# XE : Engineering Sciences

AI24BTECH11022 - Pabbuleti Venkata Charan Teja

1) The movie was funny and I _____. (2022)

a) could help laughing
b) couldn't help laughed
c) couldn't help laughing
d) could helped laughed

2) $x : y : z = \frac{1}{2} : \frac{1}{3} : \frac{1}{4}$
What is the value of $\frac{x+z-y}{y}$ (2022)

a) 0.75
b) 1.25
c) 2.25
d) 3.25

3) Both the numerator and the denominator of $\frac{3}{4}$ are increased by a positive integer, $x$, and those of $\frac{15}{17}$ are decreased by the same integer. This operation results in the same value for both the fractions.

What is the value of $x$? (2022)

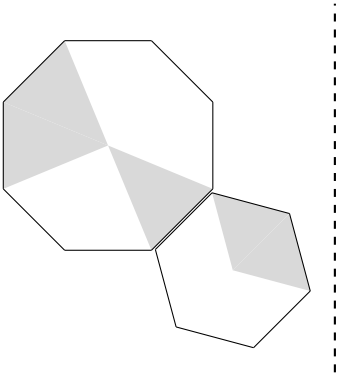
a) 1
b) 2
c) 3
d) 4

4) A survey of 450 students about their subjects of interest resulted in the following outcome.

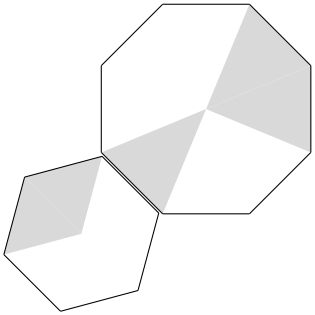
150 students are interested in Mathematics.
200 students are interested in Physics.
175 students are interested in Chemistry.
50 students are interested in Mathematics and Physics.
60 students are interested in Physics and Chemistry.
40 students are interested in Mathematics and Chemistry.
30 students are interested in Mathematics, Physics and Chemistry.
Remaining students are interested in Humanities.

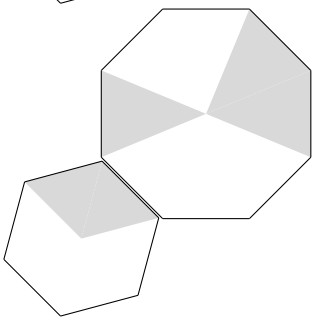
Based on the above information, the number of students interested in Humanities is (2022)

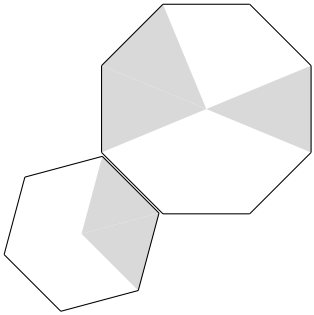
a) 10
b) 30
c) 40
d) 45

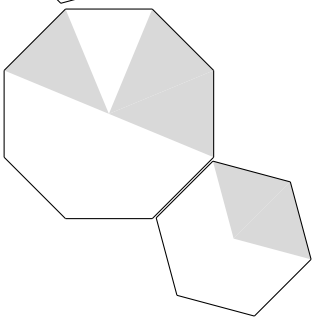
5) 

For the picture shown above, which one of the following is the correct picture representing reflection with respect to the mirror shown as the dotted line? (2022)

a) 

b) 

c) 

d) 

6) In the last few years, several new shopping malls were opened in the city. The total number of visitors in the malls is impressive. However, the total revenue generated through sales in the shops in these malls is generally low.

Which one of the following is the CORRECT logical inference based on the information in the above passage? (2022)

a) Fewer people are visiting the malls but spending more
b) More people are visiting the malls but not spending enough
c) More people are visiting the malls and spending more
d) Fewer people are visiting the malls and not spending enough

7) In a partnership business the monthly investment by three friends for the first six months is in the ratio 3 : 4 : 5. After six months, they had to increase their monthly investments by 10%, 15% and 20%, respectively, of their initial monthly investment. The new investment ratio was kept constant for the next six months.

What is the ratio of their shares in the total profit (in the same order) at the end of the year such that the share is proportional to their individual total investment over the year? (2022)

a) 22 : 23 : 24
b) 22 : 33 : 50
c) 33 : 46 : 60
d) 63 : 86 : 110

8) Consider the following equations of straight lines:

$$\text{Line } L1 : 2x - 3y = 5$$

$$\text{Line } L2 : 3x + 2y = 8$$

$$\text{Line } L3 : 4x - 6y = 5$$

$$\text{Line } L4 : 6x - 9y = 6$$

Which one among the following is the correct statement? (2022)

a) $L1$ is parallel to $L2$ and $L1$ is perpendicular to $L3$
b) $L2$ is parallel to $L4$ and $L2$ is perpendicular to $L1$
c) $L3$ is perpendicular to $L4$ and $L3$ is parallel to $L2$
d) $L4$ is perpendicular to $L2$ and $L4$ is parallel to $L3$

9) Given below are two statements and four conclusions drawn based on the statements.

Statement 1 : Some soaps are clean.
Statement 2 : All clean objects are wet.

Conclusion I : Some clean objects are soaps.
Conclusion II : No clean object is a soap.
Conclusion III : Some wet objects are soaps.
Conclusion IV : All wet objects are soaps.

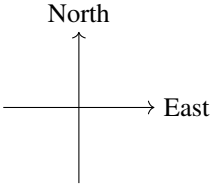
Which one of the following options can be logically inferred? (2022)

a) Only conclusion I is correct
b) Either conclusion I or conclusion II is correct
c) Either conclusion III or conclusion IV is correct
d) Only conclusion I and conclusion III are correct

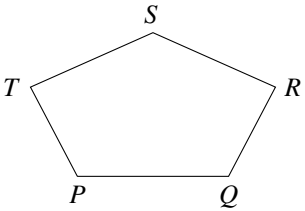
10) An ant walks in a straight line on a plane leaving behind a trace of its movement. The initial position of the ant is at point $P$ facing east.

The ant first turns 72° anticlockwise at $P$, and then does the following two steps in sequence exactly FIVE times before halting.

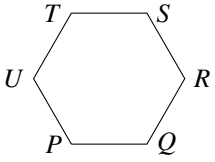
1. moves forward for $10cm$.
2. turns $144°$ clockwise.



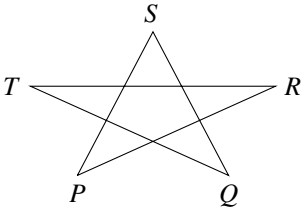

The pattern made by the trace left behind by the ant is (2022)

a) 

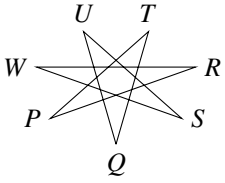
$PQ = QR = RS = ST = TP = 10cm$

b) 

$PQ = QR = RS = ST = TU = UP = 10cm$

c) 

$SQ = QT = TR = RP = PS = 10cm$

d) 

$SW = WR = RP = PT = TQ = QU = US = 10cm$

11) The value of $\lim_{x\to 0} \frac{1}{x} \int_2^{2+x} \left(t + \sqrt{t^2+5}\right) dt$ is (2022)

a) 0
b) 4
c) 5
d) 6

12) Let $\mathbb{C} = \left\{z = x + iy : x \text{ and } y \text{ are real numbers, } i = \sqrt{-1}\right\}$ be the set of complex numbers. Let the function $f(z) = u(x, y) + iv(x, y)$ for $z = x + iy \in \mathbb{C}$ be analytic in

$\mathbb{C}$, where

$$u(x,y) = xy^3 - yx^3 \text{ and } v(x,y) = \frac{x^4}{4} + \frac{y^4}{4} - \frac{3}{2}x^2y^2$$

If $f'(z)$ denotes the derivative of $f(z)$, then (2022)

a) $|f'(-1+i)|^2 = 1$
b) $|f'(-1+i)|^2 = 7$
c) $|f'(-1+i)|^2 = 8$
d) $|f'(-1+i)|^2 = 10$

13) If the partial differential equation

$$(x+2)\frac{\partial^2 u}{\partial x^2} + 2(x+y)\frac{\partial^2 u}{\partial x \partial y} + 2(y-1)\frac{\partial^2 u}{\partial y^2} - 3y^2\frac{\partial u}{\partial y} = 0$$

is parabolic on the circle $(x-a)^2 + (y-b)^2 = r^2$, then the values of $a$, $b$ and $r$ are given by (2022)

a) $a = 1, b = 2, r = 1$
b) $a = -1, b = 2, r = 1$
c) $a = 1, b = -2, r = 1$
d) $a = -1, b = -2, r = 1$