

Pregnancy, Day 1: The Developing Baby

Grades 9 and 10, Lesson #13

Time Needed

one class period

Student Learning Objectives

To be able to...

1. Identify, with 75% accuracy, the definitions of fourteen pregnancy-related terms.
2. Explain that the foundations of all organs and body systems are laid in the first trimester (three months) of pregnancy.

Agenda

1. Explain the relevance and purpose of this and the next few lessons.
2. Use Transparencies 1-6 and mini-lecture to introduce the physiology of pregnancy.
3. Reinforce new vocabulary with Pregnancy Worksheet 1 and Transparency 7.
4. Hand out and read aloud Pregnancy Reference Sheet 1. Augment the Reference Sheet, if possible, with photos and/or posters.
5. Assign homework.

Materials Needed

Classroom Materials (one to reuse with each class):

Pregnancy Transparencies 1-7

Student Materials (one to three per student):

Pregnancy Worksheet 1

Pregnancy Reference Sheet 1

Family Homework Exercise: Pregnancy (4 sides)

Individual Homework Exercise: Pregnancy (2 sides)

Other Visual Aids, optional:

“How Your Baby Grows” (poster with drawings of the stages of development). Available from your local March of Dimes or go to:

http://www.marchofdimes.com/professionals/2222_2271.asp.

A Child Is Born (book contains fascinating in utero photographs originally published in *Life* magazine) by Lennart Nilsson, Delacorte Press; 4th edition, August 26, 2003; ISBN: 038533754X

Activities

1. Begin with a transition from the social and emotional issues of lessons 5 through 12, to the primarily physical issues of today's lesson:

Let's review, briefly, where we've been and where we're going. We began a couple of weeks ago by studying the reproductive system. We talked about puberty and adolescence, the physical changes that people experience and the emotional and social changes. While we were focusing on emotional and social issues, we spent about a week on sexual exploitation.

Today, we're changing gears ... returning to some physical aspects of human sexuality. For the next three days we'll be studying pregnancy. Today's lesson looks at the developing baby, from fertilization to birth. By the end of the period, most of you will know some new terminology and you'll be able to explain the order in which the various parts develop. Tomorrow we'll examine pregnancy from the woman's point of view ... looking at what she can expect. The next day, we'll sort of combine the two, talking about how the parents (mother and father) can improve the chances the baby will be born healthy.

2. Use Pregnancy Transparencies 1-6 to explain, briefly, the physiology of pregnancy. These notes will help:

Transparency 1: Spermatozoon and Ovum

The ovum, or egg cell, is the largest cell of the human body, about the size of a grain of sand ... visible but only barely. The sperm is much smaller. It resembles a tadpole. Its head is about 1/10 as long as the whole sperm cell; about three whole sperm cells could span the diameter of the egg. The volume of the egg, however, is about 85,000 times the volume of a sperm.

The human body is made of billions of cells. The **nucleus** of each contains 23 pairs of **chromosomes** (46 separate ones). Each of those chromosomes is a chain of genes; altogether, they contain between 50,000 and 100,000 genes. Unlike other human cells, ova and sperm contain 23 individual chromosomes each, rather than 23 pairs.

Transparency 2: Fertilization

Usually, during sexual intercourse, hundreds of thousands of sperm are catapulted towards the cervix. Traveling more or less randomly, many eventually die. Some, however, quickly enter the uterus, with assistance from the cervical fluids, and travel toward the fallopian tubes. If there is an ovum there (or if one is released within five days) many sperm will try to penetrate its outer layers. One may finally enter the ovum's nucleus, forming a fertilized egg, or **zygote**. **Fertilization** is complete.

The new zygote contains a unique combination of genes: the blueprint for a new individual. Appearance, health and even aspects of personality are determined by that genetic blueprint.

Transparency 3: Sex Determination

Of each parent's 23 pairs of chromosomes, one pair are the sex chromosomes. The mother's sex chromosomes are always a pair of X's so when they part, to form 23 single chromosomes, each egg receives an X. Men's sex chromosomes, on the other hand, are nearly always a pair consisting of one X and one Y. So when the father's chromosomes part to form spermatazoa, half the sperm receive an X and half receive a Y. Thus, an X egg fertilized by an X sperm makes an XX baby: a girl. An X egg (all eggs are X's, remember) fertilized by a Y sperm makes an XY baby: a boy.

NOTE: Someone in your class might have an intersex condition or "DSD" (Disorder of Sexual Development) or a sibling with DSD. They need to know that you know they exist. Thus, it's important to acknowledge that some babies' bodies differ from the pattern described in the previous paragraph. **They are still a boy or a girl**, but they may have reproductive or sexual anatomy or chromosomal patterns that don't quite fit the typical definitions of female or male. Some people have sex chromosomes that aren't simply XX or XY. Some are **mosaic**; some of their body's cells have XX chromosomes and others have XY or, more commonly, some of their cells have XY and others have just an X. Other babies, about one in a thousand, are boys with an XXY pattern in every cell. That's called **Klinefelter's Syndrome**. Some girls have just one X chromosome. That's called **Turner Syndrome**. And there are many, other variations on the typical pattern of XX or XY. For more information about intersex issues, go to: www.isna.org or www.intersexinitiative.org.^{1,2}

Transparency 4: The First Few Days

Within 12 hours the zygote begins to divide. It begins forming a cluster, resembling a mulberry; this solid mass of cells is called a **morula**. In the meantime, it has been traveling down the tube. By the fourth or fifth day, it enters the uterus. It has become a 500—cell sphere ... no longer a solid mass of cells. This hollow, fluid-filled mass is called a blastocyst. On the eighth day, the **blastocyst** burrows into the rich endometrium, the lining of the uterus. This nesting process is called **implantation**. Now **conception** is complete.

Transparency 5: Cells Specialize

The cells of the blastocyst begin to specialize. Some become the developing baby, itself ... now called an **embryo**. Others become a transparent, fluid-filled membrane called the **amniotic sac**, surrounded by a second, thicker membrane called the **chorionic sac**. This chorionic sac provides a temporary link to the uterine lining and it produces a hormone that lets the woman's body know she is pregnant. Some of the cells of the chorionic sac will gradually develop into a **placenta**, a fascinating organ that extracts nourishment and oxygen from the mother's bloodstream, in exchange for waste products from the embryo's bloodstream ... without actually mixing the two. (It also makes many hormones to help the embryo/fetus grow and changes the mother's body to support the pregnancy.) Still other cells will form an **umbilical cord** to link the embryo with the placenta.

After 8 weeks, the embryo's name changes. It is now a **fetus**. After approximately 39 weeks (counting from fertilization), or about 9 months' **gestation**, a full-term baby will be delivered ... followed shortly by the placenta (which explains why it's sometimes called the afterbirth).

This pre-natal (literally “before birth”) time varies considerably, with 75% of women delivering after 37 to 41 weeks gestation. With expert premature-infant care, two out of three babies born in the twenty-seventh week survive. Babies born after seven months’ (30 weeks) gestation have a better than 85% chance of surviving; after eight months’ (34+ weeks) gestation, they have a 97% chance ... in industrialized countries like the United States.

In case anyone asks: abortions are usually done by the twelfth week of pregnancy. They are available, in Washington State, up to twenty weeks’ gestation.

Transparency 6: Multiple Births

Sometimes a single zygote, as it is dividing in the first week or so of development, separates into more than one blastocyst. These developing babies have identical genetic material; they’ll be identical twins (triplets, etc.) They usually have separate amniotic sacs, but they will share a common chorionic sac and placenta.

Other times — this is more common — two or more ova will be released at about the same time. Each will be fertilized by a different sperm, forming unique zygotes, each with unique genes: fraternal twins (triplets, etc.). They will have separate amniotic sacs and usually, though not always, separate chorions and placentas. On rare occasion, triplets will be a combination...two identical siblings and a fraternal one.

Approximate incidence of multiple births: twins, 1 in 90 births; triplets, 1 in 8,000; quadruplets, 1 in 500,000.

3. Reinforce all this new vocabulary, handing out Pregnancy Worksheet 1. Put Transparency 7 on the overhead. Have students take turns reading aloud from the Worksheet, filling in the answers, from the terms on the Transparency, as they read. As each term is identified, everyone should fill it in; spelling counts.

The answers are: (1) fertilization, (2) zygote, (3) morula (Latin for “mulberry”), (4) blastocyst, (5) implantation, (6) conception, (7) embryo, (8) amniotic, (9) chorionic, (10) umbilical cord, (11) placenta, (12) fetus, (13) pre-natal, (14) gestation.

4. Hand out Pregnancy Reference Sheet 1 and have volunteers take turns reading it aloud.

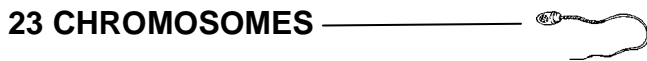
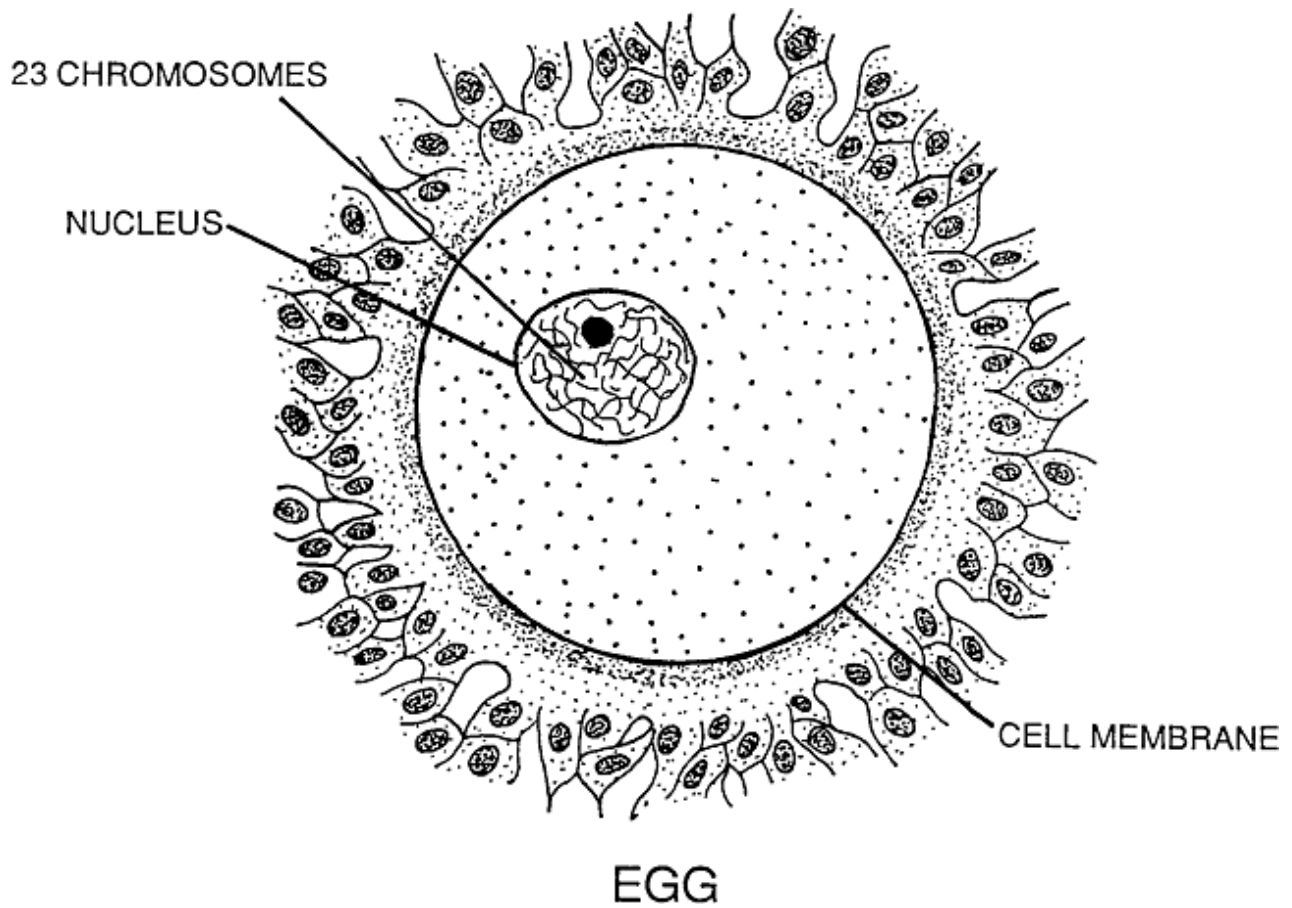
Just a note about our choice of language. Remember that it is inappropriate for a public school teacher to express a particular belief about a controversial issue. With this in mind, we have used the term “developing baby” instead of “unborn child” (the preferred term of many in the pro-life movement) or “embryonic or fetal tissue” (the preferred terms of many in the pro-choice movement). We have moved, then, to the medically specific terms: zygote, morula, blastocyst, embryo and fetus ... and avoided the use of pronouns. “It” would have implied that the referent was inanimate, while “he” or “she” would have conferred personhood that some families would take offense at. If you have posters and/or photos, pass them around as the Reference Sheet is read.

Homework

Students' options:

- *Family Homework Exercise: Pregnancy*
- *Individual Homework Exercise: Pregnancy*

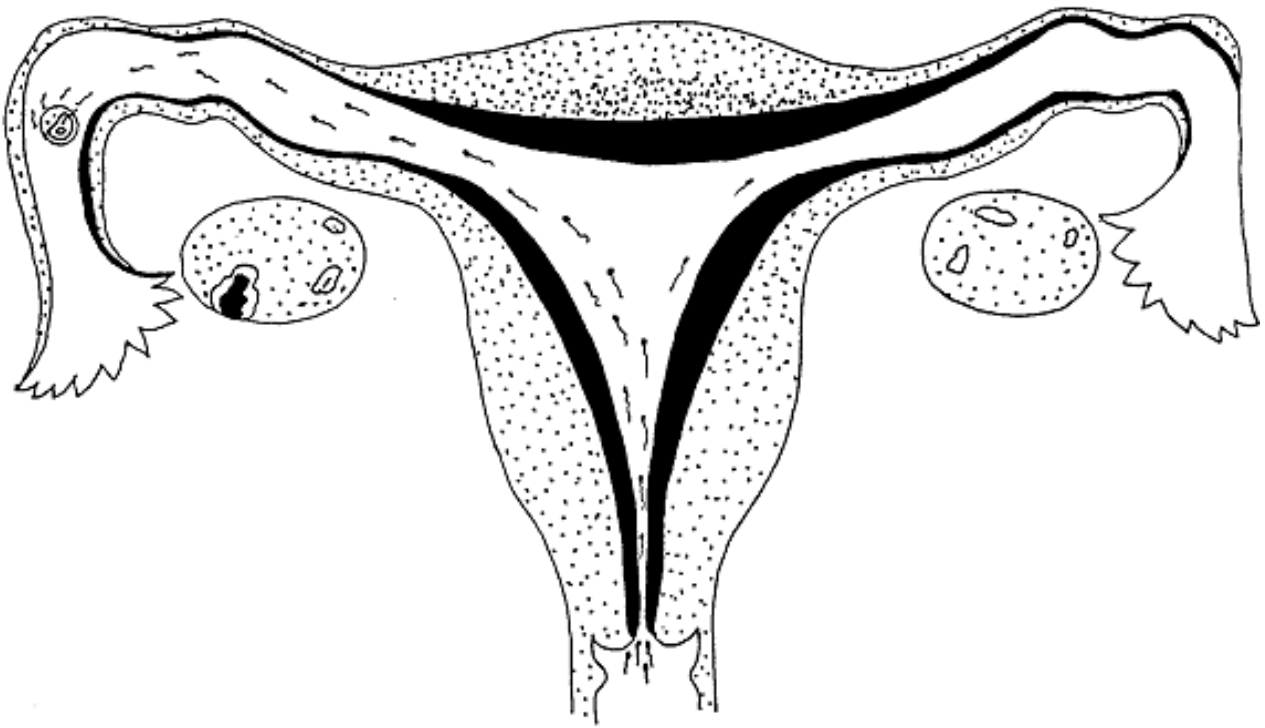
Pregnancy Transparency 1: Spermatazoon & Ovum



SPERM

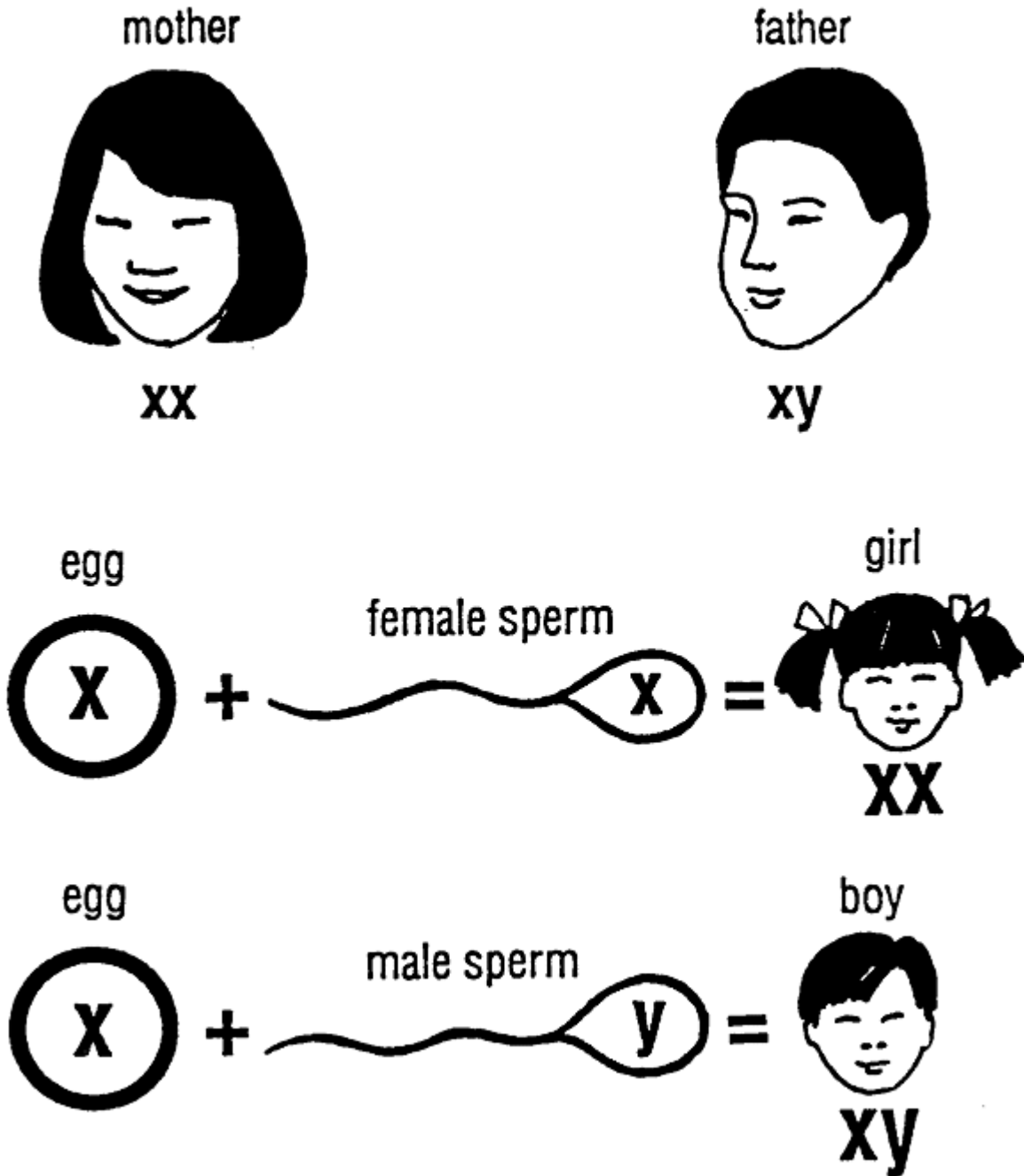
Pregnancy Transparency 2: Fertilization

OVUM AND SPERM MEET



SPERM AND EGG MAGNIFIED

Pregnancy Transparency 3: Sex Determination



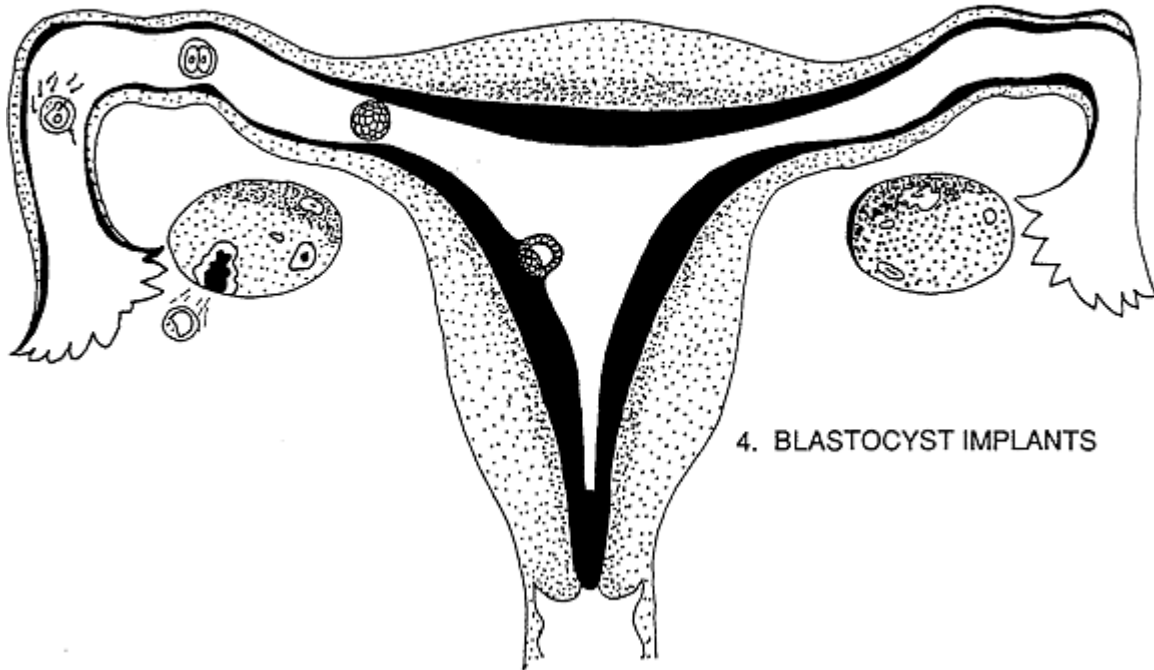
NOTE: This drawing describes what's typical. People with certain Intersex Conditions (also called "DSD") have patterns *other* than XX or XY.

Pregnancy Transparency 4: The First Week

1. FERTILIZATION

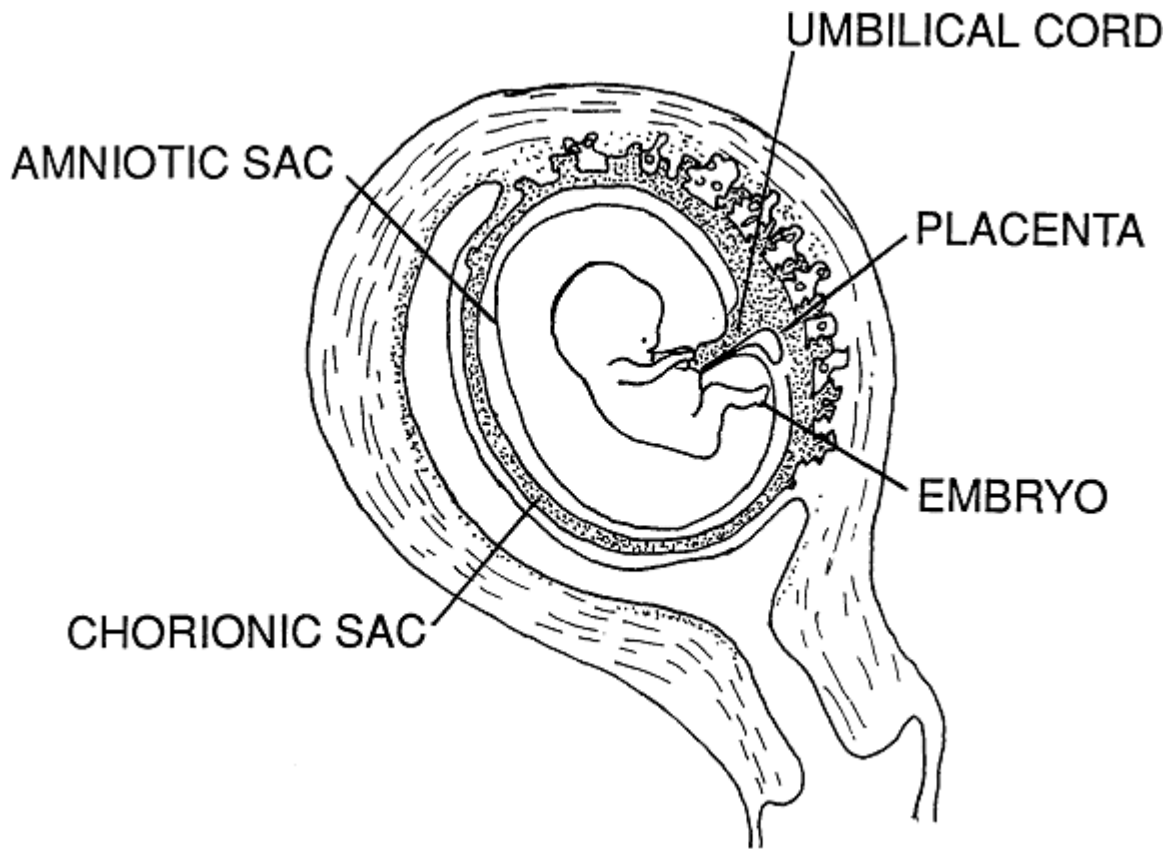
2. ZYGOTE

3. MORULA



4. BLASTOCYST IMPLANTS

Pregnancy Transparency 5: Cells Specialize



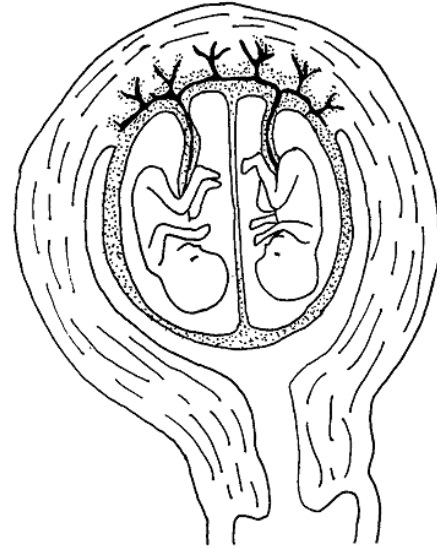
Pregnancy Transparency 6: Multiple Births

IDENTICAL TWINS

ONE PLACENTA

TWO AMNIOTIC SACS

ONE CHORIONIC SAC

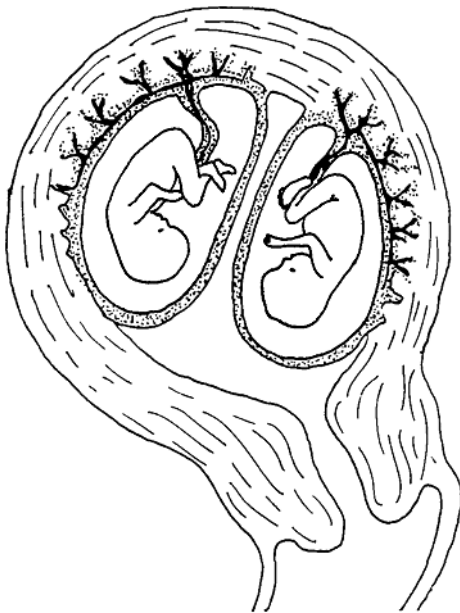


FRATERNAL TWINS

TWO PLACENTAS

TWO AMNIOTIC SACS

TWO CHORIONIC
SACS



Pregnancy Transparency 7: Vocabulary

VOCABULARY

AMNIOTIC

GESTATION

BLASTOCYST

IMPLANTATION

CHORIONIC

MORULA

CONCEPTION

PLACENTA

EMBRYO

PRENATAL

FERTILIZATION

UMBILICAL CORD

FETUS

ZYGOTE

Pregnancy Worksheet 1: The Beginning

NAME _____

PERIOD _____

DIRECTIONS: Below is a brief description of pregnancy. Fill in the fourteen terms from the Transparency, where they belong.

Pregnancy usually begins within hours of sexual intercourse (or, at most, a few days). It all starts in a fallopian tube, where the sperm and egg meet. The sperm cell burrows through the outer layers of the egg and finally penetrates the egg's nucleus. This process is called _____. * The developing baby in its earliest hours is called a "fertilized egg" or _____. *

(1) _____
(2)

About twelve hours into its development, this _____
(2) begins to divide. It forms a solid clump of cells which looks something like a mulberry. It is now called a _____. * On about the third day, this solid clump, still the same size, changes into a hollow ball of cells. Some of these cells will develop into a baby; others will become its support system. We call this fluid-filled ball of cells a _____. *

(3) _____
(4)

The _____
(4) passes into the uterus on day four or five and begins to increase in size. After floating around for three or four more days, it nests in the uterus. This nesting process, on day eight of development, is called _____.*

(5)

Now _____
(6) is complete. Less than half of all fertilized eggs survive to this point of development. *

Once it is solidly imbedded in the uterus, the ball of cells begins to form into separate parts: the developing baby (now called an _____); * the inner, or _____ sac (which is filled with fluid); * and the outer, or _____ sac; * the tube which will carry oxygen, nourishment and waste (called an _____) * and the organ connected **to** that tube (called the _____).

The _____ grows quickly, laying the foundation for many body systems, until, at about the eighth week, we begin to call it a _____.

Each animal takes a different length of time to develop. In human beings, the entire length of "pre-birth" (or _____) development is 39 weeks * ...that's about nine months of growing time (or _____) to go from a one-celled _____, smaller than the period at the end of this sentence, to a newborn baby averaging almost 7-1/2 pounds. *

* When reading this Worksheet aloud, stop at the asterisk and give the next reader a turn.

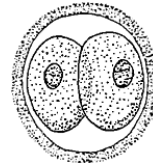
Pregnancy Reference Sheet 1

PART I: THE FIRST TRIMESTER

NOTE: Doctors often count the weeks of pregnancy starting about 2 weeks before fertilization ... when the woman has her last normal menstrual period. We're counting, below, from the moment of fertilization.

WEEKS 1 AND 2

Twelve hours after it is fertilized, the zygote divides into two cells both exactly alike. As it goes on dividing, it becomes a solid clump of cells, or morula.



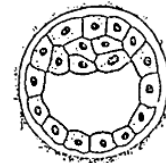
2-CELL STAGE "ZYGOTE"



CLUMP OF CELLS "MORULA"

The number of cells is doubling about every twelve hours, but the total size of the clump stays about the same. It becomes a hollow ball, or blastocyst.

By the beginning of the second week, the blastocyst has reached the uterus. Now it begins to grow, not just in number of cells, but in size, doubling daily. By the end of the second week, it has implanted and is called an embryo.



HOLLOW BALL OF CELLS
"BLASTOCYST"

WEEKS 3 AND 4

By the end of the third week of gestation, the embryo's backbone is forming ... the plans for a brain and spinal cord have been laid ... a primitive heart is starting to beat.



1/4 INCH EMBRYO



1/2 INCH EMBRYO

By the end of week four, the embryo's tail shows. We can see the buds that will grow into arms and legs. Dents beneath the skin show where eyes and ears will be. Growth has slowed a bit; it took a whole week to double in size

WEEKS 5 AND 6

By the end of week five, the chest and abdomen are formed. Eyes can be seen through clear eyelids. The embryo's tail has almost disappeared. The lungs are starting to form.



5/8 INCH



3/4 INCH

By the end of the sixth week, teeth are forming. Buds that will become fingers and toes are showing. In males, the bud of a penis appears.

WEEKS 7 AND 8

When week seven ends, the bones, muscles, and cartilage have started to form. The brain continues to form. Internal organs can be seen through the clear skin.



EMBRYO WEIGHS LESS THAN AN ASPIRIN TABLET



OVER 1 INCH

By the end of eight weeks, or about two months, the embryo's face is formed ... the eyes, which were on the sides of the head have moved to the front. Arms, legs, hands and feet are partly formed. Clitoris appears in girls.

THE THIRD MONTH (WEEKS 9 - 13)

By the beginning of this month, the developing baby is called a fetus. Finger nails appear. The head is very large, almost half as big as the whole fetus. By the end of the month, the fetus' arms and legs can move and the face can smile and frown, though not on purpose ... the brain is not mature enough for the fetus to think.



3 INCH "FETUS"

PART II: THE SECOND TRIMESTER

THE FOURTH MONTH (WEEKS 14- 17)



6-8 INCHES

The fetus' skin is less transparent; it's getting more color. Soft hair covers the whole fetus. Eyebrows and eyelashes appear. All the organs are formed, though not all are working fully yet. The fetus swallows amniotic fluid and urinates.

THE FIFTH AND SIXTH MONTHS (WEEKS 18-26)

By the beginning of this month, the developing baby is called a fetus. Finger nails appear. The head is very large, almost half as big as the whole fetus. By the end of the month, the fetus' arms and legs can move and the face can smile and frown, though not on purpose ... the brain is not mature enough for the fetus to think.



END OF 6TH MONTH: 14 INCHES

PART III: THE THIRD TRIMESTER

THE SEVENTH, EIGHTH, AND NINTH MONTHS (WEEKS 27-40)



END OF 8TH MONTH:
18 INCHES

Between weeks 28 and 32, the center of the brain which controls thinking and sensation (pain, etc.) begins to mature; this part of the brain won't fully function until after birth. Also during the last trimester, the fetus has periods of waking and sleeping, responds to sound and light. Most of the change in these last three months is in added body weight and maturing of the body systems. At birth, the baby's weight will be, on average, 7 pounds, 6 ounces. Her length will be, on average, 20 inches.

Family Homework Exercise: Pregnancy

ALL FAMILY HOMEWORK EXERCISES ARE OPTIONAL.

DIRECTIONS: There are many myths and rumors about pregnancy. Have you ever discussed them? Below is a quiz; try taking it together.

True or False ?

- ___ (1.) If a woman is overweight and becomes pregnant, she should go on a diet.
- ___ (2.) It's possible that a couple will start a pregnancy the very first time they have sex.
- ___ (3.) You can't get pregnant if you have intercourse standing up.
- ___ (4.) If you have intercourse during pregnancy, the baby will be born with a mark on his or her skin.
- ___ (5.) Getting drunk, even once during pregnancy, can cause birth defects.
- ___ (6.) If you crave clay, starch or dirt during pregnancy, your body must need them.
- ___ (7.) It is dangerous to swim when you're pregnant.
- ___ (8.) Stretch marks on the abdomen can be prevented with massage.
- ___ (9.) Boys "run" in some families (and girls in others). So if your family has mostly boys, you probably will, also.
- ___ (10.) Babies born to teens are more likely to have birth defects than those whose mothers are in their twenties.
- ___ (11.) Low-birth weight babies (five and a half pounds, or less) are healthier than big babies.
- ___ (12.) The father's use of alcohol and other drugs before a pregnancy may have an effect on the health of the baby.
- ___ (13.) A woman can get pregnant whether she enjoys the sex or not; even a rape can lead to pregnancy.
- ___ (14.) If a couple has had intercourse ten or more times and has not gotten pregnant, the woman is probably not able to have children.
- ___ (15.) If a woman is retaining too much water during pregnancy, the doctor will probably give her water pills (diuretics).

_____ = OUR SCORE

MORE DIRECTIONS: Now read and discuss the answers.

- (1.) False... Weight gain is a natural part of pregnancy. A doctor or midwife may advise the woman how much she ought to gain. Depending on the weight of the woman at the start of the pregnancy, the range is between 15 and 40 pounds—less for a woman who is overweight and more for a woman who is underweight. Dieting during pregnancy is not recommended since it can put both the mother and baby at risk.
- (2.) True... It simply depends upon whether there happens to be a mature egg present, and on chance. A pregnancy might happen the first time a couple has intercourse, or the seventh or nineteenth or **any** time.
- (3.) False... Pregnancy can start no matter what position a couple is in.
- (4.) False... Birth marks just happen; there is no reason we know of for the extra pigment in the skin.
- (5.) True... An occasional drink from time to time during pregnancy won't do any harm, but we simply do not know how much is safe. There is evidence that even one binge, especially in the first three months of pregnancy (even on beer or wine, which some people think are "safer") can harm the baby's brain cells or lead to other birth defects. Since we don't know how much is dangerous, it's better not to risk it. The same goes for all drugs, including medicines, when you're pregnant ... even aspirin should be discussed with a doctor.
- (6.) False... Usually, craving these "foods" goes along with iron deficiency, but eating them doesn't help. It can even lead to malnutrition. A woman with these cravings needs to talk it over with a doctor or midwife at her next prenatal visit.
- (7.) False... Unless a doctor specifically tells a woman not to, she should get regular exercise while she is pregnant. Swimming and bathing are safe throughout most of the pregnancy. The only time to avoid them is if she is bleeding or her "water has broken" which is no more than 24 hours before she will give birth.
- (8.) False... Stretch marks happen because of pressure from the uterus and hormone changes. They may appear no matter how little weight a woman gains and regardless of massage or fade creams. They cannot be avoided. Massage won't hurt, but it does **not** prevent stretch marks.

- (9.) False... This is a popular myth, but many studies have shown that sex is not inherited. Your chances of having one sex are affected neither by others in your family nor by how many children of one sex you already have.
- (10.) True... They are also more likely to be born too early in pregnancy (premature) or too small (*low-birth weight*). This is because teens are less likely than adult women to eat a balanced diet; more likely to use alcohol, cigarettes, and other drugs; and less likely to get pre-natal care.
- (11.) False... People used to think it was safer and easier to have a smaller baby. They would diet to try to keep their babies small. The truth is, a baby's weight is affected by many factors: genes/race (a Japanese baby is likely to be smaller than a Swedish baby), sex (boys tend to be a little bigger than girls), and nutrition. A very small (*low-birth weight*) baby **may** be healthy, but it is more **likely** than a bigger baby to have problems and to get sick a lot. As we said in question (1) it is **not** a good idea to try to lose weight during pregnancy.
- (12.) True... Although there is not nearly as much evidence of this as there is for the woman, some studies suggest that a man's ability to father a child may be impacted as a result of drug and alcohol use. Less is known about how this could impact the fetus, although some studies show that men with on-the-job exposures to chemicals do have babies with higher rates of certain congenital problems .
- (13.) True... She does not need to enjoy sex or have an orgasm to start a pregnancy. Sadly, even rape and child sexual abuse can lead to pregnancy.
- (14.) False... Some people think they can't start a pregnancy if they have had sex for a while and not started one so far. It has probably just been a matter of chance. It's **possible** one of them (man or woman) is *infertile*, but some couples just need to keep trying. Doctors don't usually suggest testing the couple until they have tried for a year or more.
- (15.) False... They used to do this. Now we know that water retention is usually due to high blood pressure (hypertension). Water pills make the **symptoms** go away, without treating the problem. Instead, the woman needs good pre-natal care; the doctor or midwife will probably suggest a balanced diet with plenty of protein and careful monitoring of blood pressure.

MORE DIRECTIONS:

- (1.) Add up the total number you got correct.
- (2.) Write that number at the bottom of the first page.
- (3.) Turn the page to find out what your score means.

SO, HOW DID YOU DO?

A score of 13-15 means you're both very well informed. Maybe you've had a pregnancy in your family recently or one of you works with pregnant women.

A score of 9-12 means you're fairly well-informed. Perhaps it's been a few years since the last pregnancy in your family. Good thing you did this exercise!

A score below 9 means you aren't as well informed. Maybe it's been a really long time since any one in your family had a baby. But don't worry ... ***that just means this class is important!***

So is early pre-natal care. A woman should see a doctor as soon as she thinks she might be pregnant ... or better yet: a couple should see a doctor when they are thinking about having a baby!

And, by the way, whatever your score was: **congratulations.**
 Congratulations for taking this class seriously and for caring enough about each other to do this kind of homework.

FOR FULL CREDIT, THIS EXERCISE IS DUE: _____
 IF YOU WANT CREDIT, SIMPLY TURN IN THE SLIP, BELOW.

FAMILY HOMEWORK CONFIRMATION SLIP

We have completed "Family Homework Exercise: Pregnancy".

Date: _____

student' s signature: _____

adult' s signature: _____

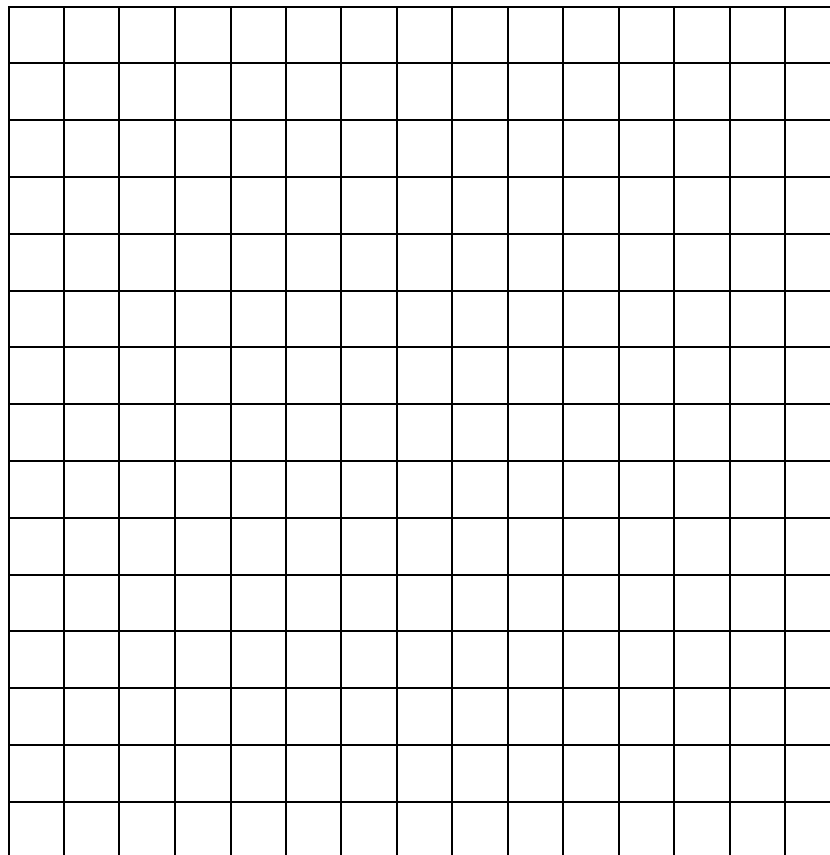
Individual Homework Exercise: Pregnancy

DIRECTIONS: Make up a crossword puzzle, using the following terms:

AMNIOTIC	CONCEPTION	FETUS	MORULA	UMBILICAL
BLASTOCYST	EMBRYO	GESTATION	PLACENTA	ZYGOTE
CHORIONIC	FERTILIZATION	IMPLANTATION	PRENATAL	

HERE'S HOW:

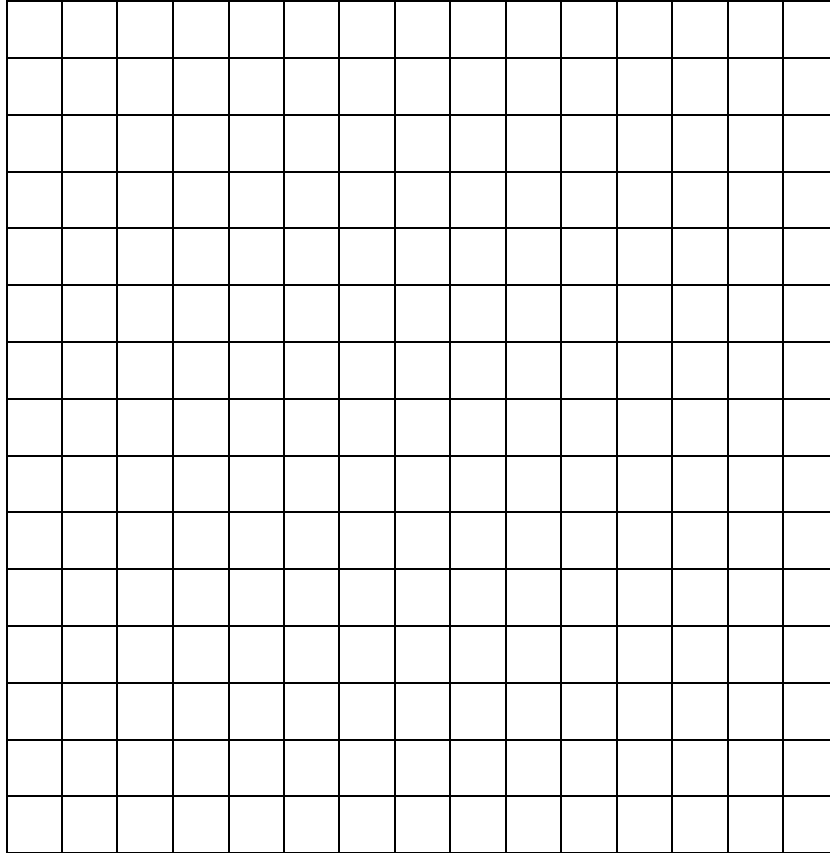
- (1.) Use the grid below to fill in your answers. It will become your answer key.
- (2.) Darken the un-used spaces, below.
- (3.) Number the words, starting in the upper left, regardless of whether they go across or down.
- (4.) Copy the darkened spaces and numbers onto the grid on the next page.
- (5.) Use a separate sheet of paper to write your clues, starting with the ACROSS words. Use your own words in the clues, and imagine that a classmate will try to solve your puzzle.



Individual Homework Exercise: Pregnancy - page 2

_____ 'S PREGNANCY PUZZLE

(your name)



REFERENCES:

¹ Hughes IA. Intersex. *British Journal of Urology*. 2002;90:769.

² Sax L. How common is intersex? a response to Anne Fausto-Sterling. *Journal of Sex Research*. 2002 Aug;39(3):174-8.