

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	$\frac{1}{2}$ $\frac{1}{2}$	■ Embryonic period begins	
		■ Fertilization resulting in zygote formation	
Day 1	$\frac{1}{2}$ $\frac{1}{2}$	■ Embryo is spherically shaped and called a morula comprised of 12 to 16 blastomeres	
Day 2	$\frac{1}{2}$ $\frac{1}{2}$	■ Early pregnancy factor (EPF)	
		■ Activation of the genome	
		■ Blastomeres begin rapidly dividing	
Day 3	$\frac{1}{2}$ $\frac{1}{2}$	■ Compaction	
Day 4	$\frac{1}{2}$ $\frac{1}{2}$	■ Embryonic disc	
		■ Hypoblast & epiblast	
		■ Inner cell mass	
		■ See where the back and chest will be	
Day 5	$\frac{1}{2}$ $\frac{1}{2}$	■ Hatching blastocyst	
Day 6	$\frac{1}{2}$ $\frac{1}{2}$	■ Embryo attaches to wall of uterus	
		■ Solid syncytiotrophoblast & cytotrophoblast	
1 week	$\frac{1}{2}$ $\frac{1}{2}$	■ Chorion	
		■ Chorionic cavity	
		■ Extra-embryonic mesoderm (or mesoblast)	
		■ Placenta begins to form	
Unit 2: 1 to 2 Weeks			
1 week, 1 day	$\frac{1}{2}$ $\frac{1}{2}$	■ Amnioblasts present; amnion and amniotic cavity formation begins	
		■ Bilaminar embryonic disc	
		■ Positive pregnancy test	

1 week, 2 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Corpus luteum of pregnancy
	<ul style="list-style-type: none"> Cells in womb engorged with nutrients
	<ul style="list-style-type: none"> Exocoelomic membrane
	<ul style="list-style-type: none"> Isolated trophoblastic lacunae
	<ul style="list-style-type: none"> Embryonic disc 0.1 mm diameter
1 week, 4 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Intercommunicating lacunae network
	<ul style="list-style-type: none"> Longitudinal axis
	<ul style="list-style-type: none"> Prechordal plate
	<ul style="list-style-type: none"> Trophoblastic vascular circle
1 week, 5 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Implantation complete
	<ul style="list-style-type: none"> Embryonic disc diameter: 0.15 to 0.20 mm
1 week, 6 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Blood islands in umbilical vesicle
	<ul style="list-style-type: none"> Angiogenesis in chorionic mesoblast
	<ul style="list-style-type: none"> Blood vessels in villi
	<ul style="list-style-type: none"> Connecting stalk
	<ul style="list-style-type: none"> Primordial blood vessels
	<ul style="list-style-type: none"> Amnion with single cell layer
	<ul style="list-style-type: none"> Chorionic villi
2 weeks $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Embryonic epiblast gives rise to primitive streak and primitive node and
	<ul style="list-style-type: none"> Yolk sac
	<ul style="list-style-type: none"> Yolk sac
Unit 3: 2 to 3 Weeks	
2 weeks, 1 day $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> 3 germ layers
	<ul style="list-style-type: none"> Cloacal membrane
	<ul style="list-style-type: none"> Primitive groove
	<ul style="list-style-type: none"> Rostral-caudal orientation
2 weeks, 2 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Erythroblasts in yolk sac
	<ul style="list-style-type: none"> Three types of blood-forming cells in yolk sac
	<ul style="list-style-type: none"> Primordial germ cells
	<ul style="list-style-type: none"> Allantoic diverticulum
	<ul style="list-style-type: none"> Allantoic diverticulum
	<ul style="list-style-type: none"> Amnion with two cell layers
	<ul style="list-style-type: none"> Notochordal process
	<ul style="list-style-type: none"> Secondary villi

2 weeks, 4 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Foregut, midgut, and hindgut
	<ul style="list-style-type: none"> Uteroplacental circulation well established
	<ul style="list-style-type: none"> Prechordal plate with 1 retinal field
	<ul style="list-style-type: none"> Brain is first organ to appear
	<ul style="list-style-type: none"> Caudal eminence
	<ul style="list-style-type: none"> Neural ectoderm
	<ul style="list-style-type: none"> Neural groove and neural folds
	<ul style="list-style-type: none"> Notochordal and neurenteric canals
	<ul style="list-style-type: none"> Notochordal plate
	<ul style="list-style-type: none"> Connecting stalk
	<ul style="list-style-type: none"> Primitive pit (or notochordal pit)
2 weeks, 5 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Prechordal plate with 2 retinal fields
2 weeks, 6 days $\frac{1}{2}$ $\frac{1}{2}$	<ul style="list-style-type: none"> Numerous blood islands in umbilical vesicle
	<ul style="list-style-type: none"> Septum transversum (primitive diaphragm)
	<ul style="list-style-type: none"> Foregut
	<ul style="list-style-type: none"> Oropharyngeal membrane
	<ul style="list-style-type: none"> Pharyngeal pouch 1
	<ul style="list-style-type: none"> Stomodeum forming
	<ul style="list-style-type: none"> Blood vessels emerge simultaneously in umbilical vesicle, embryo proper, amnion, and connecting stalk
	<ul style="list-style-type: none"> Common umbilical artery
	<ul style="list-style-type: none"> Dorsal aortae (paired)
	<ul style="list-style-type: none"> First pair of aortic arches
	<ul style="list-style-type: none"> Heart: Cardiogenic plate, cardiac jelly, myocardial mantle, and endocardial plexus
	<ul style="list-style-type: none"> Left ventricle, right ventricle, conotruncus
	<ul style="list-style-type: none"> Paired pericardial cavities
	<ul style="list-style-type: none"> Paired tubular heart
	<ul style="list-style-type: none"> Hindbrain with four rhombomeres
	<ul style="list-style-type: none"> Isthmus rhombencephali demarcates midbrain and hindbrain
	<ul style="list-style-type: none"> Mesencephalon (or midbrain)
	<ul style="list-style-type: none"> Neural cord within caudal eminence
	<ul style="list-style-type: none"> Neural groove deepens substantially
	<ul style="list-style-type: none"> Primary neuromeres
	<ul style="list-style-type: none"> Three main divisions of brain
	<ul style="list-style-type: none"> Cephalic and caudal folds
	<ul style="list-style-type: none"> Neural crest: Rostral and facial
	<ul style="list-style-type: none"> Primitive streak reaches neurenteric canal
	<ul style="list-style-type: none"> Somites with central somitocoels: Pairs 1 through 3

Unit 4: 3 to 4 Weeks

3 weeks, 1 day
1/2 1/2

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

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

3 weeks, 3 days ½	 Somites: Pairs 4 through 12
	 Primordial germ cells begin moving from umbilical vesicle to hindgut
	 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, 6 1/2 days	 All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17
3 weeks, 5 days 1/2	 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)
	 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 venous 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 $\frac{1}{2}$ $\frac{1}{2}$	Spleen primordia
	Thymic primordia
	Lower lip forms from merging of mandibular processes
	Melanoblasts in epidermis
	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 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
	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
	Stalk of umbilical vesicle lengthens and narrows
	Stomach assumes shape of a spindle
	Umbilical vesicle at height of development
	Vitelline duct
	Bronchial buds
	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: 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-vomerolateral 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
	 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, 4 days $\frac{1}{2}$ $\frac{1}{2}$

	 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
	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  $\frac{1}{2}$ $\frac{1}{2}$	 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
	 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
	 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  	 Arytenoid and epiglottal swellings
$\frac{1}{2}$ $\frac{1}{2}$	
	 Lobar pattern mimics adult pattern
	 T-shaped laryngeal inlet
	 Pacemaker cells

Unit 6: 5 to 6 Weeks

5 weeks, 2 days  	 Apical epidermal ridges
$\frac{1}{2}$ $\frac{1}{2}$	
	 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 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
	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
5½ weeks ½½	 Initial tooth formation
5½ weeks - 6 weeks ½½	 Subtle movement begins
5 weeks, 5 days - 7 weeks, 1½ days ½½	 Melanocytes in epidermis
5 weeks, 6 days ½½	 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
	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   	 Blood forming in liver
$\frac{1}{2}$ $\frac{1}{2}$	
	 Milk lines
	 Handplates develop subtle flattening
	 Medial skull cartilages: Parachordal, hypophyseal, and trabecular
	 Tooth buds (primary teeth)
	 Intestines fill base of umbilical cord
	 Crown-heel length 1.6 cm

Unit 7: 6 to 7 Weeks



































6 weeks, 2 days   	 Angiogenesis begins inside gonads
$\frac{1}{2}$ $\frac{1}{2}$	
	 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
	 Humerus, radius, and ulna
	 Humerus: Chondrocytes in phases one through three







































	<div></div> Scapula and clavicle
	<div></div> Semicircular ducts form in order: anterior, posterior, and lateral
	<div></div> Sternum: Episternal cartilage created from fusion of right and left sternal bars
	<div></div> Tibia and fibula
	<div></div> Toe rays sometimes present
	<div></div> Deltoid muscle
	<div></div> External and internal abdominal oblique muscles
	<div></div> Levator scapulae muscle
	<div></div> Longus cervicis and semispinalis cervicis muscles
	<div></div> Pectoralis major muscles
	<div></div> Platysma muscle
	<div></div> Rectus abdominis muscle
	<div></div> Rectus capitis posterior and semispinalis capitis muscles
	<div></div> Serratus anterior muscles
	<div></div> Splenius and longissimus muscles
	<div></div> Stapedius muscle
	<div></div> "Common excretory duct is disappearing"
	<div></div> Cloacal membrane ruptures (stages 18-19)
	<div></div> Primordia of secretory tubules
	<div></div> Esophagus with muscular and submucous coats
	<div></div> Submandibular gland primordia
	<div></div> Bronchial tree with subsegmental buds
	<div></div> Bronchial tree with well established segmental bronchi
	<div></div> Lingula of left upper lobe
	<div></div> Aortic and pulmonary valves assuming shape of a cup
	<div></div> Brachiocephalic veins, right and left
	<div></div> Inferior vena cava
	<div></div> Interventricular septum: membranous part begins forming
	<div></div> Left coronary artery arises from aorta
	<div></div> Mesenchyme ridges in place of future mitral and tricuspid valves
	<div></div> Pulmonary and aortic blood flows completely separate
	<div></div> Secondary interventricular foramen sometimes closing (stage 18-21) interventricular septum
	<div></div> Septum secundum and foramen ovale (stages 18-21)
	<div></div> Bucconasal membrane
	<div></div> Bucconasal membrane detaches opening up nasal airway
	<div></div> Crus commune
	<div></div> Ethmoidal epithelium emerges from upper medial nasal wall
	<div></div> 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 stapedia artery
	 External ear: Crus helices 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
	 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 1½	 Volar pads on palms








































6 weeks, 5 days $\frac{1}{2}$	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
	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 labiokingival 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 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 premuscle mass
	 Hypoglossal nerve (CN XII) innervates separating tongue muscles





































	 Linguoingival 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
	 Eyelids: Upper and lower lids present and growing
	 Sacculle 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  $\frac{1}{2}$ $\frac{1}{2}$	 Cloacal membrane ruptures

7 weeks  $\frac{1}{2}$ $\frac{1}{2}$	 Head rotates
	 Ovaries
	 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  $\frac{1}{2}$ $\frac{1}{2}$	 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  $\frac{1}{2}$ $\frac{1}{2}$	 Stomach: Folds in stomach wall
7 weeks, 2 days  $\frac{1}{2}$ $\frac{1}{2}$	 Arteries and veins of heart complete


7 weeks, 3 days  $\frac{1}{2}$	 Volar pads begin to emerge on fingertips
	 Chondrocranium with dorsum sellae and hypophysial fossa
	 Dens (of second cervical vertebrae)
	 Sternoclavicular joint and manubrium
	 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
	 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  $\frac{1}{2}$	 Fingertips thicken
	 Plantar pads toes
	 EKG pattern similar to adult
7 weeks, 5 days  $\frac{1}{2}$	 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
8 weeks  $\frac{1}{2}$ $\frac{1}{2}$	 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
	□ Ulna: Styloid process and olecranon
	□ Vertebrae cartilaginous (33 or 34 in number)
	■ Anterior digastric muscles
	■ Depressor anguli oris muscle
	■ Esophagus: Longitudinal muscles
	■ Obliquus superior capitis 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
	■ Sinus tubercle
	■ Urethra
	■ Gastrosplenic ligament
	■ Nerves reaching intestinal loop
	■ 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
	■ 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
	 Eye: Secondary vitreous 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 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
	 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  $\frac{1}{2}$ $\frac{1}{2}$

 Humerus: Bone marrow replaces cartilage

8 weeks, 1 day - 9 weeks $\frac{1}{2}$ $\frac{1}{2}$	Anal canal patent
8 $\frac{1}{2}$ weeks $\frac{1}{2}$ $\frac{1}{2}$	Eyelids completely fused
9 weeks $\frac{1}{2}$ $\frac{1}{2}$	Neurons synapse in cerebral cortex (marginal zone)
	Drinking fluid is becoming routine
	Sucking the thumb
	External capsule
	Olivary nucleus with five components
Unit 10: 9 to 10 Weeks	
9 weeks - 10 weeks $\frac{1}{2}$ $\frac{1}{2}$	Larynx recanalizes
10 weeks $\frac{1}{2}$ $\frac{1}{2}$	Palatine tonsils
	Three-layered epidermis
	Now, all the bones are getting harder
	Tooth buds (secondary teeth)
	Physiologic herniation ends
	Commissure of the fornix
	Crown-heel length 7.5 cm
Unit 11: 10 to 11 Weeks	
10 weeks - 12 weeks $\frac{1}{2}$ $\frac{1}{2}$	Langerhans cells enter epidermis
10 $\frac{1}{2}$ weeks $\frac{1}{2}$ $\frac{1}{2}$	Volar and plantar pads regress
11 weeks $\frac{1}{2}$ $\frac{1}{2}$	Intermediate layer
	Intestines absorb water & glucose
	Small intestine lined with villi
	Crown-heel length
Unit 12: 11 to 12 Weeks	
12 weeks $\frac{1}{2}$ $\frac{1}{2}$	Sebaceous glands
	Many different hormones are present in pituitary gland
	All facial muscles in final positions
	Bowel movements
	Liver: Bile production begins
	Corpus callosum
	Crura cerebri

	<div>Myelination in spinal cord</div> <div>Crown-heel length 12 cm</div> <div>Head circumference 10 cm</div>
Unit 13: 3 to 4 Months	
13 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Teeth are growing</div>
	<div>Crown-heel length 15 cm</div>
14 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Girls move their jaws more than the boys do</div>
	<div>Cerebellum resembles adult structure</div> <div>Crown-heel length 17 cm</div>
15 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Crown-heel length 19.5 cm</div>
16 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Quickening</div>
	<div>Colon lined with villi</div> <div>Canalicular stage begins</div> <div>Crown-heel length 21 cm</div>
Unit 14: 4 to 5 Months	
18 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Apocrine sweat glands</div>
	<div>Sweat glands</div>
19 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Melanin production</div>
	<div>Sulci on surface of cerebral hemispheres</div>
20 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Peyer's patches</div>
	<div>Surfactant production (low levels)</div> <div>Crown-heel length 28 cm</div> <div>Head circumference 20 cm</div>
Unit 15: 5 to 6 Months	
21 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Periderm disappears</div>
	<div>Stratum corneum</div>
22 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Cornea structure</div>
	<div>Behavioral states</div>
23 weeks $\frac{1}{2}$ $\frac{1}{2}$	<div>Brain weight 100 grams</div>

24 weeks				Crown-heel length 34.5 cm
Unit 16: 6 to 7 Months				
25 weeks				Intestinal lining contains all adult cell types
26 weeks				Terminal sac stage begins
28 weeks				Crown-heel length 39.5 cm
Unit 17: 7 to 8 Months				
30 weeks				Head circumference 30 cm
32 weeks				Esophagus: Lower esophagus muscles functional
				Crown-heel length 45 cm
Unit 18: 8 to 9 Months				
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				Heart beats 54 million times before birth
				Spinal cord ends at third lumbar vertebrae
				Brain weight 350 grams
				Crown-heel length 50 cm
				Head circumference 35 cm
				Time to be born!
66 weeks, 5 days				
				Premuscle cells form sheets representing muscles of facial expression