

Assignment 23

AI24BTECH11008- Sarvajith

- "You are delaying the completion of the task. Send contributions at the earliest."
 (A) you are
 (B) your
 (C) you're
 (D) yore
- References : : : Guidelines : Implement
 (By word meaning)
 (A) Sight
 (B) Site
 (C) Cite
 (D) Plagiarise
- In the given figure, PQRS is a parallelogram with PS = 7 cm, PT = 4 cm and PV = 5 cm. What is the length of RS in cm? (The diagram is representative.)

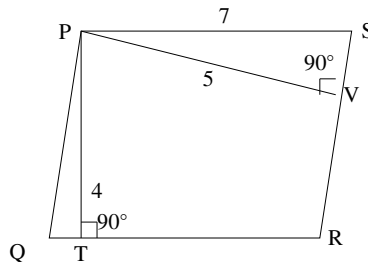


Fig. 0.1

- $\frac{20}{7}$
 - $\frac{28}{5}$
 - $\frac{9}{5}$
 - $\frac{35}{4}$
- In 2022, June Huh was awarded the Fields medal, which is the highest prize in Mathematics.
 When he was younger, he was also a poet. He did not win any medals in the International Mathematics Olympiads. He dropped out of college.
 Based only on the above information, which one of the following statements can be logically inferred with certainty?
 (A) Every Fields medalist has won a medal in an International Mathematics Olympiad.
 (B) Everyone who has dropped out of college has won the Fields medal.

- (C) All Fields medalists are part-time poets.
 (D) Some Fields medalists have dropped out of college.
5. A line of symmetry is defined as a line that divides a figure into two parts in a way such that each part is a mirror image of the other part about that line.

The given figure consists of 16 unit squares arranged as shown. In addition to the three black squares, what is the minimum number of squares that must be coloured black, such that both PQ and MN form lines of symmetry? (The figure is representative)

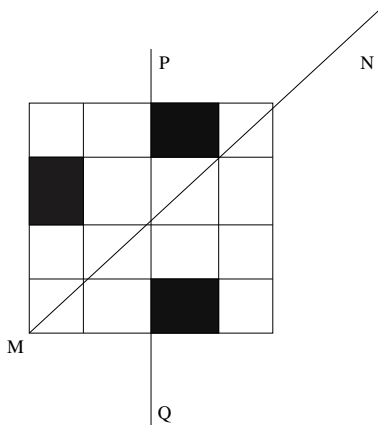


Fig. 0.2

- (A) 3
 (B) 4
 (C) 5
 (D) 6
6. Human beings are one among many creatures that inhabit an imagined world. In this imagined world, some creatures are cruel. If in this imagined world, it is given that the statement "Some human beings are not cruel creatures" is FALSE, then which of the following set of statement(s) can be logically inferred with certainty?
- (i) All human beings are cruel creatures.
 (ii) Some human beings are cruel creatures.
 (iii) Some creatures that are cruel are human beings.
 (iv) No human beings are cruel creatures.
- (A) only (i)
 (B) only (iii) and (iv)
 (C) only (i) and (ii)
 (D) (i), (ii) and (iii)
7. To construct a wall, sand and cement are mixed in the ratio of 3:1. The cost of sand and that of cement are in the ratio of 1:2.

If the total cost of sand and cement to construct the wall is 1000 rupees, then what is the cost (in rupees) of cement used?

- (A) 400
 - (B) 600
 - (C) 800
 - (D) 200
8. The World Bank has declared that it does not plan to offer new financing to Sri Lanka, which is battling its worst economic crisis in decades, until the country has an adequate macroeconomic policy framework in place. In a statement, the World Bank said Sri Lanka needed to adopt structural reforms that focus on economic stabilisation and tackle the root causes of its crisis. The latter has starved it of foreign exchange and led to shortages of food, fuel, and medicines. The bank is repurposing resources under existing loans to help alleviate shortages of essential items such as medicine, cooking gas, fertiliser, meals for children, and cash for vulnerable households. Based only on the above passage, which one of the following statements can be inferred with certainty?
- (A) According to the World Bank, the root cause of Sri Lanka's economic crisis is that it does not have enough foreign exchange.
 - (B) The World Bank has stated that it will advise the Sri Lankan government about how to tackle the root causes of its economic crisis.
 - (C) According to the World Bank, Sri Lanka does not yet have an adequate macroeconomic policy framework.
 - (D) The World Bank has stated that it will provide Sri Lanka with additional funds for essentials such as food, fuel, and medicines.
9. The coefficient of x^4 in the polynomial $(x - 1)^3 (x - 2)^3$ is equal to
- (A) 33
 - (B) -3
 - (C) 30
 - (D) 21
10. Which one of the following shapes can be used to tile (completely cover by repeating) a flat plane, extending to infinity in all directions, without leaving any empty spaces in between them? The copies of the shape used to tile are identical and are not allowed to overlap.
- (A) circle
 - (B) regular octagon
 - (C) regular pentagon
 - (D) rhombus
11. The direction in which a scalar field $\phi(x, y, z)$ has the largest rate of change at any point with the position vector $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ is the same as that of the vector
- (A) $\nabla\phi$
 - (B) $\nabla \times (\phi\vec{r})$
 - (C) $\phi\vec{r}$
 - (D) $(\nabla\phi \cdot d\vec{r})\vec{r}$

12. If a monoatonic and continuous function $y = f(x)$ has only one root in the interval $X_1 < X < X_2$, then
- (A) $f(X_1)f(X_2) > 0$
 - (B) $f(X_1)f(X_2) = 0$
 - (C) $f(X_1)f(X_2) < 0$
 - (D) $f(X_1) - f(X_2) > 0$
13. Consider one-dimensional wave equation $\frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 0$ for $-\infty < X < \infty, t \geq 0$. For an initial condition $u(x, 0) = e^{-x^2}$, the solution at $t = 1$ is
- (A) $u(x, 1) = e^{-(x-1)^2}$
 - (B) $u(x, 1) = e^{-1}$
 - (C) $u(x, 1) = e^{-x^2}$
 - (D) $u(x, 0) = e^{-(x+1)^2}$,