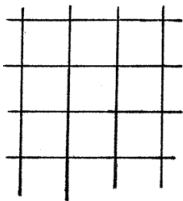


Impossible Tilings

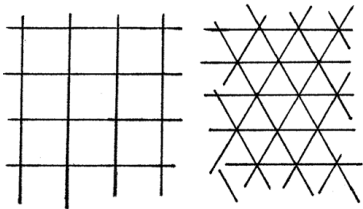
Kabe Moen
Washington University in St. Louis

■ What is a **Tiling**?

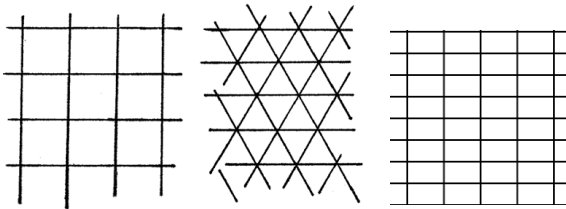
■ What is a **Tiling**?



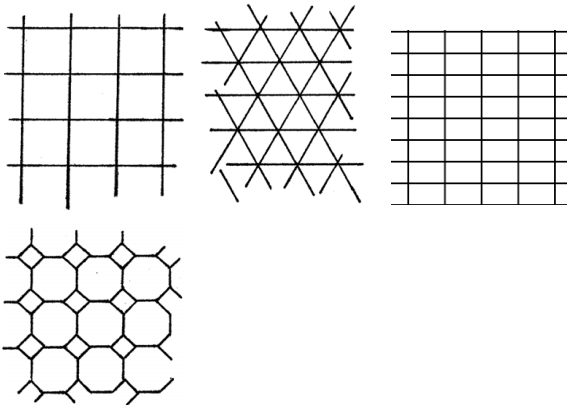
■ What is a **Tiling**?



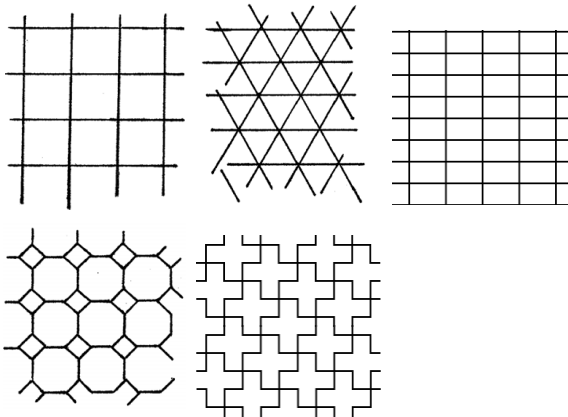
■ What is a **Tiling**?



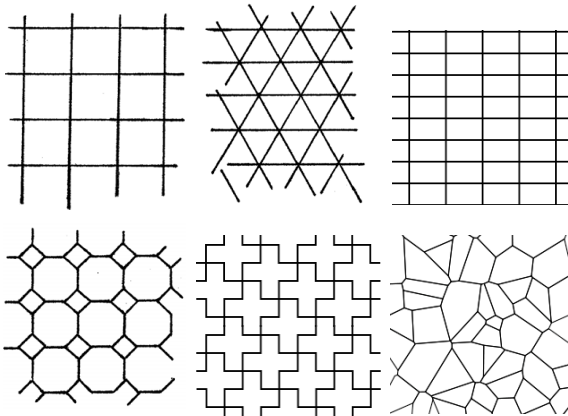
■ What is a **Tiling**?



■ What is a **Tiling**?



■ What is a **Tiling**?



- Tilings are the inspiration for the some of the artwork of M.C. Escher.

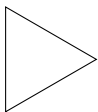


We will answer the following questions.

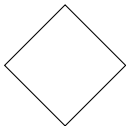
- How do we make a tiling?
- What shapes will make a tiling?
- How can we use tilings to make beautiful artwork?

- A **regular polygon** is a shape whose sides and angles are all equal.

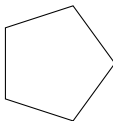
$$n = 3$$



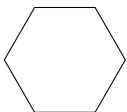
$$n = 4$$



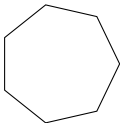
$$n = 5$$



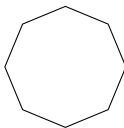
$$n = 6$$



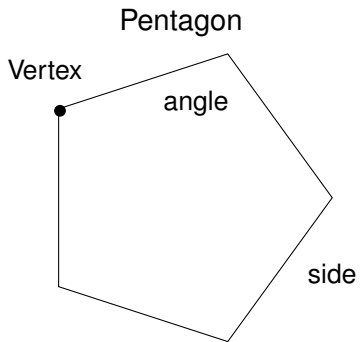
$$n = 7$$



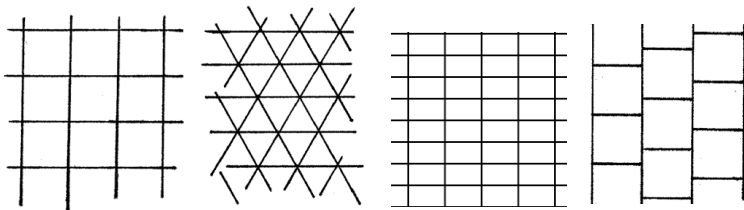
$$n = 8$$



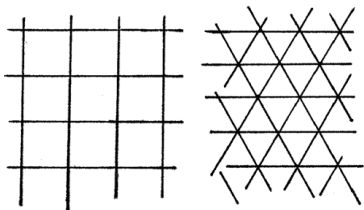
Jargon:



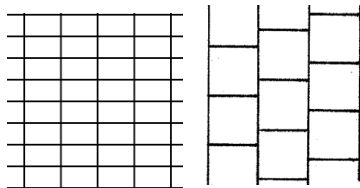
- A **regular tiling** is made up of one regular polygon whose vertices touch.



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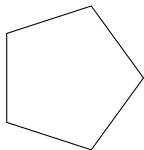


■ Regular tilings

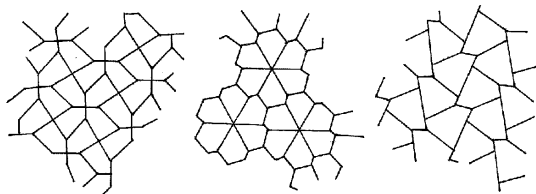


Not regular

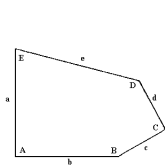
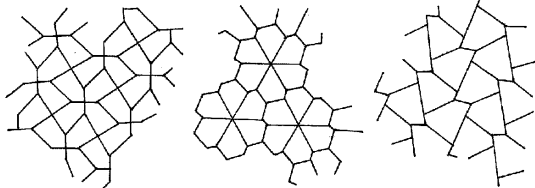
- Can we make regular tiling out of any regular polygon? For example can we make a tiling out of a pentagon?



- If we drop to word regular we can make tilings out of pentagons. Here are a few.

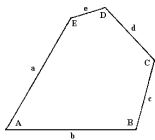


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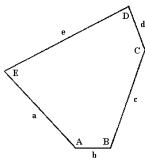
$$A = C = 90^\circ$$

$$a = b, c = d$$



$$A = 60^\circ, C = 120^\circ$$

$$a = b, c = d$$



$$B + E = 180^\circ$$

$$a = c$$