

## FOMP 10 Chapter 4 Review Pack v1 Answer Section

### MULTIPLE CHOICE

1. ANS: B                      PTS: 1                      DIF: C                      OBJ: Section 4.3  
     NAT: AN3                    TOP: Rational Exponents                    KEY: rational exponent

### SHORT ANSWER

1. ANS:  
 $(-3)^{-1}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent | negative exponent
2. ANS:  
 0  
 $=1-1=0$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent
3. ANS:  
 $1\frac{1}{8}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent | negative exponent
4. ANS:  
 15
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.3      NAT: AN3  
 TOP: Rational Exponents                    KEY: rational exponent
5. ANS:  
 $16^{\frac{1}{7}}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.4      NAT: AN3  
 TOP: Irrational Numbers                    KEY: convert radical to power
6. ANS:  
 perfect square  
 $\sqrt[3]{49} = 3.66$   
 $\sqrt{49} = 7$
- PTS: 1                      DIF: 3-4                      OBJ: Section 4.1      NAT: AN1  
 TOP: Square Roots and Cube Roots                    KEY: perfect cube | perfect square | square root

7. ANS:

$$\frac{16807}{16}$$

$$\left(\frac{7}{2}\right)^5 (2)$$

$$= \frac{16807}{32} * 2$$

$$= \frac{16807}{16}$$

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: integral exponent | order of operations

8. ANS:

$$49b^2$$

$$(7b)^2 = 7^2 b^2 = 49b^2$$

PTS: 1 DIF: 3-4

TOP: Square Roots and Cube Roots

OBJ: Section 4.1 NAT: AN1

KEY: perfect square | square root | area

9. ANS:

0.5 g

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: negative exponent

10. ANS:

$$444^{\frac{6}{5}}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN3

KEY: convert radical to power

11. ANS:

a rational exponent

PTS: 1 DIF: 3-4

TOP: Rational Exponents

OBJ: Section 4.3 NAT: AN3

KEY: rational exponent

12. ANS:

$$\sqrt[3]{25}$$

$$= 5^{\frac{1}{3} * \frac{3}{2} * \frac{4}{3}} = 5^{\frac{2}{3}} \quad \text{or} \quad \sqrt[3]{25}$$

PTS: 1 DIF: 3-4

NAT: AN3 TOP: Rational Exponents | Irrational Numbers

OBJ: Section 4.3 | Section 4.4

KEY: exponent laws | power of a power | convert power to radical

13. ANS:

$$8\sqrt{3}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN2

KEY: convert entire radical

14. ANS:

$$9s^{\frac{9}{2}}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert radical to power

15. ANS:

$$3^5\sqrt{3}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert entire radical

16. ANS:

$$x^{-\frac{3}{4}}$$

PTS: 1                    DIF: 3-4                    OBJ: Section 3.3 | Section 4.4  
NAT: AN3                    TOP: Rational Exponents | Irrational Numbers  
KEY: negative exponent | convert radical to power

17. ANS:

$$\sqrt[3]{78.125}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert mixed radical

18. ANS:

$$\frac{1}{\sqrt[3]{t^5}}$$

PTS: 1                    DIF: 3-4                    OBJ: Section 4.3 | Section 4.4  
NAT: AN2                    TOP: Rational Exponents | Irrational Numbers  
KEY: negative exponent | convert power to radical

19. ANS:

a) perfect square:  $41^2 = 1681$

b) perfect square:  $42^2 = 1764$

PTS: 1                    DIF: 3-4  
TOP: Square Roots and Cube Roots

OBJ: Section 4.1    NAT: AN1  
KEY: perfect square | perfect cube

20. ANS:

a)  $9.3^2 \text{ km}^2 + 6.4^2 \text{ km}^2 = 127.45 \text{ km}^2$

b)  $5.9^2 \text{ cm}^2 + 1.9^2 \text{ cm}^2 = 38.42 \text{ cm}^2$

PTS: 1                    DIF: 3-4                    OBJ: Section 4.1 | Section 4.2  
NAT: AN1 | AN3    TOP: Square Roots and Cube Roots | Integral Exponents  
KEY: area | perfect square | integral exponent

21. ANS:

a) 2218.4537

b) 12.5135

c) 0.5774

PTS: 1                    DIF: 3-4                    OBJ: Section 4.3    NAT: AN3

TOP: Rational Exponents

KEY: exponent laws | product of powers | quotient of powers | power of a power

22. ANS:

Find the side length,  $s$ , of the square faces of the box.

$$\begin{aligned} s &= \sqrt[3]{512} \\ &= 8 \end{aligned}$$

Each face is 8 cm by 8 cm and has an area of 64 cm<sup>2</sup>.

$$(5)(64) = 320$$

The surface area of the five faces of the box is 45 cm<sup>2</sup>.

PTS: 1                    DIF: 3-4                    OBJ: Section 4.1    NAT: AN1

TOP: Square Roots and Cube Roots

KEY: area | volume | cube root

23. ANS:

-3

PTS: 1                    DIF: 3-4

OBJ: Section 4.2    NAT: AN3

TOP: Integral Exponents

KEY: integral exponent

24. ANS:

$x$  can be any number

PTS: 1                    DIF: 5-6

OBJ: Section 4.3    NAT: AN3

TOP: Rational Exponents

KEY: rational exponent

25. ANS:

$$\begin{aligned} &= 197^{\frac{1}{2} * \frac{1}{8} * \frac{5}{8}} = 197^{\frac{5}{128}} \end{aligned}$$

PTS: 1                    DIF: 5-6

OBJ: Section 4.4    NAT: AN3

TOP: Irrational Numbers

KEY: irrational number | apply radicals

26. ANS:

$$\begin{aligned} 6(2)^{4d} &= 6(2)^{4(6)} \\ &= 6(100\ 663\ 296) \\ &= 603\ 979\ 776 \end{aligned}$$

Exponential form:  $6(2)^{24}$

Simplified form: 603 979 776

There are  $6(2)^{24}$  or 603 979 776 bacteria after 6 days.

PTS: 1                    DIF: 5-6

OBJ: Section 4.2    NAT: AN3

TOP: Integral Exponents

KEY: apply powers | growth

27. ANS:

a) Substitute  $h = 170$ :

$$\begin{aligned} s &= 2.1\sqrt{h} \\ &= 2.1\sqrt{170} \\ &= 27.38065 \end{aligned}$$

About 27 sections of fencing will be produced in 170 h of labour.

b) Substitute  $h = 340$ :

$$\begin{aligned} s &= 2.1\sqrt{h} \\ &= 2.1\sqrt{340} \\ &= 38.722087 \end{aligned}$$

The company will produce 39 sections using 340 h of labour. This represents an additional 12 sections.

c) Substitute  $s = 28$ .

$$\begin{aligned} s &= 2.1\sqrt{h} \\ 28 &= 2.1\sqrt{h} \\ \frac{28}{2.1} &= \sqrt{h} \end{aligned}$$

$$h = \left( \frac{28}{2.1} \right)^2$$

$$= 177.777778$$

About 178 h of labour per day will be needed to produce 28 sections of fencing daily.

PTS: 1

DIF: 5-6

OBJ: Section 4.4 NAT: AN2 | AN3

TOP: Irrational Numbers

KEY: irrational number | apply radicals

28. ANS:

$$\begin{aligned} \text{a) } T &= 2\pi\sqrt{\frac{L}{g}} \\ &= 2\pi\sqrt{\frac{1.9}{9.81}} \\ &= 2.76658253506 \end{aligned}$$

It would take about 2.8 s for the pendulum to swing back and forth once at Earth's surface.

b) On the moon:

$$\begin{aligned} g &= \frac{1}{6}(9.81) \\ &= 1.635 \\ T &= 2\pi\sqrt{\frac{L}{g}} \\ &= 2\pi\sqrt{\frac{1.9}{1.635}} \\ &= 6.773260678064 \end{aligned}$$

It would take about 6.8 s for the pendulum to swing back and forth once on the moon.

PTS: 1                      DIF: 5-6                      OBJ: Section 4.3 | Section 4.4  
 NAT: AN2 | AN3        TOP: Rational Exponents | Irrational Numbers  
 KEY: exponent laws | apply radicals

29. ANS:

$$x = 0$$

PTS: 1                      DIF: 7-8                      OBJ: Section 4.3        NAT: AN3  
 TOP: Rational Exponents                      KEY: exponent laws | zero exponent

**FOMP 10 Chapter 4 Review Pack v1****Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. Which statement is correct about the expression  $-4^{\frac{1}{2}}$  when it is evaluated?
- a. The sign is positive.
  - b. The sign is negative.
  - c. The expression is equal to 0.
  - d. The expression is undefined.

**Short Answer****Level 1-2 Questions**

1. Which expression represents a negative number ( $2^{-3}$ ,  $(-3)^2$ ,  $-3^0$ ,  $(-3)^{-1}$ )?
2. Determine the value of  $(-1)^0 - 5^0$ .
3. Evaluate  $2^0 + 2^{-3}$ .
4. Evaluate  $225^{\frac{1}{2}}$ .
5. Write an equivalent power to  $\sqrt[3]{16}$ ?

**Level 3-4 Questions**

6. Describe the number 49 in terms of perfect square and cube.
7. Simplify  $\left(\frac{7}{2}\right)^5 (2)$ .

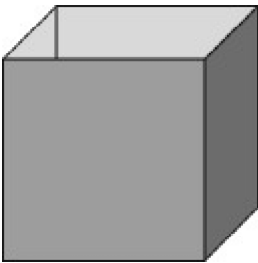
Name: \_\_\_\_\_

ID: A

8. One side of a square is  $7b$  in length. What is the area of the square?
9. Carbon-14 is a radioactive element with a half-life of 5700 years. If a sample contains 8 g of carbon-14 today, what mass of carbon-14 will it contain in 22 800 years?
10. Write an equivalent power to  $\sqrt[5]{444^6}$ ?
11. The root of a number can be represented by
12. Simplify  $[(5^{\frac{1}{3}})^{\frac{3}{2}}]^{\frac{4}{3}}$ .
13. Express  $\sqrt{192}$  as an equivalent mixed radical.
14. Express  $\sqrt{81s^9}$  as a power with a rational exponent.
15. Convert  $\sqrt[5]{729}$  to an equivalent mixed radical.
16. Write an equivalent power to  $\frac{1}{(\sqrt[4]{x})^3}$ ?
17. Write as an entire radical:  $2.5\sqrt[3]{5}$ ?
18. Express  $t^{-\frac{5}{3}}$  as an equivalent radical.



19. State whether each number is a perfect square or a perfect cube. Show your work.
- 1681
  - 1764
20. Write and evaluate an expression using exponents for the total area of each pair of squares.
- Square A has side lengths of 9.3 km and square B has side lengths of 6.4 km.
  - Square C has side lengths of 5.9 cm and square D has side lengths of 1.9 cm.
21. Evaluate using a calculator. Express the answer to four decimal places, where necessary.
- $(6^2)(6^{2.3})$
  - $\frac{9^{1.6}}{27^{0.3}}$
  - $\frac{(3^{\frac{1}{2}})^3}{9}$
22. An open-topped cubical box has a volume of  $512 \text{ cm}^3$ . Determine the total surface area of the five faces of the box.



23. The value of  $x$  that makes  $\left(\frac{4}{3}\right)^x = \frac{27}{64}$  true is \_\_\_\_\_.

### Level 5-6 Questions

24. What values of  $x$  can be substituted into the equation  $y = 8^x$ ?

25. Express  $\sqrt[8]{\sqrt{197^{\frac{5}{8}}}}$  as a power with a rational exponent. Do not evaluate.
26. There are 6 bacteria in a dish at the beginning of an experiment. The number of bacteria doubles every 6 h. How many bacteria are there after 6 days? Express your answer in both exponential and simplified form.
27. A company manufactures fences for residential use. The production of fencing can be modelled using the equation  $s = 2.1\sqrt{h}$ , where  $s$  is the number of sections of fencing produced and  $h$  is the number of hours of labour.
- How many sections will be produced if a crew works a total of 170 h in a day?
  - How many more sections will be produced in 340 h per day?
  - How many hours of labour will be needed if the company wants to maintain a production rate of 28 sections per day?
28. The swing of a pendulum is affected by acceleration due to gravity. The equation  $T = 2\pi\sqrt{\frac{L}{g}}$  represents the relationship between the time it takes a pendulum that is  $L = 1.9$  m long to swing back and forth once and gravitational acceleration. In this formula,  $T$  is time, in seconds, and  $g$  is the gravitational acceleration, in metres per second per second, or metres per second squared.
- The gravitational acceleration at Earth's surface is about  $9.81 \text{ m/s}^2$ . How long would it take the pendulum to swing back and forth once at Earth's surface? Express the answer to the nearest tenth of a second.
  - The gravitational acceleration on the moon is about  $\frac{1}{6}$  of the gravitational acceleration at Earth's surface. Determine how long it would take the pendulum to swing back and forth if it were on the moon. Express the answer to the nearest tenth of a second.

### Level 7-8 Questions

29. For what value of  $x$  do  $4^x$ ,  $2^x$ , and  $\left(\frac{1}{4}\right)^x$  have the same value?

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### MULTIPLE CHOICE

1. ANS: B                      PTS: 1                      DIF: C                      OBJ: Section 4.3  
     NAT: AN3                    TOP: Rational Exponents                    KEY: rational exponent

### SHORT ANSWER

1. ANS:  
 $(-3)^{-1}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent | negative exponent
2. ANS:  
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- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent
3. ANS:  
 $1\frac{1}{8}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2      NAT: AN3  
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4. ANS:  
 15
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.3      NAT: AN3  
 TOP: Rational Exponents                    KEY: rational exponent
5. ANS:  
 $16^{\frac{1}{7}}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.4      NAT: AN3  
 TOP: Irrational Numbers                    KEY: convert radical to power
6. ANS:  
 perfect square  
 $\sqrt[3]{49} = 3.66$   
 $\sqrt{49} = 7$
- PTS: 1                      DIF: 3-4                      OBJ: Section 4.1      NAT: AN1  
 TOP: Square Roots and Cube Roots                    KEY: perfect cube | perfect square | square root

7. ANS:

$$\frac{16807}{16}$$

$$\left(\frac{7}{2}\right)^5 (2)$$

$$= \frac{16807}{32} * 2$$

$$= \frac{16807}{16}$$

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: integral exponent | order of operations

8. ANS:

$$49b^2$$

$$(7b)^2 = 7^2 b^2 = 49b^2$$

PTS: 1 DIF: 3-4

TOP: Square Roots and Cube Roots

OBJ: Section 4.1 NAT: AN1

KEY: perfect square | square root | area

9. ANS:

0.5 g

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: negative exponent

10. ANS:

$$444^{\frac{6}{5}}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN3

KEY: convert radical to power

11. ANS:

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OBJ: Section 4.3 NAT: AN3

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12. ANS:

$$\sqrt[3]{25}$$

$$= 5^{\frac{1}{3} * \frac{3}{2} * \frac{4}{3}} = 5^{\frac{2}{3}} \quad \text{or} \quad \sqrt[3]{25}$$

PTS: 1 DIF: 3-4

NAT: AN3 TOP: Rational Exponents | Irrational Numbers

OBJ: Section 4.3 | Section 4.4

KEY: exponent laws | power of a power | convert power to radical

13. ANS:

$$8\sqrt{3}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN2

KEY: convert entire radical

14. ANS:

$$9s^{\frac{9}{2}}$$

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16. ANS:

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PTS: 1                    DIF: 3-4                    OBJ: Section 3.3 | Section 4.4  
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17. ANS:

$$\sqrt[3]{78.125}$$

PTS: 1                    DIF: 3-4  
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OBJ: Section 4.4    NAT: AN2  
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18. ANS:

$$\frac{1}{\sqrt[3]{t^5}}$$

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19. ANS:

- a) perfect square:  $41^2 = 1681$   
b) perfect square:  $42^2 = 1764$

PTS: 1                    DIF: 3-4  
TOP: Square Roots and Cube Roots

OBJ: Section 4.1    NAT: AN1  
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20. ANS:

- a)  $9.3^2 \text{ km}^2 + 6.4^2 \text{ km}^2 = 127.45 \text{ km}^2$   
b)  $5.9^2 \text{ cm}^2 + 1.9^2 \text{ cm}^2 = 38.42 \text{ cm}^2$

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Find the side length,  $s$ , of the square faces of the box.

$$\begin{aligned} s &= \sqrt[3]{512} \\ &= 8 \end{aligned}$$

Each face is 8 cm by 8 cm and has an area of 64 cm<sup>2</sup>.

$$(5)(64) = 320$$

The surface area of the five faces of the box is 45 cm<sup>2</sup>.

PTS: 1 DIF: 3-4 OBJ: Section 4.1 NAT: AN1

TOP: Square Roots and Cube Roots

KEY: area | volume | cube root

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-3

PTS: 1 DIF: 3-4

OBJ: Section 4.2 NAT: AN3

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PTS: 1 DIF: 5-6

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$$\begin{aligned} &\frac{1}{2} * \frac{1}{8} * \frac{5}{8} = 197 \frac{5}{128} \\ &= 197 \frac{5}{128} \end{aligned}$$

PTS: 1 DIF: 5-6

OBJ: Section 4.4 NAT: AN3

TOP: Irrational Numbers

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Exponential form:  $6(2)^{24}$

Simplified form: 603 979 776

There are  $6(2)^{24}$  or 603 979 776 bacteria after 6 days.

PTS: 1 DIF: 5-6

OBJ: Section 4.2 NAT: AN3

TOP: Integral Exponents

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a) Substitute  $h = 170$ :

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About 27 sections of fencing will be produced in 170 h of labour.

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$$h = \left( \frac{28}{2.1} \right)^2$$

$$= 177.777778$$

About 178 h of labour per day will be needed to produce 28 sections of fencing daily.

PTS: 1

DIF: 5-6

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It would take about 2.8 s for the pendulum to swing back and forth once at Earth's surface.

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$$\begin{aligned} g &= \frac{1}{6}(9.81) \\ &= 1.635 \\ T &= 2\pi\sqrt{\frac{L}{g}} \\ &= 2\pi\sqrt{\frac{1.9}{1.635}} \\ &= 6.773260678064 \end{aligned}$$

It would take about 6.8 s for the pendulum to swing back and forth once on the moon.

PTS: 1                      DIF: 5-6                      OBJ: Section 4.3 | Section 4.4  
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3. Evaluate  $2^0 + 2^{-3}$ .
4. Evaluate  $225^{\frac{1}{2}}$ .
5. Write an equivalent power to  $\sqrt[3]{16}$ ?

**Level 3-4 Questions**

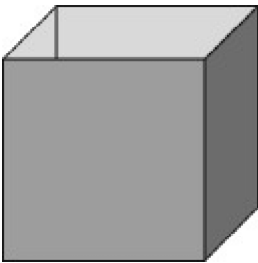
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Name: \_\_\_\_\_

ID: A

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16. Write an equivalent power to  $\frac{1}{(\sqrt[4]{x})^3}$ ?
17. Write as an entire radical:  $2.5\sqrt[3]{5}$ ?
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  - Square C has side lengths of 5.9 cm and square D has side lengths of 1.9 cm.
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  - $\frac{9^{1.6}}{27^{0.3}}$
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### Level 5-6 Questions

24. What values of  $x$  can be substituted into the equation  $y = 8^x$ ?

25. Express  $\sqrt[8]{\sqrt{197^{\frac{5}{8}}}}$  as a power with a rational exponent. Do not evaluate.
26. There are 6 bacteria in a dish at the beginning of an experiment. The number of bacteria doubles every 6 h. How many bacteria are there after 6 days? Express your answer in both exponential and simplified form.
27. A company manufactures fences for residential use. The production of fencing can be modelled using the equation  $s = 2.1\sqrt{h}$ , where  $s$  is the number of sections of fencing produced and  $h$  is the number of hours of labour.
- How many sections will be produced if a crew works a total of 170 h in a day?
  - How many more sections will be produced in 340 h per day?
  - How many hours of labour will be needed if the company wants to maintain a production rate of 28 sections per day?
28. The swing of a pendulum is affected by acceleration due to gravity. The equation  $T = 2\pi\sqrt{\frac{L}{g}}$  represents the relationship between the time it takes a pendulum that is  $L = 1.9$  m long to swing back and forth once and gravitational acceleration. In this formula,  $T$  is time, in seconds, and  $g$  is the gravitational acceleration, in metres per second per second, or metres per second squared.
- The gravitational acceleration at Earth's surface is about  $9.81 \text{ m/s}^2$ . How long would it take the pendulum to swing back and forth once at Earth's surface? Express the answer to the nearest tenth of a second.
  - The gravitational acceleration on the moon is about  $\frac{1}{6}$  of the gravitational acceleration at Earth's surface. Determine how long it would take the pendulum to swing back and forth if it were on the moon. Express the answer to the nearest tenth of a second.

### Level 7-8 Questions

29. For what value of  $x$  do  $4^x$ ,  $2^x$ , and  $\left(\frac{1}{4}\right)^x$  have the same value?

## FOMP 10 Chapter 4 Review Pack v1

### Answer Section

#### MULTIPLE CHOICE

1. ANS: B                      PTS: 1                      DIF: C                      OBJ: Section 4.3  
     NAT: AN3                    TOP: Rational Exponents                    KEY: rational exponent

#### SHORT ANSWER

1. ANS:  
 $(-3)^{-1}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2    NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent | negative exponent
2. ANS:  
 0  
 $=1-1=0$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2    NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent
3. ANS:  
 $1\frac{1}{8}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.2    NAT: AN3  
 TOP: Integral Exponents                    KEY: exponent laws | zero exponent | negative exponent
4. ANS:  
 15
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.3    NAT: AN3  
 TOP: Rational Exponents                    KEY: rational exponent
5. ANS:  
 $16^{\frac{1}{7}}$
- PTS: 1                      DIF: 1-2                      OBJ: Section 4.4    NAT: AN3  
 TOP: Irrational Numbers                    KEY: convert radical to power
6. ANS:  
 perfect square  
 $\sqrt[3]{49} = 3.66$   
 $\sqrt{49} = 7$
- PTS: 1                      DIF: 3-4                      OBJ: Section 4.1    NAT: AN1  
 TOP: Square Roots and Cube Roots                    KEY: perfect cube | perfect square | square root

7. ANS:

$$\frac{16807}{16}$$

$$\left(\frac{7}{2}\right)^5 (2)$$

$$= \frac{16807}{32} * 2$$

$$= \frac{16807}{16}$$

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: integral exponent | order of operations

8. ANS:

$$49b^2$$

$$(7b)^2 = 7^2 b^2 = 49b^2$$

PTS: 1 DIF: 3-4

TOP: Square Roots and Cube Roots

OBJ: Section 4.1 NAT: AN1

KEY: perfect square | square root | area

9. ANS:

0.5 g

PTS: 1 DIF: 3-4

TOP: Integral Exponents

OBJ: Section 4.2 NAT: AN3

KEY: negative exponent

10. ANS:

$$444^{\frac{6}{5}}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN3

KEY: convert radical to power

11. ANS:

a rational exponent

PTS: 1 DIF: 3-4

TOP: Rational Exponents

OBJ: Section 4.3 NAT: AN3

KEY: rational exponent

12. ANS:

$$\sqrt[3]{25}$$

$$= 5^{\frac{1}{3} * \frac{3}{2} * \frac{4}{3}} = 5^{\frac{2}{3}} \quad \text{or} \quad \sqrt[3]{25}$$

PTS: 1 DIF: 3-4

NAT: AN3 TOP: Rational Exponents | Irrational Numbers

OBJ: Section 4.3 | Section 4.4

KEY: exponent laws | power of a power | convert power to radical

13. ANS:

$$8\sqrt{3}$$

PTS: 1 DIF: 3-4

TOP: Irrational Numbers

OBJ: Section 4.4 NAT: AN2

KEY: convert entire radical

14. ANS:

$$9s^{\frac{9}{2}}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert radical to power

15. ANS:

$$3^5\sqrt{3}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert entire radical

16. ANS:

$$x^{-\frac{3}{4}}$$

PTS: 1                    DIF: 3-4                    OBJ: Section 3.3 | Section 4.4  
NAT: AN3                    TOP: Rational Exponents | Irrational Numbers  
KEY: negative exponent | convert radical to power

17. ANS:

$$\sqrt[3]{78.125}$$

PTS: 1                    DIF: 3-4  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2  
KEY: convert mixed radical

18. ANS:

$$\frac{1}{\sqrt[3]{t^5}}$$

PTS: 1                    DIF: 3-4                    OBJ: Section 4.3 | Section 4.4  
NAT: AN2                    TOP: Rational Exponents | Irrational Numbers  
KEY: negative exponent | convert power to radical

19. ANS:

- a) perfect square:  $41^2 = 1681$   
b) perfect square:  $42^2 = 1764$

PTS: 1                    DIF: 3-4  
TOP: Square Roots and Cube Roots

OBJ: Section 4.1    NAT: AN1  
KEY: perfect square | perfect cube

20. ANS:

- a)  $9.3^2 \text{ km}^2 + 6.4^2 \text{ km}^2 = 127.45 \text{ km}^2$   
b)  $5.9^2 \text{ cm}^2 + 1.9^2 \text{ cm}^2 = 38.42 \text{ cm}^2$

PTS: 1                    DIF: 3-4                    OBJ: Section 4.1 | Section 4.2  
NAT: AN1 | AN3    TOP: Square Roots and Cube Roots | Integral Exponents  
KEY: area | perfect square | integral exponent

21. ANS:

a) 2218.4537

b) 12.5135

c) 0.5774

PTS: 1 DIF: 3-4 OBJ: Section 4.3 NAT: AN3

TOP: Rational Exponents

KEY: exponent laws | product of powers | quotient of powers | power of a power

22. ANS:

Find the side length,  $s$ , of the square faces of the box.

$$\begin{aligned} s &= \sqrt[3]{512} \\ &= 8 \end{aligned}$$

Each face is 8 cm by 8 cm and has an area of 64 cm<sup>2</sup>.

$$(5)(64) = 320$$

The surface area of the five faces of the box is 45 cm<sup>2</sup>.

PTS: 1 DIF: 3-4 OBJ: Section 4.1 NAT: AN1

TOP: Square Roots and Cube Roots

KEY: area | volume | cube root

23. ANS:

-3

PTS: 1 DIF: 3-4

OBJ: Section 4.2 NAT: AN3

TOP: Integral Exponents

KEY: integral exponent

24. ANS:

$x$  can be any number

PTS: 1 DIF: 5-6

OBJ: Section 4.3 NAT: AN3

TOP: Rational Exponents

KEY: rational exponent

25. ANS:

$$\begin{aligned} &\frac{1}{2} * \frac{1}{8} * \frac{5}{8} = 197 \frac{5}{128} \\ &= 197 \frac{5}{128} \end{aligned}$$

PTS: 1 DIF: 5-6

OBJ: Section 4.4 NAT: AN3

TOP: Irrational Numbers

KEY: irrational number | apply radicals

26. ANS:

$$\begin{aligned} 6(2)^{4d} &= 6(2)^{4(6)} \\ &= 6(100\ 663\ 296) \\ &= 603\ 979\ 776 \end{aligned}$$

Exponential form:  $6(2)^{24}$

Simplified form: 603 979 776

There are  $6(2)^{24}$  or 603 979 776 bacteria after 6 days.

PTS: 1 DIF: 5-6

OBJ: Section 4.2 NAT: AN3

TOP: Integral Exponents

KEY: apply powers | growth



27. ANS:

a) Substitute  $h = 170$ :

$$\begin{aligned} s &= 2.1\sqrt{h} \\ &= 2.1\sqrt{170} \\ &= 27.38065 \end{aligned}$$

About 27 sections of fencing will be produced in 170 h of labour.

b) Substitute  $h = 340$ :

$$\begin{aligned} s &= 2.1\sqrt{h} \\ &= 2.1\sqrt{340} \\ &= 38.722087 \end{aligned}$$

The company will produce 39 sections using 340 h of labour. This represents an additional 12 sections.

c) Substitute  $s = 28$ .

$$\begin{aligned} s &= 2.1\sqrt{h} \\ 28 &= 2.1\sqrt{h} \\ \frac{28}{2.1} &= \sqrt{h} \end{aligned}$$

$$\begin{aligned} h &= \left(\frac{28}{2.1}\right)^2 \\ &= 177.777778 \end{aligned}$$

About 178 h of labour per day will be needed to produce 28 sections of fencing daily.

PTS: 1                      DIF: 5-6  
TOP: Irrational Numbers

OBJ: Section 4.4    NAT: AN2 | AN3  
KEY: irrational number | apply radicals

28. ANS:

$$\begin{aligned} \text{a) } T &= 2\pi\sqrt{\frac{L}{g}} \\ &= 2\pi\sqrt{\frac{1.9}{9.81}} \\ &= 2.76658253506 \end{aligned}$$

It would take about 2.8 s for the pendulum to swing back and forth once at Earth's surface.

b) On the moon:

$$\begin{aligned} g &= \frac{1}{6}(9.81) \\ &= 1.635 \\ T &= 2\pi\sqrt{\frac{L}{g}} \\ &= 2\pi\sqrt{\frac{1.9}{1.635}} \\ &= 6.773260678064 \end{aligned}$$

It would take about 6.8 s for the pendulum to swing back and forth once on the moon.

PTS: 1                      DIF: 5-6                      OBJ: Section 4.3 | Section 4.4  
 NAT: AN2 | AN3        TOP: Rational Exponents | Irrational Numbers  
 KEY: exponent laws | apply radicals

29. ANS:

$$x = 0$$

PTS: 1                      DIF: 7-8                      OBJ: Section 4.3        NAT: AN3  
 TOP: Rational Exponents                      KEY: exponent laws | zero exponent