

**SSC TIER II (MATHS) MOCK TEST - 28 (SOLUTION)**

1. (B) Let the two integers be a and b.  
A.T.Q,  
 $a + b = 16$  ..... (i)

and,  $\frac{1}{a} + \frac{1}{b} = \frac{1}{3}$

$\Rightarrow \frac{a+b}{ab} = \frac{1}{3}$

$\Rightarrow ab = 16 \times 3 = 48$  ..... (ii)

We know that

$(a - b)^2 = (a + b)^2 - 4ab$

On putting the respective values, we get

$(a - b)^2 = 16^2 - 4 \times 48$

$\Rightarrow (a - b)^2 = 256 - 192$

$\Rightarrow (a - b)^2 = 64$

$\Rightarrow (a - b) = 8$

Hence, the difference of the integers is 8.

2. (D) For being completely divisible, the numerator must have the factor of denominator

Here,  $65k = 5 \times 13 \times k$

and,  $122 = 2 \times 61$

There is no common factor

So, the minimum value of k = 122

3. (A) Here,  $(5^{70} + 7^{70})$  can be written as  $(5^2)^{35} + (7^2)^{35}$  i.e,  $(25^{35} + 49^{35})$

We know that,  $x^n + y^n$  is always completely divisible by  $x + y$ . When  $n$  is an odd number

So,  $25^{35} + 49^{35}$  will be divisible by

$25 + 49 (=74)$

$\therefore$  Required remainder = 0

4. (B) A.T.Q,

$$\left(\frac{x^p}{x^q}\right)^{p^2+q^2+pq} \cdot \left(\frac{x^q}{x^r}\right)^{q^2+r^2+qr} \cdot \left(\frac{x^r}{x^p}\right)^{r^2+p^2+rp}$$

$$= x^{(p-q)(p^2+q^2+pq)} \cdot x^{(q-r)(q^2+r^2+qr)} \cdot x^{(r-p)(r^2+p^2+rp)}$$

$$= x^{(p^3-q^3)} \cdot x^{(q^3-r^3)} \cdot x^{(r^3-p^3)}$$

$$= x^{(p^3-q^3+q^3-r^3+r^3-p^3)}$$

$$= x^0$$

$$= 1.$$

5. (C) We know that,

HCF of  $(a^m - 1)$  and  $(a^n - 1) = a^{\text{HCF of } m \text{ and } n} - 1$

HCF of  $(5^{15} - 1)$  and  $(5^{35} - 1) = 5^{\text{HCF of } 15 \text{ and } 35} - 1$

$= 5^5 - 1$

6. (B) Let the two numbers be  $5x$  and  $5y$ .  
Then,

Their LCM,  $5xy = 1105$

$\Rightarrow xy = 221$

$\Rightarrow xy = 13 \times 17$

A.T.Q,

$5x + 5y = 150$

$\Rightarrow x + y = 30$

Here, we get  $x = 13$  and  $y = 17$

Now, the difference of the numbers

$= 5y - 5x$

$= 5(17 - 13) = 20$

7. (C)  $25\% = \frac{1}{4} \rightarrow$  Profit

$\frac{1}{4} \rightarrow$  SP

We know that,

CP = SP - Profit =  $4 - 1 = 3$

Now, profit percent =  $\frac{\text{Profit}}{\text{CP}} \times 100$

$= \frac{1}{3} \times 100 = 33\frac{1}{3}$

8. (B) Total distance travelled =  $30 + 60 + 90 + \dots$  upto 10 terms

Here, first term ( $a$ ) = 30

common difference ( $d$ ) = 30

and, number of terms ( $n$ ) = 10

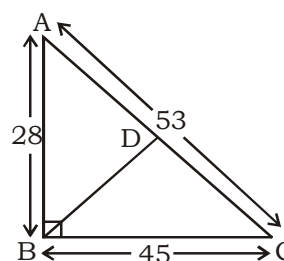
Then, sum =  $\frac{n}{2} [2a + (n - 1)d]$

$= \frac{10}{2} [2 \times 30 + (10 - 1) \times 30]$

$= 5[60 + 270] = 1650$

$\therefore$  Total distance travelled = 1650 metres.

9. (D)



Given triangle is right angle triangle with sides 28 cm, 45 cm and 53 cm.

Orthocentre of triangle ABC is B and

circumcentre is the mid point of AC.

So,

Distance between orthocentre and circumcentre is equal to the length of BD where BD is the median and circumradius of the triangle.

$$\therefore BD = \frac{53}{2} = 26.5 \text{ cm}$$

10. (C) Here, radius of the cone = half of the radius of semicircle

$$= \frac{28}{2} = 14 \text{ cm}$$

and, slant height of the cone = radius of the circle

$$l = 28 \text{ cm}$$

we know that,

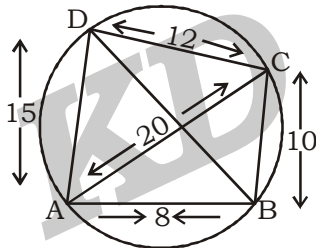
$$h = \sqrt{l^2 - r^2}$$

$$\Rightarrow h = \sqrt{28^2 - 14^2}$$

$$\Rightarrow h = 14\sqrt{3} \text{ cm}$$

$$\therefore \text{height of the cone} = 14\sqrt{3} \text{ cm}$$

11. (A)



In a quadrilateral ABCD,

$$AB \times DC + BC \times AD = AC \times BD$$

On putting the values, we get

$$8 \times 12 + 10 \times 15 = 20 \times BD$$

$$\Rightarrow 96 + 150 = 20 \times BD$$

$$\Rightarrow BD = \frac{246}{20}$$

$$\Rightarrow BD = 12.3 \text{ cm}$$

$\therefore$  Length of other diagonal = 12.3 cm

12. (B) Side of the square tiles = HCF of 75 and 100 = 25 m

and, number of tiles

$$= \frac{\text{Area of rectangular hall}}{\text{Area of one square hall}}$$

$$= \frac{75 \times 100}{25 \times 25} = 12$$

$\therefore$  Minimum number of square tiles = 12

13. (D) A.T.Q,

Length of arc AB = circumference of the base of right circular cone

$$\Rightarrow l = 2 \times \pi \times 3$$

$$\Rightarrow l = 6\pi$$

and, radius of the sector = slant height of cone

$$\Rightarrow r = \sqrt{4^2 + 3^2}$$

$$\Rightarrow r = 5$$

We know that,

angle subtended at the centre

$$= \frac{\text{length of arc}}{\text{radius}}$$

$$\Rightarrow \theta = \frac{6\pi}{5}$$

14. (C)

$$A + B \quad A \quad B$$

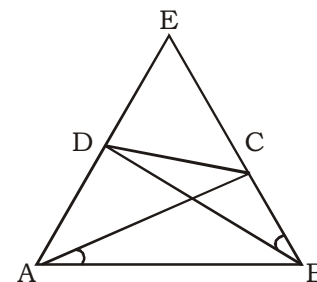
$$\text{Time} \rightarrow x \quad x+8 \quad x + \frac{9}{2}$$

$$\text{Now, } x = \sqrt{8 \times \frac{9}{2}}$$

$$\Rightarrow x = 6$$

$\therefore$  Time taken by A and B together to complete the work = 6 days

15. (B)



Extend BC and AD to meet at E.

In  $\triangle ABE$ ,

$$\angle A = \angle B = 60^\circ$$

So,  $\triangle ABE$  is an equilateral.

In  $\triangle ABC$  and  $\triangle BED$  (Given)

$$\angle ABC = \angle BED (60^\circ)$$

and,  $AB = BE$  (side of equilateral triangle)

So,  $\triangle ABC \cong \triangle BED$

and,  $BC = DE$

We know that,

$AB = AE$  (side of equilateral triangle)

$$\Rightarrow AB = AD + DE$$

$$\Rightarrow AB = AD + BC$$

16. (C) In a triangle product of side and altitude remains same  
 Let the sides of the triangle be  $a, b$  and  $c$ .  
 Then,  
 $a \times 6 = b \times 7 = c \times 8$   
 Here, we get  
 $a : b : c = 28 : 24 : 21$   
 Now,  $(a + b + c) = (28 + 24 + 21)$  units  
 $\Rightarrow 73$  units = 365  
 $\Rightarrow 1$  unit = 5  
 Then, smallest side ( $c$ ) =  $5 \times 21 = 105$  cm

17. (A) We know that, the largest triangle that can be inscribed in a semicircle is an isosceles right angled triangle.

$$\begin{aligned} \text{So, area} &= \frac{1}{2} \times \left( \frac{\text{diameter}}{2} \right)^2 \\ &= \frac{1}{2} \times \left( \frac{2r}{2} \right)^2 \\ &= r^2 \text{ sq. units} \end{aligned}$$

18. (C)

A	B	C
1000	950	950
1000	1000	940

$1000 \times 1000 : 950 \times 1000 : 950 \times 940$   
 Now,  
 Distance travelled by C when A travels 1000  
 $m = \frac{9540 \times 940}{1000} = 893$  m  
 Then, Distance by which A can beat C  
 $= 1000 - 893 = 107$  m

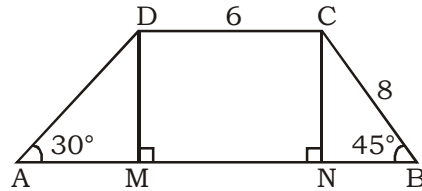
19. (B) We know that,  
 Volume of tetrahedron =  $\frac{a^3}{6\sqrt{2}}$   
 $= \frac{6^3}{6\sqrt{2}} = 18\sqrt{2}$  cm<sup>3</sup>

20. (D) A.T.Q,

Now, work done by A, B and C in one hour =  $3 + 5 - 10 = -2$  units  
 and, quantity of water in the half filled cistern =  $\frac{20}{2} = 10$  units

So, Time taken by all the pipes to empty the cistern =  $\frac{10}{2} = 5$  hours

21. (C)



In  $\triangle CNB$ ,  
 $CN = CB \sin 45^\circ = 8 \times \frac{1}{\sqrt{2}} = 4\sqrt{2}$  cm  
 and,  $BN = CB \cos 45^\circ = 8 \times \frac{1}{\sqrt{2}} = 4\sqrt{2}$  cm

Now, In  $\triangle AMD$ ,  
 $DM = 4\sqrt{2}$  ( $\because DM = CN$ )  
 Then,  $AM = DM \cot 30^\circ = 4\sqrt{2} \times \sqrt{3} = 4\sqrt{6}$  cm

We know that,  
 Area of trapezium =  $\frac{1}{2} \times (\text{sum of parallel sides} \times \text{height})$   
 $= \frac{1}{2} (DC + AB) \times CN$   
 $= \frac{1}{2} (6 + 4\sqrt{6} + 6 + 4\sqrt{2}) \times 4\sqrt{2}$   
 $= \frac{1}{2} \times (12 + 4\sqrt{6} + 4\sqrt{2}) \times 4\sqrt{2}$   
 $= 8(2 + 2\sqrt{3} + 3\sqrt{2})$   
 $= 85.65$  cm<sup>2</sup>

22. (B) Let the radii of the two circles be  $R$  and  $r$   
 Now,  
 $\pi R^2 + \pi r^2 = 125\pi$   
 $\Rightarrow \pi(R^2 + r^2) = 125\pi$   
 $\Rightarrow R^2 + r^2 = 125$  ..... (i)  
 and,  $R - r = 5$  ..... (ii)  
 We know that,  
 $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$   
 So,  $(R + r)^2 + (R - r)^2 = 2(R^2 + r^2)$   
 $\Rightarrow (R + r)^2 = 225$   
 $\Rightarrow R + r = 15$  cm

23. (D) A.T.Q,

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

Rationalizing the denominator,

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

$$\text{and, } \frac{1}{x} = 5 - 2\sqrt{6}$$

$$\text{Then, } x + \frac{1}{x} = 5 + 2\sqrt{6} + 5 - 2\sqrt{6} = 10$$

$$\Rightarrow x^2 - 10x + 1 = 0 \dots\dots\dots (i)$$

multiply by  $x$  both sides, we get

$$x^3 - 10x^2 + x = 0 \dots\dots\dots (ii)$$

Now, adding  $4 \times$  equation (i) and equation (ii),

$$\Rightarrow 4x^2 - 40x + 4 + x^3 - 10x^2 + x = 0$$

$$\Rightarrow x^3 - 6x^2 - 39x + 4 = 0$$

$$\Rightarrow x^3 - 3x(2x + 13) = -4$$

24. (C) A.T.Q,

$$x^2 + \frac{1}{x^2} = \frac{7}{9}$$

$$\Rightarrow \left(x + \frac{1}{x}\right)^2 = \frac{7}{9} + 2 = \frac{25}{9}$$

$$\Rightarrow x + \frac{1}{x} = \frac{5}{3}$$

On taking cube both sides, we get

$$\left(x + \frac{1}{x}\right)^3 = \left(\frac{5}{3}\right)^3$$

$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times x \times \frac{1}{x} \left(x + \frac{1}{x}\right) = \frac{125}{27}$$

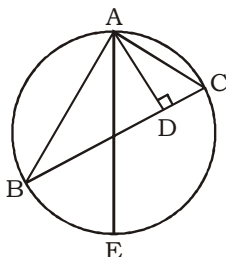
$$\Rightarrow x^3 + \frac{1}{x^3} + 3 \times \frac{5}{3} = \frac{125}{27}$$

$$\Rightarrow x^3 + \frac{1}{x^3} = \frac{125}{27} - 5 = -\frac{10}{27}$$

25. (C) In triangle ABC,  
 $|AB - AC| < |BC| < |AB + AC|$   
 $\Rightarrow 180 < BC < 1330$

Then, the number of possible number of triangles =  $1330 - 180 - 1 = 1149$

26. (B)



$$\text{Circumradius of } \Delta ABC = \frac{abc}{4\Delta}$$

where,  $b = AC = 12$  cm

$c = AB = 18$  cm

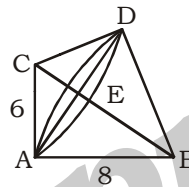
$a = BC$

and  $AD = 6$  cm

$$\text{Now, circumradius (R)} = \frac{BC \times 12 \times 18}{4 \times \frac{1}{2} \times BC \times AD}$$

$$= \frac{BC \times 12 \times 18}{4 \times \frac{1}{2} \times BC \times 6} = 18 \text{ cm}$$

27. (C)



Volume of the double cone formed  
 = volume of cone (ABD) + volume of cone (ACD)

$$= \frac{1}{3} \pi (AE)^2 \times BE + \frac{1}{3} \pi (AE)^2 \times CE$$

$$= \frac{1}{3} \pi (AE)^2 (BE + CE)$$

$$= \frac{1}{3} \pi (AE)^2 (BC)$$

$$\text{Here, } BC = \sqrt{AB^2 + AC^2}$$

$$= \sqrt{6^2 + 8^2} = 10 \text{ cm}$$

$$\text{and, } AE = \frac{AB \times AC}{BC} = \frac{8 \times 6}{10} = 4.8 \text{ cm}$$

Now, required volume

$$= \frac{1}{3} \times 3.14 \times 4.8 \times 4.8 \times 10$$

$$= 241.152 \text{ cm}^3$$

$$= 240 \text{ cm}^3 \text{ (approximate)}$$

28. (B) A.T.Q,

$$x = \sqrt{\frac{5 + 2\sqrt{6}}{5 - 2\sqrt{6}}}$$

On rationalisation, we get

$$x = \sqrt{\frac{(5 + 2\sqrt{6})(5 + 2\sqrt{6})}{(5 - 2\sqrt{6})(5 + 2\sqrt{6})}}$$

$$\Rightarrow x = 5 + 2\sqrt{6}$$

$$\text{and, } \frac{1}{x} = 5 - 2\sqrt{6}$$

$$\text{Now, } x + \frac{1}{x} = 5 + 2\sqrt{6} + 5 - 2\sqrt{6}$$

$$\Rightarrow x + \frac{1}{x} = 10$$

$$\Rightarrow x^2 = 10x - 1 \dots\dots\dots (i)$$

$$\begin{aligned} \text{Then, } x^2 - 7x - 14 &= 10x - 1 - 7x - 14 \\ &= 3x - 15 \\ &= 3(5 + 2\sqrt{6}) - 15 \\ &= 15 + 6\sqrt{6} - 15 = 6\sqrt{6} \end{aligned}$$

29. (C) We know that,  $\cot^2 x = \frac{\cot^2 x - 1}{2 \cot x}$

$$= \frac{1}{2} (\cot x - \tan x)$$

$$\text{Here, } \cot x = \frac{\sin y}{1 - \cos y} = \frac{1 + \cos y}{\sin y}$$

$$\text{and, } \tan x = \frac{1}{\cot x} = \frac{1 - \cos y}{\sin y}$$

$$\text{Then, } \cot^2 x = \frac{1}{2} \left[ \frac{(1 + \cos y) - (1 - \cos y)}{\sin y} \right]$$

$$= \frac{1}{2} \times \frac{2 \cos y}{\sin y} = \cot y$$

30. (A) A.T.Q,

$$\text{Rate of interest (r)} = \frac{SI \times 100}{p \times t} \%$$

$$\Rightarrow r = \frac{16 \times 100}{100 \times 2} = 8\%$$

Now, compound interest on ₹16000 in 3 years

$$= p \left[ \left( 1 + \frac{r}{100} \right)^3 - 1 \right]$$

$$= 16000 \left[ \left( 1 + \frac{8}{100} \right)^3 - 1 \right] = ₹ 4155$$

31. (A) A.T.Q,

$$a \sec \theta = x$$

$$\Rightarrow \cos = \frac{a}{x} \dots\dots\dots (i)$$

$$\text{and, } b \tan \theta = y$$

$$\Rightarrow \cos \theta = \frac{b \sin \theta}{y} \dots\dots\dots (ii)$$

From equation (i) and (ii), we get

$$\frac{a}{x} = \frac{b}{y} \sin \theta$$

$$\Rightarrow \sin \theta = \frac{ay}{bx} \dots\dots\dots (iii)$$

Using equation (i) and (iii),

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\Rightarrow \frac{a^2 y^2}{b^2 x^2} + \frac{a^2}{x^2} = 1$$

$$\Rightarrow \frac{a^2 y^2 + a^2 b^2}{b^2 x^2} = 1$$

$$\Rightarrow b^2 x^2 - a^2 y^2 = a^2 b^2$$

32. (B) A.T.Q,

$$\frac{210}{3 \times 7} + \frac{210}{7 \times 11} + \frac{210}{11 \times 15} + \dots\dots\dots \frac{210}{31 \times 35}$$

$$= 210 \times \frac{1}{4} \left( \frac{1}{3} - \frac{1}{7} + \frac{1}{7} - \frac{1}{11} + \frac{1}{11} - \frac{1}{15} \dots\dots\dots + \frac{1}{31} - \frac{1}{35} \right)$$

$$= 210 \times \frac{1}{4} \left( \frac{1}{3} - \frac{1}{35} \right)$$

$$= 210 \times \frac{1}{4} \times \frac{32}{3 \times 35} = 16$$

33. (C) Let the side of the triangle be a cm

Then, A.T.Q,

$$\frac{\sqrt{3}}{4} a^2 - \frac{\sqrt{3}}{4} (a-2)^2 = 5\sqrt{3}$$

$$\Rightarrow \frac{\sqrt{3}}{4} [a^2 - (a-2)^2] = 5\sqrt{3}$$

$$\Rightarrow [4a - 4] = 20$$

$$\Rightarrow a = 6 \text{ cm}$$

∴ Each side of equilateral triangle = 6 cm

34. (B) We know that,

$$\text{Distance} = \frac{\text{Product of speeds}}{\text{Difference of speeds}} \times \text{time}$$

$$\Rightarrow D = \frac{15 \times 20}{20 - 15} \times \frac{42}{60}$$

$$\Rightarrow D = 42 \text{ km}$$

∴ Distance between his house and office = 42 km

35. (B) A.T.Q,  
Total marks of 50 students of the class  
=  $81 \times 50 = 4050$   
and, total marks of 45 students of the  
class =  $80 \times 45 = 3600$   
Now, total marks obtained by 5 students  
=  $4050 - 3600 = 450$   
Then, average marks of 5 students  
$$= \frac{450}{5} = 90$$

36. (C) Let the marked price of the article be ₹x.  
A.T.Q,  
$$x \times \frac{8-1}{8} \times \frac{80+7}{80} = 3045$$
  
$$\Rightarrow x \times \frac{7}{8} \times \frac{87}{80} = 3045$$
  
$$\Rightarrow x = \frac{3045 \times 8 \times 80}{7 \times 87} = 3200$$

∴ Marked price of the article = ₹3200

37. (B) Amount given by the man to his wife  
$$= 64200 \times \frac{25}{100} = ₹16,050$$
  
Then, amount given by the man to his  
sons =  $64200 - 16050 = ₹48150$

$$\text{Now, } A \left[ 1 + \frac{r}{100} \right]^3 = B \left[ 1 + \frac{r}{100} \right]^5$$

$$\Rightarrow \frac{A}{B} = \left( 1 + \frac{r}{100} \right)^2$$

$$\Rightarrow \frac{A}{B} = \left( \frac{21}{20} \right)^2 = \frac{441}{400}$$

i.e., the amount is distributed in A and  
B in the ratio = 441 : 400

Then,  $(441 + 400)$  units = 48150

$\Rightarrow 841$  units = 48150

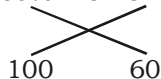
$\Rightarrow 1$  unit =  $\frac{48150}{841}$

Then, share of B = 400 units

$$= \frac{48150}{841} \times 400 = ₹22901.3$$

38. (D) A.T.Q,

SP of 60% = CP of 100%



Let the number of oranges be 100.

and, SP of the 60 oranges = ₹100

CP of the 60 oranges = ₹60

Then,

$$\text{Now, profit percentage} = \frac{100 - 60}{60} \times 100$$

$$= \frac{200}{3} \%$$

Again, SP of  $(100 - 60) \times \frac{60}{100}$  oranges

$$= 24 \times \frac{4}{3} = 32$$

Total CP = 100 and total SP =  $100 + 32 = 132$

$$\text{Profit percentage} = \frac{32}{100} \times 100 = 32\%$$

39. (C) Let the speed of the car be  $x$  kmph  
A.T.Q,

$$\frac{400}{2000} \times 2 = \frac{x(x-10)}{10} \times 3$$

$$\Rightarrow 2x + 20 = 3x - 30$$

$$\Rightarrow x = 50$$

Then, distance between the two cities

$$= \frac{50(50+10)}{10} \times 2 = 600 \text{ km}$$

40 (B) A.T.Q,

$$\csc \theta + \cot \theta = 2$$

$$\Rightarrow \frac{1}{\sin \theta} + \frac{\cos \theta}{\sin \theta} = 2$$

$$\Rightarrow \frac{1 + \cos \theta}{\sin \theta} = 2$$

$$\Rightarrow \frac{2 \cos^2 \frac{\theta}{2}}{2 \sin \frac{\theta}{2} \cdot \cos \frac{\theta}{2}} = 2$$

$$\Rightarrow \cot \frac{\theta}{2} = 2$$

$$\Rightarrow \tan \frac{\theta}{2} = \frac{1}{2}$$

We know that,

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

$$\Rightarrow \sin \theta = \frac{2 \times \frac{1}{2}}{1 + \left( \frac{1}{2} \right)^2}$$

$$\Rightarrow \sin \theta = \frac{1}{\frac{5}{4}} = \frac{4}{5}$$

41. (C) Area of the square when the wire is bent to form square =  $\left(\frac{88}{4}\right)^2 = 484 \text{ cm}^2$   
when the wire is bent in the form of circle then radius of the circle =  $\frac{88}{2\pi}$   
= 14 cm

Then, area of the circle =  $\pi r^2$   
=  $\frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2$

Now, percentage change in the two enclosed areas =  $\frac{616 - 484}{484} \times 100$   
= 27.27%

42. (A) Let the CP of the goods be ₹100  
Then, MP of the goods = ₹120  
A.T.Q,

SP of half the stock =  $120 \times \frac{1}{2} = ₹60$

SP of  $\frac{1}{4}$  th of the stock

=  $60 \times \frac{1}{2} \times \frac{90}{100} = ₹27$

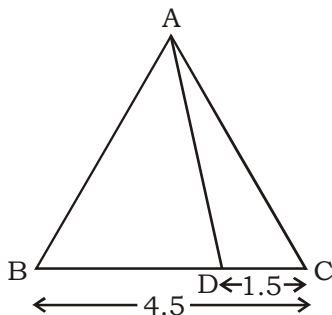
and, SP of remaining  $\frac{1}{4}$  stock

=  $30 \times \frac{80}{100} = ₹24$

∴ Total SP of the good =  $60 + 27 + 24 = ₹111$

Now, profit percent =  $\frac{111 - 100}{100} \times 100 = 11\%$

43. (A)



A.T.Q,

BD = BC - DC

$\Rightarrow BD = 4.5 - 1.5 = 3 \text{ cm}$

Now, BD : DC = 3 : 1.5 = 2 : 1

∴ Areas of  $\triangle ABD$  and  $\triangle ACD$  will be in the ratio 2 : 1

44. (C) A.T.Q,

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

and,  $\frac{1}{x} = 5 - 2\sqrt{6}$

Then,  $x - \frac{1}{x} = (5 + 2\sqrt{6}) - (5 - 2\sqrt{6})$   
=  $4\sqrt{6}$

Taking cube on both sides, we get

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

$\Rightarrow x^3 - \frac{1}{x^3} - 3 \times 4\sqrt{6} = 384\sqrt{6}$

$\Rightarrow x^3 - \frac{1}{x^3} = 396\sqrt{6}$

45. (B) A.T.Q

$p(p^2 + 6p + 12) = p^3 + 6p^2 + 12p$

=  $(p + 2)^3 - 2^3$

=  $(98 + 2)^3 - 8$

=  $100000 - 8 = 999992$

46. (C) We know that,

Distance between two points

=  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

=  $\sqrt{(5 - 3)^2 + (8 - 2)^2}$

=  $\sqrt{2^2 + 6^2} = 2\sqrt{10}$  units

Then, radius of the circle

=  $\frac{2\sqrt{10}}{2} = \sqrt{10}$  units

Now, Area of circle =  $\pi r^2$

=  $\pi \times \sqrt{10} \times \sqrt{10} = 10\pi$  sq. units

47. (C) Required rate =  $\frac{400}{2000} \times 100 = 20\%$

48. (A) Consider the equation  $x^3 + qx + r = 0$

Here, sum of the roots = 0

i.e.  $a + b + c = 0$

∴  $a^3 + b^3 + c^3 - 3abc = 0$

49. (A) We know that,

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

and,  $a : b : c = 1 : \sqrt{3} : 2$

Here,  $a^2 + b^2 = c^2$

So,  $\angle C = 90^\circ$

Now,  $\frac{a}{\sin A} = \frac{c}{\sin C}$

$$\Rightarrow \frac{1}{\sin A} = \frac{2}{\sin 90}$$

$$\Rightarrow \sin A = \frac{1}{2} \Rightarrow A = 30^\circ$$

and,  $\frac{b}{\sin B} = \frac{c}{\sin C}$

$$\Rightarrow \frac{\sqrt{3}}{\sin B} = \frac{2}{\sin 90}$$

$$\Rightarrow \sin B = \frac{\sqrt{3}}{2} = B = 60^\circ$$

$$\therefore \angle A : \angle B : \angle C = 30^\circ : 60^\circ : 90^\circ = 1 : 2 : 3$$

50. (A) A.T.Q,

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$$

$$= \frac{\tan A}{1 - \frac{1}{\tan A}} + \frac{1}{1 - \tan A}$$

$$= \frac{\tan^2 A}{\tan A - 1} - \frac{1}{\tan A(\tan A - 1)}$$

$$= \frac{(\tan A - 1)(\tan^2 A + 1 + \tan A)}{\tan A(\tan A - 1)}$$

$$= 1 + \tan A + \cot A$$

51. (D) A.T.Q,

$$x^2 - c^2 = y$$

On putting the values, we get

$$(a + b)^2 - c^2 = ab$$

$$\Rightarrow a^2 + b^2 + 2ab - c^2 = ab$$

$$\Rightarrow a^2 + b^2 - c^2 = -ab$$

we know that

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\Rightarrow \cos C = \frac{-ab}{2ab}$$

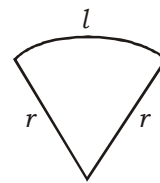
$$\Rightarrow \cos C = \frac{-1}{2} \Rightarrow C = 120^\circ$$

Then, area of  $\triangle ABC$

$$= \frac{1}{2} \times a \times b \times \sin 120^\circ$$

$$= \frac{1}{2} \times a \times b = \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4} ab$$

52. (C)



A.T.Q,

$$r + r + l = 20$$

$$\Rightarrow l = 20 - 2r$$

We know that,

$$\text{Area of sector} = \frac{1}{2} lr$$

$$\text{So, } A = \frac{1}{2} \times (20 - 2r) \times r$$

$$A = r(10 - r)$$

For  $A$  to be maximum when  $r$  and  $(10 - r)$  are equal.

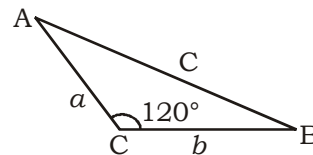
$$\text{So, } r = 10 - r$$

$$\Rightarrow 2r = 10$$

$$\Rightarrow r = 5$$

$$\text{Then, } A = 5 \times 5 = 25 \text{ sq. meter}$$

53. (B)



$$\text{Here, } a = 1 \times 5 = 5 \text{ km,}$$

$$\text{and, } b = 3 \times 5 = 15 \text{ km}$$

We know that,

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\Rightarrow \frac{-1}{2} = \frac{25 + 225 - c^2}{150}$$

$$\Rightarrow c^2 = 325$$

$$\Rightarrow c = 5\sqrt{13} \text{ km}$$



54. (A) A.T.Q,

$$\begin{aligned} \cos(\beta-\gamma) + \cos(\gamma-\alpha) + \cos(\alpha-\beta) &= -\frac{3}{2} \\ \Rightarrow \cos\beta\cos\gamma + \sin\beta\sin\gamma + \cos\gamma\cos\alpha + \\ \sin\gamma\sin\alpha + \cos\alpha\cos\beta + \sin\alpha\sin\beta &= -\frac{3}{2} \\ \Rightarrow 3 + 2\cos\beta\cos\gamma + 2\sin\beta\sin\gamma + 2\cos\gamma\cos\alpha \\ + 2\sin\gamma\sin\alpha + 2\cos\alpha\cos\beta + 2\sin\alpha\sin\beta &= 0 \\ \Rightarrow \sin^2\alpha + \cos^2\alpha + \sin^2\beta + \cos^2\beta + \sin^2\gamma + \cos^2\gamma \\ + 2\cos\beta\cos\gamma + 2\sin\beta\sin\gamma + 2\cos\gamma\cos\alpha + 2\sin\gamma \\ \sin\alpha + 2\cos\alpha\cos\beta + 2\sin\alpha\sin\gamma &= 0 \\ \Rightarrow (\sin\alpha + \sin\beta + \sin\gamma)^2 + (\cos\alpha + \cos\beta + \cos\gamma)^2 \\ \Rightarrow \sin\alpha + \sin\beta + \sin\gamma &= 0 \text{ and} \\ \cos\alpha + \cos\beta + \cos\gamma &= 0 \end{aligned}$$

55. (B) A.T.Q,

$$\begin{aligned} \text{dividend} &= 6^{2x} - (34)^{2x+1} \\ &= 36^x - (34)^{2x+1} \\ &= (35+1)^x - (35-1)^{2x+1} \\ \text{when it is dividend by 7,} \\ \text{Remainder} &= 1^x - (-1)^{2x+1} \\ &= 1 - (-1) = 2 \end{aligned}$$

56. (B) Let  $S = 1 + \frac{2}{3} + \frac{6}{3^2} + \frac{10}{3^3} + \frac{14}{3^4} + \dots$

$$\begin{aligned} \text{Then, } \frac{1}{3}S &= \frac{1}{3} + \frac{2}{3^2} + \frac{6}{3^3} + \frac{10}{3^4} + \dots \\ \Rightarrow \frac{2}{3}S &= 1 + \left(\frac{2}{3} - \frac{1}{3}\right) + \left(\frac{6}{3^2} - \frac{2}{3^2}\right) + \\ \left(\frac{10}{3^3} - \frac{6}{3^3}\right) + \left(\frac{14}{3^4} - \frac{10}{3^4}\right) + \dots \\ \Rightarrow \frac{2}{3}S &= 1 + \frac{1}{3} + \frac{4}{3^2} + \frac{4}{3^3} + \frac{4}{3^4} + \dots \\ \Rightarrow \frac{2}{3}S &= \frac{4}{1 - \frac{1}{3}} \\ \Rightarrow \frac{2}{3}S &= 2 \\ \Rightarrow S &= 3 \end{aligned}$$

57. (D) A.T.Q,

$$\cos(\alpha-\beta) = \frac{3}{5} \Rightarrow \tan(\alpha-\beta) = \frac{4}{3}$$

$$\text{and, } \sin(\alpha+\beta) = \frac{8}{17} \Rightarrow \tan(\alpha+\beta) = \frac{8}{15}$$

$$\begin{aligned} \text{Now, } \tan 2\alpha &= \frac{\tan(\alpha-\beta) + \tan(\alpha-\beta)}{1 - \tan(\alpha+\beta) \cdot \tan(\alpha-\beta)} \\ &= \frac{\frac{4}{3} + \frac{8}{15}}{1 - \frac{4}{3} \times \frac{8}{15}} = \frac{84}{13} \end{aligned}$$

58. (C) In a 3 - D space, we know that,

$$\begin{aligned} \cos^2\alpha + \cos^2\beta + \cos^2\gamma &= 1 \\ \Rightarrow \cos^2 45^\circ + \cos^2 120^\circ + \cos^2\gamma &= 1 \\ \Rightarrow \frac{1}{2} + \frac{1}{4} + \cos^2\gamma &= 1 \\ \Rightarrow \cos^2\gamma &= \frac{1}{4} \end{aligned}$$

Then, the angle made by AB with the positive z-axis =  $60^\circ$

59. (D) A.T.Q,

$$\begin{aligned} A &= \sin^2x + \cos^4x \\ \Rightarrow A &= 1 - \cos^2x + \cos^4x \\ \Rightarrow A &= \left(\cos^2x - \frac{1}{2}\right)^2 + \frac{3}{4} \end{aligned}$$

Here,  $0 \leq \cos^2x \leq 1$

$$\text{So, } \frac{3}{4} \leq A \leq 1$$

60. (A) A.T.Q,

$$\begin{aligned} 3\sin A + 4\cos B &= 6 \dots\dots\dots (i) \\ \text{and, } 4\sin B + 3\cos A &= 1 \dots\dots\dots (ii) \\ \text{Squaring and adding equation (i) and (ii),} \\ \text{we get} \\ 9\sin^2A + 16\cos^2B + 24\sin A\cos B + 16\sin^2B \\ + 9\cos^2A + 24\cos A\sin B &= 6^2 + 1^2 \\ \Rightarrow 9(\sin^2A + \cos^2A) + 16(\sin^2B + \cos^2B) \\ + 24(\sin A\cos B + \cos A\sin B) &= 37 \\ \Rightarrow 25 + 24\sin(A+B) &= 37 \\ \Rightarrow 24\sin(A+B) &= 12 \\ \Rightarrow \sin(A+B) &= \frac{1}{2} \\ \Rightarrow \sin(\pi - C) &= \frac{1}{2} \\ \Rightarrow \sin C = \frac{1}{2} \Rightarrow C &= 30^\circ \end{aligned}$$

61. (B) A.T.Q,

$$\text{Efficiency of } A = 1$$

Efficiency of B = 1.5

Let B worked for  $x$  hours

Then,

$$\frac{A \times 12}{\frac{5}{8}} = \frac{B \times x}{\frac{3}{8}}$$

$$\Rightarrow 3A \times 12 = 5B \times x$$

$$\Rightarrow 3 \times 1 \times 12 = 5 \times 1.5 \times x$$

$$\Rightarrow x = \frac{36}{5 \times 1.5} = 4.8 \text{ hours}$$

62. (C) A.T.Q,

$$\begin{array}{l} 5 \text{ men} \rightarrow 5 \times \frac{8}{5} = 8 \\ 10 \text{ women} \rightarrow 6 \times \frac{100}{60} = 10 \\ 8 \text{ children} \rightarrow 8 \times \frac{100}{40} = 20 \end{array} \left. \vphantom{\begin{array}{l} 5 \text{ men} \\ 10 \text{ women} \\ 8 \text{ children} \end{array}} \right\} 40 \left. \vphantom{\begin{array}{l} 40 \\ 4 \\ 2 \end{array}} \right\} \begin{array}{l} 5 \\ 4 \\ 2 \end{array}$$

Now, efficiency of 5 men, 5 women and

$$4 \text{ children} = 5 + \frac{4}{2} + \frac{2}{2} = 8$$

Then, time taken to complete the work

$$= \frac{40}{8} = 5 \text{ hours}$$

63. (C) Let distance between A and B =  $x$  km  
According to the question,

$$\text{Total time taken by car (t)} = \frac{x}{P_1} + \frac{x}{P_2} + \frac{x}{P_2}$$

$$\Rightarrow t = \frac{P_2x + P_1x + P_1x}{P_1P_2}$$

$\therefore$  Average speed at the car =

$$\frac{3x}{\frac{P_2x + 2P_1x}{P_1P_2}} = \frac{3P_1P_2}{P_2 + 2P_1}$$

64. (B) A.T.Q,

A	B	C
1200	1080	1080
1000	1000	950

Ratio of distance travelled by A, B and C

$$= 1200 \times 1000 : 1080 \times 1000 : 1080 \times 950$$

$$= 1000 : 900 : 855$$

When A travels 800 m, then distance

$$\text{travelled by C} = \frac{855}{1000} \times 800 = 684 \text{ m}$$

$\therefore$  The distance by which A beat C

$$= 800 - 684 = 116 \text{ m}$$

65. (B) Efficiency time

Suresh 120 100

Mahesh 100 120

A.T.Q,

$$120 \text{ units} = 30 \text{ days}$$

$$\Rightarrow 1 \text{ unit} = \frac{1}{4} \text{ days}$$

Then, time taken by Suresh to complete the work

$$= 100 \text{ units} = 100 \times \frac{1}{4} = 25 \text{ days}$$

66. (A) Area of intersecting region

$$= (4\pi - 3\sqrt{3}) \frac{r^2}{6} = \frac{1}{6} (4\pi - 3\sqrt{3}) \text{ cm}^2$$

$$= \left( \frac{2\pi}{3} - \frac{\sqrt{3}}{2} \right) \text{ cm}^2$$

67. (C) We know that,

Sum of the cubes of first  $n$  natural

$$\text{numbers} = \left[ \frac{n(n+1)}{2} \right]^2$$

Sum of the cubes of first 15 natural

$$\text{numbers} = \left( \frac{15 \times (15+1)}{2} \right)^2$$

$$= \left( \frac{15 \times 16}{2} \right)^2 = 15^2 \times 8^2$$

$$\text{Then, average} = \frac{15^2 \times 8^2}{15} = 15 \times 64 = 960$$

68. (C) A.T.Q,

$$P \left[ \frac{r}{100} \right]^2 = 81$$

$$\text{where, } r = \frac{15}{2}$$

$$\text{Then, } P \left[ \frac{15}{200} \right]^2 = 81$$

$$\Rightarrow P = \frac{81 \times 200 \times 200}{15 \times 15}$$

$$\Rightarrow P = ₹ 14400$$

$\therefore$  Principal amount = ₹14400

69. (D) A.T.Q,

$$\sqrt{5x-14} + \sqrt{5x+14} = 7 + \sqrt{21}$$

Squaring both side, we get

$$5x - 14 + 5x + 14 + 2\sqrt{25x^2 - 14^2}$$

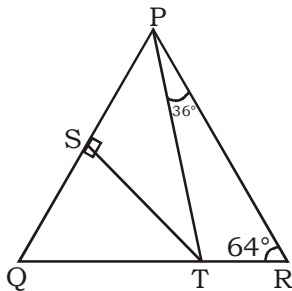
$$= 49 + 21 + 2 \times 7\sqrt{21}$$

On comparing we get,

$$10x = 70 \text{ and } 2\sqrt{25x^2 - 196} = 14\sqrt{21}$$

So,  $x = 7$

70. (B)



We know that the sum of two interior angle is equal to the external angle

$$\text{So, } \angle PTQ = 64^\circ + 36^\circ = 100^\circ$$

Now, In  $\Delta TQS$ ,

$$\angle T = \frac{100^\circ}{2} = 50^\circ \text{ and } \angle S = 90^\circ$$

$$\text{Then, } \angle PQR = 180^\circ - (50^\circ + 90^\circ) = 180^\circ - 140^\circ = 40^\circ$$

71. (B) Let the revolutions made during the journey be  $n$ .

Then,

$$n \times 2\pi r = \frac{900000}{60} \times 55$$

$$\Rightarrow n \times \frac{22}{7} \times 21 = \frac{900000 \times 55}{60}$$

$$\Rightarrow n = \frac{900000 \times 55 \times 7}{60 \times 22 \times 21}$$

$$\Rightarrow n = 12500$$

72. (A) A.T.Q,

$$\left\{ \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3 \right\} \frac{3}{4} = \frac{4}{3}\pi R^3$$

$$\Rightarrow \frac{4}{3}\pi(r_1^3 + r_2^3 + r_3^3) \times \frac{3}{4} = \frac{4}{3}\pi R^3$$

$$\Rightarrow (2^3 + 4^3 + 6^3) \times \frac{3}{4} = R^3$$

$$\Rightarrow R = 6$$

Then, diameter of the new ball =  $2 \times 6 = 12$  cm

73. (D) A.T.Q,

$$x \times \frac{2 \tan^2 15^\circ}{2 - (1 + \tan^2 15^\circ)} = \cos 30^\circ + \sin 60^\circ$$

$$\Rightarrow x \times \frac{2 \tan^2 15^\circ}{1 - \tan^2 15^\circ} = \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}$$

$$\Rightarrow x \times \tan 30^\circ = \sqrt{3}$$

$$\Rightarrow x \times \frac{1}{\sqrt{3}} = \sqrt{3} \Rightarrow x = 3$$

74. (B) A.T.Q,

$$25\% = \frac{1}{4} \rightarrow \text{Profit}$$

$$4 \rightarrow \text{CP}$$

$$\text{Then, } SP = 4 + 1 = 5$$

Now,

Number of pens bought for 4 rupees

$$= 4 \times 5 = 20$$

and, SP of 20 pens = ₹5

Then,

$$\text{Number of pens sold for ₹5} = \frac{20}{5} = 4$$

75. (A) In an equilateral triangle, the ratio of inradius and circumradius is 1 : 2.

76. (C) A.T.Q,

$$\frac{x + \sqrt{x^2 - 1}}{x - \sqrt{x^2 - 1}} - \frac{x - \sqrt{x^2 - 1}}{x + \sqrt{x^2 - 1}} = 112\sqrt{3}$$

$$\Rightarrow \frac{(x + \sqrt{x^2 - 1})^2 - (x - \sqrt{x^2 - 1})^2}{(x - \sqrt{x^2 - 1})(x + \sqrt{x^2 - 1})} = 112\sqrt{3}$$

$$\Rightarrow \frac{4x\sqrt{x^2 - 1}}{x^2 - (x^2 - 1)} = 112\sqrt{3}$$

$$\Rightarrow x\sqrt{x^2 - 1} = 28\sqrt{3}$$

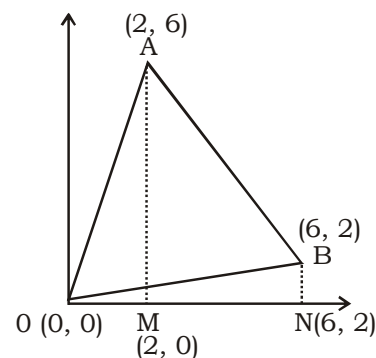
Squaring both sides, we get

$$x^2(x^2 - 1) = 28 \times 28 \times 3$$

$$\Rightarrow x^4 - x^2 - 2352 = 0$$

On solving, we get  $x = 7$

77. (A)



Area of  $\Delta OAB$

$$\begin{aligned} &= \text{ar}(\Delta OAM) + \text{ar}(AMNB) - \text{ar}(\Delta OBN) \\ &= \frac{1}{2} \times 2 \times 6 + \frac{1}{2} (6+2) \times 4 - \frac{1}{2} \times 6 \times 2 \\ &= 16 \text{ sq. units} \end{aligned}$$

78. (B) A.T.Q,

$$p(x+y)^2 = 5 \Rightarrow (x+y)^2 = \frac{5}{p}$$

$$\text{and, } q(x-y)^2 = 3 \Rightarrow (x-y)^2 = \frac{3}{q}$$

$$\text{Now, } (x+y)^2 - (x-y)^2 = \frac{5}{p} - \frac{3}{q}$$

$$\Rightarrow 4xy = \frac{5q-3p}{pq}$$

$$\Rightarrow 4pqxy = 5q-3p$$

$$\text{Then, } p^2(x+y)^2 + 4pqxy - q^2(x-y)^2$$

$$= 5p + (5q-3p) - 3q$$

$$= 5p + 5q - 3p - 3q$$

$$= 2p + 2q = 2(p+q)$$

79. (D) A.T.Q,

$$x = \frac{5-2\sqrt{6}}{5+2\sqrt{6}}$$

$$\Rightarrow x = \frac{(5-2\sqrt{6})(5-2\sqrt{6})}{(5+2\sqrt{6})(5-2\sqrt{6})}$$

$$\Rightarrow x = 25 + 24 - 20\sqrt{6}$$

$$\text{similarly, } y = 49 + 20\sqrt{6}$$

$$\text{Then, } x+y = 98$$

Squaring both sides, we get

$$x^2 + y^2 + 2xy = 98^2$$

$$\Rightarrow x^2 + y^2 = 98^2 - 2 = 9602$$

80. (B) When medians of a triangle intersect each other at right angle

$$\text{Then, } AB^2 + AC^2 = 5BC^2$$

$$\Rightarrow 5BC^2 = 18^2 + 21^2$$

$$\Rightarrow 5BC^2 = 324 + 441$$

$$\Rightarrow BC^2 = \frac{765}{5}$$

$$\Rightarrow BC^2 = 153$$

$$\Rightarrow BC = 3\sqrt{17} \text{ cm}$$

81. (C) A.T.Q,

$$x = 3^{\frac{1}{3}} + 3^{-\frac{1}{3}}$$

Taking cube on both sides, we get

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

$$\Rightarrow x^3 = \frac{10}{3} + 3x$$

$$\Rightarrow 3x^3 - 9x = 10$$

$$\Rightarrow 3x^3 - 9x - 8 = 2$$

82. (A) Speed of runner A =  $\frac{400}{80} = 5 \text{ m/s}$

$$\text{and, speed of runner B} = \frac{200}{50} = 4 \text{ m/s}$$

Now, Time taken by A to finish 1200

$$\text{metre race} = \frac{1200}{5} = 240 \text{ sec.}$$

Then, distance travelled by B in 240 sec. =  $240 \times 4 = 960 \text{ m}$

$\therefore$  Distance by which A beat B

$$= 1200 - 960 = 240 \text{ m}$$

83. (C) Let the numbers of markers of the institution be  $x$ .

Then, A.T.Q,

$$x \times 80 = 15 \times 600 + (x-15)60$$

$$\Rightarrow 80x = 9000 + 60x - 900$$

$$\Rightarrow 80x - 60x = 9000 - 900$$

$$\Rightarrow 20x = 8100$$

$$\Rightarrow x = 405$$

$\therefore$  Total number of the workers of the institution = 405

84. (C) We know that,

$$P = \frac{x}{\left(1 + \frac{r}{100}\right)} + \frac{x}{\left(1 + \frac{r}{100}\right)^2} + \dots + \frac{x}{\left(1 + \frac{r}{100}\right)^n}$$

where P = principal sum

$x$  = amount of each installment

$r$  = rate of interest

and  $n$  = number of installments

$$\text{Then, } 25200 = x \left[ \frac{20}{21} \right] + x \left[ \frac{20}{21} \right]^2 + x \left[ \frac{20}{21} \right]^3$$

$$\Rightarrow 25200 = x \times \frac{20}{21} \left[ 1 + \frac{20}{21} + \frac{400}{441} \right]$$

$$\Rightarrow x = \frac{25200 \times 21 \times 441}{20 \times 1261} = ₹ 9253.65$$

85. (C) Let  $x = \sqrt{a+b} - \sqrt{a-b}$

where  $a = 3$  and  $b = \sqrt{-2+6\sqrt{2}}$

Squaring both sides, we get

$$x^2 = (a + b) + (a - b) - 2\sqrt{a^2 - b^2}$$

$$\Rightarrow x^2 = 2a - 2\sqrt{a^2 - b^2}$$

On putting the respective values

$$x^2 = 2 \times 3 - 2\sqrt{3^2 - (\sqrt{-2 + 6\sqrt{2}})^2}$$

$$\Rightarrow x^2 = 6 - 2\sqrt{9 + 2 - 6\sqrt{2}}$$

$$\Rightarrow x^2 = 6 - 2(3 - \sqrt{2})$$

$$\Rightarrow x^2 = 6 - 6 + 2\sqrt{2}$$

$$\Rightarrow x^2 = 2\sqrt{2}$$

$$\Rightarrow x = 2^{\frac{3}{4}}$$

86. (A) Area of the regular octagon in a circle

$$= \frac{1}{2} r^2 \sin 45^\circ \times 8$$

$$= \frac{1}{2} \times 2 \times 2 \times \frac{1}{\sqrt{2}} \times 8$$

$$= 8\sqrt{2} \text{ sq. units}$$

87. (D) A.T.Q,

$$\sec \theta \operatorname{cosec} \theta = \frac{1}{\cos \theta \cdot \sin \theta}$$

$$= \frac{\sin^2 \theta + \cos^2 \theta}{\cos \theta \cdot \sin \theta} = \tan \theta + \cot \theta$$

$$\text{let } \tan \theta = x \text{ and } \cot \theta = \frac{1}{x}$$

$$\text{Then, } x^5 + \frac{1}{x^5} = 123$$

$$\Rightarrow \left(x^3 + \frac{1}{x^3}\right) \left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right) = 123$$

$$\Rightarrow \left(x + \frac{1}{x}\right)^3 - 3\left(x + \frac{1}{x}\right) \left[\left(x + \frac{1}{x}\right)^2 - 2\right] -$$

$$\left(x + \frac{1}{x}\right) = 123$$

$$\text{put } x + \frac{1}{x} = t$$

$$\Rightarrow (t^3 - 3t)(t^2 - 2) - t = 123$$

Using options; we get  $t = 3$

$$\therefore \sec \theta \operatorname{cosec} \theta = 3$$

88. (B) S.P of the toy =  $500 \times \frac{80}{100} \times \frac{95}{100} = ₹380$

89. (C) A B  
 $6000 \times 8$        $8000 \times 9$   
 $\frac{+10000 \times 4}{88000}$        $\frac{+3000 \times 3}{81000}$

Ratio of profit of A and B = 88 : 81

Now, the amount which A takes as allowance =  $150 \times 12 = ₹ 1800$

Then, Remaining profit =  $10250 - 1800 = ₹ 8450$

This profit is shared between A and B

$$\text{So, share of B} = \frac{8450}{88+81} \times 81 = ₹4050$$

90. (A) Total age reduced when an old student is replaced by a new student =  $35 \times 4 = 140$  months

Then, age of the new student = 22 years - 140 months = 10 years 4 months

91. (D) A.T.Q,

Time taken to travel from A to C and back = 16 hours

Then, time taken to travel from A to B and back =  $2 \times 16 = 32$  hours

Now, time taken to travel from B to A

$$= 32 - 20\frac{1}{3} = 11\frac{2}{3} \text{ hours}$$

92. (C) Percentage of candidates who passed in the examination =  $82 + 75 - 78 = 79$

Then, percentage of candidates who failed in the examination =  $100 - 79 = 21$

A.T.Q,

$$21\% = 4200$$

Then, total number of candidates = 100%

$$= \frac{4200}{21} \times 100 = 20000$$

93. (B) Milk Water

A	3	2	5	× 12 × 1
B	3	1	4	× 15 × 2
C	2	1	3	× 20 × 3

Now, New ratio -

	Milk	Water
A	36	24
B	90	30
C	120	60

$$246 : 114$$

$$41 : 19$$

Then, required ratio = 41 : 19

94. (D) A.T.Q,

$$40\% = \frac{2}{5}$$

Then, CP  $\rightarrow$  5

$$\text{MP} \rightarrow 5 + 2 = 7$$

and 10% discount =  $\frac{1}{10} \rightarrow$  discount  
 $\rightarrow$  MP

So, MP  $\rightarrow$  10 and SP  $\rightarrow$  10 - 1  $\rightarrow$  9

CP	MP	SP
5	7	7
<u>10</u>	<u>10</u>	<u>9</u>
50	70	63

$$\text{Now, gain percent} = \frac{63 - 50}{50} \times 100 = 26\%$$

95. (C) A.T.Q,

$$\frac{2}{3}A = \frac{3}{5}B$$

$$\Rightarrow \frac{A}{B} = \frac{9}{10}$$

Now, (9 + 10) units = 2850

$$\Rightarrow 1 \text{ unit} = 150$$

Then, profit of B = 10 units

$$= 10 \times 150 = ₹1500$$

96. (B) A.T.Q,

$$72^\circ = ₹1875$$

Then, monthly income of the family

$$= 360^\circ = \frac{1875}{72} \times 360 = ₹ 9375$$

97. (D) Percentage of savings =  $\frac{108}{360} \times 100$

$$= 30\%$$

98. (B) Ratio of expenses on rent and food  
 $= 72 : 90 = 4 : 5$

99. (A) A.T.Q,

monthly income of the family ( $360^\circ$ )  
 $= 15000$

Now, average of expenses on rent, food

$$\text{and miscellaneous} = \frac{72 + 90 + 72}{3} = 78^\circ$$

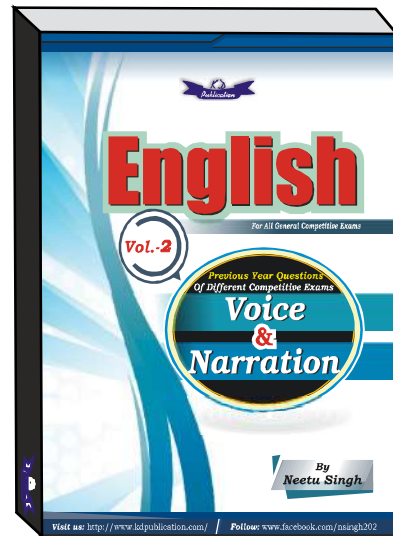
As,  $360^\circ = ₹ 15000$

$$\text{Then, } 78^\circ = \frac{15000}{360} \times 78 = ₹ 3250$$

100. (C) Ratio of average of expenses on food, rent and miscellaneous items to the average of expenses on savings and clothing

$$= \frac{72 + 72 + 90}{3} : \frac{108 + 18}{2}$$

$$= \frac{234}{3} : \frac{126}{2} = 26 : 21$$



**Note:- If you face any problem regarding result or marks scored, please contact 9313111777**

**Note : Whatsapp with Mock Test No. and Question No. at 705360571 for any of the doubts. Join the group and you may also share your suggestions and experience of Sunday Mock Test.**

**Note:- If your opinion differs regarding any answer, please message the mock test and question number to 8860330003**