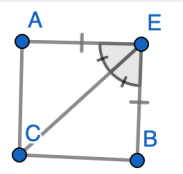
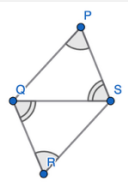
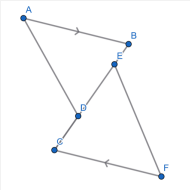
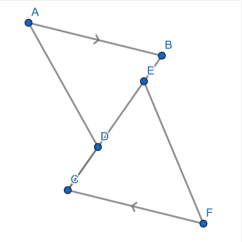
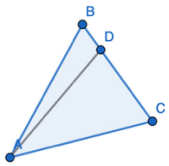
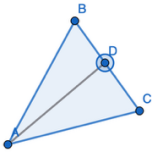
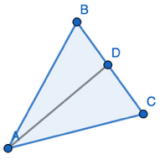
Check Your Understanding 3.5b

Complete each problem. Write CPCTC in full before using it. Flow chart or paragraph proof only.

Basic	Intermediate	Advanced
Row 3 Spiral — Triangle Congruence Shortcuts *→ The geometric facts we draw from to build arguments*		
Basic — Spiral Each diagram below shows two triangles. Identify the congruence shortcut and write the congruence statement with correct vertex correspondence.   	*Intermediate — Spiral* Given: AB ∥ CF, AB = CF.  List all congruent parts you can establish and their sources (given, free, or derived). Then state which shortcut proves △ABE ≅ △CFE.	*Advanced — Spiral* Given: AB ∥ CF, AB ≅ CF, CD ≅ EB  Prove △ABD ≅ △FCE. (Hint: use Common Notion 2 to establish DB ≅ CE from CD ≅ EB.)
Row 4 Spiral — Reading a Diagram *→ Knowing what the diagram gives us for free*		
Basic — Spiral A diagram shows △ABC with a cevian (a segment from vertex A to point D on BC).  List every piece of free information in the diagram. For each, state its source.	*Intermediate — Spiral* A student claims that in the diagram shown, ∠ADB = ∠ADC = 90° because 'AD looks perpendicular.' Is this valid free information? What would need to be given for this to be true?  	*Advanced — Spiral* Given the diagram, what is the most efficient set of given information that would allow you to prove △ADB ≅ △ADC? List all the information (free + given) and state the shortcut. 

Basic	Intermediate	Advanced

Row 5 Spiral — Writing Proofs

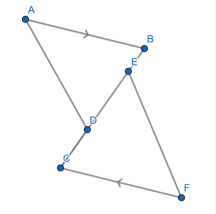
→ *Constructing arguments that cannot reasonably be rejected*

Basic — Scaffolded

Given: AB ∥ CF, CD ≅ EB, AB ≅ CF.

Prove: AD ≅ FE.

Steps are given. Fill in all missing reasons.

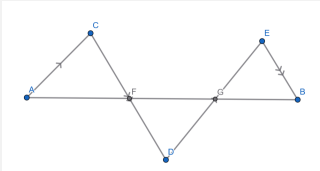


Statement	Reason
CD ≅ EB	_____
DB ≅ CE	_____
∠ABD ≅ ∠FCE	_____
△ABD ≅ △FCE	_____
AD ≅ FE	_____

Intermediate — Complete Proof

Given: AC ∥ DE, CD ∥ EB, AG ≅ FB.

Prove: △ACF ≅ △GEB.



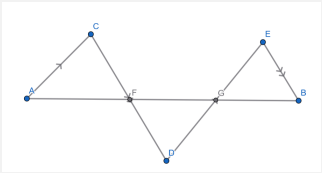
Write a complete flow chart or paragraph proof.

Advanced — Multi-Step

Given: AC ∥ DE, CD ∥ EB, AG ≅ FB.

Prove: CF ≅ EB.

This requires first proving △ACF ≅ △GEB



Row 6 Spiral — Planning Proofs

→ *Seeing the path before writing the argument*

Basic — Spiral

You want to prove that the diagonals of a parallelogram bisect each other. Before writing anything, identify:

(a) What is the key intermediate result you need?

(b) What diagram information will you draw from?

Intermediate — Spiral

Plan the following proof using backward reasoning.

Given: ABCD is a parallelogram with diagonals AC and BD intersecting at E.

Prove: AE = CE and BE = DE.

Work backward from the conclusion. List every step from conclusion to given.

Advanced — Spiral

Given: ABCD is a parallelogram with diagonals AC and BD intersecting at E.

Prove: AE = CE and BE = DE.

Write the complete proof using your plan from Intermediate

Algebra Spiral

Solve systems of two equations

Algebra Spiral

Solve each system. Show your method.

(a) y = 2x + 1 and y = −x + 7

(b) 3x + 2y = 12 and x − y = 1

CYU 3.5b — Answer Key (Teacher Copy)

Row 3 Spiral

Diagram 1: SAS. △ACE ≅ △BCE.

Diagram 2: AAS. △PQS ≅ △RQS.

Intermediate: ∠BAE = ∠CFE (alt. int. angles, AB ∥ CF). AB = CF (given). ∠ABE = ∠CFE (alt. int. angles). ASA: △ABE ≅ △CFE.

Advanced: ∠ABD = ∠FCE (alt. int. angles, AB ∥ CF). AB = CF (given). CD = EB (given) → DB = CE (Common Notion 2: add DE to both). SAS: △ABD ≅ △FCE. ■

Row 4 Spiral

Basic: D is on BC (given/diagram). AD is a segment (diagram). No angle or length information is free — nothing else can be assumed.

Intermediate: Not valid. Perpendicularity must be given or proven. Would need either '∠ADB = 90°' in the given, or an established construction proving perpendicularity.

Advanced: Free: AD = AD (reflexive). Efficient given set: DB = DC (D is midpoint of BC) and ∠ADB = ∠ADC. Then SSS (AD shared, DB = DC given, AB = AC... wait — SAS: AD reflexive, DB = DC given, ∠ADB = ∠ADC given). SAS.

Row 5 — Writing Proofs

Basic reasons: Given; Common Notion 2 (add equal DE to both CD = EB); alternate interior angles (AB ∥ CF); SAS; CPCTC (Corresponding Parts of Congruent Triangles are Congruent).

Intermediate: AC ∥ DE → ∠CAF = ∠GEB (alt. int. angles). CD ∥ EB → ∠ACF = ∠GBE (alt. int. angles). AG = FB (given) → AF = GB (Common Notion 2, add AB). △ACF ≅ △GEB by ASA. ■

Advanced: △ACF ≅ △GEB (Intermediate). CF ≅ EB by CPCTC (Corresponding Parts of Congruent Triangles are Congruent). ■

Row 6 — Planning Proofs

Basic: Key intermediate: prove two triangles formed by the diagonals congruent. Draw from: alternate interior angles (parallel sides), vertical angles at E.

Intermediate: Want AE = CE, BE = DE → CPCTC → △AEB ≅ △CED → ASA → ∠ABE = ∠CDE (alt. int., AB ∥ CD), ∠BAE = ∠DCE (alt. int.), AB = CD (parallelogram) → given. ■

Advanced: ∠ABE = ∠CDE and ∠BAE = ∠DCE (alt. int. angles, opposite sides parallel). AB = CD (opp. sides parallelogram). △ABE ≅ △CDE (ASA). AE = CE and BE = DE (CPCTC). ■

Algebra Spiral

(a) x = 2, y = 5

(b) x = 14/5, y = 9/5