***Exercise 4 Answer Key***

**Chapter 10 Long-Run Economic Growth: Sources and Policies**

**10.1 Economic Growth Over Time and around the World**

1) Suppose that in 2009 real GDP grew in Estonia by 3% and that the population increased by 5%. Therefore in 2009, Estonia experienced

(Note that economic growth is measured by percentage change in real GDP while living standards is best measured by percentage change in real GDP per capita. Think about the example of China. Real GDP per capita is determined by labor productivity, which is further determined by two factors, i.e. increases in capital per hour worked and technological change.)

A) economic growth, but not an increase in living standards. (correct)

B) economic growth and an increase in living standards.

C) no economic growth, but an increase in living standards.

D) no economic growth and no increase in living standards.

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 710/306

Topic: Why Growth Rates Matter

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

AACSB: Reflective Thinking

Special Feature: None

2) Significant economic growth did not begin in the world until

A) 1000 A.D.

B) 1750 A.D.

C) 1820 A.D.

D) the 20th century A.D.

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 708-709/304-305

Topic: Economic Growth from 1,000,000 B.C. to the Present

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

Special Feature: None

3) Growth in real GDP per capita for the world economy was greatest during

A) the seventeenth century.

B) the eighteenth century.

C) the nineteenth century.

D) the twentieth century.

Answer: D

Comment: Recurring

Diff: 2 Page Ref: 708-709/304-305

Topic: Economic Growth from 1,000,000 B.C. to the Present

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

AACSB: Reflective Thinking

Special Feature: None

4) If real GDP per capita in the United States is $8,000, what will real GDP per capita in the United States be after 5 years if real GDP per capita grows at an annual rate of 3.2%?

(8000\*(1+3.2%)^5=choice C; also pay attention to the compound rule. Small difference in growth rate could result in huge difference in real GDP per capita in the long run.)

A) $8,520

B) $9,280

C) $9,365

D) $10,560

Answer: C

Comment: Recurring

Diff: 2 Page Ref: 709/305

Topic: Economic Growth Over Time

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

AACSB: Analytic Skills

Special Feature: None

5) If real GDP per capita in the United States is $8,000 in 2009, and if real GDP per capita is $12,000 in 2019, what is the average annual percent changein the growth rate of GDP per capita between 2009 and 2019?

A) 3.33%

B) 5%

C) 33%

D) 50%

Answer: B

Diff: 2 Page Ref: 711/307

Topic: Economic Growth Over Time

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

AACSB: Analytic Skills

Special Feature: Don't Let This Happen to YOU!: Don't Confuse the Average Annual Percentage Change with the Total Percentage Change

6) Increasing the growth rate of GDP per capita and sustaining this growth rate in an economy can

A) increase infant mortality.

B) increase standards of living.

C) increase the level of poverty.

D) lower life expectancy.

Answer: B

Comment: Recurring

Diff: 1 Page Ref: 710/306

Topic: Why Growth Rates Matter

Objective: LO1: Define economic growth, calculate economic growth rates, and describe global trends in economic growth.

AACSB: Reflective Thinking

Special Feature: None

**10.2 What Determines How Fast Economies Grow?**

1) An economic growth model explains (Solow growth model)

A) changes in real GDP per capita in the long run. (correct, recall two factors determining real GDP per capita.)

B) how changes in the money supply affect real interest rates. (discuss money supply and interest rates later.)

C) changes in government tax policies over time. (incorrect, has nothing to do with government policies.)

D) the growth rate of the price level over time. (incorrect, model holds price level constant over time.)

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 712-713/308-309

Topic: What Makes Economies Grow?

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

2) Which of the following is *not* one of the three sources of technological change?

A) additional amounts of existing capital

B) better machinery and equipment

C) increases in human capital

D) better means of organizing and managing production

Answer: A

Comment: Recurring

Diff: 2 Page Ref: 712-713/308-309

Topic: What Makes Economies Grow?

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking, Use of Information Technology

Special Feature: None

3) An economy can improve its standard of living by

A) organizing production so that the quantity of goods produced per hour will decrease.

B) reducing the amount of human capital workers have.

C) increasing the amount of capital available per hour worked.

D) all of the above

Answer: C

Comment: Recurring

Diff: 1 Page Ref: 712-713/308-309

Topic: What Makes Economies Grow?

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

4) When additions of input to a fixed quantity of another input lead to progressively smaller increases in output, we say we are facing

A) diminishing returns.

B) negative returns. (still positive returns)

C) accelerating returns.

D) decreasing production.

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 713-715/309-311

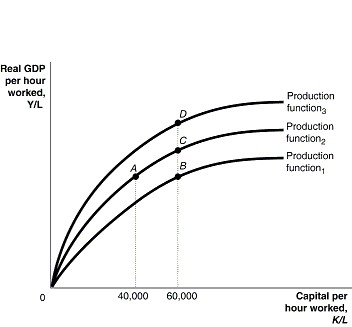
Topic: Per-Worker Production Function

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

***Figure 10-1***



5) ***Refer to Figure 10-1.***  Diminishing marginal returns is illustrated in the per-worker production function in the figure above by a movement from

A) *A* to *C*. (correct, movement along the curve)

B) *B* to *C*. (incorrect, curve shifts down implying technology level decreases.)

C) *C* to *D*. (incorrect, curve shifts up implying technology level increases.)

D) *D* to *C*. (same as B)

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

6) ***Refer to Figure 10-1.*** Technological change is illustrated in the per-worker production function in the figure above by a movement from

A) *A* to *B*. (not make sense)

B) *B* to *C*. (correct, here technology change means the desirable technology change.)

C) *B* to *A*.

D) *D* to *C*.

Answer: B

Comment: Recurring

Diff: 1 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

7) ***Refer to Figure 10-1.*** Using the per-worker production function in the figure above, the largest changes in an economy's standard of living would be achieved by a movement from

A) *A* to *B* to *C*.

B) *B* to *C* to *D*. (technology change is much more important than increases in capital per hour worked in the long run due to law of diminishing return!)

C) *C* to *B* to *A*.

D) *D* to *C* to *B*.

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

8) ***Refer to Figure 10-1.*** Suppose the per-worker production function in the figure above represents the production function for the U.S. economy. If the United States decided to double its support of university research, this would cause a movement from

A) *A* to *B*.

B) *B* to *C*. (support of university research by government could lead to technological change.)

C) *B* to *A*.

D) *D* to *C*.

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

9) ***Refer to Figure 10-1.*** Within a country, the impact of wars and revolutions and their subsequent destruction of capital is reflected in the per-worker production function in the figure above by a movement from

A) *A* to *B*.

B) *B* to *C*.

C) *B* to *A*.

D) *C* to *A*. (decreases in capital per hour worked.)

Answer: D

Comment: Recurring

Diff: 3 Page Ref: 713-715/309-311

Topic: Growth Policies

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

10) ***Refer to Figure 10-1.*** Many countries in Africa strongly discouraged and prohibited foreign direct investment in the 1950s and 1960s. By doing so, these countries were essentially preventing a moment from

A) *A* to *B*.

B) *B* to *C*. (foreign direct investment in low-income countries may help technological change)

C) *B* to *A*.

D) *D* to *C*.

Answer: B

Comment: Recurring

Diff: 3 Page Ref: 713-715/309-311

Topic: Growth Policies

Skill: Graphing

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

11) In the early 1900s, Henry Ford revolutionized the automotive manufacturing industry by instituting the assembly line. What impact did the assembly line method for producing automobiles have on the per-worker production function for Ford?

A) It became flatter.

B) It shifted up.

C) It shifted down.

D) It became linear.

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

12) Because of diminishing returns, an economy can continue to increase real GDP per hour worked only if

A) there are decreases in human capital.

B) the per-worker production function shifts downward.

C) there continue to be decreases in capital per hour worked.

D) there is technological change.

Answer: D

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

13) In a small European country, it is estimated that changing the level of capital from $8 million to $10 million will increase real GDP from $2 million to $3 million. If the number of hours worked in the labor force does not change, what does this information tell you about the slope of the per-worker production function in this range?

A) The slope is -2.

B) The slope is 1/2. (slope=(3-2)/(10-8))

C) The slope is 2.

D) The slope is 4.

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

14) If the slope of the per-worker production function is 1/2 in a given range, how will a $10,000 increase in capital per hour worked affect real GDP per hour worked in the same given range?

A) Real GDP per hour worked will increase by $5,000. (10,000\*0.5= choice A)

B) Real GDP per hour worked will increase by $20,000.

C) Real GDP per hour worked will increase by $10,000.

D) Real GDP per hour worked will decrease by $20.000

Answer: A

Comment: Recurring

Diff: 2 Page Ref: 713-715/309-311

Topic: Per-Worker Production Function

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Analytic Skills

Special Feature: None

15) According to new growth theory,

A) technological change is influenced by economic incentives.

B) centrally-planned economies are the most efficient.

C) growth in real GDP per capita occurs only if there are increasing returns.

D) economic growth is determined by forces outside the control of the market system.

Answer: A

Comment: Recurring

Diff: 2 Page Ref: 718-719/314-315

Topic: New Growth Theory

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

16) According to new growth theory,

A) physical capital is nonexcludable.

B) knowledge capital is excludable.

C) knowledge capital is subject to increasing returns.

D) knowledge capital is rival and excludable.

Answer: C

Comment: Recurring

Diff: 2 Page Ref: 718-719/314-315

Topic: New Growth Theory

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

17) Knowledge capital is nonrival in the sense that

A) two people can use the same knowledge to develop and produce a product.

B) firms do not compete to be the first to develop new technologies.

C) no single company can be excluded from the benefits of new technologies.

D) firms can benefit from the research and development of rival firms without paying for that benefit.

Answer: A

Comment: Recurring

Diff: 2 Page Ref: 718-719/314-315

Topic: New Growth Theory

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

18) Which of the following government provisions would help increase the accumulation of knowledge capital?

A) patents

B) copyrights

C) education subsidies

D) All of the above are correct.

Answer: D

Comment: Recurring

Diff: 1 Page Ref: 718-719/314-315

Topic: New Growth Theory

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

19) A patent grants an inventor exclusive rights to a product for how long?

A) 14 years

B) 17 years

C) 20 years

D) the lifetime of the product

Answer: C

Comment: Recurring

Diff: 1 Page Ref: 718-719/314-315

Topic: New Growth Theory

Objective: LO2: Use the economic growth model to explain why growth rates differ across countries.

AACSB: Reflective Thinking

Special Feature: None

**10.4 Why Isn't the Whole World Rich?**

1) The economic growth model predicts that

A) the level of real GDP per capita in poor countries will grow faster than in rich countries.

B) the per-worker production function of poor countries will be flatter than the per-worker production function of rich countries. (steeper)

C) lower-income industrial countries will forever be unable to catch up to higher-income industrial countries. (not necessarily)

D) economic growth in rich countries can only be accomplished at the expense of slow or even negative growth in poor countries.

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 723-725/319-321

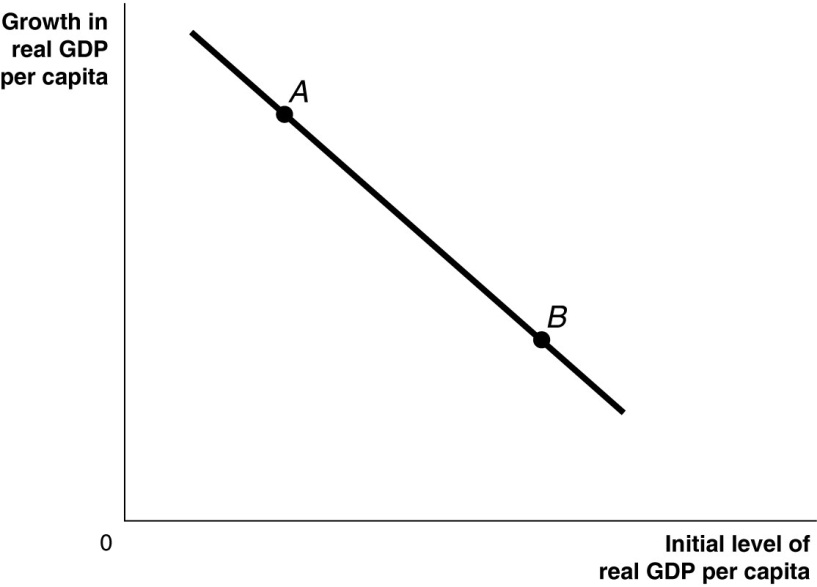
Topic: Catch-up

Objective: LO4: Explain economic catch-up and discuss why many poor countries have not experienced rapid economic growth.

AACSB: Reflective Thinking

Special Feature: None

***Figure 10-2***



2) ***Refer to Figure 10-3.*** Based on the "catch-up line" drawn above, poorer countries are more likely to be at a point like \_\_\_\_\_\_\_\_, where growth in GDP is relatively \_\_\_\_\_\_\_\_, while richer countries are more likely to be at a point like \_\_\_\_\_\_\_\_, where growth in GDP is relatively \_\_\_\_\_\_\_\_.

A) *A*; low; *B*; high

B) *A*; high; *B*; low

C) *B*; low; *A*; high

D) *B*; high; *A*; low

Answer: B

Comment: Recurring

Diff: 2 Page Ref: 723-725/319-321

Topic: Catch-up

Skill: Graphing

Objective: LO4: Explain economic catch-up and discuss why many poor countries have not experienced rapid economic growth.

AACSB: Reflective Thinking

Special Feature: None

**10.5 Growth Policies**

1) The term "brain drain" refers to

A) highly educated individuals who leave developing countries for high-income countries.

B) the diminishing returns to studying for an exam.

C) the negative impact on brain function of an individual's overinvestment in human capital.

D) the decreased quality of the college-educated workforce.

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 731/327

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: None

2) Enforcing property rights in an economy will

A) cause the market system to work less efficiently.

B) decrease the level of foreign portfolio investment.

C) encourage corruption and expand the underground economy.

D) raise the level of investment.

Answer: D

Comment: Recurring

Diff: 1 Page Ref: 730-731/326-327

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: None

3) Robert Lucas, a Nobel laureate in economics, argues that there are \_\_\_\_\_\_\_\_ returns to human capital.

A) increasing

B) decreasing

C) constant

D) negative

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 731/327

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: None

4) Which of the following policies would *not* help promote economic growth?

A) a law requiring that the funds in an individual retirement account be taxed

B) a law restricting elected officials from accepting expensive gifts and trips from private individuals

C) a law that funds prenatal care for all expectant mothers

D) a law that subsidizes research in nanotechnology

Answer: A

Comment: Recurring

Diff: 1 Page Ref: 730-731/326-327

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: None

5) In 1973, the Club of Rome published a book titled *The Limits to Growth*, which predicted that economic growth would likely end in high-income countries because of

A) declining populations.

B) rapid increases in government debt.

C) increases in outsourcing of the production of goods and services to low-income countries.

D) increasing pollution and the depletion of natural resources.

Answer: D

Comment: Recurring

Diff: 2 Page Ref: 731/327

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: None

6) One potential problem with the Chinese government's increases in spending on capital goods is that these increases have been achieved through

A) high levels of borrowing in global financial markets.

B) decreases in private consumption.

C) debt refinancing and tariff revenues.

D) a rapid expansion of the money supply.

Answer: B

Diff: 2 Page Ref: 734/330

Topic: Growth Policies

Objective: LO5: Discuss government policies that foster economic growth.

AACSB: Reflective Thinking

Special Feature: An Inside LOOK at Policy: Investment Spurs China's Growth