

LAB ____ . DEVELOPMENT OF A HUMAN FETUS

After a human egg is fertilized with human sperm, the most amazing changes happen that allow a baby to develop. This amazing process, called **development**, normally lasts about 38 weeks. Let's look and measure some of the changes that occur during this human fetal development and learn about some of the chemicals that could disrupt this normal development.

1. Examine the diagrams below of the developing human baby.
2. On the graph below the table, plot the data in **Table 1. Change in Size of a Developing Baby**: label the axes, choose a proper scale, make a title.
3. On the graph below the table, plot the data in **Table 2. Change in Mass of a Developing Baby**: label the axes, choose a proper scale, make a title.
4. On the graph below the table, plot the data in **Table 3. Survival Rates of Babies by Developmental Age**: label the axes, choose a proper scale, make a title.
5. Read the articles on the effect of drugs, alcohol, and tobacco on developing babies.
6. Answer **Summary Questions**.

Developing Human Fetus

Table 1. Change in Size of a Developing Baby

Time (weeks)	Length (mm)		Time (weeks)	Length (mm)
4 (1 month)	7		24 (6 months)	300
8 (2 months)	14		28 (7 months)	350
12 (3 months)	75		32 (8 months)	410
16 (4 months)	160		36 (9 months)	460
20 (5 months)	240		38 (9.5 months)	500

Title. _____

Name _____

Table 2. Change in Mass of a Developing Baby

Time (weeks)	Mass (grams)		Time (weeks)	Mass (grams)
4 (1 month)	0.5		24 (6 months)	650.0
8 (2 months)	1.0		28 (7 months)	1100.0
12 (3 months)	15.0		32 (8 months)	1700.0
16 (4 months)	100.0		36 (9 months)	2400.0
20 (5 months)	300.0		38 (9.5 months)	3300.0

Title. _____

ALCOHOL AND PREGNANCY: WHAT YOU SHOULD KNOW

When you drink alcohol, so does your baby. Alcohol freely passes through the placenta to your baby. Drinking alcohol during pregnancy increases the chance that a baby will be born affected by Fetal Alcohol Syndrome (FAS). Fetal Alcohol Syndrome disorders are the full spectrum of birth defects that are caused by prenatal alcohol exposure. These effects are life-long and irreversible. The good thing is that they are 100% preventable.



FACTS ABOUT ALCOHOL:

- **Alcohol is a teratogen.** A teratogen is any substance known to cause serious birth defects. It means “monster-maker”.
- **Alcohol crosses the placenta to your baby.** Remember that the placenta is the tissue that connects mother to baby and through which baby gets its food and oxygen. Since alcohol crosses the placenta, when you drink alcohol, so does your baby. Therefore, alcohol can be harmful to your baby's development, because your baby is fully exposed to it.
- **All drinks that contain alcohol can be harmful to your baby.** There is no safe amount of alcohol to consume while you are pregnant. It is best to discuss any drinking patterns with your doctor.

HOW DOES ALCOHOL AFFECT MY BABY'S DEVELOPMENT?

Your baby is constantly growing and developing throughout these nine months. During the first four weeks of pregnancy, your baby's heart, central nervous system (spinal cord), eyes, arms, and legs are developing. Your baby's brain begins developing around the third week and continues to develop through the rest of your pregnancy. During the third trimester (weeks 28–42), your baby is rapidly growing in size. If you drink an excessive amount of alcohol during these crucial times of development, you may cause developmental problems for your baby.

Results of excessive amounts of drinking (drinking on a regular basis or binge drinking) can lead to **Fetal Alcohol Syndrome**. These are lifetime, irreversible effects that can cause physical and mental birth defects.

WHAT IS FETAL ALCOHOL SYNDROME?

Fetal Alcohol Syndrome (FAS) is one of the most common causes of mental retardation and the only one that is 100% preventable. The effects are irreversible and last a lifetime.

The effects of FAS include: mental retardation, malformations of the skeletal system and major organ systems (specifically the heart and brain), stunted growth, central nervous system problems, poor motor skills, problems with learning, memory, social interaction, attention span, problem solving, speech and/or hearing, and even death.

There are also facial features that are characteristic of babies with FAS. These features include: small eyes, short or upturned nose, flat cheeks, and thin lips. These features fade as the child grows up, but the child is left with a lifetime of difficulties trying to cope with other effects.

WHAT IF I DRANK ALCOHOL BEFORE I KNEW I WAS PREGNANT?

If you were not aware that you were pregnant and drank alcohol, the best thing you can do now is STOP drinking. The sooner you quit, the better. If you stop drinking now, the chances of damage are decreased.

IS THERE ANY SAFE AMOUNT OF ALCOHOL TO DRINK?

There is no known amount of alcohol that is safe to consume during pregnancy, and the more you drink, the more you raise your baby's chances of having problems.

SMOKING AND YOUR BABY: PUT DOWN THAT CIGARETTE

Pregnancy is a great time for you to quit smoking. You will feel better and have more energy to go through your pregnancy. You will also reduce your risks of future health problems such as heart disease, cancer and other lung problems. The benefits are great.

**FACTS ABOUT SMOKING DURING PREGNANCY:**

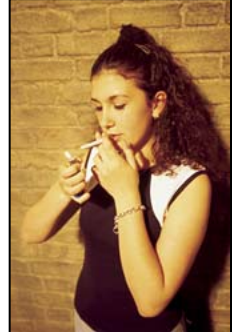
- **When you smoke... so does your baby.** When you smoke you inhale poisons such as nicotine and carbon monoxide. These poisons pass across the placenta. (Remember, the placenta is the tissue that connects a mother to her baby and supplies the baby with oxygen and nutrients and allows the baby to eliminate wastes). The poisons from cigarettes keep the baby from getting the proper supply of nutrients and oxygen that he or she needs to grow.
- **Smoking during pregnancy can cause low-birth weight, premature delivery, and even infant death.** Smoking during pregnancy is estimated to account for 20 to 30 percent of low-birth weight babies, up to 14 percent of premature deliveries, and about 10 percent of all infant deaths.
- **Second-hand smoke can also cause problems for your baby.** New studies have shown that if a woman is around second-hand smoke during pregnancy, there are added risks. Mothers have a greater chance of having a baby that weighs too little and may have health problems if she lives in a house with a smoker.
- **There can be long term health risks for your baby.** Smoking during pregnancy can cause your baby to have problems after birth. If a mother continues to smoke after the baby is born, the baby may get more colds, coughs, and middle-ear infections. Babies have very small lungs, and smoke from cigarettes makes it harder for them to breathe. This can also cause the baby to get bronchitis and pneumonia.
- **Nicotine replacement therapy such as the patch can still affect your baby.** Before using any nicotine replacement patches or gums, you should discuss it with your doctor. You and your doctor can discuss what is more beneficial for you and your baby.

USING ILLEGAL STREET DRUGS DURING PREGNANCY

When you are pregnant, it is important that you watch what you put into your body. Use of illegal drugs is not safe for the unborn baby or for the mother. Studies have shown that use of illegal drugs during pregnancy can result in miscarriage, low birth-weight, premature labor, placental separation, fetal death, and even maternal death. The following information can help you understand these drugs and their effects.

MARIJUANA:

- **What happens when a pregnant woman smokes marijuana?** Marijuana crosses the placenta to your baby. Marijuana, like cigarette smoke, contains toxins that keep your baby from getting the proper supply of oxygen that he or she needs to grow.
- **How can marijuana affect the unborn baby?** Smoking marijuana increases the levels of carbon monoxide and carbon dioxide in the blood, which reduces the oxygen supply to the baby. Smoking marijuana during pregnancy can increase the chance of miscarriage, low birth-weight, premature births, developmental delays, and behavioral and learning problems.
- **What if I smoked marijuana before I knew I was pregnant?** According to Dr. Richard S. Abram, author of *Will it Hurt the Baby*, "occasional use of marijuana during the first trimester is unlikely to cause birth defects." Once you are aware you are pregnant, you should stop smoking. Doing this will decrease the chance of harming your baby.



COCAINE:

- **What happens when a pregnant woman consumes cocaine?** Cocaine crosses the placenta and enters your baby's circulation. The elimination of cocaine is slower in a fetus than in an adult. This means that cocaine remains in the baby's body much longer than it does in your body.
- **How can cocaine affect my unborn baby?** During the early months of pregnancy, cocaine exposure may increase the risk of miscarriage. Later in pregnancy, cocaine use can cause placental separation—the placenta separates from the uterine wall. Placental separation can lead to severe bleeding, premature birth, and fetal death. The risk of a birth defect is greater when the mother has used cocaine frequently during pregnancy. Women who use cocaine during their pregnancy have a 25% increased chance of premature labor. Babies born to mothers who use cocaine throughout their pregnancy may also have a smaller head and have their growth stunted. Babies who are exposed to cocaine later in pregnancy may be born dependent and suffer from withdrawal symptoms such as tremors, sleeplessness, muscle spasms, and feeding difficulties. Some experts believe that learning difficulties may result as the child gets older. Defects of the genitals, kidneys, and brain are also possible.
- **What if I consumed cocaine before I knew I was pregnant?** There have not been any conclusive studies done on single doses of cocaine during pregnancy. Birth defects and other side effects are usually a result of prolonged use, but because studies are inconclusive, it is best to avoid cocaine altogether. Cocaine is a very addictive drug and experimentation often leads to abuse of the drug.

HEROIN:

- **What happens when a pregnant woman uses heroin?** Heroin is a very addictive drug that crosses the placenta to the baby. Because this drug is so addictive, the unborn baby can become dependent on the drug.
- **How can heroin affect my unborn baby?** Using heroin during pregnancy increases the chance of premature birth, low birth weight, breathing difficulties, low blood sugar, bleeding within the brain, and infant death. Babies can also be born addicted to heroin and can suffer from withdrawal symptoms. Withdrawal symptoms include irritability, convulsions, diarrhea, fever, sleep abnormalities, and joint stiffness. Also, mothers who inject narcotics are more susceptible to HIV, which can be passed to their baby.
- **What if I am addicted to heroin and I am pregnant?** Treating an addiction to heroin can be complicated, especially when you are pregnant. Your doctor may prescribe methadone as a form of treatment. It is best that you communicate with your doctor, so he or she can provide the best treatment for you and your baby.

PCP & LSD:

- **What happens when a pregnant woman takes PCP and LSD?** PCP and LSD are hallucinogens and these drugs cross the placenta. Both PCP and LSD users can behave violently, which may harm the baby if the mother hurts herself.
- **How can PCP and LSD affect my unborn baby?** PCP use during pregnancy can lead to low birth weight, poor muscle control, brain damage, and withdrawal symptoms if used frequently. Withdrawal symptoms include sleepiness, alternating with tremors. LSD can lead to birth defects if used frequently.
- **What if I experimented with LSD or PCP before I knew I was pregnant?** No conclusive studies have been done on one time use effects of these drugs on the fetus. It is best not to experiment if you are trying to get pregnant or think you might be pregnant.

METHAMPHETAMINE:

- **What happens when a pregnant woman takes methamphetamine?** Methamphetamine (also known as speed) crosses the placenta to the baby and the drug causes the heart rate of both the mother and baby to increase.
- **How can methamphetamine affect my unborn baby?** Taking methamphetamine during pregnancy can result in problems similar to those seen with the use of cocaine in pregnancy. The use of speed can cause the baby to get less oxygen, which can lead to a small baby at birth. Methamphetamine can also increase the likelihood of premature labor, miscarriage, and placental separation. Babies can be born addicted to methamphetamine and suffer withdrawal symptoms that include tremors, sleeplessness, muscle spasms, and feeding difficulties. Some experts believe that learning difficulties may result as the child gets older.
- **What if I experimented with methamphetamine before I knew I was pregnant?** There have not been any significant studies done on the effect of one time use of methamphetamine during pregnancy. It is best not to experiment if you are trying to get pregnant or think you might be pregnant.

SUMMARY QUESTIONS

- 1. How long is the average baby when born? _____ mm _____ meters
- 2. How much does the average baby weigh when born? _____

EXTRA CREDIT: how much is that in pounds? _____

- 3. The halfway point of development is about 20 weeks.
Is the average baby half of its full birth length at 20 weeks? _____

Is the baby half of its total birth mass at 20 weeks? _____

At what week does the baby reach half of its total birth mass? _____

- 4. Look at the diagrams on the first page. Describe the major physical changes that happen to the developing baby in the first 20 weeks.

- 5. Look at the diagrams on the first page. Describe the major physical changes that happen to the developing baby from 28 weeks to birth (36–38 weeks).

- 6. Describe the improvements that happen to survival rates of babies from weeks 21 to 24.

- 7. Review the three graphs and the developmental progress of unborn babies. Make an inference about why good early pregnancy care by the mother is stressed by doctors.

8. What are the two main reasons that alcohol is so dangerous to developing babies?

a. _____

b. _____

9. What is Fetal Alcohol Syndrome?

10. List the major damaging effects of Fetal Alcohol Syndrome.

11. Is there any safe amount of alcohol to drink during pregnancy? _____

12. Should a woman drink alcohol during her pregnancy? _____

13. What are the two main reasons that cigarette smoking is so dangerous to developing babies?

a. _____

b. _____

14. List some of the potential effects of cigarette smoking on unborn babies.

a. _____

b. _____

c. _____

15. List some of the potential effects of cigarette smoking on a baby after it's born.

- a. _____
- b. _____
- c. _____

16. Is it a problem for the developing baby if the mother doesn't smoke, but another member of the household smokes? Explain.

17. Why is smoking marijuana bad for developing babies?

18. List some of the potential effects of smoking marijuana on unborn babies.

- a. _____
- b. _____
- c. _____

19. Why is cocaine use bad for developing babies?

20. List some of the potential effects of cocaine use on unborn babies.

- a. _____
- b. _____
- c. _____

21. Why is heroin use bad for developing babies?

22. List some of the potential effects of heroin use on unborn babies.

- a. _____
- b. _____
- c. _____

23. Why is PCP and LSD use bad for developing babies?

24. List some of the potential effects of PCP and LSD use on unborn babies.

- a. _____
- b. _____
- c. _____

25. Why is methamphetamine use bad for developing babies?

26. List some of the potential effects of methamphetamine use on unborn babies.

- a. _____
- b. _____
- c. _____