超研數學 ASPIRE MATHEMATICS

SOLUTION

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ANGLES IN RECTILINEAR FIGURES

Form 1

Vol 8

Part 4 – Triangles

1. (a) $\angle CBA + 2a + 50° + 90° = 360°$ (∠s at a pt.)

$\angle CBA = 220° - 2a$

$220° - 2a + 50° + a = 180°$ (∠ sum of Δ)

$a = 90°$

(b) $\angle EBA + 40° + 35° = 180°$ (∠ sum of Δ)

$\angle EBA = 105°$

$x = \angle EBA = 105°$ (vert. opp. ∠s)

$105° + y = 130°$ (ext. ∠ of Δ)

$y = 25°$

(c) Let E a point on AC such that BDE is a straight line.

$\angle CED = 40° + 70° = 110°$ (ext. ∠ of Δ)

$x = 110° + 20° = 130°$ (ext. ∠ of Δ)

2. Given that $\angle ABC = \angle ACB = \angle BAC$, we have

$\angle ABC = \angle ACB = \angle BAC = 180° \div 3 = 60°$ (∠ sum of Δ)

$\angle DCE = 60° - 13° = 47°$

$x + 47° = 67°$ (ext. ∠ of Δ)

$x = 20°$

3. A

$\angle BCF = r + s$ (ext. ∠ of Δ)

$q + \angle BCF = p$ (ext. ∠ of Δ)

$q = p - \angle BCF = q - r - s$

4. B

$\angle AGB = 180° - a - b$ (∠ sum of Δ)

$\angle HGI = \angle AGB = 180° - a - b$ (vert. opp. ∠s)

Similarly, we have $\angle GHI = 180° - c - d$ and $\angle GIH = 180° - e - f$.

In ΔGHI,

$180° - a - b + 180° - c - d + 180° - e - f = 180°$ (∠ sum of Δ)

$a + b + c + d + e + f = 3 \times 180° - 180° = 360°$

5. $\angle BAC = 180° - 109° - 2x = 71° - 2x$ (∠ sum of Δ)

$\angle BAD = (71° - 2x) + (3x + 2°) = 90°$

$x = 17°$

$\angle ACB = (3x + 2°) + y = 109°$ (ext. ∠ of Δ)

$y = 56°$

6. $\angle BDF = (3x - 2°) + (5x + 12°) = 8x + 10°$ (ext. ∠ of Δ)

$12x - 5° = \angle DFE = (8x + 10°) + (2x + 7°) = 10x + 17°$ (ext. ∠ of Δ)

$2x = 22°$

$x = 11°$

7. $\angle ADE = 137° - 71° = 66°$ (ext. ∠ of Δ)

$x = 180° - 92° - 66° = 22°$ (adj. ∠s on st. line)

$\angle BDC = 92°$ (vert. opp. ∠s)

$y = 113° - 92° = 21°$ (ext. ∠ of Δ)

8. $\angle ACG = 43° + 59° = 102°$ (ext. ∠ of ΔACF)

$\angle ECG = 180° - 102° = 78°$ (adj. ∠s on st. line)

$x = 78° + 31° = 109°$ (ext. ∠ of ΔCEG)

$\angle BCE = 5y + 43°$ (ext. ∠ of ΔABC)

$\angle BCE = 7y + 2° + 31° = 7y + 33°$ (ext. ∠ of ΔCDE)

$7y + 33° = 5y + 43°$

$y = 5°$

$3z - 1° = \angle BCE = 5y + 43° = 68°$ (ext. ∠ of ΔABC)

$z = 23°$

Part 5 – Triangle with parallel lines

1. $\angle PRQ = 130° - 76° = 54°$ (ext. ∠ of Δ)
   $\angle BCA = \angle PRQ = 54°$ (corr. ∠s, *BC* // *QR*)
   $\angle ABC = 180° - 65° - 54° = 61°$ (∠ sum of Δ)

2. $\angle BFE = 90°$ (corr. ∠s, *AD* // *FE*)
   $\angle DCE = 45°$ (alt. ∠s, *AD* // *FE*)
   $\angle BCE = 168° - 45° = 123°$
   $y = 123° - 90° = 33°$ (ext. ∠ of Δ)

3. $x = 140° - 75° = 65°$ (ext. ∠ of Δ)
   $\angle BAC = \angle DCE = 65°$ (corr. ∠s, *AB* // *CD*)
   $y = 180° - 65° - 80° = 35°$ (∠ sum of Δ)

4. $\angle BDE = \angle ABD = 30° + 30° = 60°$ (alt. ∠s, *AB* // *DE*)
   $\angle EDF = \angle DFG = 50°$ (alt. ∠s, *DE* // *GF*)
   $\angle BDF = 60° + 50° = 110°$
   $x = 110° - 30° = 80°$ (ext. ∠ of Δ)

5. $\angle EIK = \angle CEF = 6x - 1°$ (corr. ∠s, *DG* // *HK*)
   $(6x - 1°) + (2x - 3°) = 180°$ (adj. ∠s on st. line)
   $x = 23°$

   $\angle EFB = 3y + 14°$ (vert. opp. ∠s)
   $(3y - 14°) + (2y + 11°) = 6x - 1° = 137°$ (ext. ∠ of Δ)
   $y = 28°$

6. $\angle BEC = 7x - 6°$ (vert. opp. ∠s)
   $\angle CBE = 180° - (3x - 20°) - (7x - 6°) = 206° - 10x$
   $\angle DBF = (2x + 17°) + (206° - 10x) = 223° - 8x$
   $\angle DBF + \angle BFE = (223° - 8x) + (5x + 14°) = 180°$ (int. ∠s, *EF* // *DB*)
   $x = 19°$
   $\angle BEF = \angle DBE = 2x + 17° = 55°$ (alt. ∠s, *EF* // *DB*)
   $\angle ACF = \angle EFB = 5x + 14°$ (corr. ∠s, *EF* // *AC*)
   $\angle ACE = (5x + 14°) - (3x - 20°) = 2x + 34° = 72°$