Respiratory System
Tubular branching system - controlled by inductive interactions between the mesoderm and the endoderm. Control is in the mesoderm

Adult anatomy
- Trachea
- Primary Bronchi
- Secondary Bronchi
- Tertiary Bronchi
- Bronchiole
- Terminal Bronchiole
- Alveolar Duct
- Alveolar Sac

Embryonic Period
Until week 7 – Formation of the trachea and bronchial tree
1st branching - Lung bud comes off ventrally form the foregut - called respiratory diverticulum. Growth is ventral and caudal.
2nd branching - bifurcation to left and right primary bronchial buds - trachea and larynx is formed.
3rd branching - asymmetric – Right and Left Primary Bronchi
  Right side - 3 secondary bronchial buds
  Left side - 2 secondary bronchial buds.
Buds are primordia for lung lobes
Pseudoglandular Period (8-16 weeks)

4th branching
right - 10 tertiary bronchi
left - 8 tertiary bronchi
14 more branchings to form the respiratory tree - producing terminal bronchioles
Histologically resembling a gland

Canalicular Period (16-26 weeks)

Terminal bronchiole divides into 2 or more respiratory bronchioles
Surrounding mesoderm becomes highly vascularized
Completion of this period is required for survival of premature infants

Terminal Sac Period (26 weeks - Birth)

Final branching of respiratory bronchioles associated with dense network of capillaries - terminal sacs or primitive alveoli.
Differentiation of cells –
- Type I alveolar cells – pneumocytes – gas exchange
- Type II secretory alveolar cells – pulmonary surfactant production
Differentiation continues until 8 years old.
Final 4 weeks – Alveolar period of lung development – enhanced formation of alveoli

Alveolar Period (36 weeks to term)

Maturation of alveoli - thinning of epithelial lining of terminal sac; increase in capillary network
Close association of epithelium with capillaries
Mature lung has 300-400 million terminal sacs.
Anomalies

Pulmonary agenesis - failure of lung bud or bronchial bud to branch or differentiate correctly. Abnormal number of lobes to complete absence of lung.
Pulmonary hypoplasia - reduced number of terminal air sacs - results from reduced volume of pleural cavity
Respiratory Distress Syndrome - Inadequate pulmonary surfactant results in infant death.
Pulmonary Surfactants are mixture of phospholipids and surfactant proteins that reduces surface tension of the alveolar lining - inhibiting alveolar collapse

Common Coelom / Mesentery

Somatic and Splanchnic Mesoderm line the common intraembryonic mesoderm
Dorsal and Ventral Mesenteries are derived from Splanchnic Mesoderm
Transient left and right components of the coelom
Ventral Mesentery mostly breaks down
Persist at level of stomach and liver - Ventral Mesogastrium and Falciform ligament of the liver

Diaphragm

The Diaphragm separates the Common Coelom into thoracic and abdominal components
Abdominal cavity – peritoneal cavity
Thoracic component – pleural cavities and pericardial cavity

Transverse Septum

Develops as a shelf from the ventral body wall caudal to the heart
Pleural Cavities

Pleural canals lateral to the gut
Initially contiguous with the pericardial and peritoneal cavities
Pleuropericardial folds separate pericardial and pleural cavities
Pleuroperitoneal folds separate pleural and peritoneal cavities

Diaphragmatic Hernias