Level 3: Expressions and Equations Midtest Answer Key

Question 1:

Carl has a cake decorating business. He is frosting a rectangular cake that is 8 inches longer than it is wide. The width of the cake is represented by the variable w. The perimeter of the cake is $2w + 2(w + 8)$.

Write an equivalent expression for the perimeter without parentheses and with the fewest possible terms.

$4w + 16$

Question 2:

A movie theater charges adults $10 for admission and children $5. The manager of the theater can the calculate the overall expected amount for admission using the expression $10x + 5y$.

Which of the following is equivalent to $10x + 5y$?

a. $5(2x + y)$

b. $5(5x + y)$

c. $10(x + 2y)$

d. $10(x + 5y)$

Question 3:

An industrial engineer is working on a project to improve generator performance. In her work she uses the expression $-2(1 - x)$.

Write an equivalent expression with two terms and no parentheses.

$-2 + 2x$

Continue

Question 4:

The director of a non-profit organization is raising money through an outdoor event. It costs the organization $120 to reserve the space for the event. The director can calculate the amount raised with the expression $3x - 120 + 6y$.

Which of the following is equivalent?

a. $3(x - 40 + 6y)$

b. $3(x - 40 + 2y)$

c. $3(x - 120 + 6y)$

d. $3(x - 120 + 2y)$

Question 5:

A computer analyst uses the following expression in the code for a new phone app.

$-3(2a - 5) - 4a + 1$

Which expression is equivalent?

a. $-10a - 14$

b. $-10a - 4$

c. $-10a + 11$

d. $-10a + 16$

Question 6:

A network communication analyst is working to optimize an office computer network. She uses the following expression in her analysis:

$\frac{2}{3}(x + 3y) + x - y$.

Which expression is equivalent?

a. $\frac{5}{3}x + y$

b. $\frac{4x+y}{3}$

c. $\frac{5x-y}{3}$

d. $\frac{5}{3}x + 2y$

Continue

Question 7:

A financial analyst uses the following expression to estimate the return on a client's investment.

$6x + 15y - 30z$

Which of the following is equivalent to this expression?

a. $3(2x + 5y - 10z)$

b. $3(2x - 5y + 10z)$

c. $6(x + 9y - 24z)$

d. $60(x + y + z)$

Question 8:

Two police officers collected traffic data in different parts of the city. The variable c represents the number of cars observed and t represents the number of trucks observed. The officer in the business section of town uses the expression $2c + t$ to estimate the total number of passengers in the vehicles. The officer in the residential section of town uses the expression $5c + 2t$.

Write an expression with two terms to estimate the total number of passengers combined.

$7c + 3t$

Question 9:

A journalist for a sports magazine is writing an article about a new statistic for a sport. He calculates the statistic using the expression $\frac{2}{3}w - l + 2(w + 3l)$.

Which of the following is equivalent?

a. $\frac{4}{3}w + 5l$

b. $\frac{4}{3}w + 4l$

c. $\frac{8}{3}w + 5l$

d. $\frac{8}{3}w + 4l$

Continue

Question 10:

A scientist is determining the intensity of a tornado. She enters data into the expression:

$\frac{8}{9}v + 4t - \frac{2}{3}v + 2t$

Which of the following is equivalent to this expression?

a. $\frac{2}{3}v + 6t$

b. $\frac{2}{9}v + 6t$

c. $\frac{2}{3}v + 2t$

d. $\frac{2}{9}v + 2t$

Question 11:

An insurance agent uses the following expression to calculate the cost of insurance for a new business.

$8a + 12b - 6c$

Which expression is equivalent?

a. $2(4a - 6b + 3c)$

b. $2(4a + 6b - 3c)$

c. $6(2a - 6b + c)$

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

Question 12:

A registered nurse is calculating the recommended dosage of a drug for a patient. She uses the expression $120x - 3x + 7y$ to estimate the dosage.

Write an equivalent expression without repeating variables.

$117x + 7y$

Continue

Question 13:

An environmental protection technician collects data from two locations. He uses slightly different expressions to estimate the oxygen content from the two locations to adjust for the difference in altitude.

Location 1: $3x - 9y$
Location 2: $4x - 8y$

The technician subtracts the second expression from the first.

Write an expression with two terms to show the difference.

$-x - y$

Question 14:

A municipal tax examiner uses the following expression to assess the values of properties in town.

$\frac{2}{5}(a - p) + a - 2p$

Which of the following is equivalent to this expression?

a. $\frac{7}{5}a - 3p$

b. $\frac{3}{5}a - 3p$

c. $\frac{7}{5}a - \frac{12}{5}p$

d. $\frac{3}{5}a - \frac{12}{5}p$

Question 15:

The gaming supervisor for a state uses the following expression to find the likelihood of a jackpot winner.

$300(p - 6b) + 80p$

Write an equivalent expression without parentheses.

$380p - 1{,}800b$

Continue

Question 16:

A personal financial advisor is estimating the retirement income of a client. She uses the expression:

$0.05(s + 4y) - 1.5(2s - y)$

Which of the following is equivalent to this expression?

a. $1.7y + 3.05s$

b. $1.52y + 3.05s$

c. $1.7y - 2.95s$

d. $1.52y - 2.95s$

Question 17:

A refinery operator uses the following expression to calculate the rate of gasoline production at the facility.

$9x + 21y - 30z$

Which expression is equivalent?

a. $9(x - 2y + 3z)$

b. $6(3x + 15y - 5z)$

c. $3(3x + 7y - 10z)$

d. $3(6x + 18x - 27z)$

Question 18:

A wholesale marketing representative is estimating the profit of expanding to a new geographic region. She uses the expression $5(w + 0.5s) - 2w$ in her calculations.

Write an equivalent expression without parentheses and without repeating variables.

$3w + 2.5s$

Continue

Question 19:

An analyst with a marketing firm is estimating the expenses for selling their products at two store locations. Let x represent the number of the first product and y represent the number of the second product sold. The following expressions are used for the estimation of expenses.

Location A: $3x + 4y$
Location B: $8x + y$

Which of the following can be described by the expression $5y$?

a. The difference between overall expenses at the two locations.

b. The difference between expenses associated with product y at the two locations.

c. The sum of overall expenses at the two locations.

d. The sum of expenses associated with product y at the two locations.

Question 20:

A farmer pays f dollars per pound of fertilizer and s dollars per pound of seed. An expression for the cost of seed and fertilizer combined is $1000(f + 2s)$.

What is the relationship between the amount of fertilizer and seed purchased?

a. There is 1000 times more seed than fertilizer.

b. There is 2000 times more seed than fertilizer.

c. There is half as much fertilizer as seed.

d. There is twice as much fertilizer as seed.

Question 21:

A food service manager at a hotel is preparing meals for a business meeting. Each attendee will receive one main dish, two drinks and four side choices. He uses the expression $120x + 60y + 30z$ to calculate the total cost of the meal. In the expression, x is the cost of sides, y is the cost of drinks and z is the cost of meals. The co-efficients are the numbers of each needed.

How many attendees are expected?

30 attendees

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Question 22:

An urban planner compares two locations for a new water treatment facility. She uses two expressions for the cost of the project depending on distance from city center c and distance from water supply w.

Location A: $12c - 4w$
Location B: $5c - 2w$

Which expression describes the overall cost difference between these two locations?

a. $7c - 2w$

b. $7c - 6w$

c. $7c + 2w$

d. $7c + 6w$

Question 23:

A pilot uses the following expression to estimate fuel requirements for an upcoming flight.

$4d + 8w + 6(d - w)$

The variable d represents the distance to be traveled and w represents the net effect of wind during the trip.

What is the ratio of the coefficient of d to the coefficient of w once this expression is simplified?

$\frac{\square}{\square}$

Question 24:

The manager of the theater snack bar uses the following expression to calculate revenue.

$7.5p + 3s + 10c$

The variable p represents the number of popcorn orders sold, s represents the number of sodas sold, and c is the number of combo orders sold. A combo order consists of one soda and one popcorn, $c = p + s$.

If the variable for combo orders (c) is replaced by its equivalent expression ($p + s$), which expression shows the total popcorn revenue?

a. $20.5p$

b. $17.5p$

c. $12.5p$

d. $7.5p$

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Question 25:

The sales manager of a newspaper advertising department uses the expression below to find the number of advertising deals closed in a month.

$6 + 3n + 2n - n$

He uses n to represent the number of clients.

After simplifying the expression, what is the overall effect of each client on the number of deals in a month?

a. Each client increases the number of deals by 3.

b. Each client increases the number of deals by 4.

c. Each client decreases the number of deals by 1.

d. Each client decreases the number of deals by 4.

Stop