


Prenatal Development Timeline

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










































Unit 1: The First Week	
Day 0	<ul style="list-style-type: none"> Embryonic period begins Fertilization resulting in zygote formation
Day 1	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Fertilization - development begins with a single-cell embryo!!!
Day 2	<ul style="list-style-type: none"> Early pregnancy factor (EPF) Activation of the genome Blastomeres begin rapidly dividing Zygote divides into two blastomeres (24 - 30 hours from start of fertilization)
Day 3	<ul style="list-style-type: none"> Compaction
Day 4	<ul style="list-style-type: none"> Embryonic disc Free floating blastocyst Hypoblast & epiblast Inner cell mass See where the back and chest will be
Day 5	<ul style="list-style-type: none"> Hatching blastocyst
Day 6	<ul style="list-style-type: none"> Embryo attaches to wall of uterus Solid syncytiotrophoblast & cytotrophoblast
1 week	<ul style="list-style-type: none"> Chorion Chorionic cavity Extra-embryonic mesoderm (or mesoblast) Placenta begins to form
Unit 2: 1 to 2 Weeks	
1 week, 1 day	<ul style="list-style-type: none"> Amnioblasts present; amnion and amniotic cavity formation begins Bilaminar embryonic disc Positive pregnancy test
1 week, 2 days	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Intercommunicating lacunae network Longitudinal axis Prechordal plate










































	 Trophoblastic vascular circle
1 week, 5 days	 Implantation complete
	 Yolk sac
	 Embryonic disc diameter: 0.15 to 0.20 mm
1 week, 6 days	 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	 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	 3 germ layers
	 Cloacal membrane
	 Primitive groove
	 Rostral-caudal orientation
2 weeks, 2 days	 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	 Foregut, midgut, and hindgut
	 Uteroplacental circulation well established
	 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, 6 days	 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	■ Blood and blood vessels

Unit 4: 3 to 4 Weeks

3 weeks, 1 day	■ 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
	 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	 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)
	 Adenohypophyseal pouch
	 Adenohypophysis
	 Lamina terminalis
	 Mesencephalon contains tectum and tegmentum
	 Neural crest production and migration continue
	 Neurohypophyseal primordia
	 Neuropore (near brain) closes
	 Notochord
	 Segmentation of mesoblast alongside neural tube bilaterally
	 Somites: Pairs 13 through 20
3 weeks, 3 days - 5 weeks, 6 days	 All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17
3 weeks, 5 days	 Telopharyngeal bodies
	 Alimentary epithelium invades stroma of liver
	 Alimentary epithelium 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)

	<div></div> Rostral and caudal cardinal veins along brain and spinal cord feeding common cardinal veins
	<div></div> Septum primum and foramen primum sometimes present
	<div></div> Septum primum, foramen primum
	<div></div> Sinu-atrial foramen prevents backflow into sinus venosus
	<div></div> Sinus venosus collects venous blood from entire embryo
	<div></div> Superior vena cava, inferior vena cava, and sinus venosus collecting all venous blood
	<div></div> Unidirectional circulation
	<div></div> Vitelline arteries and veins
	<div></div> Hypoglossal cord (CN XII) enters pharyngeal arch 4
	<div></div> Otocyst nearly closed
	<div></div> Brain involves 40% of neural tube
	<div></div> Brain: Embryonic commissural plate
	<div></div> Ectodermal ring complete
	<div></div> Hypoglossal nucleus (CN XII)
	<div></div> Lowermost spinal cord formation begins
	<div></div> Mamillary recess
	<div></div> Marginal layer in rhombencephalon
	<div></div> Mesencephalic flexure at 90 degrees
	<div></div> Mesencephalon with two neuromeres: M1 and M2
	<div></div> Motor neurons in basal plate of rhombencephalon
	<div></div> Neural tube closes (lower back)
	<div></div> Neurofibrils form in rhombencephalon
	<div></div> Primary neurulation ends
	<div></div> Primordia of ventral thalamus and subthalamus in diencephalon
	<div></div> Sulcus limitans
	<div></div> Sulcus limitans in midbrain
	<div></div> Somites: Pairs 21 through 29
	<div></div> Upper limb primordium at level of somites 8 to 10
	<div></div> Progressively C-shaped embryo
4 weeks	<div></div> Spleen primordia
	<div></div> Thymic primordia
	<div></div> Lower lip forms from merging of mandibular processes
	<div></div> Melanoblasts in epidermis
	<div></div> Skin is so thin, you can see through it!
	<div></div> Gonadal ridge extends from C-7 to T-8 levels
	<div></div> Primordial germ cells migrate to mesonephric ridges
	<div></div> Primordial germ cells number several hundred
	<div></div> Urorectal septum
	<div></div> Thyroid bilobed and attached to pharynx by thyroglossal 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
	Ductus venosus
	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
	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 subdivides 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 - 5 weeks	Germ cells migrate to gonads
4 weeks, 4 days	Thymus
	Parathyrogenic zones
	Thyroglossal duct
	Thyroid pedicle 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
	Atrioventricular 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 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
	Sino-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
	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	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
	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	 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	 Wrist joints are forming
5 weeks, 2 days	 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 mesogastrum)
	 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 rostralateral 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
	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
5½ weeks	 Initial tooth formation
5½ weeks - 6 weeks	 Subtle movement begins
5 weeks, 4 days	 Cartilage formation
5 weeks, 5 days	 Nerve cells differentiating
5 weeks, 5 days - 7 weeks, 1 day	 Melanocytes in epidermis
5 weeks, 6 days	 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 emerges 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
	 Capillaries between adenohypophysis and hypothalamus
	 Commissure of the oculomotor nerves
	 Cortical nucleus in amygdaloid body
	 Dentate and isthmus 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
6 weeks	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
	Synapses form in spinal cord
	Crown-heel length 1.6 cm

Unit 7: 6 to 7 Weeks

6 weeks, 2 days	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
	 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
6½ weeks	 The hands begin to move
	 Volar pads on palms
	 Bones first form in the collar bones and lower jaw
6 weeks, 5 days	 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 ilium
	Labiodental lamina: Inner dental lamina and outer labi gingival 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 transverse 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 inferior 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 primitive 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 pre-muscle 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 ophthalmic, maxillary, and mandibular divisions reach their destinations
	Vagal trunks, anterior and posterior, extending into abdomen
	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	■ Feet polygon-shaped
	■ Cloacal membrane ruptures
7 weeks	■ 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	■ 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
	 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	 Stomach: Folds in stomach wall
7 weeks, 2 days	 Arteries and veins of heart complete
7 weeks, 3 days	 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
	 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
	 Globus 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
7½ weeks	 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	 The fingers are free
7 weeks, 5 days	 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
	 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	 The toes are free
8 weeks	 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
	Gastrosplenic 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 vitreous body
	Lens: Secondary lens fibers emerging
	Retina: Eight layers present

	<input type="checkbox"/> Retina: Four of the ten adult layers present
	<input type="checkbox"/> Tympanic membrane
	<input checked="" type="checkbox"/> "The hindbrain "presents striking resemblance to that of the newborn."
	<input checked="" type="checkbox"/> "The rhombencephalon...presents striking resemblance to that of the newborn."
	<input checked="" type="checkbox"/> Amygdala area
	<input checked="" type="checkbox"/> Brain represents 43% of embryo
	<input checked="" type="checkbox"/> Brain: Caudate nucleus and putamen within corpus striatum
	<input checked="" type="checkbox"/> Cerebellar commissures
	<input checked="" type="checkbox"/> Cerebellum with external germinal layer
	<input checked="" type="checkbox"/> Cerebral hemispheres cover lateral portion of diencephalon
	<input checked="" type="checkbox"/> Choroid plexus now lobular
	<input checked="" type="checkbox"/> Cortical plate covers nearly all of neopallial surface
	<input checked="" type="checkbox"/> Dura lines entire vertebral canal
	<input checked="" type="checkbox"/> Fasciculus cuneatus and fasciculus gracilis form the decussation of the medial lemnisci
	<input checked="" type="checkbox"/> Greater palatine nerve
	<input checked="" type="checkbox"/> Grey and white matter
	<input checked="" type="checkbox"/> Hippocampus reaches temporal pole
	<input checked="" type="checkbox"/> Inferior and superior cerebellar peduncles
	<input checked="" type="checkbox"/> Most cisterns present
	<input checked="" type="checkbox"/> Principal nucleus of inferior olivary nuclei
	<input checked="" type="checkbox"/> Pyramidal decussations
	<input checked="" type="checkbox"/> Right- and left-handedness emerges
	<input checked="" type="checkbox"/> Suprapineal recess
	<input checked="" type="checkbox"/> Suprascapular nerve
	<input checked="" type="checkbox"/> Vermis of cerebellum
	<input type="checkbox"/> Crown-heel length 4.3 cm
	<input type="checkbox"/> Embryo contains approximately 1 billion (10^9) cells
	<input type="checkbox"/> Embryonic Period Ends
	<input type="checkbox"/> The 8-week embryo has formed more than 4,000 permanent body parts.

Unit 9: 8 to 9 Weeks

8 weeks, 1 day	<input checked="" type="checkbox"/> Humerus: Bone marrow replaces cartilage
8 weeks, 1 day - 9 weeks	<input checked="" type="checkbox"/> Anal canal patent
8½ weeks	<input checked="" type="checkbox"/> Neurons synapse in cerebral cortex (marginal zone)
9 weeks	<input checked="" type="checkbox"/> Bends hip & knee if sole of foot touched
	<input checked="" type="checkbox"/> Drinking fluid is becoming routine
	<input checked="" type="checkbox"/> Sucking the thumb
	<input checked="" type="checkbox"/> The young fetus now sighs, stretches, moves the head, opens the mouth, and moves the tongue
	<input checked="" type="checkbox"/> 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	Early vocal cords
	Larynx recanalizes
	My weight will rise more than 75% this week
9½ weeks	I yawn when I want
9 weeks, 4 days	Yawns
10 weeks	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	Langerhans cells enter epidermis
10½ weeks	Volar and plantar pads regress
11 weeks	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	Weight increases by 60% this week
12 weeks	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	Teeth are growing
	Cilia lining airways
	Most of body sensitive to touch
	Crown-heel length 15 cm
14 weeks	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	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	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	Retina has discrete layers
18 weeks	Apocrine sweat glands
	Cream-like substance protects skin
	Sweat glands
	Insulin secretion
	Speaking motion of larynx

	■ Corpus callosum complete
19 weeks	■ 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	■ 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




















21 weeks	■ Periderm disappears
	■ Stratum corneum
21 weeks - 22 weeks	□ If born prematurely from this point on, survival is possible
22 weeks	■ Behavioral states
23 weeks	□ Brain weight 100 grams
24 weeks	■ Blink-startle response; females before males
	□ Crown-heel length 34.5 cm

Unit 16: 6 to 7 Months

25 weeks	■ Intestinal lining contains all adult cell types
	■ Rods & cones
	■ The ability to taste
26 weeks	■ Additional fat deposits decrease wrinkles
	■ Tear production
	■ Terminal sac stage begins
	■ The ability to smell has arrived
26 weeks - 38 weeks	■ Brain weight increases 400% to 500%
27 weeks	■ Pupils react to light
28 weeks	■ Distinguishes sounds of different frequencies
	□ Crown-heel length 39.5 cm

Unit 17: 7 to 8 Months

30 weeks	■ Breathing motions are common even though there is no air in the womb
	■ 6-layered cerebral cortex
	□ Head circumference 30 cm
32 weeks	■ 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	 Prenatal food affects newborn taste preferences
34 weeks	 Rapid weight gain
35 weeks	 Firm grip
	 Amniotic fluid volume peaks
36 weeks	 Surfactant production accelerates
	 Brain weight 300 grams
	 Crown-heel length 48.5 cm
Unit 19: 9 Months to Birth	
37 weeks	 Fetus drinks an estimated 15 oz (or 450cc) of amniotic fluid/day
38 weeks	 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	 Premuscle cells form sheets representing muscles of facial expression