A Premier Institute for Pre-Medical & Pre Engineering

SRI VIDYA ARADHANA ACADEMY

"Transforming Your DREAMS Into Reality...!"

PCMB — PHYSICS CHEMISTRY MATHEMATICS BIOLOGY

NEET/JEE

Topic: Comprehensive Mathematical Tool for JEE/NEET

Sub: Mathematics **Assignment: 03** Prof. Chetan Sir

Enhancing Mathematical Skills for Physics and Chemistry Applications

Contents: This assignment includes the following sections:

Purpose of the Assignment

Sri Vidya Aradhana Academy has uniquely designed this comprehensive mathematics assignment to strengthen the foundational skills essential for excelling in physics and chemistry, an approach not replicated anywhere else, especially tailored for students preparing for JEE and NEET examinations. Mathematics is the language of science, and a solid grasp of mathematical concepts is crucial for understanding and solving problems in these subjects. This assignment covers a wide range of topics, including algebra, trigonometry, exponents, logarithms, progressions, ratio and proportion, and mensuration, all of which are frequently applied in scientific contexts.

By working through these problems and utilizing the hints, students will not only practice essential skills but also enhance their ability to retain and apply mathematical knowledge in scientific scenarios. The goal is to encourage active engagement with the material, fostering a deeper understanding and long-term retention of the concepts that underpin physics and chemistry calculations.

Empower Your Future with Every Problem You Solve!

Every problem you tackle is a step toward mastering the tools you need to shine in your exams, either JEE or NEET. So, dig in, trust your grit, and watch how this assignment transforms you into a powerhouse ready for any challenge.

Section 1: Algebra Basics

Focus: Polynomial operations, algebraic identities, and simplifying expressions in context.

1. Simplify $(4x^2 + 5x - 3) + (2x^2 - x + 7)$.
(A) $6x^2 - 4x + 4$ (B) $6x^2 + 4x + 4$ (C) $6x^2 + 6x - 4$ (D) $2x^2 + 4x + 4$

2. Simplify $(t^2 + 2t - 8) - (t^2 - 3t + 5)$.
(A) $2t^2 + 5t - 13$ (B) $5t + 13$ (C) $5t - 13$ (D) $-5t + 13$

3. Multiply $(2t + 3)(t - 4)$.
(A) $2t^2 + 5t - 12$ (B) $2t^2 - 8t - 12$ (C) $2t^2 - 11t + 12$ (D) $2t^2 - 5t - 12$

4. Multiply $(x - 5)(x + 5)$. (Hint: Difference of squares $(a - b)(a + b) = a^2 - b^2$)
(A) $x^2 - 25$ (B) $x^2 + 25$ (C) $x^2 - 10x + 25$ (D) $x^2 + 10x - 25$

5. Multiply $(x + 3)(x^2 - 2x + 5)$. (Hint: Distribute each term from the first bracket to the second)
(A) $x^3 + x^2 + 11x + 15$ (B) $x^3 + x^2 - x + 15$ (C) $x^3 - 2x^2 + 11x + 15$ (D) $x^3 - x^2 + 11x + 15$

6. Expand $(x + 2)^2$. (Hint: $(a + b)^2 = a^2 + 2ab + b^2$)
(A) $x^2 + 4$ (B) $x^2 + 4x + 2$ (C) $x^2 + 2x + 4$ (D) $x^2 + 4x + 4$

7. (Physics Context) Expand the expression $(v + at)^2$.
(Hint: Use the binomial expansion formula $(a + b)^2 = a^2 + 2ab + b^2$)
(A) $v^2 + vat + a^2t^2$ (B) $v^2 + 2vat + a^2t^2$ (C) $v^2 - 2vat + a^2t^2$ (D) $v^2 + a^2t^2$

8. Expand $(x + 2y)^3$. (Hint: Use $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$)
(A) $x^3 + 6x^2y + 12xy^2 + 8y^3$ (B) $x^3 + 2x^2y + 4xy^2 + 8y^3$
(C) $x^3 + 8y^3$ (D) $x^3 + 6x^2y + 6xy^2 + 8y^3$

9. Multiply $(m + n)(m^2 - mn + n^2)$. (Hint: This expands to the sum of cubes $a^3 + b^3$)
(A) $m^3 - 2m^2n + 2mn^2 - n^3$ (B) $m^3 - n^3$
(C) $m^3 + n^3$ (D) $m^3 + 2m^2n + 2mn^2 + n^3$

10. Multiply $(3a - 2b)(2a + 5b)$.
(A) $6a^2 - 11ab + 10b^2$ (B) $6a^2 + 19ab - 10b^2$ (C) $6a^2 + 11ab - 10b^2$ (D) $5a^2 + 11ab - 10b^2$

11. Simplify $2(p + 3q) - 3(p - 2q)$.
(A) $-p$ (B) $p + 12q$ (C) $-p - 12q$ (D) $-p + 12q$

12. Add the polynomials: $(3x^2y + 2xy^2 - y^3) + (xy^2 - 5x^2y + 2y^3)$. (Hint: Combine like terms carefully)
(A) $-2x^2y + 3xy^2 + y^3$ (B) $-2x^2y - 3xy^2 + y^3$ (C) $8x^2y - xy^2 - 3y^3$ (D) $3x^2y + 3xy^2 + y^3$

13. Divide $(6k^4 + 4k^3 - 8k^2)$ by $2k^2$. Assume $k \neq 0$.
(Hint: Divide each term in the numerator by the denominator)
(A) $6k^2 + 4k - 8$ (B) $3k^2 + 2k$ (C) $3k^2 + 2k - 4$ (D) $3k^6 + 2k^5 - 4k^4$

14. (Physics Context) The kinetic energy (KE) of two particles are $KE_1 = \frac{1}{2}mv^2$ and $KE_2 = \frac{1}{2}m(3v)^2$. Find the total kinetic energy $KE_{total} = KE_1 + KE_2$.
(A) $\frac{5}{2}mv^2$ (B) $5mv^2$ (C) $\frac{9}{2}mv^2$ (D) $4mv^2$

15. (Chemistry Context) An expression representing total moles is $2(3n + 4) + 5n$. Simplify this expression.
(A) $11n + 8$ (B) $6n + 8$ (C) $11n + 4$ (D) $8n + 11$

16. (Physics Context) Simplify potential energy expression $\frac{1}{2}k(3x^2) - 2k(x^2 - x)$.
(A) $\frac{3}{2}kx^2 - 2kx$ (B) $-\frac{1}{2}kx^2 - 2kx$ (C) $\frac{5}{2}kx^2 + 2kx$ (D) $-\frac{1}{2}kx^2 + 2kx$

17. (Physics Context) Simplify kinetic energy expression $\frac{1}{2}mv^2 - \frac{1}{2}m(0.5v)^2$.
(A) $\frac{3}{4}mv^2$ (B) $\frac{3}{8}mv^2$ (C) $\frac{1}{4}mv^2$ (D) $\frac{5}{8}mv^2$

18. (Physics Context) Simplify $\frac{1}{2}m(3v)^2 - \frac{1}{2}m(v)^2$.
(A) $3mv^2$ (B) $8mv^2$ (C) $\frac{1}{2}m(2v^2)$ (D) $4mv^2$

19. (Physics Context) Factor the expression: $Fd\cos\theta - Fd\sin\theta$. (Hint: Identify the common factor)
(A) $Fd\cos\theta$ (B) $Fd(\cos\theta - \sin\theta)$ (C) $-Fd\sin\theta$ (D) $Fd(\sin\theta - \cos\theta)$

20. (Chemistry Context) Simplify $3n(2n^2+4) - (5n^3 - 2n)$.
(A) $n^3 + 14n$ (B) $n^3 + 12n$ (C) $11n^3 + 10n$ (D) $6n^3 + 12n$

Section 2: Linear Equations and Inequalities

Focus: Solving linear equations, systems, inequalities, and rearranging formulas.

21. Solve for t: $5t - 8 = 12$.
(A) 4/5 (B) 4 (C) 5/4 (D) 20

22. Solve for V: $15 = 25 - 2V$.
(A) -5 (B) -20 (C) 5 (D) 20

23. Solve for P: $\frac{P}{3} + 2 = 7$.
(A) 5/3 (B) 27 (C) 9 (D) 15

24. Solve $2(k-5) = 12$. (Hint: Distribute the 2 first, or divide both sides by 2)
(A) 11 (B) 6 (C) 8.5 (D) 10

25. Solve $4p - 9 = 3p + 2$. (Hint: Gather terms with 'p' on one side, constants on the other)
(A) 5 (B) 11 (C) -7 (D) 7

26. Solve for x: $ax + b = cx + d$.
(A) $x = \frac{d-b}{c-a}$ (B) $x = \frac{b-d}{a-c}$ (C) $x = \frac{d-b}{a-c}$ (D) $x = \frac{d+b}{a+c}$

27. (Physics Context) The kinematic equation $v = u + at$. Solve for time t.
(A) $t = (v+u)/a$ (B) $t = a(v-u)$ (C) $t = v/a - u$ (D) $t = (v-u)/a$

28. (Physics Context) Ohm's Law is $V = IR$. Solve for resistance R.
(A) $R = V/I$ (B) $R = V - I$ (C) $R = I/V$ (D) $R = VI$

29. (Physics Context) Final velocity squared is $v_f^2 = v_i^2 + 2ad$. Solve for displacement d.
(A) $d = \frac{v_f^2 + v_i^2}{2a}$ (B) $d = \frac{v_f^2 - v_i^2}{2a}$ (C) $d = \frac{v_f - v_i}{2a}$ (D) $d = \frac{2a}{v_f^2 - v_i^2}$

30. Solve the following system for I_1: $\begin{cases} 3I_1 + I_2 = 6 \\ I_1 + 2I_2 = 4 \end{cases}$
(A) $I_1 = 2$ (B) $I_1 = 0.8$ (C) $I_1 = 1$ (D) $I_1 = 1.6$

31. Solve the following system for V_A: $\begin{cases} V_A + V_B = 10 \\ 2V_A + 5V_B = 30 \end{cases}$
(Hint: Use substitution or multiply the first equation by 2 or 5 for elimination.)
(A) $V_A = 7.5$ (B) $V_A = 5$ (C) $V_A = 20/3 \approx 6.67$ (D) $V_A = 10/3 \approx 3.33$

32. Solve the following system for A: $\begin{cases} 2A + 3B = 10 \\ A + B = 4 \end{cases}$
(A) A = 3 (B) A = 2 (C) A = 1 (D) A = 4

33. Solve the system: $\begin{cases} x + 2y = 5 \\ 3x - y = 4 \end{cases}$ for x and y.
(A) $x = 1, y = 2$ (B) $x = 13/7, y = 11/7$ (C) $x = 2, y = 3/2$ (D) $x = 2, y = 1.5$

34. Solve the system: $\begin{cases} 4p - 3q = 1 \\ 2p + q = 5 \end{cases}$ for p and q. (Hint: Multiply second equation by 3 and add)
(A) $p = 1, q = 3$ (B) $p = 1.6, q = 1.8$ (C) $p = 1.5, q = 2$ (D) $p = 2, q = 1$

35. Solve the system: $\begin{cases} 5I_1 - I_2 = 7 \\ 2I_1 + 3I_2 = 11 \end{cases}$ for I_1.
(A) $I_1 = 1$ (B) $I_1 = 1.5$ (C) $I_1 = 32/17$ (D) $I_1 = 2$

36. Solve the following system for the variable a: $\begin{cases} T - 30 = 3a \\ 50 - T = 5a \end{cases}$ (Hint: Add the two equations together to eliminate T first.)
(A) $a = 10$ (B) $a = 2.5$ (C) $a = 5$ (D) $a = 2$

37. Solve the linear inequality $3x - 5 > 10$.
(A) $x < 5$ (B) $x > 15$ (C) $x > 5$ (D) $x > 5/3$

38. Solve the inequality $1 - 2k \leq 7$. (Hint: Dividing by a negative reverses the inequality sign)
(A) $k \geq -3$ (B) $k \leq 3$ (C) $k \geq 3$ (D) $k \leq -3$

39. Solve the inequality $\frac{y}{2} + 3 < 5$.
(A) $y < 1$ (B) $y < 4$ (C) $y < 16$ (D) $y > 4$

Section 3: Quadratics

Focus: Solving and factoring quadratic expressions and equations.

40. Solve $t^2 + 2t - 15 = 0$. (Hint: Factor or use $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$)
(A) $-1, 15$ (B) $1, -15$ (C) $3, -5$ (D) $-3, 5$

41. Solve $y^2 - 16 = 0$.
(A) $8, -8$ (B) $4, -4$ (C) $16, -16$ (D) $2, -2$

42. Solve $3x^2 - 12x + 9 = 0$. (Hint: Divide by 3 first, then factor or use formula)
(A) 3 (B) 1 (C) $-1, -3$ (D) $1, 3$

43. (Chemistry Context) For equilibrium calculations, solve $3n^2 = 12$ for positive n.
(A) 2 (B) 4 (C) ± 2 (D) 12

44. (Physics Context) Solve $4t^2 - 16t + 15 = 0$ for time t. (Hint: Use quadratic formula $t = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$)
(A) $2, 2$ (B) $1.5, 2.5$ (C) $0.5, 3.5$ (D) $1, 3$

45. Solve $2p^2 + 5p - 3 = 0$.
(A) $-1, 3/2$ (B) $-1/2, 3$ (C) $1, -3/2$ (D) $1/2, -3$

46. Factor $x^2 + 7x + 12$. (Hint: Find two numbers that multiply to 12 and add to 7)
(A) $(x - 3)(x - 4)$ (B) $(x + 2)(x + 6)$ (C) $(x + 3)(x + 4)$ (D) $(x + 1)(x + 12)$

47. Factor $p^2 - 5p + 6$.
(A) $(p - 2)(p - 3)$ (B) $(p - 1)(p - 6)$ (C) $(p + 1)(p - 6)$ (D) $(p + 2)(p + 3)$

48. Factor $x^2 - 4x - 12$. (Hint: Find two numbers that multiply to -12 and add to -4)
(A) $(x - 3)(x + 4)$ (B) $(x - 6)(x + 2)$ (C) $(x + 6)(x - 2)$ (D) $(x + 3)(x - 4)$

49. Factor $2k^2 + 5k + 3$. (Hint: Look for factors of $2 \times 3 = 6$ that add to 5)
(A) $(k + 3)(2k - 1)$ (B) $(2k + 1)(k + 3)$ (C) $(k + 1)(2k - 3)$ (D) $(2k + 3)(k + 1)$

50. Factor $3m^2 - 10m + 8$.
(A) $(3m - 2)(m - 4)$ (B) $(m - 4)(3m + 2)$ (C) $(3m - 4)(m - 2)$ (D) $(m - 2)(3m + 4)$

51. Factor $4y^2 - 9$. (Hint: Difference of Squares $a^2 - b^2 = (a - b)(a + b)$)
(A) $(2y - 3)(2y + 3)$ (B) $(y - 3)(4y + 3)$ (C) $(2y - 9)(2y + 1)$ (D) $(4y - 3)(y + 3)$

52. Factor the perfect square trinomial $x^2 + 10x + 25$. (Hint: Check if it fits $a^2 + 2ab + b^2 = (a + b)^2$)
(A) $(x + 10)(x + 2.5)$ (B) $(x + 5)^2$ (C) $(x + 5)(x - 5)$ (D) $(x - 5)^2$

53. Factor $9v^2 - 30v + 25$. (Hint: Check if it fits $a^2 - 2ab + b^2 = (a - b)^2$)
(A) $(v - 5)(9v - 5)$ (B) $(3v + 5)^2$ (C) $(9v - 25)^2$ (D) $(3v - 5)^2$

Section 4: Rational Expressions

Focus: Simplifying, operating on, and solving rational expressions and equations.

54. (Physics Context) Solve for the total resistance R in a parallel circuit where $\frac{1}{R} = \frac{1}{2} + \frac{1}{3}$.
(A) $R = 6$ (B) $R = 0.83$ (C) $R = 1.2$ (D) $R = 5$

55. Simplify $\frac{x^2-4}{x+2}$. Assume $x \neq -2$.
(A) $x + 2$ (B) $x - 2$ (C) $x - 4$ (D) $x + 4$

56. Solve $\frac{2}{R_{eq}} = 8$.
(A) $R_{eq} = 16$ (B) $R_{eq} = 1/2$ (C) $R_{eq} = 4$ (D) $R_{eq} = 1/4$

57. Solve $\frac{V_{out}+1}{2} = 3$.
(A) $V_{out} = 5$ (B) $V_{out} = 6$ (C) $V_{out} = 7$ (D) $V_{out} = 4$

58. Solve $\frac{3}{t-2} = 6$.
(A) $t = 2$ (B) $t = 1.5$ (C) $t = 3$ (D) $t = 2.5$

59. Solve $\frac{n}{4} + 1 = 3$.
(A) $n = 4$ (B) $n = 12$ (C) $n = 8$ (D) $n = 6$

60. Simplify $\frac{q^2-q-12}{q-4}$. Assume $q \neq 4$.
(A) $q - 4$ (B) $q + 3$ (C) $q + 4$ (D) $q - 3$

61. Solve $\frac{5}{R+1} = 2$.
(A) $R = 1.5$ (B) $R = 1$ (C) $R = 2$ (D) $R = 2.5$

62. Perform the addition: $\frac{2}{x+1} + \frac{3}{x-1}$. (Hint: Find a common denominator)
(A) $\frac{5}{x^2-1}$ (B) $\frac{5x+1}{x^2-1}$ (C) $\frac{2(x-1)+3(x+1)}{(x+1)+(x-1)}$ (D) $\frac{5x-1}{x^2-1}$

63. Simplify $\frac{6v^2-12v}{3v}$. Assume $v \neq 0$.
(A) $2v + 4$ (B) $2v$ (C) $2v - 4$ (D) $6v - 12$

64. (Physics Context) The formula for resistors R_1, R_2 in parallel is $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$. Solve for R_{eq}.
(A) $\frac{1}{R_1} + \frac{1}{R_2}$ (B) $\frac{R_1+R_2}{R_1R_2}$ (C) $R_1 + R_2$ (D) $\frac{R_1R_2}{R_1+R_2}$

65. Solve $\frac{4}{x-1} = \frac{8}{x+1}$. (Hint: Cross-multiply)
(A) $\frac{1}{2}$ (B) 1 (C) 3 (D) 2

66. (Chemistry Context) The combined gas law is $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$. Solve for Temperature T_2.
(A) $T_2 = \frac{P_2V_2}{P_1V_1T_1}$ (B) $T_2 = \frac{P_1V_1}{P_2V_2T_1}$ (C) $T_2 = \frac{P_1V_1T_1}{P_2V_2}$ (D) $T_2 = \frac{P_2V_2T_1}{P_1V_1}$

67. (Physics Context) A kinematic equation is $s = \frac{v^2-u^2}{2a}$. Solve for v^2.
(A) $v^2 = u^2 + 2as$ (B) $v^2 = u^2 - 2as$ (C) $v^2 = 2as - u^2$ (D) $v^2 = \frac{u^2}{2as}$

68. Simplify $\frac{3k+2m}{k} - \frac{m}{k}$. Assume $k \neq 0$. (Hint: Combine fractions with the common denominator)
(A) $\frac{3k+2m}{k}$ (B) $3 + \frac{m}{k}$ (C) $3 + m$ (D) $3 + \frac{2m}{k}$

69. (Chemistry Context) Simplify $\frac{2n}{V} + \frac{n}{2V}$. Assume $V \neq 0$.
(A) $\frac{n}{V}$ (B) $\frac{3n}{2V}$ (C) $\frac{5n}{2V}$ (D) $\frac{5n}{V}$

70. (Physics - Optics) The lens formula is $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$. Solve for the image distance d_i.
(A) $d_i = \frac{fd_o}{f-d_o}$ (B) $d_i = \frac{1}{f} - \frac{1}{d_o}$ (C) $d_i = f - d_o$ (D) $d_i = \frac{fd_o}{d_o-f}$

71. Solve for x: $\frac{x}{x-3} = 2$. Assume $x \neq 3$.
(A) 2 (B) -3 (C) 6 (D) 3

72. Perform the subtraction: $\frac{3}{a-2} - \frac{1}{a}$. Assume $a \neq 0, 2$.
(A) $\frac{2a+2}{a(a-2)}$ (B) $\frac{2a-2}{a(a-2)}$ (C) $\frac{2}{a(a-2)}$ (D) $\frac{4a-2}{a(a-2)}$

73. Simplify the expression: $\frac{4a^2b-8ab^2}{2ab}$. Assume $a, b \neq 0$.
(A) $2a^2 - 4b^2$ (B) $2a - 4b$ (C) $2a - 8b^2$ (D) $4a - 8b$

74. Solve for y: $\frac{1}{y} + \frac{1}{2y} = 3$. Assume $y \neq 0$.
(A) 2 (B) 2/3 (C) 1/2 (D) 3/2

75. Perform the addition: $\frac{m}{m-n} + \frac{n}{n-m}$. Assume $m \neq n$.
(A) $\frac{m-n}{m+n}$ (B) 0 (C) $\frac{m+n}{m-n}$ (D) 1

Section 5: Functions

Focus: Evaluating functions, determining domain and range, and identifying key properties.

76. If $f(x) = 2x + 1$, find the value of x when $f(x) = 7$.
(A) 4 (B) 2 (C) 3 (D) 5

77. If $g(t) = -t + 4$, find the value of $g(2)$.
(A) -2 (B) 2 (C) 4 (D) 6

78. If $f(x) = x^2 - 6x + 5$, find the value of $f(3)$.
(A) 32 (B) 4 (C) 5 (D) -4

79. The velocity v (in m/s) of a particle changes with time t (in s) according to the equation $v(t) = 2t + 5$. At what time t is the velocity equal to 11 m/s? (Hint: Set $v(t) = 11$ in the equation and solve for t.)
(A) 2 s (B) 4 s (C) 3 s (D) 8 s

80. (Physics Context) Energy $E(t) = 2t^2 + 3$. Find the energy at $t = 5$.
(A) 103 (B) 53 (C) 13 (D) 23

81. Find the domain of the function $f(x) = \sqrt{x - 3}$. (Hint: The value inside the square root must be non-negative)
(A) $x \geq 3$ (B) $x \leq 3$ (C) $x > 3$ (D) All real numbers

82. Find the domain of the function $g(V) = \frac{1}{V-4}$. (Hint: The denominator cannot be zero)
(A) $V < 4$ (B) $V > 4$ (C) All real numbers except 4 (D) All real numbers

83. Find the range of $y = x^2 + 2$. (Hint: What is the minimum value of x^2? What does this imply for the minimum value of y?)
(A) $y \geq 0$ (B) $y \leq 2$ (C) $y \geq 2$ (D) All real numbers

84. (Chemistry Context) Concentration $C(t) = -0.5t + 4$. What is the initial concentration (at $t = 0$)?
(A) 0 (B) 4 (C) -0.5 (D) 3.5

Section 6: Coordinate Geometry and Graphs

Focus: Coordinate geometry calculations and interpreting graphs of lines, quadratics, circles, and ellipses.

85. Calculate the distance between the points (1, 2) and (4, 6).
(Hint: Use distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$)
(A) $\sqrt{7}$ (B) 5 (C) 7 (D) 25

86. Find the distance between points A(-3, 0) and B(0, 4).
(A) 25 (B) 1 (C) 5 (D) 7

87. (Physics Context) A charge q_1 is at (0, 0) and charge q_2 is at (8, 6). Find the distance r between them (used in Coulomb's Law, $F = kq_1q_2/r^2$).
(A) 14 (B) 100 (C) 2 (D) 10

88. The distance between (2, 3) and (x, 6) is 5. Find the possible value(s) of x.
(Hint: Set up the distance formula equation: $5^2 = (x - 2)^2 + (6 - 3)^2$ and solve for x)
(A) 6 or -2 (B) 6 only (C) -2 only (D) 4 or -4

89. Find the midpoint of the line segment connecting (1, 2) and (5, 8). (Hint: Midpoint $M = (\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$)
(A) (2, 3) (B) (3, 5) (C) (6, 10) (D) (4, 6)

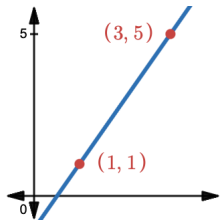
90. Find the midpoint between A(-2, -4) and B(6, 0).
(A) (2, -4) (B) (4, -4) (C) (4, -2) (D) (2, -2)

91. Find the slope (m) of the line given by the equation $6x - 2y = 4$.
(Hint: Rearrange the equation into slope-intercept form $y = mx + c$ and identify m.)
(A) -2 (B) -3 (C) 3 (D) 2

92. Find the y-intercept and the x-intercept of the line given by the equation $8x + 2y = 10$.
(Hint: For the y-intercept, set $x = 0$ and solve for y. For the x-intercept, set $y = 0$ and solve for x.)
(A) y-int=5, x-int=5/4 (B) y-int=-4, x-int=1.25 (C) y-int=4, x-int=5/4 (D) y-int=10, x-int=8

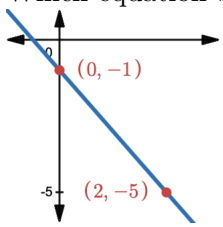
93. Find the slope of the line given by the equation $2x - 3y = 6$.
(A) $-\frac{3}{2}$ (B) $\frac{2}{3}$ (C) $-\frac{2}{3}$ (D) $\frac{3}{2}$

94. Find the equation of the straight line shown in the graph below.



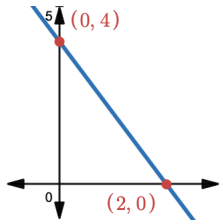
(Hint: Find the slope m using the two marked points, then use $y - y_1 = m(x - x_1)$.)
(A) $y = \frac{1}{2}x + \frac{1}{2}$ (B) $y = x$ (C) $y = 2x + 1$ (D) $y = 2x - 1$

95. Which equation best represents the linear graph shown?



(Hint: Determine the sign of the slope and the y-intercept from the graph.)
(A) $y = -x - 1$ (B) $y = x - 1$ (C) $y = 2x - 1$ (D) $y = -2x - 1$

96. Identify the slope (m) and y-intercept (c) from the graph below.



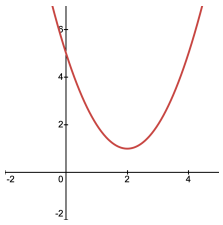
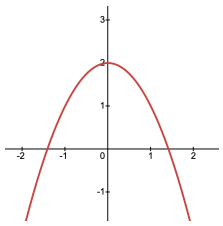
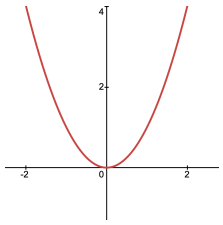
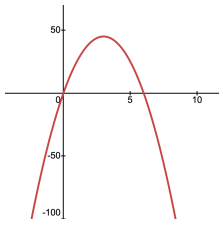
(Hint: The y-intercept is where the line crosses the y-axis ($x = 0$). Calculate slope using the two clear points.)
(A) $m = 2, c = 4$ (B) $m = -1/2, c = 2$ (C) $m = 1/2, c = 4$ (D) $m = -2, c = 4$

97. Find the vertex coordinates (h, k) of the parabola $y = x^2 - 4x + 3$. (Recall vertex x-coordinate $h = -b/2a$)
(A) $(2, 1)$ (B) $(1, 0)$ (C) $(2, -1)$ (D) $(4, 3)$

98. Find the vertex coordinates (h, k) of the parabola $y = 2p^2 - 8p + 6$.
(A) $(1, 0)$ (B) $(4, 6)$ (C) $(2, 2)$ (D) $(2, -2)$

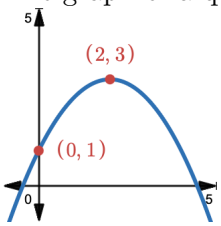
99. Find the y-intercept of the parabola $y = x^2 - 6x + 5$. (Hint: Set $x = 0$)
(A) 5 (B) -6 (C) 1 (D) 0

100. Match the quadratic equations in Column A with their corresponding graphs in Column B.

Column A (Equation)	Column B (Graph)
(i) $y = x^2$	(p) 
(ii) $y = -x^2 + 2$	(q) 
(iii) $h = 30t - 5t^2$	(r) 
(iv) $y = (x-2)^2 + 1$	(s) 

(A) (i)-(r), (ii)-(q), (iii)-(s), (iv)-(p)
(B) (i)-(r), (ii)-(q), (iii)-(p), (iv)-(s)
(C) (i)-(s), (ii)-(r), (iii)-(q), (iv)-(p)
(D) (i)-(r), (ii)-(p), (iii)-(s), (iv)-(q)

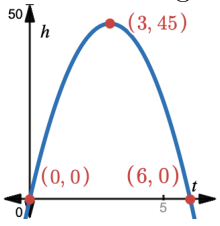
101. The graph of a quadratic function $y = ax^2 + bx + c$ is shown. Determine the signs of a and c.



(Hint: Upward opening means $a > 0$, downward means $a < 0$. The y-intercept ($x = 0$) gives the sign of c.)

(A) $a < 0, c > 0$ (B) $a > 0, c > 0$ (C) $a < 0, c < 0$ (D) $a > 0, c < 0$

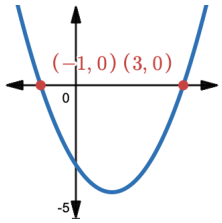
102. The graph represents the height h of a projectile versus time t. What is the time taken to reach the maximum height?



(Hint: The maximum height occurs at the vertex. Find the t-coordinate of the vertex.)

(A) 90 m (B) 3 s (C) 6 s (D) 45 m

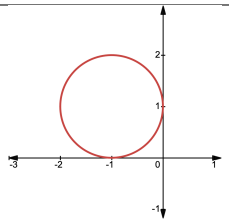
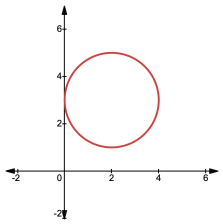
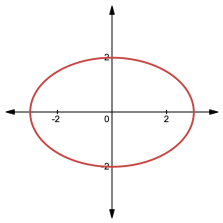
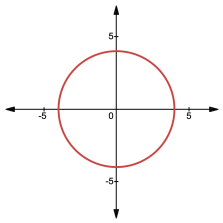
103. What are the x-intercepts (roots) of the quadratic function shown in the graph?



(Hint: X-intercepts are the points where the graph crosses the x-axis.)

(A) $x = 1, x = -3$ (B) $x = 1$ only (C) $x = -1, x = 3$ (D) $x = -1$ only

104. Match the equations of circles and ellipses in Column A with their corresponding graphs in Column B.

Column A (Equation)		**Column B (Graph)**
(i) $x^2 + y^2 = 9$	(p)	
(ii) $\frac{x^2}{16} + \frac{y^2}{9} = 1$	(q)	
(iii) $(x-2)^2 + (y-1)^2 = 4$	(r)	
(iv) $(x+1)^2 + (y-1)^2 = 1$	(s)	

(A) (i)-(p), (ii)-(q), (iii)-(r), (iv)-(s)
(B) (i)-(p), (ii)-(r), (iii)-(q), (iv)-(s)
(C) (i)-(s), (ii)-(q), (iii)-(r), (iv)-(p)
(D) (i)-(s), (ii)-(r), (iii)-(q), (iv)-(p)

Section 7: Trigonometry

Focus: Trigonometric ratios, identities, standard angles, equations, conversions, approximations, and ranges.

105. In a right-angled triangle, the side opposite to angle θ is 3 units, the adjacent side is 4 units, and the hypotenuse is 5 units. What is $\sin\theta$? (Hint: $\sin\theta = \text{Opposite/Hypotenuse}$)
(A) 4/5 (B) 3/4 (C) 3/5 (D) 4/3

106. If $\sin\alpha = 5/13$, what is $\cos\alpha$? (Hint: Use $\sin^2\alpha + \cos^2\alpha = 1$. Draw a right triangle if helpful.)
(A) 8/13 (B) 12/13 (C) 13/12 (D) 5/12

107. If $\cos\beta = 8/17$ then what is $\sin\beta$?
(A) 8/15 (B) 17/15 (C) 9/17 (D) 15/17

108. If $\tan\gamma = 3/4$ then what is $\sin\gamma$? (Hint: Draw a right triangle with sides 3 and 4, find the hypotenuse using Pythagoras.)
(A) 3/5 (B) 4/5 (C) 4/3 (D) 5/3

109. In a right-angled triangle, the hypotenuse is 10 cm and an angle is 30°. Find the length of the side opposite to this angle.
(A) 10 cm (B) 5 cm (C) 20 cm (D) $5\sqrt{3}$ cm

110. In a right-angled triangle, the side adjacent to angle β is 6 units, and the hypotenuse is 12 units. Find angle β. (Hint: Use $\cos\beta = \text{Adj/Hyp}$.)
(A) 90° (B) 30° (C) 45° (D) 60°

111. A ladder 8 m long leans against a wall, making an angle of 60° with the ground. How high up the wall does the ladder reach? (Hint: The height is opposite the 60° angle. Use $\sin 60° = \sqrt{3}/2$)
(A) 4 m (B) 8 m (C) $4\sqrt{3}$ m (D) $8\sqrt{3}$ m

112. What is the value of $\cos 45°$?
(A) $1/\sqrt{2}$ (B) 1 (C) $\sqrt{3}/2$ (D) 1/2

113. What is the value of $\tan 60°$?
(A) Undefined (B) $\sqrt{3}$ (C) $1/\sqrt{3}$ (D) 1

114. Evaluate $\sin 90° + \cos 0°$.
(A) 0 (B) 1 (C) Undefined (D) 2

115. What is $\tan 0°$?
(A) 1 (B) -1 (C) 0 (D) Undefined

116. If $\sin\theta = 0.6$, find $\cos\theta$ assuming θ is in the first quadrant.
(A) 0.8 (B) 0.6 (C) 1.0 (D) 0.4

117. Which of the following basic trigonometric identities is written INCORRECTLY?
(A) $\tan\theta = \frac{1}{\cot\theta}$ (B) $\sin\theta = \frac{1}{\text{cosec}\theta}$
(C) $\tan\theta = \frac{\sin\theta}{\cos\theta}$ (D) $\cos\theta = \frac{1}{\sin\theta}$

118. If $\sin\alpha = 3/5$ and $\cos\alpha = 4/5$, what is $\tan\alpha$? (Hint: Use $\tan\alpha = \sin\alpha/\cos\alpha$)
(A) 4/3 (B) 5/4 (C) 3/4 (D) 5/3

119. Which expression is equivalent to $\sec\theta$?
(A) $\cos\theta/\sin\theta$ (B) $1/\sin\theta$ (C) $1/\tan\theta$ (D) $1/\cos\theta$

120. Convert 60° to radians. (Hint: Multiply degrees by $\pi/180°$)
(A) $\pi/3$ rad (B) $\pi/6$ rad (C) $\pi/4$ rad (D) $\pi/2$ rad

121. Convert $\pi/4$ radians to degrees. (Hint: Multiply radians by $180°/\pi$)
(A) 90° (B) 45° (C) 30° (D) 60°

122. Convert 180° to radians.
(A) 1 rad (B) 2π rad (C) $\pi/2$ rad (D) π rad

123. In which quadrant(s) is $\sin\theta$ positive? (Hint: Recall ASTC rule or where y-coordinate is positive on unit circle)
(A) I and IV (B) II and III (C) I and II (D) I and III

124. In which quadrant(s) is $\tan\theta$ negative?
(A) II and IV (B) III and IV (C) I and III (D) II and III

125. What is the value of $\cos 180°$?
(A) Undefined (B) -1 (C) 0 (D) 1

126. What is the value of $\sin 120°$?
(A) $-\sqrt{3}/2$ (B) $1/2$ (C) $-1/2$ (D) $\sqrt{3}/2$

127. What is the value of $\cos 135°$?
(A) $1/\sqrt{2}$ (B) $-1/2$ (C) $-1/\sqrt{2}$ (D) $-\sqrt{3}/2$

128. Evaluate $\tan 225°$.
(A) 1 (B) $\sqrt{3}$ (C) $1/\sqrt{3}$ (D) -1

129. Find the values of θ for which $\sin\theta = 1/2$.
(A) $60°, 120°$ (B) $30°, 150°$ (C) $30°, 210°$ (D) $30°$ only

130. Find the value of θ for which $\cos\theta = -1$.
(A) $0°$ (B) $90°$ (C) $180°$ (D) $270°$

131. Solve $\tan\theta = 1$ for $0° \le \theta < 360°$.
(A) $45°, 135°$ (B) $135°, 315°$ (C) $45°$ only (D) $45°, 225°$

132. Which of the following reduction formulas is INCORRECT?
(A) $\sin(90° - \theta) = \cos\theta$ (B) $\cos(90° + \theta) = -\sin\theta$
(C) $\cos(180° + \theta) = -\cos\theta$ (D) $\tan(180° - \theta) = \tan\theta$

133. Simplify $\sin(180° - \alpha)$.
(A) $\cos\alpha$ (B) $\sin\alpha$ (C) $-\cos\alpha$ (D) $-\sin\alpha$

134. For a very small angle θ measured in radians, which approximation is most accurate for $\sin\theta$?
(A) $1 - \theta^2/2$ (B) 1 (C) $\theta^2/2$ (D) θ

135. Using the small angle approximation for $\theta \approx 0$ (in radians), estimate the value of $\frac{\tan\theta}{\theta}$.
(Hint: Use $\tan\theta \approx \theta$ for small θ)
(A) 0 (B) Undefined (C) 1 (D) θ

136. (Physics - Pendulum) For a simple pendulum, the restoring force is $F = -mg\sin\theta$. For small oscillations, what is the approximate expression for the force?
(A) $-mg\theta$ (B) $-mg(1 - \theta^2/2)$ (C) $-mg\cos\theta$ (D) $-mg$

137. Find the maximum value of the expression $3\sin\theta + 4\cos\theta$. (Hint: The range of $a\sin\theta + b\cos\theta$ is $[-\sqrt{a^2+b^2}, \sqrt{a^2+b^2}]$)
(A) 12 (B) 5 (C) 7 (D) 1

138. What is the range of the function $f(x) = 5\cos x - 12\sin x$?
(A) $[-7, 7]$ (B) $[-17, 17]$ (C) $[-12, 5]$ (D) $[-13, 13]$

139. Which of the following compound angle formulas is written INCORRECTLY? (Hint: Verify by setting simple values like A=60°, B=30°)
(A) $\sin(A - B) = \sin A\cos B - \cos A\sin B$ (B) $\cos(A - B) = \cos A\cos B + \sin A\sin B$
(C) $\sin(A + B) = \sin A\cos B + \cos A\sin B$ (D) $\cos(A + B) = \cos A\cos B + \sin A\sin B$

140. Which of the following double angle formulas is written INCORRECTLY?
(A) $\sin(2A) = 2\sin A\cos A$ (B) $\cos(2A) = 1 + 2\cos^2 A$
(C) $\cos(2A) = 1 - 2\sin^2 A$ (D) $\cos(2A) = \cos^2 A - \sin^2 A$

Section 8: Exponents and Radicals

Focus: Exponent rules, simplifying radicals, rationalizing denominators, and scientific notation.

141. Simplify $x^3 \cdot x^2$.
(A) x^4 (B) $2x^5$ (C) x^5 (D) x^6

142. Simplify $(2x^2)^3$.
(A) $6x^6$ (B) $8x^6$ (C) $2x^6$ (D) $8x^5$

143. Simplify $\sqrt{50}$. (Hint: Find the largest perfect square factor)
(A) $2\sqrt{5}$ (B) $25\sqrt{2}$ (C) $5\sqrt{2}$ (D) $10\sqrt{5}$

144. Simplify $\frac{x^6}{x^2}$. Assume $x \neq 0$.
(A) x^4 (B) x^3 (C) x^8 (D) x^{-4}

145. (Physics Context) Power $P = IV$. If $I = 2 \times 10^{-3}$ and $V = 5 \times 10^3$, evaluate P.
(A) 100 (B) 10 (C) 10^6 (D) 1

146. Simplify $(3x^2y)(2x^3y^4)$.
(A) $6x^5y^4$ (B) $5x^5y^5$ (C) $6x^6y^4$ (D) $6x^5y^5$

147. Express $\sqrt[3]{x^2}$ using a fractional exponent.
(A) $x^{3/2}$ (B) $x^{1/6}$ (C) $x^{2/3}$ (D) x^6

148. Simplify $\sqrt{48}$.
(A) $4\sqrt{3}$ (B) $2\sqrt{12}$ (C) $3\sqrt{16}$ (D) $16\sqrt{3}$

149. Simplify $\frac{10x^5y^2}{2x^2y}$. Assume $x, y \neq 0$.
(A) $5x^3y^2$ (B) $5x^3y$ (C) $5x^7y^3$ (D) $8x^3y$

150. (Chemistry Context) Evaluate $(6.02 \times 10^{23}) \times (2 \times 10^{-3})$ and express in scientific notation.
(A) 1.204×10^{20} (B) 12.04×10^{20} (C) 1.204×10^{26} (D) 1.204×10^{21}

151. Simplify $\sqrt{12} + \sqrt{27}$. (Hint: Simplify each radical first)
(A) $\sqrt{39}$ (B) $7\sqrt{3}$ (C) $5\sqrt{3}$ (D) $6\sqrt{3}$

152. Simplify $\sqrt{18} \times \sqrt{2}$.
(A) 6 (B) 18 (C) $9\sqrt{2}$ (D) $6\sqrt{2}$

153. Simplify $x^{3/2} \cdot x^{1/2}$. Assume $x \geq 0$.
(A) x (B) x^2 (C) $x^{3/4}$ (D) x

154. Rationalize the denominator: $\frac{2}{\sqrt{3}}$.
(A) $\frac{\sqrt{6}}{3}$ (B) $2\sqrt{3}$ (C) $\frac{2\sqrt{3}}{3}$ (D) $\frac{2}{3}$

155. Rationalize the denominator: $\frac{1}{\sqrt{5}-\sqrt{3}}$.
(Hint: Multiply the numerator and denominator by the conjugate $\sqrt{5} + \sqrt{3}$.)
(A) $\sqrt{5} + \sqrt{3}$ (B) $\frac{\sqrt{5}-\sqrt{3}}{2}$ (C) $\frac{\sqrt{5}+\sqrt{3}}{8}$ (D) $\frac{\sqrt{5}+\sqrt{3}}{2}$

156. Rationalize the denominator: $\frac{3}{2+\sqrt{3}}$.
(Hint: Multiply the numerator and denominator by the conjugate $2 - \sqrt{3}$.)
(A) $6 - 3\sqrt{3}$ (B) $6 + 3\sqrt{3}$ (C) $\frac{6-3\sqrt{3}}{7}$ (D) $3 + \sqrt{3}$

157. Rationalize the denominator: $\frac{4}{\sqrt{5}-1}$. (Hint: Multiply numerator and denominator by the conjugate $\sqrt{5}+1$)
(A) $4\sqrt{5} + 4$ (B) $\sqrt{5} + 1$ (C) $\sqrt{5} - 1$ (D) $\sqrt{5}/4$

Section 9: Logarithms and Exponentials

Focus: Logarithm properties, solving log/exponential equations, change of base, and applications.

158. Evaluate $\log_2 16$. (Hint: Use the definition $\log_b y = x \iff b^x = y$, i.e., $2^? = 16$)
(A) 8 (B) 2 (C) 3 (D) 4

159. Solve for x: $\log_3 x = 4$. (Hint: Use the definition $\log_b y = x \iff b^x = y$)
(A) 81 (B) 64 (C) 12 (D) 7

160. Evaluate $\log_5 5$. (Hint: Use the property $\log_b b = 1$)
(A) 5 (B) 1 (C) Not defined (D) 0

161. Evaluate $\log_{10} 1$. (Hint: Use the property $\log_b 1 = 0$)
(A) 10 (B) -1 (C) 0 (D) 1

162. Simplify $\log_6 2 + \log_6 3$. (Hint: Use the Product Rule $\log_b M + \log_b N = \log_b(MN)$)
(A) $\log_6 5$ (B) 1 (C) 6 (D) $\log_6(2/3)$

163. Simplify $\log_2 24 - \log_2 3$. (Hint: Use the Quotient Rule $\log_b M - \log_b N = \log_b(M/N)$)
(A) 4 (B) 8 (C) $\log_2 21$ (D) 3

164. Express $2\log_a x$ as a single logarithm. (Hint: Use the Power Rule $n\log_b M = \log_b(M^n)$)
(A) $\log_a(x^2)$ (B) $\log_a(2x)$ (C) $(\log_a x)^2$ (D) $\log_a(x+2)$

165. Solve for x: $2^x = 32$. (Hint: Express 32 as a power of 2)
(A) 16 (B) 5 (C) 6 (D) 4

166. Evaluate $\log_{10} 0.01$. (Hint: Express 0.01 as a power of 10)
(A) 2 (B) -1 (C) 0.1 (D) -2

167. Solve for x: $\log_x 64 = 3$. (Hint: Use the definition $\log_b y = x \iff b^x = y$)
(A) 8 (B) 2 (C) 4 (D) 6

168. (Chemistry Context) pH $= -\log_{10}[H^+]$. If $[H^+] = 10^{-4}$, what is the pH? (Hint: Use the property $\log_{10} 10^x = x$)
(A) 4 (B) 10^4 (C) 10 (D) -4

169. Solve for x: $e^x = 5$. (Hint: Apply the natural logarithm 'ln' to both sides, using the property $\ln e^x = x$)
(A) e^5 (B) $\ln 5$ (C) 5 (D) $\log_{10} 5$

170. Simplify $\frac{\log 8}{\log 2}$. (Hint: Use $8 = 2^3$ and the Power Rule, or recognize this as the Change of Base result for $\log_2 8$)
(A) $\log 4$ (B) 4 (C) $\log 6$ (D) 3

171. Solve for x: $\log_2(x-1) = 3$. (Hint: Use the definition $\log_b y = x \iff b^x = y$)
(A) 8 (B) 6 (C) 9 (D) 7

172. Express $\log_2 7$ using base 10 logarithms. (Hint: Use the Change of Base theorem $\log_b a = \frac{\log_c a}{\log_c b}$ with $c = 10$)
(A) $\frac{\log 7}{\log 2}$ (B) $\log(7/2)$ (C) $\log 7 - \log 2$ (D) $\frac{\log 2}{\log 7}$

173. Solve for x: $10^{2x-1} = 1000$. (Hint: Express 1000 as a power of 10, then equate exponents)
(A) 3 (B) 2 (C) 1.5 (D) 1

174. (Chemistry Context) The Arrhenius equation is $k = Ae^{-E_a/RT}$. Solve for E_a.
(Hint: Isolate the exponential term, take 'ln' of both sides)
(A) $RT\ln(k/A)$ (B) $-RT\log_{10}(k/A)$ (C) $-RT\ln(k/A)$ (D) $\frac{\ln(A/k)}{RT}$

175. Solve for x: $\log_4(x+1) = 2$. (Hint: Use the definition $\log_b y = x \iff b^x = y$)
(A) 17 (B) 8 (C) 7 (D) 15

176. Express $\log_3 10$ using natural logarithms (ln). (Hint: Use the Change of Base Theorem $\log_b a = \frac{\ln a}{\ln b}$)
(A) $\frac{\ln 10}{\ln 3}$ (B) $\frac{\ln 3}{\ln 10}$ (C) $\ln 10 - \ln 3$ (D) $\ln(10/3)$

177. Simplify $\frac{1}{2}\log_b 9 + \log_b 2$. (Hint: Use Power Rule first, then Product Rule)
(A) $\log_b 11$ (B) $\log_b 6$ (C) $\log_b 18$ (D) $\log_b(9/2)$

178. Calculate the approximate value of $\log_{10} 6$.
(Hint: Use the Product Rule $\log(ab) = \log a + \log b$, noting $6 = 2 \times 3$)
Note: $\log_{10} 2 = 0.3010$, $\log_{10} 3 = 0.4771$, $\log_{10} 10 = 1$
(A) 0.9542 (B) 0.1761 (C) 0.6020 (D) 0.7781

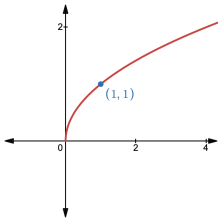
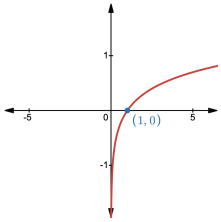
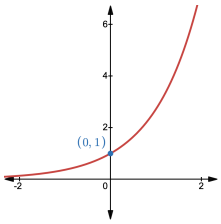
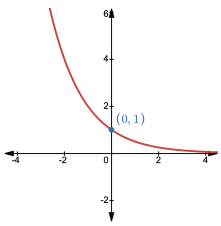
179. Calculate the approximate value of $\log_{10} 8$.
(Hint: Use the Power Rule $\log(a^n) = n \log a$, noting $8 = 2^3$)
(A) 0.6020 (B) 1.2040 (C) 0.9030 (D) 2.4080

180. Calculate the approximate value of $\log_{10} 1.5$.
(Hint: Use the Quotient Rule $\log(a/b) = \log a - \log b$, noting $1.5 = 3/2$)
(A) 0.1761 (B) 0.3010 (C) -0.1761 (D) 0.7781

181. Calculate the approximate value of $\log_{10} 12$.
(Hint: Use Product and Power Rules, noting $12 = 4 \times 3 = 2^2 \times 3$)
(A) 1.3801 (B) 1.0791 (C) 0.6020 (D) 0.9030

182. Calculate the approximate value of $\log_{10} 5$.
(Hint: Use the Quotient Rule, noting $5 = 10/2$, and recall $\log_{10} 10 = 1$)
(A) 1.3010 (B) 0.5000 (C) 0.7781 (D) 0.6990

183. Match the functions in Column A with their corresponding graphs in Column B.

Column A (Equation)		**Column B (Graph)**
(i) $y = e^x$	(p)	
(ii) $y = \frac{1}{2^x}$	(q)	
(iii) $y = \log_{10} x$	(r)	
(iv) $y = \sqrt{x}$	(s)	

(A) (i)-(r), (ii)-(p), (iii)-(q), (iv)-(s)
(B) (i)-(r), (ii)-(s), (iii)-(q), (iv)-(p)
(C) (i)-(p), (ii)-(r), (iii)-(q), (iv)-(s)
(D) (i)-(r), (ii)-(s), (iii)-(p), (iv)-q

Section 10: Progressions and Binomial Approximation

Focus: Arithmetic/Geometric progressions, series sums, binomial approximation, and applications.

184. Find the 10th term of the Arithmetic Progression (AP): 3, 7, 11, ... (Hint: AP nth term $a_n = a+(n-1)d$, where a is the first term and d is the common difference)
(A) 35 (B) 47 (C) 39 (D) 43

185. Find the sum of the first 15 terms of the AP: 2, 5, 8, ... (Hint: Sum $S_n = \frac{n}{2}[2a + (n-1)d]$)
(A) 330 (B) 345 (C) 360 (D) 315

186. (Physics Context) An object starts from rest and accelerates uniformly. Its velocity after 1s, 2s, 3s,... forms an AP. If its velocity after 5 seconds is 20 m/s, what is its velocity after 8 seconds? (Assume velocity at t=0 is 0, so $v(t) = at$). (Hint: The sequence is $a, 2a, 3a, ...$ Find a first using $v(5) = 20$)
(A) 40 m/s (B) 36 m/s (C) 32 m/s (D) 28 m/s

187. Find the sum of the first 30 positive integers ($1 + 2 + 3 + ... + 30$). (Hint: Use the sum of first n natural numbers formula $S_n = \frac{n(n+1)}{2}$)
(A) 465 (B) 450 (C) 480 (D) 435

188. Find the sum of the series: $5 + 10 + 15 + ... + 100$. (Hint: First find the number of terms 'n' using $a_n = a + (n-1)d$, then use $S_n = \frac{n}{2}[a + a_n]$)
(A) 1100 (B) 1050 (C) 950 (D) 1000

189. Find the 6th term of the Geometric Progression (GP): 2, 6, 18, ... (Hint: GP nth term $a_n = ar^{n-1}$, where a is the first term and r is the common ratio)
(A) 4374 (B) 162 (C) 729 (D) 486

190. Find the sum of the first 5 terms of the GP: 3, 6, 12, ... (Hint: Sum $S_n = \frac{a(r^n-1)}{r-1}$ for $r \neq 1$)
(A) 90 (B) 96 (C) 93 (D) 87

191. Find the sum of the first 20 terms of the AP: 50, 47, 44, ... (Hint: Use Sum $S_n = \frac{n}{2}[2a + (n-1)d]$)
(A) 430 (B) 400 (C) 490 (D) 460

192. Find the 12th term of the AP: 10, 6, 2, ... (Hint: Use nth term $a_n = a + (n-1)d$)
(A) -44 (B) -34 (C) -30 (D) -38

193. Find the sum of the first 6 terms of the GP: 4, 12, 36, ... (Hint: Use Sum $S_n = \frac{a(r^n-1)}{r-1}$ for $r \neq 1$)
(A) 1092 (B) 1452 (C) 728 (D) 1456

194. Find the sum of the infinite GP: $16 - 8 + 4 - 2 + ...$ (Hint: Use Sum $S_\infty = \frac{a}{1-r}$. Note that r is negative and $|r| < 1$)
(A) 16/3 (B) Infinity (C) 32/3 (D) 8

195. Find the 5th term of the GP: 81, 27, 9, ... (Hint: Use nth term $a_n = ar^{n-1}$)
(A) 1 (B) 1/9 (C) 1/3 (D) 3

196. Calculate the sum $13 + 14 + 15 + ... + 33$. (Hint: Calculate (Sum of 1 to 33) - (Sum of 1 to 12) using $S_n = \frac{n(n+1)}{2}$)
(A) 561 (B) 483 (C) 506 (D) 460

197. Find the sum of the infinite Geometric Progression: $\frac{1}{2} - \frac{1}{4} + \frac{1}{8} - \frac{1}{16} + ...$ (Hint: This is an infinite GP. Identify the first term a and common ratio r. Use Sum $S_\infty = \frac{a}{1-r}$)
(A) 1 (B) 2/3 (C) 1/3 (D) 1/4

198. Find the sum of the infinite GP: $1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + ...$ (Hint: Sum $S_\infty = \frac{a}{1-r}$, applicable only if $|r| < 1$)
(A) Infinity (B) 1.33 (C) 2 (D) 1.5

199. (Physics Context) A radioactive substance decays such that after each hour, only 80% (or 4/5) of it remains. What fraction of the original substance remains after 4 hours? (Hint: This is a GP with $a = 1$ (original fraction) and $r = 0.8$. Find the 5th term, representing the state *after* 4 hours)
(A) 0.4096 (B) 0.5120 (C) 0.6400 (D) 0.8000

200. (Physics Context) Find the sum of the infinite series for net force: $F = GMm\left[\frac{1}{r^2} + \frac{1}{(2r)^2} + \frac{1}{(4r)^2} + ...\right]$ (Hint: Factor out $\frac{GMm}{r^2}$. The remaining series is an infinite GP: $1 + 1/4 + 1/16 + ...$ Use $S_\infty = \frac{a}{1-r}$)
(A) $\frac{3}{2}\frac{GMm}{r^2}$ (B) $\frac{4}{3}\frac{GMm}{r^2}$ (C) $\frac{GMm}{r^2}$ (D) $2\frac{GMm}{r^2}$

201. Find the sum of the squares of the first 10 natural numbers ($1^2 + 2^2 + ... + 10^2$). (Hint: Use the formula $S_{n^2} = \frac{n(n+1)(2n+1)}{6}$)
(A) 3025 (B) 330 (C) 55 (D) 385

202. State the Binomial Approximation for $(1 + x)^n$ when $|x| \ll 1$.
(A) $1 + x^n$ (B) nx (C) $1 + nx$ (D) $1 + nx + \frac{n(n-1)}{2}x^2$

203. Use the Binomial Approximation to estimate $\sqrt{1.04}$. (Hint: Write as $(1 + 0.04)^{1/2}$ and use $(1 + x)^n \approx 1 + nx$)
(A) 1.02 (B) 1.01 (C) 1.005 (D) 1.04

204. Use the Binomial Approximation to estimate $(1.01)^5$. (Hint: Write as $(1 + 0.01)^5$)
(A) 1.10 (B) 1.05 (C) 1.25 (D) 1.01

205. (Physics Context) The acceleration due to gravity at height h above the Earth's surface is approximately $g' = g(1 + h/R)^{-2}$, where R is Earth's radius. Use binomial approximation for $h \ll R$ to simplify this. (Hint: Apply $(1 + x)^n \approx 1 + nx$ with $x = h/R$ and $n = -2$)
(A) $g(1 - h/R)$ (B) $g(1 + 2h/R)$ (C) $g(1 + h/R)$ (D) $g(1 - 2h/R)$

206. (Physics Context) Relativistic mass is $m = \frac{m_0}{\sqrt{1-v^2/c^2}} = m_0(1 - v^2/c^2)^{-1/2}$. Use binomial approximation for $v \ll c$ (meaning v^2/c^2 is very small) to find an approximate expression for m. (Hint: Apply $(1 + x)^n \approx 1 + nx$ with $x = -v^2/c^2$ and $n = -1/2$)
(A) $m_0(1 - \frac{1}{2}\frac{v^2}{c^2})$ (B) m_0 (C) $m_0(1 + \frac{1}{2}\frac{v^2}{c^2})$ (D) $m_0(1 + \frac{v^2}{c^2})$

207. Estimate the value of $\frac{1}{(1.03)^2}$ using binomial approximation. (Hint: Write as $(1 + 0.03)^{-2}$)
(A) 0.94 (B) 0.97 (C) 1.03 (D) 1.06

Section 11: Ratio, Proportion, and Percentage

Focus: Ratios, direct/inverse proportions, percentages, and scaling laws with applications.

208. (Chemistry Context) Acid and water are mixed in the ratio 1:5. If there are 30 mL of acid, how much water is there? (Recall: Set up a proportion $\frac{\text{acid}_1}{\text{water}_1} = \frac{\text{acid}_2}{\text{water}_2}$)
(A) 180 mL (B) 35 mL (C) 150 mL (D) 6 mL

209. Divide 200 kg in the ratio 3:5:12. What is the largest share? (Hint: Total parts = 3+5+12. Largest share fraction = 12 / Total parts)
(A) 120 kg (B) 100 kg (C) 50 kg (D) 30 kg

210. (Physics Context) In an alloy, the ratio of copper to zinc is 7:3. If a sample contains 21 grams of copper, what is the mass of zinc?
(A) 49 g (B) 7 g (C) 9 g (D) 3 g

211. Simplify the ratio 1800 grams : 3 kg. (Hint: Convert both quantities to the same unit, e.g., grams, before simplifying)
(A) 3:5 (B) 18:3 (C) 6:1 (D) 600:1

212. Blue and yellow paints are mixed in the ratio 3:5 to produce green. How much blue paint is needed to produce 40 mL of green paint? (Hint: Total parts = 3+5=8. Fraction of blue = 3/8)
(A) 8 mL (B) 15 mL (C) 24 mL (D) 25 mL

213. (Chemistry Context - Mole Ratio) In a reaction, the mole ratio of reactant A to product B is 2:3. If 5 moles of A react completely, how many moles of B are formed? (Set up proportion: $\frac{\text{moles A}_1}{\text{moles B}_1} = \frac{\text{moles A}_2}{\text{moles B}_2}$)
(A) 10 mol (B) 3.33 mol (C) 5 mol (D) 7.5 mol

214. (Direct Proportion) If 5 tickets cost ₹40, what is the cost of 9 tickets? (Recall: Cost is directly proportional to the number of tickets, Cost $= k \times$ Tickets)
(A) ₹8 (B) ₹45 (C) ₹72 (D) ₹64

215. (Direct Proportion) A constant force F produces an acceleration a. If F is tripled, what happens to a? (Recall Newton's 2nd Law: $F = ma$, so $a = F/m$. Assume mass m is constant)
(A) Tripled (B) Divided by 3 (C) Remains same (D) Halved

216. (Inverse Proportion) How long does it take to complete a journey of 300 miles travelling at 50 mph? (Recall: Time is inversely proportional to speed for a fixed distance, Time $= \frac{\text{Distance}}{\text{Speed}}$)
(A) 15 hours (B) 6 hours (C) 5 hours (D) 7.5 hours

217. (Inverse Proportion) For an ideal gas at constant temperature, pressure P is inversely proportional to volume V ($P = k/V$). If the volume is halved, what happens to the pressure?
(A) Remains same (B) Halved (C) Quadrupled (D) Doubled

218. (Direct Proportion) To make 3 glasses of a solution, you need 600 ml of solvent. How much solvent is needed for 7 glasses?
(A) 1200 ml (B) 2100 ml (C) 1400 ml (D) 1000 ml

219. (Inverse Proportion) If 4 people can complete a task in 1 hour, how long would it take 6 people to complete the same task, assuming they work at the same rate? (Hint: Total work = Rate $\times$ People $\times$ Time. Work is constant. Let $k =$ People $\times$ Time)
(A) 40 minutes (B) 45 minutes (C) 30 minutes (D) 1.5 hours

220. (Physics - Scaling) The area A of a circle is πr^2. If the radius r is doubled, how does the area change? (Hint: Substitute $2r$ for r in the formula $A \propto r^2$)
(A) Increases 8 times (B) Increases 4 times (C) Decreases 2 times (D) Increases 2 times

221. (Physics - Scaling) The volume V of a sphere is $\frac{4}{3}\pi r^3$. If the radius r is halved, how does the volume change?
(A) Decreases 2 times (B) Decreases 4 times (C) Decreases 8 times (D) Decreases 6 times

222. (Physics - Scaling) Gravitational force $F = G\frac{m_1 m_2}{r^2}$. If the distance r is doubled, how does the force F change?
(A) Decreases 4 times (B) Decreases 2 times (C) Increases 2 times (D) Increases 4 times

223. (Physics - Inverse Square Law) The intensity I of light is inversely proportional to the square of the distance d from the source ($I \propto 1/d^2$). If you move three times farther away from the source, how does the intensity change?
(A) Decreases 9 times (B) Decreases 3 times (C) Increases 9 times (D) Decreases 6 times

224. (Physics - Direct Square Law) Kinetic energy $KE = \frac{1}{2}mv^2$. If the velocity v is tripled, how does the kinetic energy change? (Assume mass m is constant)
(A) Increases 6 times (B) Increases 9 times (C) Decreases 9 times (D) Increases 3 times

225. Express 75% as a fraction in its lowest form.
(A) 15/20 (B) 7/10 (C) 75/100 (D) 3/4

226. Express the fraction 3/5 as a percentage.
(A) 30% (B) 50% (C) 60% (D) 75%

227. What is 80% of 130? (Recall: "of" means multiply. 80% = 0.80)
(A) 104 (B) 114 (C) 130 (D) 80

228. 21 is 30% of what number? (Hint: Set up the equation $21 = 0.30 \times x$)
(A) 6.3 (B) 70 (C) 7 (D) 63

229. 6 is what percent of 40? (Hint: Set up the equation $6 = \frac{x}{100} \times 40$)
(A) 24% (B) 6% (C) 20% (D) 15%

230. Find the percent of change from 80 kg to 72 kg. Is it an increase or decrease? (Hint: % Change $= \frac{\text{New Value}-\text{Old Value}}{\text{Old Value}} \times 100\%$)
(A) 10% (increase) (B) 8% (increase) (C) −10% (decrease) (D) −8% (decrease)

231. The speed of a car increases from 50 km/h to 60 km/h. Calculate the percentage change in speed.
(A) 20% increase (B) 10% increase (C) 16.7% increase (D) 20% decrease

232. The price of an item drops from ₹200 to ₹180. What is the percentage change in price?
(A) 11.1% decrease (B) 10% increase (C) 20% decrease (D) 10% decrease

233. The price of a component increased by 15%. If the original price was \$60, what is the new price?
(A) \$75 (B) \$51 (C) \$69 (D) \$9

234. A quantity decreases by 8% and then increases by 10%. What is the overall percentage change from the original value? (Hint: If original is x, it becomes $x \times (1 - 0.08)$, then multiply by $(1 + 0.10)$)
(A) +2.8% (B) −1.2% (C) +2% (D) +1.2%

235. The population of a town increased by 15% in one year. If the original population was 50,000, what is the new population?
(A) 57,500 (B) 51,500 (C) 42,500 (D) 7,500

Section 12: Mensuration

Focus: Calculating perimeter, area, surface area, and volume of common 2D/3D shapes.

236. Find the area of a square with a side length of 5 cm. (Hint: Area of Square = side × side = s^2)
(A) 10 cm^2 (B) 30 cm^2 (C) 25 cm^2 (D) 20 cm^2

237. Calculate the perimeter of a rectangle with length $l = 8$ m and width $w = 3$ m.
(Hint: Perimeter of Rectangle = 2 × (length + width) = $2(l + w)$)
(A) 11 m (B) 22 m (C) 24 m (D) 16 m

238. Find the area of a triangle with base $b = 10$ cm and height $h = 6$ cm.
(Hint: Area of Triangle = $\frac{1}{2}$ × base × height = $\frac{1}{2}bh$)
(A) 15 cm^2 (B) 16 cm^2 (C) 30 cm^2 (D) 60 cm^2

239. Calculate the circumference of a circle with radius $r = 7$ cm. (Use $\pi \approx 22/7$)
(Hint: Circumference of Circle = 2 × π × radius = $2\pi r$)
(A) 44 cm (B) 22 cm (C) 154 cm (D) 49 cm

240. Find the area of a circle with diameter $d = 10$ m. (Use $\pi \approx 3.14$)
(Hint: Radius = diameter / 2. Area of Circle = π × radius^2 = πr^2)
(A) 31.4 m^2 (B) 78.5 m^2 (C) 100 m^2 (D) 314 m^2

241. Calculate the perimeter of a square whose area is 64 cm^2.
(Hint: First find side s using Area = s^2, then use Perimeter = 4 × side = $4s$)
(A) 16 cm (B) 8 cm (C) 64 cm (D) 32 cm

242. Find the area of a rectangle with perimeter 30 m and length 10 m.
(Hint: Use Perimeter = $2(l + w)$ to find width w, then use Area = length × width = lw)
(A) 150 m^2 (B) 100 m^2 (C) 50 m^2 (D) 75 m^2

243. Find the area of a parallelogram with base 12 cm and height 5 cm.
(Hint: Area of Parallelogram = base × height)
(A) 60 cm^2 (B) 17 cm^2 (C) 34 cm^2 (D) 30 cm^2

244. Find the area of a trapezium with parallel sides $a = 8$ cm, $b = 12$ cm and height $h = 5$ cm.
(Hint: Area of Trapezium = $\frac{1}{2}$ × (sum of parallel sides) × height = $\frac{1}{2}(a + b)h$)
(A) 40 cm^2 (B) 50 cm^2 (C) 100 cm^2 (D) 25 cm^2

245. Calculate the volume of a cube with side length $s = 4$ cm.
(Hint: Volume of Cube = side × side × side = s^3)
(A) 12 cm^3 (B) 16 cm^3 (C) 48 cm^3 (D) 64 cm^3

246. Find the total surface area of a cube with side length $s = 3$ m.
(Hint: Total Surface Area of Cube $= 6 \times \text{side}^2 = 6s^2$)
(A) 36 m^2 (B) 27 m^2 (C) 54 m^2 (D) 18 m^2

247. Calculate the volume of a cuboid with length $l = 5$, width $w = 4$, and height $h = 3$ (units).
(Hint: Volume of Cuboid = length $\times$ width $\times$ height $= lwh$)
(A) 60 units^3 (B) 94 units^3 (C) 47 units^3 (D) 12 units^3

248. Find the total surface area of a cuboid with dimensions $l = 5, w = 4, h = 3$ (units).
(Hint: Total Surface Area of Cuboid $= 2 \times (lw + lh + wh)$)
(A) 60 units^2 (B) 94 units^2 (C) 120 units^2 (D) 47 units^2

249. Calculate the volume of a cylinder with radius $r = 2$ m and height $h = 5$ m. (Use $\pi \approx 3.14$)
(Hint: Volume of Cylinder $= \pi \times \text{radius}^2 \times \text{height} = \pi r^2 h$)
(A) 31.4 m^3 (B) 15.7 m^3 (C) 62.8 m^3 (D) 125.6 m^3

250. Find the curved surface area of a cylinder with radius $r = 3$ cm and height $h = 10$ cm. (Hint: Curved Surface Area of Cylinder $= 2 \times \pi \times$ radius $\times$ height $= 2\pi rh$)
(A) 180π cm^2 (B) 90π cm^2 (C) 30π cm^2 (D) 60π cm^2

251. Calculate the total surface area of a cylinder with radius $r = 2$ and height $h = 5$. (Leave π in the answer)
(Hint: Total Surface Area = Curved Surface Area + 2 $\times$ Area of Base $= 2\pi rh + 2\pi r^2 = 2\pi r(h + r)$)
(A) 28π (B) 20π (C) 8π (D) 24π

252. Find the volume of a cone with radius $r = 3$ cm and height $h = 7$ cm. (Use $\pi \approx 22/7$) (Hint: Volume of Cone $= \frac{1}{3} \times \pi \times \text{radius}^2 \times \text{height} = \frac{1}{3}\pi r^2 h$)
(A) 22 cm^3 (B) 66 cm^3 (C) 44 cm^3 (D) 198 cm^3

253. Calculate the volume of a sphere with radius $r = 3$ m. (Leave π in the answer) (Hint: Volume of Sphere $= \frac{4}{3} \times \pi \times \text{radius}^3 = \frac{4}{3}\pi r^3$)
(A) 27π m^3 (B) 9π m^3 (C) 108π m^3 (D) 36π m^3

254. Find the surface area of a sphere with radius $r = 5$ cm. (Leave π in the answer) (Hint: Surface Area of Sphere $= 4 \times \pi \times \text{radius}^2 = 4\pi r^2$)
(A) 20π cm^2 (B) 50π cm^2 (C) 100π cm^2 (D) 25π cm^2

255. The volume of a cube is 125 cm^3. Find the length of its side s. (Hint: Volume $= s^3$. Find the cube root.)
(A) 5 cm (B) 6.25 cm (C) 15 cm (D) 25 cm

Section 13: Additional Mathematical Tools

Focus: Determinants, absolute value equations, area under graphs, graph reading, and word problems.

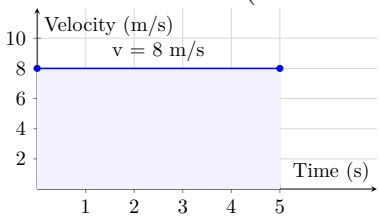
256. Evaluate the determinant of the 2x2 matrix: $\begin{vmatrix} 2 & 3 \\ 1 & 4 \end{vmatrix}$. (Recall $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$)
(A) 11 (B) -5 (C) 10 (D) 5

257. Calculate the determinant of the 3x3 matrix: $\begin{vmatrix} 2 & 0 & 1 \\ 3 & 4 & 5 \\ 1 & 6 & 7 \end{vmatrix}$.
(Hint: Expand along the first row. Determinant $= 2 \cdot \begin{vmatrix} 4 & 5 \\ 6 & 7 \end{vmatrix} - 0 \cdot \begin{vmatrix} 3 & 5 \\ 1 & 7 \end{vmatrix} + 1 \cdot \begin{vmatrix} 3 & 4 \\ 1 & 6 \end{vmatrix}$)
(A) 24 (B) 18 (C) -32 (D) 10

258. Find the determinant of $\begin{vmatrix} 1 & 3 & 2 \\ 4 & 1 & 3 \\ 2 & 2 & 1 \end{vmatrix}$.
(A) 10 (B) 5 (C) 13 (D) -15

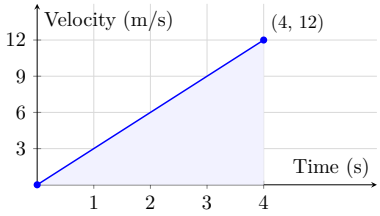
259. Solve $|2x - 3| = 5$.
(Hint: Solutions occur at $2x - 3 = 5$ and $2x - 3 = -5$)
(A) $4, -1$ (B) $4, 1$ (C) $-4, 1$ (D) $-4, -1$

260. The velocity-time graph for a particle's motion is shown below. Find the area under the graph between $t = 0$ s and $t = 5$ s (This area represents displacement).



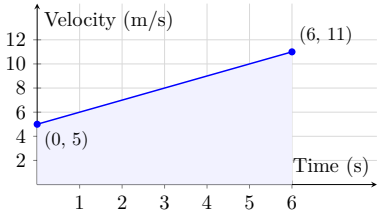
(Hint: Calculate the area of the rectangle formed: Area = base × height.)
(A) 5 m (B) 40 m (C) 13 m (D) 8 m

261. Calculate the area under the velocity-time graph from $t = 0$ s and $t = 4$ s.



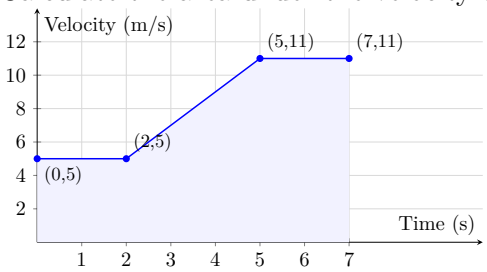
(Hint: Calculate the area of the triangle formed: Area = $\frac{1}{2}$ × base × height.)
(A) 16 m (B) 48 m (C) 12 m (D) 24 m

262. Calculate the area under the velocity-time graph from $t = 0$ s to $t = 6$ s .



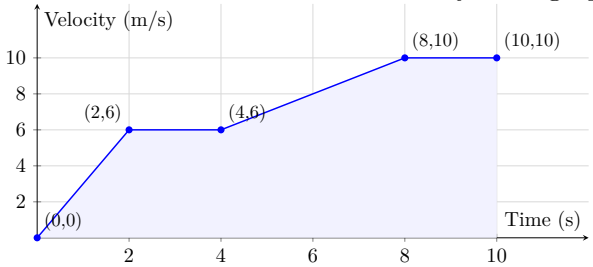
(Hint: Calculate the area of the trapezoid formed: Area = $\frac{1}{2}$ × (sum of parallel sides) × height.)
(A) 30 m (B) 66 m (C) 48 m (D) 16 m

263. Calculate the area under the velocity-time graph $t = 0$ s to $t = 7$ s.



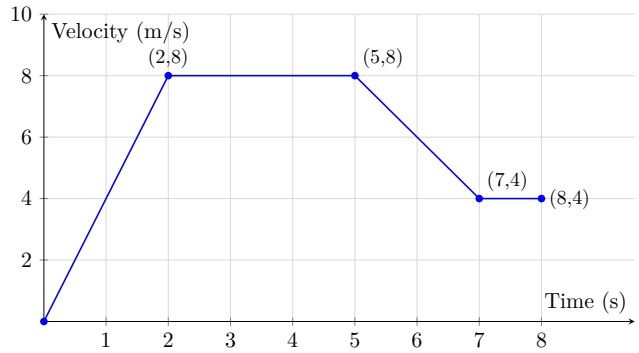
(A) 56 m (B) 52 m (C) 65 m (D) 60 m

264. Calculate the area under the velocity-time graph $t = 0$ s to $t = 10$ s.



(A) 60 m (B) 70 m (C) 80 m (D) 65 m

265. Refer to the velocity-time graph below. During which time interval is the particle's velocity maximum?



(A) 5 s to 7 s (B) 2 s to 5 s (C) 7 s to 8 s (D) 0 s to 2 s

266. Refer to the velocity-time graph in the previous question. What is the velocity of the particle at $t = 6$ s?
(A) 6 m/s (B) 4 m/s (C) 7 m/s (D) 8 m/s

267. Refer to the above velocity-time graph. During which time interval is the velocity constant and equal to 4 m/s?
(A) 0s to 2s (B) 7s to 8s (C) 5s to 7s (D) 2s to 5s

268. Refer to the above velocity-time graph. What is the velocity of the particle at $t = 1$ s?
(A) 4 m/s (B) 8 m/s (C) 6 m/s (D) 0 m/s

269. Three consecutive even integers sum to 48. Find the largest.
(Hint: Let integers be $x, x + 2, x + 4$; solve $3x + 6 = 48$)
(A) 16 (B) 14 (C) 18 (D) 20

270. Two numbers sum to 20 with product 96. Find the larger.
(Hint: Solve $x + y = 20$, $xy = 96$)
(A) 14 (B) 10 (C) 8 (D) 12

271. Two numbers have a sum of 20 and a difference of 6. Find the smaller number.
(A) 7 (B) 13 (C) 8 (D) 14

272. The sum of three consecutive even integers is 48. Find the largest integer.
(A) 16 (B) 18 (C) 14 (D) 20

Answer Key

1	(B)	**2**	(C)	**3**	(D)	**4**	(A)	**5**	(B)	**6**	(D)	**7**	(B)	**8**	(A)	**9**	(C)	**10**	(C)
11	(D)	**12**	(A)	**13**	(C)	**14**	(B)	**15**	(A)	**16**	(D)	**17**	(B)	**18**	(D)	**19**	(B)	**20**	(A)
21	(B)	**22**	(C)	**23**	(D)	**24**	(A)	**25**	(B)	**26**	(C)	**27**	(D)	**28**	(A)	**29**	(B)	**30**	(D)
31	(C)	**32**	(B)	**33**	(B)	**34**	(B)	**35**	(C)	**36**	(B)	**37**	(C)	**38**	(A)	**39**	(B)	**40**	(C)
41	(B)	**42**	(D)	**43**	(A)	**44**	(B)	**45**	(D)	**46**	(C)	**47**	(A)	**48**	(B)	**49**	(D)	**50**	(C)
51	(A)	**52**	(B)	**53**	(D)	**54**	(C)	**55**	(B)	**56**	(D)	**57**	(A)	**58**	(D)	**59**	(C)	**60**	(B)
61	(A)	**62**	(B)	**63**	(C)	**64**	(D)	**65**	(C)	**66**	(D)	**67**	(A)	**68**	(B)	**69**	(C)	**70**	(D)
71	(C)	**72**	(A)	**73**	(B)	**74**	(C)	**75**	(D)	**76**	(C)	**77**	(B)	**78**	(D)	**79**	(C)	**80**	(B)
81	(A)	**82**	(C)	**83**	(C)	**84**	(B)	**85**	(B)	**86**	(C)	**87**	(D)	**88**	(A)	**89**	(B)	**90**	(D)
91	(C)	**92**	(A)	**93**	(B)	**94**	(D)	**95**	(D)	**96**	(D)	**97**	(C)	**98**	(D)	**99**	(A)	**100**	(A)
101	(A)	**102**	(B)	**103**	(C)	**104**	(D)	**105**	(C)	**106**	(B)	**107**	(D)	**108**	(A)	**109**	(B)	**110**	(D)
111	(C)	**112**	(A)	**113**	(B)	**114**	(D)	**115**	(C)	**116**	(A)	**117**	(D)	**118**	(C)	**119**	(D)	**120**	(A)
121	(B)	**122**	(D)	**123**	(C)	**124**	(A)	**125**	(B)	**126**	(D)	**127**	(C)	**128**	(A)	**129**	(B)	**130**	(C)
131	(D)	**132**	(D)	**133**	(B)	**134**	(D)	**135**	(C)	**136**	(A)	**137**	(B)	**138**	(D)	**139**	(D)	**140**	(B)
141	(C)	**142**	(B)	**143**	(C)	**144**	(A)	**145**	(B)	**146**	(D)	**147**	(C)	**148**	(A)	**149**	(B)	**150**	(D)
151	(C)	**152**	(A)	**153**	(B)	**154**	(C)	**155**	(D)	**156**	(A)	**157**	(B)	**158**	(D)	**159**	(A)	**160**	(B)
161	(C)	**162**	(B)	**163**	(D)	**164**	(A)	**165**	(B)	**166**	(D)	**167**	(C)	**168**	(A)	**169**	(B)	**170**	(D)
171	(C)	**172**	(A)	**173**	(B)	**174**	(C)	**175**	(D)	**176**	(A)	**177**	(B)	**178**	(D)	**179**	(C)	**180**	(A)
181	(B)	**182**	(D)	**183**	(B)	**184**	(C)	**185**	(B)	**186**	(C)	**187**	(A)	**188**	(B)	**189**	(D)	**190**	(C)
191	(A)	**192**	(B)	**193**	(D)	**194**	(C)	**195**	(A)	**196**	(B)	**197**	(C)	**198**	(D)	**199**	(A)	**200**	(B)
201	(D)	**202**	(C)	**203**	(A)	**204**	(B)	**205**	(D)	**206**	(C)	**207**	(A)	**208**	(C)	**209**	(A)	**210**	(C)
211	(A)	**212**	(B)	**213**	(D)	**214**	(C)	**215**	(A)	**216**	(B)	**217**	(D)	**218**	(C)	**219**	(A)	**220**	(B)
221	(C)	**222**	(A)	**223**	(A)	**224**	(B)	**225**	(D)	**226**	(C)	**227**	(A)	**228**	(B)	**229**	(D)	**230**	(C)
231	(A)	**232**	(D)	**233**	(C)	**234**	(D)	**235**	(A)	**236**	(C)	**237**	(B)	**238**	(C)	**239**	(A)	**240**	(B)
241	(D)	**242**	(C)	**243**	(A)	**244**	(B)	**245**	(D)	**246**	(C)	**247**	(A)	**248**	(B)	**249**	(C)	**250**	(D)
251	(A)	**252**	(B)	**253**	(D)	**254**	(C)	**255**	(A)	**256**	(D)	**257**	(D)	**258**	(C)	**259**	(A)	**260**	(B)
261	(D)	**262**	(C)	**263**	(A)	**264**	(B)	**265**	(B)	**266**	(A)	**267**	(B)	**268**	(A)	**269**	(C)	**270**	(D)
271	(A)	**272**	(B)																