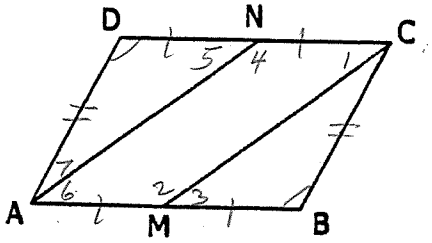
KEY

Geometry (H)
Section 5.2 – Proving quads are parallelograms

Write a flow proof for each of the following.

1. Given: □ABCD
M is the midpoint of $\overline{AB}$
N is the midpoint of $\overline{DC}$

Prove: AMCN is a parallelogram

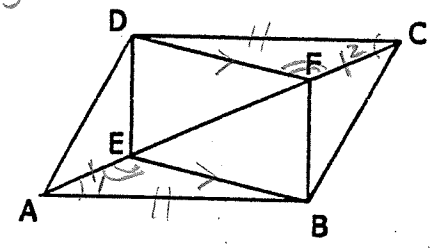


① M midpt $\overline{AB}$ → ② $AM = \frac{1}{2}AB$
N midpt $\overline{DC}$ → $NC = \frac{1}{2}DC$
③ □ABCD → ④ $\overline{DC} \cong \overline{AB}$ → ⑤ $DC = AB$ → ⑥ $\frac{1}{2}DC = \frac{1}{2}AB$ → ⑦ $AM = NC$
⑧ $\overline{AM} \cong \overline{NC}$
⑨ $\overline{NC} \parallel \overline{AM}$
→ ⑩ □AMCN

① Given
② Midpoint theorem
③ Given
④ □ → opp. sides ≅.
⑤ Def ≅ segments
⑥ Division property
⑦ Substitution
⑧ Def ≅ segments
⑨ □ → opp sides ∥.
⑩ If 1 pr. sides ≅ & ∥ → □.

2. Given: □ABCD
$\overline{AE} \cong \overline{CF}$

Prove: BFDE is a parallelogram

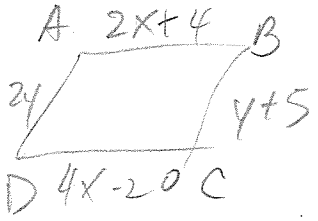


① □ABCD → ② $\overline{AB} \parallel \overline{CD}$ → ③ $\angle 1 \cong \angle 2$
④ $\overline{AB} \cong \overline{CD}$
⑤ $\overline{AE} \cong \overline{CF}$
→ ⑥ $\triangle AEB \cong \triangle CFD$
→ ⑦ $\angle AEB \cong \angle CFD$ → ⑧ $\overline{EB} \parallel \overline{DF}$
⑨ $\overline{EB} \cong \overline{DF}$
□ BFDE

① Given
② □ → opp sides ∥.
③ 2 ∥ lines → alt. int. ∠s ≅.
④ □ → opp sides ≅.
⑤ Given
⑥ SAS ≅ SAS
⑦ CPCTC
⑧ If 2 lines & alt. exterior ∠s ≅ → 2 ∥ lines.
⑨ CPCTC
⑩ If 1 pr. sides ∥ & ≅ → □

Draw a quadrilateral ABCD and determine the values of x and y for which ABCD is a parallelogram.

3. AB = 2x + 4, CD = 4x – 20, AD = 2y, BC = y + 5



$2x+4 = 4x-20$

$24 = 2x$

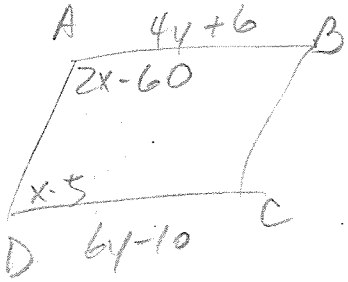
$12 = x$

$2y = y+5$

$y = 5$

x = 12, y = 5

4. m∠A = 2x – 60, m∠D = x – 5, AB = 4y + 6, CD = 6y – 10



$2x-60+x-5 = 180$

$3x-65 = 180$

$3x = 245$

$x = 81\frac{2}{3}$

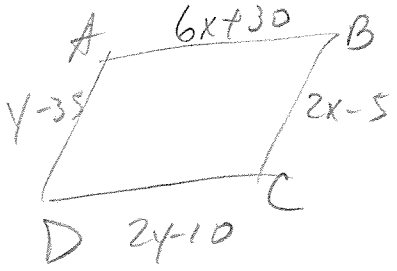
$4y+6 = 6y-10$

$16 = 2y$

$8 = y$

x = $81\frac{2}{3}$, y = 8

5. AB = 6x + 30, BC = 2x – 5, CD = 2y – 10, AD = y – 35



$6x+30 = 2y-10$

$y-35 = 2x-5$

$y-35 = 20-5$

$y = 35^{15}$

$y = 50$

$6x-2y = -40$

$-2x+y = 30$

$-4x+2y = 60$

$6x-2y = -40$

$2x = 20$

$x = 10$

x = 10, y = 50