Statewide Math Placement Day

April 13, 1999

DO NOT OPEN THIS BOOKLET UNTIL TOLD TO DO SO

PRE-EXAM INSTRUCTIONS ARE ON THE OUTSIDE BACK COVER

Points to note and tips for taking the exam:

- Fill in all bubbles completely, using only a #2 lead pencil.
- Erase completely all answers you decide to change. If the scanner reads more than one answer to a question, it will be scored as if it was left blank.
- Calculators (but not notebook computers) are allowed on this exam. However, all questions can also be done without calculators.
- Figures are not necessarily drawn to scale on this exam.
- DO NOT GUESS. The scoring scheme awards 3 points for a correct answer, 1 point for a question left blank, and 0 points for a wrong answer. All wrong answers correspond to common mistakes. Experience shows that if you are not sure of an answer, you are better off leaving that question blank. It is possible to qualify at the highest level allowed by this exam while doing less than half of the questions, if you avoid mistakes.
- Pace yourself - do not spend too much time on any question until you have looked at least once at all of the questions on the parts of the exam that you are attempting.

PRE-EXAM INSTRUCTIONS

1. Only use a #2 lead pencil to fill in the answer sheet.
2. Print your last name, first name, middle initial and social security number in the spaces provided on the answer sheet.
3. **Columns A, B, C, & D — "Other Information".**
   Column A—Print your school **CEEB #** (your exam proctor will provide).
   Indicate to which of the following colleges you have applied/intend to apply for admission. **Column B—UNL** (0000), **Column C—UNO** (0000), or **Column D—UNK** (0000). Otherwise, leave these columns blank.
4. Fill in the appropriate bubbles under each letter/number entered in instructions 2 and 3.
5. Fill in the appropriate bubble for your gender. This item is only used for statistical analysis of results.
6. Fill in today's date in the indicated portion of the answer sheet, including filling in the bubbles.
7. Sign your answer sheet in the space provided. Your signature attests that your answers will be strictly your own work, and that you are taking the test on the indicated date.
8. Make sure you understand what parts of the exam you will be doing. All students should attempt just 30 of the 40 questions. Students who have learned trigonometry should do Parts 2, 3, and 4, questions 11-40, and begin their answers in the second column (marked Part 2). Students who have not learned trigonometry will do Parts 1, 2, and 3, questions 1-30, and begin their answers in the first column (marked Part 1). If you are not sure which parts you should be attempting, check with your exam proctor before beginning the exam.
9. Avoid stray marks on the answer sheets — you should have scratch paper for your calculations.
10. DO NOT OPEN THIS BOOKLET UNTIL YOUR EXAM PROCTOR DIRECTS YOU TO BEGIN. You will have 35 minutes from that time to complete the exam.
11. Turn over this booklet when you have completed these instructions, and review the tips on the front cover until signaled by the proctor to begin working on the questions.

PART 1

Start here if you have not studied trigonometry. Attempt Parts 1 – 3 (Questions 1 – 30)

Fill in your answers in the column labeled Part 1 on the answer sheet.

1) $5 - 4(2 - 3) =$

A) -1 B) 9 C) -6 D) -23 E) -15

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2) $\frac{1}{3}\left(\frac{2}{5} - \frac{3}{4}\right) =$

A) $\frac{5}{3}$ B) $-\frac{1}{27}$ C) $-\frac{1}{3}$ D) $-\frac{7}{60}$ E) none of these

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3) $(7pq^4)(-2p^3q^5) =$

A) $14p^3q^9$ B) $5p^{-2}q^{-1}$ C) $-14p^4q^9$

D) $-14p^3q^{20}$ E) $5p^3q^{20}$

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4) If $2x - 4 = 4 + x$, then x is

A) $-\frac{1}{3}$ B) 8 C) 0 D) $\frac{8}{3}$ E) none of these

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5) $\frac{12a^3 + 8a}{4a} =$

A) $3a^2 + 2$ B) $5a^2$ C) $12a^2 + 2$

D) $3a^2 + 8a$ E) $12a^3 + 2$

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6) $\frac{x^2}{x^5} =$

A) $\frac{2}{5}$ B) $x^{\frac{2}{5}}$ C) $\frac{1}{x^3}$ D) x^3 E) x^{10}

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7) $\sqrt[3]{-27}$

A) -3 B) -9 C) 3 D) $-\frac{5}{2}$ E) 9

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8) The x – intercept of the graph of the equation $3x - y - 15 = 0$ is x is equal to

A) 15 B) 5 C) 0 D) –5 E) –15

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9) $3a - [2 + 2(b - a)] =$

A) $2a + b - 2$ B) $a + 2b - 2$ C) $5a - 2b - 2$

D) $5a - 2b + 2$ E) $7a - 4b$

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10) Eggs are to be packed in cartons, each holding 12 eggs. If there are 138 eggs and as many cartons are completely filled as possible, how many eggs are left over?

A) 6 B) 8 C) 11.5 D) 0.5 E) 138

CONTINUE WITH PART 2

PART 2

Start here if you have studied trigonometry. Attempt Parts 2 – 4 (Questions 11 – 40)

Fill in your answers in the column labeled Part 2 on the answer sheet.

11) $(x + 1)(x^2 - x + 1) =$

A) $x^3 - 1$ B) $x^3 - x + 1$ C) $x^3 - x^2 + 1$

D) $x^3 - 2x^2 + 2x - 1$ E) $x^3 + 1$

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12) $\frac{8}{r} - \frac{5}{s} =$

A) $\frac{8s - 5r}{rs}$ B) $\frac{3}{rs}$ C) $\frac{3}{r - s}$ D) $\frac{3}{r + s}$ E) $\frac{8s + 5r}{rs}$

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13) The slope of the line $-3x + 5y - 8 = 0$ is

A) $-\frac{5}{3}$ B) $-\frac{3}{5}$ C) $\frac{3}{5}$ D) $\frac{8}{5}$ E) $\frac{5}{3}$

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(14) $\frac{x^2 - 4}{5x} \cdot \frac{30}{3x - 6} =$

A) 4 B) $2(x + 2)$ C) $\frac{4}{3}$ D) $\frac{2(x - 2)}{x}$ E) $\frac{2(x + 2)}{x}$

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15) $\left[\frac{x^3}{5z}\right]^{-2} =$

A) $\frac{x^6 z^2}{25}$ B) $\frac{x^6}{5z^2}$ C) $\frac{25z^2}{x^6}$ D) $\frac{x^6}{25z^2}$ E) none of these

16) The inequality $4x - 5 < 3x + 8$ is equivalent to the inequality

A) $x < -3$ B) $x < \frac{5}{4}$ C) $x < \frac{13}{4}$ D) $x < 13$

E) none of these

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17) $t + t^{-1} =$

A) $2t$ B) 1 C) $\frac{t + 1}{t}$ D) $\frac{t^2 + 1}{t}$ E) 0

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18) If $xy = 2(x + y)$ then $y =$

A) $\frac{2x}{x - 1}$ B) $\frac{2x}{x+1}$ C) $\frac{2x}{x+2}$ D) $\frac{2x}{x - 2}$ E) $\frac{x}{x - 1}$

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19) $\frac{1}{\sqrt[4]{16}} =$

A) 64 B) 2 C) $\frac{1}{8}$ D) $\frac{1}{4}$ E) $\frac{1}{2}$

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20) If $2x^2 - 2x = 3$, then $x =$

A) $\frac{2 \pm \sqrt{28}}{4}$ B) $\frac{-2 \pm \sqrt{28}}{4}$ C) $\frac{2 \pm \sqrt{20}}{4}$ D) $\frac{-2 \pm \sqrt{20}}{4}$

E) none of these

CONTINUE WITH PART 3

PART 3

Fill in your answers in the column labeled Part 3 on the answer sheet.

21) The domain of the function $f(x) = \sqrt{2x - 14}$ is

A) $-\infty < x < \infty$ B) $x \geq 0$ C) $x \geq 14$

D) $x \leq 7$ E) $x \geq 7$

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22) If $f(x) = x^2$ then $f(x - 1) =$

A) $x^2 - 1$ B) $x^3 - x^2$ C) $x^2 + x - 1$

D) $x^3 - 1$ E) $x^2 - 2x + 1$

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23) $\dfrac{1}{\sqrt{7} + 1} =$

A) $\dfrac{1 - \sqrt{7}}{6}$ B) $\dfrac{\sqrt{7} - 1}{6}$ C) $\dfrac{\sqrt{7} - 1}{48}$

D) $\dfrac{1 + \sqrt{7}}{-48}$ E) $\dfrac{1 + \sqrt{7}}{6}$

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24) In the system of equations $\begin{cases} 2x + 6y = 5 \\ x - 3y = 8 \end{cases}$, one coordinate of the solution is

A) $x = -\dfrac{11}{12}$ B) $x = 0$ C) $x = \dfrac{5}{2}$

D) $x = \dfrac{13}{4}$ E) $x = \dfrac{21}{4}$

25) $e^x e^y =$

A) $2e^{xy}$ B) e^{2xy} C) e^{xy} D) e^{x+y} E) e^{2+x+y}

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26) The inequality $(x + 3)(x - 2) > 0$ is equivalent to

A) $-3 < x < 2$ B) $x < -3$ or $x > 2$ C) $-2 < x < 3$

D) $x < -2$ or $x > 3$ E) none of these

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27) The slope of the line through the points $(-5, -3)$ and $(-1, -8)$ is

A) $\dfrac{4}{5}$ B) $-\dfrac{4}{5}$ C) $-\dfrac{5}{4}$ D) $\dfrac{5}{4}$ E) none of these

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28) If $f(x) = 5x + 1$ and $g(x) = x^2$, then $g(f(x)) =$

A) $x^2(5x + 1)$ B) $5x^2 + 1$ C) $x^2 + 5x + 1$

D) $25x^2 + 1$ E) $(5x + 1)^2$

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29) $\log_3(9) =$

A) $\dfrac{1}{3}$ B) 27 C) 12 D) 2 E) 3

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30) $\log_{10}(4) + \log_{10}(x) =$

A) $\log_{10}(4^x)$ B) $\log_{10}(4 + x)$ C) $2\log_{10}(2x)$

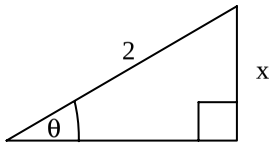
D) $\log_{10}(4x)$ E) $\log_{10}(x^4)$

Continue with Part 4 if you have studied trigonometry, otherwise review your answers to questions 1 – 30

PART 4
TRIGONOMETRY

Unless otherwise stated, angles are in radians
Fill in your answers in the column labeled Part 4 on the answer sheet.

31) In the right triangle shown,



$\cos\theta =$

A) $\frac{\sqrt{4-x^2}}{1}$ B) $\frac{\sqrt{4-x^2}}{x}$ C) $\frac{2}{x}$ D) $\frac{x}{2}$ E) none of these

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32) $\sin\frac{\pi}{3} =$

A) $\frac{\sqrt{3}}{2}$ B) $\frac{1}{2}$ C) $\frac{\sqrt{2}}{3}$ D) $\frac{1}{\sqrt{3}}$ E) none of these

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33) What is the radian measure of an angle whose degree measure is 75^{o}

A) $\frac{12\pi}{5}$ B) $\frac{12}{5\pi}$ C) $\frac{5\pi}{12}$ D) $\frac{\pi}{12}$ E) none of these

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34) For which values of θ in the interval $0^{o} \le \theta \le 180^{o}$ is $\cos 3\theta = 1$?

A) $0^{o}, 120^{o}$ B) 90^{o} C) $30^{o}, 150^{o}$ D) $60^{o}, 180^{o}$

E) none of these

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35) Which of the following numbers is largest?

A) $\tan\frac{\pi}{6}$ B) $\tan\frac{\pi}{4}$ C) $\tan\frac{5\pi}{6}$ D) $\tan\pi$ E) $\tan 2\pi$

36) For which of the following values of x is $\frac{\cos x}{\sin x}$ not defined?

A) $\frac{\pi}{2}$ B) $\frac{\pi}{3}$ C) $\frac{\pi}{4}$ D) $\frac{\pi}{6}$ E) 0

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37) $\cos\theta < 0$ and $\tan\theta > 0$ whenever θ is an angle in

A) quadrant I B) quadrant II C) quadrant III

D) quadrant IV E) quadrant III or IV

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38) $\cos^2\theta \sec\theta =$

A) $\tan\theta$ B) $\cot\theta$ C) $\sin\theta$ D) $\cos\theta$ E) $\csc\theta$

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39) The period of the function $y = \cos 2x$ is

A) 1 B) $\frac{\pi}{2}$ C) π D) 2π E) 4π

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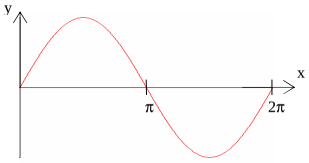
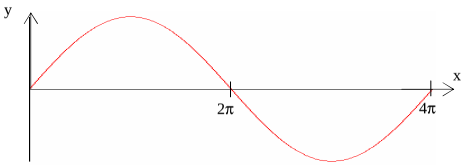
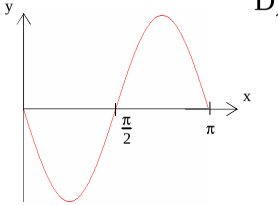
40) The figure which best represents the graph of $y = \sin(x)$ is

A)


B)


C)


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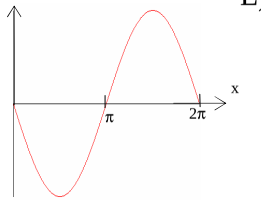

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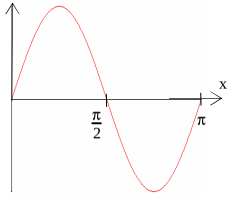

Review your answers to questions 11 – 40 until time expires.