SECTION A : SOLUTION

1. **(D)**

H.C.F. of 44 & 32 is 4.

$\therefore$ Minimum no. of rows $= \frac{44}{4} + \frac{32}{4} = 19$

2. **(A)**

$f(x) = x^2 + 6x + a = (x+8)(x-2) = x^2 + 6x - 16$

$\therefore\ a = -16$

Similarly $b = -12$ & $c = 48$

$\therefore\ a + b + c = -16 - 12 + 48 = 20$

3. **(B)**

$$x = \frac{\left(1-\frac{1}{2}\right)\left(1+\frac{1}{2}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{16}\right).....}{\left(1-\frac{1}{2}\right)}$$

$$= \frac{1}{1/2} = 2$$

4. **(A)**

$a^2 - 4a + 4 + b^2 + 2b + 1 = 0$

$\Rightarrow\ (a-2)^2 + (b+1)^2 = 0$

$\therefore\ a = 2$ & $b = -1$

5. **(A)**

Given: $\frac{28}{x+y} + \frac{12}{x-y} = 5$ .....(1)

$\frac{21}{x+y} + \frac{10}{x-y} = 4$ .....(2)

$\therefore\ x = 9$ & $y = 5$

$\therefore$ Speed in still water = 9 kmph

6. **(D)**

Given: $30x + 40y = 360$

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

x & y are positive integers

$\therefore\ y = 3$ or 6

$\Rightarrow\ x = 8, 1$

$\therefore$ Two combinations.

7. **(B)**

Remainder $= f\left(\frac{1}{2}\right)$

$$= \frac{1}{2} - 3 + 7 - 3 = \frac{3}{2}$$

8. **(A)**

Area of shaded region = Area of sector PQS – Area of ΔPQS

$$= \frac{49\pi}{4} - \frac{49}{2} = \frac{49}{4}(\pi - 2)$$

9. **(D)**

$$x = \frac{-2+4+4}{3} = 2$$

$$y = \frac{3+(-3)+5}{3} = \frac{5}{3}$$

10. **(C)**

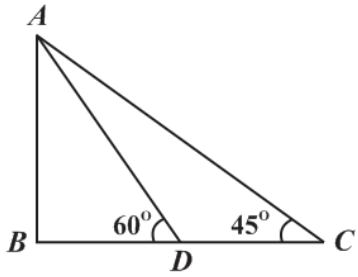
$$(4a+5b+5c)^2 - (5a+4b+4c)^2 + 9a^2$$

$$= (9a+9b+9c)(-a+b+c) + 9a^2$$

$$= 9\left[(b+c)^2 - a^2\right] + 9a^2 = 9(b+c)^2$$

$$\therefore \text{ Sq. root} = 3(b+c)$$

11. **(D)**



$$\frac{AB}{BC} = \tan 45^\circ = 1$$

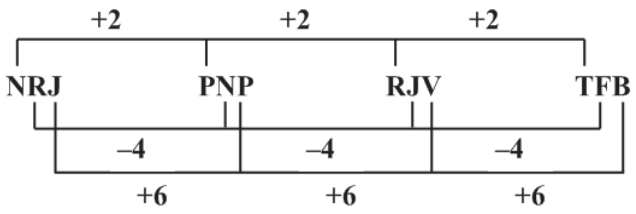
$$\Rightarrow \frac{AB}{BD+CD} = 1 \Rightarrow AB = 50 + BD$$

and $\frac{AB}{BD} = \tan 60^\circ = \sqrt{3}$

$$\Rightarrow BD = \frac{AB}{\sqrt{3}}$$

$$\therefore \quad AB\left(1 - \frac{1}{\sqrt{3}}\right) = 50 \Rightarrow AB = 25\left(3 + \sqrt{3}\right)$$

12. **(B)**



13. (C)

$12+19-1=30$

14. (C)

15. (A)

16. (B)

17. (C)

18. (D)

19. (A)

Since triangle ABC is equilateral, each angle is $60°$.

Hence, $\angle ABC = \angle BCA = \angle BAC = 60°$

In the cyclic quadrilateral ADCB, the opposite angles are supplementary.

Hence, $\angle ABC + \angle ADC = 180°$

$\angle ADC = 180° - \angle ABC$

$= 180° - 60°$

$= 120°$

Since triangle ADC is isosceles and AD = CD, $\angle CAD = \angle DCA$

In triangle ADC,

$\angle ADC + \angle DCA + \angle CAD = 180°$

$120° + \angle DCA + \angle DCA = 180°$

$$\angle DCA = \frac{(180° - 120°)}{2}$$

$= 30°$

Hence, $\angle BAC = 60°, \angle ACD = 30°$

20. (A)

Perpendicular ON and OM bisect the chords AB and CD.

Hence, AM = MB = 8/2 = 4cm and CN = ND = 6/2 = 3cm.

Also, OA = OC = 5cm

Consider the right triangles AMO and CNO and apply the Pythagoras theorem

$OA^2 = AM^2 + OM^2$

$5^2 = 4^2 + OM^2$

$25 = 16 + OM^2$

$OM = \sqrt{25-16} = \sqrt{9} = 3\text{cm}$

$OC^2 = ON^2 + CN^2$

$5^2 = ON^2 + 3^2$

$25 = ON^2 + 9$

$ON = \sqrt{25-9} = \sqrt{16} = 4\,\text{cm}$

The distance between the two chords is equal to the sum of ON and OM.

ON + OM = 4 + 3 = 7cm

21. (D)

22. (B)

23. (B)

Black dot should be in right corner with opposite direction of arrow and arrow should be under the black bot

24. (A)

The colours adjacent to yellow are orange, blue, red and rose. Hence violet will be opposite to yellow.

25. (A)

In the given figure, $\angle LPM$ is a right angle since it lies in the semi-circle.

Consider ΔLPO and ΔMPO, LO = MO (they are both equal to radius)

$\angle LOP = \angle MOP = 90^0$

OP = OP (common line)

Hence, the two triangles are congruent by SAS.

Thus, LP = MP

Hence triangle LPM is isosceles

$\angle PLM = \angle PML$

In triangle LPM,

$\angle LPM + \angle PML + \angle PLM = 180° \left(\angle PLM = \angle PLM\right)$

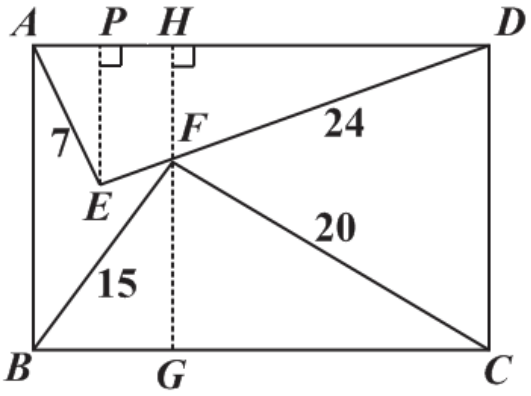
$\angle PML = \dfrac{180° - 90°}{2} = 45°$

The two angles PML and PNL lie in the same segment and hence they are equal.

$\angle LNP = 45°$

SECTION B : SOLUTION

26. (50)



In ΔAED

$AD = \sqrt{7^2 + 24^2} = 25 = BC$

In ΔBFG

$CF = \sqrt{25^2 - 15^2} = 20$

Also $BF \cdot FC = BC \cdot FG$

$$FG = \frac{15 \times 20}{25} = 12$$

And $CG = \sqrt{20^2 - 12^2} = 16 = DH$

In ΔDEA

$$EP = \frac{AE \times DE}{AD} = \frac{(7 \times 24)}{25}$$

And $DP = \sqrt{24^2 - EP^2} = \frac{(24)^2}{25}$

$\Delta DEP \sim \Delta DFH$

$$\frac{FH}{PE} = \frac{DH}{DP}$$

$$FH = \frac{7 \times 24}{25} \times \frac{16}{(24)^2} 25$$

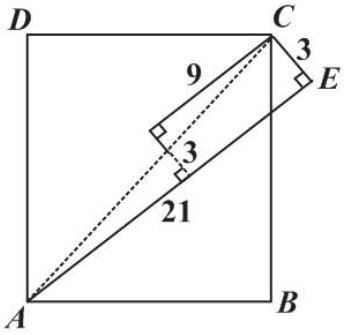
$$= \frac{14}{3}$$

$$x = FH + FG$$

$$x = 12 + \frac{14}{3}$$

$$3x = 50$$

27. (15)



AE = 21

Length of $AC = \sqrt{21^2 + 3^2}$

$$= \sqrt{450}$$

$$= 15\sqrt{2}$$

$$x = \frac{AC}{\sqrt{2}} = \frac{15\sqrt{2}}{\sqrt{2}} = 15$$