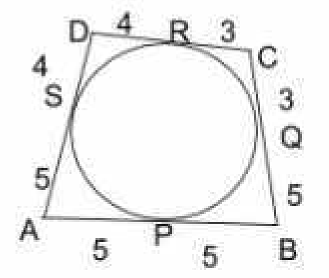
In ΔAOB, ∠OAB = ∠OBA = 30°, thus, ∠AOB = 120°

In quadrilateral AOBP, ∠OAP = ∠OBP = 90° and ∠AOB = 120°

Then, ∠APB = 60° (sum of angles of quadrilateral is 360°)

Sol 39. (b) AB = 10cm, CD = 7 cm, SD = 4 cm and AS = 5 cm

Two tangents from the same point to a circle are equal in length.



Thus, BC = 8 cm

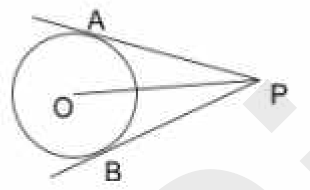
Sol 40. (d) For a triangle with sides: a,b and c

⇒ (a-b)<c<(a+b)

⇒ According to question: (3)<third side <(13)

Option d satisfies.

Sol 41. (b) ∠ APO = 35° , ∠ OAP = ∠ OBP = 90°



In quad. OAPB; OA=OB= radius

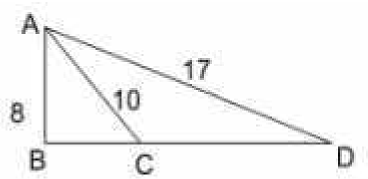
AP=BP (two tangents from a same point to a circle are equal in length)

OP common.

Thus, Δ OAP ≅ Δ OBP

Therefore, ∠APO = ∠ BPO = 35°

Sol 42. (a) AB = 8 cm, AC = 10 cm, ∠ABD = 90° and AD = 17 cm



Using pythagoras theorem, BC = 6 cm and BD = 15 cm

Then CD = 9 cm

Sol 43. (a) $\frac{AD}{AB} = \frac{AE}{AC} \Rightarrow \frac{a}{2a+4} = \frac{2a+3}{9a+3}$

$\Rightarrow 9a^2+3a = 4a^2+14a+12$

$\Rightarrow 5a^2-11a-12 = 0$

$\Rightarrow a = 3$

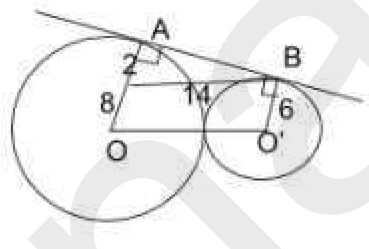
Sol 44. (c) Angles of triangle are in ratio = 3x:5x:4x

Sum of angle = 180° = 12x

x = 15°

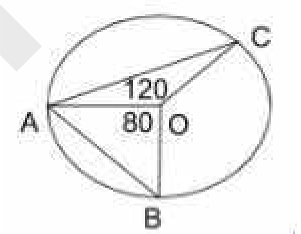
Difference between smallest and biggest angle = 2x = 30°

Sol 45. (a) let O and O’ be the centers of two circles. Tangent is perpendicular to the radius of the circle.



$AB = \sqrt{14^2 - 2^2} = \sqrt{192} = 13.86$ cm

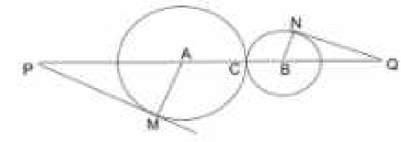
Sol 46. (b) ∠BOC = (360 - 80-120) ° = 160 °



Angle formed at the circumference of the circle is half the angle formed at its centre.

Therefore, ∠BAC = 80 °

Sol 47. (c) MP = 15 cm, NQ = 8 cm, PA = 17 cm and BQ = 10 cm



$AM = \sqrt{17^2 - 15^2} = 8$ cm

$NB = \sqrt{10^2 - 8^2} = 6$ cm

AB = 8+6 = 14 cm

Sol 48. (c) Exterior angle is equal to sum of interior opposite angles.

∠ACD = ∠ABC+∠BAC

110° = 62° + ∠BAC

∠BAC = 48°

Sol 49. (c) Sum of opposite angles of a cyclic quadrilateral is 180°.

∠A = 100° then ∠C = 80°

Sol 50. (d) In an isosceles triangle, perpendicular from common vertex to opposite side acts as its bisector.

Therefore, D is the midpoint of BC. BD=DC = 3 cm

In Δ ABD, BD = 3 cm and AD = 4 cm

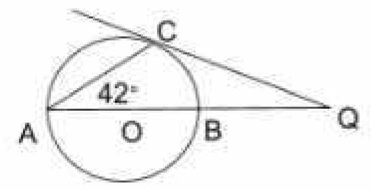
Thus, AB = 5 cm (using pythagoras theorem)

Sol 51. (c) Let two equal sides = x cm each.

2x + 18 = 50

x = 16 cm

Sol 52. (c) ∠CAB = 42° and AB is the diameter of a circle. Join OC.



In ΔOCA, OC = OA = radius

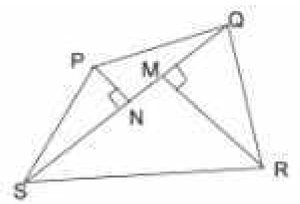
Thus, ∠CAB = ∠ OCA = 42°

∠COB = ∠CAB + ∠ OCA = 84°

CQ is a tangent, therefore, OC is perpendicular to CQ.
In ΔOCQ, ∠CQB = (90-84)° = 6°

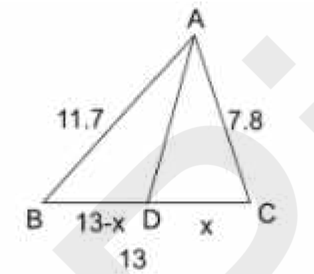
Sol 53. (b) Line formed by joining the midpoint of a triangle is half the length of its opposite side.
DE = $\frac{1}{2}$ AC, DF = $\frac{1}{2}$ BC and FE = $\frac{1}{2}$ AB
$\frac{1}{2}$ (DE+EF+DF) = $\frac{1}{2}$ ($\frac{1}{2}$ [AB + BC + AC]) = $\frac{1}{4}$ (12+20+15) = 11.75 cm

Sol 54. (b) SQ = 6 cm, PN = 2 cm and RM = 3 cm



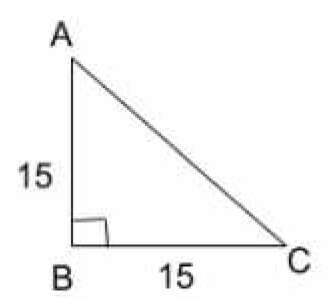
Area of quadrilateral PQRS = area(PQS) +area(RQS) = $\frac{1}{2} \times 6 \times 2 + \frac{1}{2} \times 6 \times 3 = 15$ cm^2

Sol 55. (a) In ΔABC, AB=11.7cm, AC = 7.8 cm and BC = 13 cm.



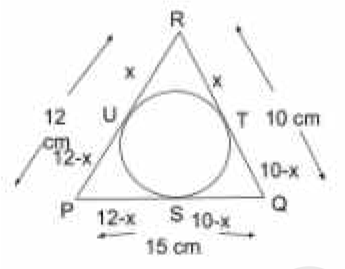
According to angle bisector theorem, $\frac{AB}{AC} = \frac{BD}{CD}$
$\Rightarrow \frac{11.7}{7.8} = \frac{13-x}{x}$
$\Rightarrow$ x = 5.2 cm

Sol 56. (a) ABC is an isosceles right angle triangle.



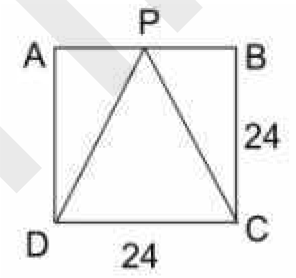
Thus, AC = 15 $\sqrt{2}$
Area of ΔABC = $\frac{1}{2} \times 15 \times 15 = \frac{225}{2}$ cm^2

Sol 57. (d) PQ = 15 cm, QR = 10 cm and PR = 12 cm



12-x+10-x = 15
x = 3.5 cm
PS = 12-x = 8.5 cm
QT = 10-x = 6.5 cm
RU = x = 3.5 cm

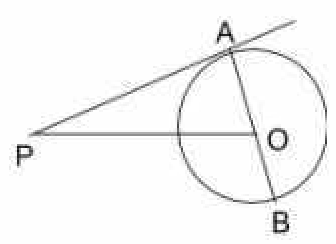
Sol 58. (c) ABCD is a square with side 24 cm.



Area of $\Delta PDC = \frac{1}{2} \times 24 \times 24$ = 288 cm^2

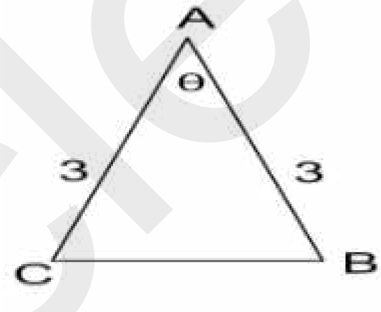
Sol 59. (b) Area of sector = $\Pi \times r^2 \times \frac{\theta}{360} = \frac{22}{7} \times 14^2 \times \frac{45}{360}$ = 77 cm^2

Sol 60. (d) ∠POB = 110°



Then, ∠POA = 70°
In ΔAPO, ∠PAO = 90° (radius ⊥ tangent)
Thus, ∠APO = 20°

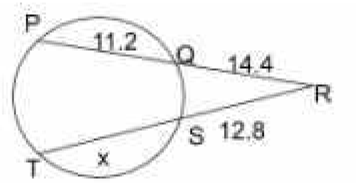
Sol 61. (d) given triangle is an isosceles triangle.



θ = 80° (given)
∠B = ∠C = $\frac{180-80}{2}$ = 50°

Sol 62. (a) Angle opposite to the greatest side in a triangle is largest.
Here, BC>AC>AB
Thus, ∠A>∠B>∠C

Sol 63. (b) QR × PR = SR × RT



14.4 × 25.6 = 12.8 × (12.8+x)
x = 16 cm

Sol 64. (d) O is the centre of the circle.

Sol 49. (a)

cosx = $\frac{-1}{2}$

Clearly, x=240

$4\,tan^2x + 3cosec^2x \Rightarrow 4$

$(\sqrt{3})^2 + 3(\frac{-2}{\sqrt{3}})^2 = 16$

Sol 50. (c)

$6(sec^2 59 - cot^2 31) + \frac{2}{3}$ sin90 - 3 $tan^2 56$ y $tan^2 34 = \frac{y}{3}$

$\Rightarrow 6(1) + \frac{2}{3}(1) - 3y(1)^2 = \frac{y}{3}$

$\Rightarrow \frac{20}{3} - 3y = \frac{y}{3}$

$\Rightarrow \frac{20}{3} = \frac{y}{3} + 3y$

$\Rightarrow \frac{20}{3} = \frac{10y}{3}$

$\Rightarrow y = 2$

Sol 51. (a)

$6(sec^2 59 - cot^2 31) - \frac{2}{3}$ sin90 - 3 $tan^2 56$ y $tan^2 34 = \frac{y}{3}$

$\Rightarrow 6(1) - \frac{2}{3}(1) - 3y(1)^2 = \frac{y}{3}$

$\Rightarrow \frac{16}{3} - 3y = \frac{y}{3}$

$\Rightarrow \frac{16}{3} = \frac{y}{3} + 3y$

$\Rightarrow \frac{16}{3} = \frac{10y}{3}$

$\Rightarrow y = \frac{8}{5}$

Sol 52.(c)

Given, sec θ = 3x and tan θ = $\frac{3}{x}$

Squaring both sides

$sec^2\theta = 9x^2$ ……..(1) and $tan^2\theta = \frac{9}{x^2}$ ……………(2)

Subtracting 2 from 1

$\Rightarrow sec^2\theta - tan^2\theta = 9x^2 - \frac{9}{x^2}$

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

Sol 53. (b)

cosx = $\frac{-1}{2}$

Clearly x=240

$2\,tan^2x + 3cosec^2x \Rightarrow 2$

$(\sqrt{3})^2 + 3(\frac{-2}{\sqrt{3}})^2 = 10$

Sol 54. (a)

cosx = $\frac{-1}{2}$

Clearly x=240

$2\,tan^2x - 3cosec^2x \Rightarrow 2$

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

Sol 55. (a)

$2(cosec^2 39 - tan^2 51) - \frac{2}{3}$ sin90 - $tan^2 56$ y $tan^2 34 = \frac{y}{3}$

$\Rightarrow 2[cosec^2 39 - tan^2(90 - 39)] - \frac{2}{3}(1) - y(tan\,56 tan\,34)^2 = \frac{y}{3}$

$\Rightarrow 2[cosec^2 39 - cot^2 39] - \frac{2}{3} - y(1)^2 = \frac{y}{3}$

$\Rightarrow 2[1] - \frac{2}{3} - y = \frac{y}{3}$

$\Rightarrow \frac{4}{3} = \frac{y}{3} + y$

$\Rightarrow \frac{4}{3} = \frac{4y}{3}$

$\Rightarrow y=1$

Sol 56. (a)

Given, cosec θ = 3x and cot θ = $\frac{3}{x}$

Squaring both sides

$cosec^2\theta = 9x^2$ ………(1) and

$cot^2\theta = \frac{9}{x^2}$ …..(2)

Subtracting 2 from 1

$\Rightarrow cosec^2\theta - cot^2\theta = 9x^2 - \frac{9}{x^2}$

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

Multiplying both sides by $\frac{2}{3}$

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

$\Rightarrow \frac{2}{3} = 6(x^2 - \frac{1}{x^2})$

Sol 57. (c)

Given, sin θ = 3x and cos θ = $\frac{3}{x}$

Squaring both sides

$sin^2\theta = 9x^2$ ………(1) and

$cos^2\theta = \frac{9}{x^2}$ …..(2)

Adding 2 from 1

$\Rightarrow sin^2\theta + cos^2\theta = 9x^2 + \frac{9}{x^2}$

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

Multiplying both sides by $\frac{2}{3}$

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

$\Rightarrow \frac{2}{3} = 6(x^2 + \frac{1}{x^2})$

Sol 58. (a)

cosx = $\frac{-\sqrt{3}}{2}$

Clearly x=210

$2\,cot^2x - 3\,sec^2x \Rightarrow 2$

$(\sqrt{3})^2 + 3(\frac{-2}{\sqrt{3}})^2 = 10$

Sol 59. (b)

$4(cosec^2 66 - tan^2 24) + \frac{1}{2}$ sin90 - 4 $tan^2 66$ y $tan^2 24 = \frac{y}{2}$

$\Rightarrow 4[cosec^2 66 - tan^2(90 - 66)] + \frac{1}{2}(1) - 4y(tan66.tan24)^2 = \frac{y}{2}$

$\Rightarrow 4(1) + \frac{1}{2}(1) - 4y = \frac{y}{2}$

$\Rightarrow \frac{9}{2} = \frac{y}{2} + 4y$

$\Rightarrow \frac{9}{2} = \frac{9y}{2}$

$\Rightarrow y=1$

Sol 60.(d)

Given, cosx= $\frac{-\sqrt{3}}{2}$ and

$\pi < x < \frac{3\pi}{2}$

Clearly x = 210

$2cot^2x - 3\,sec^2x \Rightarrow 2(-\sqrt{3})^2 - 3(-\frac{2}{\sqrt{3}})^2$

$\Rightarrow 6 - 4 = 2$

Sol 61. (c)

Given, cot θ = 5x and cosec θ = $\frac{5}{x}$

Squaring both sides

$cot^2\theta = 25x^2$ ………..(1) and

$cosec^2\theta = \frac{25}{x^2}$ …….(2)

Subtracting equations 2 from 1

$cot^2\theta - cosec^2\theta = 25x^2 - \frac{25}{x^2}$

$\Rightarrow -1 = 25(x^2 - \frac{1}{x^2})$

Multiplying both sides by $\frac{1}{5}$

$\Rightarrow -1 \times \frac{1}{5} = 25 \times \frac{1}{5}(x^2 - \frac{1}{x^2})$

$\Rightarrow 5(x^2 - \frac{1}{x^2}) = -\frac{1}{5}$

Sol 62. (b)

$4(cosec^2 65 - tan^2 25)$-sin90- $tan^2 63$ y $tan^2 27 = \frac{y}{2}$

$\Rightarrow 4[cosec^2 65 - tan^2(90 - 65)] - 1 - y(tan63.\,tan27)^2 = \frac{y}{2}$

$\Rightarrow 4[cosec^2 65 - cot^2 65] - 1 - y(1)^2 = \frac{y}{2}$

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

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

$\Rightarrow y=2$

Sol 63. (d)

Given, cosx = $\frac{-\sqrt{3}}{2}$ and $\pi < x < \frac{3\pi}{2}$

Clearly, x=210

$2\cot^2 x + 3\,cosec^2 x \Rightarrow 2\cot^2 210 + 3\,cosec^2 210$

$\Rightarrow 2(\sqrt{3})^2 + 3(-2)^2 = 18$

Sol 64.(b)

$7(cosec^2 55 - \tan^2 35)$+2sin90-$\tan^2 52$ y $\tan^2 38 = \frac{y}{2}$

$\Rightarrow 7[cosec^2 55 - \tan^2(90-55)]$+2(1)-y($\tan 52 . \tan 38)^2 = \frac{y}{2}$

$\Rightarrow 7[cosec^2 55 - \cot^2 55]$+2-y$(1)^2 = \frac{y}{2}$

$\Rightarrow 7(1) + 2 - y = \frac{y}{2}$

$\Rightarrow 9 = \frac{y}{2} + y$

$\Rightarrow y = 6$

Sol 65.(d)

$\cos\theta = 4x$ and $\sin\theta = \frac{4}{x}$

Squaring both sides

$\cos^2\theta = 16x^2$ …………(1) and

$\sin^2\theta = \frac{16}{x^2}$ …….(2)

Adding both 1 and 2

$\Rightarrow \cos^2\theta + \sin^2\theta = 16x^2 + \frac{16}{x^2}$

$\Rightarrow 1 = 16(x^2 + \frac{1}{x^2})$

$\Rightarrow \frac{1}{16} = (x^2 + \frac{1}{x^2})$

Sol 66. (a)

$7(cosec^2 57 - \tan^2 33)$+2sin90-$\tan^2 52$ y $\tan^2 38 = \frac{y}{2}$

$\Rightarrow 7[cosec^2 57 - \tan^2(90-57)]$+2(1)-$y(\tan 52 . \tan 38)^2 = \frac{y}{2}$

$\Rightarrow 7[cosec^2 57 - \cot^2 57]$+2-$y(1)^2 = \frac{y}{2}$

$\Rightarrow 7(1)+2-4y = \frac{y}{2}$

$\Rightarrow 9 = \frac{9y}{2}$

$\Rightarrow y=2$

Sol 67. (a)

Given, $\sec\theta = 8x$ and $\tan\theta = \frac{8}{x}$

Squaring both sides

$\sec^2\theta = 64x^2$ …………(1) and

$\tan^2\theta = \frac{64}{x^2}$ …….(2)

Subtracting 2 from 1

$\Rightarrow \sec^2\theta - \tan^2\theta = 64x^2 - \frac{64}{x^2}$

$\Rightarrow 1 = 64(x^2 - \frac{1}{x^2})$

Multiplying both sides by $\frac{1}{4}$

$\Rightarrow 1 \times \frac{1}{4} = 64 \times \frac{1}{4}(x^2 - \frac{1}{x^2})$

$\Rightarrow \frac{1}{4} = 16(x^2 - \frac{1}{x^2})$

Sol 68. (d)

Given, $5\sin\theta + 12\cos\theta = 13$

Trick :

Here, 5,12 and 13 are triplets. In such questions coefficient of $\sin\theta$ will be perpendicular and coefficient of $\cos\theta$ will be base and the coefficient on the right side of sign "=" will be hypotenuse.

$\Rightarrow \tan\theta = \frac{perpendicular}{base} = \frac{5}{12}$

Sol 69. (c)

Values of $\cos\theta$, $\cot\theta$ and $cosec\,\theta$ continuously decreases.

Only value of $\tan\theta$ continuously increases.

Sol 70. (b)

Given, $3(cosec^2\theta + \cot^2\theta)=5$

$\Rightarrow 3(cosec^2\theta + \cot^2\theta) = 5(cosec^2\theta - \cot^2\theta)$

$\Rightarrow 8\cot^2\theta = 2\,cosec^2\theta$

$\Rightarrow \cos\theta = \frac{1}{2}$

Clearly $\theta = 60°$

Sol 71. (a)

Given, $4(2\sin^2\theta + 7\cos^2\theta) = 13$

$\Rightarrow 4(2\sin^2\theta + 7\cos^2\theta) = 13(\sin^2\theta + \cos^2\theta)$

$\Rightarrow 8\sin^2\theta + 28\cos^2\theta = 13\sin^2\theta + 13\cos^2\theta$

$\Rightarrow 5\sin^2\theta = 15\cos^2\theta$

$\Rightarrow \tan^2\theta = 3$

$\Rightarrow \tan\theta = \sqrt{3}$

Sol 72. (d)

$\frac{\sin^3 21 + \cos^3 19}{\sin 21 + \cos 19} + \sin^2 69 + \cos^2 71 + \frac{1}{\sec 69 . cosec 71}$

$\Rightarrow$

$\frac{(\sin 21 + \cos 19)(\sin^2 21 + \cos^2 19 - \sin 21 . \cos 19)}{(\sin 21 + \cos 19)} + \sin^2 69 + \cos^2 71 + \cos 69 . \text{Sin} 71$

$\Rightarrow \sin^2 21 + \cos^2 19 - \cos 19 . \text{Sin} 21 + \sin^2(90-21) + \cos^2(90-19) + \cos(90-21) . \text{Sin}(90-19)$

$\Rightarrow \sin^2 21 + \cos^2 19 - \cos 19 . \text{Sin} 21 + \cos^2 21 + \sin^2 19 + \sin 21 . \text{Cos} 19$

$\Rightarrow$ 1+1=2

Sol 73.(a)

$\sec^2\theta + 4\tan^2\theta = 6$

$\Rightarrow \sec^2\theta + 4\tan^2\theta = 6(\sec^2\theta - \tan^2\theta)$

$\Rightarrow \sec^2\theta + 4\tan^2\theta = 6\sec^2\theta - 6\tan^2\theta$

$\Rightarrow 5\sec^2\theta = 10\tan^2\theta$

$\Rightarrow 5 \times \frac{1}{\cos^2\theta} = 10 \times \frac{\sin^2\theta}{\cos^2\theta}$

$\Rightarrow \sin\theta = \frac{1}{\sqrt{2}}$

Clearly $\theta = 45°$

Alternate :

$\sec^2\theta + 4\tan^2\theta = 6$

Put $\theta = 45$

$\sec^2\theta + 4\tan^2\theta \Rightarrow \sec^2 45 + 4\tan^2 45$

$\Rightarrow (\sqrt{2})^2 + 4(1)^2 = 6$ condition satisfied

Clearly $\theta = 45°$

Sol 74. (d)

$\sqrt{\frac{1-\sin x}{1+\sin x}}$ =a-tanx

$\Rightarrow \sqrt{\frac{1-\sin x}{1+\sin x} \times \frac{1-\sin x}{1-\sin x}}$ =a-tanx

$\Rightarrow \sqrt{\frac{(1-\sin x)^2}{1-\sin^2 x}}$ =a-tanx

$\Rightarrow \frac{(1-\sin x)}{\cos x}$ =a-tanx

$\Rightarrow$ secx-tanx=a-tanx

Clearly a = secx

Sol 75.(a)