Key

Algebra II - TMTA - 1964

1. Evaluate: $(9^{1/2} + 4^{1/2})^2$

(1) 5 ; (2) 13 ; (3) 25 ; (4) $\frac{14}{3}$; (5) 20.

2. The difference between $(\sqrt{125} + \sqrt{24})$ and $(\sqrt{96} + \sqrt{20})$ may be written:

(1) $3\sqrt{5} - 2\sqrt{6}$; (2) $3\sqrt{5} - 6\sqrt{6}$; (3) $7\sqrt{5} + 2\sqrt{6}$; (4) $\sqrt{149} - \sqrt{116}$;

(5) $\sqrt{33}$.

3. Which of the following is largest?

(1) $\frac{3}{2^{4/3}}$; (2) $2^{2/3}$; (3) $\frac{2}{3^{1/3}}$; (4) $\frac{4}{2 \cdot 2^{2/3}}$; (5) $\left(\frac{1}{2}\right)^{3/2}$

4. If $N = \frac{u^{1/3} v^{2/3}}{w^{1/2}}$ and $u = 8$, $v = 27$, and $w = 36$, then N equals

(1) $\sqrt{6}$; (2) 9 ; (3) $3\sqrt{6}$; (4) 3 ; (5) 1.

5. Which of the following satisfy $\sqrt{2x-5} + (2x+5)^{1/2} = \sqrt{4x+20}$?

(1) $\sqrt{5}$; (2) $\pm\frac{5\sqrt{5}}{2}$; (3) $\frac{5\sqrt{5}}{2}$; (4) $-\frac{5\sqrt{5}}{2}$; (5) $5\sqrt{5}$.

6. The quantity $1+y$ can be divided without a remainder by

(1) $1 + y^{1/3}$; (2) $1 + \sqrt[3]{y} + \sqrt[3]{y^2}$; (3) $y^{1/3}$; (4) $1 - y^{1/3}$; (5) $1+\sqrt[3]{y} - \sqrt[3]{y^2}$.

7. The sum of the prime factors of $2x^3 - x^2 - 3x$ is $x(2x^2 - x - 3)$ $(2x-3)(x+1)$

(1) $4x - 4$; (2) $4x - 2$; (3) $x(2x-3)(x+1)$; (4) $2x^2 - 2x + 1$

(5) None of these.

8. An expression that is equivalent to $\frac{r^{-1} + s^{-1}}{r^{-3} + s^{-3}}$ is

(1) $\frac{1}{r^{-2} + s^{-2}}$; (2) $\frac{(s^3 - r^3)(s - r)}{r^4 s^4}$; (3) $-(r^{-4} - s^{-4})$;

(4) $\frac{r^2 s^2}{s^2 + sr + r^2}$; (5) $\frac{r^2 s^2}{s^2 - sr + r^2}$.

9. An expression equivalent to $\frac{2\sqrt[3]{2}}{\sqrt[3]{5}}$ is (1) $\frac{2\sqrt[3]{6}}{4\,5}$ (2) $\frac{4}{5}$ (3) $6\sqrt[3]{2}$ (4) $\frac{2\sqrt[3]{6}}{15}$ (5) $\frac{\sqrt[3]{18}}{15}$ 5

10. If $2^{\frac{n}{2}+1} = 32$, then $n =$ (1) 5 (2) 6 (3) 7 (4) 8 (5) none of these.

11. Log $(b\sqrt[3]{a})$ equals (1) $\frac{3}{2}\log(a+b)$ (2) $\frac{1}{2}\log a + 3\log b$ (3) $\frac{3}{2}\log(ab)$ (4) $3\log(\sqrt{a}\cdot b)$ (5) None of these

Note

12. $8a^3 - 27b^3$ may be expressed as (1) $(2a+3b)(4a^2-6ab+9b^2)$ (2) $(2a+3b)(4a^2-9b^2)$ (3) $(2a-3b)(4a^2+6ab+9b^2)$ (4) $(4a^2+9b^2)(2a-3b)$ (5) $(2a-3b)(4a^2+12ab+9b^2)$

13. The solution set for $2x+10 = x^2$ is
(1) $\{-1+\sqrt{11}, -1-\sqrt{11}\}$ (2) $\{-2+2\sqrt{44}, -2-2\sqrt{44}\}$
(3) $\{2+2\sqrt{11}, 2-2\sqrt{11}\}$ (4) $\{1+\sqrt{11}, 1-\sqrt{11}\}$
(5) $\{1+2\sqrt{11}, 1-2\sqrt{11}\}$

14. Simplify: $\left(\frac{64r^{-6}s^3t^6}{343a^3b^{-9}c^0}\right)^{\frac{2}{3}}$. (1) $\frac{16b^6s^2t^4}{49a^2r^4}$

(2) $\frac{16r^{-4}s^2t^2}{49a^2b^{-6}}$ (3) $\frac{16b^2s^2t^4}{49a^2r^4}$ (4) $\frac{4r^6s^2t^4}{7a^2b^4}$

(5) $\frac{4b^6s^2t^4}{7a^2r^4}$

15. Find the coefficient of x^3 in the expansion of $\left(x-\frac{1}{3}\right)^8$. (1) $\frac{243}{56}$ (2) $\frac{56}{243}$ (3) $-\frac{14}{243}$ (4) $-\frac{56}{243}$

(5) None of these

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

16. The middle term of the expansion of $\left(\frac{a}{2}+\frac{2}{a}\right)^6$ is
(1) 1 (2) 0 (3) $\frac{2}{a}$ (4) $\frac{a}{2}$ (5) 20

17. If $X^5-2X^4-X^2+6$ is divided by $x-2$, the remainder is (1) 16 (2) -2 (3) 4 (5) none of these (4) 2

18. The factored form of $a^3-9a^2b+27ab^2-27b^3$ is
(1) $(a+3b)(a^2+6ab+9b^2)$ (2) $(a-3b)(a^2-3ab+9b^2)$
(3) $(a+3b)^3$ (4) $(a-3b)^3$ (5) $a^3-(3b)^3$

19. For the roots of the equation $9X^2+4x+k=0$ to be equal, k must be
(1) 0 (2) 1 (3) $\frac{1}{4}$ (4) $-\frac{3}{4}$ (5) $\frac{4}{9}$

20. If the domain of the function $f(x)=2X^2+X+\frac{1}{8}$ is the set of all real numbers, then the range of the function is the set of all
(1) positive real numbers (2) negative real numbers
(3) non-negative real numbers (4) real numbers
(5) non-positive real numbers

21. If m and n are positive integers which of the following is always a positive integer?
(1) $m \cdot n$ (2) $\frac{m}{n}$ (3) $m-n$ (4) $n-m$ (5) all of these

22. If one solution of a quadratic equation is $x=2-i$, then the equation is (1) $X^2-2iX-7=0$
(2) $X^2-4X+5=0$ (3) $X^2+4X+7=0$
(4) $X^2-2X-1=0$ (5) $X^2-4X+3=0$

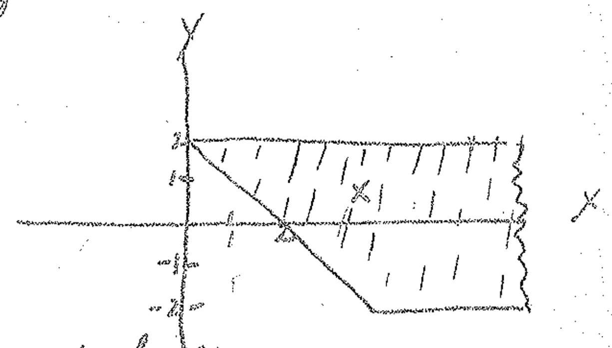
Pd

23. Which equation represents a real ellipse?
(1) $3x^2 - 4 = 2y^2$ (2) $3y^2 = 7 - 2x^2$ (3) $(x-3)(x+3y) = 9$
(4) $x^2 + 3x = y - 4$ (5) $x^2 + 2y^2 + 3 = 0$

24. The sum of the roots of the quadratic equation $9x = 4 - 3x^2$ is (1) -3 (2) 3 (3) 9 (4) -9 (5) $-\frac{4}{3}$

25. Abe noticed that during the first half of a trip that he had averaged 20 mph. What average rate must he make during the second half of the trip if he is to average 30 mph for the entire trip? (1) 25 (2) 40
(3) 50 (4) 60 (5) none of these

26. The graph represents



(1) $\{(x,y) \mid x+y \geq 2 \text{ and } |y| \leq 2\}$
(2) $\{(x,y) \mid x+y \geq 2 \text{ or } |y| \leq 2\}$
(3) $\{(x,y) \mid x+y \leq 2 \text{ and } |y| \geq 2\}$
(4) $\{(x,y) \mid x+y \leq 2 \text{ or } |y| \geq 2\}$ (5) none of these

27. The solution set of the system of equations $x^2 - 2y^2 = 1$; $x^2 + 4y^2 = 25$ is
(1) $\{(1,0)\ (3,-2)\}$ (2) $\{(2, \frac{5}{2})\ (3, -\frac{5}{2})\}$ (3) $\{(0,1)\ (0,0)\}$
(4) $\{(3,4)\ (-3,-4)\}$ (5) none of these

28. The quadratic equation $4x^2 - 3x + 1 = 0$ has roots that are (1) conjugate imaginary (2) equal and rational (3) unequal and rational
(4) equal and irrational (5) unequal and irrational

29. $\log_4 8 =$ (1) 2 (2) $\frac{3}{2}$ (3) 32 (4) $\frac{1}{2}$ (5) none of these

30. The set of all x that satisfies $3x + 4 < 5x - 8$ is
(1) $\{x \mid x < 6\}$ (2) $\{x \mid x > 6\}$ (3) $\{x \mid x < 12$ (4) $\{x \mid -6 < x < 6\}$
(5) none of these

31. If the sum of two numbers is 10 and their product is 20, the sum of their reciprocals is
(1) $\frac{1}{10}$ (2) $\frac{1}{2}$ (3) 2 (4) 10 (5) none of these

32. The diagonal of square I is $x+y$. The perimeter of square II which twice the area of I is
(1) $(x+y)^2$ (2) $\sqrt{2}(x+y)^2$ (3) $2(x+y)$ (4) $\sqrt{8}(x+y)$
(5) $4(x+y)$

33. John can run around a circular track in 40 sec, Bill, running in the opposite direction meets John every 15 sec. What is Bill's time to run around the track, expressed in seconds? (1) $12\frac{1}{2}$ (2) 24 (3) 25 (4) $27\frac{1}{2}$ (5) 55

34. If the set $S = \{1, 2, 3\}$ and an operation $*$ is defined by the table

*	1	2	3
1	1	2	3
2	2	0	1
3	3	3	1

then a basic property under $*$ which holds is

(1) existence of an identity element (2) commutativity
(3) closure (4) associativity (5) none of these

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

(35) If $A = \{1,3,4,5,7,8\}$ $B = \{2,3,4,5,6,9\}$ $C = \{1,3,5,9,10\}$
then $A \cup (B \cap C)$ is (1) $\{1,3,4,5,9\}$ (2) $\{3,5\}$
(3) $\{1,3,4,5,7,8,9\}$ (4) $\{1,2,3,4,5,6,7,8,9,10\}$ (5) $\{1,3,4,5\}$

(36) The 50th term of the arithmetic progression
$\frac{1}{2} + \frac{3}{2} + \frac{5}{2} + \ldots$ is (1) 51 (2) $50\frac{1}{2}$ (3) 50 (4) $49\frac{1}{2}$
(5) 49

(37) The first term of a geometric progression having
a sum of $23\frac{1}{4}$, a common ratio of 2, and having
5 terms is (1) 1 (2) $\frac{3}{4}$ (3) $\frac{1}{2}$ (4) $\frac{1}{4}$ (5) none of these

(38) Two swimmers, at opposite ends of a 90-foot pool,
start to swim the length of the pool, one at
the rate of 3 ft. per sec., the other at 2 ft. per sec.
They swim back and forth for 12 min. Allow-
ing no loss of time at the turns, find the no.
of times they pass each other.
(1) 24 (2) 2 (3) 20 (4) 16 (5) 18

3

(39) Five times the amount of Al's money added to
the amount of Bill's money is more than
\$51.00. Three times Al's money minus Bill's
money is \$21.00. If A represents Al's money
and B represents Bill's money in dollars, then
(1) $A > 9,\ B > 6$ (2) $A > 9,\ B < 6$ (3) $A > 9,\ B = 6$
(4) $A > 9$, but we can put no bounds on B (5) $2A = 3B$

(40) If $(x+1)^2 > (5x-1)$ and $< (7x-3)$, find the smallest
possible integral value of x.
(1) 1 (2) 2 (3) 3 (4) 4 (5) none of these