TEST NAME: **A-SSE.1NEW**

TEST ID: **999933**

GRADE: **09 - Ninth Grade**

SUBJECT: **Mathematics**

TEST CATEGORY: **School Assessment**

Student: _____

Class: _____

Date: _____

Read the passage - 'Paper Airplane Contest' - and answer the question below:

Paper Airplane Contest

Paper Airplane Contest

Jenna read an article in a magazine about a paper airplane contest. The article referenced an internet site about the records for distance and time aloft (time in the air) for paper airplanes. The record for distance, 226 feet 10 inches, was set in California in 2012. The record for time in the air, 29.2 seconds, was set in 2010 in Japan.

The magazine article also gave the requirements for hosting a contest that would have two events. The first event is a competition to find which paper airplane flies the longest distance, and the second event is a competition to find which paper airplane stays in the air the longest amount of time. Jenna asked her teacher if her class could host a paper airplane contest with the two events, and the teacher agreed. Rosa and Alex helped Jenna make posters announcing the contest.

PAPER AIRPLANE CONTEST
Sponsored by Math Department

Enter your best paper airplanes in the contest.
Enter as an individual or as a team.

Enter one plane in each category:

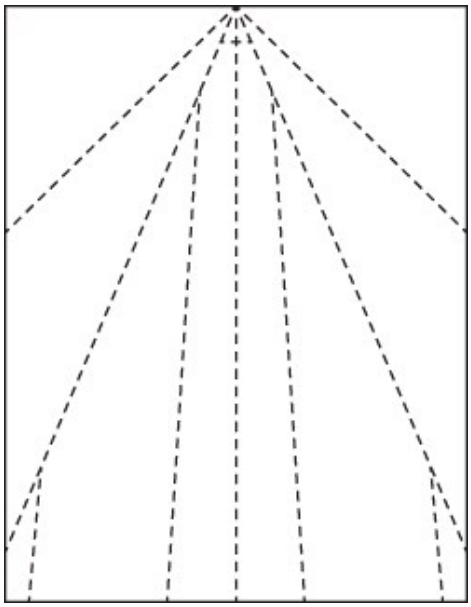
- Distance
- Time aloft

Use only the following materials to build your airplane:

- One or two standard-size sheets of copy paper (required)
- One standard paper clip (optional)
- Three inches of tape (optional)
- A dab of glue (optional)
- Three staples (optional)

Rosa found a book with patterns for paper airplanes using a standard 8.5-by-11-inch sheet of paper. The three friends tried several different patterns.

One of the patterns Alex chose is shown in this figure.



Jenna, Alex, and Rosa practiced with their paper airplanes and recorded the time and distance for each paper airplane. Each person chose one paper airplane that flew further than the others to compete in the distance competition. This table shows the best distances for the paper airplanes they chose for distance.

PAPER AIRPLANE PRACTICE DISTANCES

	Best Distance	Second-Best Distance	Third-Best Distance
Jenna	24 feet	18 feet	16 feet
Alex	19 feet	18 feet	14 feet
Rosa	18 feet	11 feet	9 feet

Each friend also chose a plane that stayed in the air longer than the others for the time aloft competition. This table shows the best times for the paper airplanes they chose for time aloft.

PAPER AIRPLANE PRACTICE TIMES

	Best Time	Second-Best Time	Third-Best Time
Jenna	8 seconds	6 seconds	5 seconds
Alex	5 seconds	3 seconds	3 seconds
Rosa	11 seconds	9 seconds	5 seconds

The day of the contest finally arrived, and 12 students had entered the contest. The distance competition was first, and Rosa’s plane won when her paper airplane flew 50% farther than the mean of the three best distances in the table of practice distances. The winner of the time aloft competition was

Alex's paper airplane, which stayed in the air 3 seconds longer than the mean of the three best times in the table of practice times.

The students all agreed that the paper airplane contest was a big success. Alex has some ideas for new patterns for paper airplanes that will fly farther, and Rosa wants a paper airplane that will stay in the air longer for the contest next year.

1. Read "Paper Airplane Contest" and answer the question.

   Which expression represents the distance of Rosa's winning entry?

   A. $0.5(18+11+9)$

   B. $0.5(24+19+18)$

   C. $1.5(18+11+9)$

   D. $1.5(24+19+18)$

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2. Which is the coefficient of the expression $-3a^2c^{-7}$?

   A. -7

   B. -3

   C. 2

   D. 3

3. **The expression $33n + 13f + 7p + 10d$ represents the cost, in dollars, to purchase *n* cases of paper, *f* packages of hanging folders, *p* packs of pencils, and *d* flash drives. Which statement is not true?**

   A. The term $7p$ represents the cost for 7 packs of pencils.

   B. The coefficient 10 represents the cost of each flash drive.

   C. The coefficient n represents the cost of one case of paper.

   D. The term $13f$ represents the cost of f packages of hanging folders at $13 per package.

4. **The expression $2T + 3F + 4M + 10E$ gives the number of points a student earns on a test when the student correctly answers *T* true-false questions, *F* fill-in-the-blank questions, *M* multiple-choice questions, and *E* extended-response questions. Which statement is not true?**

A. The coefficient 2 indicates that each correct true-false question earns 2 points.

B. The coefficient 3 represents the points earned for each fill-in-the-blank question.

C. The term 10*E* represents the total number of points earned from 10 extended-response questions.

D. The term 4*M* represents the total number of points earned from *M* multiple-choice questions worth 4 points per question.

5. In a triathlon, Agnes swims 400 meters, bikes 30 kilometers, and runs 6 kilometers. She bikes 12 times as fast as she swims and runs 5 times as fast as she swims. The expression below represents the time it took her to complete the triathlon.

$$\frac{400}{x} + \frac{30{,}000}{12x} + \frac{6{,}000}{5x}$$

Which expression represents the time it took her to complete the swimming and biking portions of the triathlon?

A. $\frac{4{,}100}{x}$

B. $\frac{2{,}900}{x}$

C. $\frac{1{,}600}{x}$

D. $\frac{1{,}200}{x}$

6. **What is the coefficient of the second term of the expression $3x^4 + x^2$?**

A. 0

B. 1

C. 2

D. 3

7. Maria purchased a book at a discount. The discounted price of the book is modeled by the equation $a = b = xb$. What do *a*, *b*, and *x* most likely represent in this equation?

A. *a* = amount Maria paid; *b* = original cost of the book; *x* = discount percentage

B. *a* = original cost of the book; *b* = amount Maria paid; *x* = discount percentage

C. *a* = amount Maria paid; *b* = original cost of the book; *x* = total discount on the book

D. *a* = original cost of the book; *b* = amount Maria paid; *x* = total discount on the book

8. Albert invested a total of $5,000 in two different accounts. He invested part of it in Account A, which pays 7% simple interest every year, and the remaining in Account B, which pays 9% simple interest every year. If Albert invested *x* dollars in Account A, what does $(5{,}000 - x)0.09$ represent?

A. the amount of money in Account A in one year

B. the amount of money in Account B in one year

C. the amount of interest earned from Account A in one year

D. the amount of interest earned from Account B in one year

9. **What is the sum of the coefficients of the expression** $3x^4 + 5x^2 + x$?

A. 6
B. 7
C. 8
D. 9

10. A person in a boat travels *c* miles upstream (against the current) and then travels the same distance downstream (with the current). If the speed of the boat is *x* miles per hour (mph) and the speed of the current is *y* mph, what does the expression $\frac{c}{x-y}$ represent in terms of the context?

A. the speed of the boat as it travels upstream

B. the speed of the boat as it travels downstream

C. the number of hours it takes the boat to travel upstream

D. the number of hours it takes the boat to travel downstream

11. The height in meters of a projectile involves the object's initial height, upward velocity, and acceleration because of gravity. If the equation $y = -9.8t^2 + 109.7t + 7.4$ models the number of meters, y, a toy rocket is above the ground t seconds after being launched, what does 7.4 represent?

A. initial height of the rocket

B. acceleration because of gravity

C. initial upward velocity of the rocket

D. total time the rocket travels after t seconds

12. A local store makes and sells handmade ceramic cookware. The store earns a profit of one dollar more on each plate sold than it earns by selling one cup. If the profit the store earns in one day on the sales of cups and plates is given by the expression, $kx + (k-1)y$, what does y represent if k is the profit earned from selling each plate?

A. the number of cups sold in one day

B. the number of plates sold in one day

C. the profit earned on the cups sold in one day

D. the profit earned on the plates sold in one day

13. The total cost of tiling a rectangular patio involves the cost of tiles and labor charges. The length of the patio is 5 feet more than its width, x. If the expression $10x(x+5)+300$ gives the total cost of tiling, what does 10 represent?

A. the labor charges

B. the total cost of the tiles

C. the area of the patio in square feet

D. the cost of the tiles per square foot

14. How many algebraic terms are in the polynomial $10x^5+2x^3y^2-1$?

A. 10

B. 5

C. 3

D. 2

15. **What is the number of terms in the polynomial below?**

$-y^4+7y^3$

A. 7
B. 4
C. 3
D. 2

16. **Marissa plans to create silk floral arrangements. The expression $13v+8f+6b+3m$ represents her cost, in dollars, for the arrangements when she buys *v* vases, *f* stems of flowers, *b* stems of wood bark, and *m* packages of marbles for the bottom of the vases. Which statement is true?**

A. The term 13*v* represents the cost of 13 vases.
B. The coefficient 6 represents the cost of *b* stems of wood bark.
C. The term 8*f* represents the cost of *f* stems of flowers at $8 per stem.
D. The coefficient 3 represents the number of packages of marbles she buys.

17. **Dee is driving home from a conference. The expression 705 – 60*h* gives the number of miles from home after driving *h* hours. Which best represents the meaning of the term 60*h*?**

A. the number of miles Dee drove in *h* hours
B. the number of miles Dee drove each hour
C. the number of miles Dee had to drive before she started
D. the number of miles Dee had left to drive after driving *h* hours

18. What are the algebraic terms in the expression below?

$-4x^2y^3+xy-5$

A. x, y

B. 2, 3, 1, and 1

C. -4, 1, and 5

D. $-4x^2y^3$, xy, and -5

19. John and Brian work for a toy manufacturer putting stuffing in teddy bears. On average, John can stuff x teddy bears in one day and Brian can stuff y teddy bears in one day. They both work the same number of days, t. What does the expression $(x+y)t$ represent?

A. the number of teddy bears John can stuff in t days

B. the number of teddy bears Brian can stuff in t days

C. the number of teddy bears John and Brian can stuff in t days

D. the number of teddy bears John and Brian can stuff in one day

20. The value, in dollars, of a certificate of deposit (CD) involves the initial amount invested, the interest rate, and the duration of the investment. If the expression $2.5\left(1+\frac{0.009}{365}\right)^{365x}$ models the value, in thousands of dollars, of a CD, x, days after its purchase, what does 2.5 represent?

A. the daily interest rate

B. the annual interest rate

C. the initial value of the CD in thousands of dollars

D. the most current value of the CD in thousands of dollars

21. **Consider the expression** $(3j-5)[3(2j+7)-4k(6j-8)]$.

Which expression represents a factor of the given expression?

A. $(2j+7)$

B. $(6j-8)$

C. $(3-4k)$

D. $(3j-5)$

22. Look at the expression below.

$3x^2 - 6x + 7$

Which statement is true about the expression?

A. $3x^2$ is a term.

B. 7 is not a term.

C. x is a factor of all the terms.

D. 2 is the exponent of the term $3x$.

23. Water Wizards and Pat's Pipes are two companies that offer plumbing and heating services. Both charge a base fee for all service appointments and an hourly labor rate for repairs. The two companies charge the same base fee, but Water Wizards charges a higher hourly rate than Pat's Pipes. If the total amount Water Wizards charges for x hours of repairs is modeled by the expression $45x + 60$, which expression could represent the total amount Pat's Pipes would charge for the same amount of time spent on repairs?

A. $35x + 60$

B. $45x + 50$

C. $45x + 70$

D. $55x + 60$

24. Which statement is true about the expression $3^5 + 4(w + 8x)$?

A. One of the coefficients is 3.

B. One of the coefficients is *w*.

C. Two of the terms have a factor of *w*.

D. Two of the terms have a factor of 4.

25. George is filling a swimming pool with volume V cubic units. He observed that at time $t = t'$ the volume of the pool filled is V' and that at time $t = t''$ one-fourth of the pool was left to be filled. What does the expression $\frac{3V}{4} - V'$ represent?

A. the volume of the pool left to be filled

B. the volume of the pool filled until time $t = t''$

C. the volume of water filled in time $t = t'' - t'$

D. the volume of water filled in time $t = t' + t''$

26. Amy and Mary are playing a board game that uses game money with values of $5 and $10. At the end of the game, Amy has *n* bills worth $5 each and *d* bills worth $10 each, and Mary has a total of 15 bills. What does $5n + 10d$ represent?

A. total value of the bills Amy has

B. total value of the bills Mary has

C. total number of bills Amy has

D. total number of bills Mary has

27. **For the start of school, Jericho bought *p* pairs of pants, *s* shirts, and *k* pairs of socks. All of his items were on sale with a different percent marked off. The expression below represents the amount he paid, including tax.**

$$(0.6 \times 15p + 0.8 \times 12s + 0.4 \times 3k) + 0.07(0.6 \times 15p + 0.8 \times 12s + 0.4 \times 3k)$$

Which best describes the meaning of the factor 0.6?

A. the sales tax rate

B. the cost of each pair of pants that Jericho paid

C. the percent marked off the cost of the pants

D. the percent of the cost of the pants that Jericho paid

28. **How many terms are in the expression $3x^6yz + x^4y^2 + 2xz^5 - 6x^2y^3 - 7y$?**

A. 3

B. 4

C. 5

D. 6

29. Fat has more than twice as many calories per gram as carbohydrates and proteins. A gram of fat has about 9 calories, while a gram of carbohydrate or protein has about 4 calories. The expression below represents the total number of calories in a food item.

$$9x + 4(y + z)$$

What does the term $4(y + z)$ represent?

A. the number of grams of fat in a food item

B. the number of calories in a food item from fat

C. the number of grams of carbohydrates and proteins in a food item

D. the number of calories in a food item from carbohydrates and proteins

30. The population of a bacteria after x number of hours is modeled by the expression $1{,}000(0.75)^x$. What is the rate of decay of the population of bacteria?

A. 25%

B. 75%

C. 0.75%

D. 1.25%

31. The height, in feet, of a flying disc after t seconds is modeled by the equation $h(t) = -4.5t^2 + 19.6t + 3$. What does the 3 in the equation represent?

A. the velocity of the disc

B. the initial height of the disc

C. the time it takes for the disc to hit the ground

D. the time it takes for the disc to reach maximum height

32. The charge for parking at a particular state park is a dollars per vehicle plus b dollars per person in the vehicle. Which expression represents the charge for 3 vehicles with n people per vehicle at this state park?

A. $3a + bn$

B. $3a + \frac{3b}{n}$

C. $3(a + bn)$

D. $3(a + b)n$

33. Marcus has a square-shaped garden that has an area of $4(x^2 - y^2)$ square feet. If the garden has four equal sections, what is the area of each section?

A. $2(x - y)$ square feet

B. $x^2 - y^2$ square feet

C. x^2 square feet

D. 4 square feet

34. Which variable in the function $f(x)=a(x-h)^2+k$ is responsible for the vertical translation of the graph?

A. a

B. h

C. k

D. x

35. **Kelsie works at a concert arena. When the price of a ticket is $30, a concert will be attended by 2,500 people. Each time the price is raised by an increment of $5, there will be 100 fewer people at the concert. Kelsie uses the equation $R=(30+5n)(2500-100n)$ to determine *R*, the total concert revenue in dollars when there have been *n* $5 increases in ticket price. Which conclusion is valid?**

A. The total concert revenue decreases when the price of a ticket is greater than $30.

B. The number of people attending the concert is represented by $2500-100n$.

C. The number of times the price is raised is represented by $30+5n$.

D. The cost per concert ticket must be less than $55.

36. A theater sells t tickets at a price of p dollars each. The theater conducts a survey and predicts that if the price of each ticket is changed by $2, the number of tickets sold will change by 15 tickets. If n is the number of times the theater changes the ticket price by $2, the expression $(p+2n)(t-15n)$ can represent the theater's total revenue, in dollars. In this expression, what does $(t-15n)$ represent?

A. the number of tickets the theater will sell if the ticket price is increased by $2

B. the number of tickets the theater will sell if the ticket price is increased by $2*n*

C. the number of tickets the theater will sell if the ticket price is decreased by $15

D. the number of tickets the theater will sell if the ticket price is decreased by $15*n*

37. A concert is being held to raise money for a charity. The function $p(x) = -25x^2 + 3000x - 18000$ can be used to determine the dollar amount raised for the charity, dependent on the ticket price. The function $n(x) = \frac{p(x) + 18000}{x}$ represents the number of concert tickets sold, dependent on the ticket price. What does the numerator of the function $n(x)$ represent in this context?

A. the cost of the concert

B. the amount of profit per concert ticket sold

C. the total amount of money brought in by the ticket sales

D. the total profit of the concert if an additional $18,000 was donated

38. **A salesperson earns a weekly base salary plus a commission of 20% of all sales over the first $500. This situation can be represented by the expression $750 + 0.2(x - 500)$. Which of the following describes the meaning of $0.2(x - 500)$ for this situation?**

A. total amount of sales

B. total amount of salary earned

C. total amount of commission earned

D. total amount of sales after the first $500

39. **Louisa found the average of her test grades using the expression below.**

$\frac{t_1 + t_2}{2}$

Which statement best describes the numerator of the expression?

A. The numerator equals 2.

B. The numerator equals t^2.

C. The numerator is a binomial.

D. The numerator is a trinomial.

40. If a quadratic equation can be factored as $(ax+b)(cx+d)=0$, what information do these factors provide about the graph of the equation?

A. The graph of the equation has a vertex at $\left(\frac{b}{a},\frac{d}{c}\right)$.

B. The graph of the equation has a vertex at $\left(-\frac{b}{a},-\frac{d}{c}\right)$.

C. The graph of the equation has roots at $x=\frac{b}{a}$ and $x=\frac{d}{c}$.

D. The graph of the equation has roots at $x=-\frac{b}{a}$ and $x=-\frac{d}{c}$.

41. **The expression $P(1+r)^n$ can be used to find the total amount in a bank account when the principal dollar amount, *P*, is compounded annually for *n* years at an interest rate of *r*. Which of the following statements is true?**

A. The quantity (1^n+r^n) is multiplied by *P*.

B. The quantity $(n+n\cdot r)$ is multiplied by *P*.

C. The quantity $(1+r)$ is multiplied by itself *n* times.

D. The quantity $P(1+r)$ is multiplied by itself *n* times.

42. **A baker sells cookies for $1.50 each. If a minimum of two dozen cookies is ordered, the baker gives a 40% discount for each cookie ordered after the minimum has been met. The cost of an order of cookies after this discount is given by the expression below.**

$1.5c-0.4(c-24)$

Which of the following parts of the expression represents the number of cookies to which the discount will be applied?

A. 1.5*c*

B. *c* –24

C. 1.5*c* –0.4

D. 0.4(*c* –24)

43. Gina is starting an exercise program. The equation $y=2(1.05)^x$ can be used to represent the number of miles, *y*, Gina has walked after *x* number of weeks. Based on this equation, which statement best describes Gina's exercise program?

A. Gina walks 2 miles in the first week and then increases her distance by 5% each week.

B. Gina walks 1.05 miles in the first week and then doubles the distance each week.

C. Gina walks 2 miles in the first week and then increases her distance by 105% each week.

D. Gina walks 2 miles in the first week and then adds a distance of 1.05 miles each week.

44. **Given the expression $(x-y-z)^2-(x+y+z)^2$, which statement best describes the base of each term?**

A. The base of each term is a binomial with two variables.
B. The base of each term is a trinomial with two variables.
C. The base of each term is a binomial with three variables.
D. The base of each term is a trinomial with three variables.

45. The expression $-2(8t^2-24t)$ represents the height, in feet, of a football t seconds after it is kicked. Which value represents the initial velocity of the football?

A. 8
B. 16
C. 24
D. 48

46. **The expression $500(2)^x$ can be used to determine the size of a population that grows over a period of time. What does 500 represent in the expression?**

A. the final size of the population
B. the initial size of the population
C. the amount of time necessary to double
D. the rate at which the population is growing

47. The initial volume of water in a certain tank is k ft^3. Every day, 0.45 ft^3 of water evaporates. Every 10 days, 3 ft^3 is drained from the tank. In the expression $k-7.5$, what does 7.5 represent?

A. the volume of water in the tank after 10 days
B. the volume of water in the tank on a given day
C. the volume of water the tank has lost after 10 days
D. the volume of water the tank has lost after a given number of days

48. Elastic potential energy is the energy stored in elastic materials as a result of their stretching or compressing. It can be stored in rubber bands, bungee chords, springs, etc.

The equation that relates the amount of elastic potential energy stored in a spring to the amount of compression x and the spring constant k is $PE_{\text{spring}} = \frac{1}{2} \cdot k \cdot x^2$.

If a spring constant for one spring is defined as $2a + 4$, which equation is true?

A. $PE = a + 4x^2$

B. $PE = (a + 2)x^2$

C. $PE = \frac{1}{2}(a + 4x^2)$

D. $PE = \frac{1}{2}(2a + 4x^2)$

49. Consider $12x + 4x^3y$ as an expression in x. What is the leading coefficient of the expression?

A. 4

B. $4y$

C. 12

D. $4x^2y$

50. Two pipes are being used to fill a water tank, pipe A and pipe B. Pipe A can fill half of a water tank in t hours. It takes pipe B one hour less than pipe A to fill the same water tank completely. What does the expression $\frac{1}{2t} + \frac{1}{2t - 1}$ represent?

A. the time taken by both pipes to fill the tank

B. the amount of the tank filled by both pipes in time t

C. the amount of the tank filled by both pipes in time $2t$

D. the rate at which both pipes can fill the tank working together

51. The charges for renting a car from a certain rental company are given by the expression $\$2(0.36x + 11d)$, where x represents the number of miles driven and d is the number of days for which the car has been rented. Which statement about renting a car from this company is **true**?

A. The charges are $0.36 per mile driven and $11 per day.

B. The charges are $0.72 per mile driven and $22 per day.

C. The charges are $11 per mile driven and $0.36 per day.

D. The charges are $22 per mile driven and $0.72 per day.

52. Which statement is true about the expression $4(10 - 8x)$?

A. As the value of x increases by 1, the value of the expression increases by 4.

B. As the value of x increases by 1, the value of the expression increases by 40.

C. As the value of x increases by 1, the value of the expression decreases by 8.

D. As the value of x increases by 1, the value of the expression decreases by 32.

53. The population of a city after x years is modeled by the equation $y = 20000(1.10)^x$. What does 1.10 represent in this equation?

A. The initial population of the city is 110.

B. The initial population of the city is 20,000.

C. The population of the city is increasing by 10% each year.

D. The population of the city is increasing by 110% each year.

54. **The volume, *V*, of a rectangular box with a square base and height *h* inches can be modeled by the function** $V = h(16 - 2h)^2$.

Which conclusion is not valid?

A. The width of the box is represented by $16 - 2h$.

B. The length of the box is represented by $16 - 2h$.

C. The height of the box is between 0 and 8 inches.

D. The height of the box is between 8 and 16 inches.

55. The price chart at an ice rink is shown.

Ice Skating Prices

Skate Rental	1 Hour Skate Time	2 Hour Skate Time
$2.50 Per Person	$5.25	$9.00

TUESDAY SPECIAL: 30% discount on skate rental for groups of 5 or more.

On Tuesday, a group of *n* friends went ice skating at this rink.

- Five of the friends paid to skate for 1 hour.
- The rest of the group paid to skate for 2 hours.
- Everyone in the group rented skates.

Which simplified expression represents a part of their cost?

A. $10.75n + 18.75$ represents the skate time cost for the group.

B. $9n + 26.25$ represents the skate time cost for the group.

C. $1.75n$ represents the cost of skate rental per person for the group.

D. $0.75n$ represents the cost of skate rental per person for the group.

56. Which of the following is true regarding the graph of the function $y = \frac{1}{x-3}$?

A. There is an *x*-intercept at $x = 3$.

B. There is an *x*-intercept at $x = -3$.

C. There is a vertical asymptote at $x = 3$.

D. There is a vertical asymptote at $x = -3$.