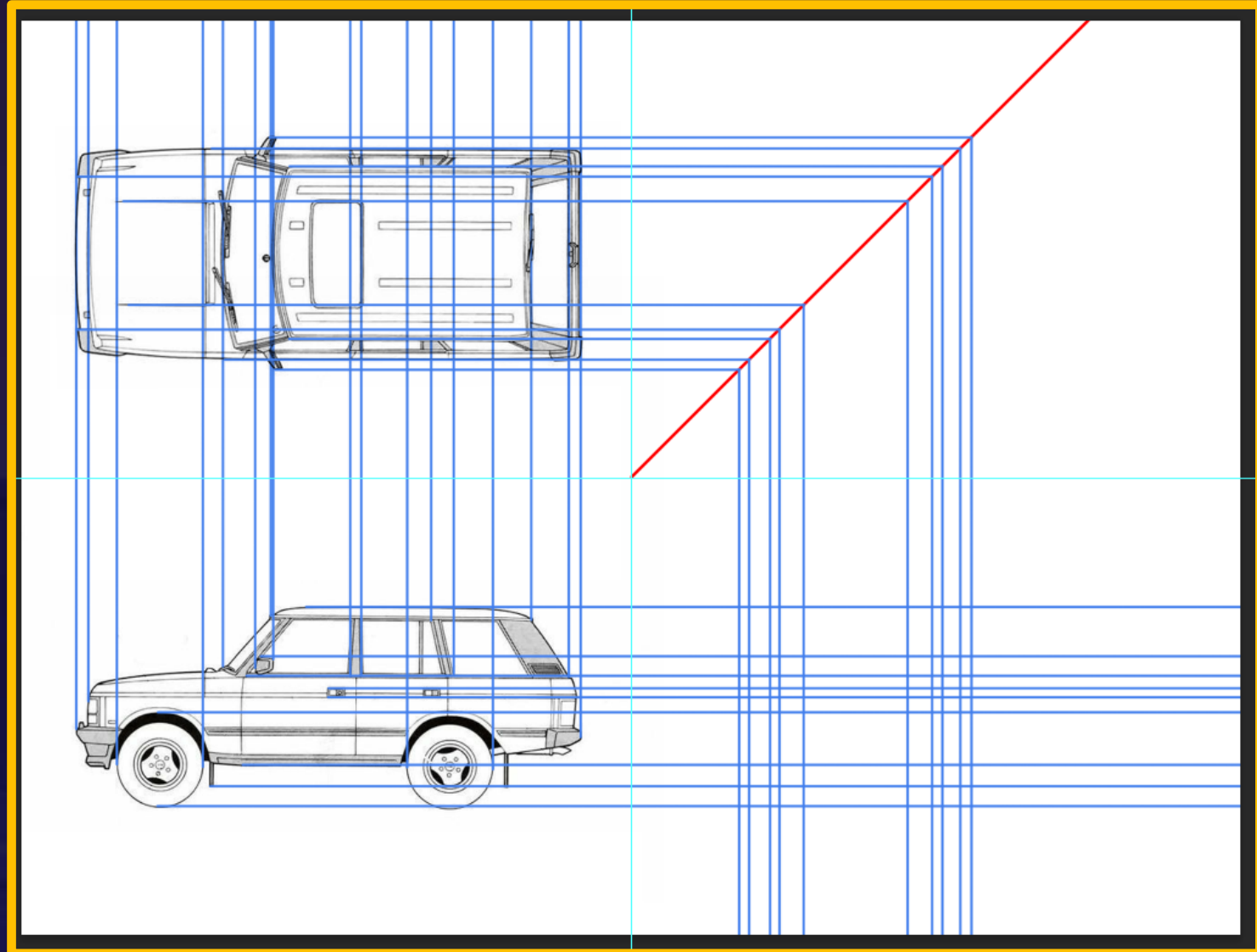




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14. On another new layer, produce **horizontal guidelines** from your original projection in the **bottom-left corner** of the image.

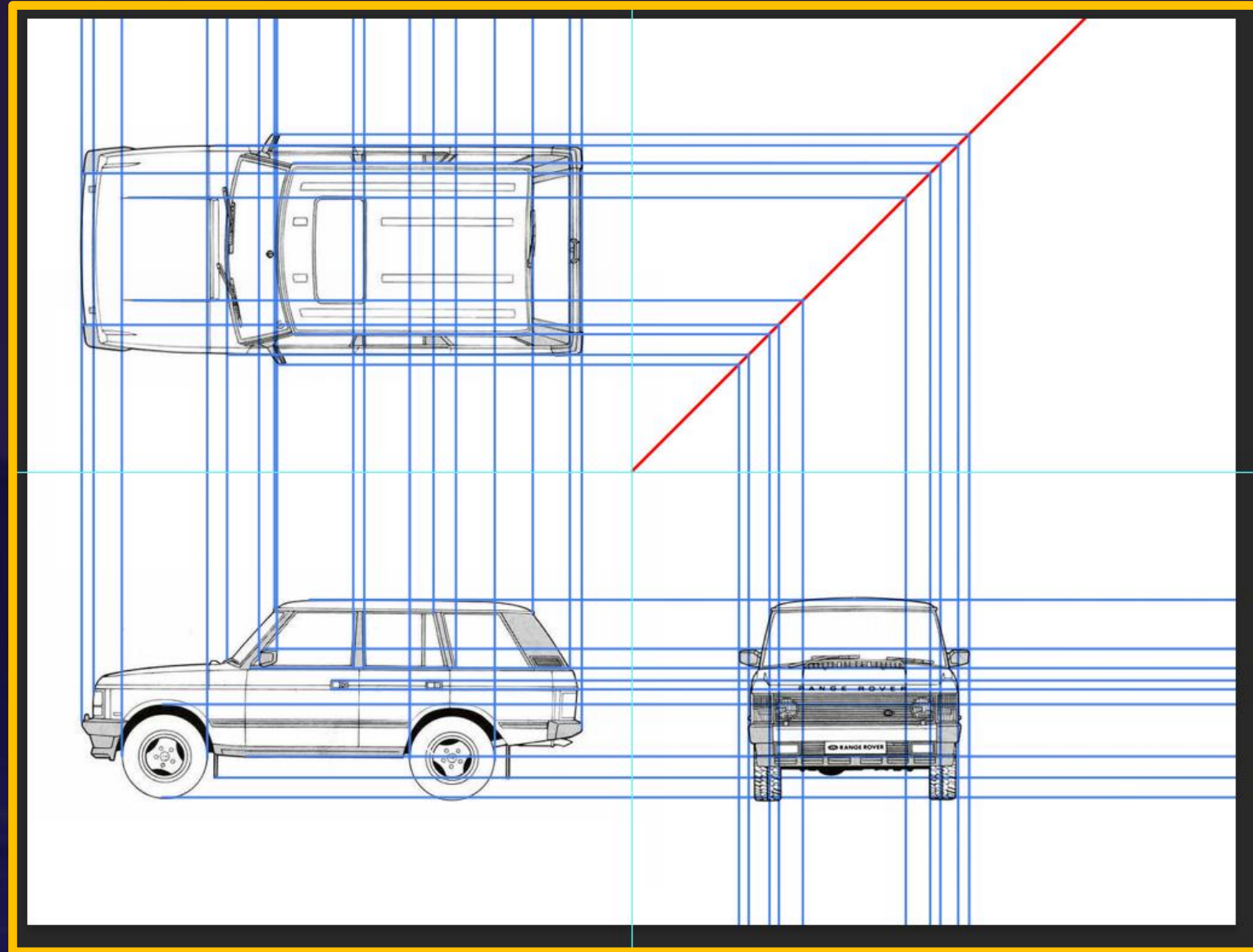
These will **intersect with the vertical lines** from the previous step and will provide the boundaries for your **third projection**.





Orthographic Construction

15. Use the guidelines to produce your **third projection**.

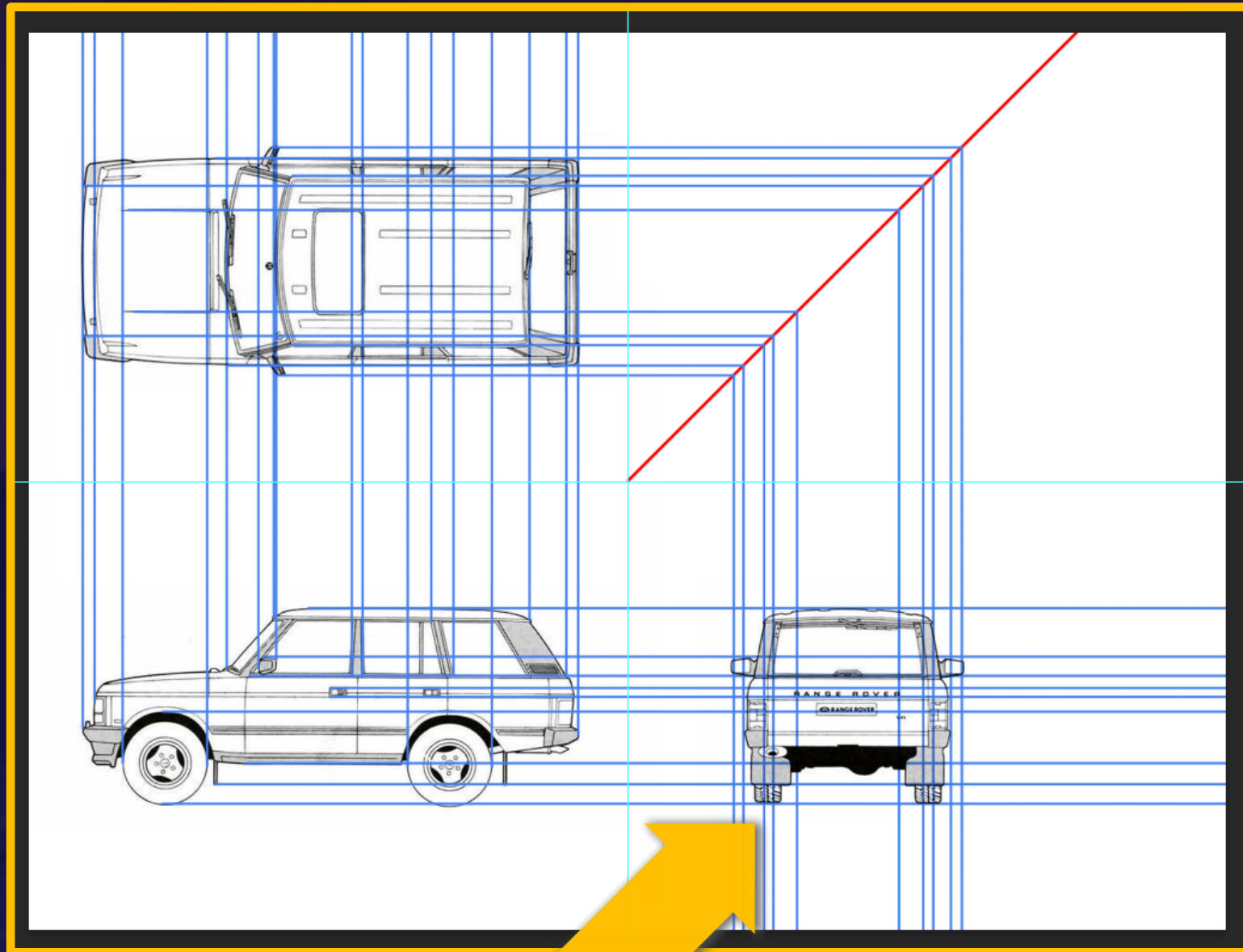




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16. If required, create another layer and **hide your third projection** to create a fourth if needed.

This is often the case for vehicles, buildings and weapons which have **different details on the front and rear**.

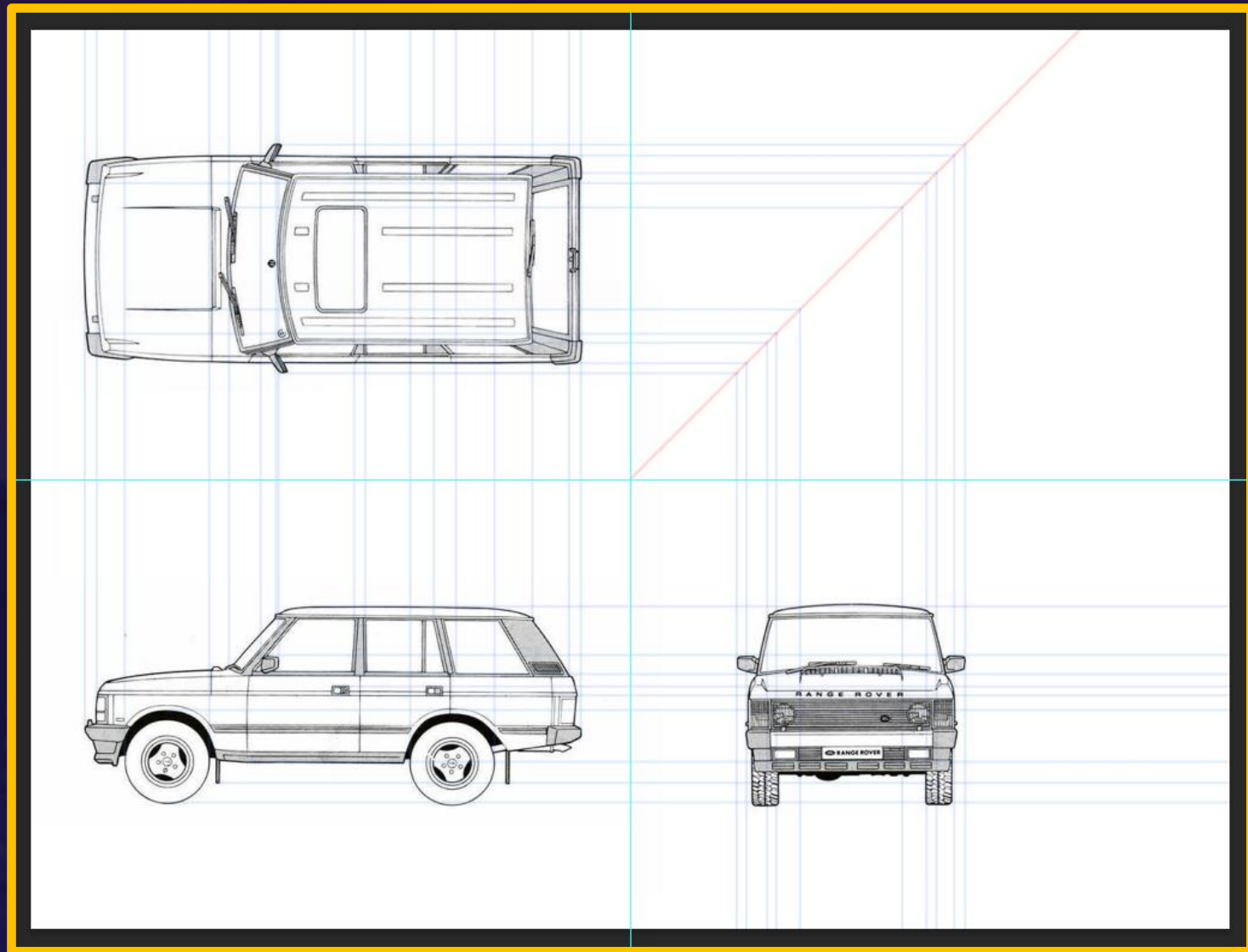




Orthographic Construction

17. You can **hide or reduce the opacity of the guideline layers** at this point to see your Orthographic assets clearly.

The image is now **ready to be edited and imported** into a 3D package as a reference, or as a **guide for concept artists** to produce a three-quarter image of the design.





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Remember:

**SAVE YOUR WORK
AND SAVE IT OFTEN!**



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Summary



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In engineering, architecture and design, a **single 3D drawing or concept does not show enough detail** for designs to be completed.



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In engineering, architecture and design, a **single 3D drawing or concept does not show enough detail** for designs to be completed.

Orthographic projections help overcome this problem.



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In engineering, architecture and design, a **single 3D drawing or concept does not show enough detail** for designs to be completed.

Orthographic projections help overcome this problem.

An orthographic projection is **a way of representing a 3D object by using several 2D views of the object**. The most commonly used views are **top, front, and right side**. Imagine it as positioning yourself directly in front, above, or to the right of an object and drawing only what you can see [2].



Any Questions?



Bibliography

- [1] (no Author), (no date). Mr Elsie – Technological Education. *Orthographic Drawing* [Online]
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- [2] (no author), (2024). Co-Design Collaborative. *Orthographic Projection* [Online]
<https://codesigncollaborative.org/orthographic-projection/>
Accessed 2/12/24



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