ACE OF PACE SOLUTION

1. **(A)**

$$\frac{7x+3y}{3x+8y}=\frac{9}{17}$$

$$\Rightarrow 92x=21y$$

$$\Rightarrow \frac{x}{y}=\frac{21}{92}$$

2. **(A)**

$$\frac{2^{8m+2n+1}\times 3^{3m-n-3}\times 5^{5m+3n+4}}{2^{8m+2n+1}\times 3^{3m-n-3}\times 5^{5m+3n+4}}=1$$

3. **(B)**

$$\alpha^3+\beta^3+\gamma^3-3\alpha\beta\gamma=-1-8+27-18=0$$

4. **(C)**

Let number be x, then x = $27.\frac{1}{x^2}\Rightarrow x=3$

5. **(D)**

$$x+y=12,\ xy=32$$

$$x+\frac{32}{x}=12\Rightarrow x^2-12x+32=0$$

$$x=8,4\Rightarrow y=4,8$$

$$\Rightarrow \frac{1}{x}+\frac{1}{y}=\frac{1}{8}+\frac{1}{4}=\frac{3}{8}$$

6. **(C)**

$$2y^2-9y+4=(2y-1)(y-4)$$

$$\Rightarrow y=\frac{1}{2},4$$

7. **(B)**

$$4^{x+2y}=4^{2x+5y}$$

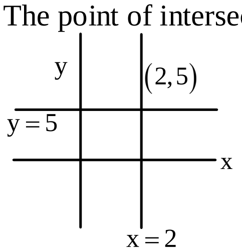
$$x+2y=2x+5y$$

$$-x=3y$$

$$\Rightarrow y=\frac{-x}{3}$$

8. **(A)**

The point of intersection of x = 2 and y = 5 is (2, 5)



9. **(A)**

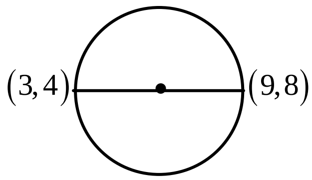
x-coordinate +ve and y-coordinates +ve , so it is the Ist quadrant.

10. **(C)**

$\sqrt{(6-4)^2+(9-5)^2}=2\sqrt{5}$

11. **(B)**

$\text{centre}=\left(\frac{3+9}{2},\frac{4+8}{2}\right)=(6,6)$



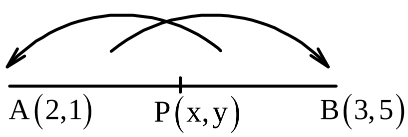
12. **(B)**

Area of triangle = $\frac{1}{2}\times\text{base}\times\text{height}$

$=\frac{1}{2}\times2\times4=4\,\text{sq.units}$

13. **(B)**

14. **(B)**



$x=\frac{2\times3+3\times2}{2+3}=\frac{12}{15}$ $\qquad$ $y=\frac{2\times5+3\times1}{2+3}=\frac{13}{5}$

Hence $\left(\frac{12}{5},\frac{13}{5}\right)$

15. **(C)**

$x^2-14x+45=0$

$(x-9)(x-5)=0$

So, the roots of eq. x = 9, 5

16. **(B)**

For $x^2+2x-3=0$

$\alpha+\beta=-2,\qquad \alpha\beta=-3$

Now $\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}=\frac{-2}{-3}=\frac{2}{3}$

17. **(C)**

Let the roots be α and α^2

$x^2 + 6mx + 64 = 0$

Product of roots = $\frac{c}{a} = \alpha \times \alpha^2 = \alpha^3 = 64 \Rightarrow \alpha = 4$

So, the roots are 4 and 16.

Sum of the roots $= -\frac{b}{a} = -6m = 4 + 16$

$\Rightarrow m = \frac{-20}{6} = \frac{-10}{3}$

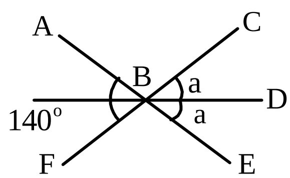
18. **(C)**

Saving = $5000 - \left[\frac{15}{100} \times 5000 + \frac{28}{100} \times 5000 + \frac{10}{100} \times 5000\right]$

= 2350

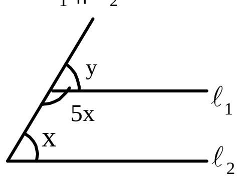
19. **(B)**

$140 = 2a \Rightarrow a = 70$



20. **(A)**

$\because \ \ell_1 \parallel \ell_2$



(Corresponding angles)

y = x

5x + x =180

$\Rightarrow$ x = 30 = y

21. **(B)**

We know that

$a^3 + b^3 + c^3 - 3abc$

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

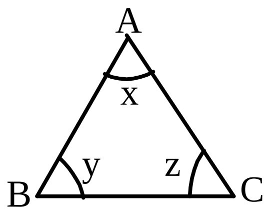
If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

22. **(A)**

We know x + y + z = 180

And $y - x = 15 \Rightarrow x = y - 15$

And $z - y = 15 \qquad z = 15 + y$



On substituting there in eq.(i) we get $(y-15)+y+(15+y)=180$

$3y=180 \Rightarrow y=60^o$

23. **(D)**

Let the side lengths of the two cubes be l_1 and l_2. Using the given value for the ratio of the volumes, we have:

$$\frac{l_1^3}{l_2^3}=k \Rightarrow \frac{l_1}{l_2}=\sqrt[3]{k}$$

The ratio of the surface areas will be

$$\frac{6l_1^2}{6l_2^2}=\left(\sqrt[3]{k}\right)^2=\sqrt[3]{k^2}$$

24. **(A)**

The surface area of a sphere varies as the square of the radius, while the volume varies as the cube of the radius. Thus, only the surface area will increase by a factor of 4

25. **(A)**

The highest power of the variable x is 4 so, the degree of the polynomial is 4

26. **(D)**

We have

$a=1, b=-4, c=-3$

Using the quadratic formula, the zeroes are:

$$x=\frac{-(-4)\pm\sqrt{(-4)^2-4\times1\times(-3)}}{2\times1}$$

$$=\frac{4\pm\sqrt{28}}{2}$$

$$=\frac{4\pm2\sqrt{7}}{2}(\text{how?})$$

$$=2\pm\sqrt{7}$$

27. **(C)**

We have

$\angle AXF=a=60^o$ [Corresponding angles]

Now,

$\angle AXE+\angle AXF=180^o$

$\Rightarrow \angle AXE=180^o-\angle AXF=120^o$

$\Rightarrow \angle EXG=\angle AXG-\angle AXE=20^o$

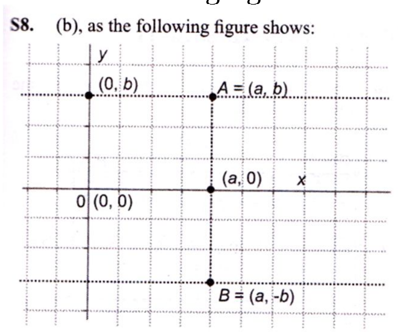
$\Rightarrow b=\angle EXG=20^o$

28. **(B)**

Since OB = OC (radii), we have $\angle OCB = \angle OBC = 50^o$. Thus $\angle BDA = \angle BCA = 50^o$

29. **(B)**

As the following figure shows:



30. **(D)**

(A) $\sqrt{3}+\sqrt{2} = \sqrt{3}+\sqrt{2}\times\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{1}{\sqrt{3}-\sqrt{2}}$

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

(C) $\frac{\sqrt{3}-\sqrt{2}}{5-2\sqrt{6}}\times\frac{5+2\sqrt{6}}{5+2\sqrt{6}}$

$= 5\sqrt{3}+6\sqrt{2}-5\sqrt{2}-4\sqrt{3} = \sqrt{3}+\sqrt{2}$

(D) $\frac{\sqrt{3}}{9-\sqrt{6}} = \frac{\sqrt{3}}{\sqrt{3}\left(3\sqrt{3}-\sqrt{2}\right)} = \frac{1}{3\sqrt{3}-\sqrt{2}}$

31. **(B)**

We have

$$\cos\theta = \frac{1}{\sec\theta} = \frac{4}{5}$$

$$\Rightarrow \sin\theta = \sqrt{1-\cos^2\theta} = \frac{3}{5}$$

Also,

$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{3}{4}$$

$$\Rightarrow \cot\theta = \frac{1}{\tan\theta} = \frac{4}{3}$$

Thus,

$$E = \frac{\frac{3}{5}-\frac{8}{5}}{\frac{3}{4}-\frac{4}{3}} = \frac{-1}{\frac{-7}{12}} = \frac{12}{7}$$

32. **(D)**

If ℓ is the length of each of the triangle's sides, we have:

$$\frac{\sqrt{3}}{4}\ell^2 = 16\sqrt{3} \Rightarrow \ell = 8\text{cm}$$

Thus, the perimeter of the triangle is 3ℓ, or 24 cm.

33. **(A)**

The area of a rhombus is half of the product of its diagonal:

Area = $\frac{1}{2}\times 16\times 10 = 80\text{cm}^2$

34. **(C)**

Let the original length of the rectangle be *l*, and its original breadth be b. The original area is $A_0 = lb$

The new area will be

$A_n = (1.2l)\times(0.8)b$

$= 0.96lb$

$= 0.96\ A_0$

Clearly, the area has decreased by 4%

35. **(C)**

Arrange the given numbers in ascending order 5,5,7,9,9,12,13,13,13,17,17,17,18.

The number of terms = 13 (odd)

Median $= \left(\frac{n+1}{2}\right)^{th}$ term

$= \left(\frac{13+1}{2}\right)^{th}$ term = 7^{th} term = 13

36. **(C)**

$$\frac{2x+2x+3+2x+5+2x+7+2x+10}{5} = 11$$

$\Rightarrow 10x + 25 = 55 \Rightarrow x = 3$

$\therefore$ Last three observations are 2x + 5 , 2x + 7

$2x + 10$, i.e., 11, 13, 16

$\therefore$ Mean $= \frac{11+13+16}{3} = \frac{40}{3} = 13\frac{1}{3}$

37. **(A)**

Arranging the data in ascending order, we have

2, 14, 15, 15, 18,19, 41, 51, 51, 51, 51, 71, 91

Mode = Highest occurring number

$\therefore$ Mode = 51

38. **(C)**

Sum of 8 observations = $40\times 8 = 320$

Sum of 7 observations = $30\times 7 = 210$

Excluded observation $= 320 - 210 = 110$

39. (C)

Total number = 11 $\therefore$ n(S) = 11

Let E = odd numbers = 1,3,5,7,9,11 $\therefore$ n(E) = 6

$\Rightarrow P(E) = \frac{n(E)}{n(S)} = \frac{6}{11}$

40. (D)

Number of fruits in the basket = 10 = n(S)

Let E = chosen fruit is orange $\Rightarrow n(E) = 3$

$\Rightarrow P(E) = \frac{n(E)}{n(S)} = \frac{3}{10}$

41. (C)

When a pair of dice is rolled, number of elements in sample space is $6 \times 6 = 36$ = n(S)

Let E = getting a sum of 2 i.e., (1, 1).

$\therefore \quad n(E) = 1$

$\Rightarrow P(E) = \frac{n(E)}{n(S)} = \frac{1}{36}$

42. (B)

$AC^2 = OA^2 - OC^2 = 25 - 9 = 16$

$\Rightarrow AC = 4cm$

$\Rightarrow AB = 2 \times AC = 8cm$

43. (A)

In ΔABC, $40^o + 110^o + \angle C = 180^o$

$\Rightarrow \angle C = 180^o - 150^o = 30^o$

Now, $\angle AOB = 2 \times \angle C$

$\Rightarrow x = 2 \times 30^o = 60^o$

44. (D)

ar (trap. PQRS)

$= ar(rect. PSRT) + ar(\Delta QRT)$

$= PT \times RT + \frac{1}{2}(QT \times RT)$

$= 8 \times RT + \frac{1}{2}(8 \times RT) = 12 \times RT$ …….(i)

Now, in $\Delta QRT, RT^2 = QR^2 - QT^2 = 17^2 - 8^2$

$\Rightarrow RT = 15cm$

Substitute the value of RT in (i) , we get

ar(trap. PQRS) = 12 $\times$ 15cm^2 = 180cm^2

45. (C)

Area of rhombus = $\frac{1}{2} \times d_1 \times d_2$; where d_1, d_2; where $d_1 = d_2$ are lengths of diagonals.

$\Rightarrow 20 = \frac{1}{2} \times 5 \times d_2 \quad [\because d_1 = 5]$

$\Rightarrow d_2 = 8cm$

46. **(B)**

In ΔBCD by Pythagoras theorem,

$BD^2 + BC^2 = CD^2 \Rightarrow (BD)^2 + (24)^2 = 26^2$

$\Rightarrow BD^2 = (10)^2 \Rightarrow BD = 10cm$

In ΔABD by Pythagoras theorem

$AB^2 = BD^2 - AD^2 = (10)^2 - (6)^2 = 100 - 36 = 64$

$\Rightarrow AB = 8cm$

$\therefore$ Area of quadrilateral = $ar(\Delta ABD) + ar(\Delta BCD)$

$= \left[\frac{1}{2} \times 6 \times 8 + \frac{1}{2} \times 24 \times 10\right] cm^2 = 144 cm^2$

47. **(C)**

Since $AB \| CD$

$\Rightarrow x + 2x + x + 5x = 180^o$ [Co-interior angles]

$\Rightarrow 9x = 180^o$

$\therefore x = 20^o$

48. **(C)**

We have, $l \| m,\ l \| n \Rightarrow m \| n$.

Now, $x : y = 3 : 2$

$\Rightarrow x = \frac{3}{2} y$

Also $x + y = 180^o$ [co-interior Angles]

$\Rightarrow \frac{3}{2} y + y = 180^o \Rightarrow y = 72^o$

Also, x = z …..(ii) [alternate Interior Angles]

From (i) and (ii) , we have

$z = \frac{3}{2} y \Rightarrow z = \frac{3}{2} \times 72^o = 108^o$

49. **(A)**

$\angle A : \angle B : \angle C = 2 : 3 : 5$

$\Rightarrow \angle A = 2x,\ \angle B = 3x,\ \angle C = 5x$

$\therefore \angle A + \angle B + \angle C = 2x + 3x + 5x = 10x$

$\Rightarrow 10x = 180^o$ [Angle sum property of a triangle]

$\Rightarrow x = 18^o$

$\Rightarrow \angle B = 3 \times 18^o = 54^o$

50. **(D)**

As Q is in III quadrant,

$\therefore$ Coordinates of Q are $\left(-\frac{13}{3}, -\frac{10}{3}\right)$