

## Solutions

$$(1) \overline{AC} \perp \overline{BD} \Rightarrow \begin{cases} m\angle CBD = 90^\circ \\ m\angle 3 = 90^\circ \end{cases}$$

$\triangle ABD$ : sum of  $\angle$ 's is  $180^\circ$ :

$$\Rightarrow m\angle 1 + 90^\circ + 47^\circ = 180^\circ$$

$$m\angle 1 = 43^\circ$$

$$\overline{AD} \perp \overline{BC} \Rightarrow \begin{cases} m\angle 1 + m\angle 2 = 90^\circ \\ 43^\circ + m\angle 2 = 90^\circ \\ m\angle 2 = 47^\circ \end{cases}$$

$\triangle OBC$ : sum of  $\angle$ 's is  $180^\circ$ :

$$\Rightarrow \begin{cases} m\angle 2 + 90^\circ + m\angle 4 = 180^\circ \\ 47^\circ + 90^\circ + m\angle 4 = 180^\circ \\ m\angle 4 = 43^\circ \end{cases}$$

(2)

Proof

Statement	Reasons
1. $\overline{AB} \cong \overline{EB}$	1. Given
2. $\overline{AC} \parallel \overline{ED}$	2. Given
3. $\angle ACB \cong \angle EDB$	3. If $\parallel$ lines, then alternate interior $\angle$ 's are $\cong$ (transversal $\overline{CD}$ )
4. $\angle ABC \cong \angle EBD$	4. Vertical $\angle$ 's $\cong$
5. $\triangle ABC \cong \triangle EBD$	5. AAS

Note: Could also show ASA if transversal  $\overline{AE}$

③

Proof

Statements	Reasons
1. $\overline{AB} \perp \overline{CD}$	1. Given
2. $\angle AEC, \angle BED$ right $\angle$ 's	2. definition $\perp$ lines
3. $\triangle AEC, \triangle BED$ right $\triangle$ 's	3. definition right $\triangle$
4. $\overline{AE} \cong \overline{BE}$	4. Given
5. $\overline{AC} \cong \overline{BD}$	5. Given
6. $\triangle AEC \cong \triangle BED$	6. HL
(3,4,5)	

④

Proof

Statements	Reasons
1. $\triangle QRS$ - isosceles	1. Given
2. $\overline{QR} \cong \overline{SR}$	2. definition isosceles $\triangle$
3. $\angle Q \cong \angle S$	3. In a $\triangle$ , if 2 sides $\cong$ , opp. $\angle$ 's are also $\cong$ .
4. $\angle RTU \cong \angle RUT$	4. Given
5. $\triangle QRT \cong \triangle SRU$	5. AAS
(2,3,4)	

⑤

Proof

Statements	Reasons
1. $\angle B =$ right $\angle$	1. Given
2. $\triangle ABE, \triangle CBD$ right $\triangle$ 's	2. definition right $\triangle$
3. $\overline{AB} \cong \overline{CB}$	3. Given
4. $\angle A \cong \angle C$	4. Given
5. $\triangle ABE \cong \triangle CBD$	5. LA
(2,3,4)	
6. $\overline{BE} \cong \overline{BD}$	6. CPCTC