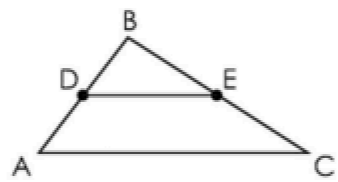
G.SRT.4
Prove and apply theorems about triangles. Theorems include but are not restricted to the following: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.

G.SRT.4 OH.2024.Q4

Triangle ABC and triangle DBE are shown. $\overline{DE}$ is parallel to $\overline{AC}$.



Marsha wants to prove that the side lengths of triangle DBE are proportional to those of triangle ABC.

An incomplete proof is given.

Statements	Reasons
1. $\overline{DE} \parallel \overline{AC}$	Given
2. $\angle BAC \cong \angle BDE$	Corresponding angles of parallel lines are congruent.
3. $\angle BCA \cong \angle BED$	Corresponding angles of parallel lines are congruent.

Which statement and reason would be the **best** next step in the proof?

Ⓐ AD = DB because D is the midpoint of $\overline{AB}$.

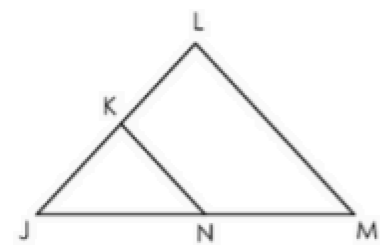
Ⓑ Triangle ABC is similar to triangle DBE by AA.

Ⓒ Triangle ABC is similar to triangle DBE by ASA.

Ⓓ $\frac{AB}{DB} = \frac{BC}{BE}$ because corresponding sides of similar triangles are in proportion.

G.SRT.4 OH.2021.Q22

A triangle JLM and line segment KN are given.



A proof of $\frac{JK}{JL} = \frac{JN}{JM}$ is shown.

Statements	Reasons
△ JLM	Given
?	Given
∠JNK = ∠JML ∠JKN = ∠JLM	Corresponding angles are congruent.
△ JKN = △ JLM	Angle-angle similar triangle postulate
$\frac{JK}{JL} = \frac{JN}{JM}$	Corresponding parts of similar triangles are proportional.

Which statement must be added to the given to keep this proof valid?

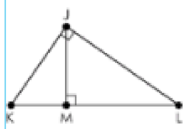
Ⓐ $\overline{JL} \perp \overline{LM}$

Ⓑ $\overline{KN} \perp \overline{LM}$

Ⓒ $\overline{JL} \parallel \overline{LM}$

Ⓓ $\overline{KN} \parallel \overline{LM}$

G.SRT.4 OH.2018.Q4



Mark is proving the Pythagorean Theorem. He draws right triangle JKL with altitude $\overline{JM}$. First he proves $\triangle JKL \sim \triangle MKJ$ and $\triangle JKL \sim \triangle MJL$ using the Angle-Angle criterion. The rest of his proof is shown with some steps missing.

Statements	Reasons
1. $\triangle JKL \sim \triangle MKJ$ and $\triangle JKL \sim \triangle MJL$	1. Angle-Angle criterion
2. $\frac{JK}{LK} = \frac{MK}{JK}$ and $\frac{LJ}{LK} = \frac{ML}{LJ}$	2. Corresponding sides of similar triangles are proportional
3. $(JK)^2 = LK \bullet MK$ and $(LJ)^2 = LK \bullet ML$	3. Multiplication property of equality
4.	4.
5.	5.
6. $MK + ML = LK$	6. Segment addition postulate
7. $(JK)^2 + (LJ)^2 = (LK)^2$	7. Substitution

Which two steps are missing from the proof?

Ⓐ

4. $(JK)^2 + (LJ)^2 = LK \cdot MK + LK \cdot ML$	4. Addition property of equality
5. $(JK)^2 + (LJ)^2 = LK(MK + ML)$	5. Distributive property

Ⓒ

4. $(JK)^2 \cdot (JK)^2 = LK \cdot MK \cdot LK \cdot ML$	4. Multiplication property of equality
5. $(JK)^2 \cdot (LJ)^2 = LK(MK \cdot ML)$	5. Distributive property

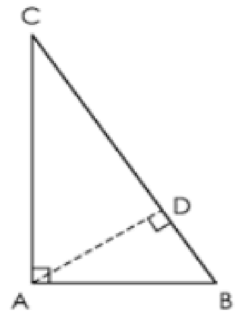
Ⓑ

4. $(JK)^2 + (LJ)^2 = LK \cdot MK + LK \cdot ML$	4. Addition property of equality
5. $(JK)^2 + (LJ)^2 = LK(LK + LK)$	5. Distributive property

Ⓓ

4. $(JK)^2 \cdot (JK)^2 = LK \cdot MK \cdot LK \cdot ML$	4. Multiplication property of equality
5. $(JK)^2 \cdot (LJ)^2 = LK(LK \cdot LK)$	5. Distributive property

James correctly proves the similarity of triangles DAC and DBA as shown.



His incomplete proof is shown.

	Statements		Reasons
1.	m∠CAB = m∠ADB = 90°	1.	Given
2.	m∠ADB + m∠ADC = 180°	2.	Angles in a linear pair are supplementary.
3.	90° + m∠ADC = 180°	3.	Substitution
4.	m∠ADC = 90°	4.	Subtraction property of equality
5.	∠CAB ≅ ∠ADB ∠CAB ≅ ∠ADC	5.	Definition of congruent angles
6.	∠ABC ≅ ∠DBA ∠DCA ≅ ∠ACB	6.	Reflexive property of congruence
7.	△ ABC ~ △ DBA △ ABC ~ △ DAC	7.	?
8.	△ DBA ~ △ DAC	8.	Substitution

What is the missing reason for the seventh statement?

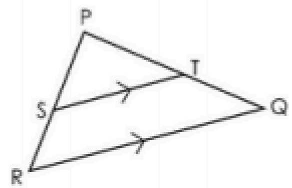
(A) CPCTC

(B) AA postulate

(C) All right triangles are similar.

(D) Transitive property of similarity

Triangle PQR is shown, where $\overline{ST}$ is parallel to $\overline{RQ}$.



Marta wants to prove that $\frac{SR}{PS} = \frac{TQ}{PT}$.

Place a statement or reason in each blank box to complete Marta's proof.

Statements	Reasons
1. $\overline{ST} \parallel \overline{RQ}$	1. Given
2. $\angle PST \cong \angle R$ and $\angle PTS \cong \angle Q$	2. If two parallel lines are cut by a transversal, then corresponding angles are congruent.
3. $\triangle PQR \sim \triangle PTS$	3.
4.	4.
5. $PR = PS + SR$, $PQ = PT + TQ$	5. Segment addition postulate
6. $\frac{PS + SR}{PS} = \frac{PT + TQ}{PT}$	6. Substitution
7. $\frac{PS}{PS} + \frac{SR}{PS} = \frac{PT}{PT} + \frac{TQ}{PT}$	7. Commutative property of addition
8. $\frac{SR}{PS} = \frac{TQ}{PT}$	8. Subtraction property of equality

$\frac{PR}{PS} = \frac{PQ}{PT}$	$\frac{PS}{SR} = \frac{PT}{ST}$	$\angle P \cong \angle P$
AA Similarity	ASA Similarity	SSS Similarity
Reflexive property	Segment addition postulate	Corresponding sides of similar triangles are proportional.
Corresponding sides of similar triangles are congruent.	If two parallel lines are cut by a transversal, then alternate interior angles are congruent.	If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.