TEST NAME: **A-CED.4 2015**
TEST ID: **684247**
GRADE: **09**
SUBJECT: **Mathematics**
TEST CATEGORY: **School Assessment**

Student: _____

Class: _____

Date: _____

1. **Margo sells bracelets for $8 each and necklaces for $12 each. The equation below can be used to calculate *E*, her total earnings.**

$E = 8b + 12n$

If *b* is the number of bracelets, and *n* is the number of necklaces she sold, which equation can be used to find *b*, when *E* and *n* are known?

A. $b = \frac{E - 12n}{8}$

B. $b = \frac{E - 8}{12n}$

C. $b = 8(E - 12n)$

D. $b = 12n(E - 8)$

2. **Tickets for a field trip cost $5 for students and $8 for adults. The total amount paid for tickets *C* can be found using the equation below, where *s* is the number of students who attend, and *a* is the number of adults.**

$C = 5s + 8a$

Which equation is equivalent when solved for *s* in terms of *C* and *a*?

A. $s = \frac{C}{5} - 8a$

B. $s = \frac{C}{5} + 8a$

C. $s = \frac{C - 8a}{5}$

D. $s = \frac{C + 8a}{5}$

3. The formula to convert degrees Fahrenheit to degrees Celsius is $C = \frac{5}{9}(F - 32)$. Which formula can be used to convert degrees Celsius to degrees Fahrenheit?

A. $F = \frac{5}{9}C + 32$

B. $F = \frac{9}{5}C - 32$

C. $F = \frac{9}{5}C + 32$

D. $F = \frac{9}{5}(C + 32)$

4. **Which is not equivalent to** $Ax + By = C$?

A. $y = \frac{C}{B} - \frac{A}{B}x$

B. $y = \frac{C - Ax}{B}$

C. $y = \frac{C}{B} - \frac{Ax}{B}$

D. $y = \frac{C - A}{B}x$

5. **Which equation can be used to find the height of a trapezoid given the area and the lengths of the two bases?** $\left(A = \frac{1}{2}h(b_1 + b_2)\right)$

A. $h = \frac{1}{2}A - (b_1 + b_2)$

B. $h = \frac{2A}{b_1} + \frac{2A}{b_2}$

C. $h = \frac{1}{2}A \div (b_1 + b_2)$

D. $h = \frac{2A}{b_1 + b_2}$

6. The formula $V = \frac{1}{3}Bh$ can be used to find the volume of a cone that has base area *B* and height *h*. Which formula expresses the height of the cone in terms of volume and base area?

A. $h = \frac{V}{3B}$

B. $h = 3V - B$

C. $h = \frac{3V}{B}$

D. $h = \frac{B}{3V}$

7. **Counting the number of cricket chirps can provide an estimate of the temperature. The formula below gives the temperature in degrees Celsius based on the number of cricket chirps (*n*) in 15 seconds.**

$$C = \frac{5n + 40}{9}$$

This formula can be rearranged to solve for the number of chirps as a function of the temperature in degrees Celsius. Which formula has been rearranged correctly?

A. $n = \frac{9}{5}C - 8$

B. $n = \frac{9}{5}C - 40$

C. $n = \frac{9}{5}(C - 8)$

D. $n = \frac{9}{5}(C - 40)$

8. Consider the following equation:

$$D = mv + \frac{v^2}{2a}$$

Which choice correctly expresses the quantity *a* in terms of *D*, *m*, and *v*?

A. $a = \frac{v^2}{2(D - mv)}$, where $D \neq mv$

B. $a = \frac{v^2}{2D - mv}$, where $2D \neq mv$

C. $a = \frac{(D + mv)}{2v^2}$, where $v \neq 0$

D. $a = \frac{(D - mv)}{2v^2}$, where $v \neq 0$

9. **If $z = x^2 + y^3$, what is the value of *y*?**

A. $y = \left(z - x^2\right)^3$

B. $y = \left(z - x^2\right)^{\frac{1}{3}}$

C. $y = z^{\frac{1}{3}} - x^2$

D. $y = 3\left(z - x^2\right)$

10. What is $\log_2 40 - \log_2 5$?

A. 3

B. 4

C. 8

D. 35

11. The circumference of a circle is given by the formula $C = \pi d$, where d is the diameter of the circle. Which formula represents the radius of the circle, r, in terms of the circumference?

A. $r = \frac{2\pi}{C}$

B. $r = \frac{\pi}{C}$

C. $r = \frac{C}{2\pi}$

D. $r = \frac{C}{\pi}$

12. Grace uses the equation $y = 25x + 20$ to calculate the dollar amount, y, she earns from renting out a lawnmower x times. She wants to solve for x in order to find the number of times she needs to rent a lawnmower to earn a given amount. Which equation should she use?

A. $x = \frac{y}{25} - \frac{4}{5}$

B. $x = \frac{y}{25} - 20$

C. $x = \frac{y + 76}{25}$

D. $x = \frac{y + 20}{25}$

13. Which equation is equivalent to $x = m(p - q)$?

A. $q = m + \frac{x}{p}$

B. $q = p + \frac{x}{m}$

C. $q = p - \frac{x}{m}$

D. $q = m - \frac{x}{p}$

14. **The formula for the area of a triangle is $A = \frac{1}{2}bh$. Which equation correctly describes the height, *h*?**

A. $h = \frac{A}{2b}$

B. $h = 2A - b$

C. $h = \frac{A}{2} - b$

D. $h = \frac{2A}{b}$

15. What equation is equivalent to $24 = ax + 4y - 10$, when solving for y?

A. $y = \frac{7}{2} - \frac{ax}{4}$

B. $y = \frac{17}{2} - \frac{ax}{4}$

C. $y = 17 - \frac{ax}{4}$

D. $y = 34 - ax$

16. The volume of a spherical tank is given by $V = \frac{4}{3}\pi r^3$. If the volume of the tank is known, which expression can be used to find its radius?

A. $\sqrt[3]{\frac{3\pi}{4V}}$

B. $\sqrt[3]{\frac{3V}{4\pi}}$

C. $\sqrt[3]{\frac{4\pi}{3V}}$

D. $\sqrt[3]{\frac{4V}{3\pi}}$

17. Which choice is equivalent to the equation $-4(x+b) = p + 8b$?

A. $x = p + 7b - 4$

B. $x = -4p - 28b$

C. $x = -\frac{1}{4}p + b$

D. $x = -\frac{1}{4}p - 3b$

18. The volume of a rectangular prism can be found using the formula $V = Bh$, where B is the area of the base and h is the height. Which formula can be used to find the height, h, of the prism?

A. $h = V - B$

B. $h = \frac{B}{V}$

C. $h = \frac{V}{B}$

D. $h = VB$

19. **An athletic booster club is ordering drinks and chips to sell at a football game. The club treasurer uses the equation $c = 3.5d + 250$ to determine *d*, the number of cases of soft drinks the club can order if $250.00 is spent on chips, the total cost (*c*) is known, and each case of soft drinks costs $3.50. Which equation is equivalent to $c = 3.5d + 250$?**

A. $c + 3.5d = 250$

B. $c - 3.5 = 250d$

C. $c + 250 = 3.5d$

D. $c - 250 = 3.5d$

20. The perimeter of a rectangle can be found using the formula $P = 2L + 2W$, where L is the length and W is the width. Which formula represents the length of a rectangle in the terms of the perimeter and width?

A. $L = P - \frac{2W}{2}$

B. $L = \frac{P - 2W}{2}$

C. $L = \frac{1}{2}P - 2W$

D. $L = \frac{1}{2}P - \frac{1}{2}W$

21. The front of a tent is an equilateral triangle with the ratio of its base, b, to its height, h, given by $\frac{b}{h} = \frac{2}{\sqrt{3}}$. Which equation can be used to find the tent's height?

A. $h = \frac{2b}{\sqrt{3}}$

B. $h = \frac{2}{b\sqrt{3}}$

C. $h = \frac{b\sqrt{3}}{2}$

D. $h = 2b\sqrt{3}$

22. **Dudley's Trophy Shop charges $4 per line for engraving plus a $36 set up charge for the team logo. The following equation is used to find *C*, the total charge for a trophy order with *n* lines of engraving.**

$C = 36 + 4n$

Which equation is equivalent when solved for *n* in terms of *C*?

A. $n = \frac{C}{4} + 9$

B. $n = \frac{C}{4} - 9$

C. $n = C - 36$

D. $n = 4(C - 36)$

23. **Cindy has 500 feet of fencing around a rectangular pen that has a width of *a* feet and length of *b* feet. This is represented by the equation** $2(a + b) = 500$ **Cindy plans to change the width of the pen and wants to solve for *b* to see how the new length will be affected. Which equation shows a correct solution for *b* in terms of *a*?**

A. $b = \frac{500}{2} - a$

B. $b = a - \frac{500}{2}$

C. $b = \frac{500 - a}{2}$

D. $b = \frac{a - 500}{2}$

24. **The formula** $P = c + m$ **can be used to determine price *P* of an item that costs *c* cents and a markup of *m* cents. The markup on a can of juice is 25 cents. What is an equivalent version of this formula solved for *c*?**

A. $c = \frac{P}{25}$

B. $c = 25P$

C. $c = P - 25$

D. $c = P + 25$

25. When solved for *b*, which equation is equivalent to $h = \frac{2ab}{3}$?

A. $b = \frac{2h}{3a}$

B. $b = \frac{2ah}{3}$

C. $b = \frac{3a}{2h}$

D. $b = \frac{3h}{2a}$

26. Assume that the equation $(x-7)(y+1)=2x+1$ holds true for all values of x and y between -6 and 6. Which expression is equal to y over that domain?

A. $\frac{2x+1}{x-7}$

B. $\frac{x-1}{-6}$

C. $\frac{x+8}{x-7}$

D. $\frac{2x}{x-7}$

27. For a cone with volume V and height h, which expression provides the radius of the base r ?

A. $r=\sqrt{\frac{3V}{\pi h}}$

B. $r=\frac{3V}{2\pi h}$

C. $r=\frac{3V}{\pi h}$

D. $r=\sqrt{\frac{6V}{\pi h}}$

28. **The formula $A=\frac{1}{2}(b_1+b_2)h$ can be used to determine the area of a trapezoid. Solving this equation for b_1 will result in which equation?**

A. $b_1=\frac{2A}{h}-b_2$

B. $b_1=2Ah-b_2$

C. $b_1=\frac{2h}{A}-b_2$

D. $b_1=\frac{1}{2}A-b_2h$

29. What is the equation $y = \frac{3}{4}x + 9$ when it is solved for *x*?

A. $x = \frac{4}{3}y - 36$

B. $x = \frac{4}{3}y - 12$

C. $x = \frac{4}{3}y + 12$

D. $x = \frac{4}{3}y + 36$

30. **To calculate the average speed at which he traveled yesterday, Justin used the equation $d = st$, where *d* is the distance he traveled, *s* is the average speed at which he traveled, and *t* is the time he spent traveling. Which is the same equation solved for *s* in terms of *d* and *t*?**

A. $s = \frac{t}{d}$

B. $s = \frac{d}{t}$

C. $s = dt$

D. $s = d + t$

31. The volume for a cone is given by the equation $V = \frac{1}{3}\pi r^2 h$. Which equation represents this formula in terms of *r*?

A. $r = \sqrt{\frac{V}{3\pi h}}$

B. $r = \sqrt{\frac{3V}{\pi h}}$

C. $r = \left(\frac{V}{3\pi h}\right)^2$

D. $r = \left(\frac{3V}{\pi h}\right)^2$

32. **How are *x* and *y* related in the equation $7(x - y) = 0$?**

A. $x = -y$

B. $x = y$

C. $x = \frac{1}{y}$

D. $y = \frac{1}{x}$

33. **Which equation is equivalent to $6 = \frac{4(z+9)}{y+2}$ when solved for *y*?**

A. $y = \frac{4z-3}{6}$

B. $y = \frac{4z+7}{6}$

C. $y = \frac{2z+12}{3}$

D. $y = \frac{2z+17}{3}$

34. **Which equation is equivalent to $2x + 3y = 12$?**

A. $y = \frac{2}{3}x + 4$

B. $y = -\frac{2}{3}x + 4$

C. $y = -\frac{2}{3}x + 12$

D. $y = \frac{2}{3}x + 12$

35. The formula $W = fd$ can be used to calculate the amount of work it takes to move a force, f, a specific distance, d. Which formula can be used to calculate distance, d?

A. $d = W - f$

B. $d = W + f$

C. $d = Wf$

D. $d = \frac{W}{f}$

36. Which formula represents the equation $r = \frac{1}{2}x + y$, when solved for *y*?

A. $y = \frac{2r}{x}$

B. $y = \frac{r}{2x}$

C. $y = r + \frac{1}{2}x$

D. $y = r - \frac{1}{2}x$

37. The formula $A = prt + p$ represents the total amount of money, *A*, that is in a savings account including the simple interest earned. Which expression represents the time, *t*, the money has been in the account?

A. $\frac{A+pr}{p}$

B. $\frac{A-p}{pr}$

C. $\frac{A-1}{r}$

D. $\frac{A+p}{pr}$

38. **The equation below is used to find *b*, the total number of books collected by two students during a book drive. Marcia collected *x* number of books. Alan collected 5 more than 2 times the number of books Marcia collected.**

$b = x + (2x + 5)$

Which of the following is the same equation solved for *x* in terms of *b*?

A. $x = \frac{b-5}{3}$

B. $x = \frac{b}{3+5}$

C. $x = 3b + 5$

D. $x = 3(b - 5)$

39. The final velocity, *v*, of a marble rolling on a table in a straight line can be calculated using the formula, $v = u + at$, where *u* represents the initial velocity, *a* represents acceleration, and *t* is the time elapsed. Which formula can be used to calculate the acceleration, *a*, of the marble?

A. $a = u - v - t$

B. $a = ut - v$

C. $a = \frac{v}{t} - u$

D. $a = \frac{v-u}{t}$

40. The formula to find the equivalent resistance, *R*, of two resistors with resistances R_1 and R_2 is given by $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$. Which equation gives R_1 in terms of *R* and R_2?

A. $R_1 = R - R_2$

B. $R_1 = \frac{RR_2}{R_2 + R}$

C. $R_1 = \frac{RR_2}{R_2 - R}$

D. $R_1 = \frac{R_2 + R}{RR_2}$

41. **The equation below is used to find *C*, the total cost for printing a quantity of books (*b*).**

$C = 5b + 200$

Which equation is equivalent equation solved for *b* in terms of *C*?

A. $b = \frac{C}{5} - 200$

B. $b = C - \frac{200}{5}$

C. $b = \frac{5}{C - 200}$

D. $b = \frac{C - 200}{5}$

42. **Sam has 100 cheese slices to make sandwiches. The equation below can be used to find *s*, the number of sandwiches he can make based on *c*, the number of cheese slices per sandwich.**

$s = \frac{100}{c}$

Which equation is the same when solved for *c* in terms of *s*?

A. $c = \frac{100}{s}$

B. $c = \frac{s}{100}$

C. $c = 100 - s$

D. $c = s - 100$

43. Which equation is equivalent to $tw + 3xy = z$?

A. $t = z(w - 3xy)$

B. $w = z - \frac{3xy}{t}$, where $t \neq 0$

C. $x = \frac{z - tw}{3y}$, where $t \neq 0$

D. $y = \frac{3(z - tw)}{x}$, where $t \neq 0$

44. **Which is not equivalent to the equation** $P = 2L + 2W$?

A. $L = \frac{P - 2w}{2}$

B. $L = \frac{P}{2W}$

C. $L = \frac{P}{2} - W$

D. $L = (P - 2W)\frac{1}{2}$

45. **Cloud base (*C*) is defined as the distance in feet from sea level to the lowest visible clouds, and depends on the air temperature (*T*) and the dew point (T_d) in degrees Fahrenheit. The formula shown below can be used to calculate this distance.**

$$C = \left(\frac{T - T_d}{4.4}\right) \cdot 1000$$

If the formula is rearranged to solve for the temperature (*T*), which equation is correct?

A. $T = \frac{C}{4400T_d}$

B. $T = 4400C + T_d$

C. $T = 0.0044(C + T_d)$

D. $T = 0.0044C + T_d$

46. **The volume (*V*) of a sphere can be determined by using the formula** $V = \frac{4\pi r^3}{3}$, **where** r **= the radius of the sphere. What is the result of solving this equation for *r*?**

A. $r = \frac{V}{12\pi}$

B. $r = \frac{V - 4\pi}{3}$

C. $r = \sqrt[3]{V - 4\pi}$

D. $r = \sqrt[3]{\frac{V}{4\pi}}$

47. **The equation $d = \frac{m}{v}$ is used to find the density (*d*) of an object using the mass (*m*) and the volume (*v*) of the object. Which is the same equation solved for *v*?**

A. $v = dm$

B. $v = \frac{d}{m}$

C. $v = \frac{m}{d}$

D. $v = m - d$

48. **The formula for the profit *p*, when selling sandwiches at a school fundraising event is $p = 4n - 50$, where *n* is the number of sandwiches sold. Which equation is equivalent to this formula solved for *n*?**

A. $n = \frac{p + 50}{4}$

B. $n = \frac{p - 4}{50}$

C. $n = \frac{p}{4} + 50$

D. $n = \frac{p}{50} - 4$

49. **The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. Which equation correctly describes the height, *h*?**

A. $h = \frac{3V}{\pi r^2}$

B. $h = V - \frac{1}{3}\pi r^2$

C. $h = \frac{V}{3\pi r^2}$

D. $h = \frac{1}{3}V\pi r^2$

50. **If Sonja deposits $1,000 into a savings account at 4% simple interest, how long will it take her to earn $100 in interest? (*I=PRT*)**

A. 0.25 years

B. 2.5 years

C. 25 years

D. 250 years

51. **The volume (*V*) of a cylinder can be determined by using the formula $V = \pi r^2 h$, where r = the radius of the base, and h = the height of the cylinder. What is the result of solving this equation for *r*?**

A. $r = \sqrt{\frac{V}{\pi h}}$

B. $r = \sqrt{V - \pi h}$

C. $r = \frac{V}{2\pi h}$

D. $r = \frac{V - \pi h}{2}$

52. **Solving the formula $P = 2l + 2w$ for *w* is not equivalent to which equation?**

A. $\frac{P-2l}{2} = w$

B. $\frac{P}{2} - \frac{2l}{2} = w$

C. $\frac{1}{2}P - l = w$

D. $P - \frac{1}{2}l = w$

53. **If $y = x^2 + 8$, which statement represents a correct value of *x*?**

A. $x = \sqrt{y-8}$

B. $x = (y-8)^2$

C. $x = y^{\frac{1}{2}} - 8^{\frac{1}{2}}$

D. $x = y^{\frac{1}{2}} - 8$

54. The radius of a black hole can be calculated using the equation $R = \frac{2GM}{c^2}$, where *G* represents the gravity constant, *M* represents mass of the black hole, and *c* represents the speed of light. Which equation can be used to find the value of gravity?

A. $G = \frac{Rc^2}{2M}$

B. $G = \frac{RM}{2c^2}$

C. $G = \frac{2Rc^2}{M}$

D. $G = \frac{2RM}{c^2}$

55. **Solve $\frac{4}{3}p - \frac{3}{4}q = 12$ for *q*.**

A. $q = \frac{16}{9}p - 16$

B. $q = -\frac{16}{9}p + 16$

C. $q = p - 9$

D. $q = -p + 9$

56. Which equation shows $w = 2sr$ solved for s?

A. $s = w - 2r$

B. $s = 2r - w$

C. $s = \frac{w}{2r}$

D. $s = \frac{2w}{r}$

57. **The equation $P = 2l + 2w$ is used to find *P*, the perimeter of a rectangle, using the length (*l*) and the width *(w)* of the rectangle. What is an equivalent equation solved for *w*?**

A. $w = P - 2l$

B. $w = \frac{P}{2} - 2l$

C. $w = \frac{P - 2l}{2}$

D. $w = 2(P - 2l)$

58. **If $\sqrt{64x^2} = z^{\frac{1}{3}}$, what is the value of *x* if $x \geq 0$?**

A. $\frac{1}{8}z^{\frac{1}{3}}$

B. $\frac{1}{64}z^{\frac{1}{3}}$

C. $\frac{1}{8}z^{\frac{1}{12}}$

D. $\frac{1}{\sqrt{8}}z^{\frac{1}{6}}$

59. **What is the solution of the equation $p + r + 2 = 3r - 4 - 3p$ in terms of *r*?**

A. $r = p + 3$

B. $r = p + \frac{1}{2}$

C. $r = 2p + 1$

D. $r = 2p + 3$

60. **Given $M = \frac{a + b + c}{3}$, which equation represents *c* in terms of the other variables?**

A. $c = 3M - a - b$

B. $c = M - \frac{a - b}{3}$

C. $c = \frac{3M}{a + b}$

D. $c = 3M + a + b$

61. Which equation is equivalent to $k = \frac{mv^2}{2}$, when solved for *m*?

A. $m = \frac{2k}{v^2}$

B. $m = \frac{2+k}{v^2}$

C. $m = 2kv^2$

D. $m = 2 + kv^2$

62. **The force of gravitational attraction between two objects, each of mass *m*, is given by the formula $F = \frac{Gm^2}{r^2}$, where *F* is the force of attraction, *G* is a constant, and *r* is the distance between the objects. Which of the following expresses *G* in terms of *F*, *m*, and *r*?**

A. $G = \frac{Fm^2}{r^2}$

B. $G = \frac{Fr^2}{m^2}$

C. $G = \frac{m^2}{Fr^2}$

D. $G = \frac{r^2}{Fm^2}$

63. **What values of *x* satisfy the inequality $x - 2a > 2x - a$?**

A. $x < -a$

B. $x > -a$

C. $x < a$

D. $x > a$

64. Which equation is equivalent to $H = \frac{T-L}{3}$ when solving for *T*?

A. $T = \frac{H}{3} + L$

B. $T = \frac{H+L}{3}$

C. $T = 3(H+L)$

D. $T = 3H + L$

65. The period of a pendulum T, in seconds, is the time it takes for a pendulum of length L to make a complete swing back and forth and is given by the formula $T = 2\pi\sqrt{\frac{L}{g}}$, where g is the acceleration of gravity.

What will be the length L', of a pendulum that has a period of T' seconds?

A. $L' = \frac{gT'^2}{4\pi^2}$

B. $L' = \frac{gT'^2}{2\pi}$

C. $L' = \frac{T'g^2}{4\pi^2}$

D. $L' = \frac{T'g^2}{2\pi}$

66. **The Cervantes family is taking a road trip. They plan to stop for 30 minutes every 2 hours. They drive an average of 63 mph. An equation representing their total time (in hours) is $t = \frac{d}{r} + \frac{s}{2}$, where *d* is the distance, *r* is the rate, *s* is the number of stops, and *t* is the time. How far will they travel after 14 hours with 5 stops?**

A. 787.5 miles
B. 756.0 miles
C. 724.5 miles
D. 693.0 miles

67. **The surface area, *S*, of a cylinder is calculated using the formula $S = 2\pi rl + 2\pi r^2$. Which equation is equivalent to this formula solved for *l*, the length of the cylinder?**

A. $l = \frac{S - 2\pi r}{2\pi r^2}$
B. $l = \frac{S - 2\pi r}{r}$
C. $l = \frac{S - 2\pi r^2}{2\pi r}$
D. $l = \frac{S}{2\pi r} - 2\pi r^2$

68. **If $x = \frac{1}{2y}$, which expression represents $\frac{1}{x}$?**

A. $\frac{1}{2y}$
B. $-\frac{1}{2y}$
C. $2y$
D. $-2y$

69. **The formula for the volume of a square pyramid in cubic units, *V*, is $V = \frac{1}{3}x^2h$. Which equation is equivalent to this formula solved for *h*?**

A. $h = \frac{3V}{x^2}$

B. $h = \frac{V}{3x^2}$

C. $h = V - \frac{1}{3}x^2$

D. $h = 3V - x^2$

70. **Which equation is equivalent to $Ax + By = C$?**

A. $y = \frac{C}{B} - \frac{A}{B}x$

B. $y = \frac{C - Bx}{A}$

C. $y = \frac{C - A}{B}x$

D. $y = \frac{C}{A + B}x$

71. **The formula for the perimeter (*P*) of a rectangle is $P = 2L + 2W$. What should be the first step when solving for *W*?**

A. $P + 2L = 2W$

B. $P - 2L = 2W$

C. $P + 2W = 2L$

D. $P - 2W = 2L$

72. Which equation is equivalent to $U_s = \frac{1}{2}kx^2$?

A. $k = \frac{2U_s}{x^2}$

B. $k = \frac{U_s}{2x^2}$

C. $k = U_s - \frac{1}{2}x^2$

D. $k = 2U_s - x^2$

73. **The distance *d* that an object travels in *t* seconds is given by the formula $d = \frac{1}{2}at^2$, where *a* is the acceleration of the object. Which of the following expresses *a* in terms of *d* and *t*?**

A. $a = 2dt^2$

B. $a = \frac{d}{2t^2}$

C. $a = \frac{2d}{t^2}$

D. $a = \frac{dt^2}{2}$

74. **The volume (*V*) of a cone can be determined by using the following formula.**

$$V = \frac{\pi r^2 h}{3}$$

Where *r* = the radius of the base, and *h* = the height of the cone, what is the result of solving this equation for *h*?

A. $h = 3V - \pi r^2$

B. $h = V + 3 - \pi r^2$

C. $h = \frac{3V}{\pi r^2}$

D. $h = \frac{V+3}{\pi r^2}$

75. **The equation below is used to find *S*, the sum of the measures of the interior angles of a polygon with *n* sides.**

$$S = 180(n-2)$$

Which equation is equivalent when solved for *n* in terms of *S*?

A. $n = 180S + 2$

B. $n = 180(S+2)$

C. $n = \frac{S+2}{180}$

D. $n = \frac{S}{180} + 2$

76. **Relative humidity (*R*) is used to indicate how much water vapor is in the air. It can be approximated using the formula shown below.**

$$R = 100\left(\frac{112 - 0.1T + T_d}{112 + 0.9T}\right)^8$$

***T* is the temperature and T_d is the dew point in degrees Celsius. This formula can be rearranged to solve for the dew point when the relative humidity is known. Which formula has been correctly solved for T_d?**

A. $T_d = \frac{\sqrt[8]{100R}}{112 + 0.9T} - 112 + 0.1T$

B. $T_d = \sqrt[8]{\frac{R}{100}}(112 + 0.9T) - 112 + 0.1T$

C. $T_d = \sqrt[8]{\frac{R}{100}}(112 + 0.9T) - 112 + 0.1T$

D. $T_d = 0.1T - 112 + \sqrt[8]{\frac{R}{100}}(112 + 0.9T)$

77. **A student wants to solve for *y* in the equation below.**

$5(y+3)=10x$

Which operation should be performed first to solve for the variable *y* using the fewest possible steps?

A. multiplying 10*x* by 5
B. dividing both sides by 5
C. multiplying $(y+3)$ by 5
D. subtracting 3 from both sides

78. **Solving the interest formula, $I=prt$, for the variable t will result in which equation?**

A. $t = Ipr$
B. $t=\frac{I}{pr}$
C. $t=I-pr$
D. $t=\frac{I}{p}r$

79. **If $V=\pi r^2 h$, which of the following is an equivalent equation?**

A. $h=V-\pi r^2$
B. $h=\frac{V}{\pi r^2}$
C. $r=\frac{V}{2\pi r}$
D. $r=V-\pi h$

80. The formula for finding the surface area of a right circular cylinder is $S=2\pi r^2+2\pi rh$, where *S* represents the surface area, *r* represents the radius, and *h* represents the height of the cylinder. Which equation can be used to find the height of a right circular cylinder in terms of its surface area and radius?

A. $h=\frac{S}{2\pi r}$
B. $h=\frac{S}{2\pi r}-r$
C. $h=\frac{S}{2\pi r}-r^2$
D. $h=\frac{S}{2\pi}-r^2-r$

81. **Solve $-4x - 8y = 24$ for *y*.**

A. $y = -\frac{1}{2}x - 3$

B. $y = -\frac{1}{2}x + 3$

C. $y = \frac{1}{2}x - 3$

D. $y = \frac{1}{2}x + 3$

82. Consider the following equation:

$$Q = \frac{r(t_1 + t_2)}{p}$$

Which choice correctly expresses the quantity t_1 in terms of the other quantities?

A. $t_1 = QPr - t_2$

B. $t_1 = \frac{Pr - t_2}{Q}$, where $Q \neq 0$

C. $t_1 = QP - rt_2$

D. $t_1 = \frac{QP}{r} - t_2$, where $r \neq 0$

83. **Which equation is equivalent to $4(p + 8) = 2(r - 6)$ when solved for *r*?**

A. $r = 2p + 7$

B. $r = 2p + 19$

C. $r = 2p + 22$

D. $r = 2p + 28$

84. The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$, where h is the height of the trapezoid, and b_1 and b_2 are the base lengths of the trapezoid. Which formula can be used to find the length of b_1?

A. $b_1 = 2\frac{A}{h} - b_2$

B. $b_1 = 2\frac{Ah}{b_2}$

C. $b_1 = \frac{A}{2h} - b_2$

D. $b_1 = 2A - \frac{b_2}{h}$

85. Nicki used the equation $v = at + v_0$, where v is velocity at time t, a is acceleration, and v_0 is velocity at time 0. Given the equation, which could be used to find the acceleration of an object?

A. $a = \frac{v}{t} - v_0$

B. $a = \frac{v}{t} + v_0$

C. $a = \frac{v - v_0}{t}$

D. $a = \frac{v + v_0}{t}$

86. **The weight of an object depends on the mass and force of gravity. The equation below is used to find *w*, the weight of an object if *m*, the mass of the object, and *g*, the force of gravity, are known.**

$w = mg$

Which equation could be used to find *m* in terms of *w* and *g*?

A. $m = \frac{w}{g}$

B. $m = \frac{g}{w}$

C. $m = \frac{1}{wg}$

D. $m = wg$

87. **Jared has 27 baseball cards. Each month he buys 3 new cards. The equation below can be used to find *n*, the number of baseball cards that Jared has after *m* months.**

$n = 27 + 3m$

Which equation can be used to find *m*?

A. $m = \frac{n-3}{27}$

B. $m = n - 9$

C. $m = \frac{n}{3} - 27$

D. $m = \frac{n}{3} - 9$

88. According to Graham's law, the rate of diffusion of two gases is inversely proportional to density and is given by $\frac{r_1}{r_2} = \sqrt{\frac{d_2}{d_1}}$, where r_1 and r_2 are rates of diffusion of two gases and d_1 and d_2 are their respective densities. Which equation represents d_1 in terms of the other variables?

A. $d_1 = \frac{d_2(r_1)^2}{(r_2)^2}$

B. $d_1 = \frac{d_2(r_2)^2}{(r_1)^2}$

C. $d_1 = \frac{d_2 r_1}{r_2}$

D. $d_1 = \frac{d_2\ r_2}{r_1}$

89. **If $z^{\frac{1}{3}} = y - 2x^3$, what is the value of *z*?**

A. $z = 3\left(y - 2x^3\right)$

B. $z = \left(y - 2x^3\right)^3$

C. $z = \left(y - 2x^3\right)^{\frac{1}{3}}$

D. $z = \frac{1}{3}\left(y - 2x^3\right)$

90. Which equation is equivalent to $y = \frac{x}{4} + c$, when solved for *x*?

A. $x = \frac{y - c}{4}$

B. $x = \frac{y + c}{4}$

C. $x = 4y - c$

D. $x = 4y - 4c$

91. **The surface area (*SA*) of a rectangular prism can be determined by using the formula, where *l* = length, *w* = width, and *h* = height.**

$SA = 2(lw + lh + hw)$

What is the result of solving this equation for *h*?

A. $h = \frac{SA}{2(l+w)} - \frac{lw}{l+w}$

B. $h = \frac{SA - 2 - lw}{l+w}$

C. $h = \frac{SA}{2} - lw - (l+w)$

D. $h = SA - 2 - lw - (l+w)$

92. **What values of *x* satisfy the inequality** $4x < 3a + x$?

A. $x < \frac{3}{5}a$

B. $x > \frac{3}{5}a$

C. $x < a$

D. $x > a$

93. **Which equation is a simplified version of** $4a + 3b = 6b - 9a$?

A. $13a = 9b$

B. $13a = 3b$

C. $-5a = 9b$

D. $-5a = 3b$

94. What equation shows $J = \sigma(E + vB)$ solved for *B*?

A. $B = \frac{J - \sigma}{E + v}$

B. $B = \frac{J}{\sigma} - E - v$

C. $B = \frac{\frac{J}{\sigma} - E}{v}$

D. $B = \frac{E + v}{J - \sigma}$

95. The eccentricity of an ellipse is the measure of how circular the ellipse is.

The ecccentricity e can be represented by the equation $e = \frac{\sqrt{a^2 - b^2}}{a}$,

where a is the length of the major axis of the ellipse and b is the length of the minor axis. Which equation represents the formula in terms of b?

A. $b = ie$

B. $b = a(1 - e)$

C. $b = a\sqrt{1 - e^2}$

D. $b = \sqrt{a^2 - e^2}$

96. Which equation is equivalent to $P = \frac{1}{3}(q + 4r)$?

A. $r = \frac{1}{3}P - q$

B. $r = 4 - \frac{1}{3}Pq$

C. $r = \frac{3P - q}{4}$

D. $r = \frac{3P + q}{4}$

97. The lid of a cylindrical oil barrel broke. The barrel has a volume of V cubic inches and a height of h inches. Which equation can be used to find the diameter, d, of the lid required to cover the barrel?

A. $d = \sqrt{\frac{V}{\pi h}}$

B. $d = 2\sqrt{\frac{V}{\pi h}}$

C. $d = 4\sqrt{\frac{V}{\pi h}}$

D. $d = \frac{1}{2}\sqrt{\frac{V}{\pi h}}$

98. The kinetic energy, *E*, of a falling ball is given as $E = \frac{1}{2}mv^2$. where *m* is the mass and *v* is the velocity of the ball. Which of these equations can be used to find the velocity of the ball?

A. $v = \sqrt{\frac{2E}{m}}$

B. $v = 2\sqrt{\frac{E}{m}}$

C. $v = 2\frac{E^2}{m^2}$

D. $v = 4\frac{E^2}{m^2}$

99. **Solve the equation $4w - \frac{2}{3}x = \frac{4}{3}(x - 24)$ for *w*.**

A. $w = \frac{1}{6}x - 8$

B. $w = \frac{1}{2}x - 6$

C. $w = \frac{1}{2}x - 8$

D. $w = \frac{2}{5}x + 8$

100. Solve the equation $2y + 5x = 16$ for the variable *y*?

A. $y = \frac{2}{5}x + 8$

B. $y = -\frac{5}{2}x + 8$

C. $y = \frac{5}{2}x + 8$

D. $y = -\frac{2}{5}x + 8$

101. **To find a shoe size, the manufacturer uses the equation $S = 3f - 22$, where *S* represents the shoe size and *f* represents the heel-to-toe length of the foot, in inches. Which of the following is the same equation solved for f in terms of *S*?**

A. $f = \frac{3}{S + 22}$

B. $f = S\frac{22}{3}$

C. $f = \frac{S}{3} + 22$

D. $f = \frac{S + 22}{3}$

102. Which equation, when solved for *x*, is equivalent to $\frac{x}{p} - 6 = m + 4$?

A. $x = mp - 2$

B. $x = mp - 2p$

C. $x = mp + 10p$

D. $x = mp + 10$

103. **If $4x - 2y = 6$, then $y =$**

A. $2x + 6$

B. $2x - 6$

C. $2x + 3$

D. $2x - 3$

104. **The relationship between *F*, the temperature in degrees Fahrenheit, and *k*, the temperature in kelvins, is given by the equation $F - 32 = \frac{9}{5}(k - 273.15)$. Which of the following expresses *k* in terms of *F*?**

A. $k = \frac{9}{5}(F - 32) - 273.15$

B. $k = \frac{5}{9}(F - 32) + 273.15$

C. $k = \frac{5F - 32}{9} + 273.15$

D. $k = \frac{5}{9}(F + 241.15)$

105. **The formula $A = lw$ is used to calculate the area *A* of a rectangular surface using the length (*l*) and the width (*w*) of the surface. Which formula could be used to find *w* in terms of *A* and *l*?**

A. $w = \frac{l}{A}$

B. $w = \frac{A}{l}$

C. $w = Al$

D. $a = Al$

106. **The surface area of a cone, *S*, is given by the formula $S = \pi r^2 + \pi r \ell$, where *r* is the radius of the base and ℓ is the slant height of the cone. Which of the following expresses ℓ in terms of *S* and *r*?**

A. $\ell = S - r$

B. $\ell = \frac{S}{\pi r}$

C. $\ell = \frac{S}{\pi r} - \pi r^2$

D. $\ell = \frac{S - \pi r^2}{\pi r}$

107. **Which equation is equivalent to $\frac{3}{5} = \frac{x+1}{y-2}$ when solved for *x*?**

A. $x = \frac{3y-3}{5}$

B. $x = \frac{3y-11}{5}$

C. $x = \frac{3y-1}{5}$

D. $x = \frac{3y-5}{5}$

108. **The pressure a shoe heel applies to the floor depends on the weight on the heel and the surface area of the tip of the heel. The equation below can be used to find *p*, the pressure applied, based on *w*, the weight, and *a*, the surface area of the tip of the heel.**

$$p = \frac{w}{a}$$

Which equation is equivalent when solved for *w* in terms of *p* and *a*?

A. $w = pa$

B. $w = \frac{p}{a}$

C. $w = \frac{a}{p}$

D. $w = p + a$

109. **An equation for determining the distance, *d*, a plane travels at rate, *r*, in a direction with an average tailwind of 10 miles per hour is shown below.**

$$d = (r + 10)t$$

Which equation is equivalent to $d = (r + 10)t$ when solved for *r*?

A. $r = d - 10t$

B. $r = \frac{d}{t} - 10$

C. $r = \frac{(d-t)}{10}$

D. $r = \frac{d-10}{t}$

110. **The mean (average) of *x*, *y*, and *z* is *t*. What is the value of *x* in terms of *y*, *z*, and *t*?**

A. $x = t + y + z$

B. $x = z - y - t$

C. $x = 3z - y - t$

D. $x = 3t - y - z$

111. **Brittany had 7 rolls of quarters and 4 extra quarters. She used the equation $n = 7q + 4$ to find *n*, the number of quarters she had altogether. Which equation could she use to find *q*, the number of quarters in each roll?**

A. $q = 7n + 4$

B. $q = 7n - 4$

C. $q = \frac{n-4}{7}$

D. $q = \frac{7}{n-4}$

112. **Wind turbines convert wind energy into a useful energy like electricity. The formula for wind power is shown below.**

$P = 0.5DEVA^3$

***D* stands for density, *E* for energy efficiency, *V* for wind velocity and *A* for windmill area. Which option shows this formula correctly rearranged to solve for wind velocity, *V*?**

A. $V = \frac{2DEA^3}{P}$

B. $V = \frac{P}{2DEA^3}$

C. $V = \frac{DEA^3}{2P}$

D. $V = \frac{2P}{DEA^3}$

113. What is the value of *x* in the equation $rx + 7 = pq - 10$?

A. $x = rpq - 17r$

B. $x = rpq - 3r$

C. $x = \frac{pq - 17}{r}$

D. $x = \frac{pq - 3}{r}$

114. **The formula for the area of a trapezoid is $A = \frac{h}{2}(b_1 + b_2)$. Which equation correctly describes the height, *h*?**

A. $h = \frac{A}{2(b_1 + b_2)}$

B. $h = \frac{2A}{b_1 + b_2}$

C. $h = 2A - b_1 - b_2$

D. $h = \frac{A}{2} - b_1 - b_2$

115. The equation $F = \frac{9}{5}C + 32$ shows the relationship between the temperature in degrees Celsius (*C*) and the same temperature measured in degrees Fahrenheit (*F*). Which equation correctly solves the formula for *C* in terms of *F*?

A. $C = \frac{5}{9}F - 32$

B. $C = \frac{9}{5}F - 32$

C. $C = \frac{5}{9}(F - 32)$

D. $C = \frac{9}{5}(F - 32)$

116. **Wesley had a box in the shape of a rectangular prism with a volume of 315 cubic inches. He found this volume by using the equation $v = lwh$, where l is the length, *w* is the width, and *h* is the height of the box. Which equation is equivalent when solved for *h*?**

A. $h = \frac{315}{lw}$

B. $h = \frac{315l}{w}$

C. $h = \frac{315w}{l}$

D. $h = \frac{lw}{315}$

117. The electrical resistance of a wire changes with a change in temperature and is given by the relation $R = R_0\left(1 + a\left(T - T_0\right)\right)$, where a = temperature coefficient of resistance. Which of these equations can be used to find the value of a?

A. $a = \frac{R - R_0}{T - T_0}$

B. $a = \frac{R - R_0}{R_0\left(T - T_0\right)}$

C. $a = \frac{R - \left(T - T_0\right)}{R_0}$

D. $a = \frac{R - R_0\left(T - T_0\right)}{R_0}$

118. The kinetic energy, E, of an object having mass m and moving with velocity v is given by the formula $E = \frac{1}{2}mv^2$. Which expression can be used to find the velocity?

A. $\sqrt{\frac{2E}{m}}$

B. $\frac{\sqrt{2E}}{m}$

C. $\frac{4E^2}{m}$

D. $\frac{4E^2}{m^2}$

119. Which equation is equivalent to $K = \frac{3gy}{5f}$?

A. $g = \frac{3y}{5fK}$

B. $g = \frac{3Ky}{5f}$

C. $g = \frac{5fK}{3y}$

D. $g = \frac{5f}{3Ky}$

120. The formula for simple interest is $I = Prt$, where I is interest, P is principal, r is interest rate, and t is time in years. Which equation can be used to calculate principal, P?

A. $P = \frac{I}{RT}$

B. $P = \frac{T}{RI}$

C. $P = \frac{TI}{R}$

D. $P = RTI$

121. **The area (*A*) of a trapezoid can be determined by using the following formula.**

$$A = \frac{h(b_1 + b_2)}{2}$$

Where *h* = the height, b_1 = the length of one base, and b_2 = the length of the other base of the trapezoid, what is the result of solving this equation for *h*?

A. $h = 2A - (b_1 + b_2)$

B. $h = A + 2 - (b_1 + b_2)$

C. $h = \frac{A + 2}{(b_1 + b_2)}$

D. $h = \frac{2A}{(b_1 + b_2)}$

122. Newton's Second Law, $F = m \cdot a$, describes the relationship between an object's mass, a force acting on it, and the resulting acceleration, where:

F is force, in Newtons

m is mass, in kilograms

a is acceleration, in meters per second squared

A young boy and his tricycle have a combined mass of 30 kilograms. If the boy's sister gives him a push with a force of 60 Newtons, what is his acceleration?

A. $\frac{1}{2}$ meter per second squared

B. 2 meters per second squared

C. 30 meters per second squared

D. 90 meters per second squared

123. Which expression represents the value of *x* in the equation $ax + b = c$?

A. $\frac{c-b}{a}$

B. $\frac{b+c}{a}$

C. $\frac{a}{c-b}$

D. $\frac{a}{b+c}$

124. **The cost, *c*, of renting a bicycle and a helmet for *h* hours is given by the formula $c = 7.50h + 3$. Which equation is equivalent to this formula when solved for *h*?**

A. $h = \frac{c-3}{7.50}$

B. $h = \frac{c-7.50}{3}$

C. $h = \frac{c}{7.50} - 3$

D. $h = \frac{c}{3} - 7.50$

125. The formula that describes an object's motion is given by $S = ut + \frac{1}{2}at^2$, where S is the distance traveled, u is the initial velocity, a is the acceleration, and t is the time. Which equation represents a in terms of the other variables?

A. $a = \frac{2S - 2u}{t}$

B. $a = \frac{2S + 2u}{t}$

C. $a = \frac{2S - 2ut}{t^2}$

D. $a = \frac{2S + 2ut}{t^2}$

126. **The mean test score, *a*, for three tests, *b*, *c*, and *d*, is calculated using the formula $a = \frac{b + c + d}{3}$ Which equation is equivalent to this formula solved for *d*, the score on the last test?**

A. $d = 3a - 3b - 3c$

B. $d = 3a + 3b + 3c$

C. $d = 3a + b + c$

D. $d = 3a - b - c$

127. **The formula for determining the kinetic energy, *k*, of an object with mass, *m*, moving at velocity, *v*, is shown.**

$$k = \frac{1}{2}mv^2$$

Which equation is equivalent to this formula when solved for the mass, *m*?

A. $m = \frac{k}{2v^2}$

B. $m = \frac{2k}{v^2}$

C. $m = k - \frac{1}{2}v^2$

D. $m = 2k - v^2$

128. **The volume (*V*) of a rectangular pyramid can be determined by using the following formula.**

$$V = \frac{lwh}{3}$$

Where *l* = the length of the rectangle, *w* = the width of the rectangle, and *h* = the height of the pyramid, what is the result of solving this equation for *w*?

A. $w = 3V - lh$

B. $w = V + 3 - lh$

C. $w = \frac{V+3}{lh}$

D. $w = \frac{3V}{lh}$