THIS SAMPLE PLACEMENT TEST IS ONLY FOR

Architecture/Interior Design majors
Computer Science majors
All Engineering majors
Environmental Science/Biology/Chemistry majors
Physics Majors
Mathematics majors

INSTRUCTIONS:

The test consists of 30 multiple-choice questions.
Only Built-in Calculators are allowed.
Duration of the exam is 90 minutes (around three minutes per question).

1. Factor completely the following Expression:

$(x - 9)(x + 6)^2 - (x - 9)^2(x + 6)$

A. $-3(x - 9)(x - 6)$

B. $54(x - 9)(x + 6)$

C. $15(x - 9)(x + 6)$

D. $15(9 - x)(x + 6)$

E. None of the above

2. Perform the following operation assuming that x, y and z are positive real numbers. Write the answer using positive exponents only:

$$\left(\frac{y^{10}z^4}{x^2}\right)^{-\frac{10}{3}}$$

A. $\dfrac{x^{\frac{20}{3}}z^{\frac{40}{3}}}{y^{\frac{100}{3}}}$

B. $\dfrac{x^{\frac{20}{3}}}{z^{\frac{40}{3}}y^{\frac{100}{3}}}$

C. $\dfrac{y^{\frac{100}{3}}z^{\frac{40}{3}}}{x^{\frac{20}{3}}}$

D. $x^{\frac{20}{3}}y^{\frac{100}{3}}z^{\frac{40}{3}}$

E. None of the above

3. Simplify the following radical expression:

$$\sqrt[3]{16x^2y} \cdot \sqrt[3]{2x^2y}$$

A. $2y\sqrt[3]{4x}$

B. $2\sqrt[3]{4x^2y}$

C. $2y\sqrt[3]{4x^2}$

D. $2x\sqrt[3]{4xy^2}$

E. None of the above

4. Rationalize the denominator of the following expression and simplify:

$$\frac{5 - \sqrt{x}}{5 + \sqrt{x}}$$

A. $\dfrac{5 - 10\sqrt{x}}{25 - x}$

B. $\dfrac{25 - 10x + x^2}{5 - x}$

C. $\dfrac{25 - 10\sqrt{x} + x}{25 - x}$

D. $\dfrac{25 + 10\sqrt{x} + x}{25 - x}$

E. None of the above

5. Perform and simplify the following operation:

$$\frac{x^2 - 2x - 8}{x^3 + 2x^2} \times \frac{x^2 + x}{x^2 - 3x - 4}$$

A. $\dfrac{x - 2}{x(x + 2)}$

B. x

C. $\dfrac{1}{x}$

D. $\dfrac{2x + 7}{(x^3 + 1)(3x + 4)}$

E. None of the above

6. Perform and simplify the following operation:

$$\frac{3}{x + 2} - \frac{2x + 18}{x^2 + 11x + 18}$$

A. $\dfrac{x + 24}{x^2 + 11x + 18}$

B. $\dfrac{x - 16}{x^2 + 11x + 18}$

C. $\dfrac{1}{x - 2}$

D. $\dfrac{1}{x + 2}$

E. None of the above

7. Simplify the following complex fraction:

$$\dfrac{x - \dfrac{x}{x+3}}{x+2}$$

A. $\dfrac{x}{x-3}$

B. x

C. $\dfrac{x}{x+3}$

D. $\dfrac{x}{x+2}$

E. None of the above

8. Evaluate the following expression and write your answer in the form $a + ib$:

$$\dfrac{6 + 18i}{3i - 1}$$

A. $\dfrac{24 - 18i}{5}$

B. $\dfrac{-12 + 9i}{5}$

C. $\dfrac{30 - 18i}{5}$

D. $\dfrac{-24 + 18i}{5}$

E. None of the above

9. Solve the linear equation:

$$(x - 7) - (x + 4) = 4x$$

A. $x = -\dfrac{11}{2}$

B. $x = -\dfrac{11}{4}$

C. $x = \dfrac{11}{4}$

D. $x = -\dfrac{3}{4}$

E. None of the above

10. Solve the following equation:

$$|3 - 4x| + 8 = 12$$

A. $x = \dfrac{1}{4}, x = -\dfrac{7}{4}$

B. $x = -\dfrac{23}{4}$

C. $x = \dfrac{23}{4}$

D. $x = -\dfrac{1}{4}, x = \dfrac{7}{4}$

E. None of the above

11. Solve the following quadratic equation:

$$4x^2 = -16x - 7$$

A. $x = -\dfrac{1}{2}, x = -\dfrac{7}{2}$

B. $x = -\dfrac{1}{4}, x = 4$

C. $x = \dfrac{1}{2}, x = \dfrac{7}{2}$

D. No real solution

E. None of the above

12. Solve the following inequality, write your answer in Interval notation and graph it:

$$\frac{1}{4} < \frac{2x - 5}{8} \leq \frac{1}{2}$$

A. $\left[\dfrac{7}{2}, \dfrac{9}{2}\right]$

7/2   9/2

B. $\left(\dfrac{7}{2}, \dfrac{9}{2}\right]$

7/2   9/2

C. $\left[\dfrac{7}{2}, \dfrac{9}{2}\right)$

7/2   9/2

D. $\left(\dfrac{11}{2}, \dfrac{21}{2}\right]$

11/2   21/2

E. None of the above

13. Solve the following inequality and write your answer in Interval notation:

$$\frac{x}{x+1} > 3x$$

A. $\left(-1, -\dfrac{2}{3}\right) \cup (0, \infty)$

B. $(-\infty, -1] \cup \left[-\dfrac{3}{2}, 0\right)$

C. $(-\infty, -1) \cup \left(-\dfrac{2}{3}, 0\right)$

D. $(-\infty, \infty)$

E. None of the above

14. Write the equation of the line with x −intercept at -3 and y −intercept at 5:

A. $5x - 3y = -30$

B. $5x - 3y = 24$

C. $3x - 5y = -15$

D. $5x - 3y = -15$

E. None of the above

15. Write the equation of the line passing through the points $(2, -3)$ and perpendicular to the line passing through the points $(3, 5)$ and $(-1, -5)$

A. $y = -\dfrac{2}{5}x - \dfrac{11}{2}$

B. $y = -\dfrac{2}{5}x + 5$

C. $y = \dfrac{5}{2}x - 8$

D. $y = -\dfrac{2}{5}x + \dfrac{4}{5}$

E. None of the above

16. Determine whether the equation below defines y as a function of x:

$$x + 2y^2 = 3$$

A. No   B. Yes

17. Find the domain of the following function:

$$f(x) = \frac{\sqrt{x}}{(x-11)(x-5)}$$

A. $[0,5) \cup (5,11) \cup (11,\infty)$

B. $(0,5) \cup (5,11) \cup (11,\infty)$

C. $[0,\infty)$

D. $(-\infty,\infty)$

E. None of the above

18. Write the following quadratic function in vertex form and find its maximum or minimum value:

$$f(x) = -x^2 - 4x + 3$$

A. $-(x+2)^2 + 7,$ Minimum value $f(-2) = 7$

B. $-(x+2)^2 + 7,$ Maximum value $f(-2) = 7$

C. $-(x-2)^2 + 7,$ Minimum value $f(-2) = 7$

D. $-(x-7)^2 - 2,$ Maximum value $f(7) = -74$

E. None of the above

19. Find the inverse of the following function:

$$f(x) = \frac{2-7x}{9-5x}$$

A. $f^{-1}(x) = \frac{2-9x}{5x-7}$

B. $f^{-1}(x) = \frac{9x-2}{5x-7}$

C. $f^{-1}(x) = \frac{2-9x}{5x+7}$

D. $f^{-1}(x) = \frac{2+9x}{5x+7}$

E. None of the above

20. Write the following expression in Logarithmic form (do not solve):

$$e^{x+2} = 0.2y$$

A. $x + 2 = \ln(0.2 + y)$

B. $x + 2 = \log(0.2y)$

C. $x + 2 = \ln(0.2y)$

D. $x + 2 = e^{0.2}$

E. None of the above

21. Find the domain of the following function:

$$f(x) = \ln(x^2 - 16)$$

A. All real numbers

B. All real numbers x such that $x \neq \pm 4$

C. All real numbers x such that $x > 4 \text{ or } x < -4$

D. All real numbers x such that $-4 < x < 4$

E. None of the above

22. Write the following expression as a single log:

$$\ln(6) - 5\ln(x) + 9\ln(x^2 + 9)$$

A. $\ln\left(\dfrac{6(x^2 + 9)^9}{x^5}\right)$

B. $\ln(6(x^2 + 9)^9) - x^5$

C. $\ln(30x(x^2 - 9)^9)$

D. $\ln\left(\dfrac{x^5}{6(x^2 + 9)^9}\right)$

E. None of the above

23. Solve the following logarithmic equation:
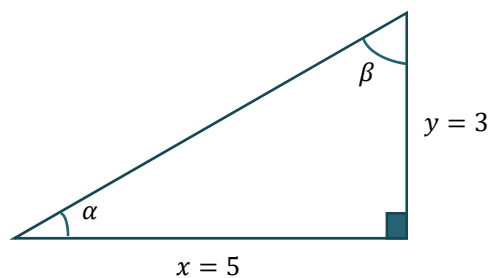
$$log_2(2x) = log_2(3) + log_2(x - 5)$$

A. $x = 3$

B. $x = 15$

C. $x = -3$

D. $x = -15$

E. None of the above

24. Solve the following Exponential Equation:

$x^3 \times 9^x - 9^x = 0$

A. $x = -1$

B. $x = 0$

C. $x = 1$

D. $x = 3$

E. None of the above

25. Given the right angled triangle below, find $\sin(\alpha)$ and $\cos(\beta)$ if $x = 5$ and $y = 3$

β

$y = 3$

α

$x = 5$

A. $\sin \alpha = \dfrac{3}{\sqrt{34}}$, $\cos \beta = \dfrac{3}{\sqrt{34}}$

B. $\sin \alpha = \dfrac{5}{\sqrt{34}}$, $\cos \beta = \dfrac{3}{\sqrt{34}}$

C. $\sin \alpha = \dfrac{3}{\sqrt{34}}$, $\cos \beta = \dfrac{5}{\sqrt{34}}$

D. $\sin \alpha = \dfrac{5}{\sqrt{34}}$, $\cos \beta = \dfrac{5}{\sqrt{34}}$

E. None of the above

26. Simplify the following trigonometric expression to its lowest form:

$$\dfrac{\csc x - \cot x}{\sec x - 1}$$

A. $\cot x$

B. $\tan x$

C. $\sec x$

D. 1

E. None of the above

27. Find all the solutions of the following trigonometric equation in the interval $[0, \pi]$:

$\tan x + \sec x = 1$

A. $x = \frac{\pi}{4}$

B. $x = 5\frac{\pi}{4}$

C. $x = 0$

D. $x = -1$

E. None of the above

28. The height of a punted object is given by

$$h(x) = -\frac{1}{64}x^2 + \frac{21}{32}x + 3$$

where x is the horizontal distance in feet from the point where the object is punted. How far, horizontally, is the object from where it started when it is at its maximum height?

A. $45\ ft$

B. $26ft$

C. $21ft$

D. $24ft$

E. None of the above

29. A man is walking away from a lamppost with a light source $b = 6$ meters above the ground. If the man is 2 meters tall, how far from the lamppost is he when his shadow is $a = 8$ meters long? [Hint: Use similar triangles.]
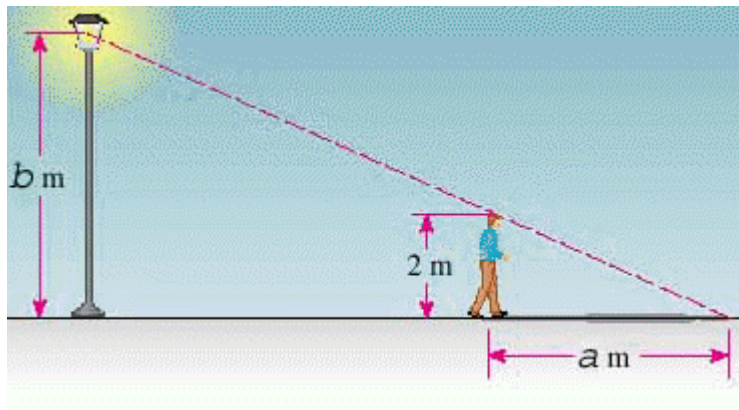
A. 15 meters
B. 24 meters
C. 16 meters
D. 14 meters
E. 17 meters

30. A Norman window has the shape of a rectangle surmounted by a semicircle as in the figure below. If the perimeter of the window is $10m$, express the area, A, as a function of the width, x, of the window.
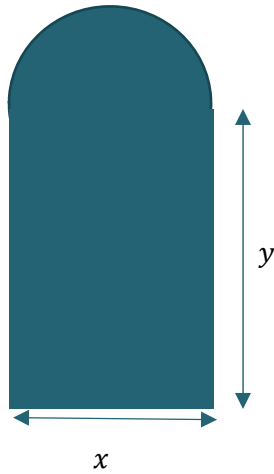
A. $A(x) = \dfrac{20x - 2x^2}{4}$

B. $A(x) = \dfrac{80x - 3\pi x^2 - 7x^2}{8}$

C. $A(x) = \dfrac{40x - 3\pi x^2 + 7x^2}{8}$

D. $A(x) = \dfrac{40x - 4x^2 - \pi x^2}{8}$

E. None of the above

ANSWER KEY

Question#	Answer	Question#	Answer
1	C	16	A
2	B	17	A
3	D	18	B
4	C	19	B
5	C	20	C
6	D	21	C
7	C	22	A
8	A	23	B
9	B	24	C
10	D	25	A
11	A	26	A
12	B	27	C
13	C	28	C
14	D	29	C
15	A	30	D