Accuplacer Prep - College Level

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College-Level Mathematics Test

The College-Level Mathematics test measures your ability to solve problems that involve college-level mathematics concepts. There are six content areas measured on this test: (a) Algebraic Operations, (b) Solutions of Equations and Inequalities, (c) Coordinate Geometry, (d) Applications and other Algebra Topics, (e) Functions, and (f) Trigonometry. The Algebraic Operations content area includes the simplification of rational algebraic expressions, factoring and expanding polynomials, and manipulating roots and exponents. The Solutions of Equations and Inequalities content area includes the solution of linear and quadratic equations and inequalities, systems of equations, and other algebraic equations. The Coordinate Geometry content area presents questions involving plane geometry, the coordinate plane, straight lines, conics, sets of points in the plane, and graphs of algebraic functions. The Functions content area includes questions involving polynomial, algebraic, exponential, and logarithmic functions. The Trigonometry content area includes trigonometric functions. The Applications and other Algebra Topics content area contains complex numbers, series and sequences, determinants, permutations and combinations, factorials, and word problems. A total of 20 questions are administered on this test.

1. $2^{\frac{5}{2}} - 2^{\frac{3}{2}}$

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

   B. 2

   C. $2^{\frac{3}{2}}$

   D. $2^{\frac{5}{3}}$

   E. 2^{2}

$$2^{\frac{5}{2}} - 2^{\frac{3}{2}}$$

$$2^{\frac{3}{2}}\left(2^{\frac{3}{2}} - 1\right)$$

$$2^{\frac{5}{2}-\frac{3}{2}}$$

$$2^{\frac{3}{2}}(2-1)$$

2. If $a \neq b$ and $\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$, then $x =$

A. $\frac{1}{b} - \frac{1}{a}$

B. $b - a$

C. $\frac{1}{ab}$

D. $\frac{a-b}{ab}$

E. $\frac{ab}{a-b}$

LCD = xab

$$\frac{1}{x} + \frac{1}{a} = \frac{1}{b}$$

$$\frac{xab}{1}\left(\frac{1}{x}\right) + \frac{xab}{1}\left(\frac{1}{a}\right) = \frac{xab}{1}\left(\frac{1}{b}\right)$$

$$ab + xb = xa$$

$$-xb \qquad -xb$$

$$ab = xa - xb$$

$$\boxed{\frac{ab}{a-b}} = \frac{x\cancel{(a-b)}}{\cancel{(a-b)}}$$

3. If $3x^2 - 2x + 7 = 0$, then $\left(x - \frac{1}{3}\right)^2 =$

A. $\frac{20}{9}$

B. $\frac{7}{9}$

C. $-\frac{7}{9}$

D. $-\frac{8}{9}$

E. $-\frac{20}{9}$

$$\frac{3x^2}{3} - \frac{2x}{3} + \frac{7}{3} = \frac{0}{3}$$

$$x^2 - \frac{2}{3}x + \frac{7}{3} = 0$$

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

$$\left(-\frac{1}{3}\right)^2$$

$$\underbrace{x^2 - \frac{2}{3}x + \boxed{\frac{1}{9}}} = \underbrace{-\frac{7}{3} + \boxed{\frac{1}{9}}}$$

$$\left(x - \frac{1}{3}\right)^2 = \boxed{-\frac{20}{9}}$$

4. The graph of which of the following equations is a straight line parallel to the graph of $y = 2x$?

A. $4x - y = 4$
B. $2x - 2y = 2$
C. $2x - y = 4$
D. $2x + y = 2$
E. $x - 2y = 4$

$y = mx + b$

Parallel lines have Same slope

$m = 2$

$2x - 2y = 2$
$-2y = -2x + 2$
$y = x - 1$

$2x - y = 4$
$-y = -2x + 4$
$y = 2x - 4$

5. An equation of the line that contains the origin and the point (1, 2) is

A. $y = 2x$
B. $2y = x$
C. $y = x - 1$
D. $y = 2x + 1$
E. $\frac{y}{2} = x - 1$

$\overset{x_1}{(0},\overset{y_1}{0)}$ $\overset{y_1}{(1},\overset{y_2}{2)}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{2-0}{1-0} = 2$

$y - y_1 = m(x - x_1)$
$y - 0 = 2(x - 0)$
$\boxed{y = 2x}$

6. An apartment building contains 12 units consisting of one- and two-bedroom apartments that rent for \$360 and \$450 per month, respectively. When all units are rented, the total monthly rental is \$4,950. What is the number of two-bedroom apartments?

A. 3
B. 4
C. 5
D. 6
E. 7

1 bdrm 360/mo. X

2 bdrm 450/mo. $12-X$

$$X(360) + 12-X(450) = 4,950$$

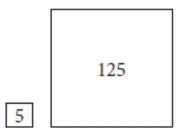
$$360X + 5400 - 450X = 4950$$

$$-90X + 5400 = 4950$$

$$-90X = -450$$

$$X = 5 \qquad \boxed{12-X = 7}$$

7. If the two square regions in the figures below have the respective areas indicated in square yards, how many yards of fencing are needed to enclose the two regions?



A. $4\sqrt{130}$
B. $20\sqrt{10}$
C. $24\sqrt{5}$
D. 100
E. $104\sqrt{5}$

$$x^2 = 5 \qquad x^2 = 125$$

$$x = \sqrt{5} \qquad x = \sqrt{125}$$

$$\sqrt{25} \cdot \sqrt{5}$$

$$5\sqrt{5}$$

$$4\sqrt{5} + 4(5\sqrt{5})$$

$$4\sqrt{5} + 20\sqrt{5} = \boxed{24\sqrt{5}}$$

8. If $\log_{10} x = 3$, then $x =$

A. 3^{10}
B. 1,000
C. 30
D. $\frac{10}{3}$
E. $\frac{3}{10}$

argument

exponent

$\log_{10} x = 3$

base

$10^3 = x$

$\boxed{1000 = x}$

9. If $f(x) = 2x + 1$ and $g(x) = \frac{x-1}{2}$, then $f(g(x)) =$

A. x
B. $\frac{x-1}{4x+2}$
C. $\frac{4x+2}{x-1}$
D. $\frac{5x+1}{2}$
E. $\frac{(2x+1)(x-1)}{2}$

$f \circ g(x)$

$f(g(x)) = 2\left(\frac{x-1}{2}\right) + 1$

$\frac{2x-2}{2} + 1$

$x - 1 + 1 = \boxed{x}$

10. If θ is an acute angle and sin θ = $\frac{1}{2}$, then cos θ =

A. -1

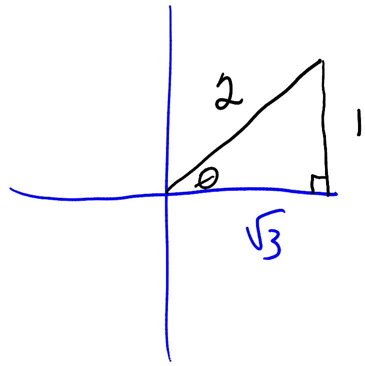
B. 0

C. $\frac{1}{2}$

D. $\frac{\sqrt{3}}{2}$

E. 2

$\sin = \frac{opp}{hyp}$



$\cos = \frac{adj}{hyp}$

$x^2 + 1^2 = 2^2$

$x^2 + 1 = 4$

$x^2 = 3$

$x = \sqrt{3}$

$\cos = \frac{\sqrt{3}}{2}$