

FINAL TOUCH 2022-KEY

1. $5, 8, 11, \dots$

a) $d = 3$

b) $8d = 8 \times 3 = 24$

c) NO. $100 - 5 = 95$ Not a multiple of 3
 95 3ന്റെ ഘടനമാണ്.

2. $x_5 = 28$ $x_9 = 40$

a) $d = \frac{40 - 28}{9 - 5} = \frac{12}{4} = 3$

b) $x_{13} = x_9 + 4d = 40 + 12 = 52$

c) NO. 100 is not a multiple of 3,
 NO. 100 3ന്റെ ഘടനമാണ്.

3. a) $f = 5 + 4 = 9$, $d = 5$

b) $5n + 4 = 109$, $5n = 109 - 4$
 $5n = 105$, $n = \frac{105}{5} = 21$

c) $f = 9$, $d = 4$
 $x_n = 4n + 5$

4) a) $d = \frac{9 - 16}{16 - 9} = \frac{-7}{7} = -1$

b) $x_{25} = x_{16} + 9d = 9 + 9 \times -1 = 0$

c) $x_{49} = 9 + 16 - 49 = -24$

d) $S_{25} = 25 \times x_{25} = 25 \times 0 = 0$

5) $10, 16, 22, \dots$

a) $d = 6$

b) $x_8 = 10 + 7 \times 6 = 10 + 42 = 52$

c) $S_{15} = 15 \times x_8 = 15 \times 52 = 780$

d) $780 - 15 \times 1 = 765$

6) $S_9 = 270$ a) $x_5 = \frac{270}{9} = 30$

b) $x_4 + x_6 = 2 \times 30 = 60$

c) $f = 30 - 4 \times 3 = 18$

A. S

$18, 21, 24, \dots$

7) $S_5 = 100$ a) $x_3 = \frac{100}{5} = 20$

A. S

$10, 15, 20, \dots$

b) $x_3 = 20$, $d = 2$

$16, 18, 20, \dots$

c) Sum of pairs } $= \frac{60}{3} = 20$
 ഘടനമാണ് x_1, x_2, x_3, x_4, x_5

c) $0, 4, 8, 12, \dots$ $x_1 + x_6 = 20$

$x_2 + x_5 = 20$

d) $5, 7, 9, 11, \dots$ $x_3 + x_4 = 20$

8) a) $1 + 2 + 3 + \dots + 20 = \frac{20 \times 21}{2} = 210$

b) $7 + 14 + 21 + \dots + 140 = 7 \times 210 = 1470$

c) $9 + 16 + 23 + \dots + 142 = 1470 + 2 \times 20 = 1510$

d) $16 + 30 + 44 + \dots + 242 = 1470 + 1510 = 2980$

e) a) n b) $7n$ c) $7n + 2$

d) $14n + 2$

$f = 3 \times 20 = 60$

9) a) $\frac{10 \times 11}{2} = 55$

b) $4 \times 55 = 220$

c) $4 \times 220 + 1 \times 10 = 220 + 10 = 230$

10) 10, 17, 24, ...

a) $d = 7$

b) $x_{20} = 10 + 19 \times 7 = 143$

c) $\frac{20}{2} [10 + 143]$

$10(153) = 1530 //$

d) $20^2 \times 7 = 400 \times 7 = 2800 //$

11) a) $2 + 4 + 6 + \dots + 40 = 20 \times 21 = 420$

b) $1 + 3 + 5 + \dots 39 = 420 - 20 = 400 //$

c) $20 + 60 + \dots 780 = 20 \times 400 = 8000 //$

2) $x_1 + x_{20} = 80$

a) $x_2 + x_{19} = x_1 + x_{20} = 80$

b) $x_3 + x_{18}$

c) $10 \times 80 = 800 //$

3) a) 12, 18, 24, ...

b) 14, 20, 26, ...

c) 98

d) $n = \frac{98 - 14}{6} + 1 = 15$

$S_{15} = \frac{15}{2} [14 + 98]$

$= 840 //$

14) a)

11	12	13	14	15	
16	17	18	19	20	21

b) Last number = $\frac{10 \times 11}{2} = 55$

first number = $55 - 9 = 46 //$

c) $\frac{10}{2} [46 + 55] = 505 //$

15) 8, 14, 20, ...

a) $6n + 2$

b) $6 \times 20 + 2 = 122$

c) $S_n = 3n^2 + 5n$

d) $S_{10} = 3 \times 10^2 + 5 \times 10$
 $= 300 + 50 = 350 //$

16) $4n^2 + 5n$

a) $d = 4 \times 2 = 8$, $f = 4 + 5 = 9 //$

b) $\frac{n(n+1)}{2}$

c) $\frac{n(n+1)}{2} = 210$

$n(n+1) = 420$

$20 \times 21 = 420$

20 terms //

17) 7, 9, 11, ...

a) $d = 2$

b) $n^2 + 6n$

c) $n^2 + 6n + 9 = (n+3)^2$

- 18) $\angle P$ - Inside the circle
 $\angle Q$ - On the circle
 $\angle R$ - Outside the circle

19. $\angle D = 80$ ($\angle D = \angle ABP$)

b) $\angle A + \angle C = 180^\circ$

c) $\angle C = x$ $\angle A = 2x$

$x + 2x = 180$, $3x = 180$

$x = 60^\circ$

$\angle C = 60^\circ$ $\angle A = 120^\circ$

20. a) $\angle AOB = 180 - 2 \times 50 = 80^\circ$

b) $\angle ACB = 80/2 = 40^\circ$

c) $\angle ADB = 180 - 40 = 140^\circ$

e) $\angle ACB = x$, $\angle AOB = 2x$

$\angle OAB = y = \angle OBA$

$2x + y + y = 180 \Rightarrow 2x + 2y = 180$

$x + y = 90^\circ$

21. a) $\angle A = 20 + 30 = 50^\circ$

b) $\angle BOC = 2 \times 50 = 100^\circ$

$\angle BDC = 180 - 50 = 130^\circ$

22. a) $\angle BAC = \angle BDC = 60^\circ$

$\angle BAD = 60 + 45 = 105^\circ$

b) $\angle ADC = 60 + 30 = 90^\circ$

$\angle ABC = 90^\circ$

c) $\angle BPC = 180 - (30 + 45) = 105^\circ$

23. a) $\angle BDE = 180 - 120 = 60^\circ$

$\angle BCE = \angle BDE = 60^\circ$

b) $\angle DEC = 20^\circ$

$\angle DBC = \angle DEC = 20^\circ$

24. a) $\angle ACP = 50^\circ$

b) $\angle AOD = 2 \times \angle ACP = 100^\circ$

c) ചുറ്റം BMC യുടെ

കേന്ദ്രകോണം $= 2 \times \angle CAB = 80^\circ$

d) ചുറ്റം ASD യുടെ കേന്ദ്രകോണം $= 100$

e) $100 + 80 = 180^\circ$

25) a) $\angle ACB = 40^\circ$ $\angle ADB = 40^\circ$

b) $\angle ACP = 180 - 40 = 140^\circ$

$\angle AOB = x$, $\angle ADB = x/2$

$\angle PCQ = \angle PDQ = 180 - x/2$

□PCQD

$\angle P + \angle CQD + 180 - x/2 + 180 - x/2 = 360$

$\angle P + \angle CQD + 360 - x = 360$

$\angle P + \angle CQD = x = \angle AOB$

26. a) NO, തെറ്റാണ്

b) $\angle A = \angle B = x$ then

$\angle BPC = \angle PQD = x$

$\angle C = \angle D = 180 - x$

$\angle A + \angle C = x + 180 - x = 180^\circ$

□ABCD is cyclic

□ABCD ചക്രിയമാണ്

27. a) $PB = 14 - 10 = 4$ cm

b) $PA \times PB = PC \times PD$

$10 \times 4 = 5 \times PD \Rightarrow PD = 8$ cm

$CD = 5 + 8 = 13$ cm

28. a) $PB = 3 + 9 = 12$ cm

b) $PA \times PB = PC \times PD$

$3 \times 12 = 4 \times PD \Rightarrow PD = 9$ cm

$CD = 9 - 4 = 5$ cm

29. a) $\angle BOC = 120^\circ$, $\angle AOC = 100^\circ$

$\angle AOB = 140^\circ$

b) നിർമ്മിതി, construction

30. ചിത്രം

31. a) $\left. \begin{array}{l} \text{ചതുരകത്തിന്റെ} \\ \text{പരമാവധി} \end{array} \right\} = 12$ cm²

Area of Square = 12 cm²

b) ചിത്രം

32. a) $AC \times CB = CD^2$
 $6 \times 2 = CD^2 \Rightarrow CD = \sqrt{12}$

b) figure (ചിത്രം)

33. figure

34. figure

35. a) $PA \times PB = PC \times PD$

$5 \times 3 = 7 \times PD$

$\Rightarrow PD = 15/7$

b) Figure

36. Figure

37. a) $\sin \theta = 1/2$

b) " $= 1/8$

c) " $= 7/8$

38. a) $6/13$ b) $7/13$

c) $7/14 = 1/2 //$

39. $3/7$

40. a) $1/3$ b) ~~5/5~~

$\frac{2 \times 5}{8 \times 5} = \frac{10}{40}$

b) $= 15 - 10 = 5 //$

41. a) $15/30 = 1/2$ b) $1/2$

42. തൊഴിലാളികളുടെ എണ്ണം

Total number
 (Total two digit number) = 90

a) $9/90 = 1/10$

b) $18/90 = 2/10 = 1/5 //$

43. a) $11 \times 12 = 132$

b) $6 \times 8 / 132 = 4/11$

c) $5 \times 4 / 132 = 4/33$

d) $3 \times 3 = 9$

44) $n^2 = 225, n = 15$

45) a) $x-5$ b) $(x-5)^2 = 625$

$\Rightarrow (x-5) = \sqrt{625} = 25$

$x = 25 + 5 = 30$

c) $30^2 = 900 \text{ cm}^2$

46

a) ചുറ്റളവ് (Perimeter) = $4x$

കുറപ്പളവ് (Area) = x^2

b) $x^2 + 4x + 4 = 900$

c) $(x+2)^2 = 900$

$x+2 = 30, x = 30 - 2 = 28$

47. a) $3^2 = 9$

b) $x^2 + 6x + 3^2 = 135 + 3^2$

$(x+3)^2 = 144 \Rightarrow x+3 = 12$

$x = 12 - 3 = 9$

48. a) $n^2 + 8n = 240$

b) $n^2 + 8n + 4^2 = 240 + 4^2$

$(n+4)^2 = 256, \Rightarrow n+4 = 16$

$n = 16 - 4 = 12 //$

49. $x(x+8) = 384$

$x^2 + 8x + 4^2 = 384 + 4^2$

$(x+4)^2 = 400 \Rightarrow x+4 = 20$

$x = 16$

Numbers (സംഖ്യകൾ) = 16, 24

50. a) $d+b = 40/2 = 20$

b) $d = 10+x, b = 10-x$

$(10+x)(10-x) = 84$

$100 - x^2 = 84$

c) $x^2 = 100 - 84 = 16, x = 4$

$d = 10 + 4 = 14, b = 10 - 4 = 6$

51. $PB = x + 10$

$PA \times PB = PC^2 \Rightarrow x(x+10) = 144$

$x^2 + 10x = 144 \Rightarrow x^2 + 10x + 5^2 = 144 + 5^2$

$(x+5)^2 = 169, x = 8, PA = 8, PB = 18$

52. a) $b = x$ $d = 2x + 1$

b) $x(2x + 1) = 78$

$2x^2 + x = 78, 2x^2 + x - 78 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $a = 2$ $b = 1$
 $c = -78$

$\Rightarrow \frac{-1 \pm \sqrt{1 - 4 \times 2 \times (-78)}}{2 \times 2} \Rightarrow \frac{-1 \pm \sqrt{1 + 624}}{4}$

$\Rightarrow \frac{-1 \pm 25}{4} \Rightarrow \frac{24}{4} = 6 \dots$

$b = 6$ $d = 2 \times 6 + 1 = 13 //$

53.

a) $\angle C = 45^\circ$

b) $AB = 6 \text{ cm}$ $AC = 6\sqrt{2}$

54. a) $\angle C = 60^\circ$

b) $AB = 3\sqrt{3}$ $AC = 3 \times 2 = 6$

55. a) $AP = 10/2 = 5 \text{ cm}$ $PC = 5\sqrt{3} \text{ cm}$

b) $BP = AP = 5 \text{ cm}$ $AB = 5\sqrt{2} \text{ cm}$

56. $\angle ABC = 120^\circ$

$BC = 8 \text{ cm}$

$AC = 4\sqrt{3} + 4\sqrt{3}$
 $= 8\sqrt{3}$

c) $8 : 8 : 8\sqrt{3} \Rightarrow 1 : 1 : \sqrt{3}$

57. a) $PS = 12/2 = 6 \text{ cm}$

b) $\frac{1}{2} \times 18 \times 6 = 54 \text{ cm}^2$

c) $\angle Q = 150$

$h = 6 \text{ cm}$

$\text{Area} (\triangle PQR) = 54 \text{ cm}^2$

58. a) $9/2 = 4.5$

b) $\text{Area} (\triangle PQR) = 4.5 \times 20$
 $= 90 \text{ cm}^2$

c) $\angle A = 60$ $h = 4.5\sqrt{3}$

$\text{Area} (\triangle PQR) = 20 \times 4.5\sqrt{3}$
 $= 90\sqrt{3} \text{ cm}^2$

59. a) $\angle ADB = \angle ACB = 60^\circ$
 $\angle ABD = 90^\circ$

b) $\angle AOB = 120^\circ$

c) $r = \frac{6}{\sqrt{3}} = 2\sqrt{3} \text{ cm} //$

60. $BC = \sqrt{13^2 - 5^2} = 12 \text{ cm}$

b) $\sin A = \frac{12}{13}$, $\cos A = \frac{5}{13}$

$\tan A = \frac{12}{5}$

c) $\sin A = \frac{BC}{AC}$ $\cos C = \frac{BC}{AC}$

$\therefore \sin A = \cos C$

d) $\cos A \times \tan A = \frac{AB}{AC} \times \frac{BC}{AB} = \frac{BC}{AC}$
 $= \sin A$

61. $\sin P = \frac{QR}{PR} = \frac{QR}{10} = \frac{4}{5} \Rightarrow QR = 8$

a) $PR = QR = 8$, $PQ = 6$

b) $\cos P = \frac{6}{10} = \frac{3}{5}$, $\cos R = \frac{4}{5}$

62. $BC = 30 \times \sin 50 = 22.8$

$AB = 30 \times \cos 50 = 19.2$

63. a) $AP = 20 \sin 40 = 12.8$

b) $\frac{1}{2} \times 25 \times 12.8 = 160 \text{ cm}^2 //$

c) $160 \text{ cm}^2 //$

64. a) $2r = \frac{9}{\sin 65} = \frac{9}{0.9} = 10$

$r = 5 //$

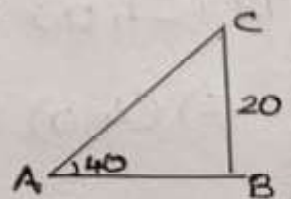
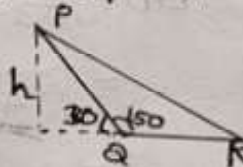
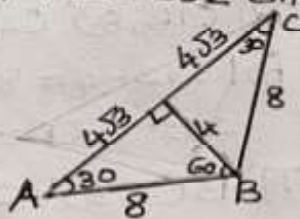
b) $2r = \frac{AC}{\sin 50}$

$AC = 2r \times \sin 50 = 10 \times 0.76$
 $= 7.6 \text{ cm} //$

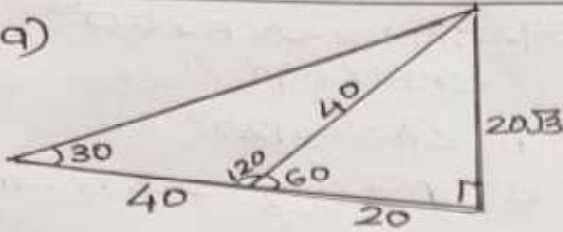
65. a) $\tan 40 = \frac{BC}{AB}$

$AB = \frac{20}{0.8} = 25$

b) $\sin 40 = \frac{20}{AC} \Rightarrow AC = \frac{20}{0.64}$
 $= 31.25$

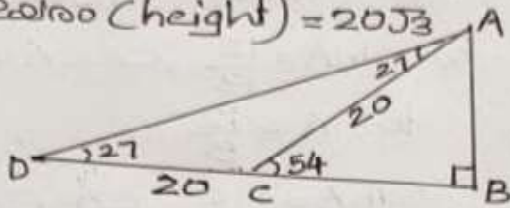


66. a)



b) Δ height = $20\sqrt{3}$

67. a)



b) $AB = 20 \sin 54 = 16$

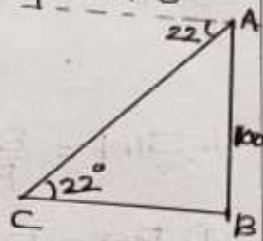
c) $BC = 20 \cos 54 = 11.8$

68. a)

b) $\tan 22 = \frac{100}{BC}$

$BC = \frac{100}{\tan 22} = \frac{100}{.4}$

$= 250$



69. X-axis (points) = $(4,0)$ $(-5,0)$

Y-axis (points) = $(0,3)$

70. a) $O(0,0)$

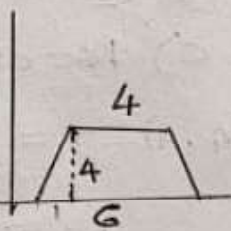
$OC = 4$

b) $C(4,0)$, $B(0,3)$

$A(4,3)$

71. a)

b) Δ is isosceles trapezium

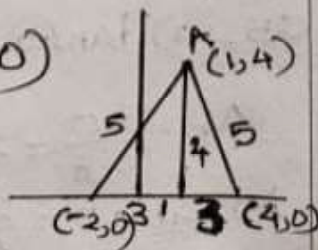


c) $\frac{1}{2}(6+4) \times 4 = 5 \times 4 = 20 \text{ cm}^2$

72. $P(3\sqrt{3}, 3)$, $Q(-3, 3\sqrt{3})$

73. a) $C(1,0)$ b) $C(0,4)$

c) $C(4,0)$, $(-2,0)$



74. $(10,8)$, Δ is outside the circle
 $10-6=4$ (con the circle)

$(6,13)$, Δ is outside the circle

$(13-8=5 > 4)$

$(0,0)$ Δ is outside the circle

$6^2+8^2=10^2 > 4$

$(1,9)$ Δ is outside the circle

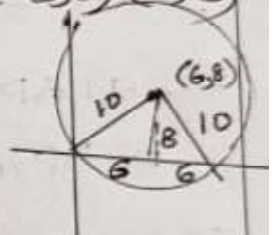
$\sqrt{5^2+1^2} = \sqrt{26} > 4$

$(1,8)$ Δ is outside the circle

75) $(5,0)$, $(0,5)$, $(-5,0)$, $(0,5)$

76) a) $r = 16-6 = 10$

b) $C(0,0)$, $(12,0)$



77) a) $C(12,8)$, $C(4,11)$

b) $a = 12-4 = 8$, $b = 11-8 = 3$

Perimeter = 22

78) $B(7,3)$, $C(7,8)$, $D(2,8)$

79. $AB = |11-3| = 8$, $AD = |1-2| = 1$

$BC = \sqrt{1+4} = \sqrt{5}$, $CD = \sqrt{1+9} = \sqrt{10}$

$AC = \sqrt{9+4} = \sqrt{13}$, $BD = \sqrt{16+9} = \sqrt{25}$

$BD = \sqrt{(3-1)^2 + (1-2)^2}$

$= \sqrt{(-4)^2 + 3^2} = \sqrt{16+9} = \sqrt{25}$

$= 5$

80). a) $\angle P = 90^\circ$
 b) $\angle Q = 90 - 40 = 50^\circ$

81). a) $\angle PQO = 90^\circ$
 b) $PQ^2 = OP^2 - OQ^2$
 $= 13^2 - 5^2$
 $= 169 - 25 = 144$
 $PQ = \sqrt{144} = 12 \text{ cm.}$
 c) $PR = PQ = 12 \text{ cm.}$

82). a) $\angle OAB = 90^\circ$
 b) $OA : AB : OB = 1 : \sqrt{3} : 2$
 radius $OA = 4 \text{ cm}$
 $\therefore AB = 4\sqrt{3} \text{ cm}$
 $OB = 4 \times 2 = 8 \text{ cm.}$

83). a) $\angle C = \angle PAB = 50^\circ$
 b) $\angle PBA = \angle PAB = 50^\circ$ ($\because PA = PB$)
 c) $\angle P = 180 - (50 + 50) = 180 - 100 = 80^\circ$

84). a) In $\triangle AQP$, $AQ = AP$ [tangents from same point]
 $\therefore \angle APQ = \angle AQP = \frac{180 - 70}{2} = 55^\circ$
 b) $\angle BPR = \frac{180 - 80}{2} = \frac{100}{2} = 50^\circ$
 $\angle Q = \angle BPR = 50^\circ$
 $\angle R = \angle APQ = 55^\circ$
 $\angle P = 180 - (50 + 55)$
 $= 180 - 105 = 75^\circ$
 c) $\angle CQR = \angle CRQ = \angle P = 75^\circ$
 $\angle C = 180 - (75 + 75)$
 $= 180 - 150 = 30^\circ$

85). a) $OQ = CP = 7 \text{ cm}$
 $AQ = AR = 11 - 7 = 4 \text{ cm.}$
 $BP = BR = 8 - 4 = 4 \text{ cm.}$

b) Perimeter } = 30 \text{ cm } \therefore S = \frac{30}{2} = 15 \text{ cm}

$AC = 10 \text{ cm}$
 $\therefore BP = S - AC = 15 - 10 = 5 \text{ cm.}$

86). a) Let $AP = AS = a$, $BP = BQ = b$,
 $QC = CR = c$, $DR = DS = d$.
 then $AB + CD = AP + PB + CR + DR$
 $= a + b + c + d$
 $= AS + BQ + QC + DS$
 $= (AS + DS) + (BQ + QC)$
 $AB + CD = AD + BC$.

b) $AP = AS = 2 \text{ cm}$, $BP = BQ = 5 \text{ cm}$
 $CQ = CR = 3 \text{ cm}$, $DR = DS = 4 \text{ cm}$
 \therefore Perimeter } = $2 + 2 + 5 + 5 + 3 + 3 + 4 + 4$
 $= 28 \text{ cm.}$

c) $AB + CD = 20 \text{ cm.}$
 $AD + BC = AB + CD = 20 \text{ cm.}$
 Perimeter } = $20 + 20 = 40 \text{ cm.}$

87). a) $PC = PB + BC = 3 + 9 = 12 \text{ cm}$
 b) $PA^2 = PB \times PC$
 $= 12 \times 3 = 36$
 $PA = \sqrt{36} = 6 \text{ cm.}$

88). a) $PQ \times PR = PA^2$ (from 1st circle.)
 $PQ \times PR = PB^2$ (from 2nd circle.)
 $\therefore PA^2 = PB^2 \Rightarrow PA = PB$.
 b) $PA^2 = PQ \times PR$ $PR = 10 + 8 = 18 \text{ cm}$
 $= 9 \times 18 = 164$
 $PA = \sqrt{164} = 12 \text{ cm.}$
 $PA = PB = 12 \text{ cm.}$

89). a) $\angle OAP = 90^\circ$
 b) $\angle AOP = \angle AOP$; $\angle OAP = \angle OQA = 90^\circ$
 $\therefore \angle APO = \angle OQA$.
 c) Angles are equal, Sides Proportional
 $\therefore \frac{OP}{OQ} = \frac{OQ}{OP} \Rightarrow OP \times OQ = OQ^2$

90) a) $A = r \times s = 3 \times 15 = 45 \text{ cm}^2$ $S = \frac{30}{2} = 15$
 b) $r = \frac{A}{s} = \frac{18}{6} = 3 \text{ cm}$
 c) $A = 2S^2 \Rightarrow r = \frac{A}{s} = \frac{25}{5} = 2 \text{ cm.}$

91) a) $AC = AR + CR$
 $= AP + CQ = 6 + 4 = 10 \text{ cm.}$

b) Inradius $r = \frac{1}{2} \times \text{Perimeter} - \text{side}$
 $= \frac{1}{2} \times 20 - 6 = 2 \text{ cm.}$

c) Area of triangle $= \frac{1}{2} \times \text{Perimeter} \times r$
 $= \frac{1}{2} \times 20 \times 2 = 20 \text{ cm}^2$

d) Sides doubled.
 $\therefore A = 24 \times 4 = 96 \text{ cm}^2$
 $\therefore r = 2 \times 2 = 4 \text{ cm.}$

92) a) $\angle PAO = 90^\circ$
 b) 2) caso.

93) a) $PA = PB = \sqrt{7^2 - 3^2} = \sqrt{40} = 2\sqrt{10} \text{ cm.}$
 b) 2) caso.

94) 2) caso

95) a) $\angle AOB = 100^\circ, \angle OAB = \angle OBA = 90^\circ$
 $\angle Q = 180 - 100 = 80^\circ$
 b) 2) caso

96) 2) caso

97) 2) caso

98) a) $PA \times PB = PC^2$
 $PA \times 7 = 4 \times 4 = 16$
 $PA = \frac{16}{7} \text{ cm.}$
 b) 2) caso.

99) a) $a = 10 \text{ cm}$
 $2al = 260 \text{ cm}$
 $2 \times 10 \times l = 260$
 $l = \frac{260}{20} = 13 \text{ cm.}$
 $h^2 = l^2 - \left(\frac{a}{2}\right)^2 = 13^2 - 5^2 = 169 - 25 = 144$
 $h = \sqrt{144} = 12 \text{ cm.}$
 c) $V = \frac{1}{3} a^2 h = \frac{1}{3} \times 10 \times 10 \times 12 = 400 \text{ cm}^3$

100) a) $a = 12 \text{ cm}$
 b) $l = \sqrt{10^2 - 6^2} = \sqrt{100 - 36} = \sqrt{64} = 8 \text{ cm.}$
 c) $TSA = a^2 + 2al$
 $= 12^2 + 2 \times 12 \times 8$
 $= 144 + 192 = 336 \text{ cm}^2$

101) a) $a = 10 \text{ cm.}$
 $l = \frac{\sqrt{3}}{2} a = \frac{\sqrt{3}}{2} \times 10 = 5\sqrt{3} \text{ cm.}$
 b) $LSA = \sqrt{3} a^2$
 $= \sqrt{3} \times 10^2 = 100\sqrt{3} \text{ cm}^2$
 $TSA = \sqrt{3} a^2 + a^2$
 $= \sqrt{3} \times 100 + 100 = (100\sqrt{3} + 100) \text{ cm}^2$

102) $\frac{x}{360} = \frac{r}{R}$
 $\frac{x}{360} = \frac{18}{30}$
 $x = \frac{18 \times 360}{30} = 216^\circ$
 $r = 18 \text{ cm}$
 $h = 24 \text{ cm}$
 $l = \sqrt{24^2 + 18^2}$
 $= \sqrt{576 + 324} = \sqrt{900}$
 $= 30 \text{ cm.}$
 $R = l = 30 \text{ cm.}$

103) a) $l = R = 20 \text{ cm}$
 $\frac{x}{360} = \frac{r}{l}$
 $\frac{216}{360} = \frac{r}{20} \Rightarrow r = \frac{216 \times 20}{360} = 12 \text{ cm}$
 b) $CSA = \pi r l = \pi \times 12 \times 20 = 240\pi \text{ cm}^2$
 $B.A = \pi r^2 = \pi \times 12^2 = 144\pi \text{ cm}^2$
 $TSA = 240\pi + 144\pi = 384\pi \text{ cm}^2$
 c) $h = \sqrt{l^2 - r^2} = \sqrt{20^2 - 12^2}$
 $= \sqrt{400 - 144}$
 $= \sqrt{256} = 16 \text{ cm}$
 d) $V = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \times 12 \times 12 \times 16$
 $= 768\pi \text{ cm}^3$

e) Radius of Cone: } $20 - 12 = 8 \text{ cm.}$
 from

104) a) $l = 2r$

b) $l = R = 10 \text{ cm}, r = \frac{l}{2} = \frac{10}{2} = 5 \text{ cm}.$

c) $CSA = 2\pi r^2 = 2\pi \times 5^2 = 50\pi \text{ cm}^2$

d) $TSA = 3\pi r^2 = 3\pi \times 5^2 = 75\pi \text{ cm}^2.$

105) $\pi r^2 = 576\pi \Rightarrow r^2 = 576$

$r = \sqrt{576} = 24 \text{ cm}.$

a) $V = \frac{1}{3} \pi r^2 h = 1920\pi$

$\frac{1}{3} \times 576\pi \times h = 1920\pi$

$h = \frac{1920 \times 3}{576} = 10 \text{ cm}.$

b) $CSA = \pi r l = \pi \times 24 \times 26$
 $= 624\pi \text{ cm}^2.$

$l^2 = h^2 + r^2$
 $= 10^2 + 24^2 = 100 + 576$
 $= 676, l = \sqrt{676} = 26$

106) $r_1 : r_2 = 2 : 3, h_1 : h_2 = 5 : 4.$

a) Ratio of perimeters = Ratio of radii
 2:3
 $= 2 : 3.$

b) $V_1 : V_2 = \frac{1}{3} \pi \times 2^2 \times 5 : \frac{1}{3} \pi \times 3^2 \times 4$
 $= 5 : 9.$

c) $V_1 = 500 = 5 \times 100$
 $\therefore V_2 = 9 \times 100 = 900 \text{ cm}^3.$

107) $h = \frac{\text{Volume of Cylinder}}{\text{Volume of Cone}}$

$h = \frac{\pi \times 12 \times 12 \times 18}{\frac{1}{3} \times \pi \times 9 \times 9}$

$h = \frac{\pi \times 12 \times 12 \times 18}{\frac{1}{3} \times \pi \times 9 \times 9} = 96 \text{ cm}.$

108) a) $V = \pi r^2 h$
 $= \pi \times 10 \times 10 \times 24$
 $= 2400\pi \text{ cm}^3.$

$r = 10 \text{ cm}$
 $h = 24 \text{ cm}$

b) Volume of Cone = $\frac{1}{3}$ Volume of Cylinder

$V = \frac{1}{3} \times 2400\pi = 800\pi \text{ cm}^3.$

c) $CSA = \pi r l$
 $= \pi \times 10 \times 26$
 $= 260\pi \text{ cm}^2.$

$r = 10 \text{ cm}$
 $h = 24 \text{ cm}$
 $l = \sqrt{24^2 + 10^2}$
 $= 26 \text{ cm}$

109) a) Diameter of Sphere = Side of the cube.

$2r = 12 \Rightarrow r = \frac{12}{2} = 6 \text{ cm}.$

b) $TSA = 4\pi r^2 = 4\pi \times 6 \times 6 = 144\pi \text{ cm}^2$

$V = \frac{4}{3} \pi r^3 = \frac{4}{3} \pi \times 6 \times 6 \times 6 = 288\pi \text{ cm}^3.$

c) $r = \frac{12}{2} = 6 \text{ cm}, h = 12 \text{ cm}$

$V = \frac{1}{3} \pi r^2 h = \frac{1}{3} \pi \times 6 \times 6 \times 12$
 $= 144\pi \text{ cm}^3.$

110) $4\pi r^2 = 40 \Rightarrow \pi r^2 = \frac{40}{4} = 10 \text{ cm}^2$

a) Flat Surface area = $\pi r^2 = 10 \text{ cm}^2$

b) $CSA = 2\pi r^2 = 2 \times 10 = 20 \text{ cm}^2$

111) $r_1 : r_2 = 2 : 3$

a) Ratio of Volumes = $r_1^3 : r_2^3 = 2^3 : 3^3$
 $= 8 : 27$

b) Ratio of areas = $r_1^2 : r_2^2$
 $= 2^2 : 3^2 = 4 : 9.$

112) height of Cone = $12 - (6 + 3) = 3 \text{ m}.$

$V = \frac{2}{3} \pi r^3 + \pi r^2 h + \frac{1}{3} \pi r^2 h$
 $= \frac{2}{3} \pi \times 3 \times 3 \times 3 + \pi \times 3^2 \times 6 + \frac{1}{3} \pi \times 3^2 \times 3$
 $= 81\pi \text{ m}^3, 81 \times 3.14 = 254.34 \text{ m}^3$

Volume (in liter) = 254.34×1000
 $= 254340 \text{ Liter}.$

113) Mid point of AC } = $(\frac{1+8}{2}, \frac{1+6}{2}) = (\frac{9}{2}, 2)$
 AC diagonals 2nd diagonal

Mid point of BD } = $(\frac{7+2}{2}, \frac{1+6}{2}) = (\frac{9}{2}, 2)$
 BD diagonals 1st diagonal

b) Midpoints of diagonals are same
 \therefore ABCD is a parallelogram
 [2nd diagonal 2nd diagonal and 1st diagonal]
 \therefore ABCD is a parallelogram

114) a) D $(2+8-4, 4+8-3) = (6, 9)$

b) AB = 8-2 = 6

\therefore AC = $6/2 = 3$

C(5, 0)

CD = $3\sqrt{3}$

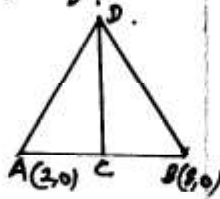
\therefore D(5, $3\sqrt{3}$)

c) A(4, 5), B(8, 8), C(16, 14)

Slope of AB } = $\frac{8-5}{8-4} = \frac{3}{4}$
 AB diagonals 2nd diagonal

Slope of BC } = $\frac{14-8}{16-8} = \frac{6}{8} = \frac{3}{4}$
 BC diagonals 2nd diagonal

Slopes are equal \therefore A, B, C are on a line
 2nd diagonal 2nd diagonal \therefore A, B, C are on a line



115) a) Slope } = $\frac{8-4}{5-2} = \frac{4}{3}$
 2nd diagonal

b) (2, 4), (5, 8) \Rightarrow (8, 12), (11, 16)

c) (2, 4), (x, y)

Slope } = $\frac{y-4}{x-2} = \frac{4}{3}$
 2nd diagonal

$(y-4) \times 3 = (x-2) \times 4$

$3y - 12 = 4x - 8$

$4x - 3y + 12 - 8 = 0$

$4x - 3y + 4 = 0$

d) (x, y), (x+3, y+4)

Slope } = $\frac{y+4-y}{x+3-x} = \frac{4}{3}$ \therefore on the line
 2nd diagonal

e) (2, 4), (5, 8), (8, 12), (11, 16), (14, 20)

(17, 24)

116) (5, 6) slope (2nd diagonal) = $3/4$

a) (5+4, 6+3) \Rightarrow (9, 9), (13, 12)

b) slope (2nd diagonal) = $3/4$

117) (6, 0), (4, 2)

a) slope (2nd diagonal) = $\frac{2-0}{4-6} = \frac{2}{-2} = -1$

b) Equation } = $x+y=6$
 2nd diagonal

c) $x+y=6$

$x-y=4$

$2x=10, x=10/2=5, y=1$

(5, 1)

d) x axis $\Rightarrow y=0$

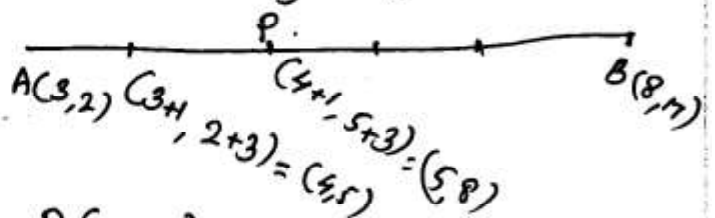
$x+y=6, y=0, \Rightarrow x=6$

(6, 0)

118) A(3, 2), B(8, 17)

d of y $\Rightarrow \frac{17-2}{5} = \frac{15}{5} = 3$

d of x $\Rightarrow \frac{8-3}{5} = \frac{5}{5} = 1$



P(5, 8)

OR

~~P~~ P \rightarrow (x) $\rightarrow 3 + 2 \times 1 = 5$ P(5, 8)

P \rightarrow (y) $\rightarrow 2 + 2 \times 3 = 8$

119) a) $r = \sqrt{25} = 5$ unit ~~b~~ b) $x^2 + y^2 = 9$

120) Centre \Rightarrow midpoint $\Rightarrow (\frac{3+3}{2}, \frac{4-4}{2}) = (0, 0)$
 a) $\angle A C M O \Rightarrow$ 2nd diagonal

b) $r^2 = 3^2 + 4^2 = 9 + 16 = 25, r = \sqrt{25} = 5$ unit

c) $x^2 + y^2 = 25$

121). Centre } $(\frac{0+8}{2}, \frac{6+0}{2}) = (4, 3)$

a) C(4,3)

b) $r^2 = (8-4)^2 + (3-0)^2 = 4^2 + 3^2 = 16+9=25$

$r = \sqrt{25} = 5$ unit.

Equation of Circle } $(x-4)^2 + (y-3)^2 = 25$

c) $(\frac{0+8}{2}, \frac{6+0}{2}) \Rightarrow (4+4, 3+3) = (8, 6)$

122). a) $r^2 = (5-1)^2 + (5-2)^2 = 4^2 + 3^2 = 16+9=25$

$r = \sqrt{25} = 5$ unit.

b) Equation = $(x-1)^2 + (y-2)^2 = 25$

c) Centre } $(2, 3)$, $r = \sqrt{81} = 9$ unit.

123). a) $x^2 + y^2 + 4x - 6y - 12 = 0$

$(x^2 + 4x + 4) + (y^2 - 6y + 9) = 4 + 9 + 12$

$(x+2)^2 + (y-3)^2 = 25$

Centre } $(-2, 3)$, $r = \sqrt{25} = 5$

b) x axis $\Rightarrow y = 0$.

$(x+2)^2 + (0-3)^2 = 25$

$(x+2)^2 = 25-9=16$ $4-2=2$

$x+2 = \pm 4$, $x = 4-2=2$
 $x = -4-2 = -6$

$(2, 0), (-6, 0)$

OR.

$r = 5$

C(-2,3) $\therefore MC = 3$

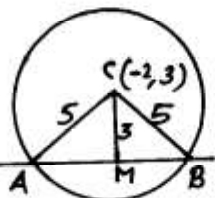
AM = MB = 4 unit.

M(-2,0) $\Rightarrow B(-2+4, 0) = B(2, 0)$

A(-2-4, 0) $\Rightarrow A(-6, 0)$

c) $(\frac{5+1}{2}, \frac{5+2}{2}) \Rightarrow (3, 3.5)$

$\Rightarrow (-3, -1)$



124). $P(x) = 2x^2 - 5x + 2$

a) $P(0) = 2$

$P(2) = 2(2)^2 - 5(2) + 2$

$= 2 \times 4 - 10 + 2$

$8 - 10 + 2 = 10 - 10 = 0$

b) $P(2) = 0 \therefore x-2$ is a factor.

125). $P(x) = 4x^2 - x + k$

$x-2$ factor (widho) $\Rightarrow P(2) = 0$

$P(2) = 4(2)^2 - 2 + k = 0$

$16 - 2 + k = 0$

$14 + k = 0$

$k = -14$

126) $P(x) = 2x^2 - 3x + 1$

a) $P(1) = 2 - 3 + 1 = 0$

$P(2) = 2(2)^2 - 3 \times 2 + 1$

$= 8 - 6 + 1 = 9 - 6 = 3$

$P(-3) = 2(-3)^2 - 3 \times -3 + 1$

$= 2 \times 9 + 9 + 1 = 18 + 10 = 28$

127). $P(x) = 2x^2 - 5x + 1$

a) $P(3) = 2(3)^2 - 5(3) + 1$

$= 2 \times 9 + 15 + 1$

$= 19 - 15 = 4$

b) $P(3) \neq 0 \therefore x-3$ not a factor

c) 4 Subtracted
4 Abnabmo.

128). $x^2 - 1 = x^2 - 1^2 = (x+1)(x-1)$

$x^2 - 9 = x^2 - 3^2 = (x+3)(x-3)$

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

$x^2 - \frac{1}{9} = x^2 - (\frac{1}{3})^2 = (x + \frac{1}{3})(x - \frac{1}{3})$

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

129). $P(x) = x^2 - 5x + 7$

a) $P(3) = 3^2 - 5 \times 3 + 7$

$= 9 - 15 + 7 \Rightarrow 16 - 15 = 1$

b) $P(x) - P(3) = x^2 - 5x + 7 - 1$

$= x^2 - 5x + 6$

c) $P(x) - P(3) = (x-3)(x-2)$

d) $x-3=0$, $x=3$

$x-2=0$, $x=2$

130). $P(x) = 3x^2 - 5x + 7$

a) $P(2) = 3 \times 2^2 - 5 \times 2 + 7$
 $= 12 - 10 + 7$
 $= 19 - 10 = 9.$

b) $P(x) - P(2) = 3x^2 - 5x + 7 - 9$
 $= 3x^2 - 5x - 2$

c) $P(x) - P(2) = (x-2)(3x+1).$

131). 3, 6, 10, 12, 15, 17, 18, 20, 25

Median = 15
 2nd w₂₀ = 15

Mean } $\frac{3+6+10+12+15+17+18+20+25}{9}$
 2nd w₁₀ } = $\frac{126}{9} = 14$

132) 30, 32, 33, 34, 35, 36, 37, 38, 39, 40

Median } $\frac{35+36}{2} = 35.5$
 2nd w₂₀ }

Mean } $\frac{30+32+33+34+35+36+37+38+39+40}{10}$
 2nd w₁₀ } = $\frac{354}{10} = 35.4.$

133) Median } = middle number } = 13.
 2nd w₂₀ } = middle number }
 2nd w₁₀ }

Mean } = 13.
 2nd w₁₀ }

134).	400	500	600	700	800
	2	4	5	7	3
Total (Amn)	2	6	11	18	21

Total = 21
 Amn.

11th = 600 rupees

Median } = 600 rupees.
 2nd w₂₀ }

135).

Daily Wage (Rs)	Number	Total Amn
100-300	5	5
300-500	7	12
500-700	8	20
700-900	10	30
900-1100	13	
1100-1300	7	
1300-1500	3	
Total	53	

Median } = $\frac{53+1}{2} = 27^{th}$
 2nd w₂₀ } = $\frac{27-22}{2} = 2.5$

$d = \frac{900-700}{10} = \frac{200}{10} = 20.$

$x_{21} = 700 + \frac{d}{2}$
 $= 700 + 10 = 710.$

$x_{27} = x_{21} + 6d$
 $= 710 + 6 \times 20$
 $710 + 120$
 $= 830$

Median } = 830 rupees.
 2nd w₂₀ }