超研數學 ASPIRE MATHEMATICS

SOLUTION

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ANGLES IN RECTILINEAR FIGURES

Form 1
Vol 8

Part 6 – Proving parallel lines

1. $\angle CAD = 62°$ (vert. opp. $\angle$s)
   $\angle BAC = 62° + 62° = 124°$
   $\angle BAC + \angle ACD = 124° + 62° = 186° \neq 180°$
   Thus, AB and CD are not parallel.

2. (a) $\angle BAC = 360° - 335° = 25°$ ($\angle$s at a pt.)
   $\angle DCG = 35° \neq \angle BAC$
   Thus, AB and CD are not parallel.
   (b) $\angle DCE + \angle CEF = 35° + 80° + 65° = 180°$
   Thus, CD // EF. (int. $\angle$s supp.)

3. (a) $\angle ECG = \angle CGB - \angle CEG = 2a - a = a$ (ext. $\angle$ of Δ)
   $= \angle CAB$
   Thus, AB // CD. (corr. $\angle$s eq.)
   (b) $\angle DGE = 2a$ (vert. opp. $\angle$s)
   $\angle DGE + \angle FDG = 2a + (180° - 2a) = 180°$
   Thus, BE // DF. (int. $\angle$s, supp.)

4. $\angle ABD = 180° - 130° = 50°$ (int. $\angle$s, AB // CD)
   $\angle BED = \angle ABD = 50°$ (given)
   $\angle DEF = 50° + 80° = 130° = \angle BDC$
   Thus, BD // FE. (corr. $\angle$s eq.)

5. Let I a point on CD such that EFI is a straight line.
   $\angle CIE = \angle CHG = 118°$ (corr. $\angle$s, EI // GH)
   $\angle AEI + \angle CIE = 62° + 118° = 180°$
   Thus, AB // CD. (int. $\angle$s supp.)

6. Let F a point on CD such that ABF is a straight line.
$\angle BFC = 126° - 36° = 90°$ (ext. ∠ of Δ)
$\angle BFD = 180° - 90° = 90°$ (adj. ∠s on st. line)
$= \angle CDE$
Thus, AB // DE. (alt. ∠s eq.)

7. (a) $\angle BDF + \angle AFD = 118° + 62° = 180°$
Thus, BD // AF. (int. ∠s supp.)
(b) (i) $\angle BAF = 180° - 130° = 50°$ (int. ∠s, BD // AF)
$y = \angle BAF = 50°$ (alt. ∠s, AB // EF)
(ii) $\angle DFE + \angle CEF = 62° + 50° + 68° = 180°$
Thus, DF // CE. (int. ∠s supp.)

8. (a) $\angle CDE = 360° - 240° = 120°$ (∠s at a pt.)
$\angle CDE + \angle DEF = 120° + 60° = 180°$
Thus, CD // FE. (int. ∠s supp.)
(b) Let G a point on EF such that BCG is a straight line.
$\angle BGF = \angle DEF = 60°$ (corr. ∠s, BG // DE)
$\angle ABG + \angle BGF = 120° + 60° = 180°$
Thus, AB // FE. (int. ∠s supp.)

9. (a) $\angle EDF = \angle CBD$ (alt. ∠s, BC // ED)
$3a - 1° = 2a + 16°$
$a = 17°$
$8b + (3b - 20°) + (2a + 16°) = 360°$ (∠s at a pt.)
$b = 30°$
(b) Notice that $\angle ABC + \angle BCD = (3b - 20°) + (2a + 16°) + 2b = 180°$.
Thus, AB // DC. (int. ∠s supp.)
Hence, AB and DF are parallel only when F and C are the same point.
Since we are given that F is not C, it is impossible for AB // DF.