

*Woolfolk et al., Educational Psychology, 6<sup>th</sup> Canadian edition*  
*Chapter 2: Cognitive Development and Language*

**Multiple Choice Questions**

- 1) Which one of the following is an example of maturation?

A) Gaining weight from age two to age three  
B) Losing weight due to exercise  
C) Losing weight during a brief illness  
D) Learning which foods produce the most weight

Answer: A

Explanation: A) *Maturation refers to changes that occur naturally and spontaneously* rather than as a result of environmental circumstances. An example would be gaining weight from age two to age three. [Note: losing weight due to illness or exercise is not a natural occurrence, but one that is caused by particular environmental events.]

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Skill: Understanding

- 2) As time goes on, Tina becomes a happier individual, more in touch with life, and content with her situation. This description emphasizes what kind of development for Tina?

A) Cognitive  
B) Personal  
C) Physical  
D) Social

Answer: B

Explanation: B) In contrast with social development that involves relations with others, *personal development* is illustrated in the scenario on changes in Tina's personality (such as being happier, changes in self-concept, etc.).

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Skill: Understanding

- 3) All developmental theories have the following general principle in common

A) Development is balanced.  
B) Development is gradual.  
C) Development occurs in a random way.  
D) Individuals develop at the same rate.

Answer: B

Explanation: B) Development is gradual, occurs in an orderly way, and occurs at variable rates. *Development is NOT considered to be balanced*, i.e., development is not balanced across physical, personal, social, and cognitive development.

Page Ref: 24-25

Skill: Knowledge

- 4) What part of the brain coordinates and orchestrates skilled movements?

- A) Cerebellum
- B) Cortex
- C) Cerebrum
- D) Frontal lobe

Answer: A

Explanation: A) The *cerebellum* is the part of the brain that coordinates and orchestrates skilled movements. The thalamus is associated with the ability to learn new information, while the cerebral cortex controls sensory input, the formation of associations, and voluntary movement.

Page Ref: 26

Skill: Knowledge

- 5) If John is introduced to the concept of fractions today, he will not be able to start adding and subtracting them tomorrow. What general principle of development is illustrated?
- A) Development proceeds through identifiable stages.
  - B) Development takes place gradually.
  - C) Maturation is the basis for development.
  - D) John lacks personal development.

Answer: B

Explanation: B) *Development takes place gradually*. John will need to acquire more experience and skills with fractions before he can perform specific operations such as adding and subtracting. [He may, however, acquire those skills at different rates than others.]

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Skill: Understanding

- 6) The last part of the brain to develop fully is the
- A) cerebellum.
  - B) cerebral cortex.
  - C) frontal lobe.
  - D) thalamus.

Answer: C

Explanation: C) The last section of the brain to develop fully is the *frontal lobe* in the cerebral cortex.

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Skill: Knowledge

- 7) The part of the cerebral cortex that matures first controls
- A) higher-order thinking processes.
  - B) physical movements.
  - C) the processing of language.
  - D) the formation of associations.

Answer: B

Explanation: B) *Control of physical movements* matures in the cerebral cortex before other functions, such as activities that involve verbalization.

Page Ref: 29  
Skill: Knowledge

- 8) Specialization of the two hemispheres of the brain involves

- A) Broca's area.
- B) lateralization.
- C) the primary auditory cortex.
- D) Wernicke's area.

Answer: B

Explanation: B) Specialization in the two hemispheres of the brain relates to *lateralization*.

Page Ref: 29-30  
Skill: Knowledge

- 9) Messages sent by releasing chemicals that jump across synapses involve

- A) lateralization.
- B) myelination.
- C) neurons.
- D) transformations.

Answer: C

Explanation: C) *Neurons* send messages by releasing chemicals that jump across synapses in the brain.

Page Ref: 27  
Skill: Knowledge

- 10) According to Piaget, the foundation for development in all humans is supplied by

- A) activity.
- B) exploration.
- C) maturation.
- D) social transmission.

Answer: C

Explanation: C) The fundamental basis for development in people is biological *maturation*, the characteristics that are genetically determined.

Page Ref: 37  
Skill: Knowledge

- 11) Piaget's basic blocks of thinking and memory are

- A) actions.
- B) accommodations.
- C) adaptations.
- D) schemes.

Answer: D

Explanation: D) *Schemes* are Piaget's basic blocks of thinking. These schemes are an organized system of thought or action that permit us to represent objects and thoughts in our own words.

Page Ref: 38  
Skill: Knowledge

- 12) The two processes involved in adaptation are
- A) assimilation and accommodation.
  - B) assimilation and equilibration.
  - C) equilibration and organization.
  - D) social transmission and scheme.

Answer: A

Explanation: A) The two processes of adaptation are *assimilation and accommodation*. Accommodation is defined by Piaget as the process of changing existing schemes to respond to a new situation. Assimilation is the process of changing what is learned to fit existing schemes.

Page Ref: 38  
Skill: Knowledge

- 13) Which of the following pairs of factors that influence thinking is thought by Piaget to be genetic or inherited tendencies?
- A) Accommodation and assimilation
  - B) Adaptation and organization
  - C) Assimilation and schemes
  - D) Schemes and equilibration

Answer: B

Explanation: B) Based on his work in biology, Piaget concluded that all species inherit two basic tendencies: *organization* (the combining of behaviours into coherent systems) and *adaptation* (adjusting to the environment).

Page Ref: 37-38  
Skill: Knowledge

- 14) Which one of the following is the clearest example of Piaget's concept of assimilation?
- A) Learning that a green light means "go" and a red light means "stop."
  - B) Learning to paint with a new type of brush.
  - C) Looking at teachers as they lecture.
  - D) Looking at a worm and thinking that it is a snake.

Answer: D

Explanation: D) The clearest example of assimilation of the choices given is *looking at a worm and thinking that it is a snake*. The observer is "fitting" the stimulus (worm) into her mental scheme at the moment, which is apparently oriented to expect to see a snake or which assigns (based on experiences) greater saliency to a snake than to a worm. The environmental stimulus is being mentally "changed" in accord with the learner's existing schemes.

Page Ref: 38  
Skill: Understanding

- 15) Jeannie observed rocks sinking in water and said, "I already knew that. All rocks sink."

Then she saw a piece of pumice floating on water and was told that pumice is rock. Several days later, she was asked again if rocks sink in water. She replied, "Well, most do." In Piaget's terms, what process did Jeannie use to draw this conclusion?

- A) Accommodation
- B) Assimilation
- C) Classification
- D) Conservation

Answer: A

Explanation: A) Jeannie is using *accommodation* by changing her ideas about whether rocks sink or float based on her experience in observing a floating piece of pumice.

Assimilation would have involved resisting the idea that rocks float, perhaps by failing to accept pumice as a type of rock.

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Skill: Understanding

- 16) According to Piaget, the process of searching for a balance between cognitive schemes and environmental information is called

- A) accommodation.
- B) adaptation.
- C) assimilation.
- D) equilibration.

Answer: D

Explanation: D) *Equilibration* is defined by Piaget as the process of searching for a balance between cognitive schemes and environmental information. When a balance occurs, equilibrium is felt; imbalance causes disequilibrium.

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Skill: Knowledge

- 17) When we try a particular strategy and it does not work, the discomfort we experience is called

- A) assimilation.
- B) centration.
- C) disequilibrium.
- D) non-adaptation.

Answer: C

Explanation: C) *Disequilibrium* is the discomfort we feel when a scheme does not work as expected. It promotes new learning by motivating us to continue searching for a solution.

Page Ref: 38

Skill: Knowledge

- 18) According to Piaget, people pass through the four stages of cognitive development

- A) at the same levels of competence.
- B) at the same rates, adjusted for intelligence.
- C) in specifically determined ages.

D) in the same sequence.

Answer: D

Explanation: D) Piaget theorized that people pass through the four stages of cognitive development *in the same sequence*. However, they do this at different rates, depending on individual development.

Page Ref: 39

Skill: Knowledge

19) The best way to determine what cognitive stage a person has reached is by

A) interpreting the person's scores on a mental ability test.

B) knowing the person's age.

C) knowing the person's rate of development.

D) observing how the person solves problems.

Answer: D

Explanation: D) The best way of determining the cognitive stage that a person has reached is to *observe how that individual solves problems*. The Piagetian stages concern ways of thinking, not particular age levels or levels of intelligence.

Page Ref: 39-43

Skill: Understanding

20) What of the following sayings best conveys a child's thinking before the notion of object permanence is acquired?

A) "A bird in the hand is worth two in the bush."

B) "A penny saved is a penny earned."

C) "A stitch in time saves nine."

D) "Out of sight, out of mind."

Answer: D

Explanation: D) Before object permanence is acquired, a child thinks that an object that is no longer visible has disappeared "out of sight, out of mind" as the saying goes.

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Skill: Understanding

21) In Piaget's theory, an understanding of object permanence is acquired during what period of development?

A) Early preoperations

B) Operations

C) Late preoperations

D) Sensorimotor

Answer: D

Explanation: D) Object permanence, the understanding that objects exist even if not visible, is acquired during the *sensorimotor period*.

Page Ref: 39

Skill: Knowledge

22) Michelle covers her own eyes, because she thinks her friends will not see her when

playing a game of hide-and-seek. What stage of Piaget's cognitive theory does this account best illustrate?

- A) Concrete operations
- B) Formal operations
- C) Preoperational thought
- D) Sensorimotor

Answer: D

Explanation: D) Michelle is demonstrating an early form of egocentrism as well as a lack of object permanence. As is common during early stages of the *sensorimotor period*, she believes that if she can't see others, others can't see her.

Page Ref: 39

Skill: Understanding

- 23) In the sensorimotor stage of development, a child begins to develop

- A) goal-directed actions.
- B) mental operations.
- C) preoperational thought.
- D) semiotic functions.

Answer: A

Explanation: A) Toward the end of the *sensorimotor period*, children begin to use logical, goal-directed actions in which they play with objects in an orderly fashion (for a purpose, with a goal in mind). By the preoperations period, these types of actions are well established.

Page Ref: 39-40

Skill: Knowledge

- 24) Nathan is shown two balls of clay that he identifies as equal in quantity. When one of the balls is then rolled into a sausage, Nathan says that piece (i.e., sausage) now has more clay. In what stage of development is he likely to be?

- A) Concrete operations
- B) Goal-directed operations
- C) Preoperational thought
- D) Sensorimotor

Answer: C

Explanation: C) Nathan is probably in the *preoperational stage* because he is failing to demonstrate conservation. If he were in the concrete operations or formal operations stages, he would indicate that both pieces contain the same amount of clay because the quantity of the sausage-like piece has not changed.

Page Ref: 40

Skill: Application

Difficulty: Understanding

- 25) Billy refuses to drink his orange juice from the 1/2 full glass that his mother gives to him. He wants her to pour the juice into his favorite cup and watches his mother fill it to the brim. Billy likes his cup better because he gets more juice in it. With what cognitive

concept in Piaget's theory is Billy having trouble?

- A) Accommodation
- B) Assimilation
- C) Conservation
- D) Semiotic function

Answer: C

Explanation: C) The cognitive concept illustrated by Billy's thinking that he gets more juice in his small cup than in the half-full larger cup is an example of a child who has not yet developed Piaget's concept of *conservation*.

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Skill: Understanding

- 26) After stringing beads from a large necklace onto a smaller empty string, a child states that there are now more beads on the small string than there were on the larger string. What cognitive concept (Piaget's theory) does this behaviour best illustrate?

- A) Accommodation
- B) Assimilation
- C) Conservation
- D) Equilibration

Answer: C

Explanation: C) The child is apparently preoperational. He or she is *failing to conserve quantity by thinking that the small string contains more beads* (because it "appears" more loaded with beads).

Page Ref: 40

Skill: Understanding

- 27) A teacher pours juice from a larger glass into two tiny glasses, and the child beams, happy now that he has "more juice." What cognitive stage (Piaget's theory) does the account best illustrate?

- A) Concrete operations
- B) Formal operational thought
- C) Preoperational thought
- D) Sensorimotor

Answer: C

Explanation: C) The child is in the *preoperational stage*. We can conclude this because he has *failed to demonstrate conservation* by thinking that the tiny glasses contain more juice.

Page Ref: 40

Skill: Understanding

- 28) In his first game of hide-and-seek, Andy covers his eyes so that his friends cannot see him. His thinking can be described as

- A) decentered.
- B) egocentric.
- C) schematic.

D) seriation.

Answer: B

Explanation: B) Andy is acting in an *egocentric manner*. He assumes that just because he cannot see his friends, they cannot see him. [Ostriches are said to act the same way!]

Page Ref: 40-41

Skill: Understanding

- 29) A preoperational child's belief that a tall, narrow glass contains more liquid than a short, wide glass is probably due to difficulties in

A) decentering.

B) egocentrism.

C) serration.

D) object permanence.

Answer: A

Explanation: A) *Decentering* is the ability to focus on more than one aspect of a situation at a time. This occurs, for example, when the preoperational child perceives that, because a glass is taller, it must also have more liquid. In this case, the child is unable to see that the amount of liquid has not changed.

Page Ref: 40

Skill: Knowledge

- 30) Corinne has mastered this type of problem: "If the white house is bigger than the blue house, and the blue house is bigger than the red house, is the white house bigger or smaller than the red house?" What stage of Piaget's cognitive theory does this situation best illustrate?

A) Concrete operations

B) Formal operations

C) Preoperational thought

D) Sensorimotor

Answer: A

Explanation: A) By demonstrating an ability to understand ordering and seriation, Corinne is evidently in the *concrete operations stage*. She would be less capable at this task, however, if she were dealing with abstractions rather than with concrete objects (houses of different colours).

Page Ref: 43

Skill: Understanding

- 31) David has just purchased a car and is intensely interested in it. When the car has engine trouble, he is able systematically to locate the problem. What cognitive stage of Piaget's theory does this situation best illustrate?

A) Concrete operations

B) Formal operations

C) Preoperational thought

D) Sensorimotor

Answer: B

Explanation: B) David appears to be in the *formal operations stage*. He is able to use logical thinking to locate the engine trouble systematically. He is evidently using formal thought to solve unique problems.

Page Ref: 41-43

Skill: Understanding

32) What is the hallmark of Piaget's stage of formal operations?

- A) Semiotic function
- B) Hypothetical-deductive reasoning
- C) Organized thinking of dependent elements
- D) Reversible thinking

Answer: B

Explanation: B) The hallmark of Piaget's stage of formal operations is *hypothetical-deductive reasoning*. This ability involves both deductive and inductive reasoning to solve real as well as hypothetical problems.

Page Ref: 43

Skill: Knowledge

33) Janie was having some difficulty deciding how to organize her defense for the debate competition. She prepared several hypothetical arguments that her opponents might raise, and how she might reply. What cognitive stage of Piaget's theory does this account best illustrate?

- A) Concrete operations
- B) Formal operations
- C) Preoperational thought
- D) Sensorimotor

Answer: B

Explanation: B) Janie's problem with organizing her defense for the debate reflects the *characteristics of formal operations*, including hypothetical-deductive reasoning, problem solving, and scientific thought.

Page Ref: 43

Skill: Understanding

34) Perry is able to solve hypothetical problems by mentally working through a set of possibilities. What characteristic of cognitive development does Perry illustrate?

- A) Compensatory reasoning
- B) Inductive thinking
- C) Organized thinking
- D) Reversible reasoning

Answer: C

Explanation: C) Perry is probably in the *formal operations stage* because he is able to solve hypothetical problems by working through a set of possible actions. Such skills would be difficult for a concrete-minded child.

Page Ref: 43

Skill: Understanding

35) When Mary returned from the high-school prom, she complained, "Everyone hated my dress!" What specific concept does this account best illustrate?

- A) Adolescent egocentrism
- B) Interpsychological action
- C) Reversible thinking
- D) Semiotic function

Answer: A

Explanation: A) Mary is probably in the formal operations stage. She is demonstrating *adolescent egocentrism* by believing that everyone is focusing on her appearance.

Page Ref: 44-45

Skill: Understanding

36) Which one of the following statements best reflects Piaget's position on the question of speeding up cognitive development?

- A) Acceleration is both inefficient and useless.
- B) Acceleration is effective for only the brightest students.
- C) Keeping cognitive development "on track" is a teacher's role.
- D) Speeding up cognitive development is a teacher's role.

Answer: A

Explanation: A) Because biological maturation is genetically programmed, parents and teachers have little impact on this facet of cognitive development. Consequently, Piaget would contend that forced *acceleration is both inefficient and useless*.

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Skill: Understanding

37) Current views about Piaget's theory generally support the idea that

- A) Piaget's tasks appear to have been invalid for judging cognitive ability.
- B) Piaget's tasks appear to have generally been too easy for subjects.
- C) Piaget tended to overestimate children's abilities and underestimate their social differences.
- D) Piaget tended to underestimate children's abilities and overlook the social and cultural issues.

Answer: D

Explanation: D) It appears that Piaget *underestimated children's abilities* by using tasks that were too difficult and directions that were too confusing. He also *overlooked social and cultural issues*. Recent studies have shown that children can reason at higher levels than Piaget had thought.

Page Ref: 48

Skill: Knowledge

38) An increasingly influential view of cognitive development proposed by Vygotsky is based on

- A) concrete experiences.
- B) creation of complex schemes of thought.

- C) culture and socioculture theory.
- D) mastery of scientific thinking

Answer: C

Explanation: C) *Culture and sociocultural theory* are becoming an increasingly more influential view of cognitive development than is Piaget's stage theory.

Page Ref: 49-50

Skill: Knowledge

- 39) According to Vygotsky, a child's cultural development is

- A) co-constructed learning and shared experiences.
- B) created by emphasis on private speech.
- C) internalized by self-thinking.
- D) intrapsychologically determined.

Answer: A

Explanation: A) A child's cultural development is the result of *co-constructed learning* (i.e., learning with others) *and shared experiences*.

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Skill: Knowledge

- 40) Vygotsky's view of cognitive development differs from Piaget's in the importance and emphasis placed on a person's

- A) experience.
- B) genetic factors.
- C) interpersonal interactions.
- D) private speech.

Answer: C

Explanation: C) Vygotsky places more emphasis on *interpersonal interactions* than Piaget. Vygotsky viewed language as playing important roles in cognitive development, both in the form of private speech (self-communication) and in the verbal transmission of guidance from other, more capable individuals.

Page Ref: 50

Skill: Knowledge

- 41) The role of cultural tools in cognitive development involves, according to Vygotsky,

- A) both real and symbolic tools.
- B) essentially real tools.
- C) predominantly symbolic tools.
- D) primarily psychological tools.

Answer: A

Explanation: A) According to Vygotsky, the role of cultural tools in cognitive development involves *both real and symbolic tools*.

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Skill: Knowledge

- 42) The role of "private speech" in Vygotsky's view is to

- A) call attention to oneself during play.
- B) guide one's activities in solving a problem.
- C) encourage children to learn new words.
- D) stimulate the development of language from simple words to full sentences.

Answer: B

Explanation: B) According to Vygotsky, *private speech* serves the beneficial function of *guiding activities in solving a problem*. Use of private speech is most common in the five- to seven-year range.

Page Ref: 53

Skill: Knowledge

- 43) Piaget called children's self-directed talk \_\_\_\_\_ while Vygotsky called the same behaviour \_\_\_\_\_.
- A) egocentric speech; private speech
  - B) private speech; egocentric speech
  - C) private speech; social speech
  - D) social speech; private speech

Answer: A

Explanation: A) Children's self-directed talk is Piaget's *egocentric speech* and Vygotsky's *private speech*.

Page Ref: 53

Skill: Knowledge

- 44) According to Vygotsky, scaffolding represents
- A) a barrier or a block to solving a problem.
  - B) a plateau that children reach before progressing to a new stage.
  - C) artificial support, such as notes, on which children can rely while learning.
  - D) external support for helping children solve problems on their own.

Answer: D

Explanation: D) The zone of proximal development is the point at which a child cannot solve a problem alone but can do so *with support or scaffolding*. Teachers can help children move to higher reasoning levels by providing appropriate guidance during problem solving.

Page Ref: 58

Skill: Knowledge

- 45) The zone of proximal development is the area where students may solve a problem
- A) by themselves.
  - B) with no disequilibrium.
  - C) with support.
  - D) without frustration.

Answer: C

Explanation: C) The zone of proximal development is the area between the learner's current development level and the level the learner could achieve with some support from a more capable peer or through adult guidance.

Page Ref: 54  
Skill: Knowledge

- 46) Application of Vygotsky's zone of proximal development concept would include
- A) making new tasks slightly beyond the student's current level of ability.
  - B) not introducing new tasks until prerequisite tasks are satisfactorily mastered.
  - C) requiring the student to work completely independently, regardless of success or failure.
  - D) using highly structured materials to introduce new content rather than semi-structured tasks.

Answer: A

Explanation: A) One implication of Vygotsky's zone of proximal development is to *make new tasks slightly beyond the child's current level of ability*. With support or "scaffolding" from others, where needed, this orientation will help the child progress to new levels of thinking.

Page Ref: 54  
Skill: Knowledge

- 47) The "Magic Middle" refers to
- A) a learning environment that support the average or "mid-level" learner.
  - B) the knowledge of a middle child in a given family.
  - C) a place of "match" where students are neither bored nor frustrated by a task.
  - D) a learning activity that require the use of a computer to scaffold learning.

Answer: C

Explanation: C) This term was coined by Kathleen Berger (2009) refers to a "match" in instruction to a child's level of development where instruction is somewhere between what the student already knows and what the student isn't ready to learn (therefore leading to neither boredom or frustration). This term is related to the concept of *zone of proximal development (ZPD)* described by Vygotsky.

Page Ref: 54, 58  
Skill: Knowledge

### True/False Questions

- 48) Developmental changes are genetically determined rather than environmentally determined.
- Answer: FALSE
- Explanation: Current views of development emphasize complex *coactions* (joint actions) of nature (genes) and nurture (environment).
- Page Ref: 24

- 49) The part of the brain directly associated with the coordination of physical movements is the cerebellum.
- Answer: TRUE

Page Ref: 26

- 50) Assimilation takes place when a person uses existing schemes to make sense of events in their world.

Answer: TRUE

Explanation:

Page Ref: 38

- 51) Understanding of object permanence occurs during the sensorimotor stage.

Answer: TRUE

Page Ref: 39

- 52) Seriation refers to the ability to work with symbols.

Answer: FALSE

Explanation: Seriation refers to the arrangement of objects in sequential order according to one aspect (e.g., size, weight, or volume).

Page Ref: 43

- 53) The cognitive stage associated with ability to understand hypothetical situations is formal operations.

Answer: TRUE

Page Ref: 43

- 54) Hypothetical-deductive reasoning is characteristic of adolescent egocentrism.

Answer: FALSE

Explanation: Hypothetical-deductive reasoning is characteristic of the formal operations stage.

Page Ref: 43

- 55) According to Piaget, most adults may be able to use formal operational thought in only a few areas in which they have the greatest interest or experience.

Answer: TRUE

Page Ref: 45

- 56) Neo-Piagetian theorists are concerned with how attention, memory, and strategy use relate to Piaget's theory of cognitive development.

Answer: TRUE

Page Ref: 46

- 57) One strategy for scaffolding complex learning is to use a reciprocal teaching approach, which requires students to play to role of the teacher by leading discussions and asking questions.

Answer: TRUE

Explanation: In reciprocal teaching, students rotate in playing the role of the teacher. The teacher becomes more of a facilitator of the learning process.

Page Ref: 58

- 58) Vygotsky viewed children's private speech to be helpful for cognitive development.  
Answer: TRUE  
Page Ref: 52  
Explanation: Vygotsky believed that language in the form of private speech (talking to yourself) guides cognitive development.
- 59) When children are in a zone of proximal development, use of scaffolding is appropriate.  
Answer: TRUE  
Page Ref: 54
- 60) The development of language is associated with the concrete operational stage.  
Answer: FALSE  
Explanation: The rapid development of language is associated with the preoperational stage.  
Page Ref: 40

### Completion Questions

- 61) Developmental changes that are genetically programmed are a function of \_\_\_\_\_.  
Answer: maturation  
Page Ref: 24
- 62) The specialization of the two hemispheres of the brain is called \_\_\_\_\_.  
Answer: lateralization  
Page Ref: 29
- 63) According to Piaget, when environmental events cause changes in existing schemes, \_\_\_\_\_ occurs.  
Answer: accommodation  
Page Ref: 38
- 64) "Out of sight, out of mind" describes the behaviour of children who have not acquired \_\_\_\_\_.  
Answer: object permanence  
Page Ref: 39
- 65) When a scheme produces an unsatisfactory result, a student experiences \_\_\_\_\_.  
Answer: disequilibrium  
Page Ref: 38
- 66) The principle that changing the shape of an object does not change the amount of the object is called \_\_\_\_\_.  
Answer: conservation

Page Ref: 40

- 67) Having the ability to focus on more than one aspect of a situation at a time is called \_\_\_\_\_.

Answer: decentring

Page Ref: 40

- 68) The process of making an orderly arrangement of objects from large to small or vice versa is called \_\_\_\_\_.

Answer: seriation

Page Ref: 43

- 69) The ability to reason abstractly and deductively occurs during the Piagetian stage of \_\_\_\_\_.

Answer: formal operations

Page Ref: 43-44

- 70) The basis of formal operations is \_\_\_\_\_.

Answer: hypothetical-deductive reasoning

Page Ref: 43

- 71) Kathleen Berger (2006) refers to the space between what the learner already knows and what he or she is not yet ready to learn as the \_\_\_\_\_.

Answer: Magic middle

Explanation: Berger refers to the magic middle as the space between what the learner already knows and what the learner is not yet ready to learn as the *magic middle*, which is similar to Vygotsky's notion of the Zone of Proximal Development (ZPD).

Page Ref: 58-59

- 72) Guided participation in the classroom is an example of \_\_\_\_\_ learning.

Answer: assisted

Page Ref: 58

- 73) The support that children use to help them solve problems just beyond their capabilities is called \_\_\_\_\_.

Answer: scaffolding

Page Ref: 58

- 74) Both Piaget and Vygotsky would most likely agree students need to be taught in the "magic \_\_\_\_\_" or the place where they are neither bored nor frustrated.

Answer: middle

Page Ref: 58-59

### Short Answer Questions

- 75) Define development and identify specific types of forms it can take. Then explain how maturation relates to development.

Answer: Development refers to orderly and relatively long-term changes that take place over one's life span. Physical development involves bodily changes, personal development changes in personality, social development changes in the way one relates to others, and cognitive development changes in one's thinking. Maturation is the part of development that involves genetically-based changes that are not influenced by environmental factors.

Page Ref: 24-25

- 76) Describe Piaget's theoretical views on cognitive development using and defining the following terms in your answer: organization, adaptation, assimilation, accommodation, equilibration.

Answer: Humans inherit tendencies toward organization, arranging information into a coherent system, and adaptation, adjusting to the environment. The mental systems that are developed are called schemes. When existing schemes are used to interpret new information, assimilation takes place. When existing schemes are changed in response to new situations, accommodation takes place. We search for balance through the process of equilibration, making adjustments whenever dissonance or imbalance between our thinking and reality occurs.

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- 77) Name and define the basic aspects of reasoning that must be mastered before a child is able to solve problems of conservation.

Answer: Conservation is mastered through the processes of *reversible thinking* (performing an operation and then "undoing" it), *decentering* (being able to focus on more than one property of a stimulus at a time), *identity* (knowing that changes in an object's shape do not change its quantity), and *compensation* (a change in one aspect, e.g., height, produces a compensating change in another aspect, e.g., width).

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- 78) Define Vygotsky's zone of proximal development and explain how it relates to the problem of matching cognitive stages with instructional strategies.

Answer: The zone of proximal development is the point when a child can master a task if given appropriate help and support. It suggests that students should have to reach a bit to understand, with the necessary support of parents, teachers, and peers. Such support is called scaffolding. Vygotsky's ideas suggest that students should be guided by explanations, demonstrations, and cooperative learning within their zone of proximal development. Use of private speech should also be encouraged in order to help organize thinking.

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## Case Studies

- 79) Trip, a seventh-grader, is having difficulty learning principles of fractions, such as two out of five is  $\frac{2}{5}$ ,  $\frac{3}{5}$  is less than  $\frac{2}{3}$ , and so on. While his classmates seem to follow most of the examples given in class and in the textbook, Trip feels overwhelmed and confused by them. He is good at other subjects (such as reading and social studies) but is falling behind rapidly in mathematics. Being familiar with Piaget's stages of development, you suspect that Trip is very concrete in his thinking about mathematical principles compared to many of his classmates.

A) Based on the above assessment of Trip's situation, what teaching approaches would Piaget's ideas suggest for making the principles of fractions more understandable to Trip?

Answer: The teacher will want to provide Trip with hands-on learning experiences. For example, the teacher could give Trip two apples to cut into pieces. Trip could cut one apple into five pieces and the other apple into three pieces. He could then compare the combined physical amount of two of the pieces from the five-piece cut apple to two of the pieces from the three-piece cut apple.

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B) If Trip is a concrete thinker in mathematics, is he likely to think in similar ways in other subjects? Explain using appropriate ideas from Piaget and Vygotsky.

Answer: According to Piagetian theory, Trip is also likely to think in concrete ways in other subject areas. For example, he may struggle with comparing the human brain to a computer. Neo-Piagetians, however, believe Trip may show general patterns of concrete thinking and yet be able to use some more advanced schemes within a particular domain. Trip may reason differently about social situations and numerical concepts. From Vygotsky's perspective, the teacher would want to consider Trip's sociocultural factors, such as how language is used, rather than focusing on whether or not Trip had surpassed a specific stage.

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- 80) Mason is another seventh grader who is having difficulty in math class. He stares blankly at the test paper asking him to compute fractions such as  $\frac{5}{7}$  and  $\frac{9}{12}$  as percentages. He can't remember at all how to determine whether  $\frac{4}{5}$  is larger or smaller than  $\frac{5}{8}$ , so he makes a guess. He hopes that, with some luck, he might manage in the class. On the weekend, Mason is watching his favorite sport, basketball. He remarks to his sister, "Oh, this guy made eight out of 11 shots last week; he's close to an 80 percent shooter so he should be for these free throws." After the player makes both shots, Mason looks down at the statistics sheet he's been keeping on the local teams' shooting percentages, and updates the statistics.

A) Is the inconsistency between Mason's performances on school test problems and in working with basketball statistics a problem for Piaget's stage theory? That is, if Mason is

at a particular stage of reasoning, shouldn't he be able to deal with the school problems as successfully as the basketball ones? Explain.

Answer: The inconsistency noted in this case study is not a problem for Piaget's theory. According to Piaget, experience and interest can affect the stage one can reach. Mason should be able to solve the school-based math problems equally as well as the basketball ones. The teacher may need to help Mason see the connection between the two situations. Also, Mason's interest is likely to be influenced by the extent to which the student can move beyond rote memorization of mathematical principles. The teacher may want to introduce a math game to facilitate interest. Also, it is important for the teacher to explain why it is important for students to have an understanding of fractions and percentages in our society.

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B) How might Vygotsky explain the role of other people in shaping Mason's math skills in the two contexts? Explain.

Answer: First, the teacher may want to look at the statistics sheet Mason created. This sheet is viewed as a cultural tool and it would be important to find out if Mason shares the sheet with any other persons. For instance, what do the headings on the columns for the data communicate to others? In addition, from Vygotsky's perspective it would be important to know if Mason typically watches basketball alone or with his brother who is four years older. It may be that his brother is providing scaffolding (cues, encouragement) to Mason as they watch the game together.

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C) Knowing Mason's behaviours, how might a teacher work with him to improve his performances on the fractions and percentages unit?

Answer: The teacher may want to integrate a physical education unit on basketball with a mathematics lesson. Mason would get the concrete experience recommended by Piaget. He would also be involved in a highly social activity, which would be supported by both Piaget and Vygotsky's theories. The basketball team could be instructed to plan and monitor their basketball activities in order to solve the math problem.

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