Department of Mathematics
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Quantitative Reasoning Examination - Sample Questions

April 9, 2010

The Mathematics Quantitative Reasoning Examination tests students' mastery of basic mathematics at the precalculus level. Areas tested include algebraic and numerical operations, linear equations, quadratic equations, plane geometry, coordinate geometry, logarithms, exponentials, trigonometry, operations with functions.

The sample questions here are modified replicas of questions on the actual examination. After you answer the sample questions, you will be provided with an answer key and a solution sheet. If you have made incorrect answers, it is suggested that you try to figure out your mistakes on your own before consulting the solution sheet. Note that calculators are not permitted on the QR Examination.

1

$$x^2\left(\frac{15x}{7y^2}\right)\left(\frac{49y}{3x^3}\right) =$$

a) $35y$ b) $\frac{35x}{y}$ c) $\frac{35}{y}$ d) $35xy$ e) $\frac{35y}{x}$

2

If $a = -5$, then $|a+1| + |a-1| =$

a) 10 b) -10 c) 0 d) 5 e) -5

3

If $f(x) = x^2 - 4$, then $f(f(3)) =$

a) 5 b) 21 c) -21 d) 26 e) -4

4

If x and y are the solutions of the pair of equations

$$\begin{aligned} 2x + 3y &= 6 \\ 3x + 2y &= 14 \end{aligned}$$

then $y =$

a) 2 b) 1 c) 0 d) -1 e) -2

5

If $f(x) = x^2 - 2x - 15$, on which of the following intervals are all values of f positive?

a) $(-4, -3)$ b)$[-4, -3]$ c)$[4, 5]$ d)$(4, 5)$ e) $(-3, 5)$

6

In a square of side length 2, a smaller square is constructed by connecting the midpoints of its sides. Which of the following statements about the area L of the larger square and the area S of the smaller square is true?

a) $L > 2S$ b)$L < 2S$ c)$L = 2S$ d)$L + S = 5$ e) $L = S + 1$

7

When $x^2 - x - 5$ is divided by $x + 2$, the remainder is

a) -2 b)-1 c)0 d)1 e) 2

8

$$log_3(81) =$$

a) 2 b)3 c)4 d)5 e) 6

9

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

a) $\frac{2}{x^2-1}$ b)$\frac{-2}{x^2-1}$ c)$\frac{x^2}{x^2-1}$ d)$\frac{x^2+1}{x^2-1}$ e) $\frac{2x^2+2}{x^2-1}$

10

$$\left(\frac{3ab^2}{c^3}\right)^{-4} =$$

a) $\frac{81a^4b^8}{c^{12}}$ b)$\frac{c^{12}}{81a^4b^8}$ c)$\frac{81c^{12}}{a^4b^8}$ d)$\frac{9c^{12}}{a^4b^8}$ e) $\frac{c^{12}}{9a^4b^8}$

11

The tuition at the Dayton University of Humanities is currently \$15,000 per year. For next year it will be raised by 30%. What will be the new DUH tuition per year?

a) \$17,500 b) \$18,000 c) \$18,500 d) \$19,000 e) \$19,500

12

Which of the numbers below is a solution of the quadratic equation $x^2 - 8x - 1 = 0$?

a) $8 + 2\sqrt{17}$ b)$8 - 2\sqrt{17}$ c)$-4 + \sqrt{17}$ d)$4 - \sqrt{17}$ e) $4 - \frac{1}{2}\sqrt{17}$

13

The legs of a right triangle have lengths 2 and 3. What is the cosine of the angle adjacent to the leg of length 3?

a) $\frac{3}{\sqrt{13}}$ b) $\frac{2}{\sqrt{13}}$ c) $\frac{\sqrt{13}}{5}$ d) $\frac{2}{3}$ e) $\frac{3}{2}$

14

$$\cos(\theta + \pi) =$$

a) $\cos(\theta)$ b) $-\cos(\theta)$ c) $\sin(\theta)$ d) $-\sin(\theta)$ e) $\sin(\pi - \theta)$

15

If $log_2(x) + log_2(x^2) + log_2(x^3) = 48$, then $x =$

a) 1 b) 2 c) 3 d) 4 e) 5

16

Which inequality is true?

a) $\sin(\frac{\pi}{3}) > \sin(\frac{\pi}{4})$ b) $\sin(\frac{\pi}{3}) < \sin(\frac{\pi}{4})$ c) $\sin(\frac{\pi}{3}) < \cos(\frac{\pi}{2})$
d) $\sin(\frac{\pi}{3}) < \cos(\frac{\pi}{4})$ e) $\sin(\frac{\pi}{3}) < \sin(\frac{\pi}{6})$

17

$$\frac{\frac{x^2-y^2}{(x+y)^2}}{\frac{x+y}{(x-y)^2}} =$$

a) 1 b) $\frac{(x-y)^4}{(x+y)^2}$ c) $\frac{(x+y)^2}{(x-y)^3}$ d) $\frac{(x-y)^3}{(x+y)^2}$ e) $(x^2 - y^2)^2$

18

A line in the (x, y)-plane passes through the points $(0, 4)$ and $(3, 0)$. The equation of the line is

a) $4x + 3y = 0$ b) $3x + 4y = 1$ c) $4x + 3y = 1$ d) $\frac{x}{4} + \frac{y}{3} = 1$ e) $\frac{x}{3} + \frac{y}{4} = 1$

19

A line in the (x, y)-plane with slope 5 passes through the point $(1, 2)$. At which points does the line intersect the coordinate axes?

a) $(\frac{4}{5}, 0)$ and $(0, -4)$ b) $(\frac{3}{5}, 0)$ and $(0, -3)$ c) $(-4, 0)$ and $(0, \frac{4}{5})$
d) $(-3, 0)$ and $(0, \frac{3}{5})$ e) $(\frac{3}{5}, 0)$ and $(0, 3)$

20

$$\frac{x^{7y+5}}{x^{5y-7}} =$$

a) x^{12y} b) x^{12y+12} c) x^{2y+12} d) x^{2y-12} e) x^{-12y}