

CSCA 样题 - 数学

选择题（每小题共有 4 个选项，其中只有 1 个选项是正确的。）

1. 函数 $y = 3x - 2$ 的反函数是().

A. $y = \frac{x+3}{2}$

B. $y = \frac{x-3}{2}$

C. $y = \frac{x-2}{3}$

D. $y = \frac{x+2}{3}$

2. 不等式 $\frac{x-3}{x+1} \geq 0$ 的解集是().

A. $(-\infty, -1] \cup [3, +\infty)$

B. $(-\infty, -1) \cup [3, +\infty)$

C. $(-\infty, -3] \cup [1, +\infty)$

D. $(-\infty, -3] \cup (1, +\infty)$

3. 点 $P(-1, 2)$ 到点 $Q(2, 3)$ 的距离是().

A. 3

B. 4

C. $\sqrt{26}$

D. $\sqrt{10}$

4. 若 $a < b$, $c < d$, 则下列式子正确的是 ().

A. $a^2 < b^2$

B. $a - c < b - d$

C. $ac < bd$

D. $c^3 < d^3$

5. 若 $\cos \alpha = -\frac{1}{4}$, 则 $\cos 2\alpha =$ ().

A. $-\frac{7}{8}$

B. $-\frac{3}{16}$

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

D. $\frac{3}{4}$

6. 双曲线 $\frac{x^2}{4} - \frac{y^2}{5} = 1$ 的焦点坐标是 ().

A. $(0, \pm 3)$

B. $(\pm 3, 0)$

C. $(0, \pm 1)$

D. $(\pm 1, 0)$

7. 若数列 $\{a_n\}$ 的前 n 项部分和 $S_n = n^2 + 1$, 则 $a_{10} =$ ().

A. 18

B. 19

C. 20

D. 21

8. 下列直线与直线 $3x - y + 1 = 0$ 平行的是().

A. $x - 3y + 2 = 0$

B. $x + 3y - 2 = 0$

C. $6x - 2y - 3 = 0$

D. $6x + 2y + 1 = 0$

9. 若 $\cos \alpha = -\frac{1}{2}$, $\pi < \alpha < \frac{3\pi}{2}$, 则 $\sin \frac{\alpha}{2} = ()$.

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

B. $-\frac{\sqrt{3}}{2}$

C. $\pm \frac{\sqrt{3}}{2}$

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

10. 函数 $y = 5 \tan(x - \frac{\pi}{4})$ 的定义域是().

A. $\{x \mid x \neq k\pi + \frac{3\pi}{4}, k \in \mathbb{Z}\}$

B. $\{x \mid x \neq k\pi + \frac{\pi}{4}, k \in \mathbb{Z}\}$

C. $\{x \mid x \neq 2k\pi + \frac{3\pi}{4}, k \in \mathbb{Z}\}$

D. $\{x \mid x \neq 2k\pi + \frac{\pi}{4}, k \in \mathbb{Z}\}$

11. 数列 $\{a_n\}$ 满足 $a_1 = 2$, $a_n = 1 + \frac{1}{a_{n-1}}$ ($n \geq 2$), 则 $a_4 = ()$.

A. $\frac{3}{2}$

B. $\frac{5}{3}$

C. $\frac{8}{5}$

D. $\frac{13}{8}$

12. 不等式 $\log_2(3-x) < 0$ 的解集是().

A. $(1,3)$

B. $(-\infty,3)$

C. $(2,+\infty)$

D. $(2,3)$

13. 若函数 $f(2x+1) = x-3$ ，则 $f(-3) = ()$.

A. -3

B. 0

C. -6

D. -5

14. 下列式子正确的是().

A. $(0.3)^{-2.1} > (0.2)^{-2.1}$

B. $(2.1)^{0.12} < (2.2)^{0.12}$

C. $(3.2)^{-1.1} > (3.2)^{-0.9}$

D. $(0.25)^{1.5} > (0.25)^{1.4}$

15. 若向量 $\vec{a} = (-1, 2)$, $\vec{b} = (2, -1)$ ，则 $2\vec{a} + \vec{b} = ()$.

- A. (1,1)
- B. (0,3)
- C. -4
- D. (-2,-2)

16. 一个袋中有 5 个大小相同的球，其中有 3 个黑球和 2 个红球，如果从中任取两个球，则恰好取到两个同色球的概率是().

- A. $\frac{1}{5}$
- B. $\frac{2}{5}$
- C. $\frac{3}{5}$
- D. $\frac{4}{5}$

17. 若椭圆 C 的中心在原点，焦点在 x 轴上，它的一个顶点是 $(0,1)$ ，离心率为 $\frac{2\sqrt{5}}{5}$ ，则 C 的方程是().

- A. $\frac{x^2}{20} + \frac{y^2}{4} = 1$
- B. $\frac{x^2}{4} + \frac{y^2}{20} = 1$
- C. $x^2 + \frac{y^2}{5} = 1$
- D. $\frac{x^2}{5} + y^2 = 1$

18. 若复数 z 满足 $(1-i)^2 z = 3+2i$ ，其中 i 是虚数单位，则 $z = ()$.

A. $-\frac{3}{2}+i$

B. $-\frac{3}{2}-i$

C. $-1-\frac{3}{2}i$

D. $-1+\frac{3}{2}i$

19. 函数 $f(x) = 2x^3 - 3x^2 - 36x + 1$ 在区间 $[-3, 4]$ 上的最大值是().

A. -63

B. 1

C. 28

D. 45

20. 平面 $x - 2y + z - 1 = 0$ 与平面 $2x + y - z + 3 = 0$ 的夹角是().

A. $\frac{\pi}{3}$

B. $\frac{2\pi}{3}$

C. $\arccos \frac{1}{6}$

D. $\pi - \arccos \frac{1}{6}$

参考答案

1	2	3	4	5	6	7	8	9	10
D	B	D	D	A	B	B	C	A	A
11	12	13	14	15	16	17	18	19	20
C	D	D	B	B	B	D	D	D	C



CSCA Sample Questions-Mathematics

Multiple-Choice Questions (Each question has four options among which only one of them is correct.)

1. The inverse function of $y = 3x - 2$ is ().

A. $y = \frac{x+3}{2}$

B. $y = \frac{x-3}{2}$

C. $y = \frac{x-2}{3}$

D. $y = \frac{x+2}{3}$

2. The solution set of the inequality $\frac{x-3}{x+1} \geq 0$ is ().

A. $(-\infty, -1] \cup [3, +\infty)$

B. $(-\infty, -1) \cup [3, +\infty)$

C. $(-\infty, -3] \cup [1, +\infty)$

D. $(-\infty, -3] \cup (1, +\infty)$

3. The distance from a point $P(-1, 2)$ to another point $Q(2, 3)$ is ().

A. 3

B. 4

C. $\sqrt{26}$

D. $\sqrt{10}$

4. If $a < b$, $c < d$, which of the following is correct? ().

A. $a^2 < b^2$

B. $a - c < b - d$

C. $ac < bd$

D. $c^3 < d^3$

5. If $\cos \alpha = -\frac{1}{4}$, then $\cos 2\alpha = ()$.

A. $-\frac{7}{8}$

B. $-\frac{3}{16}$

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

D. $\frac{3}{4}$

6. The foci of the hyperbola $\frac{x^2}{4} - \frac{y^2}{5} = 1$ have coordinates ().

A. $(0, \pm 3)$

B. $(\pm 3, 0)$

C. $(0, \pm 1)$

D. $(\pm 1, 0)$

7. If the sum of the first n terms of the sequence $\{a_n\}$ is given by

$S_n = n^2 + 1$, then $a_{10} = ()$.

A. 18

B. 19

C. 20

D. 21

8. Which of the following lines is parallel to $3x - y + 1 = 0$? ().

A. $x - 3y + 2 = 0$

B. $x + 3y - 2 = 0$

C. $6x - 2y - 3 = 0$

D. $6x + 2y + 1 = 0$

9. If $\cos \alpha = -\frac{1}{2}$, $\pi < \alpha < \frac{3\pi}{2}$, then $\sin \frac{\alpha}{2} = ()$.

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

B. $-\frac{\sqrt{3}}{2}$

C. $\pm \frac{\sqrt{3}}{2}$

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

10. The domain of the function $y = 5 \tan(x - \frac{\pi}{4})$ is ().

A. $\{x | x \neq k\pi + \frac{3\pi}{4}, k \in \mathbb{Z}\}$

B. $\{x | x \neq k\pi + \frac{\pi}{4}, k \in \mathbb{Z}\}$

C. $\{x | x \neq 2k\pi + \frac{3\pi}{4}, k \in \mathbb{Z}\}$

D. $\{x | x \neq 2k\pi + \frac{\pi}{4}, k \in \mathbb{Z}\}$

11. A sequence $\{a_n\}$ has $a_1 = 2, a_n = 1 + \frac{1}{a_{n-1}} (n \geq 2)$. Then $a_4 = (\quad)$.

A. $\frac{3}{2}$

B. $\frac{5}{3}$

C. $\frac{8}{5}$

D. $\frac{13}{8}$

12. The solution set of the inequality $\log_2(3-x) < 0$ is $(\quad)$.

A. $(1,3)$

B. $(-\infty, 3)$

C. $(2, +\infty)$

D. $(2,3)$

13. If a function satisfies $f(2x+1) = x-3$, then $f(-3) = (\quad)$.

A. -3

B. 0

C. -6

D. -5

14. Which of the following is correct? $(\quad)$.

A. $(0.3)^{-2.1} > (0.2)^{-2.1}$

B. $(2.1)^{0.12} < (2.2)^{0.12}$

C. $(3.2)^{-1.1} > (3.2)^{-0.9}$

D. $(0.25)^{1.5} > (0.25)^{1.4}$

15. Let $\vec{a} = (-1, 2)$, $\vec{b} = (2, -1)$ be two vectors. Then $2\vec{a} + \vec{b} = (\quad)$.

A. (1,1)

B. (0,3)

C. -4

D. (-2,-2)

16. A bag contains five equal sized balls. Three of them are black and two of them are red. Two balls are drawn randomly from the bag. The probability that the balls have the same color is ($\quad$).

A. $\frac{1}{5}$

B. $\frac{2}{5}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

17. Suppose that the center of an ellipse C is at the origin, and the foci are on the x -axis. Suppose also that it has a vertex at $(0,1)$, and an eccentricity of $\frac{2\sqrt{5}}{5}$. The equation of C is ($\quad$).

A. $\frac{x^2}{20} + \frac{y^2}{4} = 1$

B. $\frac{x^2}{4} + \frac{y^2}{20} = 1$

C. $x^2 + \frac{y^2}{5} = 1$

D. $\frac{x^2}{5} + y^2 = 1$

18. Suppose that a complex number z satisfies $(1-i)^2 z = 3+2i$, where i is the unit imaginary number. Then $z = (\quad)$.

A. $-\frac{3}{2} + i$

B. $-\frac{3}{2} - i$

C. $-1 - \frac{3}{2}i$

D. $-1 + \frac{3}{2}i$

19. The maximum value of the function $f(x) = 2x^3 - 3x^2 - 36x + 1$ over the interval $[-3, 4]$ is $(\quad)$.

A. -63

B. 1

C. 28

D. 45

20. The angle between the planes $x - 2y + z - 1 = 0$ and $2x + y - z + 3 = 0$ is $(\quad)$.

A. $\frac{\pi}{3}$

B. $\frac{2\pi}{3}$

C. $\arccos \frac{1}{6}$

D. $\pi - \arccos \frac{1}{6}$



参考答案

1	2	3	4	5	6	7	8	9	10
D	B	D	D	A	B	B	C	A	A
11	12	13	14	15	16	17	18	19	20
C	D	D	B	B	B	D	D	D	C

