

NORMAL JOINT DEVELOPMENT SPINE & PELVIS		
AGE	PLANE	JOINT(S)
NEWBORN	SAGITTAL	SPINE/PELVIS
		NORM / IDEAL
		FULL SPINAL KYPHOSIS WITH RIBS PERPENDICULAR TO SPINE, POSTERIOR PELVIC TILT
		LUMBAR LORDOSIS INCREASES THROUGH PRONE AND SITTING.
NEWBORN – 36 MONTHS	FRONTAL	SPINE/PELVIS
		THORACIC SPINE STRAIGHT, LUMBAR SPINE FLEXIBLE, VARIABLE OBLIQUITY TO R AND L SIDES
		PELVIS LEVEL AND PERPENDICULAR TO SPINE
NEWBORN	TRANSVERSE	SPINE/PELVIS
4 MONTHS	SAGITTAL	SPINE
5 MONTHS	SAGITTAL	SPINE
18-24 MONTHS	SAGITTAL	SPINE
		NO OBLIQUITY WHEN LYING SUPINE, ASIS LEVEL
		SYMMETRY AND MIDLINE SPINE ACHIEVED*
		ANTI-GRAVITY SPINE EXTENSION ACHIEVED
25-36 MONTHS	SAGITTAL	SPINE
ADULT	SAGITTAL	SPINE
		ANTERIOR PELVIC TILT 10-15 DEGREES MEASURED WITH ANGLE FINDER
		ANTERIOR PELVIC TILT: 15-20 DEGREES*
		MALES: 8-13 DEGREES*
		FEMALES: 10-22 DEGREES*

* for use as clinical guideline versus full established norm due to lack of established literature

NORMAL JOINT DEVELOPMENT HIP			
AGE	PLANE	JOINT(S)	NORM / IDEAL
NEWBORN	SAGITTAL	HIP FLEXION/EXTENSION	FLEXION: ANTERIOR THIGH CONTACTS ANTERIOR ABDOMEN WHILE SACRUM REMAINS ON THE SURFACE EXTENSION: -30 DEGREES, SD 3.9 (FORERO 1989)
9-12 MONTHS	SAGITTAL	HIP EXTENSION	-9 DEGREES (PHELPS 1985)
0-12 MONTHS	FRONTAL	HIP ABDUCTION/ADDUCTION	ABD: 80 DEGREES WITH KNEES FLEXED; SD:4.34 (FORERO 1989)
12 MONTHS	FRONTAL	HIP ABD/ADD	ADD: 17 DEGREES; SD: 3.5 (FORERO 1989) ABD: 54 DEGREES; SD 7.5 (PHELPS 1985)
18-24 MONTHS	FRONTAL	HIP ABD/ADD	ADD: 20 DEGREES; MEDIAN (SUTHERLAND 1988) ABD: 18 MO: 59 DEGREES; SD 5.4 (PHELPS 1985) ABD: 24 MO: 60 DEGREES; SD 7.1 (PHELPS 1985) ADD: 24 MO: 20 DEGREES; MEDIAN (PHELPS 1985)
24 MONTHS	TRANSVERSE	MEDIAL HIP ROTATION	52 DEGREES*
24 MONTHS	TRANSVERSE	LATERAL HIP ROTATION	47 DEGREES*
18-36 MONTHS	SAGITTAL	HIP FLEXION/EXTENSION	FLEXION: 130-140 DEGREES EXTENSION: -3/-5 (PHELPS 1985)

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NORMAL JOINT DEVELOPMENT HIP (CONT.)		
AGE	PLANE	JOINT(S)
25-36 MONTHS	FRONTAL	HIP ABD/ADD NORM / IDEAL ABD: 50-55 DEGREES; MEDIANS (SUTHERLAND 1988) ADD: 20 DEGREES; MEDIAN (SUTHERLAND 1988)
9-12 MONTHS	SAGITTAL	HIP EXTENSION -9 DEGREES (PHELPS 1985)
0-12 MONTHS	FRONTAL	HIP ABD/ADD ABD: 80 DEGREES WITH KNEES FLEXED; SD:4.34 (FORERO 1989)
12 MONTHS	FRONTAL	HIP ABD/ADD ADD: 17 DEGREES; SD: 3.5 (FORERO 1989) ABD: 54 DEGREES; SD 7.5 (PHELPS 1985)
18-24 MONTHS	FRONTAL	HIP ABD/ADD ADD: 20 DEGREES; MEDIAN* (SUTHERLAND 1988) ABD: 18 MO: 59 DEGREES; SD 5.4 (PHELPS 1985) ABD: 24 MO: 60 DEGREES; SD 7.1 (PHELPS 1985) ADD: 24 MO: 20 DEGREES; MEDIAN (PHELPS 1985)
18-36 MONTHS	SAGITTAL	HIP FLEXION/EXTENSION FLEXION: 130-140 DEGREES* EXTENSION: -3/-5 (PHELPS 1985)
7 YEARS	TRANSVERSE	HIP MEDIAL ROTATION FEMALE: 38 DEGREES, MALE: 49*
7 YEARS	TRANSVERSE	HIP LATERAL ROTATION 45 DEGREES*
15-19 YEARS	TRANSVERSE	HIP MEDIAL ROTATION FEMALE: 35 DEGREES, MALE: 45*
15-19 YEARS	TRANSVERSE	HIP LATERAL ROTATION 40 DEGREES*
ADULT	SAGITTAL	HIP FLEXION 120 DEGREES (HOPPENFELD 1976)
ADULT	SAGITTAL	HIP EXTENSION 30 DEGREES (HOPPENFELD 1976)

NORMAL JOINT DEVELOPMENT HIP (CONT.)		
ADULT	FRONTAL	HIP ABD/ADD ABD: 45/50 DEGREES (HOPPENFELD 1976) ADD: 20/30 DEGREES
ADULT	TRANSVERSE	MEDIAL/LATERAL ROTATION MR: 35 DEGREES (HOPPENFELD 1976) LR: 45 DEGREES (HOPPENFELD 1976)

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NORMAL JOINT DEVELOPMENT KNEE		
AGE	PLANE	JOINT(S)
NEWBORN	SAGITTAL	KNEE FLEXION/EXTENSION NORM / IDEAL FLEXION: 140 DEGREES (BROUGHTON 1993) EXTENSION: AVERAGE -20 DEGREES (BROUGHTON 1993)
2-12 MONTHS	FRONTAL	VARUM/VALGUM 10 DEGREES VARUM (SELENIUS 1975)
9-12 MONTHS	SAGITTAL	KNEE FLEXION/EXTENSION FLEXION: 140 DEGREES EXTENSION: PROGRESSES TO 0 BY 12 MONTHS OF AGE
2-4 YEARS	FRONTAL	VARUM/VALGUM VALUS EMERGES AT 2 YEARS GREATEST AT 3-4 YEARS OLD: 8-10 DEGREES (SELELIUS 1975, MORELY 1957)
7 YEARS	FRONTAL	VARUM/VALGUM VALGUM REDUCES AND RESOLVES
7- ADULT	FRONTAL	VARUM/VALGUM 0-12 DEGREES

HAMSTRING LENGTH	
AGE	NORM / IDEAL
3 MONTHSL	-18 DEGREES (READE et al 1984)
6 MONTHS	-10 DEGREES (READE et al 1984)
9 MONTHS	-1 DEGREE (READE et al 1984)
11/12 MONTHS	0 DEGREES (READE et al 1984)
1 -3 YEARS	AVE. -6 DEGREES (KATZ et al 1992)
4 YEARS	BOYS: AVERAGE: -27 DEGREES (RANGE -10 TO -50) (KATZ et al 1992) GIRLS: AVERAGE-17 DEGREES (ARNGE: -5 TO -45) (KATZ et al 1992)
5 YEARS	-25 DEGREES (KURO et al 1997 – CONVERTED FROM POPLITEAL ANGLE)
5-10 YEARS	-26 DEGREES (RANGE 0—50) (KATZ et al 1992)
ADOLESCENCE THROUGH ADULT	-25 DEGREES (KURO et al 1997 – CONVERTED FROM POPLITEAL ANGLE)

EVIDENCE OF SIGNIFICANT SHORTENING: > -50/-55

KURO et al 1997 – CONVERTED FROM POPLITEAL ANGLE

KATZ et al 1992

NORMAL JOINT DEVELOPMENT ANKLE		
AGE	PLANE	JOINT(S)
NEWBORN	SAGITTAL	ANKLE DF
6-12 MONTHS	SAGITTAL	ANKLE DF
18-36 MONTHS	SAGITTAL	ANKLE DF
ADULT	SAGITTAL	PF
NORMAL GAIT	FRONTAL	ANKLE DF
ADULT	FRONTAL	SUBTALAR INV/EV
ADULT	TRANSVERSE	FOREFOOT ABD/ADD

NORM / IDEAL

60 DEGREES; SD = 8, (WAUGH 1983)

40-45 DEGREES (WONG 1998)

30-35 DEGREES (WONG 1998)

50 (HOPPENFELD 1976)

+10 DEGREES WITH ANKLE IN SUBTALAR NEUTRAL (TABRIZI 2000)

5 DEGREES EACH (HOPPENFELD 1976)

FOREFOOT ABD: 10 DEGREES (HOPPENFELD 1976)

FOREFOOT ADD: 20 DEGREES (HOPPENFELD 1976)

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