Final touch
Answer Key

1. 12, 22, 32, ...

a) $d = 10$

b) $x_9 = 92$

c) 200 is not a term of this Sequence. because all terms of this Sequence end with the digit 2. ~~last term of~~ 1st digit of 200 is not 2

d) Three digit term: 102

2) 10, 14, 18, ...

a) $d = 4$

b) $x_{21} = x_1 + 20d$
$= 10 + 20 \times 4$.
$= 10 + 80 = 90$

c) $x_n = dn + f - d$.
$= 4n + 10 - 4 = 4n + 6$

d) $4n + 6 = 66$
$4n = 66 - 6 = 60$
$n = \frac{60}{4} = 15$
$x_{15} = 66$.

3) $x_n = 3n + 5$

a) $x_1 = 3 + 5 = 8$, $d = 3$.

b) $x_{15} = 3 \times 15 + 5$
$= 45 + 5 = 50$

c) 200 is a multiple of the Common difference 3 ∴ 200 is not the difference of any two terms.

4. 11, 14, 17, ...

a) $x_8 = 11 + 7 \times 3 = 11 + 21 = 32$

b) $d = \frac{14}{8} - \frac{11}{8} = \frac{3}{8}$

c) Integer term: $\frac{32}{8} = 4$.

5. $x_8 = 30$, $x_{11} = 42$.

a) $d = \frac{x_{11} - x_8}{11 - 8} = \frac{42 - 30}{3} = \frac{12}{3} = 4$

b) $x_1 = x_8 - 7d$.
$= 30 - 7 \times 4$
$= 30 - 28 = 2$

c) $x_n = dn + f - d$
$= 4n + 2 - 4$
$= 4n - 2$

6. $x_9 = 16$, $x_{16} = 9$.

a) $d = -1$

b) $x_{25} = x_{9+16} = 0$.

c) $S_{49} = 0 \times 49 = 0$.

7. $S_9 = 225$

a) $x_5 = \frac{S_9}{9} = \frac{225}{9} = 25$

b) $x_4 + x_6 = 2 \times x_5 = 2 \times 25 = 50$.

c) $x_1 + x_9 = 50$
$6 + x_9 = 50$
$x_9 = 50 - 6 = 44$

d) $d = \frac{44 - 6}{9 - 1} = \frac{38}{8} = \frac{19}{4}$

8. a) $S_6 = 120$.
Sequence: 20, 20, 20, 20, 20, 20

b) $x_1 = 10$; $x_6 = \frac{120}{3} - 10 = 30$.
$d = \frac{30 - 10}{6 - 1} = \frac{20}{5} = 4$
Sequence: 10, 14, 18, ...

9. a) $1+2+3+\cdots+20 = \frac{20\times 21}{2} = 210$.

b) $6+12+18+\cdots+120 = 6\times 210 = 1260$

c) $8+14+20+\cdots+122 = 1260+20\times 2$
$= 1260+40 = 1300$

d) $14+26+38+\cdots+242 = 1260+1300$
$= 2560$.

10. 1, 3, 5, ...

a) $x_{20} = 2\times 20-1 = 39$.

b) $1+3+5+\cdots+39 = 20^2 = 400$.

c) $3+9+15+\cdots+117 = 400\times 3 = 1200$.

d) $7+13+19+\cdots$

$S_{20} = 1200+20\times 4$
$= 1200+80 = 1280$.

11. 9, 15, 21, ...

a) $d = 6$.

b) $x_{11} = x_1+10d$.
$= 9+10\times 6 = 69$.

c) S_n = Mid term × no: of terms

$S_{21} = x_{11}\times 21 = 69\times 21$
$= 1449$.

d) difference of Sums: $10^2\times 6 = 600$.

12. 8, 11, 14, ...

a) $d = 3$.

b) $x_{25} = x_1+24d$
$= 8+24\times 3$
$= 8+72 = 80$

c) $S_n = \frac{n}{2}(x_1+x_n)$

$S_{25} = \frac{25}{2}(8+80) = \frac{25}{2}\times 88 = 1100$

OR

$x_{13} = \frac{x_1+x_{25}}{2} = \frac{8+80}{2} = 44$

$S_{25} = 44\times 25 = 1100$.

13) a) 100, 105, 110, ...

b) 102, 107, 112, ...

c) 997.

d) $n = \frac{997-102}{5}+1 = \frac{895}{5}+1$.

$= 179+1 = 180$.

$S = \frac{180}{2}(102+997)$

$= 90\times 1099 = 98910$.

14). $x_7 = 15$, $x_{13} = 25$.

a) $x_7 = 15$

$x_{10} = \frac{15+25}{2} = 20$.

$x_{13} = 25$

$x_{16} = 25+5 = 30$.

b) $S_{31} = x_{16}\times 31 = 30\times 31 = 930$.

15. a) $1+3+5+\cdots+19 = 10^2 = 100$.

b) $\frac{1}{2}+1\frac{1}{2}+2\frac{1}{2}+\cdots+9\frac{1}{2}$

$= \frac{1+3+5+\cdots+19}{2} = \frac{100}{2} = 50$

c) $\frac{1}{10}+\frac{3}{10}+\frac{5}{10}+\cdots+\frac{19}{10} = \frac{100}{10} = 10$.

16) a) Next lines:

11, 12 13, 14, 15
16 17 18 19 20 21.

b) last term = $\frac{20\times 21}{2} = 210$.

first term: $210-19 = 191$.

c) $S = \frac{20}{2}(191+210)$

$= 10\times 401$.

$= 4010$.

17. a) Next lines

10 11 12 13 14 15 16

17 18 19 20 21 22 23 24 25

b) $1, 4, 9, 16, \ldots$

c) Last term : $9^2 = 81$

d) first term: 82,

last term $= 10^2 = 100$

18. a) $\angle C = 90^\circ$ angle in semicircle.

b) $\angle B = 90 - 10 = 80$

$\angle A = 90 + 10 = 100$

19). a) $\angle A + \angle C = 180^\circ$

$\therefore ABCD$ is Cyclic

b) $\angle B = \frac{180}{3} = 60^\circ$, $\angle D = 120^\circ$

20) a) $\angle D = \angle CBP = 80^\circ$

b) $\angle ABC = 180 - 80 = 100$

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

21) a) $\angle B = \angle A = 70^\circ$

$\angle C = 180 - 70 = 110^\circ$

b) $\angle A + \angle C = 180^\circ$ $\therefore ABCD$ is Cyclic.

c) $\angle C$ is greater than 110°

$\therefore$ point 'C' is inside.

22) a) $\angle OBA = \angle OAB = 20^\circ$

b) $\angle ACB = \frac{180 - 40}{2} = 70^\circ$

c) $\angle ADB = 180 - 70 = 110^\circ$

d) If $\angle OAB = x$, then

$\angle ACB = 90 - x$.

$\angle ACB + \angle ADB = 180$

$\Rightarrow 90 - x + y = 180$

$y - x = 90$

23) a) $\angle OCA = \angle OAC = 30^\circ$

$\angle ACB = 90^\circ$

b) $\angle BOC = 30 \times 2 = 60^\circ$

$\therefore \angle OBC = \angle OCB = 60^\circ$

24) a) $\angle A = 30 + 20 = 50$.

b) $\angle BOC = 50 \times 2 = 100$.

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

25) a) $\angle BOD = 2 \times 80 = 160^\circ$

b) $\angle A = \frac{160}{2} = 80^\circ$

$\angle BCD = 180 - 80 = 100^\circ$

26) a) $\angle ACP = 90 - 40 = 50^\circ$

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

c) Central angle of arc BMC $= 2 \times 40 = 80^\circ$

27). a) $\angle ACB = 40^\circ = \angle ADB$.

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

c) $\angle P + \angle COD = 360 - (140 + 140)$

$= 360 - 280 = 80 = \angle AOB$.

28) $\angle D = 360 - (100 + 70 + 70) = 120$

$\angle A + \angle C = 100 + 70 \neq 180$, not Cyclic.

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

$\angle BAD = 60 + 45 = 105$

b) $\angle ABC = 180 - (60+30) = 90^\circ$

c) $\angle ADC = 90^\circ$

c) $\angle BPC = 60 + 45 = 105^\circ$.

30). a) $\angle A = 80$, $\angle QPC = 80^\circ$

$\angle D = 100$

$\angle A + \angle C \neq 180^\circ$ ∴ not Cyclic

b) $\angle A = \angle B = 80^\circ$

then $\angle B + \angle D = 180^\circ$

∴ ABCD is Cyclic.

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

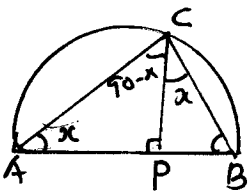
b). $PD = \frac{PA \times PB}{PC} = \frac{10 \times 4}{5} = 8$ cm.

$CD = 8 + 5 = 13$ cm

32)

a) $\angle A = \angle PCB$.

$\angle APC = \angle BPC = 90^\circ$



∴ $\frac{PA}{PC} = \frac{PC}{PB} \Rightarrow PA \times PB = PC^2$

b) $18 \times PB = 12^2$

$PB = \frac{12 \times 12}{18} = 8$ cm.

33, 34 figures.

35). a) $\angle BAO = 30^\circ$

$\angle BAC = 30 + 20 = 50^\circ$

b) $\angle AOD = 30 + 30 = 60^\circ$

c) $\angle COD = 140 - 60 = 80^\circ$

d) $\angle AOD = 60^\circ$

∴ $\angle OAD = \angle ODA = 60^\circ$

(Since OA = OD radius)

∴ $\triangle OAD$ is equilateral

36) Probability $= \frac{31-28}{7} = \frac{3}{7}$

37) Probability of white $= 1 - \frac{2}{3} = \frac{1}{3}$.

38) Probability of getting Red ball $= \frac{10}{18} = \frac{5}{9}$

b) " blue ball $= \frac{8}{18} = \frac{4}{9}$

c) Probability of Red $= \frac{11}{20}$.

$\frac{11}{20} < \frac{5}{9}$ ∴ Probability decrease.

39). no: of prime numbers is 3

∴ Probability $= \frac{3}{6} = \frac{1}{2}$

40). a) Probability of odd $= \frac{15}{30} = \frac{1}{2}$

b) " even $= \frac{1}{2}$

c) " prime $= \frac{10}{30} = \frac{1}{3}$.

41). Probability of digits equal $= \frac{9}{90} = \frac{1}{10}$.

" Product a square $= \frac{15}{90} = \frac{1}{6}$.

(11, 14, 41, 19, 91, 22, 28, 33, 44, 49, 55, 66, 77, 88, 99).

42). a) Probability of inside = $\frac{1}{2}$

b) Probability of out side = $\frac{1}{2}$

43). Probability of that point is inside = $\frac{1}{4}$

b) out side : $\frac{3}{4}$

44) a) Probability of the dot is inside the small rectangle = $\frac{2}{5}$

b) .... inside the large rectangle = $\frac{3}{5}$

45) $n^2 = 400$, $n = 20$.

46). a) Side, ~~Area~~ of the small square:

$\sqrt{625} = 25$ cm

b) Side of the large square = 25+5 = 30cm

c) Area of the large square = $30^2 = 900 cm^2$

47) a) Area = x^2, Perimeter = $4x$.

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

$(x+2)^2 = 900$

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

Side of the square = 28cm.

48) a) $(\frac{6}{2})^2 = 9$ should add.

b) $x^2 + 6x + 9 = 135 + 9$

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

$x = 12 - 3 = 9$, $x = -12 - 3 = -15$

Numbers = 9 or -15.

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

$x^2 + 8x = 384$

$x^2 + 8x + 4^2 = 384 + 16$

$(x+4)^2 = 400$

$x + 4 = 20$

$x = 16$

Number = 16 and 24.

50). Perimeter = 40 cm

$l + b = \frac{40}{2} = 20$ cm.

$l = x$, $b = 20 - x$.

then : $x(20-x) = 64$

$20x - x^2 = 64$

$\therefore x^2 - 20x = -64$

Completing the Square

$x^2 - 20x + 10^2 = 100 - 64$

$(x-10)^2 = 36$

$x - 10 = 6$, $x = 6 + 10 = 16$ cm

$l = 16$ cm, $b = 20 - 16 = 4$ cm

OR

$l = 10 + x$, $b = 10 - x$.

then Area = $(10+x)(10-x) = 64$

$10^2 - x^2 = 64$

$100 - x^2 = 64 \Rightarrow x^2 = 36$

$x = \sqrt{36} = 6$.

$l = 10 + 6 = 16$ cm, $b = 10 - 6 = 4$ cm.

51. a) $PA = x$, $PB = x + 10$.

b) $x(x+10) = 12^2$

$x^2 + 10x = 144$

$x^2 + 10x + 5^2 = 144 + 25$

$(x+5)^2 = 169$, $x + 5 = 13$, $x = 13 - 5 = 8$

$PA = 8$ cm, $PB = 18$ cm

52) a) $OP = x$, $AP = 13+x$, $PB = 13-x$

$PA \times PB = PC^2 \Rightarrow (13+x)(13-x) = 12^2$

$13^2 - x^2 = 144$

$169 - x^2 = 144$

$x^2 = 25$, $x = \sqrt{25} = 5$

$PA = 13+5 = 18$ cm

$PB = 13-5 = 8$ cm

53) a) $\angle C = 45°$

b) $AB = BC = 6$ cm.

c) $AC = 6\sqrt{2}$ cm.

54) a) $\angle P = 45°$ b) $PR = 5\sqrt{2}$ cm

55) a) $\angle C = 60°$ or

b) $AB = 3\sqrt{3}$ cm, $AC = 6$ cm.

56) a) $AP = \frac{10}{2} = 5$ cm.

$PC = 5\sqrt{3}$ cm.

b) $BP = AP = 5$ cm.

$AB = 5\sqrt{2}$ cm.

57) a) $PS = \frac{12}{2} = 6$ cm

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

c) $\angle Q = 150°$ then Area $= 54$ cm^2.

58) a) Perpendicular distance $= \frac{9\sqrt{2}}{2}$ cm

b) Area $= bh = 20 \times \frac{9\sqrt{2}}{2} = 90\sqrt{2}$ cm^2

59) a) $\angle CBD = 180 - 120 = 60°$

b) $BC = \frac{10}{2} = 5$ cm, $CD = 5\sqrt{3}$ cm.

c) Area $= \frac{1}{2}bh = \frac{1}{2} \times 15 \times 5\sqrt{3} = \frac{75\sqrt{3}}{2}$ cm^2

Perimeter $= 15 + 5\sqrt{3} + 10\sqrt{3} = (15 + 15\sqrt{3})$ cm

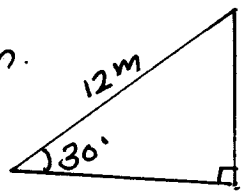
60) a) $\angle ADB = \angle ACB = 60°$

b) $\angle ABD = 90°$

c) $BD = \frac{6}{\sqrt{3}}$ cm, $\therefore$ radius $= \frac{6}{\sqrt{3}}$ cm

61) a) Height of wall $= \frac{12}{2} = 6$ m.

b) Distance $= 6\sqrt{3}$ m.



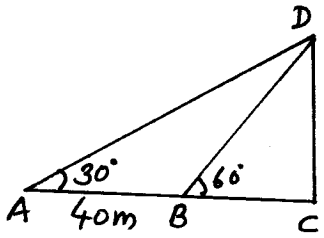
62) $\angle A = \angle ADB = 30°$

$\therefore AB = BD = 40$m

$\therefore BC = \frac{40}{2} = 20$m

$CD = 20\sqrt{3}$m.

Height of the building $= 20\sqrt{3}$ m.



63) a) $BC = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$ cm

b) $\sin A = \frac{BC}{AC} = \frac{12}{13}$

$\cos A = \frac{AB}{AC} = \frac{5}{13}$.

c) $\cos C = \frac{BC}{AC} = \frac{12}{13} = \sin A$.

64) a) $QR = 4 \times 2 = 8$ cm

$PQ = \sqrt{10^2 - 8^2} = \sqrt{100 - 64} = \sqrt{36} = 6$ cm

b) $\cos P = \frac{6}{10} = \frac{3}{5}$.

$\cos R = \frac{4}{5}$.

c) $\frac{\sin P}{\cos R} = \frac{4/5}{4/5} = 1$.

65) a) $AP = 20 \times \sin 40 = 20 \times 0.64 = 12.8$ cm

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

c) $\angle B = 140$ then Area $= 160$ cm^2

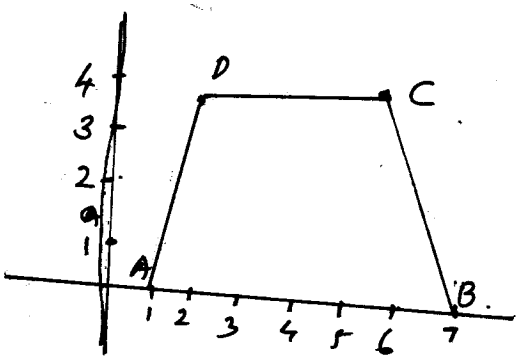
66). $(0,3)$, $-y$ axis

$(4,0)$, $(-5,0)$ → x axis.

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

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

68)



b) Isosceles trapezium.

c) $AB = 6$, $CD = 4$, $h = 4$.

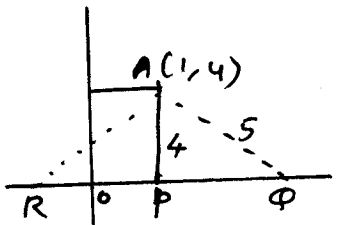
Area: $\frac{1}{2} \times 4(6+4) = 20$ sq. unit

69) $A(-5,-2)$, $C(5,1)$.

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

71) a) $(1,0)$

b) $(0,4)$



c) $PQ = \sqrt{5^2 - 4^2} = \sqrt{25-16} = \sqrt{9} = 3$.

$OQ = 1 + 3 = 4$

$Q(4,0)$

$OR = 3 - 1 = 2$, $R(-2,0)$.

72) distance between $(6,8)$ and $(10,8)$ is $10 - 6 = 4$ ∴ $(10,8)$ on the circle.

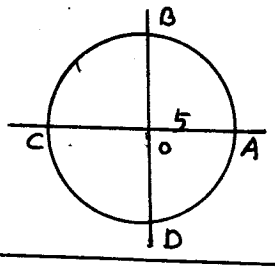
distance between $(6,8)$, $(6,13)$ is $13 - 8 = 5 > 4$ ∴ outside.

$(0,0)$, $(6,8)$ distance: 10, outside

$(6,8)$ $(-1,9)$ distance: $\sqrt{(6+1)^2 + (8-9)^2} = \sqrt{7^2 + 1^2} = \sqrt{50} > 4$ ∴ outside

73). $A(5,0)$, $B(0,5)$

$C(-5,0)$, $D(0,-5)$



74) a) Radius $= 16 - 6 = 10$.

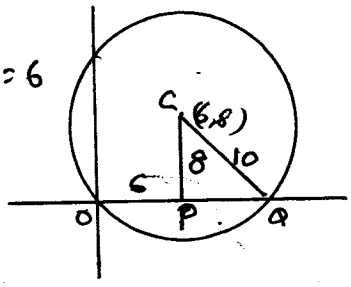
$PQ = \sqrt{10^2 - 8^2}$

$\sqrt{100-64} = \sqrt{36} = 6$

$OQ = 6 + 6 = 12$

∴ $Q(12,0)$.

$O(0,0)$.



75)

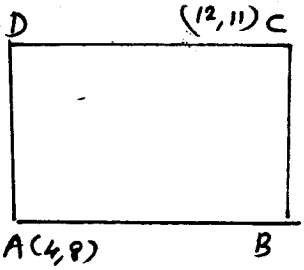
$B(12,8)$

$D(4,11)$.

$AB = 12 - 4 = 8$ unit

$BC = 11 - 8 = 3$ unit

Perimeter $= 2(8+3) = 22$ unit.



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

77) $AB = 1 - -3 = 4$

$BC = \sqrt{1^2 + -2^2} = \sqrt{1+4} = \sqrt{5}$.

$CD = \sqrt{-3^2 + 1^2} = \sqrt{9+1} = \sqrt{10}$.

$AD = 1 - -2 = 3$.

$AC = \sqrt{-3^2 + -2^2} = \sqrt{9+4} = \sqrt{13}$.

$BD = \sqrt{(1+3)^2 + (1+2)^2} = \sqrt{4^2 + 3^2}$

$= \sqrt{16+9} = \sqrt{25} = 5$.

80). a) $\angle P = 90°$

b) $\angle Q = 90 - 42 = 48°$

81) a) $\angle PQO = 90°$

b) $PQ^2 = 13^2 - 5^2 = 169 - 25 = 144$

$PQ = \sqrt{144} = 12$ cm

82) a) $\angle OAB = 90^\circ$

b) $OB = 2 \times 6 = 12$ cm.

$AB = 6\sqrt{3}$ cm.

83) ~~a) $PB^2 = PC^2 - BC^2$~~

a) $PB = PA = 8$ cm.

b) $PC^2 = PA^2 + AC^2$

$= 8^2 + 6^2 = 64 + 36 = 100$

$PC = \sqrt{100} = 10$ cm.

84) $\angle C = \angle PAB = 50^\circ$

b) $\angle PBA = \angle PAB = 50^\circ$

c) $\angle P = 180 - (50 + 50) = 80^\circ$

85) a) $\angle AQP = \angle APQ = \frac{180-70}{2} = 55^\circ$

b) $\angle PRQ = \angle APQ = 55^\circ$

$\angle PQR = \angle BPR = \frac{180-80}{2} = 50^\circ$

$\angle QPR = 180 - (50 + 55) = 75^\circ$

c) $\angle CQR = \angle CRQ = \angle QPR = 75^\circ$

$\therefore \angle QCR = 180 - (75 + 75) = 30^\circ$

86) a) $\angle POR = 360 - (120 + 130) = 110^\circ$

$\therefore \angle PAR = 180 - 110 = 70^\circ$

$\therefore \angle APR = \angle ARP = \frac{180-70}{2} = 55^\circ$

b) $\angle B = 180 - 120 = 60^\circ$

$\angle A = 70^\circ$

$\therefore \angle C = 180 - (70 + 60) = 50^\circ$

87) a) $\angle APO = 40 AP = 32$

$\angle AOP = 180 - (32 + 32) = 116$

b) $\angle OPT = 90^\circ$

$\angle POT = 32 + 32 = 64.$

$\angle PTO = 90 - 64 = 26.$

88) $AR = AC = 11 - 7 = 4$ cm.

$PC = QC = 7$ cm.

$BP = BR = 8 - 4 = 4$ cm.

89) $AP = AS$, $BP = BQ$, $CQ = CR$ and $DR = DS$.

$AB + CD = AP + PB + CR + DR$

$= AS + BQ + CQ + DS$

$= (BQ + CQ) + (AS + DS)$

$= BC + AD.$

b) Perimeter $= 2(2 + 5 + 3 + 4)$

$= 2 \times 14 = 28$ cm.

c) $AD + BC = AB + CD = 20$ cm.

Perimeter $= 20 \times 2 = 40$ cm

90) a) $PC = 3 + 9 = 12$ cm

b) $PB \times PC = PA^2$

$PA^2 = 3 \times 12 = 36$

$PA = \sqrt{36} = 6$ cm

91) a) $\angle OAP = 90^\circ$

b) $\angle OQA = \angle PQA.$

$\angle AOQ = \angle PAQ.$

c) $OQ \times QP = AQ^2.$

$OQ \times QP = r^2 - OQ^2$

$OQ \times QP + OQ^2 = r^2$

$OQ(PQ + OQ) = r^2$

$OQ \times OP = r^2.$

92, 93, 94 figures.

95). $l = 10$ cm.

$r = l/2 = \frac{10}{2} = 5$ cm.

(because semicircle)

b) $CSA = \pi r l = \pi \times 5 \times 10 = 50\pi$ cm

c) $TSA = 50\pi + 25\pi = 75\pi$ cm^2.

96) $R = 12$ cm, $x = 120°$

a) $l = R = 12$ cm.

b) $\frac{r}{l} = \frac{x}{360} \Rightarrow \frac{r}{12} = \frac{120}{360}$

$\frac{r}{12} = \frac{1}{3} \Rightarrow r = \frac{12}{3} = 4$ cm.

97). $x = 216°$ $R = 10$ cm.

a) $l = R = 10$ cm.

b) $\frac{r}{l} = \frac{x}{360} \Rightarrow \frac{r}{10} = \frac{216}{360}$

$r = \frac{10 \times 216}{360} = 6$ cm.

c) $h^2 = l^2 - r^2 = 10^2 - 6^2$

$= 100 - 36 = 64$

$h = \sqrt{64} = 8$ cm.

d) $V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times 6 \times 6 \times 8$

$= 96\pi$ cm^3.

98). $\frac{x}{360} = \frac{r}{R} \Rightarrow x = \frac{18 \times 360}{30}$

$= 216°$ //

$l^2 = \sqrt{24^2 + 18^2}$

$= \sqrt{576 + 324} = \sqrt{900} = 30$ cm

99) $l = 2r$.

b) $l = 10$ cm

$r = 5$ cm.

100). $r = 12$ cm, $h = 16$ cm.

a) $l^2 = 16^2 + 12^2 = 256 + 144 = 400$

$l = \sqrt{400} = 20$ cm.

b) $CSA = \pi r l = \pi \times 12 \times 20 = 240\pi$ cm

c) $TSA = 240\pi + 144\pi = 384\pi$ cm^2

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

$= \frac{1}{3}\pi \times 12 \times 12 \times 16$

$= 768\pi$ cm^3.

100A.

a) $\pi r^2 = 64\pi$, $r = \sqrt{64} = 8$ cm

$l = 20$ cm.

$h = \sqrt{20^2 - 8^2} = \sqrt{400 - 64}$

$= \sqrt{336}$ cm.

b) $CSA = \pi r l = \pi \times 8 \times 20 = 160\pi$ cm

$TSA = 160\pi + 64\pi = 224\pi$ cm^2

c) $V = \frac{1}{3}\pi \times 8 \times 8 \times \sqrt{336}$.

$= \frac{64\sqrt{336}}{3}\pi$ cm^3.

101). $\pi r^2 = 576\pi \Rightarrow r = \sqrt{576} = 24$ cm

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

$= \frac{1}{3}\pi \times 24 \times 24 \times h = 1920\pi$

$= 192h = 1920$.

$h = \frac{1920}{192} = 10$ cm

b) $l = \sqrt{10^2 + 24^2} = \sqrt{100 + 576}$

$= \sqrt{676} = 26$ cm

$CSA = \pi \times 24 \times 26 = 624\pi$ cm^2

101 a) Ratio of perimeters = Ratio of their radii = 2:3.

b) Ratio of their volumes.

$= \frac{1}{3}\pi \times (2k)^2 \times 5h : \frac{1}{3}\pi (3k)^2 \times 4h$

$= 5:9.$

c) Volume of Second $= 9 \times 100 = 900$ cm³

102). $r = 12$ cm, $h = 18$ cm.

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

103). $r = 10$cm, $h = 24$cm

a) $V = \pi \times 10 \times 10 \times 24 = 2400\pi$ cm³

b) $V = \frac{1}{3} \times 2400\pi = 800\pi$ cm³.

c) $l = \sqrt{24^2 + 10^2} = \sqrt{576 + 100} = \sqrt{676}$

$= 26$ cm

$CSA = \pi \times 10 \times 26 = 260\pi$ cm.

104). a) Mid point: $\left(\frac{14+20}{2}, \frac{5+7}{2}\right)$

$= (17, 6)$

b) Mid point: $\left(\frac{6+12}{2}, 2\right) = (9, 2)$

105). a) Centre: $\left(\frac{2+6}{2}, \frac{3+5}{2}\right) = (4, 4)$

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

$= \sqrt{2^2 + 1^2} = \sqrt{5}.$

106). Midpoint of AC: $\left(\frac{8+1}{2}, \frac{6+1}{2}\right)$

$= \left(\frac{9}{2}, \frac{7}{2}\right)$

Midpoint of BD: $\left(\frac{7+2}{2}, \frac{1+6}{2}\right)$

$= \left(\frac{9}{2}, \frac{7}{2}\right)$

b) Midpoints of diagonals are equal $\therefore$ ABCD is parallelogram.

107). C(9, 2) B(6, −1), D(6, 5).

108) Midpoint of AC $= \left(\frac{-1+7}{2}, 2\right) = (3, 2)$

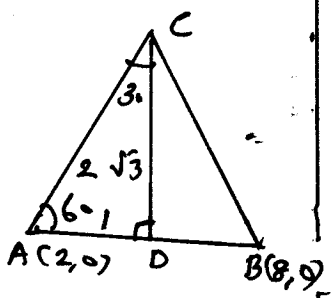
b) B(3, −1), D(3, 5)

c) Side $= \sqrt{(3+1)^2 + (2+1)^2}$

$= \sqrt{4^2 + 3^2} = \sqrt{16+9} = \sqrt{25} = 5$

109). a) D $(2+8-4, 4+8-3)$

D(6, 9).



b) AB = 8 − 2 = 4.

AD = 2.

$\therefore$ CD = $2\sqrt{3}$.

$\therefore$ Co-ordinates of C $(4, 2\sqrt{3})$

c) Slope of AB $= \frac{8-5}{8-4} = \frac{3}{4}$

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

Slopes are same $\therefore$ A, B, C are on a line.

110) a) Slope $= \frac{8-4}{5-2} = \frac{4}{3}$.

b) Other points $(5+3, 8+4) = (8, 12)$

$(8+3, 12+4) = (11, 16)$

111). a) Slope of $AB = \frac{7-4}{3-1} = \frac{3}{2}$

b) Slope of $BC = \frac{16-7}{9-3} = \frac{9}{6} = 3/2$

Slopes are equal.

$\therefore A, B, C$ are on a line

112). Slope $= \frac{8-5}{5-1} = 3/4$

Slope of $(5,8)(13,14)$ is $= \frac{6}{8} = 3/4$

Slopes are equal $\therefore$ Cannot draw a triangle

113) a) other points: $(5+4, 6+3) = (9,9)$

$(9+4, 9+3) = (13, 12)$

b) parallel = slopes are equal.

$\therefore$ Slope $= 3/4$

114) a) Slope $= \frac{6-3}{3+1} = \frac{3}{4}$

b) Other points: $(7, 9), (11, 12)$

c) Slope $= \frac{y+3-y}{x+4-x} = \frac{3}{4}$

$\therefore$ Slopes are equal.

$\therefore$ This point is on this line

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

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

$2 \times 4 - 10 + 2$

$8 - 10 + 2 = 0$.

b) factor: $P(2) = 0 \therefore x - 2$

116) $5x^3 - 4x^2 + x + K$.

$x - 1$ factor $\therefore 5 - 4 + 1 + K = 0$.

$6 - 4 + K = 0$

$2 + K = 0, \therefore K = -2$.

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

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

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

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

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

$2 \times 9 + 9 + 1$

$18 + 9 + 1 = 28$

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

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

$= 18 - 15 + 1 = 4$

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

c) $P(x) - P(2)$.

ie 4 is subtracted.

119) $x^2 - 1 = (x+1)(x-1)$

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

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

$x^2 - 100 = x^2 - 10^2 = (x+10)(x-10)$

120) $p(x) = x^2 - 5x + 7$.

a) $p(3) = 3^2 - 5\times3 + 7$

$9 - 15 + 7 = 16 - 15 = 1$.

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

$= x^2 - 5x + 6$.

c) $x^2 - 5x + 6 = (x-3)(x-2)$

121) $p(x) = x^2 - 7x + 13$

a) $p(3) = 3^2 - 7\times3 + 13$

$9 - 21 + 13 = 22 - 21 = 1$

b) $p(x) - p(3) = x^2 - 7x + 13 - 1$

$x^2 - 7x + 12$

c) $x^2 - 7x + 12 = (x-3)(x-4)$

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

$x - 4 = 0$, $x = 4$

122) Mean: $\frac{15+12+25+10+3+18+17+20+6}{9}$

$= \frac{126}{9} = 14$

3, 6, 10, 12, 15, 17, 18, 20, 25

Median: 15.

123). Mean: $\frac{35+39+32+36+40+30+34+37+38+33}{10}$.

$= \frac{354}{10} = 35.4$

Median:

30, 32, 33, 34, 35, 36, 37, 38, 39, 40.

$= \frac{35+36}{2} = 35.5$.

124). Middle number: $\frac{1+25}{2} = 13$

Mean = Median = 13.

125). 13^{th} families Income: 6000

Median: 6000.

126) a) Total = 21 workers.

b) Wage of 11^{th} worker = 600.

c) Median = 600.

127). $x_6 = 40$, $x_9 = 58$.

a) $d = \frac{58-40}{9-6} = \frac{18}{3} = 6$

$x_1 = x_6 - 5d = 40 - 5\times6$

$= 40 - 30 = 10$.

$S_n = \frac{d}{2}n^2 + (f - d/2)n$

$= 3n^2 + (10-3)n = 3n^2 + 7n$.

b) $S_{25} = 3\times25^2 + 7\times25$

$= 3\times625 + 175$

$1875 + 175$

$= 2050$.

128) 15, 33, 51, ...

a) $S_n = \frac{d}{2}n^2 + (f - d/2)n$

$= 9n^2 + (15-9)n \Rightarrow 9n^2 + 6n$.

b) $S_n + 1 = 9n^2 + 6n + 1 = (3n+1)^2$

is a perfect square.

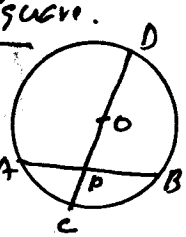
129). Let $OP = x$, then

$PD = 6 + x$, $PC = 6 - x$.

$(6+x)(6-x) = 4\times5$

$6^2 - x^2 = 20$, $36 - x^2 = 20$

$x^2 = 16$, $x = \sqrt{16} = 4$, $OP = 4$ cm.



130). a) Possible pairs: $50 \times 35 = 1750$.

b) Probability of bolt being Scouts $= \frac{30 \times 20}{1750} = \frac{12}{35}$

c) bolt being guide $= \frac{20 \times 15}{1750} = \frac{6}{35}$

d) Probability of one Scout and one guide $= \frac{30 \times 15 + 20 \times 20}{1750}$

$= \frac{450 + 400}{1750} = \frac{950}{1750} = \frac{19}{35}$

131) a) Possible pairs: $11 \times 12 = 132$.

b) Probability of bolt being red $= \frac{6 \times 8}{132} = \frac{4}{11}$.

c) Probability of bolt being white $\frac{5 \times 4}{132} = \frac{5}{33}$.

d) Probability of atleast one red $= 1 - \frac{5}{33} = \frac{28}{33}$.

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

b) $n^2 + 8n + 4^2 = 240 + 16$

$(n+4)^2 = 256$

$n + 4 = \sqrt{256} = 16$

$n = 16 - 4 = 12$

$S_{12} = 240$.

133). a) $l + b = \frac{46}{2} = 23$.

$l = 20\text{cm}$, $b = 3\text{cm}$.

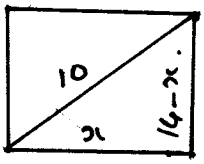
b) Area $= 20 \times 3 = 60\text{cm}^2$.

c) $l + b = \frac{62}{2} = 32$.

$lb = 60 = 30 \times 2$

$l = 30\text{cm}$, $b = 2\text{cm}$

134). $l + b = \frac{28}{2} = 14\text{cm}$.



a) $l = x$, $b = 14 - x$

c) $x^2 + (14-x)^2 = 10^2$

$x^2 + 14^2 - 2 \times 14 \times x + x^2 = 100$

$2x^2 - 28x + 196 = 100$

$x^2 - 14x = \frac{100 - 196}{2} = -48$

$x^2 - 14x + 7^2 = 49 - 48$

$(x-7)^2 = 1$.

$x - 7 = 1$, $x = 1 + 7 = 8$

$l = 8\text{cm}$, $b = 14 - 8 = 6\text{cm}$.

135). a) $PB = x$, $AP = x + 10$

b) $x(x+10) = 12^2$

$x^2 + 10x = 144$.

$x^2 + 10x + 5^2 = 144 + 25$

$(x+5)^2 = 169$

$x + 5 = \sqrt{169} = 13$

$x = 13 - 5 = 8\text{cm}$

$PB = 8\text{cm}$, $AP = 8 + 10 = 18\text{cm}$

diameter $= 8 + 18 = 26\text{cm}$

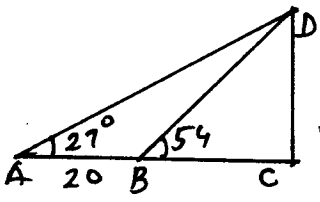
136) a) $\angle ADB = 65°$

b) $\frac{9}{\sin 65} = 2R$.

$2R = \frac{9}{0.9} = 10\text{cm}$.

137) $\angle ADB = 27°$

$\therefore AB = BD = 20\text{m}$



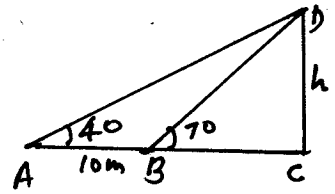
$CD = 20 \times \sin 54$

$\approx 20 \times 0.8$

$= 16\text{m}$

Height $= 16\text{m}$

138).



$$h = \frac{AB \times \tan A \times \tan B}{\tan B - \tan A}$$

$$h = \frac{10 \times \tan 40 \times \tan 70}{\tan 70 - \tan 40}$$

$$= \frac{10 \times 0.8 \times 2.8}{2.8 - 0.8} = \frac{4}{\cancel{8} \times 2.8}{\cancel{2}}$$

$$= 11.2\text{m}$$

Height = 11.2m

139). a) $\angle ACB = 70°$

$AC = AB = 20\text{m}$.

b) $CD = 20 \times \sin 40$

$= 20 \times 0.64 = 12.8\text{m}$

c) $AD = 20 \times \cos 40$

$= 20 \times 0.8 = 16\text{m}$.

$BD = 20 - 16 = 4\text{m}$.

140) a) base edge = 10 cm

b) $l = \frac{36-10}{2} = \frac{26}{2} = 13\text{cm}$.

c) $LSA = \cancel{2}al = 2 \times 10 \times 13$

$= 260\text{ cm}^2$

141). $a = 12\text{cm}$, $l = 10\text{cm}$.

a) $h^2 = l^2 - (a/2)^2 = 10^2 - 6^2 = 100 - 36 = 64$

$h = \sqrt{64} = 8\text{cm}$

b) $V = \frac{1}{3}a^2h = \frac{1}{3} \times 12 \times 12 \times 8$

$= 384\text{ cm}^2$.

142). $a = e = 12\text{cm}$.

a) $l = \frac{\sqrt{3}}{2}a = \frac{\sqrt{3} \times 12}{2} = 6\sqrt{3}\text{ cm}$

b) $TSA = \sqrt{3}a^2 + a^2$

$= \sqrt{3} \times 12^2 + 12^2$

$= (144\sqrt{3} + 144)\text{ cm}^2$

143). Ratio of Volumes: $1^3 : 2^3$

$= 1 : 8$

Ratio of their areas = $1^2 : 2^2$

$= 1 : 4$

144) a) Centre = $\left(\frac{3+-3}{2}, \frac{4+-4}{2}\right) = (0, 0)$

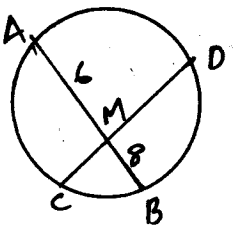
b) $r^2 = 3^2 + 4^2 = 9 + 16 = 25$

$r = \sqrt{25} = 5$

c) $x^2 + y^2 = r^2 \Rightarrow x^2 + y^2 = 25$

145). let $MC = 8 - x$

and $MD = 8 + x$.



then $(8 - x)(8 + x) = 6 \times 8$

$8^2 - x^2 = 48$

$64 - x^2 = 48 \quad x^2 = 16$

$x = \sqrt{16} = 4$.

$MC = 8 - 4 = 4\text{ cm}$

$MD = 8 + 4 = 12\text{ cm}$.

146). a) Radius $= \sqrt{25} = 5$

b) $x^2 + y^2 = 9$

147). a) Slope $= \frac{0-2}{5-3} = \frac{-2}{2} = -1$

eqn: $x + y = 5$.

b) $y = 0$.

c) Point of intersection: $(5, 0)$

148). figure.

149) a) Radius $= 6 - 3 = 3$ unit.

b) equation: $(x-5)^2 + (y-3)^2 = 9$.

c) Distance: 3 unit.

d) Tangent = x Coordinate = 5.

150) a) Point : $(4, 0)$

b) $(3, 0)$ not possible $\therefore r = 4$.

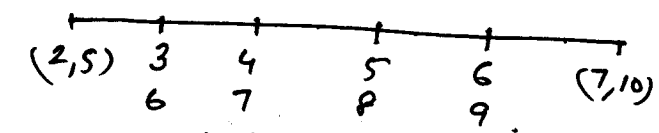
c) Inside $(3, 0)$ outside $(5, 0)$

151) a) Slope of AB $= \frac{10-2}{5-1} = \frac{8}{4} = 2$.

b) equation : $y = 2x$.

c) equation : $y = -2x$.

152).



point: $(5, 8)$

153). a) Centre: $(\frac{8}{2}, \frac{6}{2}) = (4, 3)$

b) $r = \sqrt{(8-4)^2 + 3^2} = \sqrt{4^2 + 3^2} = \sqrt{16+9}$

$= \sqrt{25} = 5$

equation: $(x-4)^2 + (y-3)^2 = 25$

c) Other end: $(4+4, 3+3) = (8, 6)$

154). a) Radius $= \frac{12}{2} = 6$cm

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

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

155) radius $= \sqrt{(5-1)^2 + (5-2)^2}$

$= \sqrt{4^2 + 3^2} = \sqrt{16+9} = \sqrt{25} = 5$ unit.

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

c) Centre: $(2, 3)$,

radius: $\sqrt{81} = 9$.

156)

Wages	Total.	
upto 300	5	1-5
" 500	12	6-12
" 700	20	13-20
" 900	30	21-30.
" 1100	43	
" 1300	50	
" 1500	53	

a) position $= \frac{53+1}{2} = 27^{th}$.

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

$x_{21} = 700 + \frac{20}{2} = 710$

$x_{27} = x_{21} + 6d$

$= 710 + 6 \times 20$

$710 + 120 = 830$.

c) Median: 830.