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2007, OUTRAM LINES, 1ST FLOOR, OPPOSITE MUKHERJEE NAGAR POLICE STATION, DELHI-110009

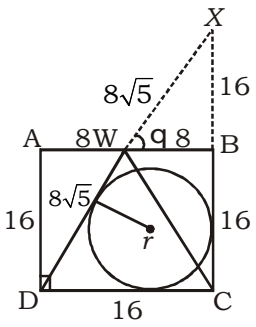
# SSC MAINS (MATHS) MOCK TEST-15 (SOLUTION)

1. (B) CP $= \frac{16}{12} \times 1200 = ₹\ 1600$

SP $= 1600 \times \frac{115}{100} = ₹\ 1840$

SP per dozen $= \frac{1840}{1200} \times 12 = ₹\ 18.40$

2. (C)




$(AW)^2 + (AD)^2 = (DW)^2$
$64 + 256 = (DW)^2$
$DW = 8\sqrt{5}$
Semi-Perimeter of triangle $X$DC

$= \frac{32 + 16 + 16\sqrt{5}}{2}$

$S = 24 + 8\sqrt{5}$

Area of $\Delta XDC = \frac{1}{2} \times 16 \times 32 = 256$

$R = \frac{256}{24 + 8\sqrt{5}} = \frac{32}{3 + \sqrt{5}}$ cm

3. (B) $\therefore$ Profit for A $= 1800 \times \frac{20}{100} = ₹\ 360$

$\therefore$ Profit for B $= \frac{1800}{120} \times 20 = ₹\ 300$

Difference in profit = ₹ (360 – 300) = ₹ 60

4. (A) Let CP of 1 Horse = $x$
CP of 1 Ox = y

$\frac{1}{5}x = \frac{1}{10}y$

$\therefore x = \frac{1}{2}y$

$-\frac{1}{20}x + \frac{1}{20}y = 600$

$-x + y = 20 \times 600$

$-\frac{1}{2}y + y = 12000 \quad \because x = \frac{1}{2}y$

$\frac{1}{2}y = 12000$

$\therefore$ CP of Ox $y = ₹\ 24000$

$x = \frac{1}{2} \times 24000 = ₹\ 1200$

5. (A) If the C.P. of article be $x$, then

$\frac{117x}{100} - \frac{81x}{100} = 162$

$\Rightarrow \frac{36x}{100} = 162$

$\Rightarrow x = \frac{162 \times 100}{36} = ₹\ 450$

6. (B) $\sqrt[3]{15612 + \sqrt{154 + \sqrt{225}}}$

$= \sqrt[3]{15612 + \sqrt{154 + 15}}$

$= \sqrt[3]{15612 + 13}$

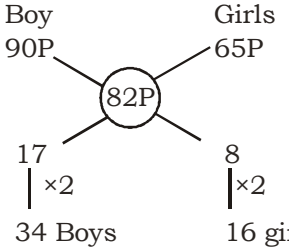
$= \sqrt[3]{15625} = 25$

7. (D) CP of 1 gram = 1

$\frac{100}{9} = \frac{1}{9}$ ← 1 less $= 900$ grams

Hence he weights 900 grams instead of 1 kg

8. (D) $\frac{4100}{50} = 82$ P



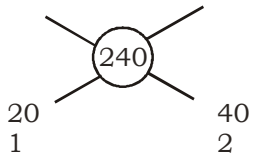

25 units = 50
1 unit = 2
17 units = 34

9. (C) Number of boys = 34

CP $= 300 \times \frac{100}{125}$

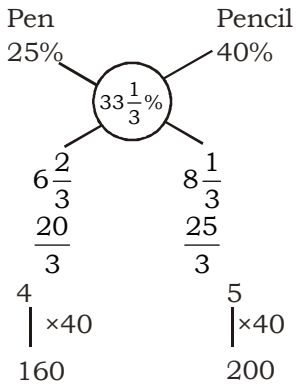
$= 300 \times \frac{4}{5} = ₹\ 240$ per quintal

₹ 200/ quintal ₹ 260/ quintal




2 units ® 52 quintal
1 unit ® 26 quintal

10. (B) Average profit = $\frac{120}{360} \times 100 = 33\frac{1}{3}\%$




9 units ® 360
1 ® 40

Price of 1 pencil = $\frac{200}{16}$ = ₹ 12.50

11. (D) $999\frac{999}{1000} \times 7$

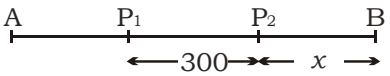
$= \left(999 + \frac{999}{1000}\right) \times 7$

$= 6993 + \frac{6993}{1000}$

$= 6993 + 6\frac{993}{1000}$

$= 6999\frac{993}{1000}$

12. (C)




$P_1$ ® Place of accident
$P_2$ ® Imaginary place of accident

| Speed | Time |
|---|---|
| $\frac{5}{6}$ | $\frac{6}{5}$ = 1 h |

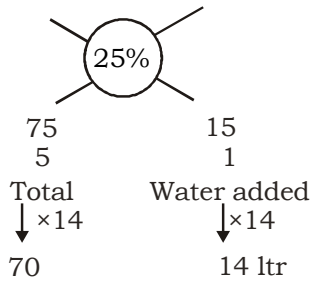
In first condition = 2 hrs late
In second condition = 1 hr late
Difference = 1 unit Þ 1 hr
= 5 × 1 = 5
It means he covers 300 km distance in 5 h

$\therefore$ Speed = $\frac{300}{5}$ = 60 km/h

13. (B) Work done by 50 men in 40 days
= 50 × 40 = 2000
Worked done by 100 men in 10 days
= 100 × 10 = 1000
Total work = 3000

Required days = $\frac{3000}{50}$ = 60 days

14. (D) 10% 100%




15. (D) Required number = HCF of 200 and 320 = 40

$$200\overline{)320}(1$$
$$\underline{200}$$
$$120\overline{)200}(1$$
$$\underline{120}$$
$$80\overline{)120}(1$$
$$\underline{80}$$
$$40\overline{)80}(2$$
$$\underline{80}$$
$$\times$$

16. (D) = $\frac{3939 - 39}{9900}$

$\frac{3900}{9900} = \frac{13}{33}$

17. (D) First number = a = 103
Last number = 998
$\therefore$ If the such numbers be n, then,
998 = 103 + (n – 1) × 5
Þ (n – 1) × 5 = 998 – 103 = 895

Þ n – 1 = $\frac{895}{5}$ = 179

Þ n = 180

$\therefore S = \frac{n}{2}(a + 1)$

$= \frac{180}{2}(103 + 998)$

= 90 × 1101 = 99090

18. (C) Divisor = 5 × remainder
= 5 × 36 = 180
Again, Divisor = 12 × quotient
$\therefore 180 = 12 \times \text{quotient}$

$\therefore \text{quotient} = \frac{180}{12} = 15$

$\therefore$ Divided = Divisor × Quotient + Remainder
= 180 × 15 + 36
= 2700 + 36 = 2736

19. (C) Every rational number is a real number.

20. (B) Let CP = 100

CP SP

$90\% \times \frac{110}{100} = 110\% - 16.50$

$11\% = 16.5$

$100\% = \frac{1650 \times 100}{11} = 150$

21. (C) ? =

$$\frac{(0.0539 - 0.002) \times 0.4 + 0.56 \times 0.07}{0.04 \times 0.25}$$

$$= \frac{0.0519 \times 0.4 + 0.0392}{0.01}$$

$$= \frac{0.02076 + 0.0392}{0.01}$$

$$= \frac{0.05996}{0.01} = 5.996$$

22. (D) Given $x^3 - y^3 - z^3 - 3xyz = 0$
$x^3 - y^3 - z^3 = 3xyz = x^3 + (-y)^3 + (-z)^3 = 3xyz$
So, $x - y - z = 0$
$\Rightarrow x = y + z$

23. (B) tan 4° tan 43° . tan 47° . tan 86°
= (tan 4°. tan 86°) (tan 43°. tan 47°)
= 1 × 1 = 1

24. (B) Expression

$$= \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} - \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$$

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

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

$$= \frac{4\sqrt{6}}{3-2} = 4\sqrt{6}$$

25. (A) $\sqrt{11+2\sqrt{30}}$

$$= \sqrt{5+6+2\times\sqrt{5}\times\sqrt{6}}$$

$$= \sqrt{\left(\sqrt{5}+\sqrt{6}\right)^2} = \sqrt{6}+\sqrt{5}$$

$$\therefore \frac{1}{\sqrt{11+2\sqrt{30}}} = \sqrt{6}-\sqrt{5}$$

$\therefore$ Expression $\sqrt{6}+\sqrt{5} - \sqrt{6}+\sqrt{5} = 2\sqrt{5}$

26. (A) Number of A-types employees in the year 2016

$\Rightarrow \frac{48640 \times 22}{100} = 10700$

Number of C and D type employees in the year 2015

$\Rightarrow \frac{42980 \times 25}{100}$

= 10745

27. (A)

28. (A) Required difference

$$= \frac{48640 \times 10}{100} - \frac{42980 \times 10\%}{100}$$

= 4864 – 4298 = 566

29. (A) Required per cent

$$= \frac{5000}{48640} \times 100 \approx 10$$

30. (B) Number of A – type employees :
Year 2015

$\frac{42980 \times 21}{100} = 9025.80$

Year 2016 $\Rightarrow \frac{48640 \times 22}{100} = 10700.80$

$\therefore$ Required percent

$\frac{10700.80}{9025.80} \times 100 = 118.55$

31. (A) 1 + 0.6 + 0.06 + 0.006 + 0.0006 + .... = 1.666 .... = $1.\overline{6}$

$= 1\frac{6}{9} = 1\frac{2}{3}$

32. (D) $x = 7 - 4\sqrt{3}$

$\therefore \frac{1}{x} = \frac{1}{7-4\sqrt{3}}$

$$= \frac{1\left(7+4\sqrt{3}\right)}{\left(7+4\sqrt{3}\right)\left(7-4\sqrt{3}\right)}$$

$$= \frac{7+4\sqrt{3}}{49-48} = 7+4\sqrt{3}$$

$\therefore x + \frac{1}{x}$

$= 7 - 4\sqrt{3} + 7 + 4\sqrt{3} = 14$

33. (C) Arithmetic mean (AM) = $\frac{a+b}{2}$

Geometric mean (GM) = $\sqrt{ab}$

As AM > GM

$\frac{a+b}{2} > \sqrt{ab}$

34. (B) $\sqrt{x} = \sqrt{5-\sqrt{21}}$

$\Rightarrow \sqrt{x} = \frac{\sqrt{10-2\sqrt{21}}}{\sqrt{2}}$

$\Rightarrow \frac{\sqrt{7+3-2\cdot\sqrt{7}\cdot\sqrt{3}}}{\sqrt{2}}$

$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}}$

$\sqrt{32-2x} = \sqrt{32-2\left(5-\sqrt{21}\right)}$

$= \sqrt{32-10+2\sqrt{21}}$

$= \sqrt{22+2\sqrt{21}}$

$= \sqrt{21+1+2\cdot\sqrt{21}\cdot 1}$

$= \sqrt{21}+1$

$\therefore$ Expression

$= \frac{\sqrt{7}-\sqrt{3}}{\sqrt{2}\left(\sqrt{21}+1-\sqrt{21}\right)}$

$= \frac{1}{\sqrt{2}}\left(\sqrt{7}-\sqrt{3}\right)$

35. (C) $\frac{4x-3}{x}+\frac{4y-3}{y}+\frac{4z-3}{z}=0$

$\Rightarrow \frac{4x}{x}-\frac{3}{x}+\frac{4y}{y}-\frac{3}{y}+\frac{4z}{z}-\frac{3}{z}=0$

$\Rightarrow \frac{3}{x}+\frac{3}{y}+\frac{3}{z} = 4+4+4 = 12$

$\Rightarrow \frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{12}{3}=4$

36. (D) $x^2 + 1 = 2x$ (Given)

$\Rightarrow x+\frac{1}{x}=2$ .... (i)

Expression

$= \frac{x^4+\frac{1}{x^2}}{x^2-3x+1} = \frac{x^6+1}{x^2\left(x^2-3x+1\right)}$

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

$= \frac{x^6+1}{(2x-3x)x^2} = \frac{x^6+1}{-x^3}$

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

$= -\left(x^3+\frac{1}{x^3}\right) = -\left(x+\frac{1}{x}\right)^3 + 3\left(x+\frac{1}{x}\right)$

$= -[2^3 - 3 \times 2]$

$= -2$

37. (A) $a^2+\frac{1}{a^2}-13\left(a-\frac{1}{a}\right)+34$

$= \left(a-\frac{1}{a}\right)^2+2-13\left(a-\frac{1}{a}\right)+34$

$= \left(a-\frac{1}{a}\right)^2-13\left(a-\frac{1}{a}\right)+36$

Let $\left(a-\frac{1}{a}\right) = x$

$\therefore$ Expression $= x^2 - 13x + 36$

$= x^2 - 9x - 4x + 36 = x(x-9) - 4(x-9)$

$= (x-4)(x-9)$

$= \left(a-\frac{1}{a}-4\right)\left(a-\frac{1}{a}-9\right)$

38. (B) Let, $P(x) = 2x^3 + ax^2 + 11x + a + 3$

$(2x - 1)$ is its factor.

$\therefore P\left(\frac{1}{2}\right) = 0$

$\Rightarrow 2\times\left(\frac{1}{2}\right)^3 + a\times\left(\frac{1}{2}\right)^2 + 11\times\frac{1}{2} + a + 3 = 0$

$\Rightarrow \frac{1}{4}+\frac{a}{4}+\frac{11}{2}+a+3=0$

$\Rightarrow \frac{1+a+22+4a+12}{4}=0$

$\Rightarrow \frac{5a+35}{4}=0$

$\Rightarrow 5a + 35 = 0 \Rightarrow 5a = -35$

$\Rightarrow a = -7$

39. (C) $\frac{3x-2y}{2x+3y}=\frac{5}{6}$

$\Rightarrow 18x - 12y = 10x + 15y$

$\Rightarrow 18x - 10x = 12y + 15y$

$\Rightarrow 8x = 27y$

$\Rightarrow \frac{x}{y}=\frac{27}{8}$

On taking cube root of both sides.

$$\frac{\sqrt[3]{x}}{\sqrt[3]{y}} = \sqrt[3]{\frac{27}{8}} = \frac{3}{2}$$

By componendo and dividendo,

$$\left(\frac{\sqrt[3]{x}+\sqrt[3]{y}}{\sqrt[3]{x}-\sqrt[3]{y}}\right)^2 = 5 \times 5 = 25$$

40. (C) $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \ldots\ldots \times \frac{31}{64} = \frac{1}{2^x} = \frac{1}{2^x}$

$\Rightarrow \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times$ ..... to 30 terms $\times \frac{1}{64} = \frac{1}{2^x}$

$\Rightarrow \frac{1}{2^{30}} \times \frac{1}{2^6} = \frac{1}{2^x}$

$\Rightarrow \frac{1}{2^{36}} = \frac{1}{2^x} \Rightarrow x = 36$

41.(A) $\because$ BE || DF

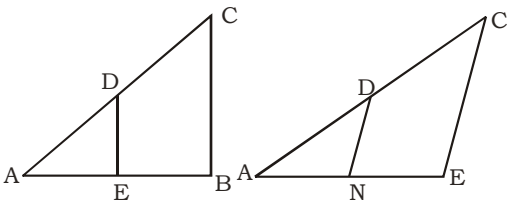
$\therefore \angle ACE = \angle CDF = 70°$

$\therefore \angle ACB = 80° - \angle ACE = 110°$

$\therefore \angle ABC = 180° - 20° - 110° = 50°$

42. (B) $\angle BIC = 90° + \frac{A}{2} = 90° + 30° = 120°$

43. (D)




in $\Delta ABC$,

$\because$ DE || BC

$\therefore \frac{AD}{DC} = \frac{AE}{EB} = \frac{4}{5} = 4 : 5$ ..... (i)

in $\Delta AEC$,

EC || ND

$\therefore \frac{AN}{NE} = \frac{AD}{DC} = \frac{4}{5} = 4 : 5$ ..... (ii)

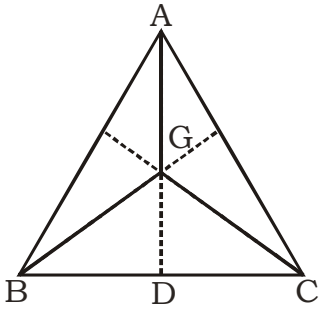
Let AE = 40 $\therefore$ EB = 50 and

$\therefore EN = 40 \times \frac{5}{9} = \frac{200}{9}$

$EN : EB = \frac{200}{9} : 50 = 4 : 9$

**Short -** 4 : (4 + 5) = 4 : 9

44. (D)




Area of $\Delta ABC$ = 6 × ar($\Delta BGD$)

= 6 × 6 = 36 sq.cm

45. (A) Let the remaining portion be sell at $x$% profit then.

$$\text{Total profit} = -\frac{1}{3} \times 20\% + \frac{2}{3} \times \frac{2}{3} \times 25\% + \frac{2}{9} \times x\%$$

$$20\% = -\frac{60}{9}\% + \frac{100}{9}\% + \frac{2x}{9}\%$$

$$\frac{2x}{9}\% = \frac{14}{9}\%$$

$x = 70$

Hence, he would sell the remaining portion at 70% profit.

Selling price of the remaining portion

$= \frac{17}{10} \times \frac{2}{9} \times 72000 \Rightarrow 27200$

46. (C) Let CP = 100

Purchase = 75

MP = 140 (40% above of CP)

Discount on MP = $140 \times \frac{80}{100} = 112$

Profit % = $\frac{112-75}{75} \times 100$

$49\frac{1}{3}\%$

47. (D) $\left(\frac{x^a}{x^b}\right)^{a+b} \left(\frac{x^b}{x^c}\right)^{b+c} \left(\frac{x^c}{x^a}\right)^{c+a}$

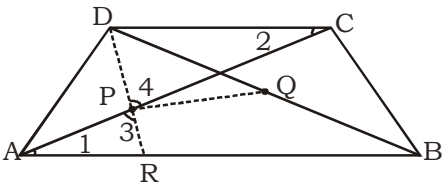
$(x^{a-b})^{a+b} (x^{b-c})^{b+c} (x^{c-a})^{c+a}$

$x^{(a-b)(a+b)} \times x^{(b-c)(b+c)} \times x^{(c-a)(c+a)}$

$x^{a^2-b^2} \times x^{b^2-c^2} \times x^{c^2-a^2}$

$x^{a^2 - b^2 + b^2 + c^2 + c^2 - a^2}\ x^0 = 1$

48. (C)




In $\Delta APR$ and $\Delta DPC$,

$\angle 1 = \angle 2$ (alternate angles)

AP = CP (∵ P is mid-point of AC) and
Ð3 = Ð4 (vertically opposite angles)
So, ΔAPR @ ΔDPC (ASA)
Þ AR = DC and PR = DP
Again, P and Q are the mid -points of sides DR and DB respectively. In ΔDRB

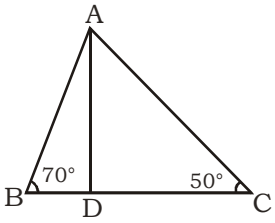
$PQ = \frac{1}{2}BR$

$\therefore PQ = \frac{1}{2}(AB - BR)$

$\therefore PQ = \frac{1}{2}(AB - CD)$ (∵ AR = DC)

49. (D) PA × PC = PB × PD
Þ 14 × 9 = (7 + $x$) × 7
Þ 18 = 7 + $x$ Þ $x$ = 11 m

50. (A)




Ð$A$ + 70° + 50° = 180°
Þ Ð$A$ = 60°

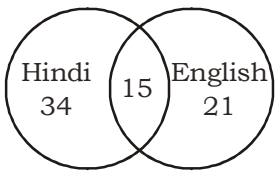
$\because \frac{AB}{AC} = \frac{BD}{DC}$

∴ AD is the bisector of Ð$BAC$

$\therefore$ Ð$BAD$ = $\frac{1}{2}$ Ð$BAC$ = $\frac{1}{2}$ × 60° = 30°

51. (B) AB = $\sqrt{(b-0)^2 + (0-a)^2}$ = $\sqrt{b^2 + a^2}$
= $\sqrt{a^2 + b^2}$

52. (B) By set theory




Total people who do not speak any language = 100 – (34 + 15 + 21) = 30%
30% = 900

1% = $\frac{900}{30}$

21% = $\frac{900}{30}$ × 21 = 630

53. (D) Amount deposit = 31,100
1% of 10,000 ® > + 100
96% of total sale ® 31,200

100% ® 31,200 × $\frac{100}{96}$ = 32,500

Hence the total sale in rupees = ₹ 32,500

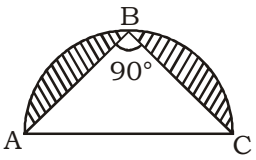
54. (A) $\frac{1}{8}$ — $\frac{\text{Expenditure}}{\text{Total amount}}$

$x \times \frac{7}{8} \times \frac{4}{5} = 8400$

$x$ = ₹ 12000

55. (A) Let total no. of voters = lOO $x$
No. of voters that voted = 90$x$
Valid votes = 90 $x$ – 2000
Winner gets votes = 52% of lOO $x$ = 52$x$
Loser gets votes = (90x-2000)-52x
= 38 $x$-2000
Now,
52$x$ – (38$x$ – 2000) = 13200
Þ 14$x$ = 13200 – 2000
Þ 14$x$ = 11200 Þ $x$ = 800
No. of votes polled in favour of losing candidate
= 38$x$ – 2000
= 38 × 800 – 2000
= 30400 – 2000 = 28400

56. (B)




$r$ = 2

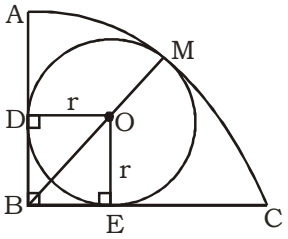
Area of circle = $\frac{\pi r^2}{2}$ = 2π sq. unit

Area of triangle in ABC = $\frac{1}{2}$ × AB × AC

= $\frac{1}{2}$ × 2 × 2 = 2 sq.unit

Shadow area = 2π – 2 sq.unit

57. (D)




Let r is the radius of smaller circle.
Ð$D$ = Ð$E$, Ð$B$ = 90°
So, Ð$DOE$ must be 90°
Hence, BEOD is a square
OB = $\sqrt{2}\,r$, BM = p

Þ OB = p – $r$ = $\sqrt{2}\,r$

$p = r\left(\sqrt{2}+1\right)$

$\Rightarrow r = \frac{p}{\sqrt{2}+1} = p\left(\sqrt{2}-1\right)$

58. (A) $\frac{a}{3-5a} + \frac{b}{3-5b} + \frac{c}{3-5c} = 1$

$\Rightarrow \frac{5a}{3-5a} + 1 \frac{5b}{3-5b} + 1 + \frac{5c}{3-5c} + 1 = 5 + 3$

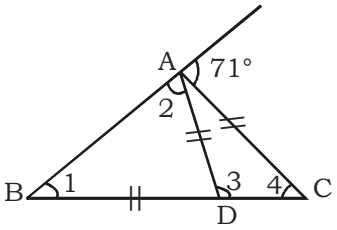
$\Rightarrow \frac{5a+3-5a}{3-5a} + \frac{5b+3-5b}{3-5b} + \frac{5c+3-5c}{3-5c} = 8$

$\Rightarrow \frac{3}{3-5a} + \frac{3}{3-5b} + \frac{3}{3-5c} = 8$

$\Rightarrow 3\left(\frac{1}{3-5a} + \frac{1}{3-5b} + \frac{1}{3-5c}\right) = 8$

$\Rightarrow \frac{1}{3-5a} + \frac{1}{3-5b} + \frac{1}{3-5c} = \frac{8}{3}$

59. (B)




$\because$ AD = BD

$\therefore \angle 1 = \angle 2 = x$ (let)

$\therefore \angle 3 = \angle 1 + \angle 2 = 2x$ (exterior angle)

$\therefore \angle 4 = \angle 3 = 2x$ ($\because$ AD = AC)

Now, in $\Delta ABC$,

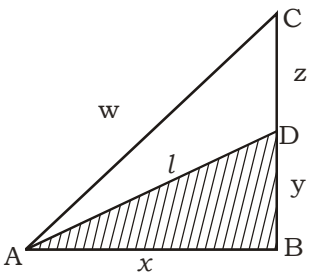
71° is an external angle.

$\therefore \angle 1 + \angle 4 = 71° \Rightarrow x + 2x = 71°$

$\Rightarrow x = \frac{71°}{3}$

$\therefore \angle C = \angle 4 = 2x = \frac{142°}{3}$

60. (D)




$l^2 = x^2 + y^2$

Areas are equal,

So, $\frac{1}{2} \times x(z + y) = 2\left(\frac{1}{2} \times x \times y\right)$

$\frac{1}{2}xz + \frac{1}{2}xy = xy$

$\frac{1}{2}xz = \frac{1}{2}xy$

$z = y$

and

$w^2 = (z + y)^2 + x^2$

$w^2 = z^2 + y^2 + 2yz + x^2$

$w^2 - y^2 - 2yz = x^2 + z^2$

$w^2 - 3y^2 = x^2 + z^2$

$l = \sqrt{w^2 - 3y^2}$

61. (D) $(6)^{333} \times 7^{222} \times (8)^{111} = (2 \times 3)^{333} \times 7^{222} \times (2^3)^{111}$

$= 2^{666} \times 3^{333} \times 7^{222}$

$= 2^{333} \times 3^{333} \times 7^{222} \times 2^{333} = 2^{666} \times 3^{333} \times 7^{222}$

Number of factors = 666 + 333 + 222

= 1221

62. (A) $= \frac{35x + 42}{35 + 7}$

Now, we have $\frac{35x + 42}{42} = x - 1$

or, $35x + 42 = 42x - 42$

or, $7x = 84 \quad \therefore \quad x = 12$

The original expenditure of the mess

$= 35 \times 12 = ₹\,420$

63. (C) $AB^2 + AC^2 = 2\left[AD^2 + \left(\frac{BC}{2}\right)^2\right]$

Apollonius theorem

$2500 = 2\left[625 + \left(\frac{BC}{2}\right)^2\right]$

$2500 = 1250 + \frac{BC}{4} \times 2$

$1250 = \frac{BC^2}{2}$

$2 \times 1250 = BC^2$

$BC = 50$ cm

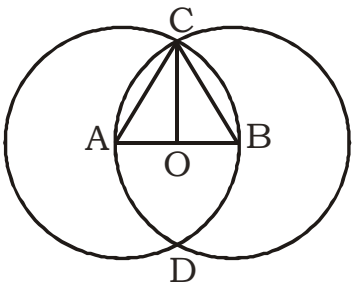
64. (C) Area of the base = 40 × 40 = 1600 sq.cm

Volume of pyramid = $\frac{1}{3}$ (area of base) × height

$\Rightarrow 800 = \frac{1}{3} \times 1600 \times h$

$\Rightarrow h = \frac{8000 \times 3}{1600} = 15$ cm

65. (B)




$AO = OB = \frac{5}{2}$

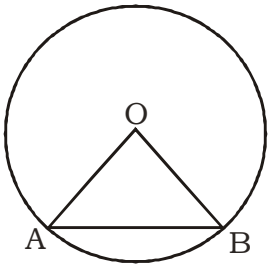
$AC = 5$

$\therefore = \sqrt{5^2 - \left(\frac{5}{2}\right)^2} = \sqrt{25 - \frac{25}{4}}$

$= \sqrt{\frac{100-25}{4}} = \sqrt{\frac{75}{4}} = \frac{5\sqrt{3}}{2}$

$\therefore CD = 2 \times OC = 2 \times \frac{5\sqrt{3}}{2} = 5\sqrt{3}$ cm

66. (A)




From D OAB,

$\angle AOB = 90°$

$OA^2 + OB^2 = AB^2$

$\Rightarrow 2r^2 = 18,$

$\Rightarrow r^2 = 9 \Rightarrow r = 3$ units

$\therefore$ Area of the sector AOB

$\frac{q}{360°}\pi r^2 = \frac{1}{4}\pi r^2 = \frac{1}{4}\pi \times 9 = \frac{9p}{4}$ sq. units

67. (C) Required ratio

$= \frac{1}{3}\pi^2 h : \frac{2}{3}\pi^2 h : \pi^2 h$

(height of cone = height of hemisphere = r)

$= \frac{1}{3} : \frac{2}{3} : 1 = 1 : 2 : 3$

68. (B) Area of the base = $\frac{\sqrt{3}}{4} \times (\text{side})^2$

$= \frac{\sqrt{3}}{4} \times 8 \times 8 = 16\sqrt{3}$ sq. cm

$\therefore$ Volume of prism = Area of base × height

$= 16\sqrt{3} \times 10 = 160\sqrt{3}$ cu. cm

69. (B) Curved surface area of cylinder $= 2\pi rh$

and volume $= \pi r^2 h$

$\therefore \frac{p r^2 h}{2p rh} = \frac{924}{264} \Rightarrow \frac{r}{2} = \frac{924}{264}$

$\Rightarrow r = \frac{924 \times 2}{264} = 7$ meter

$\therefore 2\pi rh = 264$

$\Rightarrow 2 \times \frac{22}{7} \times 7 \times h = 264$

$\therefore h = \frac{264}{2 \times 22} = 6$

$\therefore \frac{\text{Diameter}}{\text{Height}} = \frac{2 \times 7}{6} = \frac{7}{3}$

70. (B) side $= \frac{1}{2}\sqrt{d_1^2 + d_2^2}$

$= \frac{1}{2}\sqrt{3^2 + 4^2} = \frac{5}{2} = 2.5$ m

71. (A) Let base $= 4x$, then height $= 5x$

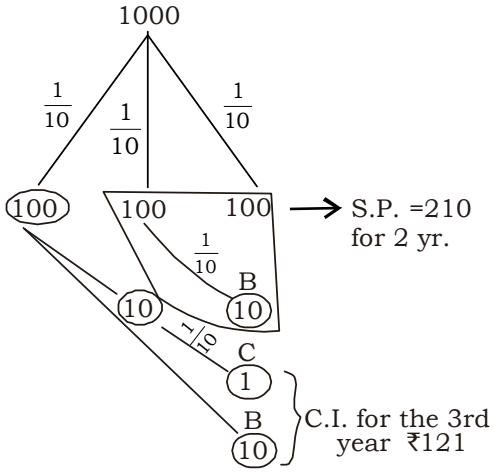
$\therefore \frac{1}{2} \times 4x \times 5x = 250$

$\Rightarrow x^2 = 25$

$\Rightarrow x = 5$

$\therefore$ height $= 5x = 5 \times 5 = 25$ m

72. (A) Time = 2 yrs. 73 days = $2 + \frac{73}{365}$ yrs. $2\frac{1}{5}$ yrs.




But ₹121 is C.I. for 365 days

Hence for 73 days C.I. must be $\frac{73}{365}$ i.e.

$\frac{1}{5}$ of 121 = ₹ 24.20

Hence total C.I.= 210
+ 24.20
= 234.20/-

73. (C) S.I = 6 × 2 = 12% of the sum

C.I. = 6 + 6 + $\frac{6\times6}{100}$ = 12.36% of the sum

Hence the difference between C.I. and S.I. is 0.36% of the sum

0.36% of the sum = ₹ 6.48

$\therefore$ Required Sum = $\frac{6.48}{0.36}\times100$

= $\frac{648}{36}\times100$ = ₹ 1800

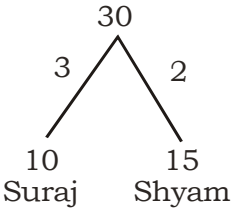
74. (A) $12500\times\left(\frac{4}{5}+\frac{16}{25}+\frac{64}{125}\right)$

$= 12500\times\left(\frac{100+80+64}{125}\right)$

$= \frac{12500\times244}{125} = 24400$

75. (B) $\frac{100\times2210}{100\times4+\frac{7\times4\times3}{2}} = 500$

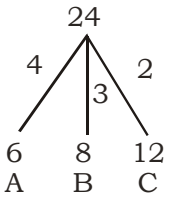
76.(C)




Word done in 5 days by Suraj = 5 × 3 = 15
Let work = 30 – 15 = 15

Done by Suraj and Shyam = $\frac{15}{5}$ = 3 days

77. (D)




ratio = 4 : 3 : 2

B = $\frac{2}{9}\times$ 1290 = 286.67

78. (C) Let the principal = ₹ $x$

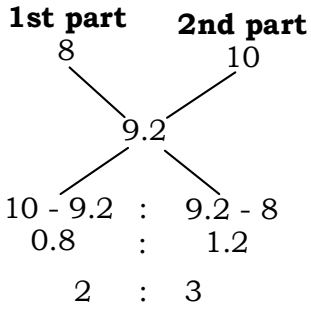
$\therefore$ Principal + S.I. = ₹ $\frac{7x}{4}$

$\therefore$ S.I. = $\frac{7x}{4} - x$ = ₹ $\frac{3x}{4}$

Rate = $\frac{\text{S.I.}\times100}{\text{Principal}\times\text{Time}}$

= $\frac{3x\times100}{4\times x\times4} = 18\frac{3}{4}\%$ p.a.

79. (A)




Hence, 1st part = $\frac{2}{5}\times10000$ = ₹ 4000

and

2nd Part = $\frac{3}{5}\times10000$ = ₹ 6000

80. (B) Distance = D
Fuel = f
Time = T
w = No of wagons

D µ $\frac{\sqrt{f}\cdot T}{w}$

D = k$\frac{\sqrt{f}\cdot T}{w}$

192 = $\frac{k\sqrt{256}\cdot 20}{10}$

k = 6

Again = 200 = $\frac{6\cdot\sqrt{f}\cdot25}{15}$

f = 400 liters

Fuel used per km = $\frac{400}{200}$ = 2 $l$/m

81. (A) To exchange the position both hands to cover 360° together in one minute, hour-hand moves $\frac{1°}{2}$ and in one minute, minute-hand moves 6°. Let the required time be t min, then

6t + $\frac{1}{2}$t = 360

$\therefore$ t = $\frac{360}{13}\times2 = \frac{720}{13} = 55\frac{5}{13}$ min

82. (C) Let the 2 men would do the work in $x$ days then time taken by 3 women = $(x + 5)$ days.

2 men ® $x$ days

2 men ® $\frac{2x}{3}$ days

Similarly : 3 ® women $(x + 5)$ days

5 women ® $\frac{3}{5}(x + 5)$

Now,

$$\frac{3}{2x} + \frac{5}{3(x+5)} = \frac{1}{3} \Rightarrow \frac{9x+45+10x}{6x(x+5)} = \frac{1}{3}$$

$$\Rightarrow \frac{19x+45}{6x^2+30x} = \frac{1}{3}$$

$57x + 135 = 6x^2 + 30x$

$6x^2 - 27x - 135 = 0$

$6x^2 - 45x + 135 = 0$

$3x(2x - 15) + 9(2x - 15) = 0$

$x = 15, x = -3$

Time taken by man = $\frac{15}{2} \times 2 = 15$

Time taken by woman = $3\left(\frac{15}{2} + 5\right)$

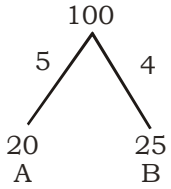
$= \frac{25}{2} \times 3 = \frac{75}{2}$

| | Man | : | Woman |
|---|---|---|---|
| Time ® | 15 | : | $\frac{75}{2}$ |
| E ® | $\frac{75}{2}$ | : | 15 |

Ratio : of efficiency of man : woman = 5 : 2

(You can take help by options.)

83.(A)




$A + B = 9 \times 5 = 45$

$100 - 45 = 55$

$\frac{55}{5} = 11 = 11 + 5$

= 16 minutes

84.(B) A → 15 min, B → 25 min, 5 units/min, 3 units/min, 75 Total capacity (in units)

∴Part of cistern fill din $x$ minutes + part of cistern filled in 5 minutes = cistern filled

$$\left(\frac{5}{6}x + 3 \times \frac{5}{8}x\right) + 5(5+3) = 75$$

$$\Rightarrow \frac{25x}{6} + \frac{15x}{8} + 40 = 75$$

$$\Rightarrow \frac{100x+45x}{24} = 35 \Rightarrow 145x = 840$$

$$x = \frac{840}{145} = \frac{168}{29} \text{ minutes}$$

85.(D)

| | A | | B | | C |
|---|---|---|---|---|---|
| $(50\times4+25\times8)$ : | $(45\times6+\frac{45}{2}\times6)$ | : | $(70\times6)$ | | |
| 400 | : | 405 | : | 420 | |
| 80 | : | 81 | : | 84 | |

86. (B) A : B : C

$A \times 2 = B \times 3$ _____ (I)

$B = 4C$ _____ (II)

$2A = 3B$

$A = \frac{3}{2}B$

$C = \frac{B}{4}$

$A : B : C = \frac{3}{2}B : B : \frac{B}{4}$

$= \frac{3}{2} : 1 : \frac{1}{4}$

$= \frac{3\times2}{4} : \frac{4}{4} : \frac{1}{4}$

= 6 : 4 : 1

∴ Share of B = $\frac{4}{11} \times 297000$ = ₹ 1,08,000

**Alternative**

| A | B | C |
|---|---|---|
| 6 | 4 | 1 |

$\frac{4}{11} \times 297000$ = ₹ 1,08,000

87.(C) Area of base = $6 \times \frac{\sqrt{3}}{4}(2a)^2$

$6 \times \frac{\sqrt{3}}{4} \times 4a^2$

$= 6\sqrt{3}\, a^2$ sq cm²

Height = $\sqrt{\left(\frac{5a}{2}\right)^2 - (2a)^2}$

$= \sqrt{\frac{9a^2}{4}}$

$= \frac{3}{2}$ a cm

Volume of pyramid

$= \frac{1}{3} \times$ Area of base $\times$ height

$= \frac{1}{3} \times 6\sqrt{3}\, a^2 \times \frac{3}{2} a$

$= 3\sqrt{3}\, a^3 cm^3$

88.(D) $\left(\frac{1}{\sin q} - \sin q\right) \times \left(\frac{1}{\cos q} - \cos q\right)$

$\frac{1 - \sin^2 q}{\sin q} \times \frac{1 - \cos^2 q}{\cos q}$

$\frac{\cos^2 q}{\sin q} \times \frac{\sin^2 q}{\cos q}$

$= \sin\theta \times \cos\theta$

89.(B) $7 \sin^2\theta + 3 \cos^2\theta = 4$

$= \frac{7 \sin^2 q}{\cos^2 q} + 3 = \frac{4}{\cos^2 q}$ Þ $4 \sec^2\theta$

$7 \tan^2\theta + 3 = 4 + 4 \tan^2\theta$

$7 \tan^2\theta + 3 = 4 + 4 \tan^2\theta$

$3 \tan^2\theta = 1$

$\tan^2\theta = \frac{1}{3}$

$\tan\theta = \frac{1}{\sqrt{3}}$

90.(D) $\text{cosec}\,\theta \sqrt{1 - \cos^2 q}$

$\text{cosec}\,\theta \times \sqrt{\sin^2 q}$

$\text{cosec}\,\theta \times \sin\theta = 1$

91.(A) $\tan^2\theta + \cot^2\theta$

$= \tan^2\theta + \frac{1}{\tan^2 q}$

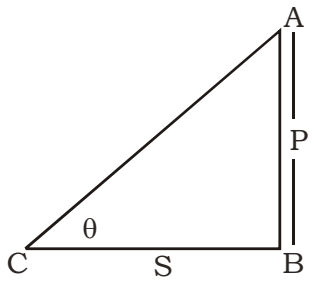
It is the form of $ax^2 + \frac{b}{x^2}$

Where a = b = 1

∵ minimum value

$2\sqrt{ab} = 2\sqrt{1 \cdot 1} = 2$

92.(C) $\tan\theta = \frac{P}{S}$




$P = \frac{S}{\cot q}$

93.(A) $x^2 + y^2 + z^2 = r^2 \sin^2\theta \times \cos^2\phi + r^2 \sin^2\theta \sin^2\phi + r^2 \cos^2\theta.$

$= r^2 \sin^2\theta (\cos^2\phi + \sin^2\phi) + r^2 \cos^2\theta$

$= r^2 \sin^2\theta + r^2 \cos^2\theta = r^2 (\sin^2\theta + \cos^2\theta)$

$r^2 = x^2 + y^2 + z^2$

94. (B) Let $x$ = Numbers of benches

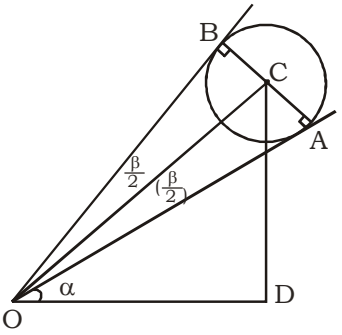
$6(x + 1) = 7x - 5$

$7x - 6x = 6 + 5$

$x = 11$

Number of students $6 \times (11 + 1) = 72$

95. (B)




$\angle BOC = \angle AOC = \frac{b}{2}$

$\angle A = BC = r$

∵ In ΔCOD

$\sin a = \frac{DC}{C}$

$DC = OC \sin a$ ..... (i)

$\frac{\sin b}{2} = \frac{AC}{OC}$

$OC = \frac{r}{\sin\frac{b}{2}}$ from ..... (i)

$\because DC = \frac{r}{\sin\frac{b}{2}} \times \sin\alpha$

$= r \,\text{cosec}\, \frac{b}{2} \times \sin\alpha$

96. (D) Suppose the maximum marks = 100

marks required to pass = 40

A get 10% less than pass marks

$= 40 \times \frac{90}{100} = 36$

B get $11\frac{1}{9}\%$ marks less than A

Fraction = $\frac{100}{9}$ Þ $\frac{1}{9}$

$= \frac{1}{9}$ ® 36

1 ® 4

8 ® 32 marks

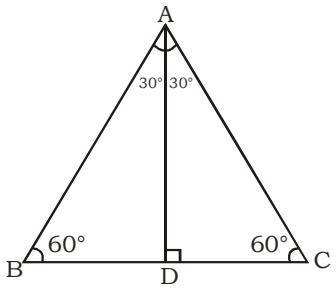
Total marks obtained by A + B = 68

C gets = $41\frac{3}{17}\%$ Þ $\frac{7}{17}$ ® 68

1 = 4 Þ 7 = 28

68 – 28 = 40 marks

97. (A)




$$\frac{BD}{AB} = \cos 60° = \frac{1}{2}$$

98. (C) Let C.P = ₹ $x$

$524 - x = x - 452$

or $2x = 524 + 452$

or $2x = 976$

or $x = \frac{976}{2} = 488$

C.P = ₹ 488

99. (B)

| | Pencils | Pens |
|---|---|---|
| CP ® | $x$ | $2x$ [Given] |
| SP ® | a | b |

According to the question,

$$\frac{3b}{10x} \times 100 = \frac{4a}{20x} \times 100$$

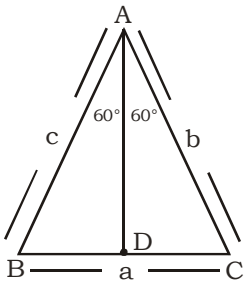
$$\frac{3a}{10x} = \frac{4b}{20x}$$

6b = 4a

$$\frac{a}{b} = \frac{6}{4} = \frac{3}{2}$$

a : b = 3 : 2

100. (B) Let AD = h(say)




Then area of ΔABC

$$\frac{1}{2} bc \sin 120° = \frac{\sqrt{3}}{9} BC$$

Area of BAD = $\frac{1}{2} ch \sin 60° \frac{\sqrt{3}}{4} bh$

Now, ΔABC = ΔBAD + ΔCAD

$$= \frac{\sqrt{3}}{4} bc = \frac{\sqrt{3}}{4} ch + \frac{\sqrt{3}}{4} bh$$

bc = h (b + c)

$$h = \frac{bc}{b+c}$$

## SSC MAINS (MATHS) MOCK TEST-15 (ANSWER KEY)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | (B) | 16. | (D) | 31. | (A) | 46. | (C) | 61. | (D) | 76. | (C) | 91. | (A) |
| 2. | (C) | 17. | (D) | 32. | (D) | 47. | (D) | 62. | (A) | 77. | (A) | 92. | (C) |
| 3. | (B) | 18. | (C) | 33. | (C) | 48. | (C) | 63. | (C) | 78. | (C) | 93. | (A) |
| 4. | (A) | 19. | (C) | 34. | (B) | 49. | (D) | 64. | (C) | 79. | (A) | 94. | (B) |
| 5. | (A) | 20. | (B) | 35. | (C) | 50. | (A) | 65. | (B) | 80. | (B) | 95. | (B) |
| 6. | (B) | 21. | (C) | 36. | (D) | 51. | (B) | 66. | (A) | 81. | (A) | 96. | (D) |
| 7. | (D) | 22. | (D) | 37. | (A) | 52. | (B) | 67. | (C) | 82. | (C) | 97. | (A) |
| 8. | (D) | 23. | (B) | 38. | (B) | 53. | (D) | 68. | (B) | 83. | (A) | 98. | (C) |
| 9. | (C) | 24. | (B) | 39. | (C) | 54. | (A) | 69. | (B) | 84. | (B) | 99. | (B) |
| 10. | (B) | 25. | (A) | 40. | (C) | 55. | (A) | 70. | (B) | 85. | (D) | 100. | (B) |
| 11. | (D) | 26. | (A) | 41. | (A) | 56. | (B) | 71. | (A) | 86. | (B) | | |
| 12. | (C) | 27. | (A) | 42. | (B) | 57. | (D) | 72. | (A) | 87. | (C) | | |
| 13. | (B) | 28. | (A) | 43. | (D) | 58. | (A) | 73. | (C) | 88. | (D) | | |
| 14. | (D) | 29. | (A) | 44. | (D) | 59. | (B) | 74. | (A) | 89. | (B) | | |
| 15. | (D) | 30. | (B) | 45. | (A) | 60. | (D) | 75. | (B) | 90. | (D) | | |