NAME:

Unit 1 Test (Lessons 1–10)

1) Sara and Liz are going grocery shopping for a family party.

A) It takes Sara 50 minutes to shop and Liz 75 minutes using the same list. How quickly will Sara and Liz be able to complete their grocery trip if they work together? Write and solve a rational equation.

B) Sara wanted to *maximize* trunk space in the car to fit all of the groceries. Using a system of linear inequalities, the vertices $\{(0, 10), (12, 20), (18, 10), (9, 0)\}$ were determined by mapping the trunk on the coordinate plane.

Determine the maximum trunk space using the objective function $f(x, y) = x + \frac{1}{2}y$.

C) The volume of one grocery bag is $\frac{2x^2 + 7x - 15}{3x^2 - 13x - 10}$ cubic inches.

If the height of the grocery bag is $\frac{2x - 3}{x - 5}$ inches, what is the area of the base when $V = lwh$?

_____ **2)** Which equation is equivalent to the given equation? $\frac{x+3}{3x} = \frac{x+4}{x-4}$

A) $x+1=-1$

B) $2x-1=4x+4$

C) $x^2-x-12=3x^2+12x$

D) $x^2+7x+12=3x^2-12x$

_____ **3)** Simplify. $\left(8x^3y^2-5x^2y^2+12xy+7\right)(2xy)^{-1}$

A) $4x^2y-\frac{5xy}{2}+6+\frac{7}{2xy}$

B) $6x^2y-3xy+10+\frac{5}{xy}$

C) $\frac{4}{x^2y}-\frac{5}{2xy}+6-\frac{7}{2xy}$

D) $16x^4y^3-10x^3y^3+20x^2y^2+14xy$

_____ **4)** Name the least common denominator for the polynomials $\frac{1}{2m+2}, \frac{3}{m^2+m}$, and $\frac{1}{m+1}$.

A) $2m$

B) $m+1$

C) m^2+3m+3

D) $2m^2+2m$

_____ **5)** Choose the statement that best completes the sentence about division.

When completing polynomial long division in which the quotient contains no remainder, ____.

A) the division problem was incorrectly simplified.

B) the quotient is a factor of the dividend.

C) the dividend has no factors.

D) nothing can be determined.

_____ **6)** The sum of three numbers is zero. The sum of the first and second numbers is negative six. The product of –2 and the first number equals the third number plus four. Determine the system of equations that best represents the problem.

A) $\begin{aligned} x+y+z&=0\\ x+y&=-6\\ -2x&=z+4\end{aligned}$

B) $\begin{aligned} x+y+z&=0\\ xy&=-6\\ -2(x+z)&=4\end{aligned}$

C) $\begin{aligned} x+y+z&=0\\ x+y&=-6\\ -2x&=x+4\end{aligned}$

D) $\begin{aligned} x+y+z&=0\\ x-y&=-6\\ -2x&=z+4\end{aligned}$

_____ **7)** Determine the sum of the first and third terms, x and z, for the system. $\begin{aligned} x-y+z&=-8\\ x+y&=12\\ y-z&=6\end{aligned}$

A) 20

B) 6

C) –10

D) 12

_____ **8)** Determine the expression equivalent to $(x-4)^2$ to form a polynomial identity.

A) $(x-4)(x+4)+(x-3)(x+3)$

B) $(x-5)^2-(x-1)^2$

C) $(2x-5)^2+\left(12x-9-3x^2\right)$

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

_____ **9)** Find the perimeter of a triangle with sides $2x-5$, $\dfrac{x-8}{x+4}$, and $\dfrac{3}{x}$.

A) $\dfrac{2x^3+4x^2-25x+12}{x(x+4)}$

B) $\dfrac{3x-10}{2x+4}$

C) $\dfrac{3x-14}{x}$

D) $\dfrac{2x^2-15x+25}{(x+4)(2x-5)}$

_____ **10)** Simplify. $\left(4x^3+5x+1\right)\div\left(2x^2-x+3\right)$

A) $2x+1$

B) $2x+1+\dfrac{10x-2}{2x^2-x+3}$

C) $2x+1-\dfrac{2}{2x^2-x-3}$

D) $2x+1-\dfrac{1}{x^2-x+3}$

_____ **11)** Determine the value(s) of Q that will make a polynomial identity for $(2x+Q)^2 = Q(4x+8)+4x^2-Q$.

A) $-7, 0$

B) 0

C) 7

D) $0, 7$

_____ **12)** Describe the transformation of the rational function $h(x) = \frac{1}{x+6} - 8$, as compared to the parent function $f(x) = \frac{1}{x}$.

A) The graph shifts right 6 spaces and down 8 spaces.

B) The graph shifts left 6 spaces and down 8 spaces.

C) The graph shifts right 6 spaces and up 8 spaces.

D) The graph shifts left 6 spaces and up 8 spaces.

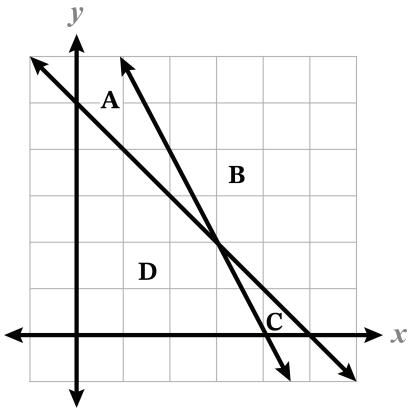
_____ **13)** Which region best represents the system of linear inequalities: $x \geq 0, y \geq 0, x+y \geq 5, 2x+y \leq 8$.

A) Region A

B) Region B

C) Region C

D) Region D



_____ **14)** Simplify. $\frac{x^2+3x-10}{x^2-6x+9} \div \frac{5x^2+21x-20}{x^2-5x+6}$

A) $\frac{2(x-2)}{(x-3)(5x-4)}$

B) $\frac{(x-2)^2}{(x-3)(5x-4)}$

C) $\frac{(5x-4)(x+5)^2}{(x-3)^3}$

D) $\frac{(x+5)(x-2)^2}{(x-3)(x-5)(5x+4)}$

_____ **15)** State the domain and range for the rational function.

$$y = \frac{-3}{x+12} + 15$$

A) domain: $\{x \mid x \in \mathbb{R}, x \neq -12\}$, range: $\{y \mid y \in \mathbb{R}, y \neq 15\}$

B) domain: $\{x \mid x \in \mathbb{R}, x \neq 12\}$, range: $\{y \mid y \in \mathbb{R}, y \neq 15\}$

C) domain: $\{x \mid x \in \mathbb{R}, x \neq 12\}$, range: $\{y \mid y \in \mathbb{R}, y \neq 15\}$

D) domain: $\{x \mid x \in \mathbb{R}, x \neq -4\}$, range: $\{y \mid y \in \mathbb{R}, y \neq -15\}$

_____ **16)** Factor completely. $80n^3 + 270$

A) $10(2n+3)(4n^2-6n+9)$

B) $10(2n+3)(4n^2+6n+9)$

C) $10(2n+3)(4n^2-6n-9)$

D) cannot be factored

_____ **17)** Solve. $\frac{5x+8}{x+2} - x = \frac{x}{x+2}$

A) $x = -2$

B) $x = -2, 4$

C) $x = 4$

D) $x = 2, 4$

_____ **18)** Divide. $12y^3 + 5y^2 - 18y + 4$ by $4y - 1$

A) $12y^2 + 8y - 16$

B) $12y^2 + 17y - 1 + \frac{3}{4y-1}$

C) $3y^2 + \frac{1}{2}y - \frac{37}{8} - \frac{\frac{21}{16}}{4y-1}$

D) $3y^2 + 2y - 4$

_____ **19)** Three people from Miller's Painting are hired to paint the interior of a house. Each person works at a different rate. The *combined* rate of the crew is needed to determine how long the job will take. Find the *combined* working rate of the 3-person crew $\frac{1}{r}, \frac{1}{r-2}, \frac{2}{r+2}$.

A) $\frac{4r^2-2r-4}{r(r-2)(r+2)}$

B) $\frac{4}{3r}$

C) $\frac{r^2+2r-4}{r(r-2)(r+2)}$

D) $\frac{2r^2-r-2}{r(r-1)(r+1)}$

_____ **20)** What is the remainder when $x^3 - 2x^2 + 6x - 8$ is divided by $x - 2$?

A) 2

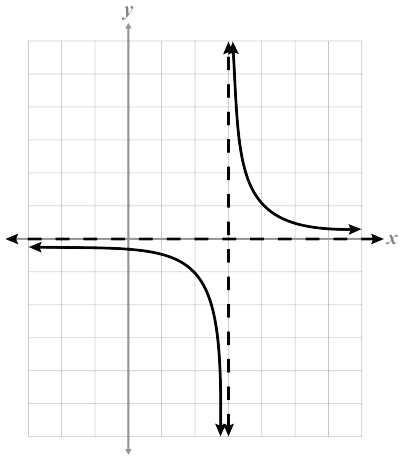
B) 4

C) –4

D) –36

_____ **21)** Select the graph that best matches the rational function: $y = \frac{8}{x - 3}$.

A)



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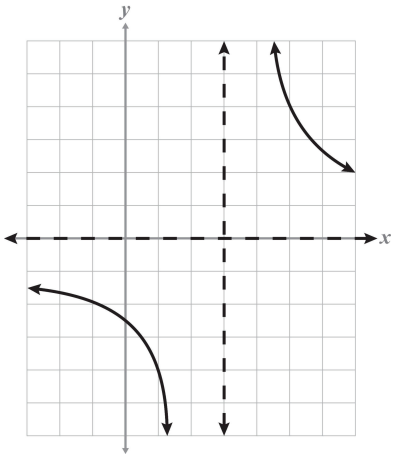

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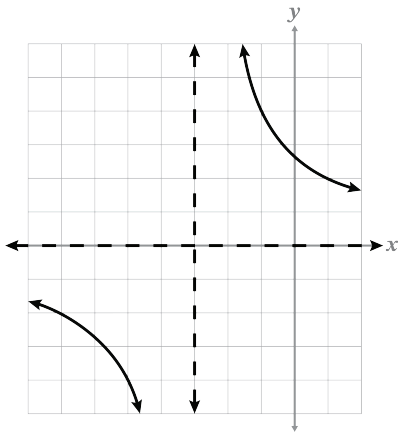
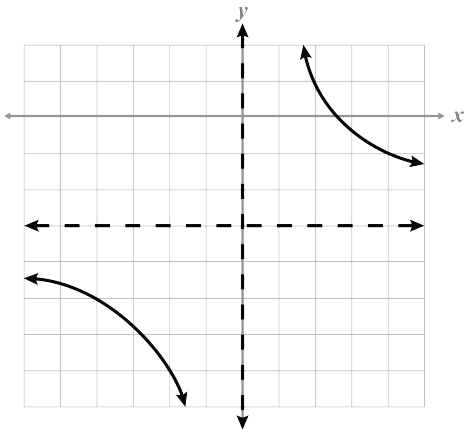


D)



22) Select all expressions that represent a polynomial.

☐ $\sqrt[3]{8}x^3y^5 + 4x$

☐ $|-4n| + 6n^2 + 7$

☐ $\frac{1}{x^2} + x - 9$

☐ $a^2x^2 + bx + c$

23) Select all that apply.

Optimization is finding the ___ value of a function depending on the given parameters of the problem.

- ☐ ordered pair
- ☐ minimum
- ☐ maximum
- ☐ inequality

24) Select the restrictions for $\dfrac{\dfrac{3x+2}{3x-1}}{\dfrac{4-x}{x}}$.

- ☐ -4
- ☐ 0
- ☐ 4
- ☐ $\dfrac{1}{3}$

25) Select all expressions that represent the difference of cubes.

- ☐ $p^3 - q^2$
- ☐ $p^3 - q^3$
- ☐ $(p-q)(p^2 - pq - q^2)$
- ☐ $(p-q)(p^2 + pq + q^2)$