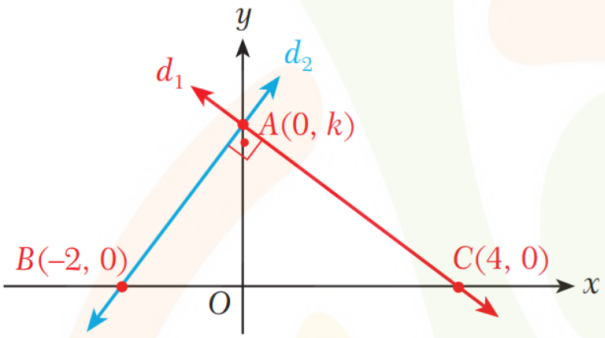
Brainiacs Math Olympiad Preliminary Round Sample Exam Paper 2

Category IV – grade 9 and 10

Q1.

In the figure $d_1 \perp d_2$. Find the value of k.



A.2

B.$2\sqrt{2}$

C.4

D.$4\sqrt{2}$

Q2.

Find the area of the region formed by the lines $x - y + 2 = 0,\ 2x + y - 2 = 0\ and\ y + 2 = 0.$

A. 8

B. 12

C. 16

D. 18

Q3.

If the world population was 7 billion people in 2015 and if the population continues to grow by 10% annually, what will the approximate population be in 2020?

A. 9.4

B. 10.2

C. 11.3

D. 12.7

Q4.

Solve the equation

$$\left(10 \bullet 25^{\frac{1}{x}}\right) + \left(10 \bullet 4^{\frac{1}{x}}\right) - \left(29 \bullet 10^{\frac{1}{x}}\right) = 0$$

A. $\{2\}$

B. $\{1,2\}$

C. $\{-1,-2\}$

D. $\{-1,1\}$

Q5.

Suppose $\log_9 x + \log_{27} x = p$. Write the value of $\log_3 x + \log_{81} x$ in terms of p.

A. $\frac{3p}{2}$

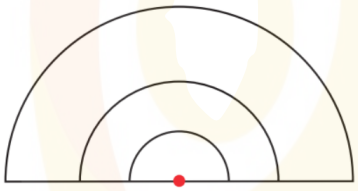
B. $\frac{5p}{6}$

C. $\frac{2p}{3}$

D. $\frac{6p}{5}$

Q6.

In the figure the largest semicircle has a radius of 4 cm. A semicircle is drawn inside this semicircle with the same center but half the radius. If this process is repeated without end, what is the total area of all the semicircles?



A. $\frac{16\pi}{3}\ cm^2$

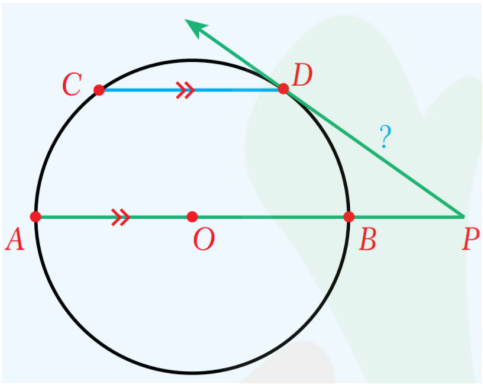
B. $\frac{32\pi}{3}\ cm^2$

C. $\frac{48\pi}{3}\ cm^2$

D. $\frac{64\pi}{3}\ cm^2$

Q7.

In the figure, $CD \parallel AP, AB = 12cm\ and\ CD = 6cm$. Find the length of PD.



A. $6\ cm$
B. $6\sqrt{3}\ cm$
C. $6\sqrt{2}\ cm$
D. $12\ cm$

Q8.

Jack has 5 different math books, 3 different biology books and 4 different physics books. In how many different ways can Jack arrange his books in three different file holders, if each holder is for a different subject?

A. 144 arrangements
B. 104144 arrangements
C. 103 680 arrangements
D. 180 arrangements

Q9.

How many five-letters words can we form using all the letters in the word MELAK if A and K must be next to each other?

A. 25
B. 48
C. 24
D. 120

Q10.

In a group 9 children, 4 children will be given apples, another 3 children will be given oranges and the rest will be given peaches. In how many ways can these fruits be given?

A. 24
B. 108
C. 512
D. 1260

Q11.

A football team is made up of 10 players plus a goalkeeper. Five more players are reserves. The team coach wants to substitute 2 team players (not including the goalkeeper) with 2 reserves and then choose

3 forward players from the resulting team. If each player can play any position, in how many ways can the coach choose the 3 forward players?

A. 60 different ways
B. 136 different ways
C. 2500 different ways
D. 54000 different ways

Q12.

For which values of k does the equation $x^2 - (4k + 2)x + 7k + 2 = 0$ form a perfect square?

A. 1
B 1 and 1.5
C. 1 and -0.25
D. 1 and -1.5

Q13.

A year ago, a father was eight times as old as his son. Now his age is the square of his son's age. How old is his father now?
A. 36
B. 49
C. 64
D. 81

Q14.

The roots of the equation $x^2 - 5x + p = 0$ are also the roots of the equation $x^3 + qx + 30 = 0$. Find $p + q$.
A. 25
B. -19
C. -13
D. -25

Q15.

Solve $\left(\frac{x}{x+2}\right)^2 - \frac{5x}{x+2} + 6 = 0.$

A. 2 and 3
B. 3 and 4
C. $-3\ and\ -2$
D. $-4\ and\ -3$

Q16.

The arithmetic mean of a set of twelve numbers is 15. The mean of a different set of four numbers is 11. Find the mean if the two sets of numbers are combined.

A.11

B.12
C.13
D.14

Q17.

If $g(x)+2\bullet g\left(\frac{1}{x}\right)=x$, find $g(x)$ in terms of x.

A. $\frac{2-x^2}{3x}$

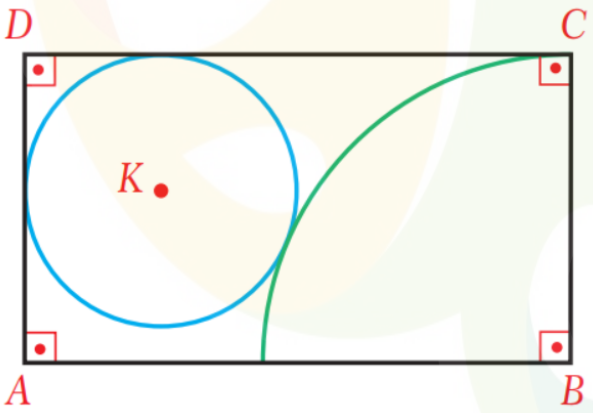
B. $\frac{2}{3x}$

C. $\frac{2x}{3}$

D. $\frac{2-x}{3}$

Q18.

In the figure, ABCD is a rectangle, $AB=8\ cm$ and the circle and quarter circle are tangent. If the radius of the smaller circle is $2\ cm$, what is the radius of $\odot B$?



A. 3.5
B. 4
C. 4.5
D. 6

Q19.

Solve $(x-1)(x-2)(x-3)(x-4)=15$

A. $\frac{3\pm\sqrt{7}}{2}$

B. $\frac{5 \pm \sqrt{21}}{2}$

C. $\frac{7 \pm 2\sqrt{3}}{2}$

D. $\frac{3 \pm 7\sqrt{3}}{2}$

Q20.

Solve $\sqrt{3+8\sqrt{7+4\sqrt{3}}} - \sqrt{3} = ?$

A. $2\sqrt{3}$

B. 4

C. $4\sqrt{3}$

D. 2