American University of Science and Technology

Department of Mathematics

MATH II

Entrance Exam Sample Questions

Directions:

For each of the 15 multiple-choice test questions, select the BEST answer among the four choices given. When the exact numerical value choice is not one of the choices, select the best approximation to the exact value. Mark your choice on the answer sheet by filling in the corresponding oval.

Notes:

Some questions (but not all) will require the use of a scientific calculator. Calculator questions are not marked as such, so you will decide whether or not to use one on each question.

1. \( \frac{3+i}{1-i} = ? \)
   a) 1-i  
   b) 1+i  
   c) 1+2i  
   d) 1-2i

2. If two fair dice are tossed, what is the probability of obtaining two equal numbers?
   a) \( \frac{1}{36} \)  
   b) \( \frac{1}{6} \)  
   c) \( \frac{5}{6} \)  
   d) \( \frac{1}{4} \)

3. In a three-dimensional coordinate system of A(3,0,5), B(0,4,5) and D(0,0,5), how far is B from D?
   a) 5  
   b) 25  
   c) 3  
   d) 4
4. If the functions f, g and h are defined by f(x) = 2x, g(x) = cosx, and h(x) = \( \frac{x}{3} \), then f(g(h(\frac{\pi}{2}))) =?

a) \( \sqrt{3} \)

b) \( \frac{\sqrt{3}}{2} \)

c) \( \frac{1}{2} \)

d) 1

5. If f(x) = tan3x, then f′(x) = ?

a) sin3x

b) tan3x

c) 3sec^23x

d) \( \frac{1}{\cos^23x} \)

6. 10 points lie on a circle. How many triangles do these points form?

a) 120

b) 12

c) 60

d) 30

7. \( \lim_{x \to 0} \frac{x + \sin3x}{2x + \sin5x} = \)

a) \( \frac{1}{7} \)

b) \( \frac{3}{7} \)

c) \( \frac{4}{7} \)

d) \( \frac{1}{2} \)

8. \( \int \frac{(x + 1)dx}{x^2 + 2x + 5} = \)

a) ln(x^2+2x+5)+C

b) \( \frac{1}{2} \)ln(x^2 + 2x + 5) + C

c) x^2+x+C
d) \( \frac{1}{2}(x^2 + 2x + 5)^2 + C \)

9. \( \cos(2\arccos \frac{1}{3}) = \)

a) \( \frac{2}{3} \)

b) \( -\frac{1}{3} \)

c) \( \frac{1}{9} \)

d) \( -\frac{7}{9} \)

10. \( \int_{0}^{1}e^{3x}dx = \)

a) \( \frac{1}{3}e^3 - \frac{1}{3} \)

b) \( \frac{1}{3}e^3 \)

c) \( 3\ln 3 \)

d) \( e^3 - 1 \)

11. A science class has a ratio of girls to boys of 4 to 3. If the class has a total of 35 students, how many more girls are there than boys?

   a) 20
   b) 15
   c) 7
   d) 5

12. If \( \frac{n}{8} \) has a remainder of 5, which of the following has a remainder of 7?

   a) \( \frac{n+1}{8} \)
   b) \( \frac{n+2}{8} \)
   c) \( \frac{n+3}{8} \)
   d) \( \frac{n+5}{8} \)

13. For a positive integer \( x \), 10 percent of \( x \) percent of 1000 is equal to which of the following?

   a) \( x \)
b) 10x

c) 100x

d) 1000x

14. A woman drove to work at an average speed of 40 miles per hour and returned along the same route at 30 miles per hour. If her total traveling time was 1 hour, what was the total number of miles in the round trip?

a) 30
b) \(30 \frac{1}{7}\)
c) \(34 \frac{2}{7}\)
d) 35

15. If 3 parallel lines are cut by 3 non-parallel lines, what is the maximum number of intersections possible?

a) 9
b) 10
c) 11
d) 12

16. If triangle ABC is right angled at A such that AB = 3 and AC = 4, then BC =?

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

17. If 10\% of x is equal to 3, then x =?

a) 3
b) 30
c) 300
d) 3000

18. If 3x - y = 5 and x - y = -1, then y =?

a) \(2^2\)
b) 1
c) -2
d) -1

19. If \(f(x) = \frac{3x-1}{x-2}\), then f(3) =?

a) -1
20. The area of a rectangle is 48 cm² and its length is 8 cm, then its width, in cm is?

a) 8  
   b) 6  
   c) 16  
   d) 14

21. The two lines 3x-y-1=0 and x+3y-5=0 are:

a) perpendicular  
   b) parallel  
   c) confounded  
   d) collinear

22. If 2 workers do a job in 6 hours, then 8 workers do the same job in:

a) 4 hrs  
   b) 1.5 hrs  
   c) 2 hrs  
   d) 24 hrs

23. \((3^2)^{-2}\) =

a) 1  
   b) \(3^{-1}\)  
   c) \(3^4\)  
   d) \(3^{-4}\)

24. The sum of the angles of a scalene triangle is:

a) 90°  
   b) 180°  
   c) 60°  
   d) 360°

25. The price of an item is reduced by 10% followed by a reduction of 20%, then the resulting reduction is:

a) 30%  
   b) 12%  
   c) 21%  
   d) 28%
26. \( \frac{4^2}{2^3} + \frac{2^3}{4^2} = ? \)

a) \( \frac{5}{2} \)

b) 2

c) \( \frac{1}{2} \)

d) \( \frac{1}{4} \)

27. If \( 9b = 81 \), then \( 3 \times 3b = ? \)

a) 27

b) 81

c) 243

d) 729

28. A College student bought 11 books for fall classes. If the cost of his physics textbook was 3 times the mean cost of the other 10 books, then the cost of the physics textbook was what fraction of the total amount he paid for the 11 books?

a) \( \frac{2}{13} \)

b) \( \frac{3}{13} \)

c) \( \frac{3}{11} \)

d) \( \frac{3}{10} \)

29. If \(-3x + 6 \geq 18\), which of the following must be true?

a) \( x \leq -4 \)

b) \( x \leq 6 \)

c) \( x \geq -4 \)

d) \( x \geq 6 \)

30. \( 2^{23} - 2^{22} = \)

a) \( 2^{1} \)

b) \( 2^{23-22} \)

c) \( 2^{22} \)

d) \( 2^{45} \)
ANSWER KEY:

1. c
2. b
3. d
4. a
5. c
6. a
7. c
8. b
9. d
10. a
11. d
12. b
13. a
14. c
15. d
16. c
17. b
18. a
19. d
20. b
21. a
22. b
23. d
24. b
25. d
26. a
27. b
28. b
29. a
30. c