

***Operations Management, Cdn. Ed., 3e (Heizer/Render/Griffin)***

**Chapter 1 Operations and Productivity**

1) Some of the operations-related activities of Hard Rock Café include designing meals and analyzing them for ingredient cost and labour requirements.

Answer: TRUE

Diff: 1 Type: TF

Skill: comprehension

Objective: LO1 Define operations management

2) Because Hard Rock Cafés are themed restaurants, operations managers focus their layout design efforts on attractiveness while paying little attention to efficiency.

Answer: FALSE

Diff: 1 Type: TF

Skill: comprehension

Objective: LO1 Define operations management

3) All organizations, including service firms such as banks and hospitals, have a production function.

Answer: TRUE

Diff: 2 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

4) Operations management is the set of activities that creates value in the form of goods and services by transforming inputs into outputs.

Answer: TRUE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

5) An example of a "hidden" production function is money transfers at banks.

Answer: TRUE

Diff: 3 Type: TF

Skill: comprehension

Objective: LO1 Define operations management

6) One reason to study operations management is to learn how people organize themselves for productive enterprise.

Answer: TRUE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

7) The operations manager performs the management activities of planning, organizing, staffing, leading, and controlling of the OM function.

Answer: TRUE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

8) "How much inventory of this item should we have?" is within the critical decision area of managing quality.

Answer: FALSE

Diff: 1 Type: TF

Skill: comprehension

Objective: LO1 Define operations management

9) In order to have a career in operations management one must have a degree in statistics or quantitative methods.

Answer: FALSE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

10) Henry Ford is known as the Father of Scientific Management.

Answer: FALSE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

11) Shewhart's contributions to operations management came during the Scientific Management Era.

Answer: FALSE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO1 Define operations management

12) Customer interaction is often high for manufacturing processes, but low for services.

Answer: FALSE

Diff: 2 Type: TF

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

13) Productivity is more difficult to improve in the service sector.

Answer: TRUE

Diff: 2 Type: TF

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

14) Manufacturing now constitutes the largest economic sector in postindustrial societies.

Answer: FALSE

Diff: 2 Type: TF

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

15) Productivity in Canada has increased significantly every year since 1973.

Answer: FALSE

Diff: 1 Type: TF

Skill: comprehension

Objective: LO3 Explain the difference between production and productivity

16) A knowledge society is one that has migrated from work based on knowledge to one based on manual work.

Answer: FALSE

Diff: 1 Type: TF

Skill: knowledge

Objective: LO3 Explain the difference between production and productivity

17) Productivity is the total value of all inputs to the transformation process divided by the total value of the outputs produced.

Answer: FALSE

Diff: 1 Type: TF

Skill: comprehension

Objective: LO3 Explain the difference between production and productivity

18) Measuring the impact of a capital acquisition on productivity is an example of multifactor productivity.

Answer: FALSE

Diff: 3 Type: TF

Skill: application

Objective: LO5 Compute multifactor productivity

19) Ethical and social dilemmas arise because stakeholders of a business have conflicting perspectives.

Answer: TRUE

Diff: 1 Type: TF

Skill: application

Objective: Ethics and social responsibility

20) Which of the following is **not** one of the Ten Critical Decisions of Operations Management?

- A) location strategy
- B) human resources and job design
- C) managing quality
- D) design of goods and services
- E) determining the financial leverage position

Answer: E

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

21) An operations task performed at Hard Rock Café is

- A) borrowing funds to build a new restaurant.
- B) advertising changes in the restaurant menu.
- C) calculating restaurant profit and loss.
- D) preparing employee schedules.
- E) paying suppliers.

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

22) Operations management is applicable

- A) mostly to the service sector.
- B) to services exclusively.
- C) mostly to the manufacturing sector.
- D) to all firms, whether manufacturing or service.
- E) to the manufacturing sector exclusively.

Answer: D

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

23) Which of the following are the primary functions of **all** organizations?

- A) production/operations, marketing, and human resources
- B) marketing, human resources, and finance/accounting
- C) sales, quality control, and production/operations,
- D) marketing, production/operations, and finance/accounting
- E) research and development, finance/accounting, and purchasing

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

24) Which of the following pioneers was **not** making a professional impact during the Scientific Management Era?

- A) Frank Gilbreth
- B) W. Edwards Deming
- C) Henry L. Gantt
- D) Lillian Gilbreth
- E) Frederick W. Taylor

Answer: B

Diff: 2 Type: MC

Skill: comprehension

Objective: The heritage of operations management

25) Which of the following would **not** be an operations function in a commercial bank?

- A) auditing
- B) teller scheduling
- C) maintenance
- D) collection
- E) cheque clearing

Answer: A

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

26) The marketing function's main concern is with

- A) producing goods or providing services.
- B) procuring materials, supplies, and equipment.
- C) building and maintaining a positive image.
- D) generating the demand for the organization's products or services.
- E) securing monetary resources.

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

27) Which of the following tasks within an Airline Company are related to Operations?

- A) Crew Scheduling
- B) International Monetary Exchange
- C) Sales
- D) Advertising
- E) Accounts Payable

Answer: A

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

28) Reasons to study Operations Management include

- A) studying how people make decisions.
- B) knowing how goods and services are consumed.
- C) understanding what human resource managers do.
- D) learning about a costly part of the enterprise.
- E) learning to prepare financial statements.

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

29) Reasons to study Operations Management include learning about all of the following **except**

- A) how people organize themselves for productive enterprise.
- B) how goods and services are produced.
- C) what operations managers do.
- D) a costly part of the enterprise.
- E) how to market a product.

Answer: E

Diff: 1 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

30) The five elements in the management process are

- A) plan, direct, update, lead, and supervise.
- B) accounting, finance, marketing, operations, and management.
- C) organize, plan, control, staff, and manage.
- D) plan, organize, staff, lead, and control.
- E) plan, lead, organize, manage, and control.

Answer: D

Diff: 1 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

31) Illiteracy and poor diets have been known to cost countries up to what percent of their productivity?

- A) 2%
- B) 5%
- C) 10%
- D) 20%
- E) 50%

Answer: D

Diff: 2 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

32) Which of the following is **not** an element of the management process?

- A) controlling
- B) leading
- C) planning
- D) pricing
- E) staffing

Answer: D

Diff: 1 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

33) An operations manager is **not** likely to be involved in

- A) the design of goods and services to satisfy customers' wants and needs.
- B) the quality of goods and services to satisfy customers' wants and needs.
- C) the identification of customers' wants and needs.
- D) work scheduling to meet the due dates promised to customers.
- E) maintenance schedules.

Answer: C

Diff: 1 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

34) All of the following decisions fall within the scope of operations management **except** for

- A) creating the company income statement.
- B) design of goods and processes.
- C) location of facilities.
- D) managing quality.
- E) layout of facilities.

Answer: A

Diff: 1 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

35) The Ten Critical Decisions of Operations Management include **except**

- A) layout strategy.
- B) maintenance.
- C) process and capacity design.
- D) managing quality.
- E) fiscal year-end.

Answer: E

Diff: 1 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

36) Which of the following is **not** one of The Ten Critical Decisions of Operations Management?

- A) layout strategy
- B) maintenance
- C) process and capacity design
- D) mass customization
- E) supply-chain management

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

37) The Ten Critical Decisions of Operations Management include

- A) finance/accounting.
- B) advertising.
- C) process and capacity design.
- D) pricing.
- E) employee benefits.

Answer: C

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

38) Which of the following are part of the Ten Critical Decisions of Operations Management?

- I. Design of Goods and Services
- II. Managing Quality
- III. Layout Strategy
- IV. Marketing
- V. Pricing of Goods and Services

A) I, II, V

B) I, II, IV

C) II, III, V

D) I, II, III

E) II, III, IV

Answer: D

Diff: 3 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

39) SCC (Standards Council of Canada), ISM (Institute for Supply Management), APICS (Association for Operations Management), and PMI (Project Management Institute) are important professional organizations to operations management because they do all of the following **except**

- A) provide certification for professionals.
- B) allow professionals to keep up with industry developments.
- C) facilitate professional networking.
- D) provide opportunities to enhance your education.
- E) act as employment agencies for professionals.

Answer: E

Diff: 3 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

40) Walter Shewhart is listed among the important people of operations management because of his contributions to

- A) assembly line production.
- B) measuring the productivity in the service sector.
- C) just-in-time inventory methods.
- D) statistical quality control.
- E) project management techniques.

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

41) Walter Shewhart, in the \_\_\_\_\_, provided the foundations for \_\_\_\_\_ in operations management.

- A) 1920s; statistical sampling
- B) United Kingdom; mass production
- C) U.S. Army; logistics
- D) nineteenth century; interchangeable parts
- E) 21st century; logistics

Answer: A

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

42) Eli Whitney, in the \_\_\_\_\_, provided the foundations for \_\_\_\_\_ in operations management.

- A) 1920s; statistical sampling
- B) United Kingdom; mass production
- C) U.S. Army; logistics
- D) nineteenth century; interchangeable parts
- E) 21st century; logistics

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

43) The person most responsible for popularizing interchangeable parts in manufacturing was

- A) Frederick Winslow Taylor.
- B) Henry Ford.
- C) Eli Whitney.
- D) Whitney Houston.
- E) Lillian Gilbreth.

Answer: C

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

44) The "Father of Scientific Management" is

- A) Henry Ford.
- B) Frederick W. Taylor.
- C) W. Edwards Deming.
- D) Frank Gilbreth.
- E) just a figure of speech, not a reference to a person.

Answer: B

Diff: 1 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

45) Henry Ford is noted for his contributions to

- A) material requirements planning.
- B) statistical quality control.
- C) assembly line operations.
- D) scientific management.
- E) time and motion studies.

Answer: C

Diff: 1 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

46) Who among the following is associated with contributions to quality control in operations management?

- A) Charles Babbage
- B) Henry Ford
- C) Frank Gilbreth
- D) W. Edwards Deming
- E) Henri Fayol

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

47) The field of operations management is shaped by advances in which of the following fields?

- A) chemistry and physics
- B) industrial engineering and management science
- C) biology and anatomy
- D) information technology
- E) all of the above

Answer: E

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

48) Which of the following is the best example of a pure service?

- A) counseling
- B) oil change
- C) heart transplant
- D) restaurant meal
- E) college course

Answer: A

Diff: 3 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

49) Which of the following statements is **true**?

- A) The person most responsible for initiating the use of interchangeable parts in manufacturing was Eli Whitney.
- B) The origins of management by exception are generally credited to Frederick W. Taylor.
- C) The person most responsible for initiating the use of interchangeable parts in manufacturing was Walter Shewhart.
- D) The origins of the scientific management movement are generally credited to Henry Ford.
- E) The person most responsible for initiating the use of interchangeable parts in manufacturing was Henry Ford.

Answer: A

Diff: 2 Type: MC

Skill: knowledge

Objective: LO1 Define operations management

50) The service sector makes up approximately what percentage of all jobs in the United States as of 2018?

- A) 12%
- B) 40%
- C) 66%
- D) 79%
- E) 90%

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

51) Which is **not** true regarding differences between goods and services?

- A) Tangible goods are generally produced and consumed simultaneously; services are not.
- B) Most goods are common to many customers; services are often unique to the final customer.
- C) Services tend to have a more inconsistent product definition than goods.
- D) Services tend to have higher customer interaction than goods.
- E) Goods can be inventoried; services are not easily inventoried.

Answer: A

Diff: 2 Type: MC

Skill: application

Objective: LO2 Explain the distinction between goods and services

52) Which is **not** true regarding differences between goods and services?

- A) Services are generally produced and consumed simultaneously; tangible goods are not.
- B) Services tend to be more knowledge-based than goods.
- C) Services tend to have a more inconsistent product definition than goods.
- D) Goods tend to have higher customer interaction than services.
- E) None of the above are true.

Answer: D

Diff: 2 Type: MC

Skill: application

Objective: LO2 Explain the distinction between goods and services

53) Which of the following services is least **likely to be unique**, i.e., customized to a particular individual's needs?

- A) dental care
- B) hairdressing
- C) legal services
- D) elementary education
- E) computer consulting

Answer: D

Diff: 3 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

54) Which of the following is **not** a typical service attribute?

- A) intangible product
- B) easy to store
- C) customer interaction is high
- D) simultaneous production and consumption
- E) difficult to resell

Answer: B

Diff: 2 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

55) Which of the following statements is **true**?

- A) Manufacturing now constitutes the largest economic sector in postindustrial societies.
- B) The number of people employed in manufacturing has increased since 1950.
- C) Each manufacturing employee now produces about 20 times more than in 1950
- D) Each manufacturing employee now produces about one tenth of that in 1950
- E) Manufacturing has disappeared in postindustrial societies.

Answer: C

Diff: 3 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

56) Which of the following attributes is most typical of a service?

- A) production and consumption occur simultaneously
- B) tangible
- C) mass production
- D) consistency
- E) easy to automate

Answer: A

Diff: 2 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

57) Which of the following is a similarity between goods and services?

- A) can be mass produced
- B) consistency in production
- C) easy to automate
- D) application of operations management
- E) all of the above

Answer: D

Diff: 3 Type: MC

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

58) Current trends in operations management include all of the following **except**

- A) just-in-time performance.
- B) rapid product development.
- C) mass customization.
- D) empowered employees.
- E) None of the above is right.

Answer: E

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

59) Which of the following is **not** a current trend in operations management?

- A) just-in-time performance
- B) global focus
- C) supply-chain partnering
- D) mass customization
- E) low bid purchasing

Answer: E

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

60) New trends in operations management include

- A) global focus.
- B) mass customization.
- C) empowered employees.
- D) rapid product development.
- E) All of the above are new trends in operations management.

Answer: E

Diff: 2 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

61) Which of the following statements about trends in operations management is **false**?

- A) Job specialization is giving way to empowered employees.
- B) Local or national focus is giving way to global focus.
- C) Environmentally-sensitive production is giving way to low-cost focus.
- D) Rapid product development is partly the result of shorter product cycles.
- E) Large batch shipments are being replaced by just-in-time.

Answer: C

Diff: 3 Type: MC

Skill: comprehension

Objective: LO1 Define operations management

62) A foundry produces circular utility access hatches (manhole covers). If 120 covers are produced in a 10-hour shift, the productivity of the line is

- A) 1.2 covers/hr.
- B) 2 covers/hr.
- C) 12 covers/hr.
- D) 1200 covers/hr.
- E) 0.12 covers/hr.

Answer: C

Diff: 1 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

63) A foundry produces circular utility access hatches (manhole covers). Currently, 120 covers are produced in a 10-hour shift. If labour productivity can be increased by 20%, it would then be

- A) 14.4 covers/hr.
- B) 24 covers/hr.
- C) 240 covers/hr.
- D) 1200 covers/hr.
- E) 144 covers/hr.

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

64) Gibson Valves produces cast bronze valves on an assembly line. If 1600 valves are produced in an 8-hour shift, the productivity of the line is

- A) 2 valves/hr.
- B) 40 valves/hr.
- C) 80 valves/hr.
- D) 200 valves/hr.
- E) 1600 valves/hr.

Answer: D

Diff: 1 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

65) Gibson Valves produces cast bronze valves on an assembly line, currently producing 1600 valves each 8-hour shift. If the productivity is decreased by 10%, it would then be

- A) 180 valves/hr.
- B) 200 valves/hr.
- C) 220 valves/hr.
- D) 1440 valves/hr.
- E) 1760 valves/hr.

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

66) Gibson Valves produces cast bronze valves on an assembly line, currently producing 1600 valves per shift. If the production is increased to 2000 valves per shift, labour productivity will increase by

- A) 10%.
- B) 20%.
- C) 25%.
- D) 40%.
- E) 50%.

Answer: C

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

67) The Dulac Box plant produces 500 cypress packing boxes in two 10-hour shifts. What is the productivity of the plant?

- A) 25 boxes/hr
- B) 50 boxes/hr
- C) 5000 boxes/hr
- D) 250 boxes/hr
- E) not enough data to determine productivity

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

68) The Dulac Box plant works two 8-hour shifts each day. In the past, 500 cypress packing boxes were produced by the end of each day. The use of new technology has enabled them to increase productivity by 30%. Productivity is now approximately

- A) 32.5 boxes/hr.
- B) 40.6 boxes/hr.
- C) 62.5 boxes/hr.
- D) 81.25 boxes/hr.
- E) 300 boxes/hr.

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

69) The Dulac Box plant produces 500 cypress packing boxes in two 10-hour shifts. Due to higher demand, they have decided to operate three 8-hour shifts instead. They are now able to produce 600 boxes per day. What has happened to productivity?

- A) It has not changed.
- B) It has increased by 37.5 boxes/hr.
- C) It has increased by 20%.
- D) It has decreased by 8.3%.
- E) It has decreased by 9.1%.

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

70) Productivity measurement is complicated by

- A) the competition's output.
- B) the unavailability of precise units of measure.
- C) stable quality.
- D) the workforce size.
- E) the type of equipment used.

Answer: B

Diff: 3 Type: MC

Skill: comprehension

Objective: LO3 Explain the difference between production and productivity

71) The total of all outputs produced by the transformation process divided by the total of the inputs is

- A) utilization.
- B) greater in manufacturing than in services.
- C) defined only for manufacturing firms.
- D) multifactor productivity.
- E) effectiveness.

Answer: D

Diff: 2 Type: MC

Skill: comprehension

Objective: LO5 Compute multifactor productivity

72) Which productivity variable has the greatest potential to increase productivity?

- A) labour
- B) globalization
- C) management
- D) capital
- E) industrialization

Answer: C

Diff: 2 Type: MC

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

73) Which of the following nets the largest productivity improvement?

- A) increase output 15%
- B) decrease input 15%
- C) increase both output and input by 5%
- D) increase output 10%, decrease input 3%
- E) decrease input 10%, increase output 3%

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO5 Compute multifactor productivity

74) Productivity can be improved by

- A) increasing inputs while holding outputs steady.
- B) decreasing outputs while holding inputs steady.
- C) increasing inputs and outputs in the same proportion.
- D) decreasing inputs while holding outputs steady.
- E) there is no way to improve productivity.

Answer: D

Diff: 3 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

75) The largest contributor to productivity increases is \_\_\_\_\_, estimated to be responsible for \_\_\_\_\_ of the annual increase.

- A) management; over one-half
- B) Mr. Deming; one-half
- C) labour; two-thirds
- D) capital; 90%
- E) technology; over one-half

Answer: A

Diff: 2 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

76) The factor responsible for the largest portion of productivity increase in Canada is

- A) labour.
- B) management.
- C) capital.
- D) labour, management and capital combined; it is impossible to determine the contribution of individual factors.
- E) technology.

Answer: B

Diff: 2 Type: MC

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

77) Which of the following is **not** true when explaining why productivity tends to be lower in the service sector than in the manufacturing sector?

- A) Services are typically labour-intensive.
- B) Services are often difficult to evaluate for quality.
- C) Services are often an intellectual task performed by professionals.
- D) Services are difficult to automate.
- E) Service operations are typically capital intensive.

Answer: E

Diff: 2 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

78) Three commonly used productivity variables are

- A) quality, external elements, and precise units of measure.
- B) labour, capital, and management.
- C) technology, raw materials, and labour.
- D) education, diet, and social overhead.
- E) quality, efficiency, and low cost.

Answer: B

Diff: 2 Type: MC

Skill: knowledge

Objective: LO3 Explain the difference between production and productivity

79) The service sector has lower productivity improvements than the manufacturing sector because

- A) the service sector uses less skilled labour than manufacturing.
- B) the quality of output is lower in services than manufacturing.
- C) services usually are labour-intensive.
- D) service sector productivity is hard to measure.
- E) manufacturing sector productivity is hard to measure.

Answer: C

Diff: 2 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

80) Productivity tends to be more difficult to improve in the service sector because the work is

- A) often difficult to automate.
- B) typically labour-intensive.
- C) frequently processed individually.
- D) often an intellectual task performed by professionals.
- E) All of the above make service productivity more difficult.

Answer: E

Diff: 3 Type: MC

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

81) Firm A operates 10 hours each day, producing 100 parts/hour. If productivity were increased 20%, how many hours would the plant have to work to produce 1000 parts?

- A) less than 2 hours
- B) between 9 and 10 hours
- C) between 2 and 6 hours
- D) between 6 and 8 hours
- E) between 8 and 9 hours

Answer: E

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

82) A cleaning company uses 10 lbs each of chemicals A, B and C for each house it cleans. After some quality complaints, the company has decided to increase its use of chemical A by an additional 10 lbs for each house. By what % has productivity (houses per pound of chemical) fallen?

- A) 0%
- B) 10%
- C) 15%
- D) 25%
- E) 33%

Answer: D

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

83) A cleaning company uses \$10 of chemicals, \$40 of labour, and \$5 of misc. expenses for each house it cleans. After some quality complaints, the company has decided to increase its use of chemicals by 50%. By what % has multifactor productivity fallen?

- A) 0%
- B) 8.3%
- C) 25%
- D) 50%
- E) 0.83%

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO5 Compute multifactor productivity

84) All of the following are ethical and social challenges facing operations managers **except**

- A) honoring stakeholder commitments.
- B) maintaining a sustainable environment.
- C) efficiently developing and producing safe, quality products.
- D) providing a safe workplace.
- E) introducing new products to market.

Answer: E

Diff: 1 Type: MC

Skill: comprehension

Objective: Ethics and social responsibility

85) Among the ethical and social challenges facing operations managers are

- A) honoring financial commitments.
- B) maintaining a sustainable environment.
- C) developing low-cost products.
- D) providing an efficient workplace.
- E) all of the above.

Answer: B

Diff: 2 Type: MC

Skill: comprehension

Objective: Ethics and social responsibility

86) Which of the following is **not** among the ethical and social challenges facing operations managers?

- A) honoring stakeholder commitments
- B) maintaining a sustainable environment
- C) efficiently developing and producing safe, quality products
- D) increasing executive pay
- E) providing a safe workplace

Answer: D

Diff: 1 Type: MC

Skill: comprehension

Objective: Ethics and social responsibility

87) A business's stakeholders, whose conflicting perspectives cause ethical and social dilemmas, include all of the following **except**

- A) lenders.
- B) suppliers.
- C) owners.
- D) employees.
- E) raw materials.

Answer: E

Diff: 1 Type: MC

Skill: comprehension

Objective: Ethics and social responsibility

88) Wise Valves needs to produce cast 80,600 bronze valves annually on an assembly line. Currently workers work 160 hours per month and produce 0.2 valves per labour hour. How many workers does Wise Valves have to hire (round to the nearest whole number)?

- A) 210
- B) 200
- C) 220
- D) 144
- E) 176

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

89) Baynham Valves needs to produce cast 90,400 bronze valves annually on an assembly line. Currently workers work 168 hours per month and produce 0.4 valves per labour hour. How many workers does Baynham Valves have to hire (round to the nearest whole number)?

- A) 112
- B) 125
- C) 98
- D) 144
- E) 176

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

90) Marcott Valves needs to produce cast 45,600 bronze valves annually on an assembly line. Currently workers work 164 hours per month and produce 0.3 valves per labour hour. How many workers does Marcott Valves have to hire (round to the nearest whole number)?

- A) 77
- B) 125
- C) 98
- D) 44
- E) 927

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

**Table 1.3 Examples of Organizations in Each Sector**

Sector	Example	Percent of All Jobs
<b>Service-Producing Sector</b>		
Trade	Hudson Bay Company; Real Canadian Superstore	15%
Transportation and warehousing	WestJet; Maritime–Ontario Freight Lines Limited	5%
Finance, insurance, real estate, and leasing	Royal Bank; Manulife	6%
Professional, scientific, and technical services	Borden Ladner Gervais Law Firm	8%
Business, building, and other support services <sup>1</sup>	Edmonton Waste Management Centre; Carlson Wagonlit Travel	4%
Educational services	McGill University	7%
Health care and social assistance	SickKids Hospital	12%
Information, culture, and recreation	Calgary Flames; Princess of Wales Theatre	5%
Accommodation and food services	Tim Hortons; Royal York Hotel	6%
<b>Other Services</b>	Joe’s Barber Shop; ABC Landscaping	4%
Public administration	Province of Manitoba; City of Hamilton	6%
<b>Goods-Producing Sector</b>		
Agriculture	Farming Operations	2%
Forestry, fishing, mining, quarrying, oil, and gas <sup>2</sup>	Canadian Mining Company Inc.; Dome Pacific Logging Ltd.	2%
Utilities	Ontario Power Generation	1%
Construction	PCL Construction Management Inc.	7%
Manufacturing	Magna International Inc.	10%

<sup>1</sup>Formerly “Management of companies, administrative, and other support services.”

<sup>2</sup>Also referred to as “Natural resources.”

Source: Statistics Canada, CANSIM, table 282-0008 and Catalogue no. 71F0004XCB.

91) Using Table 1.3, what percentage of jobs in Canada are related to transportation and warehousing?

- A) 12%
- B) 20%
- C) 16%
- D) 5%
- E) 9%

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

92) Using Table 1.3, what percentage of jobs in Canada are related to health care and social assistance?

- A) 12%
- B) 20%
- C) 16%
- D) 5%
- E) 9%

Answer: A

Diff: 2 Type: MC

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

93) Using Table 1.3, what percentage of jobs in Canada are related to educational services?

- A) 12%
- B) 20%
- C) 16%
- D) 7%
- E) 9%

Answer: D

Diff: 2 Type: MC

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

94) A cleaning company uses \$20 of chemicals, \$40 of labour, and \$5 of misc. expenses for each house it cleans. After some quality complaints, the company has decided to increase its use of chemicals by 50%. By what % has multifactor productivity fallen?

- A) 0%
- B) 13.3%
- C) 25%
- D) 50%
- E) 0.83%

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO5 Compute multifactor productivity

95) A cleaning company uses \$20 of chemicals, \$50 of labour, and \$5 of misc. expenses for each house it cleans. After some quality complaints, the company has decided to increase its use of labour by 40%. By what % has multifactor productivity fallen?

- A) 0%
- B) 21.1%
- C) 25%
- D) 50%
- E) 0.83%

Answer: A

Diff: 3 Type: MC

Skill: application

Objective: LO5 Compute multifactor productivity

96) Firm A operates 16 hours each day, producing 80 parts/hour. If productivity were increased 20%, how many hours would the plant have to work to produce 1000 parts?

- A) less than 2 hours
- B) between 10 and 11 hours
- C) between 2 and 6 hours
- D) between 6 and 8 hours
- E) between 8 and 9 hours

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

97) Firm A operates 10 hours each day, producing 60 parts/hour. If productivity were increased 25%, how many hours would the plant have to work to produce 700 parts?

- A) less than 2 hours
- B) between 9 and 10 hours
- C) between 2 and 6 hours
- D) between 6 and 8 hours
- E) between 8 and 9 hours

Answer: B

Diff: 3 Type: MC

Skill: application

Objective: LO4 Compute single-factor productivity

98) Starbucks stopped requiring signatures on credit-card purchases under \$25 in an attempt to reduce \_\_\_\_\_.

Answer: transaction time (or service time)

Diff: 1 Type: SA

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

99) \_\_\_\_\_ is the set of activities that transforms inputs into goods and services.

Answer: Operations management

Diff: 1 Type: SA

Skill: knowledge

Objective: LO1 Define operations management

100) Marketing, Production, and \_\_\_\_\_ are the three functions that all organizations must perform to create goods and services.

Answer: finance/accounting

Diff: 1 Type: SA

Skill: knowledge

Objective: LO1 Define operations management

101) "Should we make or buy this component?" is an issue in the \_\_\_\_\_ critical decision area.

Answer: supply chain management

Diff: 1 Type: SA

Skill: comprehension

Objective: LO1 Define operations management

102) Henry Ford and \_\_\_\_\_ are credited with the development of the moving assembly line.

Answer: Charles Sorensen

Diff: 1 Type: SA

Skill: knowledge

Objective: LO1 Define operations management

103) When a tangible product is not included in a service, such as with counseling, it is called a \_\_\_\_\_.

Answer: pure service

Diff: 1 Type: SA

Skill: knowledge

Objective: LO2 Explain the distinction between goods and services

104) \_\_\_\_\_ is the ability of the organization to be flexible enough to cater to the individual whims of consumers.

Answer: Mass customization

Diff: 2 Type: SA

Skill: knowledge

Objective: LO1 Define operations management

105) \_\_\_\_\_ is the operations management trend that moves more decision making to the individual worker.

Answer: Empowered employees

Diff: 2 Type: SA

Skill: knowledge

Objective: LO1 Define operations management

106) \_\_\_\_\_ is the total of all outputs produced by the transformation process divided by the total of the inputs.

Answer: Multifactor productivity

Diff: 1 Type: SA

Skill: knowledge

Objective: LO5 Compute multifactor productivity

107) Productivity is the ratio of \_\_\_\_\_ to \_\_\_\_\_. Using this relationship, productivity can be improved by \_\_\_\_\_ or \_\_\_\_\_.

Answer: outputs; inputs; reducing inputs while holding outputs constant; increasing outputs while holding inputs constant.

Diff: 3 Type: SA

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

108) Identify three or more operations-related tasks carried out by Hard Rock Café.

Answer: Providing custom meals; designing, testing, and costing meals; acquiring, receiving, and storing supplies; recruiting and training employees; preparing employee schedules; designing efficient restaurant layouts.

Diff: 1 Type: ES

Skill: comprehension

Objective: Global company profile

109) Identify two operations-related tasks carried out by Hard Rock Café. Match each to its area of the Ten Critical Decisions.

Answer: Providing custom meals—design of goods and services; designing, testing, and costing meals—design of goods and services; acquiring, receiving, and storing supplies—supply-chain management; recruiting and training employees—human resources, job design and work measurement; preparing employee schedules—intermediate and short-term scheduling; designing efficient restaurant layouts—layout strategy.

Diff: 2 Type: ES

Skill: comprehension

Objective: Global company profile

110) Define operations management. Will your definition accommodate both manufacturing and service operations?

Answer: Operations management can be defined as the management of all activities directly related to the creation of goods and/or services through the transformation of inputs into outputs. Yes.

Diff: 1 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

111) Identify the items that Frederick W. Taylor believed management should be more responsible for.

Answer: He believed that management should be more responsible for matching employees to the right job, providing the proper training, providing proper work methods and tools, and establishing legitimate incentives for work to be accomplished.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

112) Operations managers should be well versed in what disciplines in order to make good decisions?

Answer: Management science, information technology, and often one of the biological or physical sciences.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

113) Why are services typically more difficult to standardize, automate, and make efficient?

Answer: Services typically require customer interaction, which makes it difficult to standardize, automate, and make efficient.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

114) How do services differ from goods? Identify five ways.

Answer: Pick from the following: a service is usually intangible; it is often produced and consumed simultaneously; often unique; it involves high customer interaction; product definition is inconsistent; often knowledge-based; and frequently dispersed.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

115) Services are often knowledge-based. Provide two examples, and explain why they are knowledge-based.

Answer: Answers will vary, but the textbook used educational, medical, and legal services.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO2 Explain the distinction between goods and services

116) Why are organizations changing from batch (large) shipments to just-in-time (JIT) shipments?

Answer: Organizations are switching to JIT shipments because inventory requires a large financial investment, and impedes the responsiveness to changes in the marketplace.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

117) Why are organizations becoming more global?

Answer: Organizations are becoming more global with the decline in the cost of communication and transportation. Additionally, resources—capital, material, talent, and labour—are also becoming more global.

Diff: 2 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

118) Identify the three productivity variables used in the text.

Answer: The three common variables are labour, capital, and management.

Diff: 2 Type: ES

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

119) What is a knowledge society?

Answer: A knowledge society is one in which much of the labour force has migrated from manual work to work based on knowledge.

Diff: 2 Type: ES

Skill: knowledge

Objective: LO6 Identify the critical variables in enhancing productivity

120) Why are operations managers faced with ethical and social challenges?

Answer: Businesses have diverse stakeholders, which include owners, employees, lenders, and distributors. These stakeholders hold conflicting perspectives.

Diff: 1 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

121) What are some of the ethical and social challenges faced by operations managers?

Answer: Efficiently developing and producing safe quality products; maintaining a clean environment; providing a safe workplace; honoring community commitments.

Diff: 1 Type: ES

Skill: comprehension

Objective: LO1 Define operations management

122) As the administrative manager in a law office, you have been asked to develop a system for evaluating the productivity of the 15 lawyers in the office. What difficulties are you going to have in doing this, and how are you going to overcome them?

Answer: Productivity measures for a law office are difficult. Simple criteria, like number of cases processed, fail to consider complexity of the case. Even counting wins is difficult, as many cases are settled with some sort of compromise. External elements such as the quality of the opposing counsel and the tenacity of the opposition also make counting look rather silly. Categories of cases can help—(i.e., uncontested divorce, no personal injury auto case, etc.) However, many firms end up counting hours billed. This in turns leads to other problems, as noted by the number of false billing cases.

Diff: 3 Type: ES

Skill: comprehension

Objective: LO6 Identify the critical variables in enhancing productivity

123) Susan has a part-time "cottage industry" producing seasonal plywood yard ornaments for resale at local craft fairs and bazaars. She currently works 8 hours per day to produce 16 ornaments.

a. What is her productivity?

b. She thinks that by redesigning the ornaments and switching from use of a wood glue to a hot-glue gun she can increase her total production to 20 ornaments per day. What is her new productivity?

c. What is her percentage increase in productivity?

Answer: a.  $16 \text{ ornaments}/8 \text{ hours} = 2 \text{ ornaments}/\text{hour}$

b.  $20 \text{ ornaments}/8 \text{ hours} = 2.5 \text{ ornaments}/\text{hour}$

c. Change in productivity =  $0.5 \text{ ornaments}/\text{hour}$ ; percent change =  $0.5/2 = 25\%$

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

124) A firm cleans chemical tank cars in the Edmonton area. With standard equipment, the firm typically cleaned 70 chemical tank cars per month. They utilized 10 gallons of solvent, and two employees worked 20 days per month, 8 hours a day. The company decided to switch to a larger cleaning machine. Last April, they cleaned 60 tank cars in only 15 days. They utilized 12 gallons of solvent, and the two employees worked 6 hours a day.

1. What was their raw material and their labour productivity with the standard equipment?

2. What is their raw material and their labour productivity with the larger machine?

3. What is the change in each productivity measure?

Answer:

Resource	Standard Equipment	Larger Machine	Percent Change
<b>Solvent</b>	$\frac{70}{20} = 7$	$\frac{60}{12} = 5$	$\frac{5 - 7}{7} = -28.57\text{BL}$
<b>Labour</b>	$\frac{70}{320} = 0.22$	$\frac{60}{180} = .33$	$\frac{.33 - .22}{.22} = 50\%$

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

125) The Dulac Box plant produces wooden packing boxes to be used in the local seafood industry. Current operations allow the company to make 500 boxes per day, in two 8-hour shifts (250 boxes per shift). The company has introduced some small changes in equipment, and conducted appropriate job training, so that production levels have risen to 300 boxes per shift. These changes did not require any change in the amount of capital spending or energy use. What is the firm's new labour productivity?

Answer: 600 boxes per day / 16 hours = 37.5 boxes per hour

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

126) Mark's Ceramics spent \$4000 on a new kiln last year in the belief that it would cut energy usage 25% over the old kiln. This kiln is an oven that turns "greenware" into finished pottery. Mark is concerned that the new kiln requires extra labour hours for its operation. Mark wants to check the energy savings of the new oven, and also to look over other measures of their productivity to see if the change really was beneficial. Mark has the following data to work with:

	Last Year	This Year
Production (finished units)	4000	4000
Greenware (pounds)	5000	5000
Labour (hrs)	350	375
Capital (\$)	15000	19000
Energy (kWh)	3000	2600

Were the modifications beneficial?

Answer: The energy modifications did not generate the expected energy savings; also, labour and capital productivity decreased.

Resource	Last Year	This Year	Change	Pct. Change
Labour	$4000 / 350 = 11.43$	$4000 / 375 = 10.67$	-0.76	-6.7%
Capital	$4000 / 15000 = 0.27$	$4000 / 19000 = .21$	-0.060	-22.2%
Energy	$4000 / 3000 = 1.33$	$4000 / 2600 = 1.54$	0.21	15.4%

Diff: 3 Type: ES

Skill: application

Objective: LO5 Compute multifactor productivity

127) Martin Manufacturing has implemented several programs to improve its productivity. They have asked you to evaluate the firm's productivity by comparing this year's performance with last year's. The following data are available:

	Last Year	This Year
Output	10,500 units	12,100 units
Labour Hours	12,000	13,200
Utilities	\$7,600	\$8,250
Capital	\$83,000	\$88,000

Has Martin Manufacturing improved its productivity during the past year?

Answer: Productivity improved in all three categories this year; utilities showed the greatest increase, and labour the least.

Resource	Last Year	This Year	Change	Pct. Change
Labour	$10500 / 12000 = 0.88$	$12100 / 13200 = 0.9$	0.04	4.8%
Capital	$10500 / 7600 = 1.38$	$12100 / 8250 = 1.47$	0.09	6.2%
Energy	$10500 / 83000 = 0.13$	$12100 / 88000 = 0.14$	0.01	7.69%

Diff: 3 Type: ES

Skill: application

Objective: LO5 Compute multifactor productivity

128) Felicien grows mirlitons (that's Cajun for Chayote squash) in his 100 by 100 foot garden. He then sells the crop at the local farmers' market. Two summers ago, he was able to produce and sell 1200 pounds of mirlitons. Last summer, he tried a new fertilizer that promised a 50% increase in yield. He harvested 1900 pounds. Did the fertilizer live up to its promise?

Answer: Since the productivity gain was 58.3%, not 50%, the fertilizer was at least as good as advertised.

Two Summers ago	Last Summer	Change
$1200 \div 10,000 = .12$ lbs/sq. ft	$1900 \div 10,000 = .19$ lbs/sq. ft	$(.19 - .12) \div .12 = 58.3\%$

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

129) The Dulac Box plant produces wooden packing boxes to be used in the local seafood industry. Current operations allow the company to make 500 boxes per day, in two 8-hour shifts (250 boxes per shift). The company has introduced some moderate changes in equipment, and conducted appropriate job training, so that production levels have risen to 300 boxes per shift. Labour costs average \$10 per hour for each of the 5 full-time workers on each shift. Capital costs were previously \$3,000 per day, and rose to \$3,200 per day with the equipment modifications. Energy costs were unchanged by the modifications, at \$400 per day. What is the firm's multifactor productivity before and after the changes?

Answer: MFP before:  $500 \text{ boxes} / (\$10 \times 5 \times 16 + \$3000 + \$400) = 500 / 4200 = 0.119$  boxes/dollar

MFP after:  $600 \text{ boxes} / (\$10 \times 5 \times 16 + \$3200 + \$400) = 600 / 4400 = 0.136$  boxes/dollar

Diff: 3 Type: ES

Skill: application

Objective: LO5 Compute multifactor productivity

130) Gibson Products produces cast bronze valves for use in offshore oil platforms. Currently, Gibson produces 1600 valves per day. The 20 workers at Gibson work from 7 a.m. until 4 p.m., with 30 minutes off for lunch and a 15 minute break during the morning work session and another at the afternoon work session. Gibson is in a competitive industry, and needs to increase productivity to stay competitive. They feel that a 20% increase is needed.

Gibson's management believes that the 20% increase will not be possible without a change in working conditions, so they change work hours. The new schedule calls on workers to work from 7:30 a.m. until 4:30 p.m., during which workers can take one hour off at any time of their choosing. Obviously, the number of paid hours is the same as before, but production increases, perhaps because workers are given a bit more control over their workday. After this change, valve production increased to 1800 units per day.

a. Calculate labour productivity for the initial situation.

b. Calculate labour productivity for the hypothetical 20% increase.

c. What is the productivity after the change in work rules?

d. Write a short paragraph analyzing these results.

Answer: (a) Workers are active for eight hours per day; labour productivity is 10 valves/hour

(b) If Productivity rises by 20%, to 12 valves/hour; output would be  $12 \times 8 \times 20 = 1920$

(c) New productivity is  $1800 / (20 \times 8) = 11.25$  valves/hour

(d) Gibson did not gain the desired 20% increase in productivity, but they did gain over 11%, without extra equipment or energy, and without increasing the labour cost.

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

131) A local university is considering changes to its class structure in an effort to increase professor productivity. The old schedule had each professor teaching 5 classes per week, with each class meeting an hour per day on Monday, Wednesday, and Friday. Each class contained 20 students. The new schedule has each professor teaching only 3 classes, but each class meets daily for an hour. New classes contain 50 students.

- Calculate the labour productivity for the initial situation (students/hour).
- Calculate the labour productivity for the schedule change (students/hour).
- Are there any ethical considerations that should be accounted for?
- Suppose that each teacher also is required to have 2 hours of Office Hours each day he/she taught class. Is the schedule change a productivity increase?

Answer: (a) Professors teach 100 students in 15 hours or 6.67 students/hour.

(b) Professors teach 150 students in 15 hours or 10 students/hour.

(c) Responses should focus on honoring stakeholder commitment and can include students per professor ratio, class sizes, quality of education, etc.

(d) Initial productivity is 100 students in 21 hours or 4.76 students/hour. New productivity is 150 students in 25 hours or 6 students/hour, an increase or 1.24 students/hour.

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

132) A grocery chain is considering the installation of a set of 4 self-checkout lanes. The new self-checkout lane setup will replace 2 old cashier lanes that were staffed by a cashier and bagger on each lane. One cashier mans all 4 self-checkouts (answering questions, checking for unscanned items, taking coupons, etc). Checkout on the new lanes takes 2 minutes (customers bag their own orders) while checkout with the old lanes took only 45 seconds. In addition the electricity costs for both setups are \$.05 per checkout while bagging (material) costs are \$.1 per checkout with the old system and \$.15 for the new system. The new lanes also require \$100 in capital costs. Assume that the lanes are always in use for 8 hours per day (1 shift) and that a worker makes \$10/hour.

- How many checkouts did the old system provide in a shift?
- How many checkouts does the new system provide?
- What is the multifactor productivity for each system?

Answer: (a)  $2 \text{ lanes} * 8 \text{ hours} * 3600 \text{ seconds/hour} * 1 \text{ checkout}/45 \text{ seconds} = 1280 \text{ checkouts}$

(b)  $4 \text{ lanes} * 8 \text{ hours} * 60 \text{ minutes/hour} * 1 \text{ checkout}/2 \text{ min} = 960 \text{ checkouts}$

(c) Cost for the old system  $4 \text{ workers} * 8 \text{ hours} * \$10/\text{hour} + \$.1 * 1280 + \$.05 * 1280 = \$512$ .

Cost for the new system  $1 \text{ worker} * 8 \text{ hours} * \$10/\text{hour} + \$.15 * 960 + \$.05 * 960 + \$100 = \$372$ . Multifactor productivity for old system =  $1280 \text{ checkouts} / \$512 = 2.5 \text{ checkouts}/\$$ .

Multifactor productivity for new system =  $960 \text{ checkouts} / \$372 = 2.6 \text{ checkouts}/\$$ .

Diff: 3 Type: ES

Skill: application

Objective: LO5 Compute multifactor productivity

133) A swimming pool company has 100,000 labour hours available per summer and with a labour productivity of 5 pools per 6,000 hours.

a. How many pools can the company install this summer?

b. Suppose the multifactor productivity was one pool per \$25,000. How much should the company expect to spend this summer constructing the pools?

Answer: (a)  $100,000 \text{ hours} \times 5 \text{ pools}/6000 \text{ hours} = 83.33$  or 83 pools

(b)  $83 \text{ pools} \times \$25,000/\text{pool} = \$2,075,000$

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

134) An industrial plant needs to make 100,000 parts per month to meet demand. Each month contains 20 working days, each of which allows for 3 separate 8 hour shifts.

a. If a worker can produce 10 parts/hour, how many workers are needed on each shift?

b. If each shift has 100 workers, what is the productivity of an individual worker?

c. If material costs are \$10/part, capital costs are \$100,000 and labour costs are \$10/hour, what is the multifactor productivity of the plant from part A?

Answer: a.  $100,000 \text{ parts} \times 1 \text{ hour} / 10 \text{ parts} \times 1 \text{ shift} / 8 \text{ hours} \times 1 \text{ worker}/60 \text{ shifts} = 20.83 = 21$  workers

b.  $100,000 \text{ parts} / (60 \text{ shifts/worker} \times 100 \text{ workers} \times 8 \text{ hours/shift}) = 2.08 \text{ parts/hour}$

c.  $100,000 \text{ parts} / (\$10/\text{part} \times 100,000 \text{ parts} + \$100,000 + 21 \text{ workers} \times 60 \text{ shifts/worker} \times 8 \text{ hours/shift} \times \$10/\text{hour}) = .083 \text{ parts}/\$1$

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

135) The local fast food store experienced the following number of customers on the night shift:

Hour	Customers
12 AM	23
1 AM	20
2 AM	15
3 AM	5
4 AM	2
5 AM	1

If the store was staffed by two workers, what was the average productivity per worker, in customers/hour?

Answer:  $(23 + 20 + 15 + 5 + 2 + 1) \text{ customers} / (2 \text{ workers} \times 6 \text{ hours/worker}) = 5.5$  customers/hour

Diff: 3 Type: ES

Skill: application

Objective: LO4 Compute single-factor productivity

136) Brandon Production is a small firm focused on the assembly and sale of custom computers. The firm is facing stiff competition from low-priced alternatives, and is looking at various solutions to remain competitive and profitable. Current financials for the firm are shown in the table below. In the first option, marketing will increase sales by 50%. The next option is Vendor (Supplier) changes, which would result in a decrease of 10% in the cost of inputs. Finally there is an OM option, which would reduce production costs 25%. Which of the options would you recommend to the firm if it can only pursue one option? In addition, comment on the feasibility of each option.

Business Function	Current Value
Cost of Inputs	\$50,000
Production Costs	\$25,000
Revenue	\$80,000

Answer: Marketing would increase sales to \$120,000 ( $\$80,000 \times 1.5$ ) but increase cost of inputs and production costs to \$112,500 ( $(\$50,000 + \$25,000) \times 1.5$ ). This would net an additional \$2500 of profit ( $\$120,000 - \$112,500 - \text{current profit of } \$5000$ ). Vendor (Supplier) Changes would decrease cost of inputs to \$45,000 ( $\$50,000 \times .9$ ), resulting in \$5,000 of additional profit (savings) ( $\$50,000 - \$45,000$ ). Finally, the OM option would save \$6250 ( $\$25,000 - \$25,000 \times .75$ ), resulting in an additional \$6250 of profit. Thus the OM option is the most profitable. Comments on feasibility should centre on the near impossibility of increasing revenue by 50%, while noting the other two options are difficult but not impossible.

Diff: 3 Type: ES

Skill: application

Objective: LO1 Define operations management