

GRE

# Advanced GRE Math Questions



THE UNIVERSITY OF BRITISH COLUMBIA

**Continuing Studies**

1. What is the sum of all integers  $x$ , such that  $-37 < x \leq 35$  ?

- (A)  $-73$
- (B)  $-37$
- (C)  $-36$
- (D)  $36$
- (E)  $37$

Answers

1. C

1. The current ratio of boys to girls at a certain school is 2 to 5. If 12 additional boys were added to the school, the new ratio of boys to girls would be 4 to 9. How many boys currently attend the school?

- (A) 27  
(B) 48  
(C) 54  
(D) 72  
(E) 108

Column A

Column B

$a$ ,  $b$ ,  $c$ , and  $d$   
are positive

$$\frac{a}{2} + \frac{b}{6} = \frac{c}{3} + \frac{d}{9}$$

2.

$9a + 3b$

$6c + 3d$

$$k = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128}$$

3.

$k$

2

$$n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7}$$

4.

$n$

3

Answers

4.  
B  
3.  
B  
2.  
B  
1.  
E

1. If 7 workers can build 7 cars in 7 days, then how many days would it take 5 workers to build 5 cars?  
(A) 1  
(B) 5  
(C) 7  
(D) 25  
(E) 35
  
2. If 6 workers can build 4 cars in 2 days, then how many days would it take 8 workers to build 6 cars?  
(A)  $\frac{5}{3}$   
(B)  $\frac{9}{4}$   
(C)  $\frac{8}{3}$   
(D)  $\frac{11}{4}$   
(E)  $\frac{10}{3}$
  
3. Bea can paint a house three times faster than Alice can paint a house. If, working together, it takes Alice and Bea 24 hours to paint a house, then how many hours would it take Bea to paint a house alone?  
(A) 28  
(B) 30  
(C) 32  
(D) 36  
(E) 40

Answers3.  
C  
2.  
B  
1.  
C

1. What percent of 15 is 15 percent of 1?
- (A) 0.001
  - (B) 0.01
  - (C) 0.1
  - (D) 1
  - (E) 10

Answers

1. D

1. Marge has  $n$  candies, where  $n$  is an integer such that  $20 < n < 50$ . If Marge divides the candies equally among 5 children, she will have 2 candies remaining. If she divides the candies among 6 children, she will have 1 candy remaining. How many candies will remain if she divides the candies among 7 children?
- (A) 0  
(B) 1  
(C) 2  
(D) 3  
(E) 4
2. If  $x$  is an integer, and  $k = (x - 1)(x + 2) - (x - 1)(x - 2)$ , then which of the following must be true?
- (A)  $k$  is odd only when  $x$  is odd.  
(B)  $k$  is odd only when  $x$  is even.  
(C)  $k$  is even only when  $x$  is even.  
(D)  $k$  is even only when  $x$  is odd.  
(E) None of the above.
3. If  $k$  is an integer, and  $\frac{35^2 - 1}{k}$  is an integer, then  $k$  could be each of the following, EXCEPT
- (A) 8  
(B) 9  
(C) 12  
(D) 16  
(E) 17

[Answers](#)3.  
D  
2.  
E  
1.  
C

1.  $k$  is a positive integer and 225 and 216 are both divisors of  $k$ . If  $k = 2^a \times 3^b \times 5^c$ , where  $a$ ,  $b$  and  $c$  are positive integers, what is the least possible value of  $a + b + c$ ?
- (A) 4  
(B) 5  
(C) 6  
(D) 7  
(E) 8
2. What is the smallest positive integer  $k$  such that the product  $1575 \times k$  is a perfect square?
- (A) 7  
(B) 9  
(C) 15  
(D) 25  
(E) 63

[Answers](#)1. E  
2. A

1.  $3^x + 3^x + 3^x =$

- (A)  $9^x$
- (B)  $3^{x+1}$
- (C)  $9^{3x}$
- (D)  $3^{2x}$
- (E)  $3^{3x}$

2. If  $n$  is an integer and  $5^n > 4,000,000$ , what is the least possible value of  $n$ ?

- (A) 7
- (B) 8
- (C) 9
- (D) 10
- (E) 11

Column A

Column B

3.  $\frac{x^{2k}}{x^4}$   $x^{\frac{k}{2}}$

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4.  $(\sqrt{3})^{20}$   $(\sqrt[3]{9})^{15}$

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Answers

- 4. C
- 3. D
- 2. D
- 1. B



1. If  $\sqrt[6]{x} = 6$ , then  $\sqrt{x^6} =$
- (A) 6
- (B)  $6\sqrt{6}$
- (C)  $6^6$
- (D)  $6^{18}$
- (E)  $6^{36}$
2. Which of the following is the best approximation of  $\sqrt{3.8 \times 10^{25}}$  ?
- (A)  $1.9 \times 10^5$
- (B)  $6.2 \times 10^5$
- (C)  $1.9 \times 10^{12}$
- (D)  $6.2 \times 10^{12}$
- (E)  $1.9 \times 10^{25}$

[Answers](#)1. D  
2. D

1. Which of the following is equivalent to  $\frac{1 - \frac{1}{x+1}}{x}$  for all values of  $x$  for which both expressions are defined?
- (A) 1
- (B)  $x+1$
- (C)  $\frac{1}{x}$
- (D)  $\frac{1}{x+1}$
- (E)  $x^2 + x$
2. Which of the following is equivalent to  $\frac{2x^2(x+3) - 2x - 6}{x^2 + 2x - 3}$  for all values of  $x$  for which both expressions are defined?
- (A)  $2x^2 - 2$
- (B)  $2x + 2$
- (C)  $x + 1$
- (D)  $2x + 6$
- (E)  $x - 1$
3. If  $x = 3(2y - x)$ , then what is the value of  $y$  in terms of  $x$ ?
- (A)  $\frac{x}{3}$
- (B)  $\frac{x}{6}$
- (C)  $\frac{2x}{3}$
- (D)  $3x$
- (E)  $6x$

Answers

3. C  
2. B  
1. D

1. Which of the following is equivalent to  $xy + 2xy(1 + y)2y$  ?

(A)  $xy(2y + 1)^2$

(B)  $(2xy + 1)(2xy - 1)$

(C)  $(2x + y)^2$

(D)  $(x + 2y)^2$

(E)  $y(x - 2y)^2$

2.  $(3^9 - 3^8)(3^7 - 3^6) =$

(A)  $3^4$

(B)  $3^{14}$

(C)  $6^{14}$

(D)  $2 \times 3^{14}$

(E)  $4 \times 3^{14}$

Column A

Column B

$$x < 0$$

$$y < 1$$

3.

$$xy(x + z)$$

$$x^2 + xyz$$

Answers

3. B  
2. E  
1. A

1. If  $\frac{x}{y} = \frac{2}{5}$ , then which of the following must be true?

I.  $y + x = 7$

II.  $\frac{x+y}{x} = \frac{7}{2}$

III.  $\frac{y^2}{x^2} = \frac{25}{4}$

- (A) I only  
(B) I and II only  
(C) I and III only  
(D) II and III only  
(E) I, II and III

Answers

1. D

1. Which of the following could be the sum of three consecutive integers?
- (A) 29  
(B) 46  
(C) 57  
(D) 92  
(E) 100
2. A group of 10 people plan to contribute equally to pay for a friend's gift that costs  $G$  dollars? If  $n$  additional people want to contribute to pay for the gift, the required contribution per person will be reduced by how many dollars?
- (A)  $\frac{Gn}{100 + 10n}$   
(B)  $\frac{10 + n}{Gn}$   
(C)  $\frac{10G + Gn}{n}$   
(D)  $\frac{Gn + 10G}{Gn - 10}$   
(E)  $\frac{10G}{n^2 + 10n}$

Answers1. C  
2. A

1. If  $x$  and  $y$  are integers and  $2x - y = 11$ , then  $4x + y$  CANNOT be

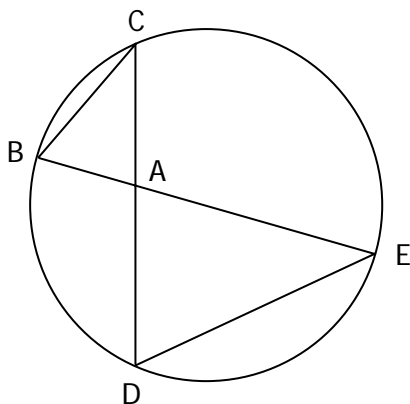
- (A) -5
- (B) 1
- (C) 13
- (D) 17
- (E) 55

Answers

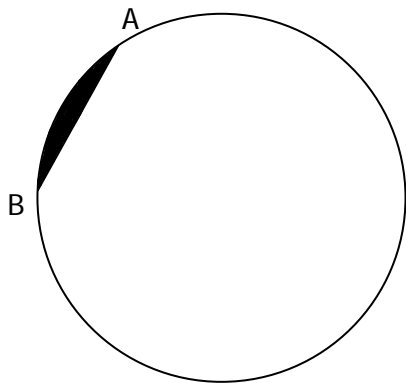
2. 2  
1. D

1. If the perimeter of a certain rectangle is 76 and its area is 360 then what is the length of its shortest side?  
  
(A) 12  
(B) 18  
(C) 20  
(D) 36  
(E) 40
  
2. If the volume of a cube is  $x$  cubic feet and the total surface area of the cube is  $x$  square feet, then what is the total length of all the cube's edges?  
  
(A) 24  
(B) 60  
(C) 72  
(D) 120  
(E) 144
  
3. If the area of an equilateral triangle is  $x$  square meters and the perimeter is  $x$  meters, then what is the length of one side of the triangle in meters?  
  
(A) 6  
(B) 8  
(C)  $4\sqrt{2}$   
(D)  $2\sqrt{3}$   
(E)  $4\sqrt{3}$

Answers3.  
2.  
1.



1. In the above circle  $AB = 4$ ,  $BC = 6$ ,  $AC = 5$  and  $AD = 6$ . What is the length of  $DE$ ?
- (A) 6  
 (B) 7.5  
 (C) 8  
 (D) 9  
 (E) 10

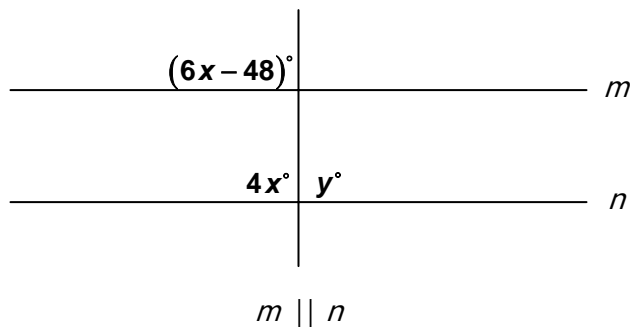


2. In the above circle, the radius is 6 and  $AB = 6$ . What is the area of the shaded region?
- (A)  $2\pi - 3\sqrt{3}$   
 (B)  $4\pi - 4\sqrt{3}$   
 (C)  $4\pi - 9\sqrt{3}$   
 (D)  $6\pi - 6\sqrt{3}$   
 (E)  $6\pi - 9\sqrt{3}$

Answers

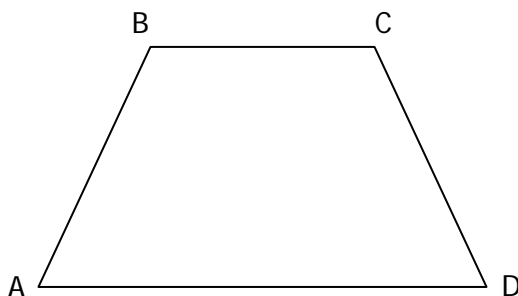
2. E  
1. D





1.  $x + y =$

- (A) 72
- (B) 90
- (C) 108
- (D) 120
- (E) 180

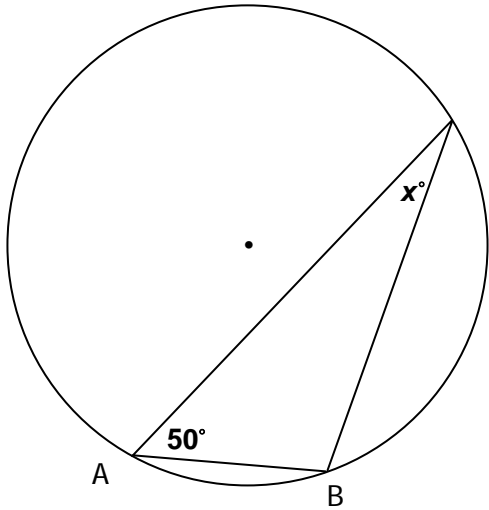


2. What is the area of the trapezoid above if  $AB = BC = CD = 6$ , and  $AD = 12$ ?

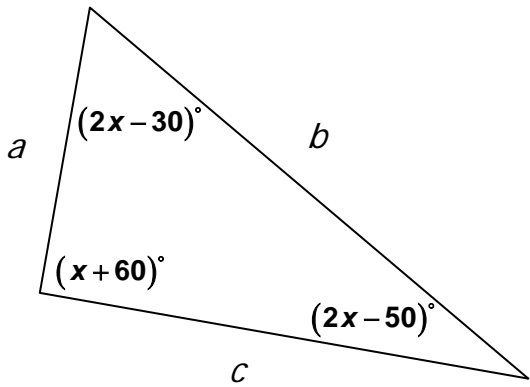
- (A)  $9\sqrt{2}$
- (B)  $9\sqrt{3}$
- (C)  $6\sqrt{6}$
- (D)  $18\sqrt{2}$
- (E)  $18\sqrt{3}$

Answers

2. B  
1. C



1. If the radius of the circle above is equal to the chord AB, then what is the value of  $x$  ?
- (A) 25
  - (B) 30
  - (C) 40
  - (D) 45
  - (E) 50

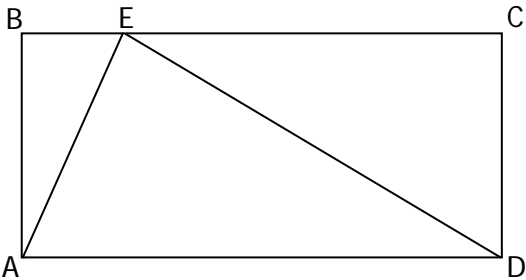


Column A

Column B

2.  $\frac{a^2 + c^2}{b^2}$

Answers  
2.B  
1.B



ABCD is a rectangle

Column A

Column B

1.

Area of triangle AED

Area of triangle ABE  
+  
area of triangle ECD

Answers  
1. C

1. If the average (arithmetic mean) of 3, 6, 10,  $m$  and  $n$  is 9, then what is the average of  $m + 4$  and  $n - 2$  ?  
  - (A) 9
  - (B) 13
  - (C) 14
  - (D) 18
  - (E) 26
  
2. If the average (arithmetic mean) of  $a$  and  $b$  is 45, and the average (arithmetic mean) of  $b$  and  $c$  is 35, then  $a - c =$   
  - (A) 5
  - (B) 10
  - (C) 20
  - (D) 30
  - (E) 40

[Answers](#)1. C  
2. C

1. If there are 16 people to choose from, what is the ratio of the number of possible 7-person committees to the number of possible 8-person committees?  
(A) 7:8  
(B) 8:7  
(C) 7:9  
(D) 8:9  
(E) 9:8
  
2. In how many ways can Ann, Bea, Cam, Don, Ella and Fey be seated if Ann and Bea cannot be seated next to each other?  
(A) 240  
(B) 360  
(C) 480  
(D) 600  
(E) 720
  
3. If  $p$  and  $q$  are prime numbers, how many divisors does the product  $p^3q^6$  have?  
(A) 9  
(B) 12  
(C) 18  
(D) 28  
(E) 36
  
4. How many positive integers less than 10,000 are there in which the sum of the digits equals 5?  
(A) 31  
(B) 51  
(C) 56  
(D) 62  
(E) 93

This is a **900-level** question!



Answers

4. C  
3. D  
2. C  
1. D

1. In the  $xy$ -coordinate plane, the points  $(a, b)$  and  $(a + k, b - 3)$  are on the line defined by  $y = 2x - 5$ . What is the value of  $k$ ?

(A)  $-\frac{5}{2}$

(B)  $-\frac{5}{3}$

(C)  $-\frac{3}{2}$

(D)  $-\frac{2}{3}$

(E)  $-\frac{2}{5}$

Answers

1. A