



MATHS

BOOKS - KAPLAN INC MATHS (ENGLISH)

MISCELLANEOUS TOPICS

Example

1. For all nonzero numbers x and y , the operation ∇ is defined by the equation

$x \nabla y = \frac{|x|}{x^2} + \frac{y^2}{|y|}$ when $x > y$ and by the equation $x \nabla y = \frac{|x|}{y^2} - \frac{x^2}{|y|}$ when $x \leq y$. If

$x \nabla y < 0$, then which of the following could be true ?

I. $x^3 = y^3$

II. $(y + x)(y - x) > 0$

III. $x - y > 0$

A. I only

B. II only

C. III only

D. I and II

Answer: D



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2. If $i = \sqrt{-1}$, then which of the following has the greatest value ?

A. $i^4 + i^3 + i^2 + i$

B. $i^8 + i^6 + i^4 + i^2$

C. $i^{12} + i^9 + i^6 + i^3$

D. $i^{16} + i^{12} + i^8 + i^4$

Answer: D



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3. "If a zic is a zac, then a zic is not a zoc."

If the statement above is true, then which of the following statements must also be true ?

A. "If a zic is a zoc, then a zic is not a zac."

B. "If a zic is not a zac, then a zic is a zoc."

C. "If a zic is not a zoc, then a zic is a zac."

D. "If a zic is not a zac, then a zoc is not a zac."

Answer: A



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4. A delicatessen charges for a certain type of sold at a rate of 2 dollars for the first half and 75 cents for each additional half pound. Which of the following expressions represents the

total charge, in cents, for p pounds of the salad, where p is a positive integer ?

A. $25(6p + 8)$

B. $25(6p + 5)$

C. $25(3p + 5)$

D. $1.25 + 1.5p$

Answer: B



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5. During a weight - lifting routine, an athlete calculates the total amount of weight moved while performing a certain exercise by multiplying the amount of weight per lift by the number of lifts. On Wednesday, the weight per lift was 20 percent greater than the weight per lift on Monday, while the number of lifts was 25 percent fewer than the number of lifts performed on Monday. On Friday, the weight per lift was 25 percent greater than the weight per lift on Wednesday, while the number of lifts was 40 percent fewer than the

number of lifts performed on Wednesday. The total weight moved by the athlete while performing the exercise on Monday was approximately what percent greater than the total weight she moves while performing the exercise on Friday ?

A. 15 %

B. 33 %

C. 48 %

D. 50 %

Answer: C



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6. Last year a manufacturer had a sales total for January that was 50 percent greater than the average (arithmetic mean) of the monthly sales totals for February through December. The sales total for January was fraction of the sales total for the year ?

A. $\frac{1}{11}$

B. $\frac{1}{8}$

C. $\frac{3}{25}$

D. $\frac{3}{22}$

Answer: C



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7. Kayla drove from Bayside to Chatham at a constant speed of 21 miles per hour and then returned along the same route from Chatham to Bayside. If her average speed for the entire journey was 26.25 miles per hour, at what

average speed, in miles per hour, did Kayla return from Chatham to Bayside ?

A. 28

B. 31

C. 31.5

D. 35

Answer: D



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8. Of the 12 members of a high school drama club, 8 are seniors. The club plans to establish an 8 - member committee to interview potential club members. If exactly 6 members of the committee must be seniors, how many committees are possible ?

A. 21

B. 34

C. 168

D. 336

Answer: C



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9. Two fair dice are tossed simultaneously.

What is the probability that the product of the numbers that land showing is at least 25 ?

A. $\frac{1}{36}$

B. $\frac{1}{12}$

C. $\frac{1}{9}$

D. $\frac{1}{4}$

Answer: C



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10. $\log_3 \sqrt[9]{3} =$

A. $\frac{1}{9}$

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

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

D. 1

Answer: A



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11. $\lim_{x \rightarrow 3} \frac{x^3 + x^2 - 12x}{x^2 - 9} =$

A. -7

B. $-\frac{7}{2}$

C. 0

D. $\frac{7}{2}$

Answer: D



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12. If the first term in a geometric sequence is 3, and if the third term is 48, what is the 11th term ?

A. 228

B. 528

C. 110, 592

D. 3, 145, 728

Answer: D



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Miscellaneous Topics Follow Up Test

1. The "panvoid" of a function is defined as the sum of the integers that do not fall within the domain of the function. All of the following functions have equal panvoids EXCEPT

$$\text{A. } f(x) = \frac{3x}{x^2 - 4}$$

$$\text{B. } f(x) = \frac{3 - x}{x^3 - x}$$

$$\text{C. } f(x) = \frac{3x}{3x^2 - 27}$$

$$D. f(x) = \frac{2 - x}{x^2 - x}$$

Answer: D



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2. If $i^2 = -1$, $4 + i$, and $4 - i$ are roots of which of the following equations ?

A. $x^2 + 8x - 17 = 0$

B. $x^2 - 8x + 17 = 0$

C. $x^2 - 8x - 17 = 0$

D. $x^2 + 10x - 8 = 0$

Answer: B



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3. If all Martians vacation on Venus, then

A. A being that does not vacation on Venus

is not a Martian.

B. Anyone who vacations on Venus is a

Martian.

C. No beings from Pluto vacation on Venus.

D. All beings from Venus vacation on Mars.

Answer: A



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4. Today Anselm is three times as old as his brother Bartholomew, and Bartholomew is 4 years younger than his sister Catherine. If Anselm, Bartholomew, and Catherine are all alive 5 years from today, which of the following

must be true on that day ?

I. Anselm is three times as old as Bartholomew.

II. Catherine is 4 years older than Bartholomew.

III. Anselm is older than Catherine.

A. I only

B. II only

C. III only

D. I and II

Answer: B



5. As part of a laboratory experiment, the number of times a light id flashed on a certain culture of bacteria is reduced 20 percent each day. If the light flashed 704 times on the fourth day of the experiment, then the number of times it flashed on the first day is closest to

A. 880

B. 1, 217

C. 1, 267

D. 1, 375

Answer: D



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6. The average (arithmetic mean) of six numbers is 3. If the average of the least and the greatest of these numbers is 5, then the other four numbers could be any of the following EXCEPT

A. $-4, 0, 5, 7$

B. $0, 0, 0, 8$

C. $\frac{1}{2}, \frac{3}{2}, 1, 5$

D. $1, 1, 1, 1$

Answer: D



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7. On the second leg of a certain journey, a person traveled at an average speed 50 percent greater than the average speed at

which the person traveled the first leg of the journey, and for an amount of time 50 percent greater than the amount of time spent on the first leg of the journey. The person's average speed for the entire journey was what percent greater than the person's average speed on the first leg of the journey ?

A. 22.5 %

B. 25 %

C. 30 %

D. 50 %

Answer: C



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8. Ten points lie on the circumference of a circle. Which of the following is the value that results when the number of triangles that can be created by connecting these points is subtracted from the number of heptagons (seven - sided polygons) that can be created by connected these points ?

A. 210

B. 35

C. 21

D. 0

Answer: D



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9. A fair coin tossed five times. What is the probability that it lands head - up at least twice ?

A. $\frac{3}{16}$

B. $\frac{1}{4}$

C. $\frac{7}{16}$

D. $\frac{13}{16}$

Answer: D



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10. If $\log_x 6 = 3$, then $x =$

A. 0.500

B. 1.442

C. 1.732

D. 1.817

Answer: D



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11. $\lim_{x \rightarrow \frac{1}{2}} \lim \frac{4x^2 + 8x - 5}{1 - 4x^2} =$

A. -3

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

C. 0

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

Answer: A



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12. What is the sum of the infinite geometric series

$$2 + \left(-\frac{1}{2}\right) + \left(\frac{1}{8}\right) + \left(-\frac{1}{32}\right) + \dots?$$

A. $1\frac{3}{8}$

B. $1\frac{2}{5}$

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

D. $1\frac{3}{5}$

Answer: D



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