SECTION- A

1. (b)
2. (d)
3. (c)
4. (c)
5. (d)
6. (a)
7. (c)
8. (b)
9. (d)
10. (a)
11. (b)
12. (a)
13. (c)
14. (b)
15. (d)
16. (a)
17. (c)
18. (a)
19. (b)
20. (d)

SECTION- B

21.

$7x - 2y = 5$ ……. (i)

$8x + 7y = 15$ ……….. (ii)

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

$x = 1, y = 1$

Verification of answer

22. Total number of remaining cards $= 51$

P(getting queen of heart) $= \dfrac{1}{51}$

23. (A) $2\sqrt{2} \times \frac{1}{\sqrt{2}} \times \frac{1}{2} + 2\sqrt{3} \times \frac{\sqrt{3}}{2}$

$= 4$

OR

(B) LHS $= \sin(60^\circ + 30^\circ) = \sin 90^\circ = 1$

RHS $= \sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$

$= \dfrac{\sqrt{3}}{2} \times \dfrac{\sqrt{3}}{2} + \dfrac{1}{2} \times \dfrac{1}{2} = 1$

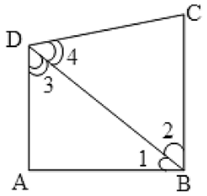
LHS = RHS

24. (i) In $\triangle ABD \& \triangle CBD$

$\angle 3 = \angle 4$

$\angle 1 = \angle 2$

$\triangle ABD \sim \triangle CBD$



(ii) $\triangle ABD \cong \triangle CBD$

AB = BC

25. **(A)** Assuming $5 - 2\sqrt{3}$ to be a rational number.

Let $5 - 2\sqrt{3} = \frac{a}{b}$ where a and b are integers & $b \neq 0$

$\Rightarrow \sqrt{3} = \dfrac{5b - a}{2b}$

Here RHS is rational but LHS is irrational.
Therefore our assumption is wrong.
Hence, $5 - 2\sqrt{3}$ is an irrational number.

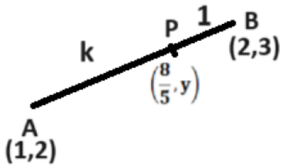
OR

(B) $5 \times 11 \times 17 + 3 \times 11 = 11 \times (5 \times 17 + 3)$
$= 11 \times 88$ or $11 \times 11 \times 2^3$

It means the number can be expressed as a product of two factors other than 1, therefore the given number is a composite number.

SECTION- C

26. **(A)** Let AP: PB = k: 1



$\dfrac{2k+1}{k+1} = \dfrac{8}{5}$

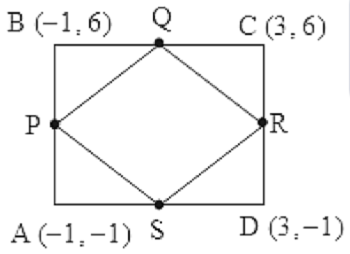
$\Rightarrow \mathrm{k} = \dfrac{3}{2}$

required ratio is 3: 2.

$y = \dfrac{3 \times 3 + 2 \times 2}{3 + 2} = \dfrac{13}{5}$

OR

(B) Co-ordinates of point P are $\left(\frac{-1-1}{2}, \frac{-1+6}{2}\right)$ i.e. $\left(-1, \frac{5}{2}\right)$



Co-ordinates of point Q are $\left(\frac{-1+3}{2}, \frac{6+6}{2}\right)$ i.e. (1,6)

Co-ordinates of point R are $\left(\frac{3+3}{2}, \frac{6-1}{2}\right)$ i.e. $\left(3, \frac{5}{2}\right)$

Co-ordinates of point S are $\left(\frac{-1+3}{2}, \frac{-1-1}{2}\right)$ i.e. $(1, -1)$

Co-ordinates of mid point of diagonal QS are $\left(\frac{1+1}{2}, \frac{6-1}{2}\right)$ i.e. $\left(1, \frac{5}{2}\right)$

Co-ordinates of mid point of diagonal PR are $\left(\frac{-1+3}{2}, \frac{\frac{5}{2}+\frac{5}{2}}{2}\right)$ i.e. $\left(1, \frac{5}{2}\right)$

Since coordinates of mid point of QS = coordinates of mid point of PR
Therefore, diagonals PR and QS bisect each other.

27. Minimum number of rooms required means there should be maximum number of teachers in a room. We have to find HCF of 48,80 and 144.

$48 = 2^4 \times 3$
$80 = 2^4 \times 5$
$144 = 2^4 \times 3^2$

$\text{HCF}(48,80,144) = 2^4 = 16$

Therefore, total number of rooms required $= \frac{48}{16} + \frac{80}{16} + \frac{144}{16} = 17$

28. LHS $= \dfrac{\frac{\sin\theta}{\cos\theta}}{\frac{(\sin\theta - \cos\theta)}{\sin\theta}} + \dfrac{\frac{\cos\theta}{\sin\theta}}{\frac{(\cos\theta - \sin\theta)}{\cos\theta}}$

$$= \frac{1}{(\sin\theta - \cos\theta)}\left[\frac{\sin^2\theta}{\cos\theta} - \frac{\cos^2\theta}{\sin\theta}\right]$$

$$= \frac{1}{(\sin\theta - \cos\theta)} \times \frac{(\sin\theta - \cos\theta)(\sin^2\theta + \cos^2\theta + \sin\theta\cos\theta)}{\sin\theta\cos\theta}$$

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

$= 1 + \sec\theta\operatorname{cosec}\theta = \text{RHS}$

29. Let present age of Rashmi and Nazma be x years and y years respectively.

Therefore, $x - 3 = 3(y - 3)$

or $x - 3y + 6 = 0$

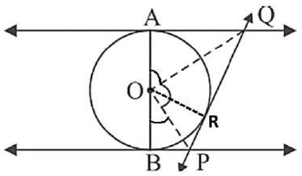
and $x + 10 = 2(y + 10)$

or $x - 2y - 10 = 0$

Solving equations to get $x = 42, y = 16$

Present age of Rashmi is 42 years and that of Nazma is 16 years.

30. **(A)**



Join OR.

$\Delta AOQ \cong \triangle ROQ \Longrightarrow \angle AOQ = \angle ROQ$ ---- (i)

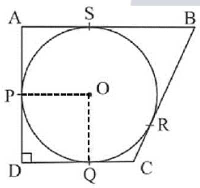
$\Delta BOP \cong \triangle ROP \Rightarrow \angle BOP = \angle ROP$ ---- (ii)

Since $\angle AOR + \angle ROB = 180^\circ$

$\Rightarrow 2\angle QOR + 2\angle ROP = 180^\circ$

$\Rightarrow \angle QOR + \angle ROP = \angle POQ = 90^\circ$

OR



(B)

Join OP and OQ.

$BR = BS = 24$ cm

$CR = 6$ cm

$\Rightarrow CQ = 6$ cm

Also, $DQ = OP = 8$ cm

Hence, $DC = 8 + 6 = 14$ cm

31. Let outer radius be r_2 cm and inner radius be r_1 cm.

$r_2 - r_1 = 1$--- (i)

Volume of metal used $= 176\ \text{cm}^3$

$$\Rightarrow \frac{22}{7} \times 14 \times (r_2^2 - r_1^2) = 176$$

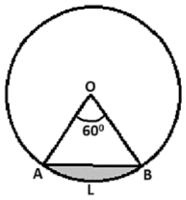
$\Rightarrow r_2 + r_1 = 4$---- (ii)

Solving (i) and (ii), we get

$$r_2 = \frac{5}{2} \text{ or } 2.5, r_1 = \frac{3}{2} \text{ or } 1.5$$

Therefore, outer radius = 2.5 cm and inner radius = 1.5 cm

32.



(i) Length of the arcAB $= 2 \times \frac{22}{7} \times 21 \times \frac{60}{360}$
$= 22$ cm
(ii) Area of sector OALB $= \frac{22}{7} \times 21 \times 21 \times \frac{60}{360} = 231$ cm^2
Area of $\triangle$ OAB $= \frac{\sqrt{3}}{4} \times 21 \times 21 = \frac{441\sqrt{3}}{4}$ cm^2
Area of minor segment $= \left(231 - \frac{441\sqrt{3}}{4}\right)$ cm^2
or $(231 - 190.95) = 40.05$ cm^2

33. (A) $a + a_8 = 32 \Rightarrow 2a + 7d = 32$
$a \times a_8 = 60 \Rightarrow a(a + 7d) = 60$
Solving (i) & (ii), we get
$a = 2$ or $a = 30$
and $d = 4$ or $d = -4$
First term and common difference of A.P. are 2 and 4 or 30 and -4 respectively.
Now, for a $= 2$& d $= 4$
$S_{20} = 10(4 + 76) = 800$
and for $a = 30$&$d = -4$
$S_{20} = 10(60 - 76) = -160$

OR

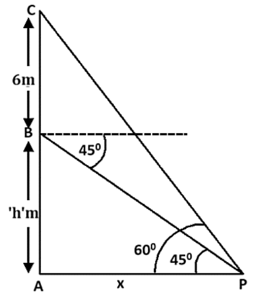
(B) Here n $= 40$,
$S_9 = \frac{9}{2}[2a + 8d] = 153 \Rightarrow a + 4d = 17 \ldots - $ (i)
and $S_{40} - S_{34} = 687$ or $a_{35} + a_{36} + a_{37} + a_{38} + a_{39} + a_{40} = 687$
$\Rightarrow 6a + 219d = 687$ or $2a + 73d = 229$---- (ii)
solving (i) and (ii) to get a $= 5$, d $= 3$
Also, $S_{40} = \frac{40}{2}(10 + 39 \times 3) = 2540$

34. (A) Correct figure, given, to prove and construction Correct proof

OR

(B) $\triangle$ PAC $\sim \triangle$ QBC
$\frac{x}{y} = \frac{AC}{BC}$ or $\frac{y}{x} = \frac{BC}{AC}$ .... (i)
$\triangle$ RCA $\sim \triangle$ QBA
$\frac{z}{y} = \frac{AC}{AB}$ or $\frac{y}{z} = \frac{AB}{AC}$ .... (ii)
Adding (i) and (ii)
$\frac{y}{x} + \frac{y}{z} = \frac{BC + AB}{AC}$
$\Rightarrow \frac{1}{x} + \frac{1}{z} = \frac{1}{y}$

35.



Let BC be the pole and AB be the tower of height ' h ' m.

$\tan 45^\circ = 1 = \frac{h}{x}$

$\Rightarrow h = x$ ……. (i)

$\tan 60^\circ = \sqrt{3} = \frac{h+6}{x}$

$\Rightarrow h + 6 = x\sqrt{3}$ …...(ii)

Solving (i) & (ii) to get

$h = 3(\sqrt{3} + 1) = 8.19$

and $x = 8.19$

Therefore, the height of tower is 8.19 m and the distance of point P from the foot of the tower is 8.19 m

SECTION- E

36. **(i)** $200x^2 = 128(x+1)^2$

(ii) $25x^2 = 16x^2 + 32x + 16$

$\Rightarrow 9x^2 - 32x - 16 = 0$

(iii) (a) $9x^2 - 32x - 16 = 0$

$\Rightarrow (9x+4)(x-4) = 0$

$x \neq \frac{-4}{9}$ so, $x = 4$

OR

(b) $x = \frac{32 \pm \sqrt{1024+576}}{18} = \frac{32 \pm 40}{18}$

$x \neq \frac{-4}{9}$ so, $x = 4$

37.

Number announced	Number of times (f)	cf
$0 - 15$	8	8
$15 - 30$	9	17
$30 - 45$	10	27
$45 - 60$	12	39
$60 - 75$	9	48 = N

(i) $\frac{N}{2} = 24$

median class is $30 - 45$

(ii) P (picking up an even number) $= \frac{37}{75}$

(iii) (a) Median $= 30 + \frac{\left(\frac{48}{2} - 17\right)}{10} \times 15$

$= 40.5$

OR

(b) Modal class is $45 - 60$

Mode $= 45 + \frac{12 - 10}{2 \times 12 - 10 - 9} \times 15$

$= 51$

38. **(i)** AR $= x$ m

(ii) Quad. $ORBQ$ is a square.

(iii) (a) PC $= 8 + x$

$AC^2 = (8 + 2x)^2 = 49 + 225 = 274$

$\Rightarrow 8 + 2x = \sqrt{274}$

$\Rightarrow x = \frac{-8 + \sqrt{274}}{2}$ or 4.28 approx.

OR

(iii) (b) $AC^2 = (8 + 2x)^2 = 49 + 225 = 274$

$\Rightarrow 8 + 2x = \sqrt{274}$

$\Rightarrow x = \dfrac{-8 + \sqrt{274}}{2}$ or 4.28 approx.

Hence, radius $r = 7 - \text{x} = 7 - \left(-4 + \frac{\sqrt{274}}{2}\right)$

$= \left(11 - \dfrac{\sqrt{274}}{2}\right)$ or 2.72 approx.

Therefore, radius of the circle is $\left(11 - \frac{\sqrt{274}}{2}\right)$ m or 2.72 m approx.