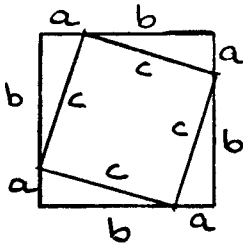


- 1) The value of $-8^{-2/3}$ is
- a) 4 b) -4 c) $\frac{1}{4}$ d) $-\frac{1}{4}$ e) none of these
- 2) The product of the x and y coordinates of the vertex of the parabola defined by $y = 2x^2 - 12x + 14$ is
- a) 132 b) -132 c) 12 d) -12 e) none of these
- 3) $\frac{3}{2} \log 9 - 2 \log 3 + \log 2$ is equivalent to
- a) $-\frac{1}{2} \log 8$ b) $\log 20$ c) $\log 56$ d) $\log 36$ e) none of these
- 4) The graph of $2x^2 + 4x = 2y + y^2 + 1$ is a(n)
- a) circle b) ellipse c) hyperbola d) parabola e) none of these
- 5) The value of $\frac{2-i}{i^3}$ is (where $i^2 = -1$)
- a) $1 + 2i$ b) $1 - 2i$ c) $-1 + 2i$ d) $-1 - 2i$ e) none of these
- 6) The number of gops varies directly as the number of hogs and inversely as the square of the number of pogs. When the number of pogs is 4 and the number of hogs is 2, the number of gops is 5. The constant of variation is
- a) 10 b) 20 c) 40 d) 80 e) none of these
- 7) In lowest terms, the numerator of the fractional form of $0.3\overline{4}$ is
- a) 34 b) 35 c) 340 d) 341 e) none of these
- 8) $\sqrt[3]{-54x^5y^3}$ is equivalent to
- a) $3x\sqrt[3]{-2xy}$ b) $3xy\sqrt[3]{2x}$ c) $-3xy\sqrt[3]{2x^2}$ d) $3xy\sqrt[3]{2x^2}$ e) none of these
- 9) $|x|$ is equivalent to
- a) x b) $-x$ c) $-\sqrt{x^2}$ d) $\sqrt{-x^2}$ e) none of these
- 10) How soon after 1:00 P.M. are the minute and hour hands of a clock together?
- a) 5 minutes b) $\frac{26}{5}$ minutes c) $\frac{31}{6}$ minutes d) $\frac{60}{11}$ minutes e) none of these
- 11) If using Cramer's Rule to solve for y of the system $x - y + z = 2$; $2x + y + z = -1$; $x - 3y + z = -1$, then the numerator determinant has a value of
- a) 3 or -3 b) 2 or -2 c) 12 or -12 d) 0 e) none of these

- 12) When graphing the solution of $\frac{5x}{x-1} > 2$ the graph contains two solution intervals. One of the interval endpoints is
- a) -5 b) -1 c) $\frac{2}{5}$ d) $-\frac{2}{3}$ e) none of these
- 13) If the equation of the circle with radius of 3 units and the center is at (3, -5) is written in the form $ax^2 + by^2 + cx + dy + e = 0$ then the numerical coefficient of y is
- a) -6 b) 1 c) 10 d) 25 e) none of these
- 14) The number of solutions to the system $x^2 + y^2 = 25$ and $x^2 - y = 5$ is
- a) 1 b) 2 c) 3 d) 4 e) none of these
- 15) The domain of the function $f(x) = \ln(3 - x)$ in interval notation is
- a) $(-\infty, 3]$ b) $(-\infty, 3)$ c) $[-3, \infty)$ d) $(-3, \infty)$ e) none of these
- 16) The y -intercept (as an ordered pair) of the line perpendicular to the line described by $2x - 4y = 7$ and containing the point at (4, 5) is
- a) (0, 2) b) (0, 3) c) (0, -13) d) (0, 13) e) none of these



- 17) This sketch is sometimes used to derive the Pythagorean theorem. The sum of the areas of the triangles is
- a) ab b) $2ab$ c) $4ab$ d) $(ab)^2$ e) none of these
- 18) Points, (x, y) , in quadrant one of a circle satisfy the equation $x^2 + y^2 = 1$. If $y = \frac{1}{3}$ then in rationalized form and in lowest terms the numerator of x is
- a) $2\sqrt{2}$ b) $\sqrt{2}$ c) 8 d) 2 e) none of these
- 19) The hyperbola defined by $\frac{(y-2)^2}{16} - \frac{(x+3)^2}{4} = 1$ has two asymptotes. The slope of the asymptote with the positive slope is
- a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) $\frac{1}{2}$ d) 2 e) none of these
- 20) The function f is defined by $f(x) = 3 - x - x^2$. If a is a constant, then the numerical coefficient of x in the simplified form of $f(x - a)$ is
- a) $2a$ b) $-2a$ c) -1 d) 1 e) none of these

- 21) If $(f \circ g)(x) = 4x^2 - 8x$ and $f(x) = x^2 - 4$ then the numerical coefficient of x in $g(x)$ is
- a) 1 or -1 b) 2 or -2 c) 4 or -4 d) 8 or -8 e) none of these
- 22) If $f(x) = \frac{2x-1}{3x+1}$ then $f^{-1}(x)$ may be represented as
- a) $\frac{3x+1}{2x-1}$ b) $\frac{x+1}{2-3x}$ c) $\frac{x-1}{3x-2}$ d) $\frac{2x+1}{3x-1}$ e) none of these
- 23) A function is *odd* if $f(-x) = -f(x)$. The odd function is
- a) $\frac{1}{x}$ b) $\frac{1}{1-x}$ c) $\frac{x}{1-x}$ d) $\frac{-x}{1+x}$ e) none of these
- 24) Abel, Ben, Carl, Debbie, and Ellen are to sit on a bench. Abel and Ben are afraid to sit on the ends. How many sitting arrangements are possible?
- a) 36 b) 72 c) 120 d) 216 e) none of these
- 25) The value of $\sum_{i=2}^4 \ln(i)$ is
- a) $\ln 6$ b) $\ln 8$ c) $\ln 9$ d) $\ln 24$ e) none of these
- 26) The sum of the first ninety terms of the series $5 + 7 + 9 + \dots$ is
- a) 4275 b) 8460 c) 8550 d) 16920 e) none of these
- 27) The sum of the solutions of $x^3 - 3x^2 - 4x + 12 = 0$ is
- a) -3 b) -7 c) 7 d) 12 e) none of these
- 28) A sphere has the property that the surface area has the same numerical value as the volume. The circumference of the sphere is (Hints: Surface area = $4\pi r^2$, Volume = $\frac{4}{3}\pi r^3$)
- a) 4 units b) 4π units c) 8 units d) 8π units e) none of these
- 29) The numerical coefficient of the x^3 term in the expansion of $(1 - 2x)^4$ is
- a) -8 b) 32 c) -32 d) 64 e) none of these
- 30) A shoebox contains two red marbles and one green marble. One marble is removed at random and then without replacing the first marble a second marble is removed. If the second marble is red, then the probability that the first marble is also red is
- a) $\frac{2}{3}$ b) $\frac{1}{3}$ c) $\frac{2}{5}$ d) $\frac{1}{2}$ e) none of these

- 31) Each term of a sequence (after term one) is inversely proportional to the term before it (The proportionality constant is the same for each pair of consecutive terms). If term one is 1 and term two is 2, then term 16 is
- a) 1 b) 2 c) 128 d) 256 e) none of these
- 32) A y -coordinate of a solution to the system $3xy - 2y^2 = -2$ and $9x^2 + 4y^2 = 10$ is
- a) -1 b) 1 c) $-\frac{\sqrt{2}}{2}$ d) $\frac{\sqrt{2}}{2}$ e) none of these
- 33) The discriminant of the expression $-x^2 + 5x - 3$ is
- a) 13 b) $\sqrt{13}$ c) 37 d) $\sqrt{37}$ e) none of these
- 34) When factoring $27x^3 - 64$ by using the difference of two cubes, the numerical coefficient of x in the trinomial is
- a) 8 b) 9 c) 16 d) 24 e) none of these
- 35) When converted to a simple rational expression in lowest terms, the numerical coefficient of the degree two term in the numerator of $\frac{\frac{3x-1}{x^2} - \frac{x}{y}}{\frac{3}{xy}}$ is
- a) -1 b) 1 c) 3 d) does not exist e) none of these
- 36) On the Richter scale, the magnitude of an earthquake of intensity I is $R = \log_{10} \frac{I}{I_0}$ where $I_0 = 1$ is the minimum intensity used for comparison. If two earthquakes in Japan had Richter scale values of $R = 8.3$ and $R = 7.3$, then the larger intensity earthquake is greater than the smaller intensity earthquake by a factor of
- a) 10 b) 100 c) $\log_{10} 8.3 - \log_{10} 7.3$ d) $\frac{\log_{10} 8.3}{\log_{10} 7.3}$ e) none of these
- 37) The constant term of the remainder when dividing $(4x^3 - 3x^2 + x + 1)$ by $(x^2 + 2)$ is
- a) -5 b) 5 c) -7 d) 7 e) none of these
- 38) The vertex of a parabola, $y = f(x)$ is located at (2, 4). The vertex of the parabola $y = f(x + 5)$ is located at
- a) (7, 4) b) (2, 9) c) (2, 16) d) (49, 4) e) none of these
- 39) A train leaves a station and travels west at the rate of 40 mile per hour. Two hours later, a second train leaves the same station traveling west at 60 miles per hour. The number of miles from the station that the second train will overtake the first train is
- a) 100 miles b) 120 miles c) 240 miles d) 2400 miles e) none of these
- 40) Joe can paint a barn in 10 days working alone. After working for 2 days, Jane begins to help and the job is completed in 3 more days. If Jane were working alone, then the number of days to paint the whole barn is
- a) 4 days b) $4\frac{2}{7}$ days c) 6 days d) $6\frac{2}{7}$ days e) none of these

- 41) The asymptote equation of the graph of $y = -\ln(x - 2) + 3$ is
- a) $x = 2$ b) $x = -2$ c) $y = 3$ d) $y = -3$ e) none of these
- 42) Two bicyclists are 20 miles apart and each begin riding toward the other at 10 miles per hour. At the moment the riders started, a fly sitting on one of the handlebars flies toward the other bicyclist, touches the handlebar and flies back to the other bicyclist and touches the handlebar. The fly flew back and forth in the manner until the bicycles meet. If the fly flew at a constant speed of 15 miles per hour, the fly flew a total of
- a) 10 miles b) 15 miles c) 20 miles d) 30 miles e) none of these
- 43) The operation "*" is defined by $a*b = ab - a + b$. The solution to the equation $5*x = 19$ is
- a) 3 b) $\frac{14}{5}$ c) $\frac{19}{5}$ d) 4 e) none of these
- 44) $\frac{\log_3 \sqrt{2}}{\log_3 7}$ is equivalent to
- a) $\frac{2}{\log_8 7}$ b) $\frac{1}{2 \log_8 7}$ c) $\frac{6}{\log_8 7}$ d) $\frac{1}{6 \log_8 7}$ e) none of these
- 45) The units digit of 7^{102} is
- a) 1 b) 3 c) 7 d) 9 e) none of these