MATHEMATICS LEVEL 2 TEST

REFERENCE INFORMATION

THE FOLLOWING INFORMATION IS FOR YOUR REFERENCE IN ANSWERING SOME OF THE QUESTIONS IN THIS TEST.

Volume of a right circular cone with radius r and height h: $V = \frac{1}{3}\pi r^2 h$

Lateral Area of a right circular cone with circumference of the base c and slant height ℓ: $S = \frac{1}{2}c\ell$

Volume of a sphere with radius r: $V = \frac{4}{3}\pi r^3$

Surface Area of a sphere with radius r: $S = 4\pi r^2$

Volume of a pyramid with base area B and height h: $V = \frac{1}{3}Bh$

DO NOT DETACH FROM BOOK.

MATHEMATICS LEVEL 2 TEST

For each of the following problems, decide which is the BEST of the choices given. If the exact numerical value is not one of the choices, select the choice that best approximates this value. Then fill in the corresponding circle on the answer sheet.

Notes: (1) A scientific or graphing calculator will be necessary for answering some (but not all) of the questions in this test. For each question you will have to decide whether or not you should use a calculator.

   (2) For some questions in this test you may have to decide whether your calculator should be in the radian mode or the degree mode.

   (3) Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

   (4) Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number. The range of f is assumed to be the set of all real numbers $f(x)$, where x is in the domain of f.

   (5) Reference information that may be useful in answering the questions in this test can be found on the page preceding Question 1.

USE THIS SPACE FOR SCRATCHWORK.

1. If $3x + 6 = \dfrac{k}{4}(x + 2)$ for all x, then $k =$

   (A) $\dfrac{1}{4}$ (B) 3   (C) 4   (D) 12   (E) 24

3YBC

2. The relationship between a reading C on the Celsius temperature scale and a reading F on the Fahrenheit temperature scale is $C = \frac{5}{9}(F - 32)$, and the relationship between a reading on the Celsius temperature scale and a reading K on the Kelvin temperature scale is $K = C + 273$. Which of the following expresses the relationship between readings on the Kelvin and Fahrenheit temperature scales?

(A) $K = \frac{5}{9}(F - 241)$

(B) $K = \frac{5}{9}(F + 305)$

(C) $K = \frac{5}{9}(F - 32) + 273$

(D) $K = \frac{5}{9}(F - 32) - 273$

(E) $K = \frac{5}{9}(F + 32) + 273$

3. What is the slope of the line containing the points $(3, 11)$ and $(-2, 5)$?

(A) 0.17
(B) 0.83
(C) 1.14
(D) 1.20
(E) 6

4. If $x + y = 2$, $y + z = 5$, and $x + y + z = 10$, then $y =$

(A) −3

(B) $\frac{3}{17}$

(C) 1

(D) 3

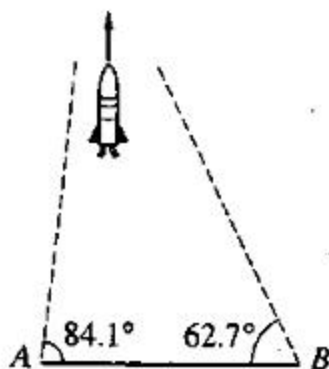(E) $\frac{17}{3}$

5. If $f(x) = 3 \ln(x) - 1$ and $g(x) = e^x$,
   then $f(g(5)) =$

   (A)   6.83
   (B)   12
   (C)   14
   (D)   45.98
   (E)   568.17

6. The intersection of a cube with a plane could
   be which of the following?

      I. A square
      II. A parallelogram
      III. A triangle

   (A) I only
   (B) II only
   (C) III only
   (D) I and III only
   (E) I, II, and III

7. The figure above shows a rocket taking off
   vertically. When the rocket reaches a height of
   12 kilometers, the angles of elevation from points
   A and B on level ground are 84.1° and 62.7°,
   respectively. What is the distance between
   points A and B ?

   (A)   0.97 km
   (B)   6.36 km
   (C)   7.43 km
   (D)   22.60 km
   (E)   139.37 km

8. What is the value of x^2 if $x = \sqrt{15^2 - 12^2}$?

(A) $\sqrt{3}$ (B) 3   (C) 9   (D) 81   (E) 81^2

9. The points in the rectangular coordinate plane are transformed in such a way that each point $P(x, y)$ is moved to the point $P'(2x, 2y)$. If the distance between a point P and the origin is d, then the distance between the point P' and the origin is

(A) $\dfrac{1}{d}$

(B) $\dfrac{d}{2}$

(C) d

(D) $2d$

(E) d^2

10. If $f(g(x)) = \dfrac{2\sqrt{x^2 + 1} - 1}{\sqrt{x^2 + 1} + 1}$ and $f(x) = \dfrac{2x - 1}{x + 1}$,

then $g(x) =$

(A) $\sqrt{x}$

(B) $\sqrt{x^2 + 1}$

(C) x

(D) x^2

(E) $x^2 + 1$