Floor Pattern

The diagram shows a floor pattern.

In the floor pattern, the shaded part is made by overlapping two equal squares.
The shaded shape can also be seen as a set of eight equal kites.

1. Find the measures of all four angles of the kites.

   Explain how you obtained your answers.

   \[
   \frac{45}{8760} \sqrt{360 - 135} = 225^\circ \checkmark
   \]

   \[
   \frac{12 \frac{1}{2}}{21225}
   \]

   \[
   \frac{0.7}{0.5} \quad \text{thus 2 are } \frac{1}{2} \text{ because it's a kite}
   \]

   \[
   112 \frac{1}{2} \checkmark
   \]

   \[
   90^\circ \text{ it because could be described as 2 0s } \checkmark
   \]

2. Two of the kites can fit together to make a hexagon.

   Prove that the quadrilateral ABCD is a parallelogram.

   \[
   1 \quad \overline{AB} \cong \overline{DC}, \overline{AE} \cong \overline{CF}, \overline{DE} \cong \overline{BF} \quad 1 \text{ kites are } \cong, \text{ therefore corr. sides are } \cong
   \]

   \[
   2 \quad \angle A = 360^\circ, B = 90^\circ, \text{ so left over is } \cong
   \]

   \[
   3 \quad \overline{AE} \cong \overline{AC} \checkmark \quad \text{2 sides + an } \angle \text{ are } \cong
   \]

   \[
   4 \quad \overline{AD} \cong \overline{BC} \checkmark \quad \text{a. CPCTC}
   \]

   \[
   5 \quad \text{ABCD is a } \square \checkmark \quad \text{5. two pairs of opp sides are } \cong
   \]
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   Explain how you obtained your answers.

   1st \( \angle = 90^\circ \)
   
   2nd \( \angle = 45^\circ \)
   
   3rd \( \angle = 1\text{st} \text{ or } 112.5^\circ \)

2. Two of the kites can fit together to make a hexagon.

   Prove that the quadrilateral ABCD is a parallelogram.

   The two unshaded cut things are congruent because of SAS. The shaded and unshaded are congruent to the other three. For \( A = C \), \( D = B \), and \( \angle B = \angle D \). So it must be a parallelogram.
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   Explain how you obtained your answers.

   The inner most angle is 45° because they form a 360° with the eight angles. The curve angle is 90° because properties of a square, the other two angles are a half of 360° - 135° = 225
   225 / 2 = 112.5° because they are equal.

   By properties of a kite.

2. Two of the kites can fit together to make a hexagon.

   Prove that the quadrilateral ABCD is a parallelogram.

   \[ \overline{DF} \cong \overline{AB} \] because the kites are equal by CPCTC. I drew points X, Y. As proved by the previous problem, \( \angle AXY = 90° \) and \( \angle DXY = 112.5° \) so \( \angle AXD \) must be \( 360° - 112.5° - 90° = 157.5° \). \( \triangle AXD \) is isos. because \( \overline{AX} \cong \overline{XD} \) by CPCTC. So, \( \angle XAD \cong \angle A DX \) and they both are equal since the both equal 112.5°. \( \angle A DX \) and \( \angle A AD \) are supp. so \( \overline{AB} \parallel \overline{CD} \) because \( \overline{E} \) is the int. of \( \overline{1} \) lines. Since one pair of opp. side are both \( \overline{E} \) and \( \overline{1} \), the quad. must be a parallelogram.
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1. Find the measures of all four angles of the kites.

   Explain how you obtained your answers.
   
   The outer angles are all right, 90°
   Because it is made of two squares
   The closest to the middle 36°
   = 45° The other 2 are congruent
   22.5° or 112.5 each

2. Two of the kites can fit together to make a hexagon.

   Prove that the quadrilateral ABCD is a parallelogram.

   The kites are kites and equal because \( \overline{EF} = \overline{FC}, \overline{EF} = \overline{AE} \), so \( \overline{DC} = \overline{AB} \)

   and \( \overline{DE} = \overline{FB}, \overline{AE} = \overline{FC} \). \( \angle AED \) is congruent to \( \angle BFC \) because

   \( \angle AEC = \angle EFC \) and \( \angle DEF = \angle EFB \) and they all add up to 360°, which is proved by the Subtraction Property. Therefore

   \( \triangle AED \cong \triangle CFB \) by SAS, and \( \overline{AD} = \overline{BC} \) by CPCTC.

   If a quadrilateral has two pairs of opposite sides congruent, it is a parallelogram.
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1. Find the measures of all four angles of the kites.

   Explain how you obtained your answers.
   \[
   \frac{360}{8} = 45 \text{ - Inner Angle} \checkmark
   \]
   \[
   \frac{180-45}{2} = 67.5 \text{ - part of the 2 side } \angle \text{s} \checkmark
   \]
   \[
   90 - \text{ outer angle (corner of a square)} \checkmark
   \]
   \[
   \frac{180-90}{2} = 45 \text{ - 2nd part of side } \angle \text{s} \checkmark
   \]
   \[
   45 + 67.5 = 112.5 \text{ - side } \angle \text{s} \checkmark
   \]

2. Two of the kites can fit together to make a hexagon.

   Prove that the quadrilateral ABCD is a parallelogram.

   \[
   \sqrt{AF \cong EC} \\
   DF \cong EB \\
   DC = AB \text{ according to congruent corresponding parts.} \\
   \text{Angle } \angle AFD \cong \angle CEB \text{ because } \angle AFE \cong \angle EFC \text{ and } \angle DFE \cong \angle FEB. \\
   \text{Therefore } \triangle AFD \cong \triangle CEB. \text{ Through } CA = TC, \overline{AD} \cong \overline{EB}. \text{ Therefore } \\
   \text{ABCD is a parallelogram } \checkmark