

# Posture & Torso Alignment in Pediatric Orthopedic Development Lab Session • Course Description

**COURSE LEVEL:** Beginner to Intermediate.

INSTRUCTOR/STUDENT RATIO: Lab sessions maintain a qualified Instructor-to-participant ratio of 1:9.

**PRE-REQUISITES:** Participants must have successfully completed the didactic session of *Posture & Torso Alignment in Pediatric Orthopedic Development*, including having passed the didactic examination. Precourse review materials are assigned to expedite learning in this lab program.

**TARGET AUDIENCE:** The sponsor welcomes a range of qualified clinicians who are likely to work together in rehabilitation, including physical therapists, orthotists, occupational therapists, and physical therapy assistants accompanied by an associated physical therapist.

#### COURSE DESCRIPTION

Participants apply the didactic program principles and strategies in this supervised, hands-on lab program, beginning with the measurement of sagittal-plane spinal and pelvic alignment in sitting and standing positions. They will then acquire and demonstrate competence in donning TheraTogs garments and assorted straps to optimize postural alignment and bodyweight loading on the feet in standing position.

Participants receive a *Certified TheraTogs Fitter – Level I* credential within two weeks following successful completion of the lab sessions and exams.

#### LAB OBJECTIVES

Participants are expected to demonstrate competence - and to pass the related exam - in measuring four components of sagittal-plane alignment of the thoracic spine and pelvis in sitting and standing positions.

Participants are expected to demonstrate competence - and to pass the related exam — in donning the garments, facilitating desired alignment changes, and using straps effectively to address these issues:

Flexible thoracic kyphosis.
Flexible shoulder protraction with scapular abduction.
Flexible thoracolumbar kyphosis.
Flexible lumbar lordosis.
Flexible thoracolumbar lordosis
Excessive pelvic anteversion.
Diminished pelvic anteversion.
Chronic Body weight displacement over the forefeet.

**Disclosure:** Beverly Cusick, PT, MS, NDT, COF/BOC, the author of this training has equity ownership in Progressive GaitWays LLC and TheraTogs Inc. which develops and sells products related to the training being offered.

## CTF-I Lab Course Schedule

After assessment procedures, each team member dons garments and completes the battery of 10 strapping applications in turn.

Start	Topic / Learning Activity	Contact Minutes
8:00	Arrive, sign in.	
8:15	Introduction and opening remarks <b>DEMONSTRATION (DEMO):</b> Measuring Sitting Postural Alignment in the Sagittal Plane	15
8:30	LAB: Measuring Sitting Postural Alignment in the Sagittal Plane – Teams of 3	30
9:00	DEMO & LAB: Measuring Standing Pelvic Alignment in the Sagittal Plane	15
9:15	Review of TheraTogs Posture & Torso Alignment System components, properties of the materials & criteria for optimum fit & function.	15
9:30	<b>DEMO:</b> Garment Donning for Optimum Fit & Function	10
9:35	LAB - Garment Donning by Team Member #1	10
9:45	Short break - 15 min Please remain in the garments	
10:00	<b>DEMO &amp; LAB:</b> Cross Strap Applications to Improve Thoracic & Thoracolumbar Extension	15
10:06	DEMO & LAB: Cross Strap Application to Increase Lumbar Extension	6
10:12	DEMO & LAB: Straight Strap Application to Increase Thoracic Extension	6
10:18	DEMO & LAB: Cross Strap Application to Retract a Shoulder and Stabilize the Scapula	6
10:24	DEMO & LAB: Cross Strap Application to Retract Both Shoulders	6
10:30	DEMO & LAB: Add Cross Strap Application to Shorten Oblique Abdominals	6
10:36	DEMO & LAB: Add Straight Strap Application for Lower Transverse Abdominus (TA)	6
10:42	DEMO & LAB: Add Cross Strap to Shorten Rectus Abdominus	6
10:48	<b>DEMO &amp; LAB:</b> Apply TA strap, Add Cross Strap to Shorten Gluteus Maximus	6
10:54	REPEAT ALL PROCEDURES with Team Member #2 Donning	60
11:54	Remove TheraTogs and prepare them for the 3 <sup>rd</sup> team member	
12:00	Lunch on premises – 30 min	
12:30	REPEAT ALL PROCEDURES WITH Team Member #3.	70
1:40	<b>REVIEW LAB:</b> Remove TheraTogs. Form Teams of 2 with New Partners. Don Garments on your New Partner. Repeat on another new partner.	30
0:40	Remove all tabs, fold & pack Garments, compile & stack like straps and tabs for packing.	
2:10	Complete & submit course evaluations.	
2:30	Adjourn	
	Didactic contact minutes (hours):	15 (.25)
	Lab contact minutes (hours):	304 (5.1
	Total contact minutes (hours):	319 (5.25

### Appendix A: Measuring Sagittal-Plane Pelvic & Spinal Alignment

#### 1. QUANTIFYING PELVIC & SPINAL ALIGNMENT IN SITTING - TEAMS OF 3

SET UP FOR TESTING (ESTIMATE 5 MINUTES): 3.5" Angle finder (AF), a set of 6 adhesive dots, 2 chip bag clips

Angle Finder (AF):



ZERO is at the top & bottom on the dial when the longest side is horizontal.

#### POSITION YOUR TEAM MEMBER:

- Position the team member in sitting on a narrow, stable table with the sacrum located above the back table edge to permit access with the AF.
- Use chip clips as needed to secure the shirt or blouse against the posterior trunk.
- Determine that the sitting posture is comfortable and sustainable for a few minutes.

#### **MEASUREMENT PROCEDURES** [A: anterior tilt (anteversion); P: posterior tilt (retroversion)]

#### 1. SACRAL INCLINATION ANGLE (SIA)





Fig. 3b. 34° P: posterior

- 1. With the AF in the sagittal plane, set the side that fits onto the proximal sacrum. Measure x 3 & average.
- 2. Record the mean & range of the 3 findings.

#### 3. UPPER THORACIC INCLINATION ANGLE (UTIA)

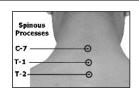






Fig. 5b. AF placement

- 1. Palpate spinous processes T1 & T2 (Fig. 5a).
- 2. Place 2 adhesive dots on the clothing over T1 & T2.
- 3. Lay the AF short, ruled edge on both spinous processes with even pressure & measure x 3 & average the findings.
- 4. Record the mean & range of the 3 findings.

#### 2. LUMBAR INCLINATION ANGLE (LIT)

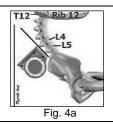




Fig. 4b. 24° P

- 1. Palpate & mark L4 & L5 spinous processes (Fig. 4a) placing adhesive dots on clothing over them.
- 2. Align the AF in the sagittal plane & set the short edge on the dots with even pressure (Fig. 4b). Measure x 3 & average.
- 3. Record the mean & range of the 3 findings.

#### CALCULATE THORACIC KYPHOSIS ANGLE (TKA)





Calculate the thoracic kyphsis angle by adding the mean findings obtained for LIA + TIA = TKA

Example from figures 4 & 5:  $24^{\circ} + 42^{\circ} = 66^{\circ}$  TKA

#### RECORDING FORM NAME: \_\_\_\_\_ (Record Your own findings.)

TEST	Anterior (mean of 3 & range)	OR	Posterior (mean of 3 & range)	
1. Sacral Inclination Angle (SAI)	0		0	
2. Lumbar Inclination Angle (LIA)	0		0	
3. Upper Thoracic Inclination Angle (UTIA)	0		0	
2 + 3: Thoracic Kyphosis / Lordosis Angle: Mean LIA:° + Mean TIA° =°				

#### 2. STANDING PELVIC TILT (A-P) - SACRAL ANGLE

# PSIS >> Sacral Angle

#### AGE IDEALS:

3 yrs: 15°A

4-7 yrs: <u><</u>15°A

<u>></u>8 yrs: 10°A

**Tool:** AF Use short side for a small pelvis

**Position:** Relaxed standing

**LANDMARKS:** The sulci over sacral vertebra #2, medial to the PSISs. Mark the center of each sulcus if needed.





#### PROCEDURE:

- Offer gentle stability with your free hand on the child's abdomen to detect and check any anterior body displacement imposed by the testing hand.
- Place the selected AF straight edge on the proximal sacrum with the upper corner between the S-2 sulci.
- 3. Apply gentle pressure evenly to the AF contacting surface, seeking contact with the underlying bone.



RECORDING FORM — SACRAL ANGLE	NAME:	(Your own findings)
Sacral Angle: A / Po		

#### **EXAM: ASSESSMENT PROCEDURES**

GLE (SIA)	2. LUMBAR INCLINATIO	N ANGLE (LIT	)	
Target Score	Score	COMPONENT	Target Score	Score
2		Correct client positioning	2	
4		Correct landmarks	4	
1		Correct AF orientation to the body	1	
2		Correct AF pressure	2	
2		Correct recording	2	
: 11		Subtotal score	11	
ATION ANGLE	(UTIA)	CALCULATE THORACIC K	PHOSIS ANG	LE
Target Score	Score		Target Score	Score
2		Correct calculating	1	
4		Subtotal score	1	
2				
_		SACRAL ANGLE (SA)		
2		COMPONENT	Target Sco	re Score
2		Correct client positioning	2	
		Correct landmarks	4	
11		Corroct farialitatio	4	
11		Correct AF orientation to body	1	
	Target Score  2  4  1  2  2  11  ATION ANGLE  Target Score  2  4  2  2	Target Score   Score   2	Target Score Score  2	Target Score   COMPONENT   Target Score

Correct recording

Subtotal score:

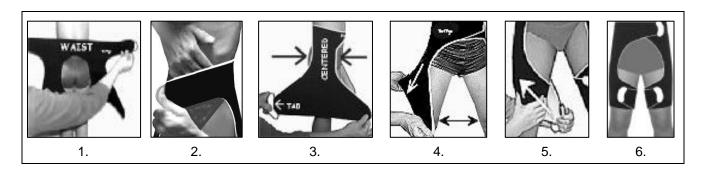
TOTAL ASSESSMENTS SCORE:

11

45

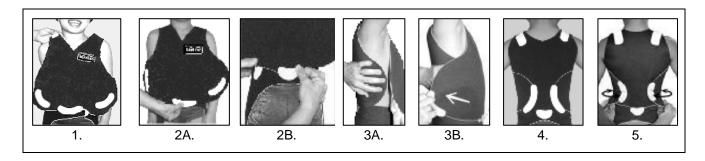
# Appendix B: Checklist for Learning Donning Procedures

# B.1 Donning the Hipster



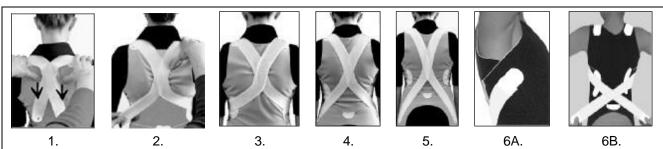
	CHECKPOINTS	DONE
1.	Tab one end and hold the waistband open. Approach the wearer from behind, centering the cut-out on the pelvis. Stay behind the wearer (Fig. 1).	
2.	Wrap the waistband snugly just distal to the ribcage (Fig. 2).	
3.	Move to the side & squat or kneel.	
5.	Check that both hip panels are centered on lateral pelvis (Fig. 3)  If they are forward, get another tab and center the panels by loosening the waistband tab & folding the fabric at the back of the waistband. Tab the folded material down.	
4.	Pull downward firmly on a hip panel to check that the waistband locks on the pelvis. If it does not, wrap it again more snugly.	
6.	Place a banana tab ½-way off the edge of the back thigh cuff flap.	
7.	Ask the wearer to place the feet wide apart & to stand up straight (Fig. 4).	
8.	Grip the front & back thigh-cuff flaps, pull it open & draw downward firmly (Fig. 4).	
9.	Press the center of the thigh cuff firmly against the thigh just above the outer knee.	
10.	Wrap the front flap first under gentle tension, around & upward.	
11.	Wrap the back flap over front - under moderate tension - around & upward (Fig. 5). Attach the tab without allowing it to contact skin.	
12.	Repeat on the other side (Fig. 6).	
13.	Check that the bottom of thigh cuff is snug (finger pull test) on both sides.	
14.	Wearer reports feeling comfortable. Thigh cuffs grip. They do not constrict.	

# B.2 Donning the TankTop (TT)



	CHECKPOINTS	DONE
1.	Tab one set of shoulder flaps closed. Approach the wearer from the same side; lay the closed TT shoulder on the wearer's shoulder, TheraTogs logo in front. Tab the free shoulder flaps closed (Fig. 1).	
2.	Adjust shoulder tabs to bring bottom panel edges over the waistband (Fig. 1).	
3.	Reattach the centering tabs half-off the bulges at bases of the TT back panels.	
4.	Attach centering tabs to the waistband – front (Fig. 2A) & back (Fig. 2B).	
4.	Reattach rib flap banana tabs half-off the lower edge of each flap.	
5.	Stand behind the wearer.	
6.	Lay your left palm on the right back rib flap. Flatten it against the torso (Fig. 3A).	
7.	With your right hand, draw the right front rib flap downward, around the trunk & upward to catch any tapering of the trunk (Fig. 3B). Attach the tab.	
8.	Repeat on the other side, reversing hands used.	
9.	Check the rib flap tabs for symmetrical location on the lower thorax (Fig. 4).  Lower placement reduces risk of restricting thoracic expansion.	
10.	"Washing machine" Grip the bottom TT edges at the waist on both sides & use them to rotate the trunk. Any movement of fabric moves the body. Rewrap the rib flaps if fabric moves without displacing the body.	
11.	Check fabric fit around the shoulders & axillae. Adjust the tension & direction of pull of the shoulder flaps as needed.  Try folding the top of the back panel inward and reattach the front panel shoulder tabs more medially.  Fold down and tab closed any excess fabric under the axillae.	
12.	Wearer reports feeling comfortable.	

# B.3 Cross Strap Applications to Assist Spinal Extension



	1. 2. 5. 4. 5. 0A.	OD.				
THO	DRACIC EXTENSION (FIGURES 1-4)	DONE				
1.	Choose a size-appropriate strap that, when held with the long axis vertical, spans the length from the upper shoulders to the lower thorax					
2.	Attach the top tabs to the anterior upper shoulders near the clavicles. (Fig. 1)					
3.	Manually extend the upper thoracic spine (Figs. 1 & 2).					
4.	Draw the strap downward & tab the lower extensions to the outer TT (Fig. 3), or to the Hipster ((Fig. 4).					
5.	Assure that the center bridge on the strap lies over apex of the curve.					
6.	Check the neck area for contact with the strap. If needed, adjust by drawing the strap laterally and tabbing it to the TT.					
7.	Check/adjust strap tension for optimum alignment.					
8.	Wearer reports feeling comfortable.					
FULL SPINE EXTENSION WITH BACKWARD WEIGHT SHIFT (Fig. 5)						
1.	Choose the longest Cross Strap & tab the ends.					
2.	Attach the lower strap extensions to the Hipster hip panels (Fig. 5).					
3.	Repeat steps 1 & 2 of the previous procedure.					
4.	Check/adjust strap tension & placement for effective alignment or change.					
LUI	MBAR EXTENSION (FIGURES 6A & 6B)	DONE				
1.	Select a medium-length Cross Strap. Turn the long axis horizontal. Tab the ends.					
2.	Reach under the arms & attach top 2 ends to TT below the anterior axillae (Fig. 6A).					
3.	Manually extend the lumbar spine.					
4.	Draw the bottom 2 strap extensions down toward the pelvis & attach them to the Hipster hip panels, proximal to or over the greater trochanters (Fig. 6B).					
5.	The strap center should lie on the lumbar spine, just proximal to the sacrum.					
6.	Wearer reports feeling comfortable.					

# B.4 Straight Strap Applications to Assist Thoracic Spine Extension

Consider using these straps to adduct the scapulae.





	CHECKPOINTS	DONE			
1.	Select two TogRite straight straps of suitable size. Tab both ends.				
2.	Attach one strap end to the TT over one anterior shoulder near the clavicle.				
3.	Manually extend the upper trunk & draw the free strap end toward the planned attachment site on opposite thorax (Fig. 1).				
4.	Repeat with the second strap (Fig. 2).				
5.	Check/adjust strap attachment sites & tension for optimum alignment.				
6.	Wearer reports feeling comfortable.				

## B.5 Cross Strap Shoulder Retraction & Scapular Retraction



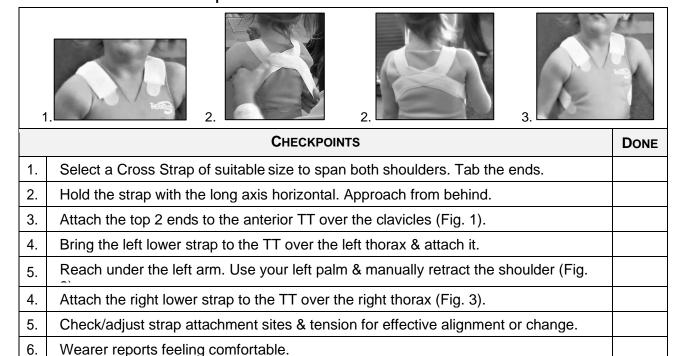






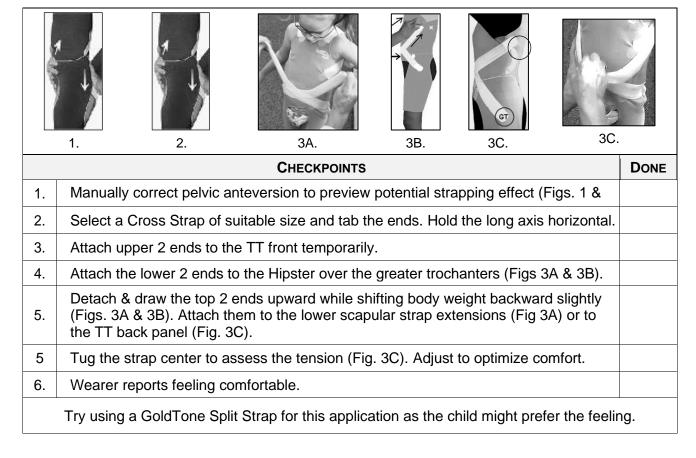
	1.	2.	3.	4.	
		Снескя	POINTS		DONE
1.	Select & tab a	size-appropriate Cross or	Split Strap. Hold the long	axis vertical.	
2.			oper strap extension over t e left arm (Fig. 1). Attach th		
3.		ne arm with your left hand your other hand, align the	l & use your palm to manu e scapula (Fig. 2).	ally retract the	
4.	•		the back, see that the stra just strap tension &/or plac	. •	
5.			timize the upper strap line opposite scapula (Fig. 4).		
6.	Assess. Adjust	strap lengths, tension, &	attachment sites for optim	um effect.	
7.	Wearer reports	feeling comfortable.			

# B.6 Single Cross Strap Application for Shoulder Retraction, Scapular Adduction & Scapular Stabilization



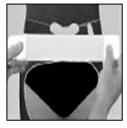
Leave the B.6 Cross Strap in place and proceed to abdominal strapping.

## B.7 Cross Strap Application to Shorten the Oblique Abdominals



## B.8 Straight Strapping to Shorten the Lower Transverse Abdominus











1. 2. 3.

ADI	ADD A TOGRITE LOWER (TRANSVERSE) ABDOMINAL STRAP (FIGS.1 & 2):				
1.	Select a wide TogRite straight strap from your strap set. Tab both ends.				
2.	Locate the navel (Fig 1).				
3.	Stretch & press the strap across the upper pelvis just below the navel (Figs. 2 & 3). Assess the tension & effects & adjust as needed (Fig,.4).				
4.	Wearer reports feeling comfortable.				
	Try using GoldTone straight strapping for this application as it might be more comfortable for a child.				

## B.9 Cross Strap Application to Shorten the Rectus Abdominus



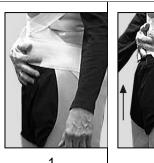
1.



2.

	2.	
	CHECKPOINTS	DONE
1.	Use your thumbs to facilitate anterior thoracic flexion.	
2.	Select & tab a Cross Strap of suitable length held vertically to span from shoulders to pelvis under stretch.	
3.	Approach from the front. Attach the top 2 tabs to the posterior TT above the	
4.	Manipulate the trunk to lower the anterior thorax & draw the lower strap ends to the lateral pelvis (Fig. 1).	
5.	Check strap tension & effect on posture. Adjust for optimum effectiveness & comfort.	
6.	Wearer reports feeling comfortable.	
	Try this at home with GoldTone Split Straps to compare effect & comfort (Fig. 2).	•

# B.10 Add a Cross Strap Hip Extension Assist to Abdominal Straps











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	CHECKPOINTS	DONE
1.	Facilitate a reduction in pelvic anteversion to reveal change potential (Figs 1A & 1B)	
2.	Select a Cross Strap of suitable size to span the upper pelvis from ASIS to ASIS around the back side when stretched in horizontal position. Tab the strap ends.	
3.	Approach from behind. Stretch the upper 2 strap ends around the upper pelvis and attach them to the TA strap medial to the ASISes (Fig. 2).	
4.	Manually reduce pelvic anteversion & draw each lower strap end downward toward the lateral thigh cuffs (Fig. 3).	
5.	Attach the bottom 2 ends below the hip joints (Fig. 4).	
6.	Check that the center bridge is on the sacrum and that the straps will not interfere with toileting. Adjust strap attachment sites & tension to optimize effect & comfort.	
	Ask the wearer to walk & to try sitti	<u>I</u>

ng down & standing up.

# Appendix C: CTF-I Competency Exam

# Orthotic Garments & Strapping for Neuromotor Training

١	Name	e: Date:		
to 6	o you certific S poir	e put your name and the date on the top of the exam, remove it from your haur Instructor when she/he is ready to test you. If your score falls < 6 points show cation, you may correct the procedure(s) that caused the shortfall and retest. In the short of qualifying, you will need more practice, and you may need to attert cation session.	ort of qual If your sc	lifying for ore falls:
		1. 2A.	2B.	
		CHECKPOINTS: DONNING GARMENTS	TARGET Score	SCORE
	HIP	STER – FIGURE 1		
	1.	Hipster is centered on pelvis from all angles.	2	
	2.	Waist band is snug above the pelvis.	2	
	3.	Bottom of thigh cuffs are snug (finger pull test). No notable slack.	2	
	4.	Wearer reports feeling comfortable.	2	
		Subscore:	8	
	TAN	IK TOP – FIGURES 2A & 2B		
	1.	Centering tabs are attached to waistband centers, front & back.	2	
	2.	Rib flap tabs are symmetrically located on the lower thorax.	2	
	3.	Fabric around shoulders is brought to optimum contact with the trunk.  Potential trim lines are folded under.	2	
	4.	Using the bottom edge on both sides of waist to rotate the trunk, trunk rotates. No notable slack.	2	
	5	Wearer reports feeling comfortable	2	

10

Subscore:









3B.

5.

	CHECKPOINTS: THORACIC & SPINE EXTENSION	TARGET SCORE	SCORE
CRO	DSS-STRAP THORACIC EXTENSION – FIGURE 3A or 3B		
1.	Strap is sized appropriately.	2	
2.	No strap edge or Velcro tab touches skin.	2	
3.	The bridge on strap lies over the apex of the curve.	2	
4.	Strap attachment sites & tension optimize alignment forces on spine.	2	
5.	Wearer reports feeling comfortable.	2	
	Subscore	10	
FUL	L SPINE EXTENSION – FIGURE 4		- 1
1.	Strap is sized appropriately.	2	
2.	No strap edge or Velcro tab touches skin.	2	
3.	Spinal alignment under the strap is normal by visual assessment.	2	
4.	Lower extensions tabbed to outer Hipster hip panels do not influence hip joints.	2	
5.	Wearer reports feeling comfortable.	2	
	Subscore	10	
LUN	MBAR EXTENSION – FIGURE 5		,
1.	Strap is sized appropriately.	2	
2.	The center bridge on strap lies over the apex of the curve.	2	
3.	Strap attachment sites & tension optimize alignment forces on spine.	2	
4.	Wearer reports feeling comfortable.	2	
	Subscore	8	









6A

7A.

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	6A. 6B		
	CHECKPOINTS: SCAPULA RETRACTION & TRUNK EXTENSION	TARGET SCORE	Score
ST	RAIGHT STRAP TRUNK EXTENSION APPLICATIONS – CHOOSE FIGURE 6	A or 6B	
1.	Straps are sized appropriately.	2	
2.	Straps cross over the apex of the curve.	2	
3.	Strap attachment sites & tension optimize alignment forces on spine. (OK to include clavicles &/or lumbar spine of straps are long enough.)	2	
4.	Wearer reports feeling comfortable.	2	
	Subscore:	8	
	OULDER RETRACTION / SCAPULAR STABILIZATION / UPPER THORACI or 7B	C EXTEN	SION –
1.	Single TogRite Cross Strap is sized appropriately.	2	
2.	The straps capture the scapulae effectively – it cannot escape.	2	
3.	Strap attachment sites & tension optimize scapular stability against humeral motions.	2	
4.	Wearer reports feeling comfortable.	2	
	Subscore:	8	
SH	OULDER RETRACTION / SCAPULAR STABILIZATION / THORACIC EXTE	NSION -	7B
1.	Both TogRite Straps are sized appropriately.	2	
2.	The bridge on strap captures the scapula effectively – it cannot escape.	2	
3.	Strap attachment sites & tension optimize scapular stability against humeral motions.	2	
4.	Wearer reports feeling comfortable.	2	
	Subscore:	8	





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	CUEOVEDINITO: A PROMINAL A COLOT				
	CHECKPOINTS: ABDOMINAL ASSIST	SCORE	SCORE		
2-	2—STRAP OBLIQUE & TRANSVERSE ABDOMINAL ASSIST				
1.	Straps are sized appropriately.	2			
2.	Strap attachment sites & tension optimize alignment forces.	2			
3.	Wearer reports feeling comfortable.	2			
	Subscore:	6			
CF	ROSS-STRAP HIP EXTENSION ASSIST				
1.	Strap is sized appropriately.	2			
2.	Strap attachment sites & tension optimize alignment forces.	2			
3.	Strap center is aligned over the sacrum	2			
4.	Wearer reports feeling comfortable.	2			
	Subscore:	8			

FINAL EXAM SCORE		
Postural Assessments	45	
Minimum Passing Grade (85%)	38	
Donning Garments and Strapping	84	
Minimum Passing Grade (85%)	71	
Candidate is Certified		
Candidate must review and repeat testing		