

Gunther von Hagens'

# BODY WORLDS

The Original Exhibition



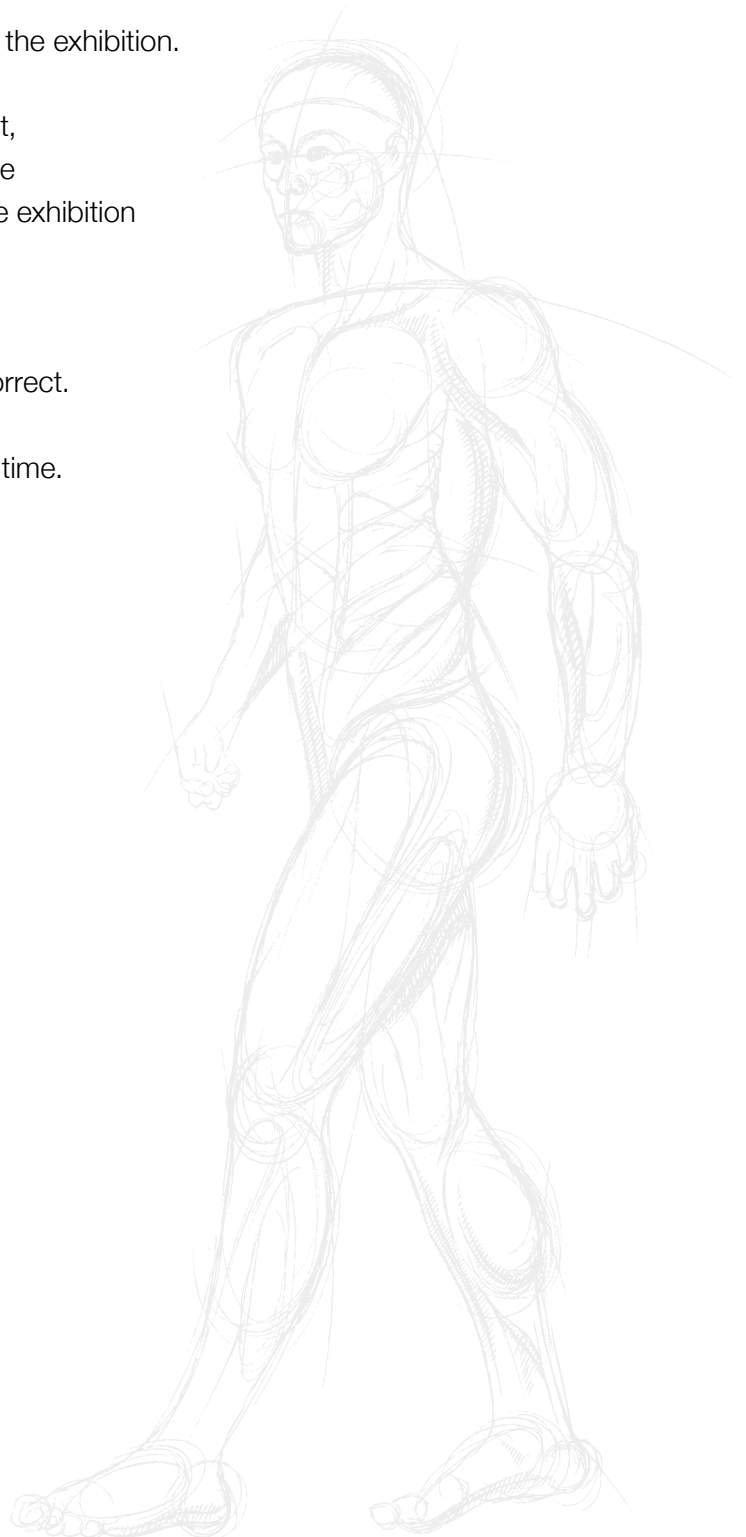
STUDENT  
WORKSHEETS

# INSTRUCTIONS

The following worksheets are mostly grouped according to the major systems of the body, just as the BODY WORLDS exhibition is. Complete these questions as you tour through the exhibition.

Questions can be answered by reading the text, observing the specimens and others will require that you draw conclusions from your tour of the exhibition and personal experience.

Be sure to read the questions carefully so that you can eliminate answers that are incorrect. If you can't find the correct answer, mark it for discussion with your class at a later time.



# SKELETAL SYSTEM

1. The smallest bones in the body are located in the \_\_\_\_\_.

- a  nose      b  ear      c  fingers      d  toes

2. The bones play several roles in the body.  
Which of the following is not a function of bones?

- a  protecting inner organs      b  deposit of minerals  
c  body support      d  filtering harmful materials from the body

3. The human hand has an equal number of bones and muscles.

- a  true      b  false

4. How much does an adult's skeleton weigh?

- a  about 2 kg (5 pounds)      b  7 to 9 kg (15-20 pounds)  
c  half of the weight of the body      d  about 45 kg (100 pounds)

5. The main blood cell production sites are in \_\_\_\_\_ bones such as the breast bone, ribs, shoulder blades and pelvis.

- a  large      b  small      c  flat      d  long

6. Cartilage is one of the tissues of the body that is not supplied with blood.

- a  true      b  false

7. The spine normally has how many vertebrae?

- a  13      b  23      c  33      d  34

# SKELETAL SYSTEM

8. Which joint bears the most weight in the body?

- a  shoulder   b  hip   c  knee   d  ankle

9. Ball-and-socket joints include the following:

- a  neck and spine                      b  toe and finger  
c  ankle and knee                         d  hip and shoulder

10. Arthritis is most common in those who are:

- a  over the age of 50                         b  overweight  
c  overly active                                 d  a & b (over age of 50 and overweight)

11. What are the three bones that make up the shoulder joint?

- a  the collarbone, the shoulder blade and the upper arm bone  
b  the clavicle, the scapula and the humerus  
c  both a. & b. since they refer to the same bones



# MUSCULAR SYSTEM

1. When a muscle contracts it \_\_\_\_\_.

- a  shortens    b  relaxes    c  lengthens    d  softens

2. There are more than 620 \_\_\_\_\_ muscles in the body.

- a  involuntary    b  voluntary    c  total    d  arm and leg

3. Muscles convert energy into movement.

- a  true    b  false

4. Muscle performance gradually declines beginning around the age of

- a  15    b  30    c  45    d  60

5. What do tendons do?

- a  connect bones to each other  
b  reduce friction and lubricate joints  
c  connect muscles to bones

6. Which of the following is true about muscles?

- a  they can be increased by 15-20%  
b  they are pre-determined in size when we are born  
c  they are all attached to bones  
d  they can double from their natural size through exercise

# MUSCULAR SYSTEM

**7.** Which is true about voluntary and involuntary muscles?

- a  Voluntary muscles cannot be controlled, while involuntary muscles can.
- b  Involuntary muscles and voluntary muscles can be controlled.
- c  Voluntary muscles can be controlled, while involuntary muscles cannot be.
- d  Involuntary muscles do not exist in adults, all adult muscles are voluntary.

**8.** Muscles are not used in which of the following activities

- a  breathing
- b  moving
- c  seeing
- d  thinking

**9.** Males have more muscle mass than females

- a  true
- b  false

**10.** Take a moment to describe which plastinates you felt best displayed the muscular system.

---

---

---

---

---

---

---

---

# NERVOUS SYSTEM

1. The brain and spinal cord make up the \_\_\_\_\_.

- a  central nervous system      b  nervous system  
c  peripheral nervous system      d  upper body

2. The brain makes up \_\_\_\_\_ of our total body weight, but requires \_\_\_\_\_ of our bloody supply.

- a  20% and 2%, respectively      b  2% and 20%, respectively  
c  3% and 30%, respectively      d  30% and 3%, respectively

3. In terms of evolutionary brain development, the \_\_\_\_\_ is one of the oldest parts.

- a  cerebellum      b  spinal column  
c  brainstem      d  corpus callosum

4. Which part of the brain controls our movement?

- a  cerebrum      b  thalamus      c  cerebellum      d  corpus callosum

5. During a severe brain hemorrhage blood pours into the cerebral matter.

- a  true      b  false

6. Regular exercise stimulates the brain.

- a  true      b  false

7. The \_\_\_\_\_ is the largest part of the brain.

- a  brainstem      b  cerebrum  
c  cerebellum      d  corpus callosum

# NERVOUS SYSTEM

8. Nerve cells can travel at speeds of up to \_\_\_\_\_ .

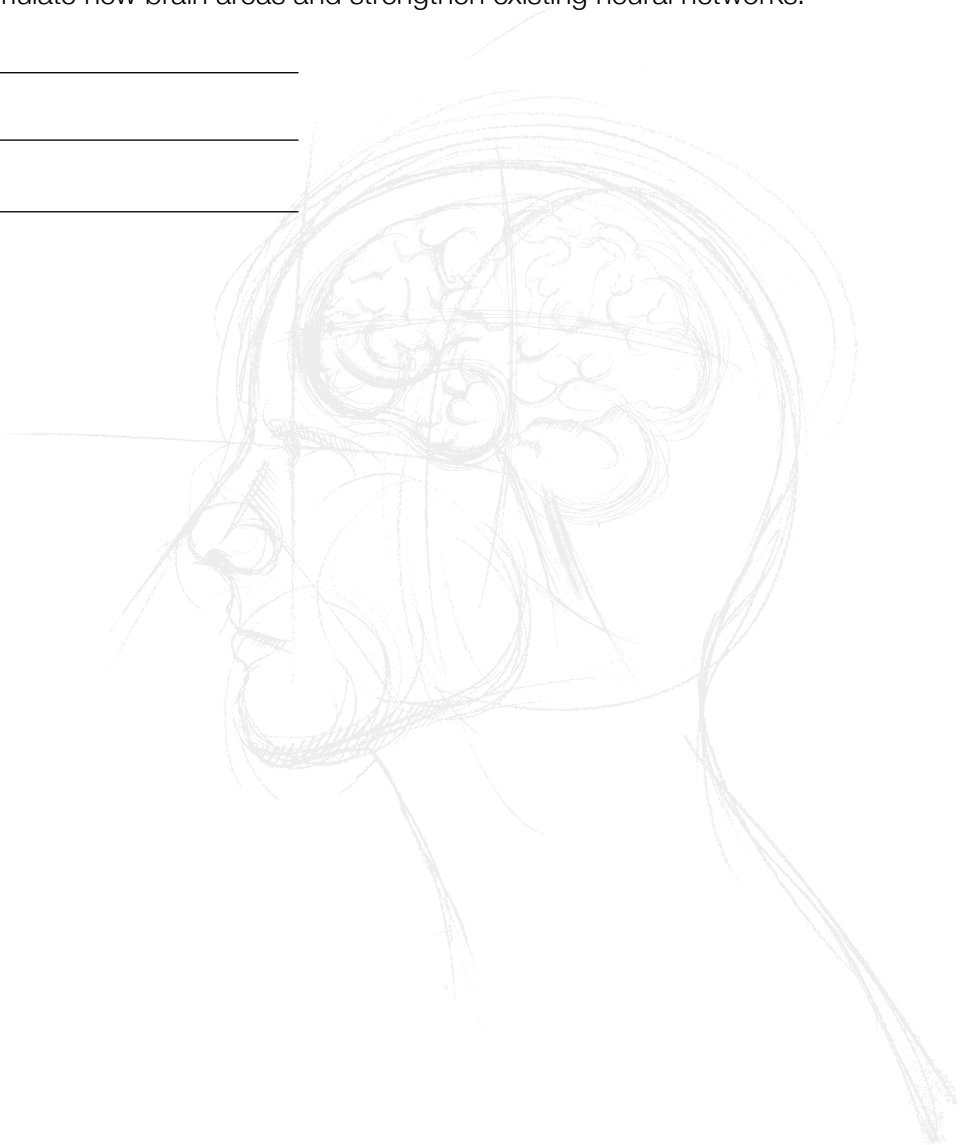
- a  8 km/h (5 mph)    b  80 km/h (50 mph)    c  400 km/h (250 mph)    d  800 km/h (500 mph)

9. Nerve fibers originate directly \_\_\_\_\_ .

- a  from in the brain  
b  from in the spinal column  
c  from either the brain or spinal column

10. List three activities that stimulate new brain areas and strengthen existing neural networks.

- a \_\_\_\_\_  
b \_\_\_\_\_  
c \_\_\_\_\_





# RESPIRATORY SYSTEM

1. Tar and soot particles from cigarette smoke form deposits in the \_\_\_\_\_ tissue.

- a  skin      b  pulmonary      c  muscle      d  cardiovascular

2. Every minute, about \_\_\_\_\_ pints of air pass into the lungs.

- a  2-3      b  5      c  10-12      d  20

3. Breathing is an exchange process of oxygen and carbon dioxide.

- a  true      b  false

4. The thyroid is a gland in the neck that produces \_\_\_\_\_.

- a  saliva      b  oxygen      c  hormones      d  all of the above

5. Nicotine raises the levels of a neurotransmitter called dopamine

- a  true      b  false

6. Each lung contains \_\_\_\_\_ alveoli

- a  300 to 450      b  300-450 thousand  
c  300-450 million      d  300-450 billion

7. The bronchial passages of the lungs lead to clusters of tiny air sacs called \_\_\_\_\_.

- a  alveoli      b  tracheas      c  capillaries      d  bronchial trees

8. What causes deepening of the voice in puberty, particularly in males?

- a  the larynx growing larger and thicker  
b  the larynx shrinking and getting thinner  
c  chronic lung disease as a child  
d  smoking and pollution

# RESPIRATORY SYSTEM

9. Studies show that \_\_\_\_\_ of all deaths caused by heart disease are related to smoking.

- a  10%      b  15%      c  20%      d  50%

10. Lung cancer is \_\_\_\_\_ common in smokers than non-smokers.

- a  10 times less common  
b  equally  
c  10 times more common  
d  20 times more common

11. The chemicals in cigarette smoke increase mutation rates and inhibit cells from repairing DNA.

- a  true      b  false

12. Nicotine raises the levels of a neurotransmitter called dopamine

- a  true      b  false      c  50%

13. The effects of smoking are:

- a  skin wrinkles  
b  accelerating our aging process  
c  weakening our immune system  
d  increasing the risk for diseases, such as cancer, heart attack, stroke, and eye diseases  
e  all of the above

14. Which of these facts is NOT true?

- a  The surface area of the lungs is the same size as a tennis court?  
b  A sneeze travels at a speed of about 145 km/h (90 mph).  
c  Your left lung is larger than your right lung.

# CARDIOVASCULAR SYSTEM

- 1.** The size of the heart is roughly that of our fist and weighs approximately \_\_\_\_\_.
- a  **60 g** (2 oz.)    b  **150 g** (5 oz.)    c  **300 g** (11 oz.)    d  **600 g** (21 oz.)
- 2.** The network of arteries, veins, and capillaries is extraordinarily dense. In an adult, this network is more than \_\_\_\_\_ long.
- a  **15 metres** (600 inches)                      b  **200 metres** (600 feet)  
c  **9.656 kilometres** (6.000 miles)            d  **96.500 kilometres** (60.000 miles)
- 3.** Cardiovascular diseases are the number one cause of death globally. According to the World Health Organization (WHO) more than \_\_\_\_\_ people die of heart disease every year.
- a  **500.000**            b  **9 million**            c  **17 million**            d  **23 million**
- 4.** Which of these is not true?
- a  **Your heart beats around 70 times a minute.**  
b  **The heart is the biggest organ in your body.**  
c  **Your heart pumps a cup full of blood every time it beats.**
- 5.** In an adult normal blood pressure at rest is considered to be \_\_\_\_\_.
- a  **under 120/80 mmHg**                      b  **over 120/80 mmHg**
- 6.** Our heart is the only muscle that does not grow with exercise.
- a  **true**                      b  **false**
- 7.** Causes of an enlarged heart may include which of the following:
- a  **exercise**  
b  **high blood pressure**  
c  **defects in the heart wall**  
d  **all of the above**

# CARDIOVASCULAR SYSTEM

8. The heart sits tucked between \_\_\_\_\_.

- a  the stomach and chest muscles                      b  the lungs  
c  the spleen and liver    d  the ribs

9. Sometimes heart attacks go undiagnosed, because the signs are not as obvious as what people may be used to seeing depicted in the movies or on TV.

- a  true                      b  false

10. "Smoker's leg" is a common term for severe peripheral arterial occlusive disease.

- a  true                      b  false

11. Name three cardiovascular diseases shown in the exhibition.

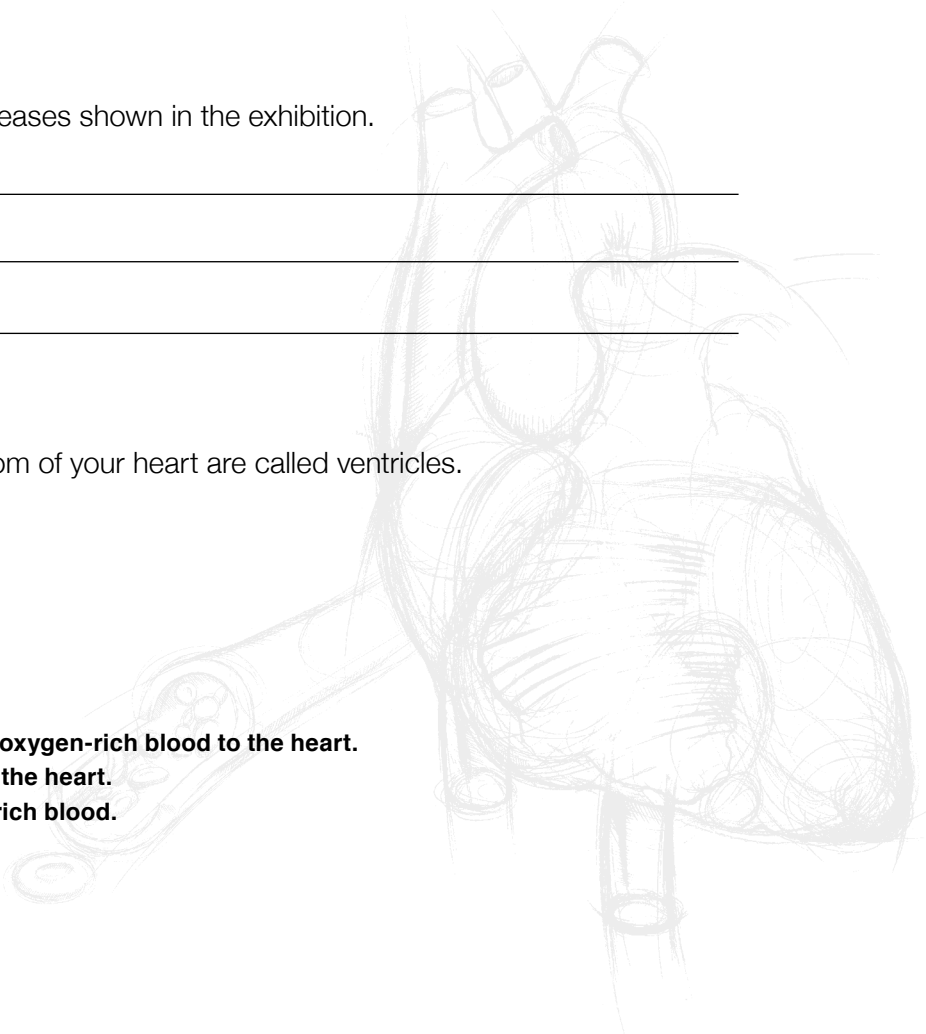
- a \_\_\_\_\_  
b \_\_\_\_\_  
c \_\_\_\_\_

12. The two chambers at the bottom of your heart are called ventricles.

- a  true                      b  false

13. Which of the following is true:

- a  The pulmonary vein carries oxygen-rich blood to the heart.  
b  Veins lead to the body from the heart.  
c  Veins always carry oxygen-rich blood.  
d  None of the above.



# DIGESTIVE SYSTEM & EXCRETORY SYSTEM

1. The stomach is a hollow, muscular organ, capable of holding \_\_\_\_\_ of food and liquids.

- a  0,5 to 1 litres (2-4 cups)      b  2 to 3 litres (4-6 pints)  
c  up to 10 litres (3 gallons)

2. Most digestion occurs in \_\_\_\_\_.

- a  the mouth      b  the stomach      c  the small intestine  
d  the large intestine      e  equally in all areas listed before

3. To enlarge the area available for nutrient absorption, the small intestine has ring-shaped folds and a dense network of finger-shaped villi that \_\_\_\_\_.

- a  are each 1 mm (0.04 inches) in length      b  act like bristles of a microscopic brush  
c  are tiny finger-shaped projections      d  all of the above

4. Water and vitamins are absorbed in the large intestine.

- a  true      b  false

5. The pancreas secretes two hormones they are:

- a  testosterone and estrogen  
b  insulin and glucagon  
c  oxytocin and cortisol

6. The liver is the largest organ in the body.

- a  true      b  false

7. The \_\_\_\_\_ is the largest and heaviest organ of the body.

- a  liver      b  heart      c  skin      d  stomach

# DIGESTIVE SYSTEM & EXCRETORY SYSTEM

8. Liver cells produce 0,75 to 1,25 litres (1,6-2,6 pints) of \_\_\_\_\_ each day.

- a  **bile**      b  **blood**      c  **urine**      d  **waste**

9. Excess alcohol intake causes \_\_\_\_\_ to accumulate in liver cells.

- a  **blood**      b  **bile**      c  **fat**      d  **protein**

10. Melanomas are a benign form of skin cancer.

- a  **true**      b  **false**

11. Factors that can tip the balance in favor of weight gain include:

- a  **our genetic makeup**  
b  **overeating**  
c  **lack of physical activity**  
d  **all of the above**

12. Overweight and obesity are linked to more death worldwide than underweight.

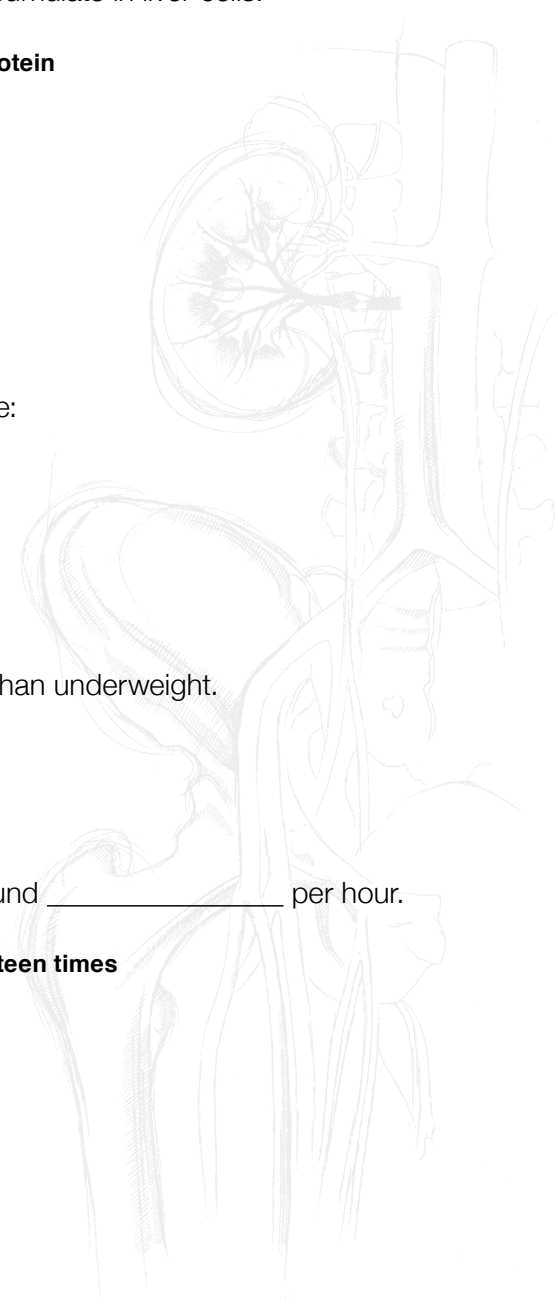
- a  **true**      b  **false**

13. The body's total blood volume flows through the kidneys around \_\_\_\_\_ per hour.

- a  **once**      b  **five times**      c  **ten times**      d  **fifteen times**

14. The male urethra is about 20 cm (8 inches) long.  
In women, the urethra is about \_\_\_\_\_ cm long.

- a  **4 cm** (1,5 inches)      b  **8 cm** (3 inches)  
c  **10 cm** (4 inches)      d  **also 20 cm** (8 inches)



# REPRODUCTIVE SYSTEM & FETAL DEVELOPMENT

- 1.** The testes contain thousands of finely coiled tubes, called seminiferous tubules, in which about how many sperm cells mature every day?
- a  1 million      b  100 million      c  300 million      d  1 billion
- 2.** The prostate gland is roughly the size of a \_\_\_\_\_.
- a  pea      b  chestnut      c  golf ball      d  tennis ball
- 3.** What is the most common form of cancer in women?
- a  lung      b  ovarian      c  breast      d  skin
- 4.** A woman's egg cells develop throughout her life.
- a  true      b  false
- 5.** After only four weeks, an embryo already has developed the following:
- a  a heart and eyes  
b  four buds (beginnings of arms and legs)  
c  all of the above  
d  none of the above
- 6.** After the eighth week of pregnancy, the developing child is called a \_\_\_\_\_.
- a  embryo      b  fetus      c  baby      d  infant

# REPRODUCTIVE SYSTEM & FETAL DEVELOPMENT

7. In the fourth month of pregnancy the following organs develop \_\_\_\_\_.

- a  kidneys                      b  liver and pancreas  
c  large and small intestines      d  all of the above

8. The placenta exists only during pregnancy.

- a  true                      b  false

9. Twins that share the same genetic code are known as identical or \_\_\_\_\_.

- a  fraternal                      b  dizygotic  
c  monozygotic                      d  brother and sister

10. In the exhibition what is described as the “life line” from the mother to the developing fetus?

- a  uterus                      b  blood supply  
c  umbilical cord                      d  placenta



# BODY WORLDS & DAILY LIFE

**1.** Briefly describe your favorite part of the exhibition.

---

---

---

---

---

**2.** After seeing the exhibition will you be more or less likely to live a healthy lifestyle and why?

---

---

---

---

---

---

---

---

---

## SKELETAL SYSTEM

- 1) b. ear
- 2) d. filtering harmful materials from the body
- 3) b. false (there are 27 bones controlled by 37 muscles)
- 4) b. 7 to 9 kg (15-20 pounds)
- 5) c. flat
- 6) a. true
- 7) c. 33
- 8) c. knee
- 9) d. hip and shoulder
- 10) d. a & b (over age of 50 and overweight)
- 11) c. both a & b since they refer to the same bones

## MUSCULAR SYSTEM

- 1) a. shortens
- 2) b. voluntary
- 3) a. true
- 4) b. 30
- 5) c. connect muscles to bones
- 6) a. they can be increased by 15-20%
- 7) c. Voluntary muscles can be controlled, while involuntary muscles cannot be.
- 8) d. thinking
- 9) a. true
- 10) answers will vary among students

## NERVOUS SYSTEM

- 1) a. central nervous system
- 2) b. 2% and 20%, respectively
- 3) c. brainstem
- 4) a. cerebrum
- 5) a. true
- 6) a. true
- 7) b. cerebrum
- 8) c. 400 km/h (250 mph)
- 9) c. from either the brain or spinal column
- 10) answers may vary but can include:  
exercise, playing a musical instrument, studying a language

## RESPIRATORY SYSTEM

- 1) b. pulmonary
- 2) c. 10-12
- 3) a. true
- 4) c. hormones
- 5) a. true
- 6) c. 300-450 million
- 7) a. alveoli
- 8) a. the larynx growing larger and thicker
- 9) c. 20%
- 10) d. 20 times more common

## RESPIRATORY SYSTEM

- 11) a. true
- 12) a. true
- 13) g. all of the above
- 14) c. Your left lung is larger than your right lung.

## CARDIOVASCULAR SYSTEM

- 1) c. 300 g (11 ounces)
- 2) d. 96.500 kilometres (60.000 miles) long
- 3) c. 17 million
- 4) b. false – The skin is the biggest organ.
- 5) a. under 120/80 mmHg
- 6) b. false
- 7) d. all of the above
- 8) b. the lungs
- 9) a. true
- 10) a. true
- 11) Answers may include:  
Aneurysm (of the Abdominal Aorta), Arteriosclerosis.  
Infarct in the Apex of the Heart, Heart Hypertrophy,  
Hemorrhage due to a Heart Attack,  
arterial occlusive disease/"smoker's leg",  
Enlarged Heart (Cardiac Hypertrophy)  
Enlarged Spleen due to Leukemia
- 12) a. true
- 13) a. The pulmonary vein carries oxygen-rich blood to the heart.

## DIGESTIVE SYSTEM & EXCRETORY SYSTEM

- 1) b. 2 to 3 litres (4-6 pints)
- 2) c. the small intestine
- 3) d. all of the above
- 4) a. true
- 5) b. insulin and glucagon
- 6) b. false
- 7) c. skin
- 8) a. bile
- 9) c. fat
- 10) b. false
- 11) d. all of the above
- 12) a. true
- 13) d. fifteen times
- 14) a. about 4 cm (1,5 inches)

## REPRODUCTIVE SYSTEM & FETAL DEVELOPMENT

- 1) c. 300 million
- 2) b. chestnut
- 3) c. breast
- 4) b. false – All of a female's egg cells are present at birth.
- 5) c. all of the above
- 6) b. fetus

## REPRODUCTIVE SYSTEM & FETAL DEVELOPMENT

- 7) d. all of the above
- 8) a. true
- 9) c. monozygotic
- 10) c. umbilical cord

## BODY WORLDS & DAILY LIFE

- 1) answers will differ
- 2) answers will differ