

NATIONAL EDUCATIONAL ASSESMENT AND EXAMINATIONS AGENCY (NEAEA)
ETHIOPIAN UNIVERSITY ENTRANCE EXAMINATION (EUEE)
MATHEMATICS EXAMINATION 2008

BOOKLET CODE: 00

NUMBER OF ITEMS:

SUBJECT CODE: 00

TIME ALLOWED: 00

1. Which one of the following is a one to one correspondence function from $A=[0, 1]$ to $B=[1, 2]$?

Not Answered

- A) $f(x) = x$
- B) $f(x) = 1/3x^3 + 1$
- C) $f(x) = 2x + 1$
- D) $f(x) = x^2 + 1$ ✓

2. What is the solution set of $\frac{1-\frac{1}{x}}{1-\frac{1}{x^2}} = 3x^2 - \frac{x}{1+\frac{1}{x}}$? ? Not Answered

- A) $\{-1, 1/3\}$
- B) $\{1/3\}$ ✓
- C) $\{3, -1/3\}$
- D) $\{-1/3\}$

3. Suppose $\frac{1-\frac{1}{x}}{1-\frac{1}{x^2}} = 3x^2 - \frac{x}{1+\frac{1}{x}}$? , where $Q(x)$ is a quadratic function. Which one of the following is necessarily true about the graph of f . Not Answered

- A) $x = 0$, $x = 1$ and $x = -1$ are vertical asymptotes of graph of f .
- B) the graph of f doesn't intersect with its horizontal asymptote.
- C) the vertical asymptotes of the graph of f is only $x = -1$
- D) the vertical asymptotes of graph of f are $x = 1$ and $x = -1$ if $Q(x) = 2x^2$. ✓

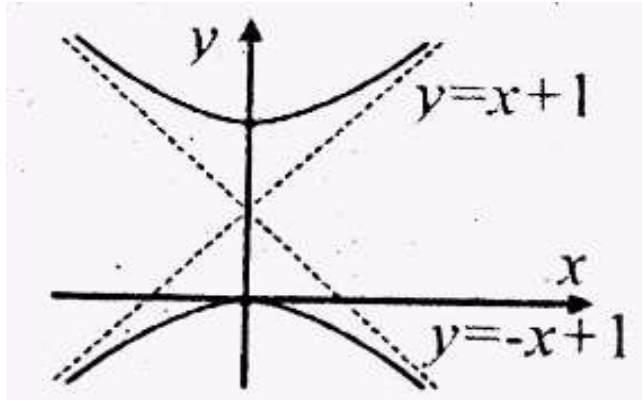
4. Which one of the following is equation of a circle whose center is on y -axis and radius is 3? Not Answered

- A) $x^2 + y^2 + 6y = 0$
- B) $(x-2)^2 + y^2 = 9$
- C) $x^2 + (y-2)^2 = 9$ ✓
- D) $x^2 - 2x + y^2 = 8$

5. The planet Mercury's orbit around the sun is an ellipse with eccentricity 0.206, length of the major axis 1.16×10^8 km and the sun at one focus. What is the max distance from Mercury to the sun? Not Answered

- A) 6.99×10^8 km
- B) 6.99×10^7 km ✓
- C) 9.66×10^7 km
- D) 9.66×10^8 km

6. The graph of a hyperbola and the lines of its asymptotes are given as shown in the following figure. Which one of the following is an equation of the hyperbola?



Not Answered

- A) $y^2 - 2y - x^2 = 0$ ✓
- B) $y^2 - 3y - x^2 = 0$
- C) $x^2 - (y-1)^2 = 1$
- D) $(x-1)^2 - y^2 = 1$

7. If the truth value of a proposition p is False, then which one of the following compound proposition has a truth value True? Not Answered

- A) $\neg p \wedge p$
- B) $\neg p \Rightarrow p$
- C) $\neg(\neg p \vee p)$
- D) $p \Rightarrow \neg p$ ✓

8. What is the contrapositive of "If $x \in \mathbb{N}$, then x is integer and $x > 0$."? Not Answered

- A) if x is not integer or $x < 0$, then $x \in \mathbb{N}$
- B) if x is integer or $x > 0$, then $x \in \mathbb{N}$
- C) if x is not integer or $x \leq 0$, then $x \notin \mathbb{N}$
- D) if $x \notin \mathbb{N}$, then x is not integer and $x \leq 0$ ✓

9. Which one of the following compound propositions is a tautology? Not Answered

- A) $(q \vee \neg q) \Rightarrow p$
- B) $p \Rightarrow (p \vee \neg q)$ ✓
- C) $p \vee (q \wedge \neg q)$
- D) $p \Rightarrow (q \wedge \neg q)$

10. The following is sample frequency distribution of data with variable x .

X	3	5	6	7
Frequency	2	5	2	1

What are the mean (\bar{x}) and variance (δ^2) of the data? Not Answered

- A) $\bar{x} = 5, \delta^2 = 0.7$
- B) $\bar{x} = 6, \delta^2 = 1.4$
- C) $\bar{x} = 6, \delta^2 = 0.7$
- D) $\bar{x} = 5, \delta^2 = 1.4$ ✓

11. A box contains 10 items of which 3 are defective. If 2 items are randomly taken out of the box, what is the probability that both items are not defective? Not Answered

- A) 7/10
- B) 4/7
- C) 7/15 ✓
- D) 49/100

12. Items produced by accompany are subjected to two kinds of defects D1 and D2. Out of the total product, 5% have the defect D1, 10% have defect D2, and 2% have both defects. What is the probability that a randomly selected item has neither defect D1 nor defect D2? Not Answered

- A) 0.13
- B) 0.5
- C) 0.98
- D) 0.87 ✓

13. If $A = \begin{pmatrix} 2 & 7 \\ 1 & 3 \end{pmatrix}$ and $B^{-1} = \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix}$, then $(AB)^{-1}$ is equal to: Not Answered

- A) $\begin{pmatrix} 4 & -3 \\ 4 & -5 \end{pmatrix}$
- B) $\begin{pmatrix} -2 & 5 \\ 2 & -4 \end{pmatrix}$ ✓
- C) $\begin{pmatrix} -3 & 11 \\ 1 & -3 \end{pmatrix}$
- D) $\begin{pmatrix} 4 & 0 \\ 0 & 2 \end{pmatrix}$

14. Let $A = \begin{pmatrix} 0 & \alpha & \beta \\ 2 & 2 & 1 \\ 3 & 1 & 2 \end{pmatrix}$, $b = \begin{pmatrix} 6 \\ 0 \\ 0 \end{pmatrix}$, and $X = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$. If $\det(A) = 3$, then what is the solution set of the system $AX = b$?

Not Answered

- A) $\{(6, -2, -8)^T\}$ ✓
- B) $\left\{\left(0, \frac{1}{\alpha}, \frac{5}{\beta}\right)^T\right\}$
- C) $\{(-3, 1, 4)^T\}$
- D) \emptyset

15. In set of complex numbers, what is the solution set of $x^2 + 4x + 5 = 0$? Not Answered

- A) $\{\emptyset\}$
- B) $\{1 - 2i, 1 + 2i\}$
- C) $\{2 - i, 2 + i\}$
- D) $\{-2 - i, -2 + i\}$ ✓

16. If $z = (1 + i)^{10}$, then which one of the following is equal to z ? Not Answered

- A) $1 + 32i$
- B) $32i$ ✓
- C) $10i$
- D) $1 + 10i$

17. If $\{A_n\}_{n=1}^{\infty}$ is an arithmetic sequence such that its 1st term $A_1 = -5$ and its 5th term $A_5 = 15$, then its 11th term A_{11} is equal to: Not Answered

- A) 40
- B) 50
- C) 45 ✓
- D) 55

18. What is the sum of all multiples of 4 that are between 30 and 301? Not Answered

- A) 12,882
- B) 11,288 ✓
- C) 6,288
- D) 6,882

19. The left hand side limit $\lim_{x \rightarrow 0^-} \frac{xe^x - |x|}{x}$ is equal to: Not Answered

- A) 0
- B) 2 ✓
- C) 1
- D) does not exist

20. Which one of the following is equal to $\lim_{x \rightarrow 0} \frac{2x + \tan x}{x \sec x}$? Not Answered

- A) 2
- B) 0
- C) 1
- D) 3 ✓

21. Which one of the following is true about the horizontal asymptote(s) of the graph of $y = \frac{|x|+2}{x}$?

Not Answered

- A) $y = 2$ is the only horizontal asymptote of the graph.
- B) $y = 1$ & $y = -1$ are the horizontal asymptote of the graph. ✓
- C) $y = 2$ & $y = -2$ are the horizontal asymptote of the graph.
- D) $y = 1$ is the only horizontal asymptote of the graph.

22. If $f(x) = 2x^2 - 3x$, then $\lim_{x \rightarrow 1} \frac{f(x) - f(1)}{x - 1}$ is equal to: Not Answered

- A) 1
- B) -1
- C) 7 ✓
- D) ∞

23. If $f(x) = e^{3x} \cos x - \frac{x+\pi}{x^2+2}$, then $f'(0)$ is equal to: Not Answered

- A) $3 - \pi/2$
- B) $3/2$
- C) $7/4$
- D) $5/2$ ✓

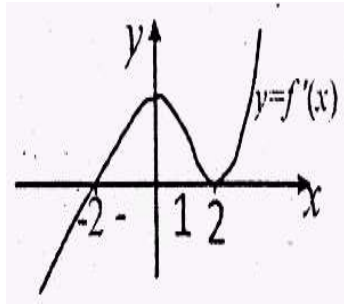
24. If $f(x) = \ln \sqrt{x^2 - 5}$, then which of the following is equal to $f'(x)$? Not Answered

- A) $\frac{x}{x^2-5}$ ✓
- B) $\frac{-x}{\sqrt{x^2-5}}$
- C) $\frac{2x}{x^2-5}$
- D) $\frac{-x}{x^2-5}$

25. Let f be twice differentiable function on \mathbb{R} . which one of the following is necessarily true? Not Answered

- A) if $f'(c) = 0$, at some $c \in \mathbb{R}$, then f has relative extreme at $x = c$.
- B) if $f'(x)$ is increasing, then graph of $y = f(x)$ is concave upward. ✓
- C) if $f'(x) = 0$ for all $x \in \mathbb{R}$, then $f(x) = 0$ for all $x \in \mathbb{R}$
- D) if $f(x)$ is increasing, then $f''(x) = 0$ for all $x \in \mathbb{R}$

26. Suppose $f(x)$ is differentiable on $(-\infty, \infty)$ and the graph of its derivative, $y = f'(x)$ is as shown in the following figure.



Not Answered

- A) $f(x)$ is increasing on $(-\infty, 0) \cup (2, \infty)$
- B) $f(x)$ has a local extreme value at $x = 2$
- C) $f(x)$ has a local minimum value at $x = -2$ ✓
- D) $f(x)$ has a local maximum value at $x = 0$

27. A closed cylindrical can is to be made to hold 1000 cm^3 of oil. What are the dimensions (radius r and height h) that will minimize the total surface area of the can? Not Answered

- A) $r = \frac{\sqrt[3]{\sqrt{50}}}{\pi}, h = 2 \frac{\sqrt[3]{\sqrt{50}}}{\pi}$
- B) $r = \frac{\sqrt[3]{\sqrt{500}}}{\pi}, h = 2 \frac{\sqrt[3]{\sqrt{500}}}{\pi}$
- C) $r = \sqrt[3]{\frac{50}{\pi}}, h = 2 \sqrt[3]{\frac{50}{\pi}}$
- D) $r = \sqrt[3]{\frac{500}{\pi}}, h = 2 \sqrt[3]{\frac{500}{\pi}}$ ✓

28. If $f(x) = 3x^2\sqrt{x^3 - 1}$, then which one of the following is anti-derivative of $f(x)$? Not Answered

- A) $\frac{3x}{2}(x^3 - 1)^{3/2} + c$
- B) $\frac{2}{3}(x^3 - 1)^{3/2}$ ✓

- C) $\frac{3}{2}(x^3 - 1)^{3/2}$
- D) $\frac{2}{3}(x^3 - 1)^{3/2} + c$

29. Which one of the following is equal to $\int \frac{(\ln x)^2 + x^2 \cos x}{x} dx$? Not Answered

- A) $1/x^2 \ln x + x \sin x - \cos x + c$
- B) $1/3 (\ln x)^3 + x \sin x - \cos x + c$
- C) $1/3 (\ln x)^3 + x \sin x + \cos x + c$ ✓
- D) $1/x^2 \ln x + x \sin x + \cos x + c$

30. The volume of the solid generated when the region bounded between graph of $y = \begin{cases} x^2, & 0 \leq x \leq 2 \\ 4, & 2 \leq x \leq 3 \end{cases}$ and x-axis is rotated about the x-axis: Not Answered

- A) $32\pi/5$
- B) $112\pi/5$ ✓
- C) $112\pi/3$
- D) $64\pi/5$

31. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are functions, then which one of the following is true about the composition function? Not Answered

- A) domain of $g \circ f \subseteq$ domain of f ✓
- B) range of $g \circ f \not\subseteq$ range of g
- C) domain of $g \circ f \not\subseteq$ domain of f
- D) range of $g \circ f$ range of f

32. If the point $(3, -2)$ is on the graph of $y = f(x)$, then which point is on the graph of $y = f^{-1}(x)$? Not Answered

- A) $(1/3, -2)$
- B) $(3, -1)$
- C) $(-2, 3)$ ✓
- D) $(3, -1/2)$

33. The equation of the line that passes through $(2, -1)$ and perpendicular to the line $3x + 4y = 6$ is:

Not Answered

- A) $-4x + 3y = 5$
- B) $4x - 3y = 5$
- C) $4x + 3y = 11$
- D) $-4x + 3y = -11$ ✓

34. If $Z = \frac{2-4i}{1+i}$, then the modulus of the conjugate of Z , $|\bar{Z}|$ is:

- A) $\sqrt{10}$ ✓
 B) $3\sqrt{2}$
 C) $2\sqrt{3}$
 D) $2\sqrt{2}$

35. The n^{th} term of the sequence: 1, -4, 9, -16,... is:

- A) $a_n = (-2)^n$
 B) $a_n = (-1)^n n^2$
 C) $a_n = (-1)^{2^n} n^2$
 D) $a_n = (-1)^{n-1} n^2$ ✓

36. Which one of the following is true about the horizontal asymptote(s) of the graph of $y = \frac{|x|+2}{x}$

- A) $y = 2$ is the only horizontal asymptote of the graph.
 B) $y = 1$ and $y = -1$ are the horizontal asymptotes of the graph. ✓
 C) $y = 2$ and $y = -2$ are the horizontal asymptote of the graph.
 D) $y = 1$ is the only horizontal asymptote of the graph.

37. For any $n \times n$ square matrix A , which of the following is true?

- A) $\text{Det}(A) = -\text{det}(A^T)$, where A^T is the transpose of A
 B) If k is a scalar, then $\text{det}(kA) = k^n \text{det}(A)$ ✓
 C) If B is a matrix obtained from A by interchanging of two rows of A , then $\text{det}(B) = \text{det}(A)$
 D) If A is invertible, then $\text{det}(A) = \text{det}(A^{-1})$

38. The solution of the system of linear equation of $\begin{cases} x - 3y - 2z = 6 \\ 2x - 4y - 3z = 8 \\ -3x + 6y + 8z = -5 \end{cases}$ is:

- A) $x = -1, y = -3, z = -2$
 B) $x = -1, y = -3, z = 2$
 C) $x = 1, y = -3, z = 2$ ✓
 D) $x = 1, y = 3, z = -2$

39. there are three children in a room, ages three, four, and five. If a four- year- old child enters the room then which one of the following is true?

- Mean age will stay the same but the standard deviation will increase.
 Mean age will stay the same but the standard deviation will decrease.
 Mean age and standard deviation will increase.
 Mean age and standard deviation will stay the same. ✓

40. In how many more ways can 4 people be arranged in a row than if they were arranged in a circle?

Not Answered

- A) 1
- B) 6
- C) 18 ✓
- D) 12

41. Two machines A and B work independently. The probability that both machines A and B work is 0.4. If the conditional probability that machine B works given that machine A works is 0.5, then the conditional probability that machine A works given that machine B works is

Not Answered

- A) 0.8
- B) 0.3
- C) 0.5
- D) 0.7

42. Which of the following is true about the function f defined by $f(x) = x^2 + e^{2x}$?

Not Answered

- A) f is decreasing for $x = 0$
- B) f is increasing for $x = 0$
- C) f has a relative minimum $x = 0$
- D) f has a relative maximum at $x = 0$

43. The value of $\int_0^1 (x+1)e^{(x^2+2x)} dx$ is:

Not Answered

- A. $\frac{e^3}{2}$
- B. $\frac{e^4 - e}{2}$
- C. $\frac{e^3 - 1}{2}$ ✓
- D) $e^3 - 1$

44. $\int_0^3 (x+1)^{\frac{1}{2}} dx =$ _____

Not Answered

- A) $2\frac{1}{2}$
- B) $14\frac{2}{3}$ ✓
- C) 7
- D) $16\frac{2}{3}$

45. Given $f(x) = \begin{cases} x+1, & \text{for } x < 0 \\ \cos \pi x, & \text{for } x \geq 0 \end{cases}$, then $\int_{-1}^1 f(x) dx =$ _____

Not Answered

- A. $\frac{1}{2} + \frac{1}{\pi}$
- B. $\frac{1}{2} - \frac{1}{\pi}$
- C) 1/2
- D) -1/2 ✓

46. The sum of $\sum_{n=0}^{\infty} 5 \left(\frac{2}{3}\right)^n$ is _____, Not Answered

- A) 0
- B) 15 ✓
- C) 10/3
- D) 5

47. In which interval the sequence $\left\{ \frac{(-1)^n}{3n} \right\}_{n=1}^{\infty}$ is bounded? Not Answered

- A. $\left[\frac{-1}{9}, \frac{1}{12} \right]$
- B. $\left[\frac{-1}{3}, \frac{1}{6} \right]$ ✓
- C. $\left[\frac{-1}{6}, \frac{1}{3} \right]$
- D. $\left[\frac{-1}{12}, \frac{1}{9} \right]$

48. Which one of the following is true about the function given by the formula $f(x) = \begin{cases} \frac{x^2}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$?

Not Answered

- A. f is continuous except at $x = 0$
- B. f has an infinite discontinuity at $x = 0$
- C. f is continuous everywhere ✓
- D. f has $x = 0$ as a vertical asymptote

49. $\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$ is equal to :? Not Answered

- A) 0
- B) 1 ✓
- C) ∞

D) -1

50. $\frac{d}{dx}(\ln e^{2x})$ is equal to :? Not Answered

A. $\frac{1}{e^{2x}}$

B. $\frac{2}{e^{2x}}$

C) 2x

D) 2 ✓

51. If $f(x) = 2 + |x - 3|$ for all x , then the value of the derivative $f'(x)$ at $x = 3$ Not Answered

A) -1

B) Does not exist ✓

C) 1

D) 2

52. The graph of $y = 5x^4 - x^5$ has a point of inflection at: Not Answered

A) (3, 162) only ✓

B) (4, 256) only

C) (0, 0) only

D) (0, 0) and (3, 162)

53. Let the angle between $\vec{V} = -2\vec{i} - \vec{j} + 2\vec{k}$ and \overrightarrow{PQ} be 60° , where P and Q are points in space. If $|\vec{V} \cdot \overrightarrow{PQ}| = 2$, then what is the distance between P and Q? Not Answered

A) 3/4

B) 4/5

C) 4/3 ✓

D) 5/4

54. Consider the following assertion of a person and his proof "If x and y are equal positive integers, then $x + y = y$."

Proof: the following steps and reasons are used to prove the assertion.

Step	Reason
1. $x = y$	Given hypothesis
2. $x^2 = xy$	Multiply both sides of (1) by x
3. $x^2 - y^2 = xy - y^2$	Subtract y^2 from both sides of (2)
4. $(x - y)(x + y) = (x - y)y$	Factor both sides of (3)
5. $x + y = y$	Divide both sides of (4) by $x - y$

Step 5 completes the proof.

Which one of the following is true about this proof? Not Answered

- A) It is a correct direct proof of the assertion.
- B) It follows the technique of a proof by contradiction because the steps lead to a contradiction.
- C) The proof is invalid because Step 4 does not lead to Step 5. ✓
- D) The proof is invalid because Step 4 does not follow from Step 3.

55. Which one of the following is a valid assertion that can be proved by the principle of mathematical induction? Not Answered

- A) $2^n > 10^n$ for every integer n such that $n \geq 6$. ✓
- B) $r^2 > 0$ for every real number r such that $r \geq 1$.
- C) $n^2 + 10n > 2n^2$ for every natural number $n \geq 1$.
- D) $2^n > 8n$ for every integer n such that $n \geq 3$.

56. The image of a figure with vertices $A(1, 2)$, $B(3, 6)$, $C(-1, 2)$, and $D(-2, -2)$ after reflection across the x -axis is: Not Answered

- A) $A'(1, -2)$, $B'(-3, -6)$, $C'(1, -2)$, and $D'(2, 2)$
- B) $A'(-1, 2)$, $B'(-3, 6)$, $C'(1, -2)$, and $D'(2, -2)$
- C) $A'(1, 2)$, $B'(3, -6)$, $C'(-1, -2)$, and $D'(-2, 2)$ ✓
- D) $A'(1, -2)$, $B'(3, 6)$, $C'(-1, 2)$, and $D'(-2, -2)$

57. If $\vec{V} = \vec{AB} + 3\vec{BA}$, where A and B are distinct points in the coordinate plane, then which one of the following is equal to $3\vec{V}$? Not Answered

- A. $6\vec{AB}$
- B. $-6\vec{AB}$ ✓
- C. $12\vec{AB}$
- D. $-12\vec{AB}$

58. If \vec{U} is a unit vector in the direction of \vec{A} and $|\vec{A}| = 4$, then $\vec{A} \cdot \vec{U}$ is equal to _____.

Not Answered

- A) 1/4
- B) 4 ✓
- C) 1/2
- D) 2

59. If \vec{A} and \vec{B} are parallel vectors with opposite directions and $|\vec{B}| = |2\vec{A}|$, then $\vec{B} - \vec{A}$ is equal to:

Not Answered

- A. \vec{A}
- B. $-\vec{A}$ ✓
- C. $-3\vec{A}$
- D. $3\vec{A}$

60. If $\cot(\theta) = 2$, then which of the following is equal to $\csc(\theta)$? Not Answered

- A) $\sqrt{5}$ ✓
- B) $2/\sqrt{5}$
- C) $1/\sqrt{5}$
- D) $1/2$

61. What is the amplitude and period, respectively, of the graph of $f(x) = 4\sin(x/3)\cos(x/3)$? Not Answered

- A) $4, \pi/3$
- B) $2, 3\pi$ ✓
- C) $2, 2\pi/3$
- D) $4, 3\pi$

62. A boat on a sea sailed from its station toward North with constant speed of 80 km/h. Another boat from the same station sailed 60° NE (North East) with constant speed of 100km/h. If the two boats started sailing at the same time, what is the straight distance between them after they have sailed for just 30 minutes?

Not Answered

- A) $10\sqrt{42}$ km
- B) 90km
- C) $10\sqrt{41}$ km
- D) $10\sqrt{21}$ km ✓

63. What is the value k, for which the two vectors $\vec{U} = \begin{pmatrix} 1 \\ k \\ -3 \end{pmatrix}$ and $\vec{V} = \begin{pmatrix} 2k \\ -5 \\ 4 \end{pmatrix}$ are perpendicular?

Not Answered

- A) 4
- B) -4 ✓
- C) 3

D) -3

64. If one of the end point of the line segment is (3, 2, -4) and the mid-point is (4, 1, -2), then the coordinate of the other end point is: Not Answered

A) (5, 0, 0) ✓

B) (2, 0, 5)

C) (5, 1, 2)

D) (3, 1, 0)

65. What is the value of $\arcsin\left(-\frac{\sqrt{2}}{2}\right)$ Not Answered

A) $\pi/4$

B) $\pi/2$

C) $-\pi/4$ ✓


D) $-\pi/2$

Your Answers

you have scored 0 out of 0

Answer Key

1.D	11.C	21.B	31.A	41.	51.B	61.B
2.B	12.D	22.C	32.C	42.	52.A	62.D
3.D	13.B	23.D	33.D	43.C	53.C	63.B
4.C	14.A	24.A	34.A	44.B	54.C	64.A
5.B	15.D	25.B	35.D	45.D	55.A	65.C
6.A	16.B	26.C	36.B	46.B	56.C	
7.D	17.C	27.D	37.B	47.B	57.B	
8.D	18.B	28.B	38.C	48.C	58.B	
9.B	19.B	29.C	39.D	49.B	59.B	
10.D	20.D	30.B	40.C	50.D	60.A	

 Retake Exam (exam.php?subject=Mathematics&year=2008)

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