

**Multiple Choice***Identify the choice that best completes the statement or answers the question.*

\_\_\_\_ 1. How many prime numbers are there between  $-2$  and  $18$  on the number line?

- a. 17
- b. 0
- c. 1
- d. 19
- e. 7
- f. 18

\_\_\_\_ 2. Select the correct representation of the inequality in interval notation.

$$x \leq 9$$

- a.  $[9, \infty)$
- b.  $[-\infty, 9]$
- c.  $(9, \infty)$
- d.  $(-\infty, 9]$
- e.  $(-\infty, 9)$

\_\_\_\_ 3. Simplify the expression.

$$(x^5)^4 (x^3)^3$$

- a.  $x^{15}$
- b.  $x^{29}$
- c.  $x^6$
- d.  $x^{-9}$

\_\_\_\_ 4. Simplify the expression.

$$(-14x)^0$$

Write the answer without using exponents.

- a.  $-14$
- b.  $-1$
- c.  $1$
- d.  $14$

- \_\_\_\_ 5. Simplify the expression.

$$\frac{1}{x^{-7}}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $x^7$
- b.  $\frac{1}{x^8}$
- c.  $x^8$
- d.  $\frac{1}{x^7}$

- \_\_\_\_ 6. Simplify the expression.

$$\frac{x^4 x^2}{x^3 x}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $x^4$
- b.  $x^3$
- c.  $x^2$
- d.  $x^{10}$

- \_\_\_\_ 7. Simplify the expression.

$$\frac{(8^{-2}z^{-4}y)^{-1}}{(5y^3z^{-3})^4(5yz^{-3})^{-1}}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{8z^{12}}{125y^{13}}$
- b.  $\frac{64z^{12}}{125y^{13}}$
- c.  $\frac{125y^{12}}{64z^{13}}$
- d.  $\frac{64z^{13}}{125y^{12}}$

- \_\_\_\_ 8. Simplify the expression.

$$\left( \frac{7x^{-5}y^3z^{-4}}{28x^6y^{11}z^{-9}} \right)^3$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{z^5}{4x^{11}y^8}$
- b.  $\frac{z^{15}}{64x^{24}y^{33}}$
- c.  $\frac{z^{15}}{64x^{33}y^{24}}$
- d.  $\frac{z^{15}}{64x^{-33}y^{-24}}$
- e.  $\frac{z^5}{4x^{33}y^{24}}$

- \_\_\_\_ 9. Rationalize the numerator and simplify.

$$\frac{\sqrt{5}}{20}$$

- a.  $\frac{1}{4\sqrt{3}}$
- b.  $\frac{1}{4\sqrt{5}}$
- c.  $\frac{1}{8\sqrt{3}}$
- d.  $\frac{1}{4\sqrt{9}}$
- e.  $\frac{1}{5\sqrt{5}}$

- \_\_\_\_ 10. Simplify the radical expression.

$$\sqrt[6]{8}$$

- a.  $18\sqrt{2}$
- b.  $2\sqrt[2]{200}$
- c.  $\sqrt[6]{2}$
- d.  $2\sqrt{2}$
- e.  $2\sqrt[2]{8}$

- \_\_\_\_ 11. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt[3]{3}\sqrt[2]{5} = \sqrt[6]{27}\sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

$$\frac{\sqrt[4]{2}}{\sqrt{6}}$$

- a.  $\frac{\sqrt[4]{72}}{6}$
- b.  $\frac{\sqrt[5]{72}}{6}$
- c.  $\frac{\sqrt[4]{72}}{8}$
- d.  $\frac{\sqrt[4]{72}}{2}$

- \_\_\_\_ 12. Simplify the expression.

$$-16^{3/2}$$

- a. -192
- b. 67
- c. -64
- d. -66
- e. -128
- f. -24

- \_\_\_\_ 13. Simplify the expression. Assume that all variables represent positive numbers, so that no absolute value symbols are needed.

$$\sqrt[4]{2xy^5} + y\sqrt[4]{512xy} - \sqrt[4]{2xy^5}$$

- a.  $8y\sqrt{3xy}$
- b.  $12y\sqrt{2xy}$
- c.  $4y\sqrt{4xy}$
- d.  $4y\sqrt{2xy}$

- \_\_\_\_ 14. Rationalize the denominator and simplify.

$$\frac{2}{\sqrt[3]{2}}$$

- a.  $\sqrt[3]{104}$
- b.  $\sqrt[3]{7}$
- c.  $\sqrt[4]{5}$
- d.  $\sqrt[3]{4}$
- e.  $\sqrt[6]{4}$

- \_\_\_\_ 15. Perform division and write the answer without using negative exponents.

$$\frac{-12x^6y^4z^9}{3x^9y^6z^0}$$

- a.  $\frac{4z^9}{x^3y^6}$
- b.  $\frac{-4z^4}{x^3y^2}$
- c.  $\frac{4z^9}{x^3y^2}$
- d.  $\frac{-4z^9}{x^3y^2}$

- \_\_\_\_ 16. Perform the division and write the answer without using negative exponents.

$$\frac{160x^5y^7 - 96x^2y^5 + 32xy}{4x^5y^4}$$

- a.  $24y^3 - \frac{40y}{x^3} + \frac{32}{x^4y^3}$
- b.  $40y^3 - \frac{40y}{x^4} + \frac{32}{x^4y^3}$
- c.  $24y^3 - \frac{24y}{x^3} + \frac{32}{x^4y^9}$
- d.  $40y^3 - \frac{24y}{x^3} + \frac{8}{x^4y^3}$

- \_\_\_\_ 17. Give the degree of the polynomial.

$$\sqrt{791}$$

- a. 1/2
- b. 0
- c. This is not a polynomial
- d. No defined degree

- \_\_\_\_ 18. Perform the operation and simplify.

$$-3a^2(a + 1) + 9a(a^2 - 6) - a^2(a + 6)$$

- a.  $5a^3 - 9a^2 - 54a$
- b.  $5a^3 - 9a^2 - 54$
- c.  $5a^2 + 9a^4 - 54$
- d. 0

- \_\_\_\_ 19. Multiply the expression as you would multiply polynomials.

$$(x^{17/2} + y^{7/2})^2$$

- a.  $x^{17} - 2x^{17}y^7 + y^7$
- b.  $x^{17} + x^{17}y^7 + y^7$
- c.  $x^{17} + y^7$
- d.  $x^{17} + 2x^{17/2}y^{7/2} + y^7$

- \_\_\_\_ 20. Factor the expression completely.

$$4z^2 + 28z + 49$$

- a.  $(2z + 7)^2$
- b.  $7(2z + 7)$
- c.  $(2z + 7)(2z - 7)$
- d.  $(2z - 7)^2$

- \_\_\_\_ 21. Perform the operations and simplify.

$$\frac{2a}{13} \cdot \frac{3}{5b}$$

Assume that no denominators are 0.

- a.  $\frac{3}{2}$
- b.  $\frac{13a}{b5}$
- c.  $\frac{6a}{65b}$
- d.  $\frac{2}{3}$

- \_\_\_\_ 22. Simplify the fraction.

$$\frac{xy + 6x + 9y + 54}{x^3 + 729}$$

Assume that denominator is not 0.

- a.  $\frac{y - 6}{x^2 - 9x - 81}$
- b.  $\frac{y + 9}{x^2 - 9x + 81}$
- c.  $\frac{y + 6}{x^2 - 9x + 81}$
- d.  $\frac{y - 6}{x^2 - 9x + 81}$



- \_\_\_\_ 23. Perform the operations and simplify.

$$\frac{1}{x-4} + \frac{3}{x+4} - \frac{3x-4}{x^2-16}$$

Assume that no denominators are 0.

- a.  $\frac{4}{x+4}$
- b.  $\frac{1}{x+16}$
- c.  $\frac{1}{x+4}$
- d.  $\frac{1}{x-4}$

- \_\_\_\_ 24. Simplify the complex fraction.

$$\frac{\frac{4x^2}{y^4}}{\frac{8x^3z^3}{y^2}}$$

Assume that the denominators are not 0.

- a.  $\frac{1}{2} x^{-1} y^{-2} z^{-3}$
- b.  $\frac{1}{2} x^2 y^3 z^3$
- c.  $\frac{1}{2} x^2 y^{-2} z^{-3}$
- d.  $\frac{1}{2} x^{-1} y^4 z^{-3}$

\_\_\_\_ 25. Simplify each complex fraction.

$$\frac{x + 1 - \frac{6}{x}}{x + 5 + \frac{6}{x}}$$

Assume that no denominators are 0.

a.  $\frac{x + 3}{x - 3}$

b.  $\frac{x - 2}{x + 2}$

c.  $\frac{x + 2}{x - 2}$

d.  $\frac{x - 3}{x + 3}$

## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: E  | PTS: 1 |
| 2. ANS: D  | PTS: 1 |
| 3. ANS: B  | PTS: 1 |
| 4. ANS: C  | PTS: 1 |
| 5. ANS: A  | PTS: 1 |
| 6. ANS: C  | PTS: 1 |
| 7. ANS: D  | PTS: 1 |
| 8. ANS: C  | PTS: 1 |
| 9. ANS: B  | PTS: 1 |
| 10. ANS: D | PTS: 1 |
| 11. ANS: A | PTS: 1 |
| 12. ANS: C | PTS: 1 |
| 13. ANS: D | PTS: 1 |
| 14. ANS: D | PTS: 1 |
| 15. ANS: D | PTS: 1 |
| 16. ANS: D | PTS: 1 |
| 17. ANS: B | PTS: 1 |
| 18. ANS: A | PTS: 1 |
| 19. ANS: D | PTS: 1 |
| 20. ANS: A | PTS: 1 |
| 21. ANS: C | PTS: 1 |
| 22. ANS: C | PTS: 1 |
| 23. ANS: C | PTS: 1 |
| 24. ANS: A | PTS: 1 |
| 25. ANS: B | PTS: 1 |

**Multiple Choice**

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

\_\_\_\_ 1. How many prime numbers are there between  $-6$  and  $14$  on the number line?

- a. 19
- b. 13
- c. 0
- d. 14
- e. 6
- f. 5

\_\_\_\_ 2. Select the correct representation of the inequality in interval notation.

$$x \leq 3$$

- a.  $(-\infty, 3)$
- b.  $(-\infty, 3]$
- c.  $[3, \infty)$
- d.  $[-\infty, 3]$
- e.  $(3, \infty)$

\_\_\_\_ 3. Simplify the expression.

$$(x^3)^3 (x^3)^2$$

- a.  $x^{11}$
- b.  $x^{-1}$
- c.  $x^{10}$
- d.  $x^{15}$

\_\_\_\_ 4. Simplify the expression.

$$(-13x)^0$$

Write the answer without using exponents.

- a. 1
- b. 13
- c. -13
- d. -1

- \_\_\_\_ 5. Simplify the expression.

$$\frac{1}{x^{-7}}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $x^7$
- b.  $\frac{1}{x^7}$
- c.  $x^8$
- d.  $\frac{1}{x^8}$

- \_\_\_\_ 6. Simplify the expression.

$$\frac{x^6 x^4}{x^3 x}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $x^8$
- b.  $x^7$
- c.  $x^{14}$
- d.  $x^6$

- \_\_\_\_ 7. Simplify the expression.

$$\frac{(8^{-2}z^{-5}y)^{-1}}{(5y^5z^{-1})^3(5yz^{-1})^{-2}}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

a.  $\frac{64z^6}{5y^{14}}$

b.  $\frac{5y^{14}}{64z^6}$

c.  $\frac{64z^{14}}{5y^6}$

d.  $\frac{8z^5}{5y^{15}}$

- \_\_\_\_ 8. Simplify the expression.

$$\left( \frac{8x^{-4}y^5z^{-8}}{32x^4y^{12}z^{-13}} \right)^3$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

a.  $\frac{z^5}{4x^8y^7}$

b.  $\frac{z^{15}}{64x^{24}y^{21}}$

c.  $\frac{z^{15}}{64x^{21}y^{24}}$

d.  $\frac{z^{15}}{64x^{-24}y^{-21}}$

e.  $\frac{z^5}{4x^{24}y^{21}}$

- \_\_\_\_ 9. Rationalize the numerator and simplify.

$$\frac{\sqrt{5}}{25}$$

- a.  $\frac{1}{10\sqrt{2}}$
- b.  $\frac{1}{5\sqrt{5}}$
- c.  $\frac{1}{5\sqrt{2}}$
- d.  $\frac{1}{6\sqrt{5}}$
- e.  $\frac{1}{5\sqrt{10}}$

- \_\_\_\_ 10. Simplify the radical expression.

$$\sqrt[4]{4}$$

- a.  $\sqrt[2]{4}$
- b.  $\sqrt[2]{2}$
- c.  $\sqrt[2]{200}$
- d.  $\sqrt[4]{2}$
- e.  $\sqrt[8]{2}$

- \_\_\_\_ 11. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt[3]{3}\sqrt[3]{5} = \sqrt[6]{27}\sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

$$\frac{\sqrt[6]{4}}{\sqrt{5}}$$

- a.  $\frac{\sqrt[6]{500}}{9}$
- b.  $\frac{\sqrt[6]{500}}{5}$
- c.  $\frac{\sqrt[6]{500}}{4}$
- d.  $\frac{\sqrt[7]{500}}{5}$

- \_\_\_\_ 12. Simplify the expression.

$$-25^{4/2}$$

- a. -1,250
- b. 628
- c. -1,875
- d. -625
- e. -50
- f. -627

- \_\_\_\_ 13. Simplify the expression. Assume that all variables represent positive numbers, so that no absolute value symbols are needed.

$$\sqrt[4]{2xy^5} + y\sqrt[4]{512xy} - \sqrt[4]{2xy^5}$$

- a.  $4y\sqrt{4xy}$
- b.  $4y\sqrt{2xy}$
- c.  $12y\sqrt{2xy}$
- d.  $8y\sqrt{3xy}$



- \_\_\_\_ 14. Rationalize the denominator and simplify.

$$\frac{4}{\sqrt[4]{4}}$$

- a.  $\sqrt[4]{164}$
- b.  $\sqrt[5]{65}$
- c.  $\sqrt[4]{67}$
- d.  $\sqrt[4]{64}$
- e.  $\sqrt[8]{64}$

- \_\_\_\_ 15. Perform division and write the answer without using negative exponents.

$$\frac{-190x^6y^4z^9}{19x^9y^6z^0}$$

- a.  $\frac{10z^9}{x^3y^6}$
- b.  $\frac{10z^9}{x^3y^2}$
- c.  $\frac{-10z^4}{x^3y^2}$
- d.  $\frac{-10z^9}{x^3y^2}$

- \_\_\_\_ 16. Perform the division and write the answer without using negative exponents.

$$\frac{100x^5y^7 - 60x^2y^5 + 20xy}{10x^5y^4}$$

- a.  $6y^3 - \frac{6y}{x^3} + \frac{20}{x^4y^9}$
- b.  $10y^3 - \frac{10y}{x^4} + \frac{20}{x^4y^3}$
- c.  $10y^3 - \frac{6y}{x^3} + \frac{2}{x^4y^3}$
- d.  $6y^3 - \frac{10y}{x^3} + \frac{20}{x^4y^3}$

- \_\_\_\_ 17. Give the degree of the polynomial.

$$\sqrt{576}$$

- a. 0
- b. No defined degree
- c.  $\frac{1}{2}$
- d. This is not a polynomial

- \_\_\_\_ 18. Perform the operation and simplify.

$$-3a^2(a + 1) + 6a(a^2 - 4) - a^2(a + 10)$$

- a. 0
- b.  $2a^3 - 13a^2 - 24$
- c.  $2a^3 - 13a^2 - 24a$
- d.  $2a^2 + 13a^4 - 24$

- \_\_\_\_ 19. Multiply the expression as you would multiply polynomials.

$$(x^{7/2} + y^{9/2})^2$$

- a.  $x^7 + 2x^{7/2}y^{9/2} + y^9$
- b.  $x^7 - 2x^7y^9 + y^9$
- c.  $x^7 + x^7y^9 + y^9$
- d.  $x^7 + y^9$

- \_\_\_\_ 20. Factor the expression completely.

$$36z^2 + 84z + 49$$

- a.  $(6z + 7)^2$
- b.  $(6z - 7)^2$
- c.  $(6z + 7)(6z - 7)$
- d.  $7(6z + 7)$

- \_\_\_\_ 21. Perform the operations and simplify.

$$\frac{23a}{2} \cdot \frac{11}{2b}$$

Assume that no denominators are 0.

- a.  $\frac{11}{23}$
- b.  $\frac{253a}{4b}$
- c.  $\frac{23}{11}$
- d.  $\frac{2a}{b2}$

- \_\_\_\_ 22. Simplify the fraction.

$$\frac{xy + 6x + 4y + 24}{x^3 + 64}$$

Assume that denominator is not 0.

- a.  $\frac{y - 6}{x^2 - 4x - 16}$
- b.  $\frac{y + 6}{x^2 - 4x + 16}$
- c.  $\frac{y - 6}{x^2 - 4x + 16}$
- d.  $\frac{y + 4}{x^2 - 4x + 16}$

- \_\_\_\_ 23. Perform the operations and simplify.

$$\frac{1}{x-4} + \frac{3}{x+4} - \frac{3x-4}{x^2-16}$$

Assume that no denominators are 0.

- a.  $\frac{1}{x+16}$
- b.  $\frac{1}{x+4}$
- c.  $\frac{1}{x-4}$
- d.  $\frac{4}{x+4}$

- \_\_\_\_ 24. Simplify the complex fraction.

$$\frac{\frac{3x^5}{y^2}}{\frac{6x^2z^4}{y^4}}$$

Assume that the denominators are not 0.

- a.  $\frac{1}{2} x^3 y^2 z^{-4}$
- b.  $\frac{1}{2} x^4 y^2 z^4$
- c.  $\frac{1}{2} x^5 y^2 z^{-4}$
- d.  $\frac{1}{2} x^3 y^2 z^{-4}$

\_\_\_\_ 25. Simplify each complex fraction.

$$\frac{x + 1 - \frac{6}{x}}{x + 5 + \frac{6}{x}}$$

Assume that no denominators are 0.

a.  $\frac{x - 2}{x + 2}$

b.  $\frac{x + 2}{x - 2}$

c.  $\frac{x - 3}{x + 3}$

d.  $\frac{x + 3}{x - 3}$

## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: E  | PTS: 1 |
| 2. ANS: B  | PTS: 1 |
| 3. ANS: D  | PTS: 1 |
| 4. ANS: A  | PTS: 1 |
| 5. ANS: A  | PTS: 1 |
| 6. ANS: D  | PTS: 1 |
| 7. ANS: A  | PTS: 1 |
| 8. ANS: B  | PTS: 1 |
| 9. ANS: B  | PTS: 1 |
| 10. ANS: B | PTS: 1 |
| 11. ANS: B | PTS: 1 |
| 12. ANS: D | PTS: 1 |
| 13. ANS: B | PTS: 1 |
| 14. ANS: D | PTS: 1 |
| 15. ANS: D | PTS: 1 |
| 16. ANS: C | PTS: 1 |
| 17. ANS: A | PTS: 1 |
| 18. ANS: C | PTS: 1 |
| 19. ANS: A | PTS: 1 |
| 20. ANS: A | PTS: 1 |
| 21. ANS: B | PTS: 1 |
| 22. ANS: B | PTS: 1 |
| 23. ANS: B | PTS: 1 |
| 24. ANS: A | PTS: 1 |
| 25. ANS: A | PTS: 1 |

**Multiple Choice**

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

\_\_\_\_ 1. How many prime numbers are there between  $-5$  and  $20$  on the number line?

- a. 0
- b. 4
- c. 19
- d. 24
- e. 20
- f. 8

\_\_\_\_ 2. Select the correct representation of the inequality in interval notation.

$$x \leq 7$$

- a.  $[-\infty, 7]$
- b.  $(7, \infty)$
- c.  $[7, \infty)$
- d.  $(-\infty, 7)$
- e.  $(-\infty, 7]$

\_\_\_\_ 3. Simplify the expression.

$$(x^6)^4 (x^2)^2$$

- a.  $x^{-8}$
- b.  $x^6$
- c.  $x^{14}$
- d.  $x^{28}$

\_\_\_\_ 4. Simplify the expression.

$$(-4x)^0$$

Write the answer without using exponents.

- a. 1
- b. 4
- c. -4
- d. -1

- \_\_\_\_ 5. Simplify the expression.

$$\frac{1}{x^{-8}}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $\frac{1}{x^9}$
- b.  $x^8$
- c.  $x^9$
- d.  $\frac{1}{x^8}$

- \_\_\_\_ 6. Simplify the expression.

$$\frac{x^7 x^4}{x^4 x}$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $x^{16}$
- b.  $x^6$
- c.  $x^7$
- d.  $x^8$



- \_\_\_\_ 7. Simplify the expression.

$$\frac{(8^{-2}z^{-5}y)^{-2}}{(5y^2z^{-5})^5(5yz^{-5})^{-1}}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{512z^{29}}{625y^{12}}$   
 b.  $\frac{625y^{11}}{4096z^{30}}$   
 c.  $\frac{4096z^{30}}{625y^{11}}$   
 d.  $\frac{4096z^{11}}{625y^{30}}$

- \_\_\_\_ 8. Simplify the expression.

$$\left( \frac{5x^{-5}y^5z^{-7}}{20x^6y^{10}z^{-12}} \right)^3$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{z^5}{4x^{33}y^{15}}$   
 b.  $\frac{z^{15}}{64x^{33}y^{15}}$   
 c.  $\frac{z^{15}}{64x^{15}y^{33}}$   
 d.  $\frac{z^5}{4x^{11}y^5}$   
 e.  $\frac{z^{15}}{64x^{-33}y^{-15}}$

- \_\_\_\_ 9. Rationalize the numerator and simplify.

$$\frac{\sqrt{2}}{8}$$

- a.  $\frac{1}{8\sqrt{5}}$
- b.  $\frac{1}{4\sqrt{2}}$
- c.  $\frac{1}{4\sqrt{6}}$
- d.  $\frac{1}{5\sqrt{2}}$
- e.  $\frac{1}{4\sqrt{5}}$

- \_\_\_\_ 10. Simplify the radical expression.

$$\sqrt[4]{49}$$

- a.  $\sqrt[8]{7}$
- b.  $\sqrt[2]{700}$
- c.  $\sqrt[2]{49}$
- d.  $\sqrt[4]{7}$
- e.  $\sqrt[2]{7}$

- \_\_\_\_ 11. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt[3]{3}\sqrt[3]{5} = \sqrt[6]{27}\sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

$$\frac{\sqrt[6]{4}}{\sqrt{7}}$$

- a.  $\frac{\sqrt[6]{1372}}{11}$
- b.  $\frac{\sqrt[7]{1372}}{7}$
- c.  $\frac{\sqrt[6]{1372}}{4}$
- d.  $\frac{\sqrt[6]{1372}}{7}$

- \_\_\_\_ 12. Simplify the expression.

$$-8^{4/3}$$

- a. -10.6667
- b. 19
- c. -32
- d. -48
- e. -18
- f. -16

- \_\_\_\_ 13. Simplify the expression. Assume that all variables represent positive numbers, so that no absolute value symbols are needed.

$$4\sqrt[4]{2xy^5} + y\sqrt[4]{512xy} - 4\sqrt[4]{2xy^5}$$

- a.  $12y\sqrt{2xy}$
- b.  $8y\sqrt{3xy}$
- c.  $4y\sqrt{2xy}$
- d.  $4y\sqrt{4xy}$

- \_\_\_\_ 14. Rationalize the denominator and simplify.

$$\frac{3}{\sqrt[5]{3}}$$

- a.  $\sqrt[6]{82}$
- b.  $\sqrt[5]{181}$
- c.  $\sqrt[5]{84}$
- d.  $\sqrt[10]{81}$
- e.  $\sqrt[5]{81}$

- \_\_\_\_ 15. Perform division and write the answer without using negative exponents.

$$\frac{-56x^6y^4z^9}{14x^9y^6z^0}$$

- a.  $\frac{-4z^4}{x^3y^2}$
- b.  $\frac{-4z^9}{x^3y^2}$
- c.  $\frac{4z^9}{x^3y^6}$
- d.  $\frac{4z^9}{x^3y^2}$

- \_\_\_\_ 16. Perform the division and write the answer without using negative exponents.

$$\frac{400x^5y^7 - 240x^2y^5 + 80xy}{16x^5y^4}$$

- a.  $25y^3 - \frac{15y}{x^3} + \frac{5}{x^4y^3}$
- b.  $15y^3 - \frac{15y}{x^3} + \frac{80}{x^4y^9}$
- c.  $15y^3 - \frac{25y}{x^3} + \frac{80}{x^4y^3}$
- d.  $25y^3 - \frac{25y}{x^4} + \frac{80}{x^4y^3}$

- \_\_\_\_ 17. Give the degree of the polynomial.

$$\sqrt{127}$$

- a.  $1/2$
- b. No defined degree
- c. This is not a polynomial
- d. 0

- \_\_\_\_ 18. Perform the operation and simplify.

$$-3a^2(a+1) + 7a(a^2-4) - a^2(a+9)$$

- a.  $3a^2 + 12a^4 - 28$
- b.  $3a^3 - 12a^2 - 28$
- c. 0
- d.  $3a^3 - 12a^2 - 28a$

- \_\_\_\_ 19. Multiply the expression as you would multiply polynomials.

$$(x^{11/2} + y^{15/2})^2$$

- a.  $x^{11} + 2x^{11/2}y^{15/2} + y^{15}$
- b.  $x^{11} + x^{11}y^{15} + y^{15}$
- c.  $x^{11} - 2x^{11}y^{15} + y^{15}$
- d.  $x^{11} + y^{15}$

- \_\_\_\_ 20. Factor the expression completely.

$$9z^2 + 42z + 49$$

- a.  $(3z - 7)^2$
- b.  $(3z + 7)(3z - 7)$
- c.  $7(3z + 7)$
- d.  $(3z + 7)^2$

- \_\_\_\_ 21. Perform the operations and simplify.

$$\frac{5a}{3} \cdot \frac{2}{7b}$$

Assume that no denominators are 0.

a.  $\frac{3a}{b7}$

b.  $\frac{5}{2}$

c.  $\frac{2}{5}$

d.  $\frac{10a}{21b}$

- \_\_\_\_ 22. Simplify the fraction.

$$\frac{xy + 6x + 8y + 48}{x^3 + 512}$$

Assume that denominator is not 0.

a.  $\frac{y - 6}{x^2 - 8x + 64}$

b.  $\frac{y + 8}{x^2 - 8x + 64}$

c.  $\frac{y - 6}{x^2 - 8x - 64}$

d.  $\frac{y + 6}{x^2 - 8x + 64}$

- \_\_\_\_ 23. Perform the operations and simplify.

$$\frac{1}{x-6} + \frac{3}{x+6} - \frac{3x-6}{x^2-36}$$

Assume that no denominators are 0.

- a.  $\frac{1}{x-6}$
- b.  $\frac{1}{x+36}$
- c.  $\frac{1}{x+6}$
- d.  $\frac{6}{x+6}$

- \_\_\_\_ 24. Simplify the complex fraction.

$$\frac{\frac{2x^2}{y^3}}{\frac{4x^4z^3}{y^5}}$$

Assume that the denominators are not 0.

- a.  $\frac{1}{2} x^2 y^2 z^{-3}$
- b.  $\frac{1}{2} x^{-2} y^3 z^{-3}$
- c.  $\frac{1}{2} x^{-2} y^2 z^{-3}$
- d.  $\frac{1}{2} x^5 y^4 z^3$

\_\_\_\_ 25. Simplify each complex fraction.

$$\frac{x + 2 - \frac{63}{x}}{x + 16 + \frac{63}{x}}$$

Assume that no denominators are 0.

a.  $\frac{x + 9}{x - 9}$

b.  $\frac{x - 7}{x + 7}$

c.  $\frac{x + 7}{x - 7}$

d.  $\frac{x - 9}{x + 9}$



## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: F  | PTS: 1 |
| 2. ANS: E  | PTS: 1 |
| 3. ANS: D  | PTS: 1 |
| 4. ANS: A  | PTS: 1 |
| 5. ANS: B  | PTS: 1 |
| 6. ANS: B  | PTS: 1 |
| 7. ANS: C  | PTS: 1 |
| 8. ANS: B  | PTS: 1 |
| 9. ANS: B  | PTS: 1 |
| 10. ANS: E | PTS: 1 |
| 11. ANS: D | PTS: 1 |
| 12. ANS: F | PTS: 1 |
| 13. ANS: C | PTS: 1 |
| 14. ANS: E | PTS: 1 |
| 15. ANS: B | PTS: 1 |
| 16. ANS: A | PTS: 1 |
| 17. ANS: D | PTS: 1 |
| 18. ANS: D | PTS: 1 |
| 19. ANS: A | PTS: 1 |
| 20. ANS: D | PTS: 1 |
| 21. ANS: D | PTS: 1 |
| 22. ANS: D | PTS: 1 |
| 23. ANS: C | PTS: 1 |
| 24. ANS: C | PTS: 1 |
| 25. ANS: B | PTS: 1 |

**Multiple Choice**

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

\_\_\_\_ 1. How many natural numbers are there between  $-16.5$  and  $6.5$  on the number line?

- a. 0
- b. 7
- c. 12
- d. 6
- e. 23

\_\_\_\_ 2. Identify the correct union of intervals for the inequality.

$$x \leq -16 \text{ or } x > 5$$

- a.  $(-\infty, -16] \cup (5, \infty)$
- b.  $(-\infty, -16) \cup [5, \infty)$
- c.  $(-\infty, -16) \cup (5, \infty)$
- d.  $(-\infty, -16] \cup (5, \infty]$
- e.  $(-\infty, -16] \cup [5, \infty)$

\_\_\_\_ 3. Write the expression without using absolute value symbols.

$$|x + 4| - |x - 11| \quad \text{for } x < -8$$

$$|x + 4| - |x - 11| = \underline{\hspace{2cm}} \quad \text{for } x < -8$$

- a. 15
- b.  $2x - 15$
- c. 7
- d.  $15 - 2x$
- e.  $-15$

\_\_\_\_ 4. Calculate the volume of a box that has dimensions of 6,000 by 8,600 by 4,800 millimeters.

- a.  $2.4768 \times 10^{10} \text{ mm}^3$
- b.  $2.4768 \times 10^{11} \text{ mm}^3$
- c.  $1.9975 \times 10^{10} \text{ mm}^3$
- d.  $1.9975 \times 10^{11} \text{ mm}^3$

- \_\_\_\_ 5. Simplify the expression.

$$\left( \frac{a^{-5}}{b^{-3}} \right)^{-4}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{a^{12}}{b^{20}}$
- b.  $\frac{a^{20}}{b^{12}}$
- c.  $\frac{b^{12}}{a^{20}}$
- d.  $\frac{b^{20}}{a^{12}}$

- \_\_\_\_ 6. Simplify the expression.

$$\left( \frac{r^5 r^{-1}}{r^3 r^{-3}} \right)^2$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $r^2$
- b.  $r^8$
- c.  $r^0$
- d.  $r^{12}$

- \_\_\_\_ 7. Express the number -176,000,000 in scientific notation.

- a.  $-1.76 \times 10^8$
- b.  $-1.76 \times 10^7$
- c.  $-17.6 \times 10^9$
- d.  $-1.76 \times 10^9$

- \_\_\_\_ 8. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt{3} \sqrt[3]{5} = \sqrt[6]{27} \sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

$$\sqrt{4} \sqrt[3]{4}$$

- a.  $\sqrt{1024}$
- b.  $\sqrt[6]{1024}$
- c.  $\sqrt[3]{1024}$
- d.  $\sqrt[6]{4}$
- e.  $\sqrt[6]{256}$

- \_\_\_\_ 9. Simplify the expression.

$$(9y^2)^{1/2}$$

- a.  $9|y|$
- b.  $3y$
- c.  $3y^2$
- d.  $3|y|$
- e.  $3|y^2|$

- \_\_\_\_ 10. Simplify the expression.

$$\left( -\frac{3,125x^{10}}{32y^5} \right)^{1/5}$$

- a.  $\frac{5x^2}{2y}$
- b.  $-\frac{5x^2}{2y^2}$
- c.  $\frac{5x^3}{2y}$
- d.  $-\frac{5x^2}{2y}$

- \_\_\_\_ 11. Simplify the expression.

$$\frac{a^{1/5} a^{4/5}}{a^{2/5}}$$

Write all answers without using negative exponents. Assume that all variables represent positive numbers.

- a.  $a^{3/10}$
- b.  $a^{7/5}$
- c.  $a^{3/5}$
- d.  $a^{5/5}$
- e.  $a^{3/8}$

- \_\_\_\_ 12. Perform the division.

$$x^2 + x - 1 \overline{) 13x^3 - 8x^2 - 34x + 21}$$

- a.  $13x - 23$
- b.  $13x - 21$
- c.  $13x^2 - 21$
- d.  $23 - 13x$

- \_\_\_\_ 13. Perform the operations and simplify.

$$(8x^3 - 3x^2) + (5x^3 - 3x)$$

- a.  $13x - 3x^2 - 3x^3$
- b.  $0$
- c.  $7x^3$
- d.  $13x^3 - 3x^2 - 3x$

- \_\_\_\_ 14. Perform the operation and simplify.

$$(a - 15)^2$$

- a.  $a^2 + 30a + 225$
- b.  $a^2 - 15a + 225$
- c.  $a^2 - 225$
- d.  $a^2 - 30a + 225$
- e.  $a^2 + 225$

- \_\_\_\_ 15. Multiply the expression as you would multiply polynomials.

$$(a^{11/2} + b^{3/2})(a^{11/2} - b^{3/2})$$

- a.  $a^{11} - b^3$
- b.  $(a + b)^4$
- c.  $(a - b)^7$
- d.  $a^{22} - b^6$

- \_\_\_\_ 16. Perform the multiplication and simplify.

$$(x - y)(3x + 14y)^2$$

- a.  $9x^3 + 75x^2y + 112xy^2 + 196y^3$
- b.  $9x^3 + 112x^2y + 196xy^2 + 75y^3$
- c.  $196x^3 + 112x^2y + 75xy^2 + 9y^3$
- d.  $9x^3 + 75x^2y + 112xy^2 - 196y^3$
- e.  $9x^3 - 75x^2y + 112xy^2 + 196y^3$

- \_\_\_\_ 17. Factor the expression completely.

$$10x^2 + 5x^3$$

- a.  $5x^2(2 - x)$
- b.  $5x^2(2 + x^2)$
- c.  $5x^2(3 + x)$
- d.  $5x^2(2 + x)$

- \_\_\_\_ 18. Factor the expression completely.

$$3x^3 + 3x^2 - 13x - 13$$

- a.  $(x - 1)(3x^2 + 13)$
- b.  $(1 - x)(3x^2 - 13)$
- c.  $(x + 1)(3x^2 - 13)$
- d.  $(x + 1)(13 - 3x^2)$

- \_\_\_\_ 19. Factor the expression completely.

$$64x^{10} + 1$$

- a.  $(8x^5 + 1)^2$
- b.  $(8x^5 - 1)^2$
- c.  $(8x^5 + 1)(8x^5 - 1)$
- d. The expression is prime.

- \_\_\_\_ 20. Factor the expression completely.

$$56x^2 - 29xy - 40y^2$$

- a.  $(7x - 8y)(8x + 5y)$
- b.  $(7x - 8y)(5x + 8y)$
- c.  $(5x - 8y)(8x + 7y)$
- d.  $(7x + 8y)(8x - 5y)$

- \_\_\_\_ 21. Factor the expression completely.

$$22r^2 - 13rs - 30s^2$$

- a.  $(2r - 3s)(11r + 10s)$
- b.  $(3r - 2s)(11r + 10s)$
- c.  $(2r + 3s)(11r - 10s)$
- d.  $(2r - 3s)(10r + 11s)$

- \_\_\_\_ 22. Factor the expression completely.

$$z^2 + 4z + 4 - 144y^2$$

- a.  $(z - 2 + 12y)(z + 2 + 12y)$
- b.  $(z + 2 + 12y)(z + 2 - 12y)$
- c.  $(z - 2 + 12y)(z - 2 - 12y)$
- d.  $(z + 12 + 2y)(z + 12 - 2y)$

- \_\_\_\_ 23. Factor the expression completely.

$$(4x - 4y)^3 + 125$$

- a.  $(4x + 4y - 5) \cdot (16x^2 - 20x - 32xy + 20y + 16y^2 + 25)$
- b.  $(4x - 4y + 5) \cdot (16x^2 + 20x + 32xy - 20y - 16y^2 + 25)$
- c.  $(4x + 4y - 5) \cdot (16x^2 + 20x + 32xy - 20y - 16y^2 + 25)$
- d.  $(4x - 4y + 5) \cdot (16x^2 - 20x + 32xy - 20y + 16y^2 + 25)$
- e.  $(4x - 4y + 5) \cdot (16x^2 - 20x - 32xy + 20y + 16y^2 + 25)$

- \_\_\_\_ 24. Simplify the fraction.

$$\frac{3x - 9}{x^2 - 9}$$

Assume that the denominator is not 0.

a.  $\frac{x}{x - 3}$

b.  $\frac{3}{x + 3}$

c.  $\frac{1}{x - 1}$

d.  $\frac{1}{x + 1}$

e.  $\frac{x}{x + 3}$

f.  $\frac{3}{x - 3}$

- \_\_\_\_ 25. Perform the operations and simplify.

$$\frac{x + 8}{x^2 + 11x + 24} + \frac{x}{x^2 - 9}$$

Assume that no denominators are 0.

a.  $\frac{2x - 9}{x^2 - 3}$

b.  $\frac{2x + 3}{x^2 - 9}$

c.  $\frac{2x - 3}{x^2 - 9}$

d.  $\frac{2x - 3}{x^2 + 9}$



## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: D  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: E  | PTS: 1 |
| 4. ANS: B  | PTS: 1 |
| 5. ANS: B  | PTS: 1 |
| 6. ANS: B  | PTS: 1 |
| 7. ANS: A  | PTS: 1 |
| 8. ANS: B  | PTS: 1 |
| 9. ANS: D  | PTS: 1 |
| 10. ANS: D | PTS: 1 |
| 11. ANS: C | PTS: 1 |
| 12. ANS: B | PTS: 1 |
| 13. ANS: D | PTS: 1 |
| 14. ANS: D | PTS: 1 |
| 15. ANS: A | PTS: 1 |
| 16. ANS: D | PTS: 1 |
| 17. ANS: D | PTS: 1 |
| 18. ANS: C | PTS: 1 |
| 19. ANS: D | PTS: 1 |
| 20. ANS: A | PTS: 1 |
| 21. ANS: A | PTS: 1 |
| 22. ANS: B | PTS: 1 |
| 23. ANS: E | PTS: 1 |
| 24. ANS: B | PTS: 1 |
| 25. ANS: C | PTS: 1 |

**Multiple Choice**

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

\_\_\_\_ 1. How many natural numbers are there between  $-6.5$  and  $12.5$  on the number line?

- a. 10
- b. 0
- c. 13
- d. 12
- e. 19

\_\_\_\_ 2. Identify the correct union of intervals for the inequality.

$$x \leq -18 \text{ or } x > 4$$

- a.  $(-\infty, -18] \cup (4, \infty)$
- b.  $(-\infty, -18) \cup (4, \infty)$
- c.  $(-\infty, -18] \cup (4, \infty]$
- d.  $(-\infty, -18] \cup [4, \infty)$
- e.  $(-\infty, -18) \cup [4, \infty)$

\_\_\_\_ 3. Write the expression without using absolute value symbols.

$$|x + 4| - |x - 14| \quad \text{for } x < -8$$

$$|x + 4| - |x - 14| = \underline{\hspace{2cm}} \quad \text{for } x < -8$$

- a. 10
- b.  $-18$
- c.  $2x - 18$
- d.  $18 - 2x$
- e. 18

\_\_\_\_ 4. Calculate the volume of a box that has dimensions of 4,000 by 8,400 by 5,300 millimeters.

- a.  $1.7808 \times 10^{11} \text{ mm}^3$
- b.  $1.2948 \times 10^{11} \text{ mm}^3$
- c.  $1.7808 \times 10^{10} \text{ mm}^3$
- d.  $1.2948 \times 10^{10} \text{ mm}^3$

- \_\_\_\_ 5. Simplify the expression.

$$\left( \frac{a^{-1}}{b^{-4}} \right)^{-5}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{a^{20}}{b^5}$
- b.  $\frac{b^5}{a^{20}}$
- c.  $\frac{a^5}{b^{20}}$
- d.  $\frac{b^{20}}{a^5}$

- \_\_\_\_ 6. Simplify the expression.

$$\left( \frac{r^4 r^{-2}}{r^4 r^{-4}} \right)^5$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $r^{10}$
- b.  $r^0$
- c.  $r^{30}$
- d.  $r^5$

- \_\_\_\_ 7. Express the number -174,000,000 in scientific notation.

- a.  $-1.74 \times 10^9$
- b.  $-1.74 \times 10^8$
- c.  $-17.4 \times 10^9$
- d.  $-1.74 \times 10^7$

- \_\_\_\_ 8. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt{3} \sqrt[3]{5} = \sqrt[6]{27} \sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

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

- a.  $\sqrt[6]{81}$
- b.  $\sqrt[6]{3}$
- c.  $\sqrt{243}$
- d.  $\sqrt[3]{243}$
- e.  $\sqrt[6]{243}$

- \_\_\_\_ 9. Simplify the expression.

$$(625y^4)^{1/4}$$

- a.  $5|y|$
- b.  $5|y^2|$
- c.  $25|y|$
- d.  $5y^2$
- e.  $5y$

- \_\_\_\_ 10. Simplify the expression.

$$\left( -\frac{343x^9}{125y^3} \right)^{1/3}$$

- a.  $\frac{7x^3}{5y}$
- b.  $-\frac{7x^3}{5y}$
- c.  $-\frac{7x^3}{5y^2}$
- d.  $\frac{7x^4}{5y}$

- \_\_\_\_ 11. Simplify the expression.

$$\frac{a^{3/7} a^{2/7}}{a^{1/7}}$$

Write all answers without using negative exponents. Assume that all variables represent positive numbers.

- a.  $a^{4/10}$
- b.  $a^{6/7}$
- c.  $a^{4/14}$
- d.  $a^{4/7}$
- e.  $a^{5/7}$

- \_\_\_\_ 12. Perform the division.

$$x^2 + x - 1 \overline{) 3x^3 - 2x^2 - 8x + 5}$$

- a.  $3x - 10$
- b.  $10 - 3x$
- c.  $3x^2 - 5$
- d.  $3x - 5$

- \_\_\_\_ 13. Perform the operations and simplify.

$$(7x^3 - 5x^2) + (7x^3 - 5x)$$

- a.  $14x - 5x^2 - 5x^3$
- b.  $4x^3$
- c.  $0$
- d.  $14x^3 - 5x^2 - 5x$

- \_\_\_\_ 14. Perform the operation and simplify.

$$(a - 14)^2$$

- a.  $a^2 - 28a + 196$
- b.  $a^2 - 14a + 196$
- c.  $a^2 - 196$
- d.  $a^2 + 196$
- e.  $a^2 + 28a + 196$

- \_\_\_\_ 15. Multiply the expression as you would multiply polynomials.

$$(a^{19/2} + b^{15/2})(a^{19/2} - b^{15/2})$$

- a.  $a^{19} - b^{15}$
- b.  $(a - b)^{17}$
- c.  $(a + b)^2$
- d.  $a^{38} - b^{30}$

- \_\_\_\_ 16. Perform the multiplication and simplify.

$$(x - y)(3x + 14y)^2$$

- a.  $9x^3 + 112x^2y + 196xy^2 + 75y^3$
- b.  $9x^3 + 75x^2y + 112xy^2 + 196y^3$
- c.  $196x^3 + 112x^2y + 75xy^2 + 9y^3$
- d.  $9x^3 + 75x^2y + 112xy^2 - 196y^3$
- e.  $9x^3 - 75x^2y + 112xy^2 + 196y^3$

- \_\_\_\_ 17. Factor the expression completely.

$$6x^2 + 3x^3$$

- a.  $3x^2(3 + x)$
- b.  $3x^2(2 + x)$
- c.  $3x^2(2 + x^2)$
- d.  $3x^2(2 - x)$

- \_\_\_\_ 18. Factor the expression completely.

$$8x^3 + 8x^2 - 5x - 5$$

- a.  $(x - 1)(8x^2 + 5)$
- b.  $(1 - x)(8x^2 - 5)$
- c.  $(x + 1)(8x^2 - 5)$
- d.  $(x + 1)(5 - 8x^2)$

- \_\_\_\_ 19. Factor the expression completely.

$$64x^{10} + 1$$

- a.  $(8x^5 - 1)^2$
- b. The expression is prime.
- c.  $(8x^5 + 1)^2$
- d.  $(8x^5 + 1)(8x^5 - 1)$

- \_\_\_\_ 20. Factor the expression completely.

$$30x^2 - 13xy - 56y^2$$

- a.  $(5x - 8y)(6x + 7y)$
- b.  $(5x + 8y)(6x - 7y)$
- c.  $(7x - 8y)(6x + 5y)$
- d.  $(5x - 8y)(7x + 6y)$

- \_\_\_\_ 21. Factor the expression completely.

$$4r^2 - 4rs - 35s^2$$

- a.  $(7r - 2s)(2r + 5s)$
- b.  $(2r - 7s)(2r + 5s)$
- c.  $(2r + 7s)(2r - 5s)$
- d.  $(2r - 7s)(5r + 2s)$

- \_\_\_\_ 22. Factor the expression completely.

$$z^2 + 8z + 16 - 196y^2$$

- a.  $(z - 4 + 14y)(z - 4 - 14y)$
- b.  $(z - 4 + 14y)(z + 4 + 14y)$
- c.  $(z + 14 + 4y)(z + 14 - 4y)$
- d.  $(z + 4 + 14y)(z + 4 - 14y)$

- \_\_\_\_ 23. Factor the expression completely.

$$(4x - 5y)^3 + 64$$

- a.  $(4x - 5y + 4) \cdot (16x^2 + 16x + 40xy - 20y - 25y^2 + 16)$
- b.  $(4x - 5y + 4) \cdot (16x^2 - 16x + 40xy - 20y + 25y^2 + 16)$
- c.  $(4x + 5y - 4) \cdot (16x^2 + 16x + 40xy - 20y - 25y^2 + 16)$
- d.  $(4x + 5y - 4) \cdot (16x^2 - 16x - 40xy + 20y + 25y^2 + 16)$
- e.  $(4x - 5y + 4) \cdot (16x^2 - 16x - 40xy + 20y + 25y^2 + 16)$

- \_\_\_\_ 24. Simplify the fraction.

$$\frac{7x - 49}{x^2 - 49}$$

Assume that the denominator is not 0.

- a.  $\frac{1}{x - 1}$
- b.  $\frac{7}{x + 7}$
- c.  $\frac{x}{x + 7}$
- d.  $\frac{x}{x - 7}$
- e.  $\frac{7}{x - 7}$
- f.  $\frac{1}{x + 1}$

- \_\_\_\_ 25. Perform the operations and simplify.

$$\frac{x + 6}{x^2 + 13x + 42} + \frac{x}{x^2 - 49}$$

Assume that no denominators are 0.

- a.  $\frac{2x - 49}{x^2 - 7}$
- b.  $\frac{2x - 7}{x^2 - 49}$
- c.  $\frac{2x - 7}{x^2 + 49}$
- d.  $\frac{2x + 7}{x^2 - 49}$



## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: D  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: B  | PTS: 1 |
| 4. ANS: A  | PTS: 1 |
| 5. ANS: C  | PTS: 1 |
| 6. ANS: A  | PTS: 1 |
| 7. ANS: B  | PTS: 1 |
| 8. ANS: E  | PTS: 1 |
| 9. ANS: A  | PTS: 1 |
| 10. ANS: B | PTS: 1 |
| 11. ANS: D | PTS: 1 |
| 12. ANS: D | PTS: 1 |
| 13. ANS: D | PTS: 1 |
| 14. ANS: A | PTS: 1 |
| 15. ANS: A | PTS: 1 |
| 16. ANS: D | PTS: 1 |
| 17. ANS: B | PTS: 1 |
| 18. ANS: C | PTS: 1 |
| 19. ANS: B | PTS: 1 |
| 20. ANS: A | PTS: 1 |
| 21. ANS: B | PTS: 1 |
| 22. ANS: D | PTS: 1 |
| 23. ANS: E | PTS: 1 |
| 24. ANS: B | PTS: 1 |
| 25. ANS: B | PTS: 1 |

**Multiple Choice**

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

\_\_\_\_ 1. How many natural numbers are there between  $-12.5$  and  $6.5$  on the number line?

- a. 0
- b. 19
- c. 6
- d. 10
- e. 7

\_\_\_\_ 2. Identify the correct union of intervals for the inequality.

$$x \leq -14 \text{ or } x > 10$$

- a.  $(-\infty, -14] \cup (10, \infty)$
- b.  $(-\infty, -14) \cup [10, \infty)$
- c.  $(-\infty, -14] \cup [10, \infty)$
- d.  $(-\infty, -14) \cup (10, \infty)$
- e.  $(-\infty, -14] \cup (10, \infty]$

\_\_\_\_ 3. Write the expression without using absolute value symbols.

$$|x + 9| - |x - 13| \quad \text{for } x < -13$$

$$|x + 9| - |x - 13| = \underline{\hspace{2cm}} \quad \text{for } x < -13$$

- a.  $2x - 22$
- b.  $22$
- c.  $4$
- d.  $22 - 2x$
- e.  $-22$

\_\_\_\_ 4. Calculate the volume of a box that has dimensions of 6,000 by 9,300 by 4,300 millimeters.

- a.  $2.3994 \times 10^{11} \text{ mm}^3$
- b.  $1.932 \times 10^{11} \text{ mm}^3$
- c.  $1.932 \times 10^{10} \text{ mm}^3$
- d.  $2.3994 \times 10^{10} \text{ mm}^3$

- \_\_\_\_ 5. Simplify the expression.

$$\left( \frac{a^{-2}}{b^{-4}} \right)^{-5}$$

Write the answer without using negative exponents. Assume that all variables are restricted to those numbers for which the expression is defined.

- a.  $\frac{b^{10}}{a^{20}}$
- b.  $\frac{b^{20}}{a^{10}}$
- c.  $\frac{a^{20}}{b^{10}}$
- d.  $\frac{a^{10}}{b^{20}}$

- \_\_\_\_ 6. Simplify the expression.

$$\left( \frac{r^5 r^{-1}}{r^6 r^{-6}} \right)^4$$

Write the answer without using negative exponents. Assume that the variable is restricted to those numbers for which the expression is defined.

- a.  $r^4$
- b.  $r^{24}$
- c.  $r^0$
- d.  $r^{16}$

- \_\_\_\_ 7. Express the number -187,000,000 in scientific notation.

- a.  $-1.87 \times 10^8$
- b.  $-1.87 \times 10^7$
- c.  $-1.87 \times 10^9$
- d.  $-18.7 \times 10^9$

- \_\_\_\_ 8. We can often multiply and divide radicals with different indexes. For example:

$$\sqrt{3} \sqrt[3]{5} = \sqrt[6]{27} \sqrt[6]{25} = \sqrt[6]{(27)(25)} = \sqrt[6]{675}$$

Use this idea to write the following expression as a single radical.

$$\sqrt{5} \sqrt[3]{5}$$

- a.  $\sqrt[3]{3125}$
  - b.  $\sqrt[6]{5}$
  - c.  $\sqrt[6]{3125}$
  - d.  $\sqrt{3125}$
  - e.  $\sqrt[6]{625}$
- \_\_\_\_ 9. Simplify the expression.

$$(625y^4)^{1/4}$$

- a.  $5|y|$
  - b.  $25|y|$
  - c.  $5|y^2|$
  - d.  $5y$
  - e.  $5y^2$
- \_\_\_\_ 10. Simplify the expression.

$$\left( -\frac{3,125x^{10}}{32y^5} \right)^{1/5}$$

- a.  $-\frac{5x^2}{2y^2}$
- b.  $\frac{5x^3}{2y}$
- c.  $-\frac{5x^2}{2y}$
- d.  $\frac{5x^2}{2y}$

- \_\_\_\_ 11. Simplify the expression.

$$\frac{a^{2/5} a^{2/5}}{a^{1/5}}$$

Write all answers without using negative exponents. Assume that all variables represent positive numbers.

- a.  $a^{3/5}$
- b.  $a^{4/5}$
- c.  $a^{5/5}$
- d.  $a^{3/10}$
- e.  $a^{3/8}$

- \_\_\_\_ 12. Perform the division.

$$x^2 + x - 1 \overline{) 11x^3 - 2x^2 - 24x + 13}$$

- a.  $11x - 13$
- b.  $11x - 15$
- c.  $15 - 11x$
- d.  $11x^2 - 13$

- \_\_\_\_ 13. Perform the operations and simplify.

$$(5x^3 - 6x^2) + (9x^3 - 3x)$$

- a.  $14x - 6x^2 - 3x^3$
- b.  $5x^3$
- c.  $0$
- d.  $14x^3 - 6x^2 - 3x$

- \_\_\_\_ 14. Perform the operation and simplify.

$$(a - 8)^2$$

- a.  $a^2 - 8a + 64$
- b.  $a^2 - 16a + 64$
- c.  $a^2 - 64$
- d.  $a^2 + 64$
- e.  $a^2 + 16a + 64$

- \_\_\_\_ 15. Multiply the expression as you would multiply polynomials.

$$(a^{19/2} + b^{9/2})(a^{19/2} - b^{9/2})$$

- a.  $(a - b)^{14}$
- b.  $a^{38} - b^{18}$
- c.  $(a + b)^5$
- d.  $a^{19} - b^9$

- \_\_\_\_ 16. Perform the multiplication and simplify.

$$(x - y)(4x + 14y)^2$$

- a.  $16x^3 + 84x^2y + 196xy^2 + 96y^3$
- b.  $16x^3 + 96x^2y + 84xy^2 + 196y^3$
- c.  $16x^3 + 96x^2y + 84xy^2 - 196y^3$
- d.  $196x^3 + 84x^2y + 96xy^2 + 16y^3$
- e.  $16x^3 - 96x^2y + 84xy^2 + 196y^3$

- \_\_\_\_ 17. Factor the expression completely.

$$6x^2 + 3x^3$$

- a.  $3x^2(2 - x)$
- b.  $3x^2(2 + x)$
- c.  $3x^2(3 + x)$
- d.  $3x^2(2 + x^2)$

- \_\_\_\_ 18. Factor the expression completely.

$$4x^3 + 4x^2 - 7x - 7$$

- a.  $(1 - x)(4x^2 - 7)$
- b.  $(x - 1)(4x^2 + 7)$
- c.  $(x + 1)(7 - 4x^2)$
- d.  $(x + 1)(4x^2 - 7)$

- \_\_\_\_ 19. Factor the expression completely.

$$25x^8 + 1$$

- a. The expression is prime.
- b.  $(5x^4 + 1)^2$
- c.  $(5x^4 - 1)^2$
- d.  $(5x^4 + 1)(5x^4 - 1)$

- \_\_\_\_ 20. Factor the expression completely.

$$30x^2 - 13xy - 56y^2$$

- a.  $(7x - 8y)(6x + 5y)$
- b.  $(5x - 8y)(7x + 6y)$
- c.  $(5x - 8y)(6x + 7y)$
- d.  $(5x + 8y)(6x - 7y)$

- \_\_\_\_ 21. Factor the expression completely.

$$8r^2 - 16rs - 90s^2$$

- a.  $(2r + 9s)(4r - 10s)$
- b.  $(9r - 2s)(4r + 10s)$
- c.  $(2r - 9s)(4r + 10s)$
- d.  $(2r - 9s)(10r + 4s)$

- \_\_\_\_ 22. Factor the expression completely.

$$z^2 + 6z + 9 - 36y^2$$

- a.  $(z + 6 + 3y)(z + 6 - 3y)$
- b.  $(z - 3 + 6y)(z + 3 + 6y)$
- c.  $(z + 3 + 6y)(z + 3 - 6y)$
- d.  $(z - 3 + 6y)(z - 3 - 6y)$

- \_\_\_\_ 23. Factor the expression completely.

$$(2x - 5y)^3 + 125$$

- a.  $(2x - 5y + 5) \cdot (4x^2 - 10x - 20xy + 25y + 25y^2 + 25)$
- b.  $(2x - 5y + 5) \cdot (4x^2 - 10x + 20xy - 25y + 25y^2 + 25)$
- c.  $(2x - 5y + 5) \cdot (4x^2 + 10x + 20xy - 25y - 25y^2 + 25)$
- d.  $(2x + 5y - 5) \cdot (4x^2 + 10x + 20xy - 25y - 25y^2 + 25)$
- e.  $(2x + 5y - 5) \cdot (4x^2 - 10x - 20xy + 25y + 25y^2 + 25)$

- \_\_\_\_ 24. Simplify the fraction.

$$\frac{8x - 64}{x^2 - 64}$$

Assume that the denominator is not 0.

a.  $\frac{x}{x - 8}$

b.  $\frac{8}{x + 8}$

c.  $\frac{1}{x - 1}$

d.  $\frac{1}{x + 1}$

e.  $\frac{8}{x - 8}$

f.  $\frac{x}{x + 8}$

- \_\_\_\_ 25. Perform the operations and simplify.

$$\frac{x + 3}{x^2 + 9x + 18} + \frac{x}{x^2 - 36}$$

Assume that no denominators are 0.

a.  $\frac{2x - 6}{x^2 + 36}$

b.  $\frac{2x - 36}{x^2 - 6}$

c.  $\frac{2x + 6}{x^2 - 36}$

d.  $\frac{2x - 6}{x^2 - 36}$



## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: C  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: E  | PTS: 1 |
| 4. ANS: A  | PTS: 1 |
| 5. ANS: D  | PTS: 1 |
| 6. ANS: D  | PTS: 1 |
| 7. ANS: A  | PTS: 1 |
| 8. ANS: C  | PTS: 1 |
| 9. ANS: A  | PTS: 1 |
| 10. ANS: C | PTS: 1 |
| 11. ANS: A | PTS: 1 |
| 12. ANS: A | PTS: 1 |
| 13. ANS: D | PTS: 1 |
| 14. ANS: B | PTS: 1 |
| 15. ANS: D | PTS: 1 |
| 16. ANS: C | PTS: 1 |
| 17. ANS: B | PTS: 1 |
| 18. ANS: D | PTS: 1 |
| 19. ANS: A | PTS: 1 |
| 20. ANS: C | PTS: 1 |
| 21. ANS: C | PTS: 1 |
| 22. ANS: C | PTS: 1 |
| 23. ANS: A | PTS: 1 |
| 24. ANS: B | PTS: 1 |
| 25. ANS: D | PTS: 1 |

**Multiple Choice**

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

- \_\_\_\_ 1.  $x$  represents a real number. Find any restrictions on  $x$ .

$$x + 2 = 5$$

- a.  $(0, \infty)$
- b. 0
- c.  $x \geq -3$
- d.  $(-\infty, 2)$
- e. no restrictions

- \_\_\_\_ 2. Solve the equation.

$$4x + 8 = 36$$

- a.  $x = 7$
- b.  $x = 11$
- c.  $x = 15$
- d.  $x = -11$
- e.  $x = 1$

- \_\_\_\_ 3. Solve the equation

$$\frac{9}{x-4} = 1$$

- a.  $x = 5$
- b.  $x = 13$
- c.  $x = 16$
- d.  $x = -16$
- e.  $x = -13$

- \_\_\_\_ 4. Juan scored 10 points higher on his midterm and 26 points higher on his final than he did on his first exam. If his mean (average) score was 45, what was his score on the first exam?

- a. 32
- b. 40
- c. 33
- d. 31
- e. 35

- \_\_\_\_ 5. One morning, John drove 6 hours before stopping to eat. After lunch, he increased his speed by 10 mph. If he completed a 390-mile trip in 9 hours of driving time, how fast did he drive in the morning?

- a. 36 mph
- b. 40 mph
- c. 48 mph
- d. 33 mph
- e. 43 mph

- \_\_\_\_ 6. Jake can wash a car in 40 minutes, while Harold can wash the same car in 50 minutes. How long will it take them to wash the car if they work together?

- a. 40 minutes
- b.  $\frac{9}{200}$  minutes
- c. 10 minutes
- d. 30 minutes
- e.  $\frac{200}{9}$  minutes

- \_\_\_\_ 7. Solve the equation  $x^2 - 12x - 45 = 0$  by completing the square.

- a.  $x = -3, x = 6$
- b.  $x = 3, x = -15$
- c.  $x = 9, x = 15$
- d.  $x = -3, x = 15$
- e.  $x = 6, x = 3$

- \_\_\_\_ 8. Solve the formula

$$\frac{x^2}{g^2} + \frac{y^2}{e^2} = 1; y$$

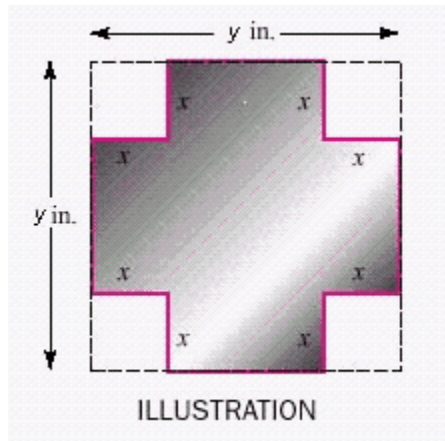
for the indicated variable.

- a.  $y = e \sqrt{\left(1 - \frac{x}{g}\right)\left(1 + \frac{x}{g}\right)}, y = -e \sqrt{\left(1 - \frac{x}{g}\right)\left(1 + \frac{x}{g}\right)}$
- b.  $y = \sqrt{e(1 - xg)(1 + xg)}, y = -\sqrt{e(1 - xg)(1 + xg)}$
- c.  $y = \sqrt{e\left(1 - \frac{x}{g}\right)^2}, y = -\sqrt{e\left(1 - \frac{x}{g}\right)^2}$
- d.  $y = e \sqrt{\left(a - \frac{x}{g}\right)\left(a + \frac{x}{g}\right)}, y = -e \sqrt{\left(a - \frac{x}{g}\right)\left(a + \frac{x}{g}\right)}$
- e.  $y = \sqrt{e(2 - xg)(1 + xg)}, y = -\sqrt{e(2 - xg)(1 + xg)}$

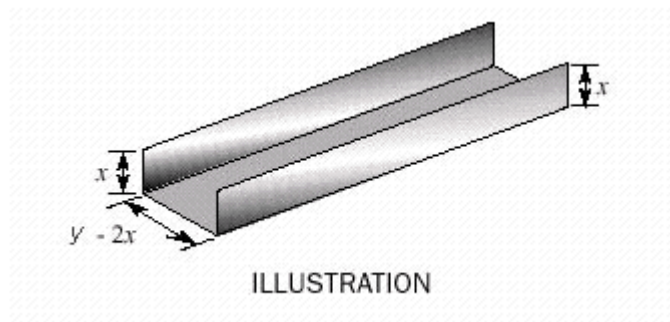
- \_\_\_\_ 9. Does the equation  $6.269x^2 - 3.015x + 3.445 = 0$  have any roots that are real numbers?

- a. no
- b. yes

10. A piece of tin,  $y = 16$  inches on a side, is to have four equal squares cut from its corners, as in the illustration. If the edges are then to be folded up to make a box with a floor area of 16 square inches, find the depth of the box.



- a. 11 in  
b. 13 in  
c. 6 in  
d. 12 in  
e. 9 in
11. A piece of sheet metal, 16 inches wide, is bent to form the gutter shown in the illustration. If the cross-sectional area is 32 square inches, find the depth of the gutter.



- a. 5 in  
b. 6 in  
c. 7 in  
d. 4 in
12. A hose can fill a swimming pool in 18 hours. Another hose needs 3 more hours to fill the pool than the two hoses combined. How long would it take the second hose to fill the pool?
- a. 9 hours  
b. 14 hours  
c. 18 hours  
d. 6 hours  
e. 12 hours

- \_\_\_\_ 13. Simplify the expression.

$$i^{14}$$

- a. -6
- b.  $-i$
- c. -1
- d.  $i$
- e. 1

- \_\_\_\_ 14. Simplify the expression.

$$i^{-26}$$

- a.  $-i$
- b.  $-3i$
- c. -1
- d. 1
- e.  $i$

- \_\_\_\_ 15. Find the values of  $x$  and  $y$ .

$$x + 89i = y - yi$$

- a.  $x = 89, y = 89$
- b.  $x = 89, y = 178$
- c.  $x = -89, y = -89$
- d.  $x = 89, y = -89$
- e.  $x = -89, y = 89$

- \_\_\_\_ 16. Do the operation and express the answer in  $a + bi$  form.

$$\frac{4 + i}{8 - i\sqrt{3}}$$

- a.  $\frac{67 + \sqrt{3}}{67} - \frac{8 + 4\sqrt{3}}{67}i$
- b.  $\frac{32 + \sqrt{3}}{67} + \frac{8 - 4\sqrt{3}}{1}i$
- c.  $\frac{67 - \sqrt{3}}{67} - \frac{8 - 4\sqrt{3}}{67}i$
- d.  $\frac{32 - \sqrt{3}}{67} + \frac{8 + 4\sqrt{3}}{67}i$
- e.  $\frac{32 - \sqrt{3}}{67} - \frac{8 - 4\sqrt{3}}{33}i$

- \_\_\_\_ 17. Factor the expression over the set of complex numbers

$$9a^2 + 16$$

- a.  $(-3a + 4i)(-3a + 4i)$
- b.  $(3a + 4i)(3a - 4i)$
- c.  $(3a + 4)(3a - 4)$
- d.  $(3 + 4i)(3 - 4i)$
- e.  $(3a + 4i)(3a + 4i)$

- \_\_\_\_ 18. In electronics, the formula  $V = IR$  is called **Ohm's law**. It gives the relationship in a circuit between the voltage  $V$  (in volts), the current  $I$  (in amperes), and the resistance  $R$  (in ohms).

Find  $V$  when  $I = 8 - 7i$  amperes and  $R = 2 + 8i$  ohms.

- a.  $V = i$  volts
- b.  $V = 72 + 78i$  volts
- c.  $V = 72$  volts
- d.  $V = 78$  volts
- e.  $V = 72 + 50i$  volts

- \_\_\_\_ 19. Solve the inequality.

$$2x - 13 < -7$$

- a.  $(3, \infty)$
- b.  $[3, \infty)$
- c.  $(-3, \infty)$
- d.  $(-\infty, 3)$
- e.  $(-\infty, 3]$

- \_\_\_\_ 20. Solve the inequality.

$$\frac{12(x - 8)}{5} \geq \frac{6(x + 4)}{4}$$

- a.  $(-28, \infty)$
- b.  $(28, \infty)$
- c.  $[-28, \infty)$
- d.  $[28, \infty)$
- e. none of the above

\_\_\_\_ 21. Solve the inequality.

$$\frac{4}{x} > 2$$

- a.  $(0, 2]$
- b.  $(0, 2)$
- c.  $[0, 2]$
- d.  $(-\infty, 2)$
- e.  $[0, 2)$

\_\_\_\_ 22. Express the relationship  $4 < C < 18$  in terms of  $F$ , if  $F = \frac{3}{2}C + 17$ .

- a.  $24 < F < 45$
- b.  $22 < F < 43$
- c.  $21 < F < 42$
- d.  $27 < F < 40$
- e.  $23 < F < 44$

\_\_\_\_ 23. Solve the inequality. Express the solution set in interval notation.

$$|3x - 2| < 5$$

- a.  $(3, 7)$
- b.  $(-1, \frac{3}{7})$
- c.  $(-1, \frac{7}{3})$
- d.  $(1, \frac{7}{3})$
- e.  $(-\infty, -\frac{7}{3}) \cup (-1, \infty)$

\_\_\_\_ 24. Solve the inequality. Express the solution set in interval notation.

$$0 < |4x + 7| < 11$$

- a.  $(-\frac{7}{4}, 1)$
- b.  $(-\infty, -\frac{7}{4}) \cup (1, \infty)$
- c.  $(-\frac{9}{2}, -\frac{7}{4})$
- d.  $(-\infty, -1) \cup (\frac{7}{4}, \infty)$
- e.  $(-\frac{9}{2}, -\frac{7}{4}) \cup (-\frac{7}{4}, 1)$

\_\_\_\_ 25. Solve the inequality. Express the solution set in interval notation.

$$5 < \left| \frac{x-14}{3} \right| < 8$$

- a.  $(-38, -29) \cup (1, 10)$
- b.  $(-10, 1) \cup (29, 38)$
- c.  $(-10, -1) \cup (29, 38)$
- d.  $(-1, 29)$
- e. none of the above



## Answer Section

### MULTIPLE CHOICE

- |            |        |
|------------|--------|
| 1. ANS: E  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: B  | PTS: 1 |
| 4. ANS: C  | PTS: 1 |
| 5. ANS: B  | PTS: 1 |
| 6. ANS: E  | PTS: 1 |
| 7. ANS: D  | PTS: 1 |
| 8. ANS: A  | PTS: 1 |
| 9. ANS: A  | PTS: 1 |
| 10. ANS: C | PTS: 1 |
| 11. ANS: D | PTS: 1 |
| 12. ANS: A | PTS: 1 |
| 13. ANS: C | PTS: 1 |
| 14. ANS: C | PTS: 1 |
| 15. ANS: C | PTS: 1 |
| 16. ANS: D | PTS: 1 |
| 17. ANS: B | PTS: 1 |
| 18. ANS: E | PTS: 1 |
| 19. ANS: D | PTS: 1 |
| 20. ANS: D | PTS: 1 |
| 21. ANS: B | PTS: 1 |
| 22. ANS: E | PTS: 1 |
| 23. ANS: C | PTS: 1 |
| 24. ANS: E | PTS: 1 |
| 25. ANS: C | PTS: 1 |

**Multiple Choice**

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

- \_\_\_\_ 1.  $x$  represents a real number. Find any restrictions on  $x$ .

$$x + 1 = 8$$

- a. no restrictions
- b.  $x \geq -3$
- c. 0
- d.  $(-\infty, 1)$
- e.  $(0, \infty)$

- \_\_\_\_ 2. Solve the equation.

$$2x + 6 = 22$$

- a.  $x = 8$
- b.  $x = 18$
- c.  $x = 2$
- d.  $x = 14$
- e.  $x = -14$

- \_\_\_\_ 3. Solve the equation

$$\frac{6}{x-4} = 1$$

- a.  $x = 10$
- b.  $x = -10$
- c.  $x = 2$
- d.  $x = -13$
- e.  $x = 13$

- \_\_\_\_ 4. Juan scored 4 points higher on his midterm and 2 points higher on his final than he did on his first exam. If his mean (average) score was 138, what was his score on the first exam?

- a. 134
- b. 138
- c. 136
- d. 135
- e. 143

- \_\_\_\_ 5. One morning, John drove 6 hours before stopping to eat. After lunch, he increased his speed by 10 mph. If he completed a 390-mile trip in 9 hours of driving time, how fast did he drive in the morning?

- a. 33 mph
- b. 36 mph
- c. 48 mph
- d. 43 mph
- e. 40 mph

\_\_\_\_ 6. Jake can wash a car in 25 minutes, while Harold can wash the same car in 30 minutes. How long will it take them to wash the car if they work together?

- a.  $\frac{150}{11}$  minutes
- b. 5 minutes
- c. 20 minutes
- d.  $\frac{11}{150}$  minutes
- e. 25 minutes

\_\_\_\_ 7. Solve the equation  $x^2 - 12x - 45 = 0$  by completing the square.

- a.  $x = 6, x = 10$
- b.  $x = 3, x = -15$
- c.  $x = 9, x = 15$
- d.  $x = -3, x = 15$
- e.  $x = -3, x = 6$

\_\_\_\_ 8. Solve the formula

$$\frac{x^2}{d^2} + \frac{y^2}{n^2} = 1; y$$

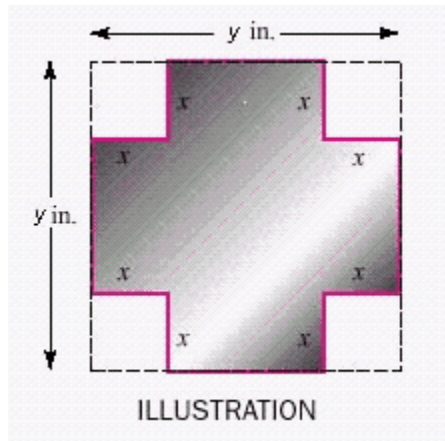
for the indicated variable.

- a.  $y = \sqrt{n(2 - xd)(1 + xd)}, y = -\sqrt{n(2 - xd)(1 + xd)}$
- b.  $y = \sqrt{n(1 - xd)(1 + xd)}, y = -\sqrt{n(1 - xd)(1 + xd)}$
- c.  $y = n \sqrt{\left(1 - \frac{x}{d}\right)\left(1 + \frac{x}{d}\right)}, y = -n \sqrt{\left(1 - \frac{x}{d}\right)\left(1 + \frac{x}{d}\right)}$
- d.  $y = \sqrt{n\left(1 - \frac{x}{d}\right)^2}, y = -\sqrt{n\left(1 - \frac{x}{d}\right)^2}$
- e.  $y = n \sqrt{\left(a - \frac{x}{d}\right)\left(a + \frac{x}{d}\right)}, y = -n \sqrt{\left(a - \frac{x}{d}\right)\left(a + \frac{x}{d}\right)}$

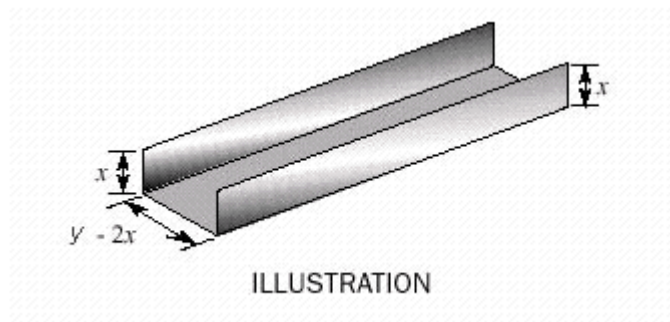
\_\_\_\_ 9. Does the equation  $6.356x^2 - 8.036x + 1.688 = 0$  have any roots that are real numbers?

- a. yes
- b. no

10. A piece of tin,  $y = 12$  inches on a side, is to have four equal squares cut from its corners, as in the illustration. If the edges are then to be folded up to make a box with a floor area of 16 square inches, find the depth of the box.



- a. 9 in
  - b. 4 in
  - c. 8 in
  - d. 7 in
  - e. 11 in
11. A piece of sheet metal, 9 inches wide, is bent to form the gutter shown in the illustration. If the cross-sectional area is 10 square inches, find the depth of the gutter.



- a. 2 in
  - b. 3 in
  - c. 5 in
  - d. 4 in
12. A hose can fill a swimming pool in 12 hours. Another hose needs 2 more hours to fill the pool than the two hoses combined. How long would it take the second hose to fill the pool?
- a. 4 hours
  - b. 12 hours
  - c. 10 hours
  - d. 6 hours
  - e. 8 hours

- \_\_\_\_ 13. Simplify the expression.

$$i^{34}$$

- a. 1
- b.  $i$
- c.  $-i$
- d. -6
- e. -1

- \_\_\_\_ 14. Simplify the expression.

$$i^{-26}$$

- a.  $i$
- b. 1
- c.  $-i$
- d.  $-3i$
- e. -1

- \_\_\_\_ 15. Find the values of  $x$  and  $y$ .

$$x + 62i = y - yi$$

- a.  $x = 62, y = 62$
- b.  $x = 62, y = -62$
- c.  $x = -62, y = -62$
- d.  $x = 62, y = 124$
- e.  $x = -62, y = 62$

- \_\_\_\_ 16. Do the operation and express the answer in  $a + bi$  form.

$$\frac{3+i}{5-i\sqrt{7}}$$

- a.  $\frac{15 + \sqrt{7}}{32} + \frac{5 - 3\sqrt{7}}{1}i$
- b.  $\frac{32 + \sqrt{7}}{32} - \frac{5 + 3\sqrt{7}}{32}i$
- c.  $\frac{15 - \sqrt{7}}{32} + \frac{5 + 3\sqrt{7}}{32}i$
- d.  $\frac{32 - \sqrt{7}}{32} - \frac{5 - 3\sqrt{7}}{32}i$
- e.  $\frac{15 - \sqrt{7}}{32} - \frac{5 - 3\sqrt{7}}{16}i$

- \_\_\_\_ 17. Factor the expression over the set of complex numbers

$$4a^2 + 9$$

- a.  $(2 + 3i)(2 - 3i)$
- b.  $(2a + 3)(2a - 3)$
- c.  $(-2a + 3i)(-2a + 3i)$
- d.  $(2a + 3i)(2a - 3i)$
- e.  $(2a + 3i)(2a + 3i)$

- \_\_\_\_ 18. In electronics, the formula  $V = IR$  is called **Ohm's law**. It gives the relationship in a circuit between the voltage  $V$  (in volts), the current  $I$  (in amperes), and the resistance  $R$  (in ohms).

Find  $V$  when  $I = 5 - 2i$  amperes and  $R = 6 + 9i$  ohms.

- a.  $V = 57$  volts
- b.  $V = 48 + 57i$  volts
- c.  $V = 48 + 33i$  volts
- d.  $V = 48$  volts
- e.  $V = i$  volts

- \_\_\_\_ 19. Solve the inequality.

$$2x - 13 < -1$$

- a.  $(-\infty, 6)$
- b.  $(-6, \infty)$
- c.  $[6, \infty)$
- d.  $(6, \infty)$
- e.  $(-\infty, 6]$

- \_\_\_\_ 20. Solve the inequality.

$$\frac{18(x - 8)}{5} \geq \frac{9(x + 4)}{4}$$

- a. none of the above
- b.  $(28, \infty)$
- c.  $[-28, \infty)$
- d.  $(-28, \infty)$
- e.  $[28, \infty)$

\_\_\_\_ 21. Solve the inequality.

$$\frac{4}{x} > 2$$

- a.  $(0, 2]$
- b.  $(-\infty, 2)$
- c.  $[0, 2]$
- d.  $(0, 2)$
- e.  $[0, 2)$

\_\_\_\_ 22. Express the relationship  $6 < C < 16$  in terms of  $F$ , if  $F = \frac{9}{2}C + 17$ .

- a.  $42 < F < 87$
- b.  $45 < F < 90$
- c.  $44 < F < 89$
- d.  $43 < F < 88$
- e.  $48 < F < 85$

\_\_\_\_ 23. Solve the inequality. Express the solution set in interval notation.

$$|3x - 4| < 7$$

- a.  $(-1, \frac{11}{3})$
- b.  $(-1, \frac{3}{11})$
- c.  $(1, \frac{11}{3})$
- d.  $(3, 11)$
- e.  $(-\infty, -\frac{11}{3}) \cup (-1, \infty)$

\_\_\_\_ 24. Solve the inequality. Express the solution set in interval notation.

$$0 < |4x + 3| < 7$$

- a.  $(-\frac{5}{2}, -\frac{3}{4})$
- b.  $(-\frac{5}{2}, -\frac{3}{4}) \cup (-\frac{3}{4}, 1)$
- c.  $(-\frac{3}{4}, 1)$
- d.  $(-\infty, -\frac{3}{4}) \cup (1, \infty)$
- e.  $(-\infty, -1) \cup (\frac{3}{4}, \infty)$

\_\_\_\_ 25. Solve the inequality. Express the solution set in interval notation.

$$8 < \left| \frac{x-23}{3} \right| < 10$$

- a.  $(-7, -1) \cup (47, 53)$
- b.  $(-53, -47) \cup (1, 7)$
- c.  $(-1, 47)$
- d. none of the above
- e.  $(-7, 1) \cup (47, 53)$



**Answer Section**

**MULTIPLE CHOICE**

- |            |        |
|------------|--------|
| 1. ANS: A  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: A  | PTS: 1 |
| 4. ANS: C  | PTS: 1 |
| 5. ANS: E  | PTS: 1 |
| 6. ANS: A  | PTS: 1 |
| 7. ANS: D  | PTS: 1 |
| 8. ANS: C  | PTS: 1 |
| 9. ANS: A  | PTS: 1 |
| 10. ANS: B | PTS: 1 |
| 11. ANS: A | PTS: 1 |
| 12. ANS: D | PTS: 1 |
| 13. ANS: E | PTS: 1 |
| 14. ANS: E | PTS: 1 |
| 15. ANS: C | PTS: 1 |
| 16. ANS: C | PTS: 1 |
| 17. ANS: D | PTS: 1 |
| 18. ANS: C | PTS: 1 |
| 19. ANS: A | PTS: 1 |
| 20. ANS: E | PTS: 1 |
| 21. ANS: D | PTS: 1 |
| 22. ANS: C | PTS: 1 |
| 23. ANS: A | PTS: 1 |
| 24. ANS: B | PTS: 1 |
| 25. ANS: A | PTS: 1 |