HUMAN DEVELOPMENT · STUDY GUIDE

Exam 2 Study Guide

This guide covers chapters 3 and 4. You will follow a life from a single cell to a newborn: how genes are packaged and passed on, how the prenatal periods unfold on their schedule, what can harm them, and how care protects them. Then you will walk through labor and birth and meet a newborn who is far more capable than she looks. Work one chapter at a time. Read the "what to know" paragraphs, copy the tables out by hand, then try each worked case with the steps covered. Finish each chapter with its ten self-test items. The cram sheet at the end puts every number in one place.

WHAT THIS GUIDE COVERS

- Chapter 3 · DNA, genes, chromosomes (46, 23 pairs); alleles, genotype and phenotype; dominant, recessive and X-linked patterns; nondisjunction and trisomy 21; germinal, embryonic and fetal periods; teratogens and the three principles; prenatal care, folic acid and screening.
- Chapter 4 · the three stages of labor and the oxytocin loop; birth settings, doulas, medicated and prepared birth, cesarean delivery; anoxia, preterm birth and low birth weight; the Apgar score; newborn reflexes; newborn senses and how researchers test them.

CHAPTER 3

Genetics and Prenatal Development

Read it in full: **Chapter 3 in the textbook**. Practice it in the lab: **Punnett Square Builder** and **Teratogen Timeline**.

What to know

Inside almost every cell is a full copy of the genetic instructions, written in **DNA**, a twisted ladder (the double helix) whose rungs use four chemical letters, A, T, C and G, paired in a fixed way: A with T, C with G. A **gene** is a stretch of DNA that spells out one instruction, usually the recipe for one protein. Proteins build and run the body. A gene is a recipe, not destiny; how it is expressed depends on the rest of the body and the environment.

When a cell gets ready to divide, its DNA coils around proteins into **chromosomes**. A typical body cell holds **46 chromosomes in 23 pairs**. Twenty-two pairs are **autosomes**. The twenty-third pair is the sex chromosomes: XX in a typical female and XY in a typical male. One member of each pair came from the egg and one from the sperm, which is why you resemble both parents and neither exactly.

The versions of a gene that can sit at the same spot are **alleles**. Two matching alleles make a person **homozygous**; two different ones make the person **heterozygous**. The alleles you carry are your **genotype**; the trait that shows is your **phenotype**. A **dominant** allele shows its effect with one copy. A **recessive** allele shows only with two copies. A person with one of each is a **carrier**: the trait is hidden but can be passed on. Most traits, such as height, skin tone, temperament and intelligence, are **polygenic**: many genes plus the environment, so they vary along a smooth range.

Eggs and sperm come from **meiosis**, which halves the chromosome number to 23. Along the way, matching chromosomes swap segments (crossing over) and sort independently, so every gamete carries a new mix. That is why full siblings can be so different, and why everyone except an identical twin is genetically one of a kind.

Single-gene conditions follow patterns. In **autosomal dominant** inheritance, one altered allele is enough, so an affected parent has about a one in two chance of passing it to each child; Huntington's disease is the classic example. In **autosomal recessive** inheritance, a child needs two altered copies; two unaffected carriers have about a one in four chance of an affected child each pregnancy. Cystic fibrosis, sickle cell disease, Tay-Sachs disease and PKU follow this pattern. In **X-linked recessive** inheritance, the gene is on the X. Males have one X, so a single altered allele shows, which is why hemophilia, red-green color blindness and Duchenne muscular dystrophy appear far more often in males.

Nondisjunction is a failure of chromosomes to separate in meiosis, leaving a gamete with an extra or missing chromosome. **Down syndrome** (trisomy 21) means three copies of chromosome 21. It is associated with mild to moderate intellectual disability, characteristic facial features and more heart defects, and its chance rises with the mother's age. Sex chromosome conditions include Turner syndrome (45,X) and Klinefelter syndrome (47,XXY). Genetic risk is about probability, not blame, and a genetic counselor helps families turn odds into their own informed choices.

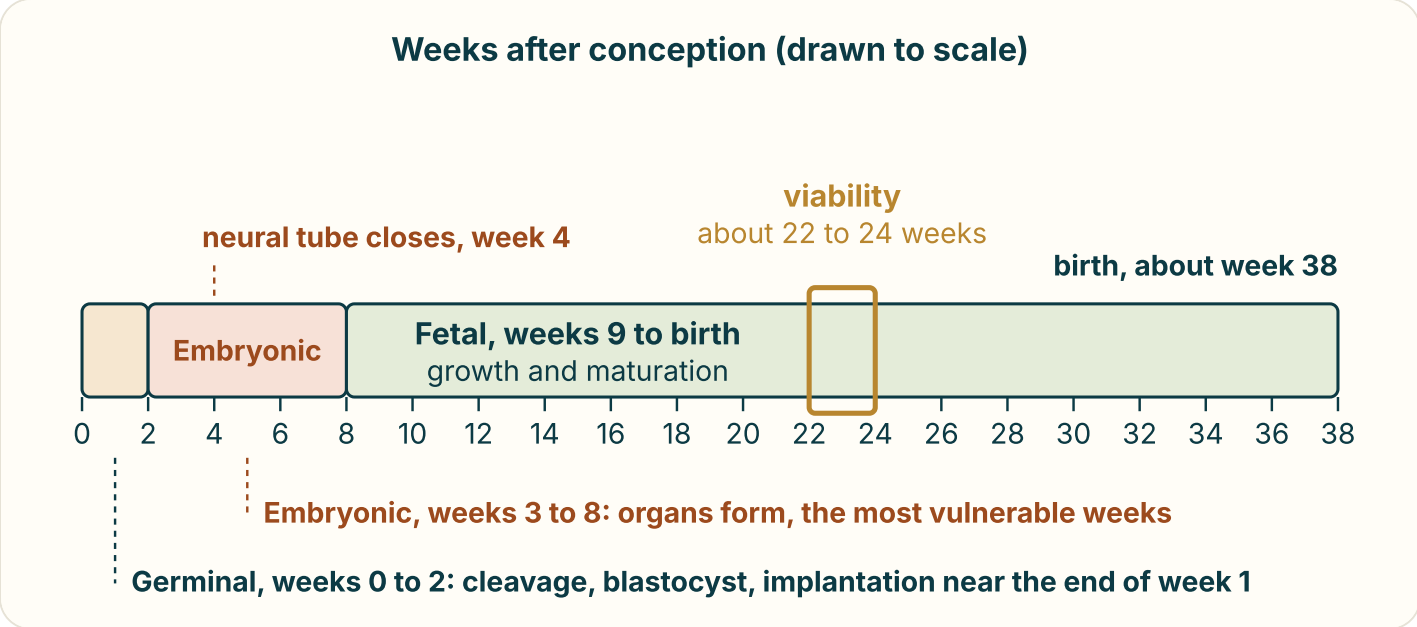
Development begins at **conception**, when the sperm and egg combine into a **zygote** with 46 chromosomes. The egg always gives an X, so the sperm (X or Y) decides biological sex. Identical (monozygotic) twins come from one zygote that splits; fraternal (dizygotic) twins come from two eggs and two sperm. The **germinal period** (conception to about 2 weeks) brings cleavage, a hollow **blastocyst** and **implantation** around the end of the first week; the outer cells start the placenta. The **embryonic period** (about weeks 3 to 8) is organogenesis: the neural tube closes in week 4, the heart beats, limbs and senses take shape. It is the most vulnerable stage. The **fetal period** (week 9 to birth) is growth and maturation, with **viability** at about 22 to 24 weeks.

A **teratogen** is any outside agent (drug, infection, chemical or radiation) that can disturb prenatal development. The placenta is not a perfect barrier. Harm depends on three principles: **timing** (each organ's critical period is when it forms), **dose** (more exposure, more risk, sometimes above a threshold) and **individual susceptibility** (the genes of mother and fetus). Alcohol is the most common preventable teratogen; no amount is known to be safe, and it can cause **fetal alcohol spectrum disorders** (FASD). Tobacco raises the risk of low birth weight, prematurity and SIDS. Thalidomide caused limb malformations. The TORCH infections, rubella among them, and Zika (microcephaly) are on the list, along with lead, mercury and high-dose radiation.

Prenatal care starts as soon as pregnancy is known. Visits track blood pressure, weight and fetal growth and screen for gestational diabetes and preeclampsia. **Folic acid** lowers the risk of neural tube defects such as spina bifida, but the neural tube closes in week 4, often before a pregnancy is known, so it is recommended before conception for anyone who could become pregnant. Ultrasound images the fetus with no radiation. Amniocentesis (amniotic fluid) and chorionic villus sampling (placental tissue) diagnose chromosomal conditions directly but carry a small risk, so they are offered selectively, with genetic counseling.

LOCK THESE IN

- DNA, then gene (one instruction), then chromosome (a package). 46 chromosomes, 23 pairs, 22 autosome pairs plus XX or XY.
- Dominant shows with one copy; recessive needs two. A heterozygous carrier can pass on a hidden trait.
- Affected dominant parent: about 50% per child. Two recessive carriers: about 25% per pregnancy.
- X-linked recessive conditions show far more often in males, who have one X.
- Nondisjunction causes trisomy 21; risk rises with maternal age. Turner is 45,X; Klinefelter is 47,XXY.
- Germinal 0 to 2 weeks; embryonic 3 to 8 (organs, most vulnerable); fetal 9 to birth; viability about 22 to 24 weeks.
- Teratogen harm depends on timing, dose and susceptibility. No safe amount of alcohol is known.
- Folic acid works before the neural tube closes in week 4, so start before conception.



The prenatal periods drawn to scale. The germinal and embryonic periods fill only the first eight weeks, yet that is when the organs are built and harm does the most damage. The long fetal period is growth and maturation.

Key terms and comparisons

Term	What it means	Handle
DNA	The coded molecule carrying genetic instructions	The instruction book
Gene	A stretch of DNA coding one instruction	A single recipe
Chromosome	DNA coiled into a package; 46 in 23 pairs	A chapter of recipes
Allele	One version of a gene	A variant of one recipe
Homozygous	Two matching alleles	AA or aa
Heterozygous	Two different alleles	Aa, a possible carrier
Genotype	The alleles a person carries	What is written
Phenotype	The trait that shows	What shows
Polygenic	Many genes plus environment	Height, temperament
Meiosis	Division that makes gametes with 23 chromosomes	Shuffles each egg and sperm

Inheritance patterns

Pattern	How it passes	Examples
Autosomal dominant	One altered allele is enough; about 50% per child of an affected parent	Huntington's disease
Autosomal recessive	Two altered alleles needed; two carriers, about 25% per pregnancy	Cystic fibrosis, sickle cell disease, PKU, Tay-Sachs
X-linked recessive	Gene on the X; males affected far more often	Hemophilia, red-green color blindness, Duchenne
Trisomy	An extra whole chromosome from nondisjunction	Down syndrome (trisomy 21)
Sex chromosome	A missing or extra X or Y	Turner (45,X), Klinefelter (47,XXY)

Prenatal periods, teratogens and care

Item	Key facts	Why it matters
Germinal	Conception to about 2 weeks	Cleavage, blastocyst, implantation; placenta begins
Embryonic	About weeks 3 to 8	Organogenesis; highest vulnerability
Fetal	Week 9 to birth	Growth, movement; viability about 22 to 24 weeks
Alcohol	No known safe amount	FASD: facial changes, growth and cognitive effects
Tobacco	Smoking in pregnancy	Low birth weight, prematurity, SIDS
Thalidomide	Old morning sickness drug	Severe limb malformations
Rubella	Infection, worst early	Deafness, heart defects, cataracts
Zika	Infection	Microcephaly, brain abnormalities
Folic acid	B vitamin before and early in pregnancy	Prevents most neural tube defects
Amniocentesis or CVS	Samples fluid or placental tissue	Diagnoses chromosomal conditions; small risk

Worked cases

WORKED CASE 1 · TWO CARRIERS AND A PUNNETT SQUARE

Ana and Luis are both unaffected carriers of the cystic fibrosis allele (each is Ff, where f is the recessive allele). What are the chances for each pregnancy?

STEP 1 · LIST EACH PARENT'S GAMETES

Each parent can pass F or f, with equal odds.

STEP 2 · FILL THE FOUR BOXES

FF, Ff, fF and ff. That is 1 FF, 2 Ff and 1 ff out of 4.

STEP 3 · READ THE PHENOTYPES

Only ff is affected: 1 of 4, or **25%**. Ff is an unaffected carrier: 2 of 4, or 50%. FF: 1 of 4, or 25%, neither affected nor a carrier.

STEP 4 · SAY IT THE RIGHT WAY

The 25% applies to **each** pregnancy. Chance has no memory, so an earlier child does not change the odds for the next. Whether to test or how to plan is the family's choice, with a genetic counselor's help.

WORKED CASE 2 · AN X-LINKED PATTERN

Mira carries an allele for red-green color blindness on one X; her partner Sam has typical color vision. What are the odds for their sons and daughters?

STEP 1 · WRITE THE GENOTYPES

Mira is $X^{C}X^{c}$. Sam is $X^{C}Y$.

STEP 2 · SONS

Sons get Sam's Y and one of Mira's X's. Half get X^{c}, so each son has a **50%** chance of color blindness.

STEP 3 · DAUGHTERS

Daughters get Sam's X^{C}, which masks the allele. Each daughter has a 50% chance of being a carrier and is unlikely to be affected.

CHECK IT

This is why the trait can seem to skip from grandfather to grandson through an unaffected mother.

WORKED CASE 3 · TIMING A TERATOGEN

Two pregnant patients take the same medicine with known teratogenic risk. One takes it in week 5, the other in week 34. Who faces the greater risk of a structural birth defect, and why?

STEP 1 · PLACE EACH WEEK

Week 5 is in the embryonic period (weeks 3 to 8). Week 34 is late in the fetal period.

STEP 2 · APPLY THE TIMING PRINCIPLE

Each organ's critical period is when it is forming, and the major organs form in the embryonic weeks.

STEP 3 · ADD THE OTHER TWO PRINCIPLES

Dose and individual susceptibility also shape the outcome, so the same exposure can play out differently.

ANSWER

The week 5 exposure carries the greater risk of a structural defect. Clinicians ask not just what was taken but when.

TRAPS PEOPLE FALL INTO

- **Treating gene and chromosome as one thing.** A gene is one stretch of DNA; a chromosome carries many genes.
- **Thinking dominant means common.** Dominant only means one copy is enough to show. It says nothing about how common an allele is.
- **Reading 25% as "one in every four children."** It is the chance for each pregnancy. A family could have several affected children, or none.
- **Saying the egg decides sex.** The egg always gives an X. The sperm, X or Y, decides.
- **Mixing up the periods.** Organs form in the embryonic period (3 to 8 weeks), not the fetal period.
- **Thinking the placenta blocks harm.** Many drugs, infections and toxins cross it.
- **Starting folic acid after a positive test.** The neural tube closes in week 4, so it works best before conception.
- **Blaming parents for a genetic condition.** Carriers are usually unaware. Risk is probability, not fault.

Chapter 3 self-test · ten items

1. How many chromosomes are in a typical human body cell?

A. 23, in 46 pairs
B. 46, in 23 pairs
C. 44, in 22 pairs
D. 48, in 24 pairs

B. 46, in 23 pairs Body cells hold 46 chromosomes: 22 pairs of autosomes and one pair of sex chromosomes.

2. A person with two different alleles for a gene is

A. homozygous
B. polygenic for that trait
C. heterozygous
D. monozygotic

C. heterozygous Heterozygous means the two alleles differ; homozygous means they match.

3. In genetics, what does the phenotype refer to?

A. The alleles a person carries
B. A gene's position on a chromosome
C. One stretch of coded DNA
D. The trait that can be observed

D. The trait that can be observed Genotype is what is carried; phenotype is what shows.

4. Two unaffected carriers of a recessive allele have what chance of an affected child each pregnancy?

A. About 25%
B. About 50%
C. About 75%
D. About 10%

A. About 25% Only the ff outcome, one of four equal boxes, is affected.

5. Why do X-linked recessive conditions affect males more often?

A. Males have two X chromosomes
B. Males have only one X chromosome
C. The Y carries the altered gene
D. Males make more of the protein

B. Males have only one X chromosome With one X, a single altered allele has no second copy to mask it.

6. Down syndrome usually results from

A. a dominant allele on chromosome 21
B. a missing X chromosome
C. nondisjunction of chromosome 21
D. crossing over between twins

C. nondisjunction of chromosome 21 Chromosomes fail to separate in meiosis, leaving three copies of chromosome 21.

7. During which period do the major organs form?

A. Embryonic, about weeks 3 to 8
B. Germinal, about weeks 0 to 2
C. Fetal, week 9 to birth
D. Neonatal, the first four weeks

A. Embryonic, about weeks 3 to 8 Organogenesis happens in the embryonic period, which is why it is the most vulnerable stage.

8. Which is NOT one of the three principles of teratogen harm?

A. Timing of exposure
B. Dose of exposure
C. Individual susceptibility
D. The sex of the fetus

D. The sex of the fetus Harm depends on timing, dose and individual susceptibility.

9. Why is folic acid advised before conception?

A. It is not safe after week 8
B. It causes the blastocyst to implant
C. It replaces prenatal visits
D. The neural tube closes in week 4

D. The neural tube closes in week 4 The window opens before many people know they are pregnant.

10. Viability, survival outside the womb with intensive care, begins at about

A. 12 to 14 weeks
B. 22 to 24 weeks
C. 30 to 32 weeks
D. 8 to 10 weeks

B. 22 to 24 weeks Viability arrives around 22 to 24 weeks, and each extra week in the uterus improves the odds.

CHAPTER 4

Birth and the Newborn

Read it in full: **Chapter 4 in the textbook**. Practice it in the lab: **Stages Of Labor** and **Apgar Score**.

What to know

Birth is the most dramatic transition of the lifespan. In hours the newborn leaves a warm, dark, fully provided world and must breathe air, control its own temperature and feed by mouth. Before true labor, the uterus practices with irregular, painless **Braxton Hicks** contractions. At term, estrogen, prostaglandins and above all **oxytocin** bring on coordinated contractions.

Oxytocin works through a **positive feedback loop**. A contraction pushes the baby's head against the cervix, stretch receptors there signal the brain, the brain releases more oxytocin, and the next

contraction is stronger. Most body systems use negative feedback to stay steady. This loop is built to grow until it ends in one way: birth. That is also why synthetic oxytocin can start or strengthen a stalled labor.

Labor has three stages. The first, **dilation**, is the longest, often 12 to 14 hours for a first birth. The cervix **effaces** (thins) and **dilates** (opens) from 0 to a full 10 centimeters. Its final, most intense phase is **transition**. The second stage, **delivery**, lasts minutes to about 2 hours: the mother pushes, the head **crowns**, and the baby is born and takes a first breath. The third stage, **afterbirth**, lasts 5 to 30 minutes as the placenta and cord are expelled. The whole placenta must come out, because a retained piece can cause dangerous bleeding.

Most births in industrialized countries happen in a hospital with an obstetrician or a certified nurse-midwife. Some families choose a birth center or a planned home birth. A **doula** gives continuous emotional and physical support but does not deliver the baby, and that support is linked to shorter labors and fewer interventions. A **medicated** birth commonly uses an **epidural**, a regional anesthetic that numbs the lower body while the mother stays awake. A **natural or prepared** birth limits drugs and uses breathing, relaxation, movement and support; Lamaze (patterned breathing) and Bradley (partner coached, drug free) are the best known. Neither path is simply better. The choice belongs to an informed family.

A **cesarean section** delivers the baby through incisions in the abdomen and uterus. It can save lives. Indications include a breech baby, fetal distress, a labor that fails to progress, placenta previa and certain prior cesareans. It is still major surgery, with a longer recovery and higher infection risk, and about one birth in three in the United States is a cesarean. An intervention is a tool, not a verdict: the aim is to match each birth to what it needs.

Anoxia is a total lack of oxygen around birth; **hypoxia** is a reduced supply. Causes include a pinched cord, a very long labor or a delayed first breath. Brief mild loss is usually harmless, but prolonged anoxia can injure the brain and is one recognized cause of **cerebral palsy**. Fetal monitoring exists mainly to catch falling oxygen early.

Keep two problems apart. **Preterm** means born before 37 weeks. **Low birth weight** (LBW) means under 2,500 g (about 5½ lb) at birth, whatever the timing. Very low birth weight is under

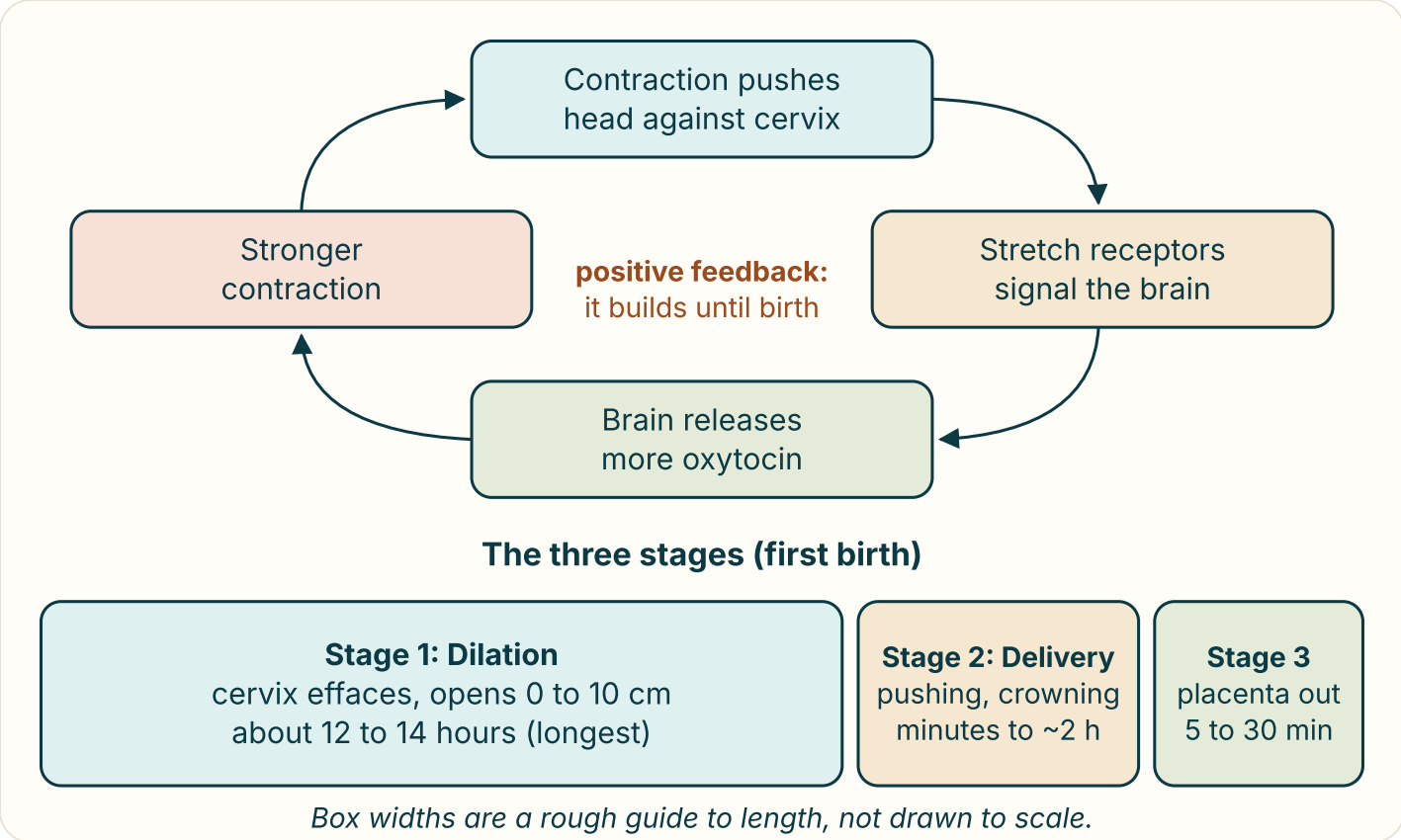
1,500 g and extremely low is under 1,000 g. A full-term baby who grew slowly is **small for gestational age**. Preterm lungs may lack **surfactant**, causing respiratory distress syndrome. **Kangaroo care**, skin-to-skin holding, steadies heart rate, temperature and breathing and supports bonding.

The **Apgar score**, devised in 1952 by Virginia Apgar, is given at 1 and 5 minutes. It rates five signs from 0 to 2: Appearance (color), Pulse (heart rate), Grimace (reflex response), Activity (muscle tone) and Respiration (breathing effort), for a total of 0 to 10. A score of 7 to 10 is reassuring, 4 to 6 means the baby needs help, and below 4 is an emergency. It is a snapshot of the transition, not a forecast of the child's future.

Newborn **reflexes** are automatic, unlearned responses. Rooting and sucking help feeding. Primitive reflexes include the Moro (startle), palmar grasp, Babinski, stepping and tonic neck. Each should appear at birth and fade on schedule as the cortex matures. A missing or lingering reflex can be an early sign of a neurological problem. Newborn senses are better than they look. Researchers use the **preference method** (Robert Fantz; longer looking shows a preference) and **habituation** (renewed interest in a new stimulus shows the baby can tell them apart). Vision is the least mature sense (about 20/400, sharpest at 8 to 12 inches, the distance to a caregiver's face during feeding). Hearing is nearly mature; DeCasper and Fifer showed newborns prefer their mother's voice. Smell and taste are well developed, and touch is the most mature sense.

LOCK THESE IN

- Oxytocin drives labor by positive feedback: contraction, stretch, more oxytocin, stronger contraction.
- Stage 1 dilation (longest, 12 to 14 h first birth, cervix to 10 cm); stage 2 delivery (minutes to about 2 h); stage 3 afterbirth (5 to 30 min).
- A doula supports but does not deliver. Epidural is medicated; Lamaze and Bradley are prepared birth.
- Cesarean indications: breech, fetal distress, failure to progress, placenta previa, certain prior cesareans.
- Preterm: before 37 weeks. LBW: under 2,500 g. VLBW under 1,500 g; ELBW under 1,000 g.
- Apgar at 1 and 5 minutes: five signs, 0 to 2 each. 7 to 10 fine, 4 to 6 needs help, below 4 emergency.
- Reflexes must appear and fade on time. Missing or lingering reflexes are a warning sign.
- Vision is least mature (about 20/400, clear at 8 to 12 in); touch is most mature.



Why labor builds instead of leveling off. Each contraction triggers more oxytocin, which makes the next contraction stronger, until the baby is born. Below, the three stages and their typical lengths for a first birth.

The three stages of labor

Stage	What happens	Typical length (first birth)
1 · Dilation	Cervix effaces and dilates 0 to 10 cm; ends in transition	12 to 14 hours, very variable
2 · Delivery	Pushing, crowning, birth, first breath	Minutes to about 2 hours
3 · Afterbirth	Placenta and cord expelled	5 to 30 minutes

The Apgar score

Sign	Score 0	Score 1	Score 2
Appearance (color)	Blue or pale	Body pink, limbs blue	Fully pink
Pulse (heart rate)	Absent	Below 100 bpm	Above 100 bpm
Grimace (reflex)	No response	Grimace	Cry, cough or pull away
Activity (tone)	Limp	Some flexion	Active movement
Respiration	Absent	Slow, irregular	Strong cry

Reflexes and senses

Item	What you see	Timing or level
Rooting	Stroke the cheek; head turns, mouth opens	Fades by about 4 months
Sucking	Object in mouth; rhythmic sucking	Persists, becomes voluntary
Moro (startle)	Arms fling out, then embrace	Fades by 4 to 6 months
Palmar grasp	Fingers curl around what touches the palm	Fades by 3 to 4 months
Babinski	Stroke the sole; toes fan out	Fades by 8 to 12 months
Stepping	Held upright; stepping motions	Fades by about 2 months
Vision	Prefers faces, contrast, curves	Least mature; about 20/400
Hearing	Prefers speech and the mother's voice	Nearly mature
Smell and taste	Mother's scent; sweet over bitter and sour	Well developed
Touch	Warmth and gentle contact	Most mature

Birth complications compared

Term	Definition	Main concern
Anoxia or hypoxia	Total or partial loss of oxygen around birth	Brain injury; one cause of cerebral palsy
Preterm	Born before 37 weeks	Immature lungs (no surfactant), temperature, immunity
Low birth weight	Under 2,500 g	Infection, feeding trouble, delay
Small for gestational age	Small for the weeks of gestation, even at term	Restricted growth in the womb

Worked cases

WORKED CASE 1 · SCORING AN APGAR

At one minute, baby Kai has a pink body with blue hands and feet, a heart rate of 120, a grimace when his foot is flicked, some flexion of the limbs and a strong cry. Score him and say what it means.

STEP 1 · APPEARANCE

Body pink, limbs blue: **1**.

STEP 2 · PULSE

120 is above 100 bpm: **2**.

STEP 3 · GRIMACE

A grimace only: **1**.

STEP 4 · ACTIVITY

Some flexion: **1**.

STEP 5 · RESPIRATION

Strong cry: **2**.

STEP 6 · ADD AND READ IT

1 + 2 + 1 + 1 + 2 = **7**. A score of 7 to 10 is reassuring. He will be scored again at 5 minutes.

WORKED CASE 2 · A NEWBORN WHO NEEDS HELP

Baby Noor at one minute: pale all over, heart rate 90, a grimace to stimulation, some flexion and slow, irregular breathing. Score her.

STEP 1 · SCORE EACH SIGN

Appearance 0 (pale), Pulse 1 (below 100), Grimace 1, Activity 1, Respiration 1 (slow, irregular).

STEP 2 · ADD

0 + 1 + 1 + 1 + 1 = **4**.

STEP 3 · INTERPRET

4 to 6 means the newborn needs help, such as suctioning or oxygen. Below 4 would be an emergency.

CHECK IT

The score guides what the team does now. It does not predict her future.

WORKED CASE 3 · PRETERM, LOW WEIGHT, OR BOTH?

Three babies: Ava is born at 35 weeks weighing 2,700 g. Ben is born at 40 weeks weighing 2,300 g. Cal is born at 31 weeks weighing 1,400 g. Classify each.

STEP 1 · APPLY THE 37 WEEK LINE

Ava (35) and Cal (31) are preterm. Ben (40) is full term.

STEP 2 · APPLY THE 2,500 G LINE

Ben (2,300 g) and Cal (1,400 g) are low birth weight. Ava (2,700 g) is not.

STEP 3 · CHECK THE FINER LINES

Cal is under 1,500 g, so he is very low birth weight. Ben is full term but small, so he is small for gestational age.

ANSWER

Ava: preterm only. Ben: low birth weight and small for gestational age. Cal: preterm and very low birth weight.

TRAPS PEOPLE FALL INTO

- **Calling labor negative feedback.** Oxytocin builds on itself. That is positive feedback.
- **Thinking delivery is the longest stage.** Dilation is by far the longest.
- **Ending labor at the baby's birth.** The third stage, the afterbirth, still has to happen.
- **Thinking a doula delivers babies.** A doula supports; a physician or midwife delivers.
- **Treating preterm and low birth weight as the same.** One is about timing, the other about weight. A baby can be one, both or neither.
- **Reading the Apgar as a forecast.** It is a snapshot of the transition at 1 and 5 minutes.

- **Thinking a lasting reflex is a strength.** A reflex that persists past its time can signal a neurological problem.
- **Picturing newborns as blank slates.** They already prefer faces, their mother's voice and her scent.

Chapter 4 self-test · ten items

1. Which hormone is the main engine of labor?

A. Insulin
B. Cortisol
C. Oxytocin
D. Melatonin

C. Oxytocin Oxytocin drives contractions through a positive feedback loop.

2. During which stage does the cervix open to 10 cm?

A. Stage 1, dilation
B. Stage 2, delivery
C. Stage 3, afterbirth
D. The Braxton Hicks stage

A. Stage 1, dilation The first stage ends when the cervix is fully dilated.

3. What happens in the third stage of labor?

A. The placenta is expelled
B. The baby crowns
C. The cervix effaces
D. The first breath is taken

A. The placenta is expelled The afterbirth stage delivers the placenta and cord.

4. Which statement about a doula is accurate?

A. Gives the epidural injection
B. Performs the cesarean if one is needed
C. Gives support but does not deliver
D. Scores the newborn's Apgar at birth

C. Gives support but does not deliver Continuous doula support is linked to shorter labors and fewer interventions.

5. Which is a clear reason for a cesarean section?

A. A labor that began at night
B. A first pregnancy
C. A request for a doula
D. A baby in breech position

D. A baby in breech position Breech, fetal distress, failure to progress and placenta previa are indications.

6. A baby born at 39 weeks weighs 2,200 g. This baby is

A. preterm, not low birth weight
B. low birth weight, not preterm
C. both preterm and low weight
D. neither preterm nor low weight

B. low birth weight, not preterm 39 weeks is full term, and 2,200 g is under 2,500 g.

7. What do preterm lungs often lack?

A. Oxytocin
B. Melanin pigment
C. Myelin sheathing
D. Surfactant

D. Surfactant Without surfactant the air sacs collapse, causing respiratory distress syndrome.

8. An Apgar total of 8 at five minutes means the baby is

A. in need of help
B. doing well
C. in an emergency
D. likely to be gifted

B. doing well 7 to 10 is reassuring. The score says nothing about the child's future ability.

9. Stroking a newborn's sole makes the toes fan out. This is the

A. Babinski reflex
B. Moro reflex
C. rooting reflex
D. stepping reflex

A. Babinski reflex The Babinski reflex normally fades by 8 to 12 months.

10. Which newborn sense is the least mature?

A. Hearing
B. Touch
C. Vision
D. Taste

C. Vision Newborn vision is about 20/400, sharpest at 8 to 12 inches.

ONE PAGE

Cram sheet

Everything from chapters 3 and 4 in one place. Cover the right column and see if you can rebuild each row.

Numbers to know

Item	Value	Note
Chromosomes	46 in 23 pairs	22 autosome pairs plus XX or XY
Gametes	23 chromosomes each	Made by meiosis
Autosomal dominant	About 50% per child	Affected parent; Huntington's
Autosomal recessive	About 25% per pregnancy	Two carriers; CF, sickle cell, PKU, Tay-Sachs
X-linked carrier mother	Each son about 50% affected	Daughters about 50% carriers
Prenatal periods	Germinal 0 to 2; embryonic 3 to 8; fetal 9 to birth (weeks)	Neural tube closes week 4
Viability	About 22 to 24 weeks	Each extra week helps
Labor stage lengths	12 to 14 h; minutes to 2 h; 5 to 30 min	First birth
Full dilation	10 cm	End of stage 1
Preterm	Before 37 weeks	Timing
Birth weight	LBW under 2,500 g; VLBW under 1,500 g; ELBW under 1,000 g	About 5½ lb = 2,500 g
Apgar	0 to 10 at 1 and 5 min	7 to 10 fine; 4 to 6 help; below 4 emergency
Newborn vision	About 20/400	Sharpest at 8 to 12 in
Cesarean rate (US)	About one birth in three	Major surgery

Rules that are not numbers

Topic	The rule
Genotype and phenotype	What is carried versus what shows; carriers hide recessive traits.
Sex	The sperm (X or Y) decides; the egg always gives an X.
Twins	Identical: one zygote splits. Fraternal: two eggs, two sperm.
Teratogens	Harm depends on timing, dose and susceptibility; organs are most at risk in weeks 3 to 8.
Alcohol	No known safe amount; FASD.
Folic acid	Start before conception; prevents most neural tube defects.
Labor	Oxytocin positive feedback; dilation, delivery, afterbirth.
Reflexes	Should appear and fade on schedule.
Newborn testing	Preference method (looking time) and habituation (renewed interest).

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