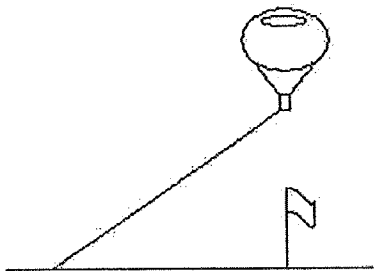
Algebra I/Integrated I TMTA Test 2019

1. Simplify the given expression completely. $7x - 2x^2 - x$
   A. $6x^2 - 2x$
   B. $4x$
   C. $6x - 2x^2$
   D. $2x^2 + 6x$
   E. $8x - 2x^2$

2. A balloon is secured to rope that is staked to the ground. A breeze blows the balloon so that the rope is taut while the balloon is directly above a flag pole that is 20 feet from where the rope is staked down. Find the altitude of the balloon if the rope is 50 feet long.

   A. $\sqrt{2900}$ feet
   B. 30 feet
   C. $\sqrt{2100}$ feet
   D. 210 feet
   E. 900 feet



3. The greatest common factor of 2^{2004} *and* 2^{2005} is
   A. 1
   B. 2
   C. 2^{2004}
   D. 2^{2005}
   E. 2^{4009}

4. Choose the phrase that is true about whether or not the two expressions are equivalent.

   $$(2x - 7)(3x + 1) \text{ and } (3x + 1)(2x + 7)$$

   A. They are equivalent because of the commutative property of multiplication.
   B. They are not equivalent because products must always be multiplied left to right. They cannot be multiplied right to left.
   C. They are not equivalent because the expressions are products with two factors, one of which is a common factor and one of which is a different factor.
   D. They are not equivalent because binomials that have different signs cannot be multiplied.
   E. They are equivalent because the $3x + 1$ is a factor in both products.

5. Multiply and simplify completely: $(a-b)^2$

   A. $a^2+2ab+b^2$

   B. a^2+b^2

   C. a^2-b^2

   D. $a^2-2ab+b^2$

   E. a^2b^2

6. Simplify completely: $(-8x^8y^4z)^2$

   A. $-64x^{16}y^8z^2$

   B. $-8x^{10}y^8z$

   C. $16x^{16}y^8z^2$

   D. $64x^{16}y^8z^2$

   E. $-16x^{16}y^8z^2$

7. Simplify completely: $(8x^3+2x^5-7+5x^4)-(3-2x^4+6x^5-3x^3)$

   A. $-4x^5+3x^4+5x^3-4$

   B. $-4x^5+7x^4+11x^3-10$

   C. $8x^5+3x^4+5x^3-10$

   D. $8x^5+3x^4+5x^3-4$

   E. $-4x^5+7x^4+11x^3-4$

8. Simplify the fraction: $\frac{9+\frac{3}{x}}{\frac{x}{4}+\frac{1}{12}}$

   A. 36

   B. $\frac{36}{x}$

   C. $\frac{x}{36}$

   D. 1

   E. $\frac{3x}{4}$

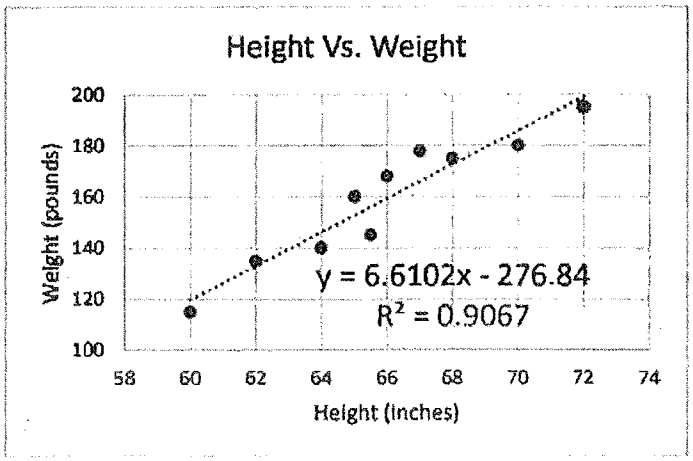
9. Solve the equation: $3^{-|x+2|} = \frac{1}{9}$

A. $x = 1, -1$
B. $x = 2, -2$
C. $x = 3, -3$
D. $x = -4, 0$
E. $x = 4, -4$

10. Kimberly invested $3000 in her savings account for 4 years. When she withdrew it, she had $3492.48. Interest was compounded continuously. What was the interest rate on the account? Round to the nearest tenth of a percent.

A. 3.6%
B. 3.7%
C. 3.8%
D. 3.9%
E. 4.0%

11. Correctly interpret the equation of the line that relates teen height and weight.



A. If a teen grows an inch, they can expect to lose 276 pounds.
B. If a teen grows an inch, they can expect to gain 0.9067 lbs.
C. If a teen grows two inches, they can expect to gain 6.6102 lbs.
D. The y-intercept of this line is 6.6102.
E. If a teen grows an inch, they can expect to gain 6.6102 pounds.

12. Perform the indicated operations.

$$[(8x^8 + 8) - (12x^7 + 7x^2)] - [(4x^8 - 7x^4 + 7x) + (7x + 11)(7x - 1)]$$

A. $4x^8 + 12x^7 - 7x^4 - 56x^2 - 77x+19$

B. $4x^8 - 12x^7 + 7x^4 - 56x^2 - 77x+19$

C. $4x^8 - 12x^7 + 7x^4 + 56x^2 + 4x+19$

D. $-4x^8 + 12x^7 - 7x^4 - 14x^2 - 4x+19$

E. $-4x^8 + 12x^7 + 7x^4 - 56x^2 - 11x+19$

13. Multiply: $(5x^8)(-2x)(3x^8)$

A. $-30x^{17}$

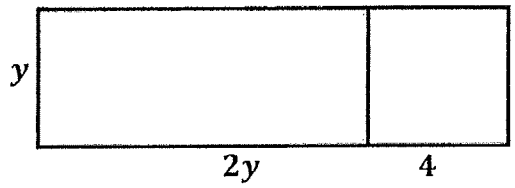
B. $-30x^{34}$

C. $-30x^{16}$

D. $30x^{15}$

E. $-30x^{65}$

14. Write an expression for the area of the larger rectangle below in two different ways.



A. $y(2y + 4);\ 2y^2 + 4y$

B. $2y(y + 4);\ 2y^2 + 4y$

C. $4(2y + y);\ 8y^2 + 4y$

D. $2y(4y + 8);\ 8y^2 + 16y$

E. $y(2y + y);\ 3y^2$

15. Find the product: $(5y^3 - 8y^2 + 6y - 1)(3y + 9)$

A. $-30y^4 + 48y^3 - 36y^2 + 6y$

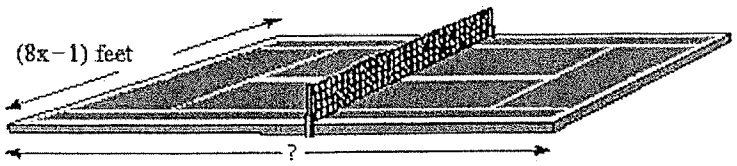
B. $-30y^4 - 96y^3 + 72y^2 - 12y$

C. $15y^4 + 21y^3 + 54y^2 + 51y - 9$

D. $15y^4 + 48y^3 + 72y^2 - 12y + 9$

E. $15y^4 + 21y^3 - 54y^2 + 51y - 9$

16. The area of the playing surface of the tennis court shown is $(64x^2 + 16x - 3)$ square feet. If its width is $(8x - 1)$ feet, find its length.



A. $(8x - 3)$ feet
B. $(24x + 3)$ feet
C. $(8x + 3)$ feet
D. $(64x^2 + 16x + 3)$ feet
E. $(24x - 3)$ feet

17. The sum of the lengths of the edges of a cube is L. Find the volume of this cube.

A. $\frac{L^3}{4096}$
B. $\frac{L^3}{1728}$
C. $\frac{L^3}{512}$
D. $\frac{L^3}{27}$
E. $\frac{L^3}{3}$

18. Which of the following are true about the definition of function, domain and range?

A. A function is a linear equation which is not a vertical line.
B. A function is a set of ordered pairs in which each *x*-coordinate has exactly one *y*-coordinate.
C. The domain of a function is the set of all *x*-coordinates for the relation.
D. The domain of a function is the set of coordinates which allow the function to pass the vertical line test.
E. The range of a function is the set of all *y*-coordinates for the relation.
F. The range of a function is f(*x*).

A. A, C, and E are true.
B. B, C, and E are true.
C. B, D, and F are true.
D. Only C and D are true.
E. Only B is true.

19. It is the end of the budgeting period for John Smith, and he has $450 left in his budget for car rental expenses. He plans to spend this budget on a sales trip throughout the country. He will rent a car that costs $45.00 per day and $0.50 per mile, and he can spend no more than $ 450. Identify the inequality that must be solved and one correct solution.
    A. $45.00x + 0.50\,y \leq 450$; 5 days and 400 miles
    B. $45.00x + 0.50\,y < 450$; 2 days and 600 miles
    C. $45.00x + 0.50\,y \geq 450$; 6 days and 800 miles
    D. $45.00x + 0.50\,y < 450$; 7 days and 250 miles
    E. $45.00x + 0.50\,y \leq 450$; 8 days and 300 miles

20. Find the slopes of the lines that are parallel and perpendicular to the line through the pair of points: (- 3,4) and (- 2,- 4)
    A. Parallel: $-\frac{1}{8}$; perpendicular: 8
    B. Parallel: 8; perpendicular: $-\frac{1}{8}$
    C. Parallel: $\frac{1}{8}$; perpendicular: $-\frac{1}{8}$
    D. Parallel: -8; perpendicular: $\frac{1}{8}$
    E. Parallel: -8; perpendicular: 8

21. The approach ramp used by a daredevil motorcyclist for flying over a collection of flaming railroad ties has a rise of 35 feet for every 50 feet in horizontal distance. Find the grade of the ramp. Round to the nearest whole percent.
    A. 1%
    B. 70%
    C. 75%
    D. 40%
    E. 14%

22. The amount of water used to take a shower varies directly as the amount of time that the shower is in use. A shower lasting 21 minutes requires 12.6 gallons of water. Find the amount of water used in a shower lasting 5 minutes.
    A. 3.6 gallons
    B. 2.4 gallons
    C. 10.5 gallons
    D. 3 gallons
    E. 59.92

23. Suppose you mix an amount of candy that costs \$0.44 a pound with candy that costs \$0.64 a pound. Which of the following costs per pound could result?

A. \$0.31, \$0.65
B. \$0.53
C. \$0.65
D. \$0.31
E. \$0.53, \$0.65, \$0.31

24. In the box on the right, which statements represent functions?

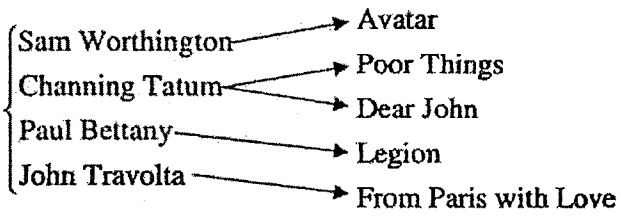
A. II and IV
B. III and IV
C. I, II, and III
D. I, III, and IV
E. I and III

I. $\{(-5,7),(-2,-1),(3,-6),(4,7)\}$

II. $x = y^2 + 2y + 1$

III. $y = x^2 + 2x + 1$

IV.



25. Multiply and divide as indicated, then write the rational expression in lowest terms:

$$\frac{9x^2 - 25}{x^2 - 11x + 30} \times \frac{x^2 - 4x - 12}{3x^2 + x - 10} \div \frac{3x^2 + 8x + 5}{5 - x}$$

A. $-(x + 1)$
B. $x + 1$
C. $-\frac{1}{x+1}$
D. $\frac{1}{x+1}$
E. $\frac{5-x}{x+1}$

26. A rocket is fired upward from the ground with an initial velocity of 200 feet per second. Neglecting air-resistance, the height of the rocket at any time t can be described in feet by the polynomial $-16t^2 + 200t$. Find the height of the rocket at different times shown in the table. Then explain what happens to the height of the rocket as time passes.

Time, t (in seconds)	Height $-16t^2+200t$ ft
1	
5	
7.6	
10.3	

A. Initially, the rocket increases in height, but gravity continually slows the rocket until it eventually begins to fall back to the ground, thus decreasing its height over time.
B. The force due to gravity increases over time. So, the rocket increases height at first, and then decreases height over time.
C. As time increases the rocket collects particulate pollutants from the atmosphere and becomes heavier. So, the rocket increases height at first, and then decreases height over time.
D. The force due to gravity increases as the altitude increases. So, the rocket increases height at first, and then decreases height over time.
E. The rocket increases height because it becomes lighter as it burns fuel, but as the fuel runs out gravity pulls the rocket back down. So, the rocket increases height at first, and then decreases height over time.

27. The side of a square equals the length of a rectangle. The width of the rectangle is 4 centimeters longer than its length. The sum of the areas of the square and the rectangle is 126 square centimeters. Find the side of the square.
A. 49 cm
B. 2 cm
C. 9 cm
D. 7 cm
E. 14 cm

28. A window washer accidentally drops a bucket from the top of a 400-foot building. The height h of the bucket after t seconds is: $h = -16t^2 + 400$. After how many seconds will the bucket hit the ground?
A. -5 seconds
B. 80 seconds
C. 5 seconds
D. 24 seconds
E. 12 seconds

29. Solve the inequality: $7 + |4x - 7| \leq 20$

A. $(-\infty, \frac{3}{2}) \cup (5, \infty)$

B. $(-\infty, \frac{3}{2}] \cup [3, \infty)$

C. $\left[-\frac{3}{2}, 5\right]$

D. $\left\{x | x = -\frac{3}{2}, 5\right\}$

E. $\left(-\frac{3}{2}, 5\right)$

30. A basket of nuts contains only walnuts and pecans. Originally, the ratio of walnuts to pecans is 5 to 19. After 23 more pecans are added to the mix, the ratio of walnuts to pecans becomes 10 to 61. Which one of the following systems could be used to determine the original number of walnuts and pecans? Let w represent the original number of walnuts and p represent the original of pecans.

A. $\begin{cases} 10w = 61(p + 23) \\ 5p = 19w \end{cases}$

B. $\begin{cases} 61w = 10(p + 23) \\ 5p = 19w \end{cases}$

C. $\begin{cases} 61w = 10(p + 23) \\ 19p = 5w \end{cases}$

D. $\begin{cases} 10w = 61(p + 23) \\ 19p = 5w \end{cases}$

E. $\begin{cases} 10w = 23(p + 61) \\ 5w = 19p \end{cases}$

31. The cost, C(x), for manufacturing x units of a certain product is given by $C(x) = x^2 - 10x + 600$, and the units sell for \$95 per unit. Find the number of units manufactured at a cost of \$7800 and the profit or loss from the manufacture and sale of those units.

A. 70 units; \$4950
B. 90 units; \$200
C. 20 units; -\$1900
D. 90 units; \$750
E. 70 units; \$6650

32. Suppose z varies directly as x and inversely as the square of y.

If $z = 2$ when $x = 36$ and $y = 3$, find z when $x = 24$ and $y = 2$.

A. 12
B. 6
C. 3
D. 2
E. None of these

33. One conveyor belt can move 1000 boxes in 11 minutes. Another can move 1000 boxes in 10 minutes. If another conveyor belt is added and all three belts are used, 1000 boxes are moved in 3 minutes. How long would it take the third conveyor belt alone to do the same job?

A. $7\frac{1}{47}$ minutes
B. $\frac{47}{330}$ minutes
C. $1\frac{57}{173}$ minutes
D. $\frac{173}{330}$ minutes
E. $7\frac{47}{330}$ minutes

34. Perform the indicated operation and simplify completely: $\frac{4x^2-y^2}{8a^3b} \div \frac{4x^2+4xy+y^2}{4ab^2}$

A. $\frac{2a^2(2x+y)}{b(2x-y)}$
B. $\frac{2a^2(2x-y)}{b(2x+y)}$
C. $\frac{b(2x-y)}{2a^2(2x+y)}$
D. $\frac{b(2x+y)}{2a^2(2x-y)}$
E. $\frac{a^2(2x-y)}{2b(2x+y)}$

35. Solve: $2z^2 = \frac{1}{2}z + \frac{5}{2}$

A. $z = \frac{5}{4}, -1$

B. $z = \frac{5}{2}, -2$

C. $z = \frac{-1 \pm \sqrt{41}}{4}$

D. $z = -\frac{5}{4}, -2$

E. $z = \frac{-1 \pm \sqrt{-79}}{8}$

36. Identify the vertex and the intercepts of $y = x^2 - 2x + 4$

A. Vertex $(1, 3)$; *x*-intercepts none; *y*-intercept $(0, 4)$

B. Vertex $(\frac{5}{2}, \frac{9}{4})$; *x*-intercepts $(1, 0)$ and $(4, 0)$; *y*-intercept $(0, 4)$

C. Vertex $(1, 3)$; *x*-intercept $(0, 0)$; *y*-intercept $(0, 4)$

D. Vertex $(1, -1)$; *x*-intercepts $(0, 0)$ and $(2, 0)$; *y*-intercept $(0, 0)$

E. Vertex $(1, -3)$; *x*-intercepts none; *y*-intercept $(0, -4)$

37. Identify the domain and range of the function: $f(x) = \begin{cases} -x & if\ x < 2 \\ 1 & if\ 2 \le x \le 3 \\ x & if\ x > 3 \end{cases}$

A. Domain (2, 3); Range (- ∞, 2]

B. Domain (-∞, ∞); Range (-2, ∞)

C. Domain (- ∞, ∞); Range (- ∞, 2]

D. Domain (- ∞, 2) U (3, ∞); Range (- 2,∞]

E. Domain (-∞, ∞); Range [-2, ∞)

38. Write an equation of the line through (-7,- 4); perpendicular to $3x + 2y = -13$

A. $y = -\frac{3}{2}x - 13$

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

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

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

E. $y = \frac{2}{3}x - 13$

39. Solve the inequality $-2 \leq 7 - \frac{3}{4}x < 9$

A. $(-\frac{8}{3}, 12]$

B. $(-\frac{29}{3}, 5]$

C. $\left(-\infty, -\frac{29}{3}\right) \cup [5, \infty)$

D. $\left(-\infty, -\frac{8}{3}\right) \cup [12, \infty)$

E. None of these

40. At Spy High, students are enrolled in either exactly two of the school's three after-school clubs or zero after-school clubs. One-half of the students are in the Codebreaking Club, $\frac{1}{2}$ of the students are in the Gadget Design club, and $\frac{1}{2}$ of the students are in the Spies' Disguise Club. If you were to pick a student at random from the school, what is the probability that they are not involved in any clubs?

A. $\frac{1}{2}$

B. $\frac{3}{8}$

C. $\frac{1}{3}$

D. $\frac{1}{4}$

E. 0