

Term: Mathematics
Subject: Admission Exams 2021
Last update: May 3, 2021

Topics

The questions are organized into different sections by five (5) topics: probability & statistics, analytic geometry, geometry, functions and calculus.

Negative marking is applied

All questions have the same difficulty and worth the same amount of points.

- 5 points for each correct answer
- -1 point for each incorrect answer
- 0 if *No answer* is chosen

For example, let us say a student has answered 15 questions correctly and marked 5 questions incorrectly. Then the final score is calculated as

$$15 \times 5 + 5 \times (-1) = 70.$$

At the same time, if a student answered 15 question correctly, 3 incorrectly and marked 2 questions as *No answer*, then the final score is calculated as

$$15 \times 5 + 3 \times (-1) + 2 \times 0 = 72.$$

Types of questions

All questions are multiple choice questions with 5 options.

- For each question, there is an option called *No answer*. This option can be used when a student doesn't want to loose points for incorrect answers.
- The correct answer is one of the other 4 options. *No answer* is never a correct answer.

Number of questions

The following table summarizes the number of questions and amount of total points per section.

Summary		
Section	Questions	Points
Probability & Statistics	6	30
Analytic Geometry	1	5
Geometry	4	20
Functions	7	35
Calculus	2	10
Total	20	100

1 Probability & Statistics

1. (5 points) Find the value of $C(7, 3)$, where

$$C(n, k) = \frac{n!}{(n - k)!k!}$$

- A. 35**
B. 840
C. 410
D. 210
E. No answer.
2. (5 points) In a class of 50 students, 18 students take chemistry, 26 students take biology, and 2 students take both chemistry and biology. How many students in the class are enrolled in either chemistry or biology?
A. 44
B. 26
C. 42
D. 2
E. No answer.
3. (5 points) The proportion of x in $2/3$ is equal to $1/3$. What is the value of x ?
A. $2/3$
B. 2
C. $2/9$
D. $1/9$
E. No answer.
4. (5 points) In a recent town election, 75 percent of the 16,000 people voted. Of those who voted, 60 percent voted for current mayor and 120 votes were invalid. How many people voted for other candidates?
A. 4000
B. 4800
C. 4680
D. 12000
E. No answer.
5. (5 points) If the sum of 7 numbers is between 41 and 43, then the average (arithmetic mean) of the 7 numbers could be which of the following?

- A. mean = 6
B. mean = 5.5
C. mean = 5
D. mean = 6.5
E. No answer
6. (5 points) There are 5 sizes and 6 colors of T-shirts available for students at a local Merchandise Store. How many different combinations of T-shirt color and size can students choose?
- A. 16
B. 30
C. 15
D. 11
E. No answer.

2 Analytic Geometry

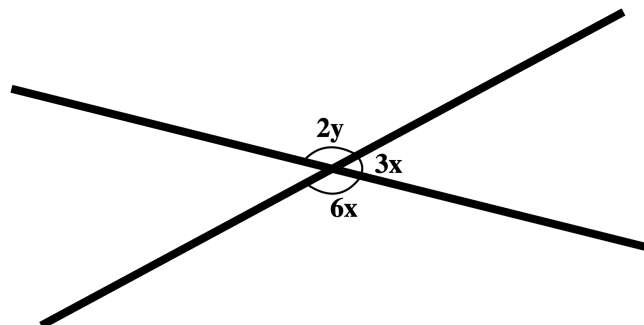
1. (5 points) Find the sum of the components of the vector $2\vec{a} + 3\vec{b}$, where the vectors \vec{a} and \vec{b} are given in the following form

$$\vec{a} = (1, 2), \quad \text{and} \quad \vec{b} = (-4, 2)$$

- A. 2
B. -1
C. 1
D. 0
E. No answer.

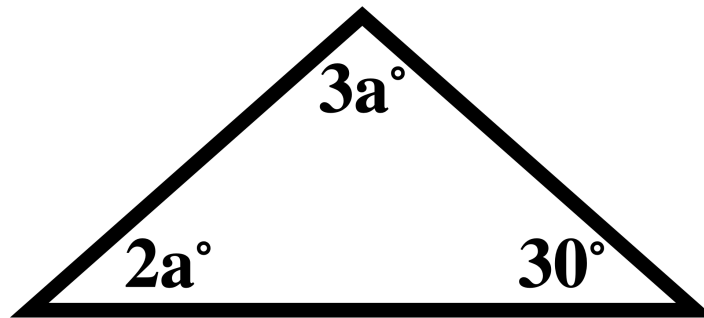
3 Geometry

1. (5 points) In the figure below, what is the value of $x + y$ in degrees?



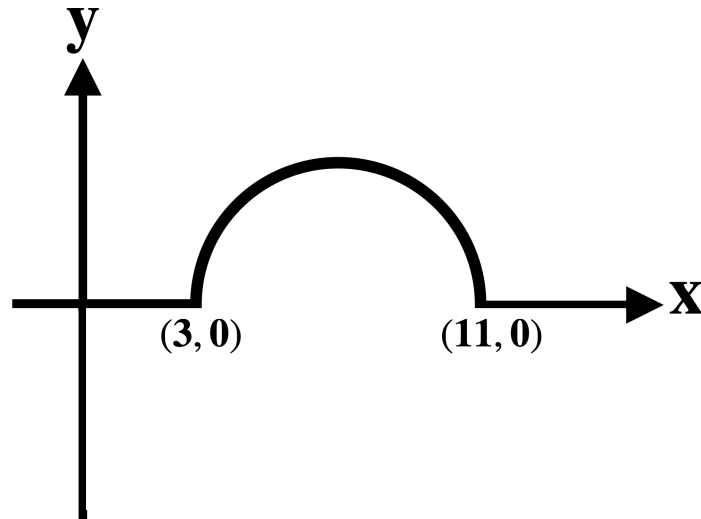
- A. 60
- B. 75
- C. 100
- D. 80**
- E. No answer.

2. (5 points) Based on the figure below, what is the value of a in degrees?



Note: Figure not drawn to scale

- A. 25
 - B. 30**
 - C. 35
 - D. 40
 - E. No answer.
3. (5 points) The diameter of a semi-circle is 4. What is its perimeter?
- A. $2\pi + 4$**
 - B. $2\pi + 2$
 - C. 2π
 - D. $\pi + 2$
 - E. No answer.
4. (5 points) In the figure above, what is the sum of the x and y coordinates of the highest point on the above semicircle?



- A. 6
- B. 8
- C. 11**
- D. 14
- E. No answer.

4 Functions

1. (5 points) If x and y are positive integers, and $x^2 - y^2 = 5$, what is the value of x ?
 - A. 1
 - B. 2
 - C. 4
 - D. 3**
 - E. No answer.
2. (5 points) Given $f(x) = 3x - 1$ and $g(x) = \sqrt{x^2 - 8}$. Evaluate

$$f(g(3)) \quad \text{or} \quad (f \circ g)(3)$$

- A. 8
- B. 3
- C. 2**
- D. 7
- E. No answer.

3. (5 points) If $f(x) = x^{-1} + x + x^2$ at which of the following values of x is $f(x)$ undefined?
- A. **0**
 - B. -1
 - C. 1
 - D. 2
 - E. No answer.
4. (5 points) What is the equation of a line through the following two points $A(1, 1)$ and $B(2, 4)$?
- A. $y = x + 2$
 - B. $y = 2x$
 - C. $y = 4x - 3$
 - D. $y = 3x - 2$
 - E. No answer.
5. (5 points) Let the function f be defined as $f(x) = 2x - 1$. If $f(a + 1) = 10$, what is the value of $f(a)$?
- A. 4.5
 - B. 2
 - C. 9
 - D. **8**
 - E. No answer.
6. (5 points) What are the solutions of x for which $(x - 1)(x + 2) = 0$?
- A. -1
 - B. -2
 - C. -1 and 2
 - D. **1 and -2**
 - E. No answer.
7. (5 points) If
- $$a^x \cdot a^4 = a^{16} \quad \text{and} \quad (a^3)^y = a^{12},$$
- what is the value of $x + y$?
- A. 13
 - B. 15
 - C. 17
 - D. **16**
 - E. No answer.

5 Calculus: differentiation & Integration

1. (5 points) Suppose

$$f(x) = (x - 1)^2 + \sin(x)$$

What is the value of $f'(0)$?

- A. -1
 - B. -3
 - C. 0
 - D. 2
 - E. No answer.
2. (5 points) Evaluate the following integral

$$\int_0^2 2(1-x)^2 dx$$

- A. -1/3
- B. 0
- C. -2/3
- D. 4/3
- E. No answer.