

QUESTION 5

A certain number of students are to be accommodated in a hostel. If 2 students share each room, then 2 students will be left without any room. If 3 students share each room, then 2 rooms will be left unoccupied. How many rooms are there in the hostel?

QUESTION 6

Four persons whose names begin with different letters are placed in a row, side by side. What is the probability that they will be placed in alphabetical order from left to right?

- A. $1/120$ B. $1/24$ C. $1/12$ D. $1/6$ E. $1/4$

QUESTION 7

A number is the multiplicative inverse of another number if the product of the two numbers is 1. Which of the following sets of numbers is identical to the set of its multiplicative inverses ?

- A. $\{1, 2, 3\}$ D. $\{2, 3, 5, \frac{1}{2}, \frac{1}{3}\}$
- B. $\{1, \frac{1}{2}\}$
- C. $\{1, 2, \frac{1}{2}\}$ E. $\{2, 3, \frac{2}{3}\}$

QUESTION 8

In the figure above, the circle with centre C touches, internally, at point T, the circle with centre O. P is a point on the larger circle such that TP is not a diameter. If TP intersects the smaller circle at A, then what additional information is needed to prove that AC and PO are parallel ?

- A. None D. $CO = 2TC$
- B. $PO = 2AC$
- C. $TA = AP$ E. $TA = AC$

QUESTION 9

Which of the following is (are) true for all values of θ for which the functions are defined?

- I. $\sin(-\theta) = -\sin \theta$
- II. $\cos(-\theta) = -\cos \theta$
- III. $\tan(-\theta) = -\tan \theta$

- A. I only
- B. II only
- C. III only
- D. I and III only
- E. II and III only

QUESTION 10

A radio-active element decomposes according to the formula

$$y = y_0 e^{-kt}$$

where y is the mass of the element remaining after t days and y_0 is the

value of y for $t = 0$. Find the value of the constant k for an element whose half-life (i.e., time to decompose half of the material) is 4 days.

- A. $-4 \log_e 2$
- B. $\log_e \frac{1}{2}$
- C. $\log_2 e$
- D. $(\log_e 2)^{-1}$
- E. $2e^4$

QUESTION 11

A stationer wants to make a card 8cm. long and of such a width that, when it is cut into halves, the original width becomes the length and the shape of each half is similar to the original card. What width, in cm., should he make the original card?

- A. 4
- B. $4\sqrt{2}$
- C. $5\sqrt{2}$
- D. $5\sqrt{3}$
- E. 6

QUESTION 12

The arithmetic mean or average of one group of 100 pupils is exactly 80 and the mean of another group of 50 pupils is exactly 65. What is the mean of the combined group of 150 pupils?

- A. 79
- B. 72.5
- C. 75
- D. 77.5
- E. It is impossible to determine exactly.

QUESTION 13

In the diagram on the right, the numbers represent regions.

The circle X represents the set of regular polygons

The circle Y represents the set of quadrilaterals

The circle Z represents the set of equilateral triangles

[Picture]

Which are the parts of the schema that are empty [have no elements] ?

- A. 1, 3 and 5
- B. 2, 3 and 4
- C. 1, 6 and 7
- D. 1, 3 and 7
- E. 3, 6 and 7

QUESTION 14

In the figure on the right, FGHI is a parallelogram. Which of the following statements is a condition which implies that FGHI is a rectangle ?

[Picture]

[Note: the character $\hat{\angle}$ denotes the character for an angle]

- A. $JF = GH$
- B. $\hat{\angle} HJG = \hat{\angle} JGF$
- C. $\hat{\angle} HJF = \hat{\angle} JHG$
- D. $\hat{\angle} HJF$ and $\hat{\angle} JGH$ are supplementary.
- E. HF and JG are perpendicular bisectors of each other.

QUESTION 15

What is the sum of the infinite geometric series

$$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots ?$$

- A. $\frac{5}{8}$
- B. $\frac{2}{3}$
- C. $\frac{3}{5}$
- D. $\frac{3}{2}$
- E. $\frac{1}{2}$

QUESTION 16

A goods train travelling at 50 miles per hour leaves a station 3 hours before an express train which travels in the same direction at 90 miles an hour. How many hours will it take the express train to overtake the goods train?

- A. $\frac{5}{9}$
- B. $\frac{9}{5}$
- C. $\frac{12}{5}$
- D. $\frac{15}{4}$
- E. $\frac{18}{4}$

QUESTION 17

In the right-angled triangle PQR (on the right) the measure of PQ is 4 and \hat{Q} can be any angle between 30° and 45° . What are all possible values for x , the length of RQ?

[Picture]

A. $0 < x < 4$

B. $\frac{1}{2} < x < \frac{\sqrt{2}}{2}$

C. $\frac{1}{2} < x < \frac{\sqrt{3}}{2}$

D. $2 < x < 2\sqrt{2}$

E. $2 < x < 2\sqrt{3}$