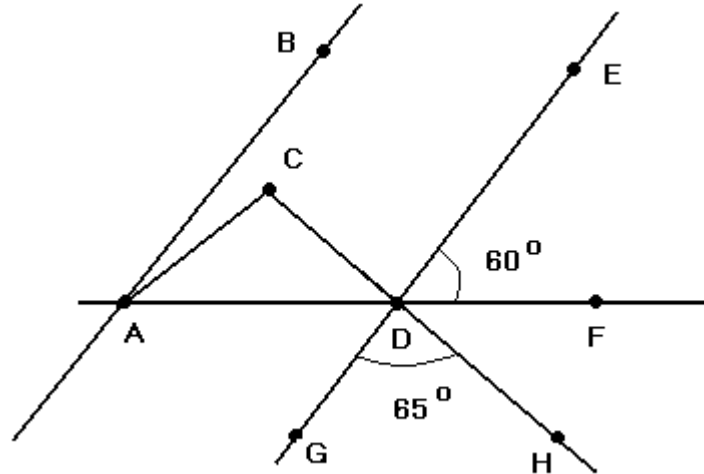


1. In the figure below, AB and GE are parallel. Triangle ACD is isosceles with the lengths of CA and CD equal. The measures of angles FDE and GDH are  $60^\circ$  and  $65^\circ$  respectively. What is the measure of angle CAB?



- A)  $55^\circ$   
 B)  $6^\circ$   
 C)  $10^\circ$   
 D)  $15^\circ$   
 E)  $5^\circ$
2. If  $a$ ,  $b$  and  $y$  are positive real numbers with such that none of them is equal to 1 and  $b$
- $2a + 6 = y^2$ , which of these must be true?
- A)  $y = b^{a+3}$   
 B)  $2a + 6 = 2$   
 C)  $b = y$   
 D)  $b = 2$   
 E)  $b(2a + 6) = 2y$
3. What is true about the graph of function  $f$  defined by

$$f(x) = 4 + ||x| - 3|$$

- (I) Symmetric with respect to y-axis
- (II) Has no x intercepts
- (III) Has a y intercept at (0 , 7)
- A) (I) and (II) only
- B) (I) and (III) only
- C) (I), (II) and (III)
- D) None
- E) (II) and (III) only

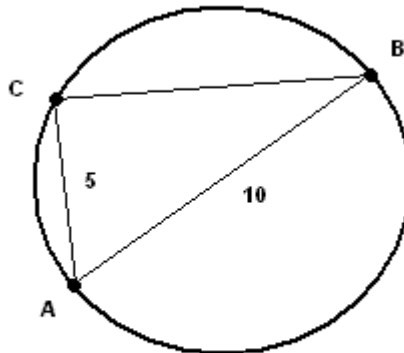
4. A number  $x$  is divided by 0.71 and the result decreased by 0.2. If the fifth root of the final result equals -0.15, what is the value of  $x$  rounded to the nearest thousandth?
- A) 0.141
  - B) 0.71
  - C) 0.143
  - D) 0.142
  - E) 0.036
5. Find the constant  $k$  so that the perpendicular bisector of the line segment with end points  $(k, 0)$  and  $(4, 6)$  has a slope of -3.
- A) 4
  - B) -14
  - C) 6
  - D) 22
  - E) 0
6. Forty students are each registered to study one or more of three courses. 23 students are registered in one course only and 14 students are registered in two courses only. How many are registered in all 3 courses?
- A) 3
  - B) 11
  - C) 37
  - D) 17
  - E) 26
7. Which of the statements below are true about the graphs of the equations  $x^2 + y^2 = 9$  and  $(x + 6)^2 + y^2 = 9$ ?
- (I) Both graphs are circles.
  - (II) The two graphs touch at one point.
  - (I) The two graphs have two distinct points of intersection.

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

8. If the perimeter of a regular hexagon is equal to  $6a$ , then the area of this hexagon is given by

- A)  $6a^2$
  - B)  $3a^2$
  - C)  $0.5\sqrt{3}a^2$
  - D)  $\sqrt{3}a^2$
  - E)  $1.5\sqrt{3}a^2$
- 

9.  $AB$  is a diameter to the circle in the figure below and point  $C$  is on the circle. The measure of the diameter is 10 units and side  $AC$  has a length of 5 units. Find the measure of angle  $CBA$



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- A) 28
- B) 30
- C) 40
- D) 45
- E) 43

- 
10. For what value of positive  $k$  does the equation have one solution only?

$$(x + k)x = -4$$

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

11. The average of the roots of a quadratic equation is equal to 3 and the difference of the roots is equal to 2. Which of these could be the equation?

- A)  $x^2 - 5x + 6 = 0$
  - B)  $x^2 + 5x + 6 = 0$
  - C)  $x^2 - 6x + 8 = 0$
  - D)  $x^2 + 6x + 8 = 0$
  - E)  $x^2 - 6x + 6 = 0$
- 

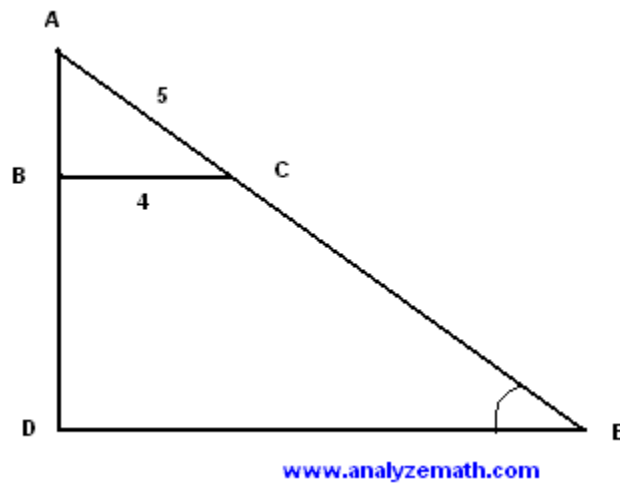
12. If points  $M$ ,  $B(2, 6)$  and  $C(4, 8)$  are such that  $MBC$  is a right triangle with hypotenuse  $BC$ , then the 3 points  $M$ ,  $B$  and  $C$  are on a circle of radius

- A)  $2\sqrt{2}$
  - B)  $\sqrt{2}$
  - C) 2
  - D) 4
  - E) 8
- 

13. The volume of a rectangular solid is equal to  $1000 \text{ m}^3$ . If the length, width and height are increased by 50%, the volume of the new rectangular solid is equal to

- A)  $3375 \text{ m}^3$
  - B)  $3500 \text{ m}^3$
  - C)  $1500 \text{ m}^3$
  - D)  $5000 \text{ m}^3$
  - E)  $50000 \text{ m}^3$
- 

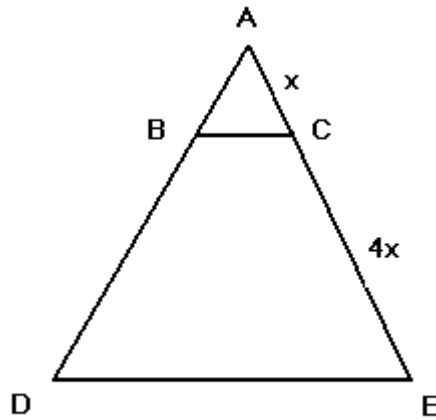
14. In the figure below angle ADE is right and BC and DE are parallel. The length of AC is 5 and the length of BC is 4. Find  $\tan(\text{angle CED})$ .



- A)  $5/4$
  - B)  $4/5$
  - C)  $4/3$
  - D)  $1$
  - E)  $3/4$
- 

15. What are the coordinates of the center of the circle that is entirely in quadrant II and is tangent to the lines  $y = 8$ ,  $y = 2$  and  $x = -2$ ?
- A)  $(-2, 8)$
  - B)  $(-5, 2)$
  - C)  $(-2, 2)$
  - D)  $(-5, 5)$
  - E)  $(-5, 8)$

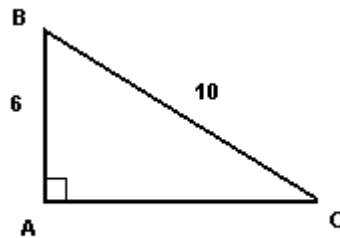
- 
16. In the figure below BC is parallel to DE. The length of side AC is  $x$  and the length of side CE is  $4x$ . What is the area of triangle ADE if the area of ABC is  $100 \text{ cm}^2$ ?



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- A)  $2500 \text{ cm}^2$
- B)  $1600 \text{ cm}^2$
- C)  $900 \text{ cm}^2$
- D)  $500 \text{ cm}^2$
- E)  $600 \text{ cm}^2$ ?

- 
17. In the figure below is shown a right triangle ABC. What is the volume of the cone obtained by rotating the triangle about the side AB?



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- A)  $60\pi$
  - B)  $128\pi$
  - C)  $24\pi$
  - D)  $48\pi$
  - E)  $480\pi$
- 

18. If  $3(x + y) = 27$  and  $x$  and  $y$  are positive integers, which of these cannot be the value of  $x / y$ ?
- A)  $1/2$
  - B)  $8$
  - C)  $2$
  - D)  $1/8$
  - E)  $1/4$
- 

19.  $[\cos(x) \sin(2x) - 2 \sin x] / [\sin^2 x \cos(x)] =$
- A)  $2 \cot(x)$
  - B)  $2 \tan(x)$
  - C)  $-2 \tan(x)$
  - D)  $-2 \cot(x)$
  - E)  $\cot(x)$
- 

20. Find the smallest value of a positive integer  $x$  such that  $x^2 + 4$  is divisible by 25.
- A) 4
  - B) 7
  - C) 6
  - D) 11
  - E) 8
- 

21. Find the value of constant  $a$  such that  $x = 1$  is a solution to the equation

$$a\sqrt{(x + 3) - 4a} | 2x - 1 | = 4$$

- A) - 2
  - B) 2
  - C) 1
  - D) -1
  - E) 5
- 

22.  $m$  and  $n$  are positive integers such that  $m > n$  and  $m^{2n} = 46656$ .

Find  $m$ .

- A) 9
  - B) 8
  - C) 7
  - D) 6
  - E) 5
- 

23. The root of an equation of the form  $f(x) = 2$  is  $x = 5$ . The solution of the equation defined by  $f(-2x + 1) = 2$  is equal to

- A) -9
  - B)  $-1/2$
  - C) 5
  - D) 2
  - E) -2
- 

24. For what value of  $b$  will the system of equations  $2x + 5y = 3$  and  $-5x + by = 14$  have no solution?

- A) 5
  - B)  $-25/2$
  - C)  $5/2$
  - D)  $5/3$
  - E)  $5/14$
- 

25. Find the real numbers  $a$  and  $b$  such that  $3a - bi = (2 - i)(4 + i)$  where  $i = \sqrt{-1}$ .

- A)  $a = -3$ ,  $b = -2$



- B)  $a = -3$  ,  $b = 2$
  - C)  $a = 3$  ,  $b = 2$
  - D)  $a = 2$  ,  $b = 4$
  - E)  $a = 8$  ,  $b = -1$
- 

26. A dealer increased the price of an item by 20%, then increased the price of the same item by 30%. If  $x$  is the original price, what is the price after the two increases?
- A)  $1.5x$
  - B)  $1.56x$
  - C)  $x + 0.5$
  - D)  $x + 0.56$
  - E)  $x + 6$
- 

27. Two dice are thrown. What is the probability that the sum of the two numbers obtained is greater than 10?
- A)  $1/12$
  - B)  $1/36$
  - C)  $1/6$
  - D)  $1/4$
  - E)  $1/2$
- 

28. If  $x$  and  $y$  are two real numbers such that  $3x + 2y = 5$  and  $5x + 4y = 9$ , then  $4x + 3y =$
- A) 0
  - B) 2
  - C) 5
  - D) 6
  - E) 7
- 

29. The solution set of the inequality  $|2x - 4| > x + 1$  is given by the interval
- A)  $(5, +\infty)$
  - B)  $(-\infty, -1)$

- C)  $(-\infty, 1) \cup (5, +\infty)$
  - D)  $(-\infty, -1) \cup (5, +\infty)$
  - E)  $(-\infty, 0) \cup (5, +\infty)$
- 

30. If  $m$  and  $n$  are positive integers are such that  $m / n = 2 / 3$ , which of these values cannot be values of  $m$  and  $n$ ?

- A)  $m = 12$  and  $n = 18$
  - B)  $m = 60$  and  $n = 90$
  - C)  $m = 34$  and  $n = 51$
  - D)  $m = 7$  and  $n = 21$
  - E)  $m = 102$  and  $n = 153$
- 

31. If 35 is the median of the data set including 21, 7, 45, 33, 62 and  $x$ , then  $x =$

- A) 3
- B) 14
- C) 37
- D) 33
- E) 48