Prenatal Development Timeline

- Nervous
- Special Senses
- Blood & Immune
- Skin/Integument
- Cardiovascular
- Respiratory
- Gastrointestinal
- Renal/Urinary
- Muscular
- Skeletal
- Endocrine
- Reproductive
- Early Events
- Growth Parameters
- General
- Movement

Unit 1: The First Week

Day 0 ï¿½ï¿½	Embryonic period begins
	Fertilization resulting in zygote formation
Day 1 ï¿½ï¿½	Embryo is spherically shaped and called a morula comprised of 12 to 16 blastomeres
	Embryo is spherically shaped with 12 to 16 cells
Day 1 - Day 1 ï¿½ï¿½	Fertilization - development begins with a single-cell embryo!!!
Day 2 ï¿½ï¿½	Early pregnancy factor (EPF)
	Activation of the genome
	Blastomeres begin rapidly dividing
	Zygote divides into two blastomeres (24 â€“ 30 hours from start of fertilization)
Day 3 ï¿½ï¿½	Compaction
Day 4 ï¿½ï¿½	Embryonic disc
	Free floating blastocyst
	Hypoblast & epiblast
	Inner cell mass
	See where the back and chest will be
Day 5 ï¿½ï¿½	Hatching blastocyst
Day 6 ï¿½ï¿½	Embryo attaches to wall of uterus
	Solid synctiotrophoblast & cytotrophoblast
1 week ï¿½ï¿½	Chorion
	Chorionic cavity
	Extra-embryonic mesoderm (or mesoblast)
	Placenta begins to form

Unit 2: 1 to 2 Weeks

1 week, 1 day ï¿½ï¿½	Amnioblasts present; amnion and amniotic cavity formation begins
	Bilaminar embryonic disc
	Positive pregnancy test
1 week, 2 days ï¿½ï¿½	Corpus luteum of pregnancy
	Cells in womb engorged with nutrients
	Exocoelomic membrane
	Isolated trophoblastic lacunae
	Embryonic disc 0.1 mm diameter
1 week, 4 days ï¿½ï¿½	Intercommunicating lacunae network
	Longitudinal axis
	Prechordal plate
	Trophoblastic vascular circle
1 week, 5 days ï¿½ï¿½	Implantation complete
	Yolk sac
	Embryonic disc diameter: 0.15 to 0.20 mm
1 week, 6 days ï¿½ï¿½	Blood islands in umbilical vesicle
	Angiogenesis in chorionic mesoblast
	Blood vessels in villi
	Connecting stalk
	Primordial blood vessels
	Amnion with single cell layer
	Chorionic villi
2 weeks ï¿½ï¿½	Embryonic epiblast gives rise to primitive streak and primitive node and
	Yolk sac
	Yolk sac

Unit 3: 2 to 3 Weeks

2 weeks, 1 day ï¿½ï¿½	3 germ layers
	Cloacal membrane
	Primitive groove
	Rostral-caudal orientation
2 weeks, 2 days ï¿½ï¿½	Erythroblasts in yolk sac

	Three types of blood-forming cells in yolk sac
	Primordial germ cells
	Allantoic diverticulum
	Allantoic diverticulum
	Amnion with two cell layers
	Notochordal process
	Secondary villi
2 weeks, 4 days ï¿½ï¿½	Foregut, midgut, and hindgut
	Uteroplacental circulation well established
	Prechordal plate with 1 retinal field
	Brain is first organ to appear
	Caudal eminence
	Neural ectoderm
	Neural groove and neural folds
	Neural plate induced by notochordal process
	Notochordal and neurenteric canals
	Notochordal plate
	Connecting stalk
	Primitive pit (or notochordal pit)
2 weeks, 5 days ï¿½ï¿½	Prechordal plate with 2 retinal fields
2 weeks, 6 days ï¿½ï¿½	Numerous blood islands in umbilical vesicle
	Septum transversum (primitive diaphragm)
	Foregut
	Oropharyngeal membrane
	Pharyngeal pouch 1
	Stomodeum forming
	Beginnings of the heart can be seen
	Blood vessels emerge simultaneously in umbilical vesicle, embryo proper, amnion, and connecting stalk
	Common umbilical artery
	Dorsal aortae (paired)
	First pair of aortic arches
	Heart: Cardiogenic plate, cardiac jelly, myocardial mantle, and endocardial plexus
	Left ventricle, right ventricle, conotruncus
	Paired pericardial cavities
	Paired tubular heart
	Forebrain, midbrain, and hindbrain
	Hindbrain with four rhombomeres
	Isthmus rhombencephali demarcates midbrain and hindbrain

	Mesencephalon (or midbrain)
	Neural cord within caudal eminence
	Neural groove deepens substantially
	Primary neuromeres
	Three main divisions of brain
	Cephalic and caudal folds
	Neural crest: Rostral and facial
	Primitive streak reaches neurenteric canal
	Somites with central somitocoels: Pairs 1 through 3
3 weeks ï¿½ï¿½	Blood and blood vessels

Unit 4: 3 to 4 Weeks

3 weeks, 1 day ï¿½ï¿½	Thyroid primordium emerges from floor of pharynx
	Nephrogenic cord emerges (at 10 somites)
	Cloaca
	Common coelomic cavity divides into peritoneal, pericardial, and pleural cavities
	Liver: Hepatic plate (endoderm)
	Midgut emerging
	Pharyngeal arches 1 and 2
	Pharyngeal cleft 1
	Second pharyngeal cleft and pouch
	Pharyngeal groove and ridge with laryngotracheal sulcus
	Respiratory outgrowth
	Atria (right and left) far apart
	Bulbis cordis
	Circulatory system function begins
	Endocardial tubes fuse forming tubular heart
	Heart begins beating
	Pericardial sac
	Pericardium
	Primary head vein
	Sinus venosus
	Tubular heart begins folding
	Umbilical arteries
	Umbilical veins (right and left)
	Optic primordia fill neuromere D2
	Otic pits
	Chiasmatic plate
	Mesencephalic flexure
	Neural tube
	Neuromeres D1 and D2 (in diencephalon)

	Optic sulcus in forebrain
	Pontine region identifiable near cranial nerves VII and VIII
	Segment D in rhombencephalon
	Some secondary neuromeres
	Superior colliculus
	Telencephalon
	Telencephalon (or telencephalic) medium
	Body cavities
	Hyoid arch
	Mandibular arch and maxillary process
	Neural crest: Trigeminal, facioacoustic, glossopharyngeal-vagal, and occipitospinal
	Somites: Pairs 4 through 12
3 weeks, 3 days ï¿½ï¿½	Primordial germ cells begin moving from umbilical vesicle to hindgut
	Thyroid complete
	Face: Maxillary and mandibular processes (bilaterally)
	Cloacal membrane
	Mesonephric duct emerges from nephrogenic cord
	Nephric vesicles
	Cystic primordium
	Hepatic diverticulum
	Liver
	Membrane between future mouth and throat may begin to rupture
	Angiogenesis along surface of central nervous system
	Aortic sac
	Atrioventricular canal
	Capillary plexus begins forming around brain and spinal cord
	Conotruncus
	Conus cordis emerging from right ventricle
	Endocardium
	Heart contractions produce peristaltic blood flow
	Internal carotid arteries
	Interventricular septum
	Primordium of myocardium
	Sinus venosus separating from left atria
	Trabeculated outpouches along primary cardiac tube representing primordia of left and right ventricles
	Trigeminal and otic arteries
	Facio-vestibulocochlear ganglia (CN VII, CN VIII)
	Glossopharyngeal and vagal ganglia
	Optic evagination (starting at 14 somites)

	Otic vesicle
	Trigeminal ganglia (CN V)
	Neural crest: Optic crest emerges during Carnegie Stages 11 and 12
	Nose: Nasal plate
	Optic vesicles form (17 to 19 somites)
	Adenohypophysial pouch
	Adenohypophysis
	Lamina terminalis
	Mesencephalon contains tectum and tegmentum
	Neural crest production and migration continue
	Neurohypophysial primordia
	Neuropore (near brain) closes
	Notochord
	Segmentation of mesoblast alongside neural tube bilaterally
	Somites: Pairs 13 through 20
3 weeks, 3 days - 5 weeks, 6ï¿ï¿ days ½½	All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17
3 weeks, 5 days ï¿ï¿ ½½	Telopharyngeal bodies
	Alimentary epithelium invades stroma of liver
	Alimentary epthelium proliferates in primordia of stomach, liver, and dorsal pancreas
	First part of pancreas
	Gastric portion of foregut elongates (25 to 28 somites)
	Hepatic primordium with abundant vascular plexus
	Omental bursa
	Oropharyngeal membrane is ruptured
	Pharyngeal arch 3
	Pharyngeal arches with dorsal and ventral parts
	Umbilical vesicle elongates
	Cervical sinus
	Laryngotracheal groove
	Lung bud
	Tracheo-esophageal septum
	Atrioventricular canal
	Common cardinal veins (right and left)
	Descending aorta
	Heart circulates blood to and from central nervous system, umbilical vesicle, and chorion
	Hepatocardiac channels (right and left)
	Rostral and caudal cardinal veins along brain and spinal cord feeding common cardinal veins

	Septum primum and foramen primum sometimes present
	Septum primum, foramen primum
	Sinu-atrial foramen prevents backflow into sinus venosus
	Sinus venosus collects veinous blood from entire embryo
	Superior vena cava, inferior vena cava, and sinus venosus collecting all venous blood
	Unidirectional circulation
	Vitelline arteries and veins
	Hypoglossal cord (CN XII) enters pharyngeal arch 4
	Otocyst nearly closed
	Nasal discs form part of ectodermal ring
	Optic vesicles covered by sheath (formed by mesencephalic and optic crest)
	Brain involves 40% of neural tube
	Brain: Embryonic commissural plate
	Ectodermal ring complete
	Hypoglossal nucleus (CN XII)
	Lowermost spinal cord formation begins
	Mamillary recess
	Marginal layer in rhombencephalon
	Mesencephalic flexure at 90 degrees
	Mesencephalon with two neuromeres: M1 and M2
	Motor neurons in basal plate of rhombencephalon
	Neural tube closes (lower back)
	Neurofibrils form in rhombencephalon
	Primary neurulation ends
	Primordia of ventral thalamus and subthalamus in diencephalon
	Sulcus limitans
	Sulcus limitans in midbrain
	Somites: Pairs 21 through 29
	Upper limb primordium at level of somites 8 to 10
	Progressively C-shaped embryo
4 weeks ï¿½ï¿½	Spleen primordia
	Thymic primordia
	Lower lip forms from merging of mandibular processes
	Melanoblasts in epidermis
	Skin is so thin, you can see through it!
	Gonadal ridge extends from C-7 to T-8 levels
	Primordial germ cells migrate to mesonephric ridges
	Primordial germ cells number several hundred
	Urorectal septum

	Thyroid bilobed and attached to pharynx by thryoglossal duct
	Diaphragm primordia
	Glomeruli emerge in mesonephros
	Mesonephric duct attached to cloaca
	Nephric tubules now S-shaped
	Urogenital sinus
	Urorectal cleavage line
	Diverticulum ilei marks division between foregut and hindgut
	Esophagus primordia
	Intestines growing in length
	Mesentery from end of duodenum to proximal half of colon
	Opening between gut and umbilical vesicle decreases
	Pancreas: Ventral pancreas
	Pharyngeal pouches 1 through 4
	Pharynx
	Pleuroperitoneal canals
	Small & large intestines
	Stalk of umbilical vesicle lengthens and narrows
	Stomach assumes shape of a spindle
	Umbilical vesicle at height of development
	Vitelline duct
	Bronchial buds
	Lungs begin filling chest cavity
	Mesenchyme from coelomic epithelium surrounds esophagus and lung buds
	Trachea
	Anterior, middle, and posterior cerebral plexuses
	Aorta branches include dorsal intersegmental, lateral segmental, and ventral segmental arteries
	Aortic arches 4 and 6
	Artery from the common iliac artery feeds each lower limb bud
	Atrioventricular bundle
	Cardiac contractions still under myogenic control
	Celiac artery, superior and inferior mesenteric arteries
	Circulatory system "well established"
	Common iliac arteries (right and left, from dorsal aorta bifurcation)
	Contractions well coordinated and sequential from sinus venosus to atria to ventricles
	Functioning two-chamber heart
	Gas exchange through placenta begins
	Gelatinous reticulum (or cardiac mesenchyme)
	Heart chambers bulging with fluid

	Heart now functions as two parallel pumps
	Heart rate (about) 113 beats/min
	Heart: Atrioventricular cushions (rostroventral and caudodorsal)
	Heart: Myocardium wall 3 to 4 cells thick
	Primary head veins (right and left) drain anterior, middle, and posterior cerebral plexuses and feed precardinal veins
	Small arteries emerging throughout mesoderm
	Ventricle walls trabeculated
	Vertebral arteries
	Vitelline veins empty exclusively into hepatic plexus
	Most cranial nerve ganglia
	Trigeminal, glossopharyngeal, and vagal preganglia
	Basement membrane of otic disc surrounds otic vesicle
	Endolymphatic appendage
	Otic invagination
	Otic vesicle closes
	Terminal-vomeronasal neural crest
	Brain: Commissural plate
	Cerebellum
	Common afferent tract
	Fourth ventricle
	Interstitial nucleus (part of medial longitudinal fasciculus)
	Isthmus rhombencephali (a new neuromere)
	Oculomotor (CN III) and trochlear nuclei (CN IV) in mesencephalon (midbrain) and isthmus respectively
	Retinal and lens discs
	Amnion surrounds connecting stalk and vitelline stalk
	Amnion surrounds embryo
	Cervical flexure
	Hyoid arch sudivides into dorsal and ventral segments
	Limb buds - the first sign of arms and legs
	Lower limb buds
	Umbilical cord emerging
	Upper and lower limb buds
Unit 5: 4 to 5 Weeks	
4 weeks, 3 days ï¿½ï¿½	Early eyes
4 weeks, 3 days - 5 weeks ï¿½ï¿½	Germ cells migrate to gonads
4 weeks, 4 days ï¿½ï¿½	Thymus

	Parathyrogenic zones
	Thyroglossal duct
	Thyroid pedical lengthens
	Dorsal contour develops depression at level of sclerotomes 4 and 5
	Muscular plates between upper and lower limb buds
	Glomerular capsules, partially vascularized
	Mesonephric corpuscle
	Metanephrogenic cap emerges from ureteric bud
	Ureteric buds
	Angiogenesis within peri-esophageal mesenchyme
	Epiploic foramen
	Lesser sac (omental bursa)
	Small intestine forming coils
	Tongue: Hypopharyngeal eminence
	Arytenoid swellings (right and left)
	Capillary network surrounds pulmonary mesenchyme
	Epithelial lamina of larynx
	Lungs: Right and left primary (or main stem) bronchi
	Mesenchyme covering esophagus and respiratory tree separates
	Mesenchyme surrounds bronchi
	Pleura (mesothelium) surrounds part of mesenchyme
	Right main bronchus longer than left
	Atria walls thin, ventricle walls thick and trabeculated
	Atrioventricula cushions not fused
	Common pulmonary vein drains pulmonary plexuses into left atrium
	Conotruncal ridges or cushions (remnants of cardiac jelly)
	Epicardium
	Left subclavian artery feeds left axillary artery, left vertebral artery, and and left thyrocervical trunk
	Outflow tract still with one lumen
	Posterior communicating arteries
	Pulmonary arch (sixth aortic arch) forms from aorta and aortic sac
	Pulmonary capillary network fed by pulmonary arteries, drain into left atrium
	Sinu-atrial (SA) node
	Superior mesenteric artery and vein
	Upper limb buds with early marginal blood vessel
	Brachial plexus
	Cervical plexus
	Dorsal roots
	Hypoglossal nerve roots unite (CN XII)

	Lens and retina invaginate to form optic cup
	Primordium of cochlear duct
	Rami communicantes
	Spinal nerves reach muscle primordia
	Upper limb buds innervated
	External ear: Auricular hillocks merging
	Eyes located on sides of head
	Lens pits
	Lens vesicle open to surface (lens pore)
	Nose: Nasal pits
	Nose: Nasal plate (or disc) flat or concave
	Pigment in retina (external layer of optic cup)
	D1 and D2 no longer identifiable within diencephalon
	75% of midbrain covered by marginal layer
	All 16 secondary neuromeres
	Brain enlarges 50% since Carnegie Stage 13
	Brain: Cerebral hemispheres appear and begin rapid growth
	Brain: Lateral ventricles
	Cerebellum with intermediate and ventricular layers
	Cerebellum: Primordium found in alar plate of rhombomere 1
	Corpora striata primordia connected by commissural plate
	Cranial nerve 3
	Di-telencephalic sulcus
	Dorsal and ventral thalami
	Dorsal funiculus
	Hypothalamic sulcus
	Hypothalamus
	Mamillary region
	Medial and lateral longitudinal fasciculi
	Median ventricular eminence
	Pontine flexure
	Preoptic sulcus extends between optic evaginations
	Preoptico-hypothalamo-tegmental tract
	Primary meninx surrounds most of brain
	Rhombic lip
	Spinal cord wall with three zones: ventricular (ependymal) zone, mantle (intermediate) zone, and marginal zone
	Subthalamus with medial striatal ridge emerging
	Synencephalon
	Tegmentum
	Tentorium cerebelli, medial portion

	Terminal-vomeronasal crest contacts brain (olfactory area)
	Torus hemisphericus (TH)
	Velum transversum
	Ventral longitudinal fasciculus
	Ventral segment of hyoid arch subdivides
4 weeks, 5 days ï¿ï¿½½	Primordium of antitragus emerges from ventral subsegment of hyoid arch
	Gonad framework found in coelomic epithelium
	Thyroid detached from epithelium of pharynx in some embryos
	Lower limb bud rounded proximally and tapered distally
	Mesenchymal skeleton in upper and lower limbs
	Right and left neural processes
	Sclerotomic material around notochord (rhombomere D level)
	Vertebrae well defined
	Vertebral centra
	Primary urogenital sinus
	Ureteric bud extends to pelvis of the ureter
	Bladder and rectum are separating caudal to ureters
	Caecum
	Dense mesenchyme surrounds much of gastrointestinal tract
	Esophagus elongates, passes dorsal to carina and between main stem bronchi
	Gall bladder and cystic duct
	Liver: Hepatic ducts
	Ventral pancreas appears as an offshoot of the cystic duct
	Lobar bud swellings denote areas of secondary bronchi
	Remnants of coelomic epithelium forming visceral pleura
	Atrioventricular cushions apposed
	Blood flow divided into right and left streams through atrioventricular canal, ventricles, outflow tract, and aortic sac
	Blood vessels penetrate diencephalon
	Capillary plexus surrounds esophagus
	Capillary plexus surrounds lung buds
	Cardiac mesenchyme surrounds ventricles and outflow tract
	Coronary arteries (terminal end)
	Foramen secundum begins in septum primum
	Left ventricle with thicker walls and greater volume than right

	Right subclavian artery originates from brachiocephalic artery and feeds right thyrocervical trunk and axillary and vertebral arteries
	Semilunar cusps
	Capsule present around lens
	Corneal epithelium overlying optic cup
	Ear: Endolymphatic duct
	Geniculate and vestibulocochlear ganglia separating
	Lens body now present containing some lens fibers
	Lower limb buds innervated
	Optic stalk
	Utricle, endolymphatic duct, and endolymphatic sac
	Utriculo-endolymphatic fold
	External ear primordia emerges from caudolateral portion of mandibular arch
	Face: Lateral and medial nasal processes bilaterally
	Lateral nasal processes along dorsolateral lip of nasal pits
	Lens vesicles closed, pores absent
	Nose: Nasal discs recede forming nasal pits
	Optic chiasm
	Adult lamina terminalis
	Amygdaloid area
	Brain with five main sections
	Cerebellar plate
	Cerebellum with marginal layer
	Fibers of dorsal funiculus reach level of C1
	First axodendritic synapses in cervical spinal cord
	First nerve fibers
	Habenular nucleus
	Habenulo-interpeduncular tract
	Lateral striatal ridge (derived from telencephalon and comprised mainly of neostriatum)
	Lateral ventricular eminence
	Locus caeruleus
	Longitudinal zones in diencephalon
	Marginal layer throughout most of diencephalon
	Material for sympathetic trunks scattered in cervical region
	Median striatal ridge (paleostriatum)
	Mesencephalic tract of CN 5
	Most cranial nerves seen
	Olfactory fibers reach brain
	Optic groove (also called preoptic recess)
	Postoptic recess
	Primordium of epiphysis

	Rhombomeres still identifiable
	Superior colliculi and its commissure
	Superior medullary velum
	Supramamillary commissure
	Synapses among motor neurons in spinal cord
	Tectobulbar tract
	Tentorium
	Third ventricle
	Trigemino-cerebellar tract
	Trochlear nerve root and decussation (CN IV)
	Hand plate emerges from distal upper limb bud
	Frontonasal prominence
5 weeks ï¿½ï¿½	ACTH [adrenocorticotropin hormone]
	Growth hormone
	Pituitary gland
	Limb buds form hand plates
	Permanent kidneys
	Arytenoid and epiglottal swellings
	Bronchial tree branching accelerates
	Lobar pattern mimics adult pattern
	T-shaped laryngeal inlet
	Pacemaker cells
	Head is one third of entire embryo
Unit 6: 5 to 6 Weeks	
5 weeks, 1 day ï¿½ï¿½	Wrist joints are forming
5 weeks, 2 days ï¿½ï¿½	Apical epidermal ridges
	Mammary ridge
	Maxillary and premaxillary fields still widely separated
	Nipples emerge from mammary crest
	Gonad region separates from mesonephros
	Gonadal primordium
	Labioscrotal swelling
	Urogenital fold and groove
	Suprarenal gland: Cortex primordium
	Suprarenal gland: Medulla
	Thyroid detaches from pharynx
	Thyroid with right and left lobes connected by an isthmus
	Cartilage in mandibular arch

	Hand area with central carpal region and digital plate with marginal vein
	Pre-chondrocranium: Otic capsule, nasal capsule, and parachordal condensations
	Primordia of primary palate
	Ribs: Primordia now present for all 12 pairs
	Vertebral column with 36 levels of ganglia and myotomes
	Extra-ocular premuscle masses receive cranial nerve fibers [oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves]
	Gluteal mesoderm
	Infrahyoid premuscle masses
	Limb mesoderm
	Sternocleidomastoid-trapezius premuscle mass with spinal accessory nerve (CN11)
	Thigh and thigh mesoderm
	Tongue premuscle mass
	Metanephros at level of sacrum
	Urethral plate
	Lesser omentum (ventral mesogastrun)
	Peritoneal cavity
	Rectum
	Stomach: Greater and lesser curvatures
	Yolk stalk disappears
	Bronchial tree expanding
	Cervical sinus diminished in size
	Epiglottis
	Primitive Larynx
	Anterior, middle, and posterior cerebral arteries
	Atrioventricular (AV) node
	Atrioventricular cushions fuse with interventricular septum
	Circle of Willis almost complete
	Conotruncal septum
	Endocardial cushions (rostroventral and caudodorsal) begin fusing around atrioventricular canal forming right and left atrioventricular canals and two separate blood streams
	External carotid artery
	Foramen primum disappearing
	Hepatic portal vein
	Infundibulum of right ventricle
	Jugular lymph sac
	Lateral atrioventricular cushions
	Mesencephalic artery
	Myelencephalic artery

	Perilental blood vessels
	Primitive cavernous sinus drains primitive maxillary and supraorbital veins
	Primitive renal plexus
	Right ventricle feeds sixth (pulmonary) aortic arches; left ventricle feeds fourth aortic arches
	Semilunar valves (aortic and pulmonary) are forming
	Ventricles each with three parts: inlet, trabecular pouch, and outflow tract
	Ventricles enlarge and deepen side-by-side forming an ever growing interventricular septum
	Celiac plexus
	Cochlear nerve present
	Femoral and obturator nerves innervate rostrolateral part of lower limb
	Hypoglossal nerve (CN XII) reaches tongue
	Intercostal nerves
	Lumbar and sacral plexuses
	Musculocutaneous, radial, ulna, and median nerves enter upper limb bud
	Nasal pits face more ventrally, still widely separated
	Nasofrontal groove
	Olfactory fibers connect nasal pits with brain
	Olfactory fibers enter brain
	Olfactory tubercle present
	Peroneal and tibial nerves innervate caudomedial part of lower limb
	Phrenic nerve
	Pigment in retina visible externally
	Primordium of cochlear pouch
	Tibial nerve innervates foot area
	Auricular hillocks on hyoid arch (antitragus and helix)
	Auricular hillocks on mandibular arch (tragus and crus)
	Blind nasal sac
	Nasal fin
	Alar lamina emerging with dense rhombic lip
	All cranial nerves identifiable
	Archipallium, paleopallium, and neopallium
	Area epithelialis
	Brain: Primordial plexiform layer in area of future temporal lobe
	Cajal-Retzius cells
	Commissure of the trochlear nerve
	Diencephalic subthalamic nucleus
	Dorsal and ventral thalami separated by groove
	Dorsal funiculus fibers reach medulla oblongata
	Epiphysis cerebri

	Glial cells identifiable adjacent to neurons
	Greater petrosal nerve
	Hippocampus: Gyrus dentatus
	Infundibular recess and infundibulum
	Interventricular foramen large
	Marginal ridge
	Medial and lateral ridges of corpus striatum are continuous
	Median forebrain bundle
	Neurohypophysial outgrowth
	Olfactory tubercle
	Pontine flexure deepens
	Posterior commissure
	Recurrent laryngeal nerve
	Reticular formation more defined
	Retinal fissure closes
	Splanchnic nerve
	Sulcus limitans hippocampi
	Superior laryngeal nerve
	Second pharyngeal arch more prominent
	Third pharyngeal arch recedes
5ï¿½ weeksï¿½ï¿½	Initial tooth formation
5ï¿½ weeks - 6 weeksï¿½ï¿½	Subtle movement begins
5 weeks, 4 days ï¿½ï¿½	Cartilage formation
5 weeks, 5 days ï¿½ï¿½	Nerve cells differentiating
5 weeks, 5 days - 7 weeks, 1ï¿½ï¿½ day ï¿½ï¿½	Melanocytes in epidermis
5 weeks, 6 days ï¿½ï¿½	Facial growth centers grow and begin merging forming nose and upper jaw
	Genital eminence forms phallus or genital tubercle
	Gonad grows into oval shape with irregular surface
	Auditory ossicles identifiable in mesenchyme
	Cartilage in occipital sclerotomes (1-4)
	Digital rays in hand plate
	Femur: Chondrification begins
	Foot with rounded digital plate
	Hypoglossal foramen (or canal) through sclerotome 4 (area of future occipital bone)

	Odontogenic epithelium ermerges in six areas (four maxillary and two mandibular)
	Primary palate components (right and left) fuse in midline
	Primitive palatine groove
	Primordium of cartilage within nasal septum
	Vertebral centra begin chondrification
	Primordia of orbital muscles
	Calices
	Mesonephros can produce urine
	Pelvis of the ureter with three main divisions
	Vesico-urethral canal
	Biliary ducts within liver
	Dorsal and ventral pancreas fuse but retain separate ducts
	Duodenum enlarges proximal to and distal to bile and pancreatic ducts
	Esophagus developing a submucous coat surrounding epithelium
	Intestinal loop begins umbilical herniation
	Primordial vermiform appendix
	Stomach regions include gastric canal, fundus, corpus (or body), and pyloric antrum
	Trachea: Precursors of tracheal cartilages
	Condensing mesenchyme around junction between left and right atria and cardiac tube is precursor to mitral and tricuspid valves
	Outflow tract rotates counterclockwise
	Right and left atrioventricular canals totally separated
	All parasympathetic cranial nerve ganglia identifiable
	All spinal nerves present
	Cell islands in olfactory tubercle
	Crescentic lens cavity
	Geniculate ganglion separate from vestibulocochlear nerve
	Globular process emerges from each medial nasal process
	Nasal fin connecting nasal disc and surface epithelium
	Nasofrontal grooves
	Olfactory tubercle with cellular islands
	Hyomandibular groove enlarges (onset of concha and external auditory meatus formation)
	Medial rims of nasal pits form nasal septum
	Nostril becomes continuous with nasal sac
	Primary lens fibers
	Retinal fissure closed
	Capillaries between adenohypophysis and hypothalamus

	Commissure of the oculomotor nerves
	Cortical nucleus in amygdaloid body
	Dentate and isthmic nuclei in cerebellum
	Dura begins forming in basal area
	Epiphysis cerebri with intermediate layer
	First hint of septal nucleus
	Frontal and temporal poles of cerebral hemispheres
	Gustatory fibers separate from common afferent tract
	Hemispheric stalk
	Intermediate layer in tectum mesencephali
	Interventricular foramen
	Mesencephalon with intermediate layer
	Somites: Pairs 38 and 39
	Spinal cord reaches caudal tip of body
	Subarachnoid space
	Synapses in spinal cord between interneurons and primary afferent neurons
	Ventral thalamus with intermediate layer
	Anterior choroid artery
6 weeks ï¿½ï¿½	Face withdraws from light touch around mouth
	Blood forming in liver
	Milk lines
	Nipples along side of trunk
	Adrenal glands
	Glucagon in pancreas
	Handplates develop subtle flattening
	Joints
	Medial skull cartilages: Parachordal, hypophyseal, and trabecular
	Tooth buds (primary teeth)
	Diaphragm is largely formed
	Intestines fill base of umbilical cord
	External ears
	Synapses form in spinal cord
	Crown-heel length 1.6 cm
Unit 7: 6 to 7 Weeks	
6 weeks, 2 days ï¿½ï¿½	Angiogenesis begins inside gonads
	Gonad grows into oval shape with irregular surface
	Ostium (abdominal) of uterine tube at rostral end of paramesonephric duct (in female embryos)
	Paramesonephric duct forms from rostral end of mesonephric duct

	Testicular cords in gonads of male embryos
	Testicular cords in male gonad
	Elbow regions sometimes identifiable
	Embryo with cervical and lumbar flexures
	Embryo with dorsal concavity
	Finger rays with early interdigital notching
	Hands polygon-shaped
	Humerus, radius, and ulna
	Humerus: Chondrocytes in phases one through three
	Scapula and clavicle
	Semicircular ducts form in order: anterior, posterior, and lateral
	Sternum: Episternal cartilage created from fusion of right and left sternal bars
	Tibia and fibula
	Toe rays sometimes present
	Deltoid muscle
	External and internal abdominal oblique muscles
	Levator scapulae muscle
	Longus cervicis and semispinalis cervicis muscles
	Pectoralis major muscles
	Platysma muscle
	Rectus abdominis muscle
	Rectus capitus posterior and semispinalis capitis muscles
	Serratus anterior muscles
	Splenius and longissimus muscles
	Stapedius muscle
	"Common excretory duct is disappearing"
	Cloacal membrane ruptures (stages 18-19)
	Primordia of secretory tubules
	Esophagus with muscular and submucous coats
	Submandibular gland primordia
	Bronchial tree with subsegmental buds
	Bronchial tree with well established segmental bronchi
	Lingula of left upper lobe
	Aortic and pulmonary valves assuming shape of a cup
	Brachiocephalic veins, right and left
	Inferior vena cava
	Interventricular septum: membranous part begins forming
	Left coronary artery arises from aorta
	Mesenchyme ridges in place of future mitral and tricuspid valves
	Pulmonary and aortic blood flows completely separate

	Secondary interventricular foramen sometimes closing (stage 18-21) interventricular septum
	Septum secundum and foramen ovale (stages 18-21)
	Bucconasal membrane
	Bucconasal membrane detaches opening up nasal airway
	Crus commune
	Ethmoidal epithelium emerges from upper medial nasal wall
	Frontonasal angle (marks location of future nasal bridge)
	Mesenchyme thickenings mark beginning of "sclera and its muscular attachments"
	Nasal tip emerges
	Nerve fibers in retina
	Optic fibers
	Retina's outer lamina heavily pigmented
	Vomeronasal nerve and ganglion
	Vomeronasal organ marked by groove and located in fold of lower medial nasal wall
	Choanae
	Conjunctival sac marked by groove
	Cornea and conjunctiva
	Ear: Stapes primordium surrounds stapedial artery
	External ear: Crus helicis forming from auricular hillocks two and three (from mandibular arch)
	Eyelid folds sometimes present
	Nasal fin splits forming choanae and bucconasal membrane
	Nasolacrimal duct begins as epithelial strand emanating from nasomaxillary groove
	Nostrils, nasal wings, and nasal septum easily seen
	Olfactory bulb sometimes with olfactory ventricle
	Primary lens fibers filling lens vesicle cavity
	Adenohypophysis no longer open to pharyngeal cavity
	Archistriatum
	Brain: Dentate nucleus in internal cerebellar swellings
	Brain: Pineal recess emerges representing anterior lobe of epiphysis
	Brainwave activity has begun
	Cerebrospinal fluid production begins
	Choroid plexuses in fourth and lateral ventricles
	Corpus striatum much larger extending to preoptic sulcus; has subtle groove
	External cerebellar swellings contain future flocculus
	Four amygdaloid nuclei
	Fourth ventricle: Choroid folds

	Hippocampus reaches olfactory region
	Interpeduncular fossa
	Neurohypophysis walls are folded
	Nucleus ambiguus of the vagus (CN10)
	Prosencephalic septum
	Red nucleus
	Substantia nigra
	Supra-optic commissure
6ï¿½ weeksï¿ï¿½½	The hands begin to move
	Volar pads on palms
	Bones first form in the collar bones and lower jaw
6 weeks, 5 days ï¿ï¿½½	Greater thymic bud
	Cheeks form by merging of maxillary and mandibular processes
	Mammary gland primordium
	Mammary ridge disappears leaving only mammary gland primordium
	Female duct
	Gonads extend from levels T-10 to L-2
	Rete ovarii (in female embryos)
	Rete testis begins emerging from seminiferous cords (Stage 19-23) (in male embryos)
	Tunica albuginea in male embryos
	Suprarenal gland: Cortex
	Suprarenal gland: Medulla populated by prechromaffin cells
	Arms point forward
	Beginnings of occipital and sphenoid bones
	Bilateral cartilaginous sternal bars tie ribs together; sternal bars join cranially to form the episternal bar in the midline
	Cartilage within otic capsule envelops semicircular canals and cochlear duct
	Cartilaginous styloid process
	Ear: Cartilaginous malleus, incus, and stapes (the middle ear ossicles)
	Ectomeninx covers lateral and dorsal surfaces of brain (laying the foundation for the flat bones of the skull)
	Intervertebral discs form from caudal condensed portion of sclerotomes
	Ischium and illium
	Labiodental lamina: Inner dental lamina and outer labiogingival band
	Laryngeal cartilages

	Limbs point forward (ventrally)
	Orbitosphenoid cartilage located within ectomeninx near optic stalk
	Ossification begins in maxilla (stages 19 -20)
	Primitive palate (or intermaxillary segment)
	Rib primordia become cartilaginous
	Ribs each have an identifiable head and shaft
	Trachea: Tracheal cartilage
	U-shaped labiodental lamina form along upper and lower oral cavity
	Vertebral column represented by cartilaginous centrum, neural arch, and short tranverse process
	Esophagus: Muscularis layer adjacent to esophageal plexus
	Gluteal muscle group
	Iliopsoas muscles
	Infrahyoid muscles
	Internal intercostal muscles
	Limb extensor muscles located dorsally
	Limb flexor muscles located ventrally
	Midgut: Muscularis
	Muscle tissue forming around phrenic nerve within septum transversum portion of diaphragm
	Pharyngeal constrictor muscle
	Premuscle mass of the muscles of mastication innervated by mandibular nerve
	Quadratus lumborum muscle
	Rhomboid and scalene muscles
	Sternocleidomastoid and trapezius muscles distinct and innervated by separate branches of spinal accessory nerve (CN XI)
	Thenar and hypothenar eminences
	Tongue forms from swellings in floor of pharynx
	Tongue: Extrinsic muscles identifiable
	Tongue: Intrinsic muscles identifiable
	Transversospinal and erector spinae muscle groups
	Upper limb flexors innervated by musculocutaneous, median, and ulnar nerves
	Major calyces, cranial and caudal, with collecting tubules within metanephrogenic mass
	Mesonephros extends from T-9 to L-3
	Metanephros extends from T-12 to L-2
	Renal capsule covers distal collecting tubules
	Renal vesicles form in part of metanephros
	Ureter forms from "proximal segment of metanephric diverticulum"
	Urogenital sinus comprised of three parts: Bladder, pelvic, and phallic portions

	Anal folds adjacent to anal membrane
	Anal membrane
	Duodenum: "Assumes the shape of an arc"
	Greater omentum
	Lateral palatine process
	Liver: rapid growth, right side greater than left
	Median mandibular groove disappears as mandibular processes merge in midline
	Palatine fossa (from pharyngeal pouch 2)
	Primitive oral cavity
	Primitive rima oris replaces stomodeum
	Stomach wall layers: Mucosa, submucosa, muscularis, and serosa
	Submandibular and parotid gland buds
	Submandibular gland duct
	Bronchial tree: First generation of subsegmental bronchi complete
	Glottis, primitive
	Lung sac, right: Oblique and horizontal fissures define upper, lower, and middle lobes
	Lung sac: Apex and base
	Lung, left: Oblique fissure defines upper and lower lobes
	"Septum primum fuses with endocardial cushions" obliterating ostium primum and creating the ostium secundum
	Apex of left ventricle
	Circulus arteriosus (Circle of Willis) complete
	External iliac arteries
	Iliac lymph sac
	Intercostal and subcostal arteries
	Internal thoracic artery and costocervical trunk
	Mesenteric lymph sac
	Mesonephric artery feeds mesonephros, gonads, and suprarenal glands
	Papillary muscles
	Pontine, superior cerebellar, and anterior and posterior interior cerebellar arteries replace myelencephalic and metencephalic arteries
	Primitive marginal sinus drains diencephalon
	Primitive tentorial sinus drains cerebral vesical
	Primitive transverse and sigmoid sinuses
	Pulmonary arteries (right and left)
	Right coronary artery arises from aorta
	Splenic vein
	Tricuspid and mitral valves

	Anterior chamber between iridopupillary membrane and thickened ectoderm
	Auditory tube and primtive tympanic cavity form from tubotympanic recess pharyngeal pouch 1)
	Celiac, superior mesenteric, and inferior mesenteric preaortic ganglia
	Choana
	Cochlear duct tip grows upward
	Esophageal plexus formed by vagal nerves (CN X)
	Facial nerve (CN VII) branches: Chorda tympani, greater petrosal, posterior auricular, and digastric
	Facial nerve (CN VII) reaches cervicomandibular region
	Glossopharyngeal nerve (CN IX) innervates stylopharyngeus premuscle mass
	Hypoglossal nerve (CN XII) innervates separating tongue muscles
	Linguogingival groove
	Nasolacrimal duct forms from maxillonasal groove
	Nasolacrimal ducts extend from medial eyes to primitive nasal cavity
	Nerve fibers begin extending from retina
	Optic fibers enter chiasmatic plate
	Primitive nasal cavity
	Primordial vitreous body
	Superior, middle, and inferior cervical ganglia
	Trigeminal nerve (CN V) with opthalmic, maxillary, and mandibular divisions reach their destinations
	Vagal trunks, anterior and posterior, extending into abdomen
	Eyelids: Upper and lower lids present and growing
	Saccule and cochlear duct
	Adenohypophysis: Lateral lobes of pars tuberalis
	Adenohypophysis: Pars intermedia emerging
	Brain: Internal capsule formation underway
	Cerebral hemispheres cover half of diencephalon
	Dorsal and ventral cochlear nuclei
	Fourth ventricle: Lateral recesses
	Ganglion of nervus terminalis
	Globus pallidus externus in the diencephalon
	Habenular commissure
	Intermediate layer in dorsal thalamus
	Lemniscal decussation
	Lower limb nerves (femoral, obturator, sciatic, common peroneal, and tibial) identifiable
	Medial accessory olivary nucleus
	Neurohypophyseal bud
	Nuclei of forebrain septum

	Nucleus accumbens
	Occipital pole of cerebral hemispheres
	Optic stalk with barely discernible lumen
	Paraphysis marks dividing line in roof between telencephalon and diencephalon
	Primitive filum terminale
	Radial nerve innervates upper limb extensors
	Rhombomeres no longer distinguishable
	Subcommissural organ
	Zona limitans intrathalamica between dorsal and ventral thalami
6 weeks, 6 days ï¿½ï¿½	Feet polygon-shaped
	Cloacal membrane ruptures
7 weeks ï¿½ï¿½	Head rotates
	Leg movements
	B lymphocytes in liver
	Ovaries
	Testes begin to differentiate
	Insulin in pancreas
	Foot plates notched
	Hiccups
	Tendons attach muscle to bone
	The heart has four chambers and is nearly complete.
	The heart rate peaks at 165 to 170 beats per minute.
	Crown-heel length 2.2 cm
Unit 8: 7 to 8 Weeks	
7 weeks, 1 day ï¿½ï¿½	Facial processes no longer distinguishable
	Ovaries full of primitive oogonia, intermediate pregranulosa cells, and mesenchyme
	Testes with short straight tubules
	Upper limbs with slightly flexed elbows
	Diaphragm: Central tendon
	Renal vesicles with S-shaped lumina
	Submandibular gland: Solid epithelial ducts enlarge and begin to branch
	Adenohypophysis with new capillaries on rostral surface
	Scalp vascular plexus
	Cochlear duct tip growing horizontally
	Lens cavity completely filled
	Optic commissure

	Optic fibers extend to optic chiasma
	Cornea with three layers
	Brain: Inferior colliculus (in mesencephalon)
	Cerebral hemispheres expand beyond lamina terminalis
	Cerebral hemispheres extend over two-thirds of diencephalon
	Interpeduncular groove
	Medial septal nucleus
	Nigrostriatal fibers
	Nucleus of diagonal band
	Sacrocaudal spinal cord formation (secondary neurulation) complete
	Sensory pathways: Cuneate and gracile decussating fibers
	Septum verum
	Spinothalamic tract
7 weeks, 1 day - 8 weeks ï¿½ï¿½	Stomach: Folds in stomach wall
7 weeks, 2 days ï¿½ï¿½	Arteries and veins of heart complete
7 weeks, 3 days ï¿½ï¿½	Volar pads begin to emerge on fingertips
	Chondrocranium with dorsum sellae and hypophysial fossa
	Dens (of second cervical vertebrae)
	Sternoclavicular joint and manubrium
	The knee joints have arrived
	Trachea: Thyroid cartilage
	Wrists slightly flexed
	Gluteus medius and gluteus minimus muscles
	Iliacus muscles
	Mylohyoid and infrahyoid muscles
	Orbicularis oculi muscles
	Submandibular gland: Solid ducts with definitive branches
	Anterior and posterior choroid arteries
	Left superior vena cava disappears (Stages 21-23)
	Scalp vascular plexus moving toward vertex
	Cornea: Substantia propria layer
	Fibers of optic nerve reach brain
	Eyelids growing rapidly
	Anterior and inferior horns of lateral ventricle
	Brain: Insula within cerebral hemisphere
	C-shaped lateral ventricle

	Cerebral hemispheres cover 75% of diencephalon
	Cerebral hemispheres cover more than half of diencephalon
	Cortical plate within primordial plexiform layer
	Glial and neurilemmal (Schwann) cells within cranial nerves
	Global pallidus internus
	Internal fiber layer of cerebellum
	Lateral olfactory tract
	Primordium of dentate nucleus
	Pyramidal cells in hippocampus
	Subthalamic nucleus proper, entopeduncular nucleus, and globus pallidus externus within subthalamus
	Sulcus transversus rhombencephali
	Ventral part of lateral geniculate body
7ï¿½ weeksï¿ï¿½½	Hands begin to touch face
	The hands touch each other as do the feet!
	Fingertips thicken
	Plantar pads toes
	EKG pattern similar to adult
7 weeks, 4 days ï¿ï¿½½	The fingers are free
7 weeks, 5 days ï¿ï¿½½	Bone-forming cells called osteoblasts emerge
	Bone-forming cells emerge
	Endolymphatic and jugular foramina
	Hands can reach one another and fingers can overlap
	Optic foramen, foramen rotundum, internal acoustic foramen
	Osteoblasts emerge
	Pelvis: Obturator foramen
	Obturator internus muscles
	Rectus femoris muscle
	Large glomeruli present within metanephros
	Submandibular gland: Secondary branching with lumen formation starting at oral end of duct
	Costodiaphragmatic recess of pleural cavity
	Chordae tendineae (Stages 22 and 23)
	Intradural veins (sinuses)
	Scalp vascular plexus 75% of the way to the vertex
	Cochlear duct's second loop growing upward
	Scleral condensation
	Tragus and antitragus taking shape

	Eyelids continue growing rapidly over the surface of the cornea
	Optic nerve acquires a sheath
	Brain: Claustrum
	Brain: Cortical plate within cerebral hemispheres
	Brain: Internal capsule with connections to epithalamus, dorsal thalamus, and mesencephalon
	Brain: Putamen
	Cerebral hemispheres cover 75% of diencephalon
	Commissural plate thickens
	Cortical plate expanding rapidly
	Folds in roof of third ventricle
	Nerve fibers between neopallial subplate and internal capsule
	Thalamocortical fibers
7 weeks, 6 days ï¿½ï¿½	The toes are free
8 weeks ï¿½ï¿½	Complex response to touch
	More frequent hand-to-face contact
	Mouth opens & closes
	Squinting
	The embryo floats and rolls over in the womb
	Hairs first appear in eyebrows & around mouth
	Skin multi-layered, loses transparency
	Ductus deferens
	Interstitial cells forming within testis
	Testicular tubules
	Male embryos are making testosterone already!
	Anterior inferior iliac spine
	Costal cartilage
	Enamel organ
	Femur: Head and acetabular fossa
	Glenoid fossa
	Greater trochanter
	Head of humerus
	Inguinal ligament
	Joint development: Cavitation underway in hip, knee, and ankle (in some embryos)
	Joint development: Cavitation underway in shoulder, elbow, and wrist (in some embryos)
	Nucleus pulposus (from notochord)
	Ossification underway in scapula and distal phalanges in some embryos
	Pubic symphysis

	Scapular spine and notch
	Skull: Foramen magnum (wide)
	Skull: Ossification underway in some embryos
	Superior and inferior pubic rami
	The embryo's joints are similar to adult joints
	Ulna: Styloid process and olecranon
	Vertebrae cartilaginous (33 or 34 in number)
	Anterior digastric muscles
	Depressor anguli oris muscle
	Diaphragm complete
	Esophagus: Longitudinal muscles
	Obliquus superior capitus muscle
	Obturator externus, gluteus maximus, and hamstring muscles
	Posterior belly of the digastric muscle
	Psoas tendon
	Rectus sheath with anterior and posterior lamina
	Temporal and lateral pterygoid muscles
	Zygomaticus major muscle
	Kidneys at level of first three lumbar vertebrae
	Metanephros: Numerous large glomeruli
	Metanephros: Secretory tubules elongating and becoming convoluted
	Sinusal tubercle
	Urethra
	Urine production and release
	Gastrolienal ligament
	Nerves reaching intestinal loop
	Peristalsis in large intestine
	Submandibular gland: Lumen present in terminal portions of duct
	Submandibular gland: Mesodermal sheath surrounds gland
	Unfused uvula (edge of unfused palatine shelf) and secondary palate
	Occasional breathing motions begin
	Pseudoglandular stage begins
	Azygos vein
	Blood supply to the brain closely resembles adult pattern
	Hemiazygos veins
	Inferior epigastric artery
	Inferior vena cava valve at junction of right atrium
	Scalp vascular plexus nearing vertex
	Submandibular glands: Angiogenesis begins around epithelial tree (ducts)

	Superior sagittal sinus
	Cochlear duct's 2.5 coils nearly complete
	Cranial nerve distribution mimics adult pattern
	Ear drum
	Eye: Secondary vitrous body
	Lens: Secondary lens fibers emerging
	Retina: Eight layers present
	Retina: Four of the ten adult layers present
	Tympanic membrane
	Eyelids fusing laterally and medially
	Optic tract reaches ventral portion of lateral geniculate body
	"The hindbrain "presents striking resemblance to that of the newborn."
	"The rhombencephalon...presents striking resemblance to that of the newborn."
	Amygdala area
	Brain represents 43% of embryo
	Brain: Caudate nucleus and putamen within corpus striatum
	Cerebellar commissures
	Cerebellum with external germinal layer
	Cerebral hemispheres cover lateral portion of diencephalon
	Choroid plexus now lobular
	Cortical plate covers nearly all of neopallial surface
	Dura lines entire vertebral canal
	Fasciculus cuneatus and fasciculus gracilis form the decussation of the medial lemnisci
	Greater palatine nerve
	Grey and white matter
	Hippocampus reaches temporal pole
	Inferior and superior cerebellar peduncles
	Most cisterns present
	Principal nucleus of inferior olivary nuclei
	Pyramidal decussations
	Right- and left-handedness emerges
	Suprapineal recess
	Suprascapular nerve
	Vermis of cerebellum
	Crown-heel length 4.3 cm
	Embryo contains approximately 1 billion (10^9) cells
	Embryonic Period Ends
	The 8-week embryo has formed more than 4,000 permanent body parts.

Unit 9: 8 to 9 Weeks

8 weeks, 1 day ï¿½ï¿½	Humerus: Bone marrow replaces cartilage
8 weeks, 1 day - 9 weeks ï¿½ï¿½	Anal canal patent
8ï¿½ weeks ï¿½ï¿½	Eyelids completely fused
	Neurons synapse in cerebral cortex (marginal zone)
9 weeks ï¿½ï¿½	Bends hip & knee if sole of foot touched
	Drinking fluid is becoming routine
	Sucking the thumb
	The young fetus now sighs, stretches, moves the head, opens the mouth, and moves the tongue
	Tongue movement
	Female fetuses have early reproductive cells in their ovaries
	Thyroid gland weighs 2 grams
	Small intestine peristalsis
	External capsule
	Face, hands, and feet sense light touch
	Olivary nucleus with five components

Unit 10: 9 to 10 Weeks

9 weeks - 10 weeks ï¿½ï¿½	Early vocal cords
	Larynx recanalizes
	My weight will rise more than 75% this week
9ï¿½ weeks ï¿½ï¿½	I yawn when I want
9 weeks, 4 days ï¿½ï¿½	Yawns
10 weeks ï¿½ï¿½	Eyes roll downward reflexively
	Palatine tonsils
	Fingernails and toenails begin to grow!
	Three-layered epidermis
	Tiny unique fingerprints have arrived!
	Now, all the bones are getting harder
	Tooth buds (secondary teeth)
	Glomeruli formation begins
	Physiologic herniation ends

	Commissure of the fornix
	Corpus callosum begins
	Crown-heel length 7.5 cm
Unit 11: 10 to 11 Weeks	
10 weeks - 12 weeks ï¿½ï¿½	Langerhans cells enter epidermis
10ï¿½ weeksï¿½ï¿½	Volar and plantar pads regress
11 weeks ï¿½ï¿½	The face now makes complex expressions
	Immunological competence
	Intermediate layer
	Nose & lips completely formed
	Now you can tell if your baby is a girl or a boy!
	Thyroid gland weighs 12 grams
	Intestines absorb water & glucose
	Small intestine lined with villi
	Auditory cells: inner & outer hair cells
	Crown-heel length
Unit 12: 11 to 12 Weeks	
11 weeks - 12 weeks ï¿½ï¿½	Weight increases by 60% this week
12 weeks ï¿½ï¿½	Hands touch the mouth up to 50 times per hour
	T lymphocytes leave thymus
	Sebaceous glands
	Many different hormones are present in pituitary gland
	Thyroid gland produces hormone
	Palate fuses
	Upper limbs reach final proportion
	All facial muscles in final positions
	Bladder resembles smooth muscle
	Bowel movements
	Liver: Bile production begins
	There are taste buds all over the mouth
	Corpus callosum
	Crura cerebri
	Myelination in spinal cord
	Crown-heel length 12 cm
	Head circumference 10 cm
Unit 13: 3 to 4 Months	

13 weeks ï¿½ï¿½
Teeth are growing

Cilia lining airways
Most of body sensitive to touch
Crown-heel length 15 cm

14 weeks ï¿½ï¿½
Girls move their jaws more than the boys do

Light touch to mouth evokes turn toward stimulus
4-lobed cerebral cortex
Cerebellum resembles adult structure
Crown-heel length 17 cm
Fat deposits in cheeks

15 weeks ï¿½ï¿½
Stem cells arrive in bone marrow

Body fat emerges throughout the body
Glucagon in fetal bloodstream
Digestive enzymes
Crown-heel length 19.5 cm

16 weeks ï¿½ï¿½
Quickening

Fat deposits upper & lower limbs
Tooth enamel
Colon lined with villi
Bronchial tree nearly complete
Canalicular stage begins
Hormonal stress response to invasive procedures
Crown-heel length 21 cm

Unit 14: 4 to 5 Months

17 weeks ï¿½ï¿½
Retina has discrete layers

18 weeks ï¿½ï¿½
Apocrine sweat glands

Cream-like substance protects skin
Sweat glands
Insulin secretion
Speaking motion of larynx
Corpus callosum complete

19 weeks ï¿½ï¿½
Melanin production

Number of oogonia peak (at about 7 million) within fetal ovaries

	Daily cycles in biological rhythms
	Sulci on surface of cerebral hemispheres
20 weeks ï¿½ï¿½	All skin layers and structures
	Peyer's patches
	Surfactant production (low levels)
	Hearing and responding to sound begins
	Hearing and responding to sound begins
	Crown-heel length 28 cm
	Head circumference 20 cm
Unit 15: 5 to 6 Months	
20 weeks - 24 weeks ï¿½ï¿½	Eyelids separate, eyes open and close
21 weeks ï¿½ï¿½	Periderm disappears
	Stratum corneum
21 weeks - 22 weeks ï¿½ï¿½	If born prematurely from this point on, survival is possible
22 weeks ï¿½ï¿½	Cornea structure
	Behavioral states
23 weeks ï¿½ï¿½	Brain weight 100 grams
24 weeks ï¿½ï¿½	Blink-startle response; females before males
	Crown-heel length 34.5 cm
Unit 16: 6 to 7 Months	
25 weeks ï¿½ï¿½	Intestinal lining contains all adult cell types
	Rods & cones
	The ability to taste
26 weeks ï¿½ï¿½	Additional fat deposits decrease wrinkles
	Tear production
	Terminal sac stage begins
	The ability to smell has arrived
26 weeks - 38 weeks ï¿½ï¿½	Brain weight increases 400% to 500%

27 weeks ï¿½ï¿½ Pupils react to light

28 weeks ï¿½ï¿½ Distinguishes sounds of different frequencies

Crown-heel length 39.5 cm

Unit 17: 7 to 8 Months

30 weeks ï¿½ï¿½ Breathing motions are common even though there is no air in the womb

6-layered cerebral cortex

Head circumference 30 cm

32 weeks ï¿½ï¿½ Esophagus: Lower esophagus muscles functional

Glomeruli formation complete

Alveoli

Memory - music preferences

Crown-heel length 45 cm

Unit 18: 8 to 9 Months

32 weeks - 36 weeks ï¿½ï¿½ Prenatal food affects newborn taste preferences

34 weeks ï¿½ï¿½ Rapid weight gain

35 weeks ï¿½ï¿½ Firm grip

Amniotic fluid volume peaks

36 weeks ï¿½ï¿½ Surfactant production accelerates

Brain weight 300 grams

Crown-heel length 48.5 cm

Unit 19: 9 Months to Birth

37 weeks ï¿½ï¿½ Fetus drinks an estimated 15 oz (or 450cc) of amniotic fluid/day

38 weeks ï¿½ï¿½ Air breathing begins

By term, the typical umbilical cord measures 20 to 24 inches (50 to 60 cm)

Heart beats 54 million times before birth

Major circulatory changes

Spinal cord ends at third lumbar vertebrae

Brain weight 350 grams

	Crown-heel length 50 cm
	Fetus initiates labor
	Head circumference 35 cm
	Time to be born!
66 weeks, 5 days ï¿½ï¿½	Premuscle cells form sheets representing muscles of facial expression