FMS Actual Paper – 2007 (Memory Based Questions)

1. A straight line is perpendicular to the straight line 2x + 3y = 5 and it passes through the point (1, 1). Which of the following gives its equation?
   a. 2x – 3y = 1 b. 2x + 3y = 2 c. 3x + 2y = 1 d. 3x – 2y = 1

2. A straight line passes through the point (3, 2) and is perpendicular to the straight line x+ y = 3 and is perpendicular to the straight line x + y = 3. Find its equation.
   a. x + y + 1 = 0 b. x – y – 1 = 0 c. x – y + 1 = 0 d. x + y – 1 = 0

3. The vertices of a triangle lie on points (0, 4), (3, 5) and (–1, –1) in the X – Y plane. Which of the following is correct about this triangle?
   a. It is an isosceles right triangle. b. It is a right triangle.
   c. It is an equilateral triangle d. It is an obtuse triangle.

4. Find the length of the altitude of an equilateral triangle whose sides have a length of $3\sqrt{3}$ units.
   a. 8.5 units b. 6.5 units c. 4.5 units d. 2.5 units

5. If a = log2, b = log 3 and c = log 7 then find the value of $\log_6 7$ in terms of a, b and c.
   a. $\frac{b}{a+c}$ b. $\frac{c}{a+b}$ c. $\frac{a}{b+c}$ d. None of these

6. If the real number x lies between 2 and 3, then which of the following expressions is valid?
   a. (x – 2) (x – 3) = 0 b. (x – 2) (x – 3) < 0
   c. $|x-2| > |x-3|$ d. None of these

7. Solve for all values of x for which $6 + x - x^2 \geq 0$
   a. $-2 \leq x \leq 3$ b. $2 \leq x \leq 3$ c. $-3 \leq x \leq 2$ d. $-3 \leq x \leq -2$

8. Evaluate the expression $\frac{1^3 + 2^3 + 3^3 ... + 12^3}{1^2 + 2^2 + 3^2 ... + 12^2}$
   a. $\frac{234}{25}$ b. $\frac{224}{35}$ c. $\frac{324}{35}$ d. $\frac{335}{24}$

9. Evaluate $\left(\frac{1+i}{1-i}\right)^{100}$
   a. 0 b. 1 c. –1 d.100

10. Find the value of the expression $\left(\frac{1+i\sqrt{3}}{1-i\sqrt{3}}\right)^6+\left(\frac{1-i\sqrt{3}}{1+i\sqrt{3}}\right)^6$

a.0 b.2 c.128 d. None of these

11. Evaluate $\log_3 4\times\log_4 5\times\log_5 6\times\log_6 7\times\log_7 8\times\log_8 9$

a.0 b.1 c.–1 d. None of these

12. If the sum of the roots of the equation $x^2 + ax + 1 = 0$ is equal to the sum of the squares of their reciprocals, then which of the following is a possible value of a?

a. –1 b. 2 c.1 d. None of these

13. If the straight lines $ax – by = k$ and $cx – dy = k_1$ are perpendicular to each other, then what is the relation between a, b, c & d?

a. ab + cd= 0 b. ab – cd = 0 c. ac – bd = 0 d. ac + bd = 0

14. The sum of the infinite series $1 - x + \frac{x^2}{2!}-\frac{x^3}{3!}+...\infty$ is denoted by

a. sin x + cos x b. 1 + log (1 – x) c. 1 – log (1 + x) d. None of these

15. The value of $\sum_{n=1}^{\infty}\frac{1}{2n(2n+1)}$ is

a. $1 – \log_e 2$ b. $1 + \log_e 2$ c. $\log_e 2$ d. $\log_2 e$

16. If $2 +3x – 2x^2 < 0$, then x is given by

a. $-\frac{1}{2} < x < 2$ b. $x < -\frac{1}{2}$ c. $x < 2$ d. $x < -\frac{1}{2}$ or $x > 2$

17. If log(x – 7) + log (x + 1) = 1 then which of the following is correct?

a. $x^2 – 7x – 6 – e = 0$ b. $x^2 – 7x – 6 + e = 0$
c. $x^2 – 6x – 7 – e = 0$ d. $x^2 – 6x – 7 + e = 0$

18. If the equations $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$, have one root in common, then find the value of (a + b).

a. 0 b. 1 c. –1 d. 2

19. Given the following three equations, find the value of $x^3 + y^3 + z^3 – 3xyz$ {Here, ω is a cube root of unity.}

$a\omega^2+b+c\omega=x$ ...(i)

$a+b\omega+c\omega^2=y$ ...(ii)

$a\omega+b\omega^2+c=z$ ...(iii)

a. 0 b. 1 c. 2 d. –1

20. If $\frac{\log x}{a^2+b^2+ab} = \frac{\log y}{b^2+c^2+bc} = \frac{\log z}{c^2+a^2+ac}$ then, the value of $x^{(a-b)}.y^{(b-c)}.z^{(c-a)}$ is

a. 0 b. 1 c. abc d. $(xyz)^{abc}$

21. Solve the equation for x, $2.x^{\frac{1}{3}} + 2.x^{\frac{-1}{3}} = 5.$

a. $2, \frac{1}{2}$ b. $4, \frac{1}{4}$ c. $6, \frac{1}{6}$ d. $8, \frac{1}{8}$

22. $\sqrt[3]{\sqrt{.000064}}$ simplifies to

a. 0.2 b. 0.02 c. 0.4 d. 0.04

23. Simplify the expression $(1+i)^6 + (1+i)^4$.

a. $-4-8i$ b. $4-8i$ c. $8-4i$ d. $8+4i$

24. In a post graduate college, 5% of the students are married and 25% of the married students ae females. Further, 60% of the students are neither married nor females. Which of the following statements are valid?
I. There is 1 married female student for every 28 unmarried female students.
II. There is 1 married male student for every 4 unmarried male students.

a. I b. II c. Both I and II d. None

25. An amount of Rs12500 was deposited for a period of 3 years at a compound interest rate of 20%. What will be the amount of money, in rupees, at the end of 3 years?

a. 21600 b. 22600 c. 23600 d. None of these

26. The market price of a machine depreciates at an annual compound rate of 10%. If the current market price of the machine is Rs. 8748 then what was its market price 3 years ago?

a. Rs. 12500 b. Rs. 12000 c. Rs. 20000 d.Rs. 20500

27. A cylinder has a diameter of 8cm and a cuboid has a square base of side length 8cm. If both of these solids have a height of 14 cm then what is the difference in their volumes?

a.196 cc b.1960 cc c.1920 cc d.195 cc

28. A metallic cuboid has dimensions of 9cm × 10cm × 11cm. How many spherical balls of radius 0.3 cm, can be drawn from this cuboid?

a. 2750 b. 5750 c. 8750 d. 3750

29. A cylinder of diameter 10 cm and a height of 20 cm is filled with water. If a sphere of diameter 10 cm is completely submerged inside the cylinder, what will be the increase in the level of water, in the cylinder?

a. 3.33 cm b. 6.67 cm c. 8.33 cm d. cannot be determined

30. Four brothers and three sisters sit in a single row, facing the photographer's camera. If the three sisters always sit together, how many different photographs, having all of them, can be eliked?
a.840 b.126 c.120 d.720

31. From amongst the available 15 cricket players, of whom 5 are bowlers, a team of 11 is to be selected. What is the probability that the selected team will have at least 3 bowlers?

a. $\frac{7}{13}$ b. $\frac{5}{13}$ c. $\frac{12}{13}$ d. $\frac{9}{13}$

32. The imaginary part of the complex number $\frac{(a+ib)}{(c-id)}$ is given by

a. $\frac{ac+bd}{c^2-d^2}$ b. $\frac{ac-bd}{c^2+d^2}$ c. $\frac{ad-bc}{c^2-d^2}$ d. $\frac{ad+bc}{c^2+d^2}$

33. The area of a triangle is 21 sq. units. If two of its vertices lie on points (5, 3) and (–4, –3), then find the locus of the third vertex.
a. 2x – 3y = 15 b. 2x + 3y = 15 c. 3x + 2y = 15 d. 3x – 2y = 15

34. The profit by selling an item was 25%. If the item was marked 40% above the selling price then what is the ratio of the marked price to the cost price of the item?

a. $\frac{5}{4}$ b. $\frac{7}{4}$ c. $\frac{3}{4}$ d. $\frac{1}{4}$

35. The per liter price of vehicular fuel has increased by 25%. If the transportation cost is still the same, then what is the ratio of the reduced fuel consumption to the previous fuel consumption?
a. 1:5 b. 1:4 c. 1:3 d. 1:6

36. The arithmetic mean of the k^{th} and the l^{th} terms of an A.P. is equal to the arithmetic mean of the m^{th} and the n^{th} terms of the same A.P. Find the value of (m + n).
a. l – k b. k – l c. l + k d. None of these

37. A very small ball lies at the point (3, 2) in the X – Y plane. The ball is now shifted by 5 units towards the negative Y-axis. If Y-axis were a mirror, then at what point will the image of this ball, lie?
a. (–3, –3) b. (–3, –2) c. (–2, –2) d. (–2, –3)

38. In the X – Y plane, three lines are concurrent. Their equations are
3x + 4y = 6
5x + 4y = 4
zx + 4y = 5
Find the value of the constant z.
a. 23 b. 25 c. 27 d. 29

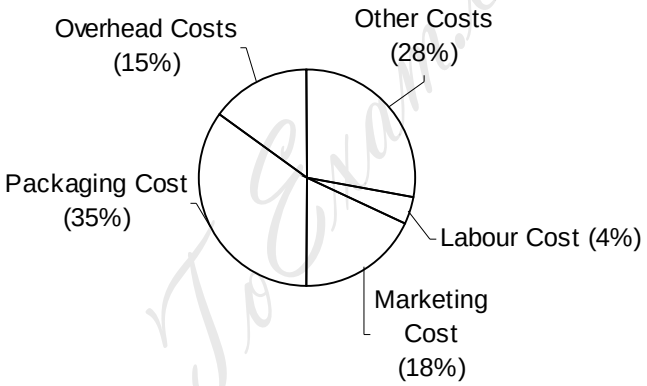
39. If the following three lines pass through the same point in the X – Y plane, then find the value of (a + b).
3x – 2y = 1
5x + 4y = 9
ax + by = 3
a. 0 b.1 c.2 d.3

40. If ax +by + c = 0 and dx + ey + f = 0 represent the same straight line then which of following is necessarily satisfied?

a. a = d, b = e and c = f b. $\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$

c. ad + be + cf = 0 d. None of these

Directions for questions 41 to 45: Answer the questions on the basis of the information given below.
The following pie chart gives the percentage wise break up of the cost price of a machine. Study the pie chart and answer the questions that follow.



41. If the "Labour Cost" of a single unit of machine is Rs.2500 then what is the per unit "Marketing Cost" of the machine?
a. Rs. 1125 b. Rs. 112500 c. Rs. 11250 d. none of these.

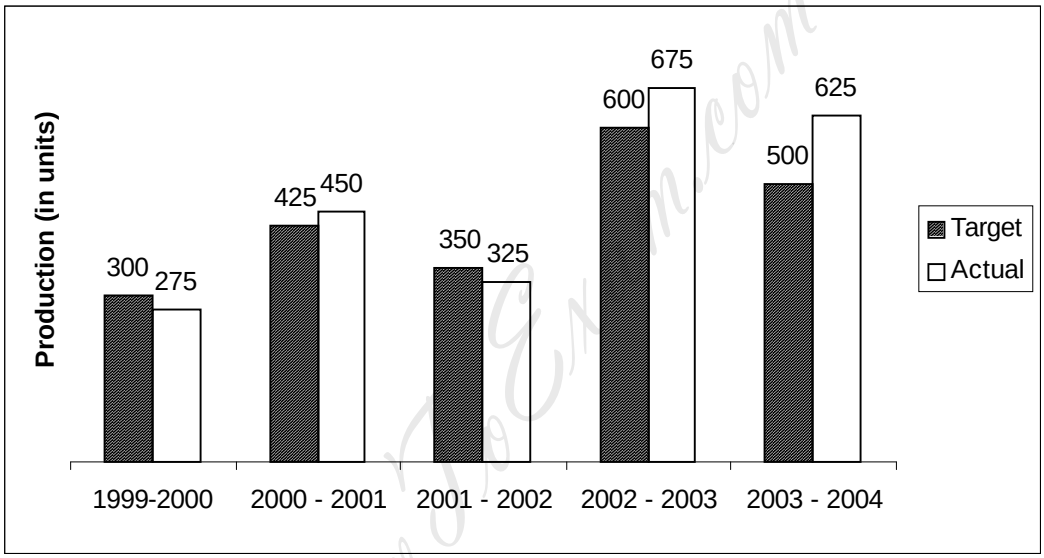
42. What is the angle subtended by the "Overheads Cost" at the centre of the circle, in the above pie chart?
a. 15° b. 75° c. 54° d. 45°

43. How much more is the per unit "Packaging Cost" with respect to the per unit "Marketing Cost"?
a. 94.44% b. 84.44% c. 104.44% d. none of these

44. If the per unit "Packaging Cost" cost of the machine is reduced by 10% then what will be the change in the per unit cost price of the machine?
a. –2.5% b. –10% c. –1.5% d. –3.5%

45. Which of the following is true?
   a. The sum of per unit "Other Costs" and the "Labour Cost" add up to the per unit "Packaging Cost"
   b. The sum of per unit "Overhead Cost" and the "Marketing Cost" add up to the per unit "Packaging Cost"
   c. The sum of per unit "Other Cost" and the "Marketing Cost" add up to the per unit "Packaging Cost"
   d. none of these.

Directions for questions 46 to 50: Answer the questions on the basis of the information given below.
The following bar graph shows the annual comparisons of the "Targeted Production" with the "Actual Production" for a manufacturing plant. Study the bar graph and answer the questions that follow.



46. What is the ratio of the "Targeted Production" to the "Actual Production" in the year 2000 - 2001?

a. $\frac{11}{12}$ b. $\frac{17}{18}$ c. $\frac{15}{16}$ d. $\frac{19}{20}$

47. What percent of the "Targeted production" was met by the "Actual Production", in the year 2002 - 2003?

a. 112.5% b. 12.5% c. 125% d. 120.5%

48. Which of the following two consecutive years have followed the same trend of "Actual Production" with respect to the "Targeted Production"?

a. 1999–2000 and 2001–2002 b. 2000–2001 and 2002–2003
c. 2001–2002 and 2000–2001 d. 2002–2003 and 2003–2004

49. In which of the following years the "Actual Production" surpassed the "Targeted Production" by the maximum percentage?
a. 1999-2000 b. 2000-2001 c. 2002-2003 d. 2003-2004

50. Which of the following statements is correct about the cumulative production of the plant from the year 1999 to the year 2004?
a. The cumulative "Actual Production" has missed the cumulative "Targeted Production" by less than 10%.
b. The cumulative "Actual Production" has surpassed the cumulative "Targeted Production" by more than 10%
c. The cumulative "Actual Production" has missed the cumulative "Targeted Production" by more than 10%.
d. The cumulative "Actual Production" has surpassed the cumulative "Targeted Production" by less than 10 %

Answers and Explanations

1. d Slope of the, line $= \dfrac{-1}{\frac{-2}{3}} = \dfrac{3}{2}$

Equation is $\dfrac{y-1}{x-1} = \dfrac{3}{2}$ or $3x - 2y = 1$

Hence (d) is the correct answer.

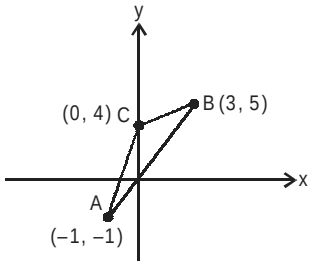
2. b Slope of the line $= \dfrac{-1}{(-1)} = 1$

equation is $\dfrac{y-2}{x-3} = 1$

or $x - y = 1$

Hence (b).

3. d

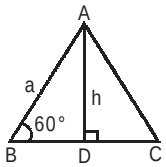


Slopes of lines AB, BC & AC are $\dfrac{3}{2}, \dfrac{1}{3}$ and 5.

The length of the sides AB, BC and AC are $\sqrt{52}$ units, $\sqrt{10}$ units and $\sqrt{26}$ units.

As. $AC^2 + BC^2 < AB^2$; It is an obtuse triangle. Hence (d).

4. c



$a = 3\sqrt{3}$ units

$AB^2 = BD^2 + AD^2$

or $h = \sqrt{a^2 - \left(\dfrac{a}{2}\right)^2} = \dfrac{\sqrt{3}}{2}a = \dfrac{\sqrt{3}}{2} \times \left(3\sqrt{3}\right)$

or h = 4.5 units. hence (c) is correct.

5. b $\log_6^7 = \dfrac{\log 7}{\log 6} = \dfrac{\log 7}{\log 2 + \log 3} = \dfrac{c}{a+b}$

Hence, (b) is correct.

6. c If x lies between 2 and 3 then it is greater than 2 and less than 3.

$\Rightarrow (x-2) > 0$ and $(x-3) < 0$

$\Rightarrow (x-2)(x-3) < 0$. Hence (b) is always correct.

(a) is incorrect and (c) is correct for some values of x, only.

7. a $6 + x - x^2 \geq 0$

$\Rightarrow x^2 - x - 6 \leq 0$

or $(x+2)(x-3) \leq 0$

$\Rightarrow -2 \leq x \leq 3$

Hence (a) is correct.

8. a $\dfrac{1^3 + 2^3 + 3^3 + \ldots\ldots 12^3}{1^2 + 2^2 + 3^2 + \ldots\ldots + 12^2}$

$= \dfrac{\left\{\dfrac{12(12+1)}{2}\right\}^2}{\dfrac{12(12+1)(12\times 2+1)}{6}} = \dfrac{234}{25}$

Hence (a) is correct.

9. b $\dfrac{1+i^\circ}{1-i^\circ} = \dfrac{(1+i^\circ)^2}{(1)^2 - (i^\circ)^2} = \dfrac{1+i^{\circ 2} + 2i^\circ}{1+1} = i^\circ$

$\left(\dfrac{1+i^\circ}{1-i^\circ}\right)^{100} = \left(i^{\circ 2}\right)^{50} = 1$

Hence (b) is correct.

10. b $= \left(\dfrac{-1+i\sqrt{3}}{2}\right)^6 + \left(\dfrac{-1-i\sqrt{3}}{2}\right)^6$

$= \left(\dfrac{\left(1+i\sqrt{3}\right)^2}{(1)^2 - \left(i\sqrt{3}\right)^2}\right) + \left(\dfrac{\left(1-i\sqrt{3}\right)}{(1)^2 - \left(i\sqrt{3}\right)^2}\right)$

$$= \left(\frac{-1+i\sqrt{3}}{2}\right)^6 + \left(\frac{-1-i\sqrt{3}}{2}\right)^6$$

$= (\omega)^6 + (\omega^2)^6$

{ω is a cube root of unity}

$= (\omega^3)^2 + (\omega^3)^4$

$= 1 + 1$

$= 2.$

11. $\log_3^4 \times \log_4^5 \times \log_5^6 \times \log_6^7 \times \log_7^8 \times \log_8^9$

$$= \frac{\log 4}{\log 3} \times \frac{\log 5}{\log 4} \times \frac{\log 6}{\log 5} \times \frac{\log 7}{\log 6} \times \frac{\log 8}{\log 7} \times \frac{\log 9}{\log 8}$$

$$= \frac{\log 9}{\log 3} = \log_3^9 = \log_3^{3^2} = 2.$$

12. c Let roots are α, β.

$$(\alpha+\beta) = \frac{1}{\alpha^2} + \frac{1}{\beta^2} = \frac{(\alpha+\beta)^2 - 2\alpha\beta}{(\alpha\beta)^2}$$

$$\Rightarrow -a = \frac{(-a)^2 - 2\times(1)}{(1)^2}$$

$$\Rightarrow a^2 + a - 2 = 0$$

$\Rightarrow a = -2$ or 1.

$\Rightarrow$ (c) is correct.

13. d Slope of line ax – by = k is $\frac{a}{b}$ and the slop of line cx – dy = k^1 is $\frac{-c}{d}$

as the two lines are perpendicular to each other,

$$\left(\frac{a}{b}\right)\times\left(\frac{c}{d}\right) = -1$$

$\Rightarrow ac = -bd$

or ac + bd = 0

Hence (d) is correct.

14. d The infinite series is denoted by e^{-x}.

15. a $$\frac{1}{2n(2n+1)} = \left(\frac{1}{2n}\right) - \frac{1}{2n+1}$$

$$\sum_{n=1}^{\infty} \frac{1}{2n(2n+1)} = \left(\frac{1}{2.1} + \frac{1}{2.2} + \frac{1}{2.3} + ...\infty\right)$$

$$-\left(\frac{1}{2.1+1} + \frac{1}{2.2+1} + \frac{1}{2.3+1} + ...\infty\right)$$

$$= \left(\frac{1}{2} - \frac{1}{3}\right) + \left(\frac{1}{4} - \frac{1}{5}\right) + \left(\frac{1}{6} - \frac{1}{7}\right) + ...\infty$$

$$= -\left[-\frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - .....\infty\right]$$

$$= -\left[\left(1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + ...\infty\right) - 1\right]$$

$$= -\left[\log_e^2 - 1\right]$$

$$= 1 - \log_e^2$$

$$= \log_e^{\frac{e}{2}}$$ Hence (a) is the correct answer.

16. d $2 + 3x - 2x^2 < 0$

$$\Rightarrow (2x+1)(x-2) > 0$$

$$\Rightarrow x > 2 \text{ or } x < \frac{-1}{2}$$

Option (d) is correct.

17. c $\log (x - 7) + \log (x + 1) = 1$

$$\Rightarrow \log\left[(x-7)(x+1)\right] = 1 = \log_e e$$

$$\Rightarrow (x-7)(x+1) = e$$

$$\Rightarrow x^2 - 6x - 7 - e = 0$$

Option (e) is correct.

18. c Let $x^2 + ax + b = 0$ has roots (α, β)

and $x^2 + bx + a = 0$ has roots (α, γ)

α is a root of the equation;

$(x^2 + ax + b) - (x^2 + bx + a) = 0$

or, $(a - b)x = (a - b)$

$\Rightarrow \alpha = 1$

From the first equation,

$\alpha + \beta = b \Rightarrow 1 + \beta = -a$ & $\alpha.\beta = b \Rightarrow 1.\beta = b \Rightarrow \beta = b$

Hence a + b = –1.

Option (c) is correct.

19. a $a\omega^2 + b + c\omega = x$

$a + b\omega + c\omega^2 = y$

$a\omega + b\omega^2 + c = z$

Adding the three equations,

$a(1+\omega+\omega^2) + b(1+\omega+\omega^2) + c(1+\omega+\omega^2) = x + y + z$

or $x + y + z = 0$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = 0$

Option (a) is correct.

20. b Let $\frac{\log x}{a^2+b^2+ab}=\frac{\log y}{b^2+c^2+bc}=\frac{\log z}{c^2+a^2+ac}=k_1$

and $x^{(a-b)}.y^{(b-c)}.z^{(c-a)}=k_2$

$(a-b)\log x+(b-c)\log y+(c-a)\log z=\log k_2$

$\Rightarrow k_1\{(a-b)(a^2+b^2+ab)+(b-c)(b^2+c^2+bc)$

$=(c-a)(c^2+a^2+ac)\}\log K_2$

$\Rightarrow \log K^2g=0$

$\Rightarrow K_2=1$

Hence, (b) is the answer.

21. d $2x^{\frac{1}{3}}+2x^{\frac{-1}{3}}=5$

Let $x^{\frac{1}{3}}=t$

$\Rightarrow 2t+\frac{2}{t}=5$ or $2t^2-5t+2=0$

$\Rightarrow t=x^{\frac{1}{3}}=2$ or $\frac{1}{2}$

$\Rightarrow x=8$ or $\frac{1}{8}$

Hence, (d).

22. a $\sqrt{\sqrt{0.000064}}=\left[\left(64\times10^{-6}\right)^{\frac{1}{2}}\right]^{\frac{1}{3}}$

$=\left[\left[\left(8\times10^{-3}\right)^2\right]^{\frac{1}{2}}\right]^{\frac{1}{3}}$

$=\left(8\times10^{-3}\right)^{\frac{1}{3}}=\left(2\times10^{-1}\right)^{3\times\frac{1}{3}}=2\times10^{-1}$

= 0.2

Hence (a).

23. a $(1 + i)^6 + (1 + i)^4 = (1 + i)^4 [(1 + i)^2 + 1]$
$= (1^2 + i^2 + 2i)2 [1^2 + i + 2i + 1]$
$= [4 (i)^2] [1 + 2i]$
$= (–4) (1 + 2i)$
$= (–4 – 8i)$

24. a Let N = total number of students

Number of married students $=\frac{N}{20}$

Number of unmarried students $=\frac{19}{20}N$

Number of married female students $=\frac{N}{80}$

Number of unmaried male students $=\frac{12}{20}N$

Number of unmaried female students $=\frac{7}{20}N$

$\Rightarrow \frac{\text{Number of married female student}}{\text{Number of un-married female student}}=\frac{N}{80}\times\frac{20}{7N}=\frac{1}{28}.$

& $\frac{\text{Number of married male students}}{\text{number of un-married male students}}=\frac{3N}{80}\times\frac{20}{12N}=\frac{1}{16}.$

$\Rightarrow$ Only (I) is valid .

$\Rightarrow$ Option (a) is correct

26. b Final price, A = 8748 Rs.
Time = n = 3 years
depreciation rate = r = –10%
Let the price, 3 years ago be, P

Then, $A=P\left(1+\frac{r}{100}\right)^n$

or 8748 = $P\left(1-\frac{10}{100}\right)^3$

$\Rightarrow P=12{,}000$

Hence (b) is correct.

27. c Volume of cylinder = $\pi\times r^2h$

$=\frac{22}{7}\times(8)^2\times(14)$

= 2816 cc.
Volume of cuboid = $a^2 \times h$
$= (8)^2 \times (14)$
= 896 cc.
The difference is 1920 cc.
Hence (c) is correct.

28. c Let the number of balls be N,

$=N=\frac{9\times10\times11}{\frac{4}{3}\times\frac{22}{7}\times\left(\frac{3}{10}\right)^3}=8750$

Hence (c) is correct.

29. b Let the increase in the level of water, inside the cylinder be Δh, then

$$\pi \times (r_{cylinder})^2 \times (\Delta h) = \frac{4}{3} \times \pi (r_{sphare})^3$$

$$\Rightarrow \Delta h = \frac{4}{3} \times (5) = \frac{20}{3} \text{cm} \quad \text{or} \quad \Delta h = 6.67 \text{ cm}$$

Hence, (b) is correct.

30. d Taking the three sisters as a single entity, we have to arrange 5 entities & then we have to arrange 3 three sisters, internally. Hence, total number of different photographs, that can be taken = (5!) × (3!) = 720.
Hence, (d) is correct.

31. c P(atleast 3 bowlers)
= P(3 bowlers) + P(4 bowlers) + P(5 bowlers)

$$= \frac{{}^5C_3 \times {}^{10}C_8}{{}^{15}C_{11}} + \frac{{}^5C_4 \times {}^{10}C_7}{{}^{15}C_{11}} + \frac{{}^5C_5 \times {}^{10}C_6}{{}^{15}C_{11}}$$

$$= \frac{10 \times 45}{1365} + \frac{5 \times 120}{1365} = \frac{1 \times 210}{1365} = \frac{252}{273} = \frac{12}{13}.$$

$\Rightarrow$ Option (c) is corrects.

32. d $$\frac{a+ib}{c-id} = \frac{(a+ib)(c+id)}{(c-id)(c+id)}$$

$$= \frac{ac + iad + ibc + (i)^2 bd}{c^2 + d^2}$$

$$= \frac{(ac - bd) + i(ad + bc)}{c^2 + d^2}$$

$$\text{Imaginary part} = \frac{ad + bc}{c^2 + d^2}$$

$\Rightarrow$ (d) is the correct answer.

33. a Let the co-ordinates of the third vertex be (h, k). Then,

$$\frac{1}{2}\begin{vmatrix} 5 & 3 & 1 \\ -4 & -3 & 1 \\ h & k & 1 \end{vmatrix} = 21 \Rightarrow 2h - 3k = 15$$

$\Rightarrow$ Locus of the third vortex is $2x - 3y = 15$.
option (a) is correct.

34. b Let the cost price = Rs. 100,
then, selling price = Rs. 125

$$\Rightarrow \text{Marked price} = 125\left(1 + \frac{40}{100}\right)$$

$$\Rightarrow \frac{\text{Marked Price}}{\text{Cost Price}} = \frac{175}{100} = 1.75$$

Option (b) is correct.

35. b (Fuel Consumption) × (Fuel Price) = (Transportation Cost) = constant

$$\frac{\text{Current Fuel Consumption}}{\text{Previous Fuel Consumption}} = \frac{\text{Previous Fuel Price}}{\text{Current Fuel Price}}$$

$$= \frac{100}{125}$$

$$\Rightarrow \frac{\text{reduced Fuel consumption}}{\text{Previous Fuel consumption}} = \frac{(125 - 100)}{100}$$

$$= \frac{25}{100} = \frac{1}{4}$$

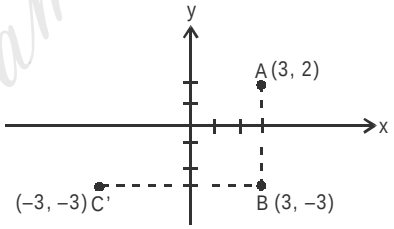
option (b) is correct.

36. Let the first term and the common difference of the AP are a & d.

$$\frac{[a + (k-1)d] + [a + (l-1)d]}{2} = \frac{[a + (m-1)d] + [a + (n-1)d]}{2}$$

$\Rightarrow (k - 1) + (l - 1) = (m - 1) + (n - 1)$
$\Rightarrow (m + n) = (l + k)$
option (c) is correct.

37.



The ball first lied at point A (3, 2).
It was shifted by 5 units to point B (3, – 3).
Its reflection is at point C (– 3, – 3).
Option (a) is correct.

38. As the three lines are concurrent,

$$\begin{vmatrix} 3 & 4 & -6 \\ 5 & 4 & -4 \\ z & 4 & -5 \end{vmatrix} = 0 \Rightarrow z = 29$$

Hence (d) is correct.

39. $$\begin{vmatrix} 3 & -2 & -1 \\ 5 & 4 & -9 \\ a & b & -3 \end{vmatrix} = 0$$

$\Rightarrow 3(-12 + 9b) + 2(-15 + 9a) - 1(5b - 4a) = 0$
$\Rightarrow 22 (a + b) = 66$
$\Rightarrow (a + b) = 3$
$\Rightarrow$ Option (d) is correct

40. b For two lines ax + by + c = 0 and dx + ey + f = 0 to be concurrent, the necessary and sufficient conditions is

$$\frac{a}{d}=\frac{b}{e}=\frac{c}{f}$$

option (b) is correct.

41. c Labour cost = $\frac{4}{100}$ × (Total cost)

Marketing Cost = $\frac{18}{100}$ × (Total cost)

$\Rightarrow$ Marketing Cost = $\frac{18}{100} \times \left(\frac{100}{4}\right) \times 2500$

= Rs. 11,250

Option (c) is correct.

42. b Contribution of the Overhead Cost = 15%

$\Rightarrow$ angle subtended = $\frac{15}{100}$ × (360°) = 54°

$\Rightarrow$ option (b) is correct.

43. a $\frac{\text{Packaging cost}}{\text{Marketing cost}}=\frac{35}{18}=1.944$

$\Rightarrow$ Packaging cost is 94%, more than the Marketing cost.

44. d Let the total cost of manufacturing one unit = Rs. 100
$\Rightarrow$ Packaging cost = Rs. 35

$\Rightarrow$ new packaging cost = $35\left(1-\frac{10}{100}\right)$ = Rs. 31.50

$\Rightarrow$ new total cost = [100 – (35)] + 31.50

= Rs. 96.5

$\text{change}=\frac{96.5-100}{100}=-3.5$

Hence (d) is correct.

45. a,b,c

Other Cost = $\frac{28}{100}$ × (Total cost)

Labour Cost = $\frac{4}{100}$ × (Total cost)

Overhead Cost = $\frac{15}{100}$ × (Total cost)

Marketing cost = $\frac{18}{100}$ × (Total cost)

none of (a), (b) or (c) is correct.

46. b $\frac{\text{Targeted Production}}{\text{Actual Production}}=\frac{425}{450}=\frac{17}{18}$

Option (b) is correct.

47. a Actual Production = 675 units.
Targeted Production = 600 units

the required percentage = $\frac{675-600}{600}$ × 100 = 112.5%

option (a) is correct.

48. d From the bar graph, it is clear that in the years 2002 - 2003 and 2003 - 2004 the actual production was more than the targeted production. Hence (d) is correct.

49. d In 2000 - 2001, $\frac{\text{Actual Production}}{\text{Targeted Production}}=\frac{450}{425}=1.058$

In 2002 - 2003, $\frac{\text{Actual Production}}{\text{Targeted Production}}=\frac{675}{600}=1.125$

and, In 2003 - 2004,

$\frac{\text{Actual Production}}{\text{Targeted Production}}=\frac{625}{500}=1.25$

$\Rightarrow$ (d) is correct.

50. d Cumulative Targeted Production
= (300 + 425 + 350 + 600 + 500) = 2175 units
Cumulative Actual Production
= (275 + 450 + 325 + 375 + 625) = 2350 units

$\Rightarrow \frac{\text{Cumulative Actual Production}}{\text{Cumulative Targeted Production}}=\frac{2350}{2175}=1.08$

$\Rightarrow$ (d) option is correct.