FUNDAMENTAL PROPERTIES OF TRIANGLES

त्रिभुजों के मूलभूत गुण

PRACTICE SHEET

WITH SOLUTIONS

BY ADITYA RANJAN

Maths By Aditya Ranjan

Rankers Gurukul

PDF की विशेषताएं

INDIA में पहली बार

- UPDATED CONTENT
- TYPE WISE
- LEVEL WISE
- BILINGUAL
- ERROR FREE

MATHS SPECIAL BATCH
में Enroll करने के लिए

8506003399

9289079800

MATHS EXPERT

DOWNLOAD
RG VIKRAMJEET APP

FUNDAMENTAL PROPERTIES OF TRIANGLES (Practice Sheet With Solution)

1. If the sides of a triangle are produced, then the sum of the exterior angles i.e., $\angle a + \angle b + \angle c$ is equal to:

किसी त्रिभुज में यदि भुजाओं को आगे बढाया जाए तो उसके बाहरी कोणों का योग होगा: $\angle a + \angle b + \angle c$

(a) 180° (b) 360°
(c) 90° (d) 270°

2. Of the three angles of a triangle, one is twice the smallest and another is three times the smallest. Find the smallest angles.

त्रिभुज के तीनों कोणों में से एक कोण सबसे छोटे कोण का दोगुना एवं अन्य कोण सबसे छोटे कोण का तिगुना हो तो, सबसे छोटे कोण का मान ज्ञात करो।

(a) 30° (b) 60°
(c) 45° (d) 75°

3. The angles of a triangle are $(x - 40)°$, $(x - 20)°$ and $\left(\frac{1}{2}x - 10\right)°$. Find the value of x.

यदि त्रिभुज के तीनों कोण $(x - 40)°$, $(x - 20)°$, $\left(\frac{1}{2}x - 10\right)°$ हों तो x का मान ज्ञात करो।

(a) 90° (b) 100°
(c) 75° (d) 35°

4. An exterior angle of a triangle is 108° and its interior opposite angles are in the ratio 4:5. The angles of the triangles are-

यदि त्रिभुज के एक बाह्य कोण का मान 108° है एवं इसके विपरीत अन्तः कोण 4 : 5 के अनुपात में हों तो त्रिभुज के तीनों कोणों का माप ज्ञात करो।

(a) 48°, 60°, 72° (b) 50°, 60°, 70°
(c) 52°, 56°, 72° (d) 42°, 60°, 76°

5. ABC is a triangle such that AB = 10 and AC = 3. The side BC is:

ABC एक त्रिभुज है, जिसमें AB = 10 और AC = 3 है। भुजा BC है:

(a) Equal to 7 (b) Greater than 7
(c) Less than 7 (d) None of these

6. Which one of the following sets of lengths of sides does not relate to that of a right angled triangle?

लम्बाईयों के समुच्य में कोन-सा समकोण त्रिभुज नहीं हो सकता?

(a) 3, 4, 5 (b) 5, 12, 13
(c) 7, 24, 25 (d) 9, 12, 16

7. If each angle of a triangle is less than the sum of the other two, then the triangle is?

यदि त्रिभुज का प्रत्येक कोण दो कोणों के योग से कम हो तो त्रिभुज कैसा होगा?

(a) Acute angle/न्यूनकोण
(b) Right angle/समकोण
(c) Obtuse angle/अधिक कोण
(d) Cannot be known/ज्ञात नहीं कर सकते।

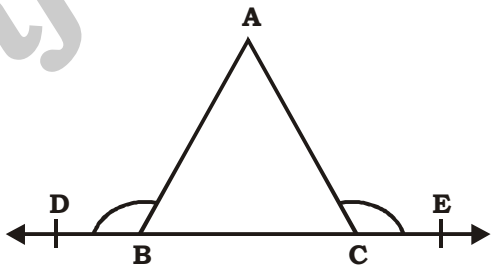
8. In a ΔABC, the sum of the exterior angles at ∠B and ∠C is equal to:

ΔABC में, ∠B तथा ∠C के बाहरी कोणों का योग होगा:

(a) $180° - \angle BAC$ (b) $180° + \angle BAC$
(c) $180° - 2\angle BAC$ (d) $180° + 2\angle BAC$

9. In the given figure, if ∠ABD = ∠ACE then ΔABC is:

दिए चित्र में यदि ∠ABD = ∠ACE है तो ΔABC है:



(a) Isosceles/समद्विबाहु
(b) Equilateral/समबाहु
(c) Right angled/समकोण
(d) Obtuse angled/अधिककोण

10. The exterior angles obtained on producing the base of a triangle both ways are 104° and 136°. Find all the angles of the triangle.

यदि किसी त्रिभुज के आधार को दोनों तरफ बढ़ाने पर 104° एवं 136° के बाह्य कोण उत्पन्न हों तो त्रिभुज के सभी अन्तः कोणों का मान बताओ?

(a) 60°, 76°, 44°
(b) 60°, 50°, 70°
(c) 50°, 90°, 40°
(d) 68°, 72°, 40°

11. An exterior angle of a triangle is equal to 100° and two interior opposite angles are equal. Each of these angles is equal to

त्रिभुज का एक बाह्य कोण 100° हो एवं इसके विपरीत दोनों अन्तः कोण बराबर हों तो प्रत्येक अन्तः कोण का मान होगा?

(a) 75° (b) 80°
(c) 40° (d) 50°

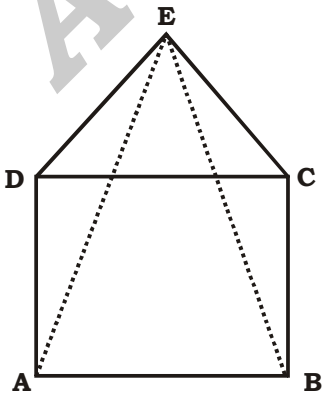
12. If two acute angles of a right triangle are equal, then each acute is equal to.
यदि किसी समकोण त्रिभुज में दोनों न्यून कोण बराबर हों तो, प्रत्येक न्यून कोण का मान होगा।
(a) 30° (b) 45°
(c) 60° (d) 90°

13. Side BC of a ΔABC has been produced to a point D such that ∠ACD = 120°. If $\angle B = \frac{1}{2}\angle A$, then ∠A is equal to.
ΔABC में भुजा BC को D बिन्दु तक इस प्रकार बढ़ाया जाता है कि ∠ACD = 120° हो। यदि $\angle B = \frac{1}{2}\angle A$ हो तो ∠A का मान बताओ।
(a) 80° (b) 75°
(c) 60° (d) 90°

14. In ΔCBA, ∠CAB = $x°$, ∠CBA = $5y°$ and ∠BCA = $3y°$. AB produced to D and ∠CBD is $7y°$, what is the value of x?
ΔCBA में ∠CAB = $x°$, ∠CBA = $5y°$, ∠BCA = $3y°$ है। भुजा AB को D बिन्दु तक बढ़ाया जाता है और ∠CBD = $7y°$ हो तो x का मान बताओ।
(a) 35 (b) 45
(c) 50 (d) 60

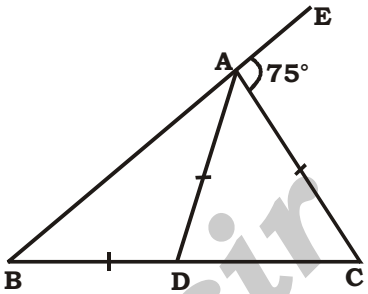
15. In ΔABC, ∠A = $x°$, ∠B = $2x°$. BC produced to D and E is a point on AC. If ∠CDE = $y°$, ∠AED = $3y°$. What is y in terms of x?
किसी ΔABC में, ∠A = $x°$, ∠B = $2x°$ है। BC को D तक बढ़ाया जाता है। AC पर कोई बिन्दु E है। यदि ∠CDE = $y°$, ∠AED = $3y°$ है तो y का मान x के पदों में ज्ञात करो।
(a) $\frac{3x}{2}$ (b) $\frac{4x}{3}$
(c) x (d) $\frac{3x}{4}$

16. If ABCD is a square and DCE is an equilateral triangle in the given figure, then ∠DAE is equal to:
यदि ABCD एक वर्ग तथा DCE एक समबाहु त्रिभुज है तो ∠DAE = ? है:



(a) 45° (b) 30°
(c) 15° (d) $22\frac{1}{2}°$

17. In the adjoining figure, AD = BD = AC; angle CAE = 75° and ∠ACD = $x°$. Then the value of x is:
दिए गए चित्र में AD = BD = AC है एवं कोण CAE = 75° तथा ∠ACD = $x°$ हो तो x का मान = ?



(a) 45° (b) 50°
(c) 60° (d) $37\frac{1}{2}°$

18. In a right angled triangle, if the square of the hypotenuse is twice the product of the other two sides, then one of the angles of the triangle is:
किसी समकोण त्रिभुज में यदि कर्ण का वर्ग शेष दोनों भुजाओं के गुणनफल का दोगुना है तो इस त्रिभुज में एक कोण होगा:
(a) 15° (b) 30°
(c) 45° (d) 60°

19. In ΔPQR, sides QP and RQ are produced to point S and T respectively. If ∠SPR = 135° and ∠PQT = 110°, find ∠PRQ.
ΔPQR में, भुजा QP एवं RQ को क्रमशः S एवं T बिन्दु तक बढ़ाया जाता है यदि ∠SPR = 135°, ∠PQT = 110° हो तो ∠PRQ = ?
(a) 50° (b) 65°
(c) 45° (d) 80°

20. Sides BC, CA and BA of a ΔABC are produced to D, Q, P respectively. If ∠ACD = 100° and ∠QAP = 35°, find ∠C of the triangle.
ΔABC में भुजा BC, CA एवं BA को क्रमशः D, Q एवं P बिन्दु तक बढ़ाया जाता है यदि ∠ACD = 100° एवं ∠QAP = 35° हो तो ∠C का मान बताओ।
(a) 65° (b) 80°
(c) 72° (d) 95°

21. In ΔABC, BC is produced to D. CE is a ray and is perpendicular to AC. ∠A : ∠B : ∠C = 3 : 2 : 1, find the value of ∠ECD.
ΔABC में भुजा BC को D बिन्दु तक बढ़ाया जाता है। CE एक भुजा है जो AC पर लम्बवत् है। यदि ∠A : ∠B : ∠C = 3 : 2 : 1 हो तो ∠ECD = ?
(a) 66° (b) 59°
(c) 75° (d) 60°

22. If the lengths of the three sides of a triangle are 6cm, 8cm and 10cm, then the length of the median to its greatest side is.

यदि त्रिभुज की भुजाएँ 6 सेमी, 8 सेमी एवं 10 सेमी हों तो त्रिभुज की सबसे बड़ी भुजा पर खींची गई माध्यिका की लम्बाई होगी।

(a) 8 cm (b) 6 cm
(c) 5 cm (d) 4.8 cm

23. The length of the three sides of a right angled triangle are $(x - 2)$ cm, x cm and $(x + 2)$ cm respectively. Then the value of x is.

यदि एक समकोण त्रिभुज की भुजाएँ $(x - 2)$ सेमी, x सेमी एवं $(x + 2)$ सेमी हों तो x का मान = ?

(a) 10 (b) 8
(c) 4 (d) 0

24. In a right-angled triangle ABC, $\angle ABC = 90°$, AB = 5 cm and BC = 12 cm. The radius of the circumcircle of the triangle ABC is.

एक समकोण ΔABC में, $\angle ABC = 90°$ एवं AB = 5 cm तथा BC = 12 cm है। तो ΔABC की परिवृत्त की त्रिज्या का मान बताओ।

(a) 7.5 cm (b) 6 cm
(c) 6.5 cm (d) 7 cm

25. In an equilateral triangle, the circumcentre, orthocentre and incentre are:

समबाहु त्रिभुज में, परिकेन्द्र, लम्ब केन्द्र और अन्तः केन्द्र होते हैं:

(a) Linear (b) Same
(c) Circular (d) None of these

26. Two medians AD and BE of ΔABC intersect at G at right angles. If AD = 9 cm and BE = 6cm, then the length of BD, in cm, is

ΔABC की दो माध्यिकाएँ AD व BE एक दूसरे को बिन्दु G पर 90° पर काटती हैं। यदि AD = 9 cm एवं BE = 6 cm. है तो भुजा BD की लम्बाई बताओ।

(a) 10 (b) 6
(c) 5 (d) 3

27. Suppose ΔABC be a right-angled triangle where $\angle A = 90°$ and $AD \perp BC$. If $\Delta ABC = 40cm^2$, $\Delta ACD = 10\ cm^2$ and AC = 9 cm, then the length of BC is.

ΔABC एक समकोण त्रिभुज है जहाँ A = 90° एवं $AD \perp BC$ है। यदि $\Delta ABC = 40\ cm^2$, $\Delta ACD = 10\ cm^2$ एवं AC = 9 cm है तो भुजा BC की लम्बाई बताओ।

(a) 12 cm (b) 18 cm
(c) 4 cm (d) 6 cm

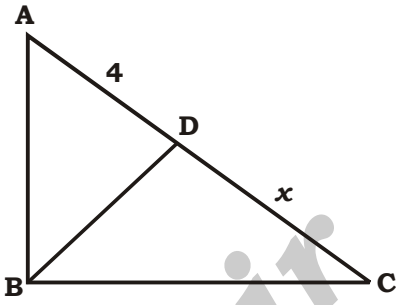
28. In a right angled ΔABC, $\angle ABC = 90°$; BN is perpendicular to AC, AB = 6cm, AC = 10 cm. Then AN : NC is.

एक समकोण ΔABC में $\angle ABC = 90°$ है। BN भुजा AC पर लम्ब है। यदि AB = 6 cm एवं AC = 10 cm है तो AN : NC = ?

(a) 3 : 4 (b) 9 : 16
(c) 3 : 16 (d) 1 : 4

29. In the adjoining figure, $\angle B = 90°$ and $BD \perp AC$, BD = 8 cm, AD = 4 cm, find the value of CD.

दिए गए चित्र में, $\angle B = 90°$ एवं $BD \perp AC$, BD = 8 cm, AD = 4 cm. है तो CD = ?



(a) 16 (b) $\frac{54}{25}$
(c) $\frac{25}{54}$ (d) None of these

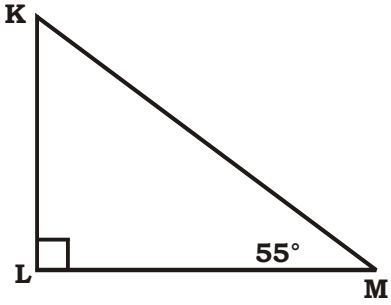
30. In a triangle ABC, if $\angle A + \angle C = 140°$ and $\angle A + 3\angle B = 180°$, then $\angle A$ is equal to.

एक त्रिभुज ABC में, यदि $\angle A + \angle C = 140°$ और $\angle A + 3\angle B = 180°$ है, तो $\angle A$ बराबर है।

(a) 80° (b) 40°
(c) 60° (d) 20°

31. Which of the following statements is true based on the following diagram?

निम्नलिखित आरेख के आधार पर निम्नलिखित में से कौन सा कथन सत्य है?



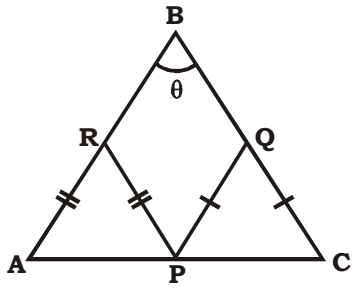
(a) KM < KL (b) KM < LM
(c) LM < KL (d) None of these

32. The side QR of an equilateral triangle PQR is produced to the point S in such a way that QR = RS and P is joined to S. Then the measure of $\angle PSR$ is

एक समबाहु त्रिभुज PQR की भुजा QR को बिंदु S तक इस प्रकार बढ़ाया जाता है कि QR = RS और P को S से जोड़ दिया जाता है। फिर $\angle PSR$ का माप है।

(a) 30° (b) 15°
(c) 60° (d) 45°

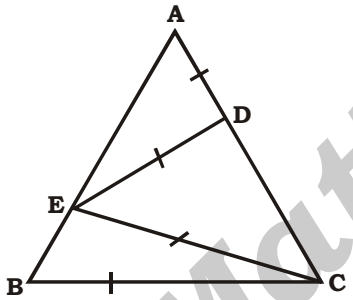
33. In the given figure, find ∠RPQ in terms of θ.
दिए गए चित्र में, ∠RPQ का मान θ के पदों में ज्ञात करें।



(a) θ (b) $\frac{\theta}{2}$

(c) $90°+\frac{\theta}{2}$ (d) $90°-\frac{\theta}{2}$

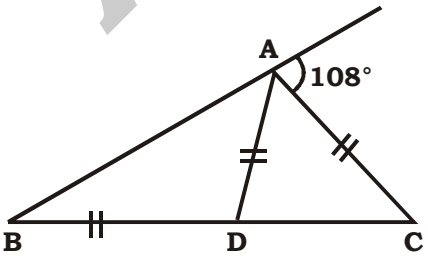
34. In the given ΔABC, AD = DE = EC = BC then find ∠A : ∠B .
दिए गए ΔABC में, AD = DE = EC = BC है। ∠A : ∠B का मान क्या होगा?



(a) 1 : 3 (b) 1 : 2
(c) 2 : 5 (d) Can't be determined

35. In ΔABC, D is a point on AC such that AB = BD = DC. If ∠BAD = 70°, then the measure of ∠B is:
ΔABC में, AC पर बिन्दु D इस प्रकार है कि AB = BD = DC। यदि ∠BAD = 70° है तो ∠B का मान होगा:
(a) 75° (b) 80°
(c) 82° (d) 70°

36. In the given triangle, if AD = BD = AC then the value of ∠B will be?
दिए गए त्रिभुज में, यदि AD = BD = AC है तब ∠B का मान ज्ञात करो।

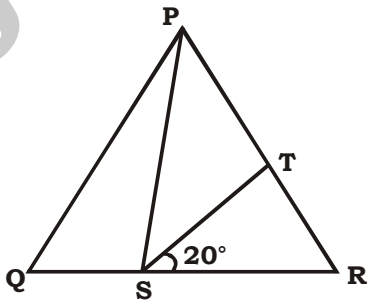


(a) 36° (b) 90°
(c) 54° (d) 64°

37. Side BC of a ΔABC is produced to D such that CD = AC. Also, AD = BD and AB = AC. What is the measure of ∠ADB?
ΔABC की भुजा BC को D तक इस प्रकार बढ़ाया जाता है कि CD = AC है। साथ ही, AD = BD और AB = AC है। ∠ADB का माप क्या है?
(a) 36° (b) 24°
(c) 30° (d) 40°

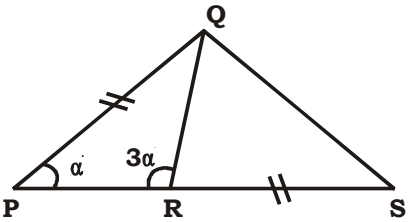
38. In ΔPQR, S is a point on the side QR such that ∠QPS = $\frac{1}{2}$ ∠PSR, ∠QPR = 78° and ∠PRS = 44°. What is the measure of ∠PSQ ?
ΔPQR में, S एक बिंदु है, जो भुजा QR पर इस प्रकार स्थित है कि ∠QPS = $\frac{1}{2}$ ∠PSR, ∠QPR = 78° और ∠PRS = 44° है। ∠PSQ की माप क्या है?
(a) 68° (b) 64°
(c) 58° (d) 56°

39. In the following figure, PQR is isosceles triangle in which PQ = PR, if PS = PT and ∠TSR = 20°, then find ∠QPS.
दिए गए चित्र में, त्रिभुज PQR एक समद्विबाहु त्रिभुज है, जिसमें PQ = PR है। यदि PS = PT और ∠TSR = 20° है तब ∠QPS = ?



(a) 30° (b) 40°
(c) 20° (d) 35°

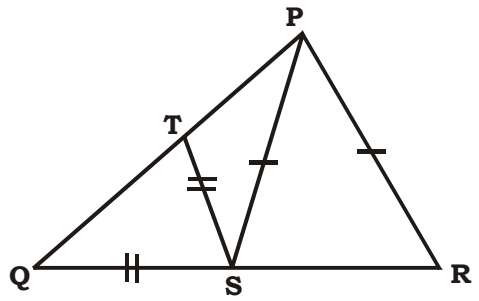
40. In the given figure, QS is external angle bisector of ΔPQR, if PQ = RS, then find α.
दिए गए चित्र में, भुजा QS, ΔPQR बाह्य कोण समद्विभाजक है, यदि PQ = RS है, तब α का मान ज्ञात करें।



(a) 48° (b) 45°
(c) 36° (d) 54°

41. In the triangle PQR, S and T are two points on sides QR and PQ such that QS = ST, PS = PR and ∠PRQ – ∠QPS = 44° then find the ∠QST. (Diagram is not drawn to scale)

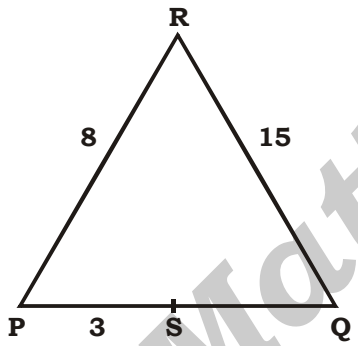
त्रिभुज PQR में, भुजा QR और PQ पर क्रमशः दो बिंदु S और T इस प्रकार हैं कि QS = ST, PS = PR और ∠PRQ – ∠QPS = 44°, तब ∠QST का मान क्या होगा?



(a) 88° (b) 92°
(c) 68° (d) 122°

42. In the diagram below of triangle PQR, S is a point on PQ, PR = 8, PS = 3 and QR = 15. Then the length of SQ could be.

दिए गए चित्र में त्रिभुज PQR में, S, PQ रेखाखण्ड पर एक बिंदु है, PR = 8, PS = 3 और QR = 15 है तो SQ की लंबाई हो सकती है।



(a) 4 (b) 13
(c) 20 (d) 24

43. Find the sum of perimeters of all the triangles formed from the sides 14cm, 25cm and x cm where x is an integer?

उन सभी त्रिभुजों की परिमापों का योगफल ज्ञात करें जिनकी भुजाएँ 14 सेमी, 25 सेमी और x सेमी हैं, जहाँ x पूर्णांक है?

(a) 1728 (b) 1944
(c) 1678 (d) 1560

44. In a triangle ABC, ∠B = 90°, if points D and E are on side BC such that BD = DE = EC, then which of the following is true?

त्रिभुज ABC में, ∠B = 90°, यदि बिंदु D और E, BC पर इस प्रकार हैं जैसे BD = DE = EC, तो निम्नलिखित में से कौन-सा सत्य है?

(a) $5AE^2 = 2AC^2 + 3AD^2$
(b) $8AE^2 = 5AC^2 + 3AD^2$
(c) $8AE^2 = 3AC^2 + 5AD^2$
(d) $5AE^2 = 2AC^2 + 2AD^2$

45. Calculate the area of a triangle whose side lengths are $\sqrt{2}, 3\sqrt{2}$ and $2\sqrt{5}$.

एक त्रिभुज के क्षेत्रफल की गणना करें जिसकी भुजाओं की लंबाई $\sqrt{2}, 3\sqrt{2}$ और $2\sqrt{5}$ हैं।

(a) $\sqrt{6}$ (b) 3
(c) $\sqrt{10}$ (d) $\frac{\sqrt{15}}{2}$

46. Instead of walking along two adjacent sides of a rectangular field, a boy took a shortcut along the diagonal and saved a distance equal to half the longer side. Then, the ratio of shorter side to the longer side is?

एक आयताकार क्षेत्र की दो आसन्न भुजाओं के साथ चलने के बजाय, एक लड़के ने विकर्ण के साथ एक शॉर्टकट लिया और लंबी भुजा के आधे हिस्से के बराबर दूरी बचा ली। फिर छोटी भुजा का लम्बी भुजा से क्या अनुपात है?

(a) $\frac{5}{12}$ (b) $\frac{2}{3}$
(c) $\frac{3}{5}$ (d) $\frac{3}{4}$

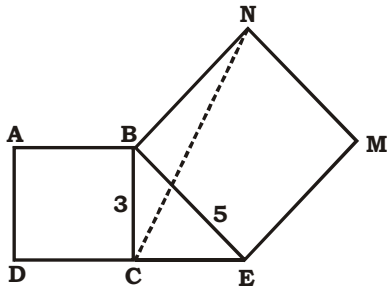
47. In triangle ABC (∠ABC = 90°), side BC is divided into four equal parts at P,Q and R respectively. If $AP^2 + AQ^2 + AR^2 = 3b^2 + 17na^2$ then n is equal to.

एक समकोण त्रिभुज ABC (∠ABC = 90°) की भुजा BC को क्रमशः बिन्दुओं P, Q और R द्वारा चार बराबर भागों में विभाजित किया गया है। यदि $AP^2 + AQ^2 + AR^2 = 3b^2 + 17na^2$ तो n बराबर है।

(a) $-\frac{1}{8}$ (b) $\frac{3}{4}$
(c) $\frac{1}{8}$ (d) $-\frac{3}{4}$

48. In the given figure, there is a square ABCD of side 3 cm. If an another square of 5 cm with side BE is formed. In triangle BCE, C is right angle. Find the length of CN.

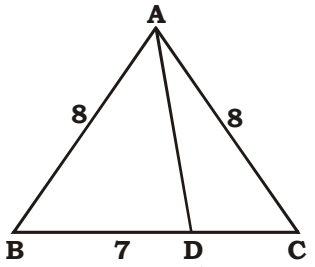
दिए गए चित्र में, ABCD एक वर्ग है जिसकी भुजा 3 सेमी है, एक दूसरा वर्ग जिसकी भुजा 5 सेमी है भुजा BE पर बनाया गया है, त्रिभुज BCE में कोण C समकोण है। CN की लंबाई ज्ञात कीजिए।



(a) $\sqrt{56}$ cm (b) $\sqrt{57}$ cm
(c) $\sqrt{58}$ cm (d) $\sqrt{59}$ cm

49. **In the given figure if AB = AC = 8cm, BC = 11cm, BD = 7cm, then AD = ?**

दिए गए चित्र में यदि AB = AC = 8cm, BC = 11cm, BD = 7cm तब AD = ?

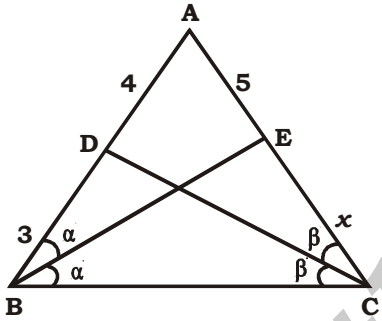


(a) 6 cm **(b) 5.5 cm**

(c) 4 cm **(d) 7 cm**

50. **Find the value of x.**

x का मान ज्ञात कीजिए-



(a) $\frac{75}{13}$ **(b)** $\frac{60}{11}$

(c) $\frac{48}{7}$ **(d)** $\frac{67}{12}$

51. **The two sides of a triangle are 40 cm and 41 cm. If the perimeter of the triangle is 90 cm, what is its area?**

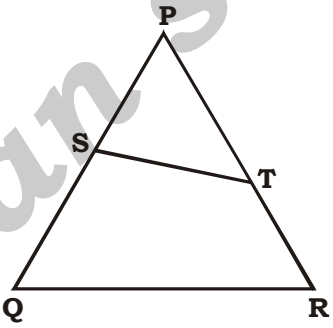
एक त्रिभुज की दो भुजाएँ 40 सेमी और 41 सेमी हैं। यदि त्रिभुज की परिमाप 90 सेमी है तो इसका क्षेत्रफल क्या है?

(a) 90 cm² **(b) 135 cm²**

(c) 150 cm² **(d) 180 cm²**

52. **In the given triangle PQR, S and T are two points on side PQ and PR respectively such that PS : SQ = 3 : 4 and PT : TR = 6 : 5, if area of □STRQ = 177 cm² then find the area of ΔPQR.**

दिए गए त्रिभुज PQR में, S और T क्रमशः PQ तथा PR पर स्थित दो बिंदु हैं। इस प्रकार है कि PS : SQ = 3 : 4 और PT : TR = 6 : 5 है। यदि □STRQ का क्षेत्रफल = 177 वर्ग सेमी है तो ΔPQR का क्षेत्रफल = ?



(a) 198 **(b) 231**

(c) 190 **(d) 264**

Answer Key

1.(b)	**2.**(a)	**3.**(b)	**4.**(a)	**5.**(b)	**6.**(d)	**7.**(a)	**8.**(b)	**9.**(a)	**10.**(a)
11.(d)	**12.**(b)	**13.**(a)	**14.**(d)	**15.**(a)	**16.**(c)	**17.**(b)	**18.**(c)	**19.**(b)	**20.**(b)
21.(d)	**22.**(c)	**23.**(b)	**24.**(c)	**25.**(b)	**26.**(c)	**27.**(b)	**28.**(b)	**29.**(a)	**30.**(c)
31.(c)	**32.**(a)	**33.**(a)	**34.**(a)	**35.**(a)	**36.**(a)	**37.**(a)	**38.**(b)	**39.**(b)	**40.**(c)
41.(b)	**42.**(b)	**43.**(a)	**44.**(c)	**45.**(b)	**46.**(d)	**47.**(a)	**48.**(c)	**49.**(a)	**50.**(a)
51.(d)	**52.**(b)								

SOLUTIONS

1. (b) Sum of exterior angles = 360°

2. (a) $A + B + C = 180°$

$\Rightarrow x + 2x + 3x = 180°$

$\Rightarrow x = \frac{180°}{6}$

$\Rightarrow x = 30°$

3. (b) Given,

$\angle A = (x - 40)°$

$\angle B = (x - 20)°$

$\angle C = \left(\frac{1}{2}x - 10\right)°$

$\because \angle A + \angle B + \angle C = 180°$

$\therefore x - 40° + x - 20° + \frac{1}{2}x - 10 = 180°$

$\Rightarrow x + x + \frac{1}{2}x - 70° = 180°$

$\Rightarrow 5x = 500°$

$\Rightarrow x = 100°$

4. (a) Exterior angle = 108°

Opposite end angle = 4 : 5

We know that the measure of the exterior angle of Δ is equal to the sum of the interior opposite angles.

$\therefore 4x + 5x = 108$

$\Rightarrow 9x = 108$

$\Rightarrow x = 12$

$\therefore 4x = 4 \times 12 = 48°$

$\therefore 5x = 5 \times 12 = 60°$

Third angle = $180° - (48° + 60°) = 180° - 108° = 72°$

5. (b) In ΔABC, AB = 10 and AC = 3, BC = ?

We know that the one side of a triangle is greater than the difference of the other two sides, then

$BC > (AB - AC) = (10 - 3)$

$\Rightarrow BC > 7$

$\therefore$ BC will be more than 7

6. (d) Which of the sets of lengths is not a right angle Δ?

(a) 3, 4, 5 Pythagoras Theorem

$H^2 = B^2 + P^2$

$\Rightarrow (5)^2 = (3)^2 + (4)^2$

$\Rightarrow 25 = 9 + 16 = 25$

(b) 5, 12, 13 $H^2 = B^2 + P^2$

$\Rightarrow (13)^2 = (5)^2 + (12)^2$

$\Rightarrow 169 = 25 + 144 = 169$

(c) 7, 24, 25 $\Rightarrow (25)^2 = (7)^2 + (24)^2$

$\Rightarrow 625 = 49 + 576$

$\Rightarrow 625 = 625$

(d) 9, 12, 16 $\Rightarrow (16)^2 = (12)^2 + (9)^2$

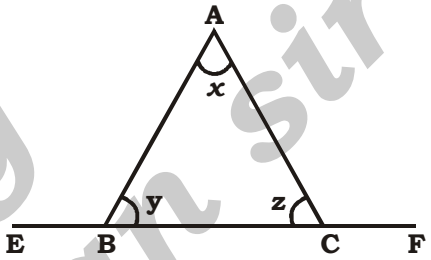
$\Rightarrow 256 = 144 + 81 = 225$

$\Rightarrow 256 \neq 225$

$\therefore$ Option (d) is not right angle Δ.

7. (a) If each angle of a Δ is less than the sum of two angles, then the triangle is acute.

8. (b)



$\angle ACF = x + y$

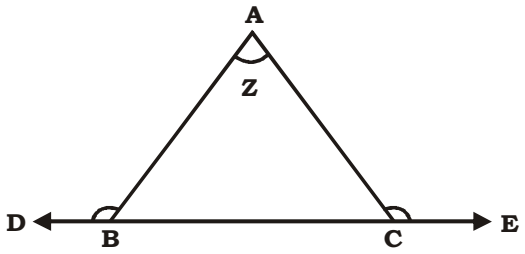
$\angle ABE = x + z$

$\angle ACF + \angle ABE = x + y + x + z$

$= 180° + x$ $(\because x + y + z = 180°)$

$= 180° + \angle BAC$

9. (a)



Since,

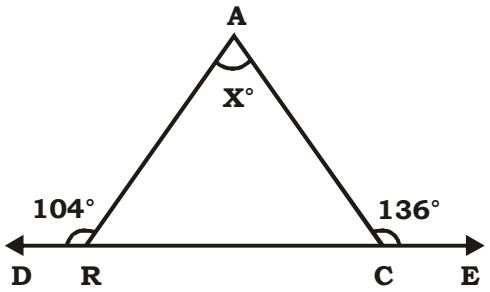
$\angle ABD = \angle ACE$

i.e. $\angle B = \angle C$

i.e. AB = AC

So, triangle is isosceles.

10. (a)

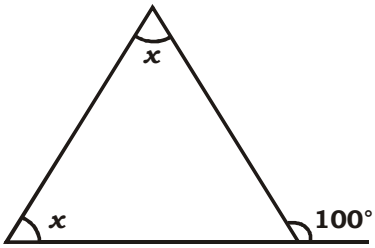


$\angle ARC = 180° - 104° = 76°$

$\angle ACR = 44°$

$\therefore X = 180° - (76° + 44°) = 180° - 120° = 60°$

11. (d)

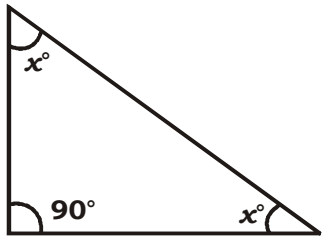


We know that the measure of an exterior angle is equal to the sum of the other two opposite interior angles.

$\therefore 2x = 100°$

$\Rightarrow x = 50°$

12. (b)

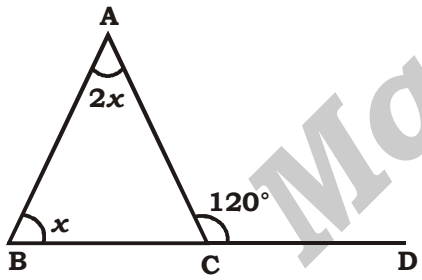


$\because x° + x° + 90° = 180°$

$\Rightarrow 2x° = 90° \Rightarrow x° = 45°$

13. (a) In ΔABC, BC extend to D

$\angle ACD = 120°$ $\angle B = \frac{1}{2} \angle A$

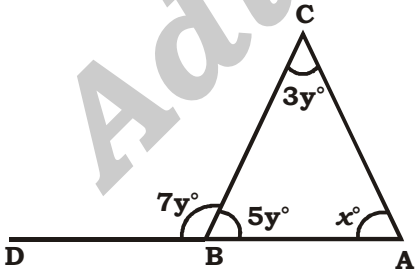


Let, $\angle B = x°$

$\therefore \angle A = 2x°$

$\Rightarrow 3x = 120° \Rightarrow 2x = 80°$

14. (d) In ΔCBA, $\angle CAB = x°$, $\angle CBA = 5y°$, $\angle BCA = 3y°$ $\angle CBD = 7y°$ x = ?



$\because \angle DBC + \angle CBA = 180°$ (linear pair)

$\Rightarrow 7y° + 5y° = 180°$

$\Rightarrow y = 15°$

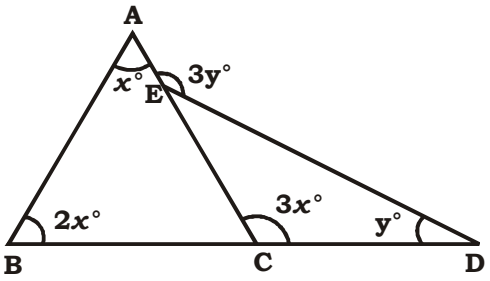
$\therefore \angle CBA = 5y° = 75°$

$\therefore \angle BCA = 3y° = 45°$

$\therefore \angle CAB = 180° - (75° + 45°)$

$= 180° - 120° = 60°$

15. (a) $\angle A = x°$, $\angle B = 2x°$, $\angle CDE = y°$, $\angle AED = 3y°$ Value of y in terms of x = ?



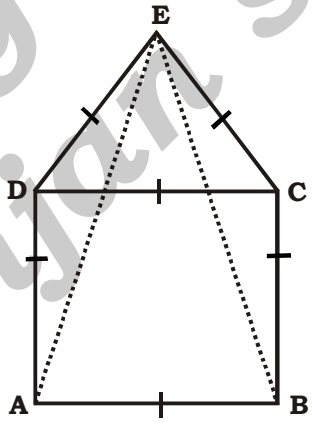
In ΔCED,

$\Rightarrow 3y° = 3x° + y°$

$\Rightarrow 3x° = 2y°$

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

16. (c)



If ABCD is a square then each angle is 90°

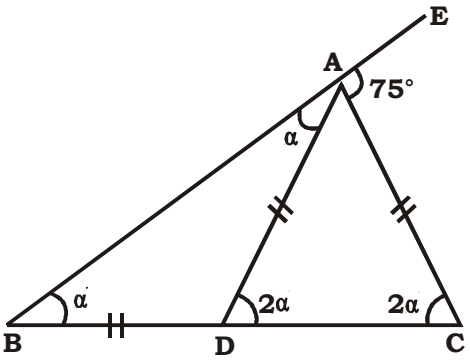
DCE is equilateral Δ then each angle is 60°

$\therefore \angle EDA = \angle EDC + \angle CDA$

$= 60° + 90° = 150°$

$\Rightarrow \angle DAE = \frac{180° - 150°}{2} = 15°$

17. (b)

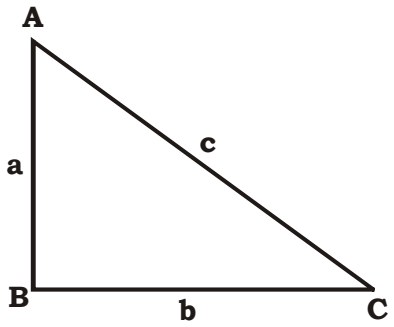


In ΔABC

$\alpha + 2\alpha = 75°$ **(by exterior angle property)**

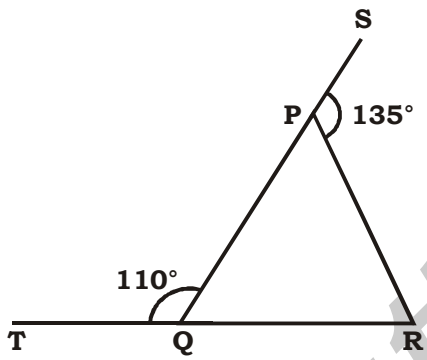
$\therefore x = 2\alpha = 50°$

18. (c)



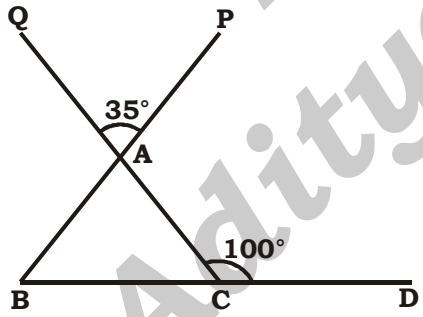
Given,
$c^2 = 2ab$
$\because c^2 = a^2 + b^2$
$\therefore a^2 + b^2 = 2ab$
$\Rightarrow (a - b)^2 = 0$
$\Rightarrow a = b$
So, $\angle A = \angle C = 45°$

19. (b)



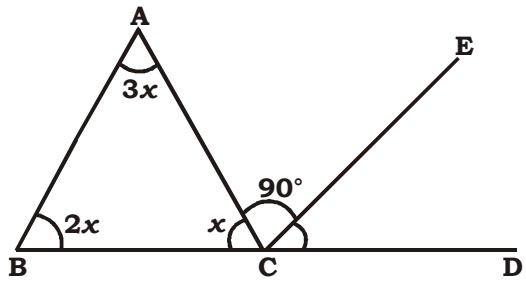
$\Rightarrow \angle RPQ = 180° - 135° = 45°$ (linear pair)
$\Rightarrow \angle PQR = 180° - 110° = 70°$
In ΔPQR,
$\angle P + \angle Q + \angle PRQ = 180°$
$\Rightarrow 45° + 70° + \angle PRQ = 180°$
$\Rightarrow \angle PRQ = 180° - 115° = 65°$

20. (b)



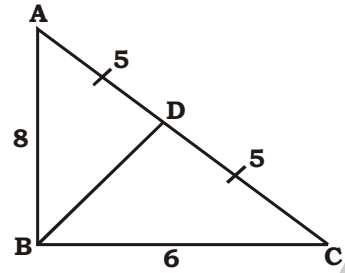
$\angle BCA = 180° - \angle ACD$ (linear pair)
$= 180° - 100° = 80°$

21. (d)



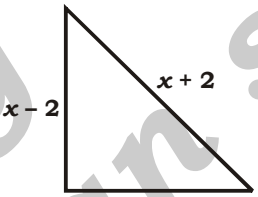
Given,
$\angle A : \angle B : \angle C = 3 : 2 : 1$
$\therefore 3x + 2x + x = 180°$
$\Rightarrow x = 30°$
$\because \angle BCA + \angle ACE + \angle ECD = 180°$ (Linear pair)
$\Rightarrow 30° + 90° + \angle ECD = 180°$
$\Rightarrow \angle ECD = 180° - 120° = 60°$

22. (c)



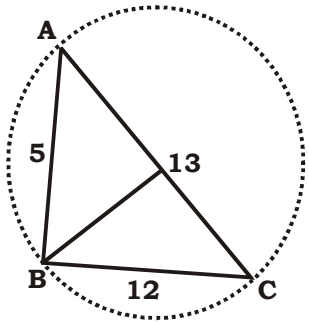
We know, in right triangle, AD = DC = BD
So, BD = 5 cm

24. (b)



By Pythagorus theorem,
$(x + 2)^2 = (x - 2)^2 + x^2$
$\Rightarrow x^2 + 4 + 4x = x^2 + 4 - 4x + x^2$
$\Rightarrow 8x = x^2$
$\Rightarrow x = 8$ cm

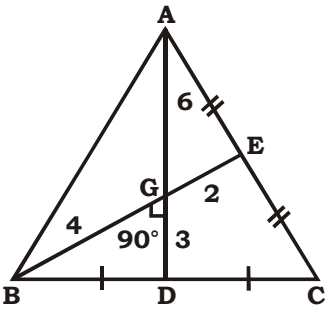
24. (c)



$\because AC^2 = 144 + 25 = 169$
$\Rightarrow AC = \sqrt{169} = 13$ cm
$\therefore$ Radius $= \frac{13}{2} = 6.5$ cm

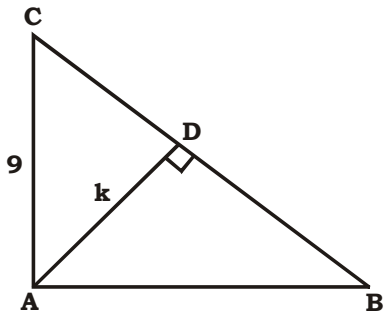
25. (b) In equilateral Δ, the circumcentre, incentre and orthocentre are at the same point.

26. (c)



$BD = \sqrt{(3)^2 + (4)^2} = \sqrt{9 + 16} = 5$ cm

27. (b)



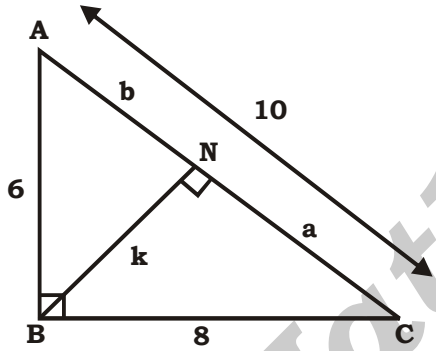
Area of $\Delta ABC = 40\ cm^2$
and area of $\Delta ACD = 10\ cm^2$
Here $\Delta CAB \sim \Delta CDA$

So, $\frac{BC}{CA} = \sqrt{\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta ACD}}$

$\Rightarrow \frac{BC}{9} = \sqrt{\frac{40}{10}}$

$\Rightarrow BC = 18\ cm$

28. (b)



$\Delta ABC \sim \Delta ANB$

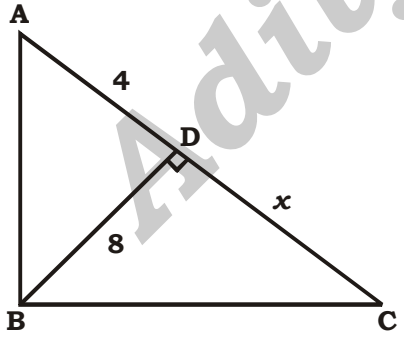
$\therefore \frac{6}{AN} = \frac{8}{k} = \frac{10}{6}$

$\Rightarrow AN = 3.6\ cm$

$\therefore NC = 6.4\ cm$

$\Rightarrow \frac{AN}{NC} = \frac{3.6}{6.4} = \frac{9}{16}$

29. (a)



$\because BD^2 = AD \times CD$

$\therefore 64 = 4x$

$\Rightarrow x = 16\ cm$

30. (c) $A + C = 140°$ .....(I)

$A + 3B = 180°$ .....(II)

$A + B + C = 180°$ .....(III)

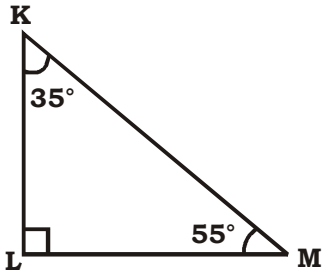
Solving (I) & (III)

$B = 40°$

$\therefore A + 120° = 180°$ {using eqn (ii)}

$\Rightarrow A = 60°$

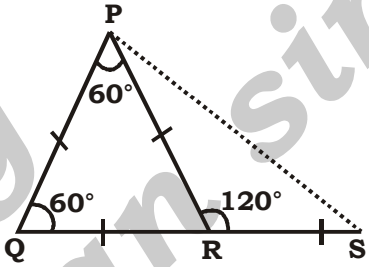
31. (c)



$\because \angle LMK > \angle LKM$

So, KL > LM

32. (a)

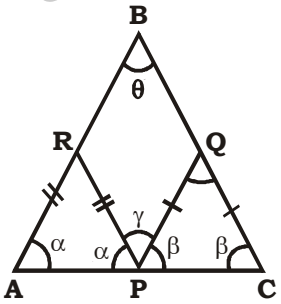


$\because$ PR = RS

$\therefore \angle RPS = \angle PSR$

So, $\angle PSR = \frac{180° - 120°}{2} = 30°$

33. (a)



Let, $\angle RAP = \angle RPA = \alpha$ & $\angle QPC = \angle QCP = \beta$

In ΔABC,

$\theta + \alpha + \beta = 180°$

$\alpha + \beta = 180° - \theta$ .....(I)

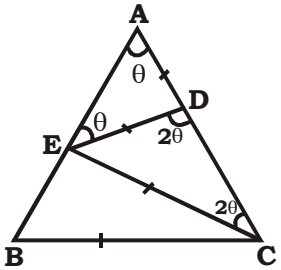
$\because \alpha + \beta + \gamma = 180°$

$\Rightarrow \gamma = 180° - (180° - \theta)$ {using eqn (i)}

$\Rightarrow \gamma = \theta$

$\Rightarrow \angle RPQ = \theta$

34. (a)



Let, $\angle A = \theta$

Then $\angle E = \theta$

So, $\angle EDC = 2\theta$ {Exterior angle property}

$\therefore \angle ECD = 2\theta$

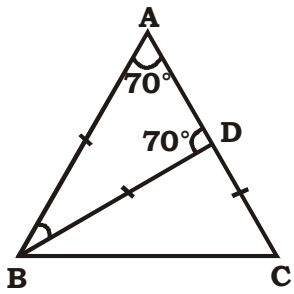
$\therefore \angle BEC = \theta + 2\theta = 3\theta$ {Exterior angle property}

So, $\angle B = 3\theta$

$\therefore \angle A : \angle B = \theta : 3\theta$

$= 1 : 3$

35. (a)



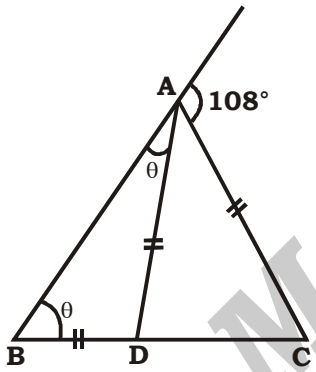
$\because \angle ABD = 180° - (70° + 70°) = 40°$

$\Rightarrow \angle BDC = 70° + 40° = 110°$ {Exterior angle property}

$\Rightarrow \angle DBC = \angle C = \frac{180° - 110°}{2} = 35°$

$\therefore \angle B = 40° + 35° = 75°$

36. (a)



Let,

$\angle BAD = \theta$

Then, $\angle B = \theta$

So, $\angle ADC = 2\theta$ {Exterior angle of ΔABD}

Then, $\angle ACD = 2\theta$

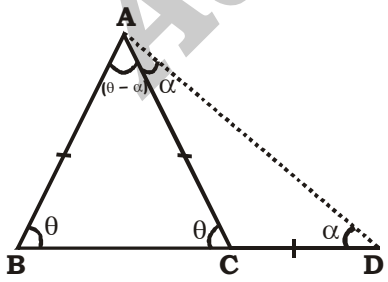
So, $\theta + 2\theta = 108°$ {Exterior angle property}

$\Rightarrow 3\theta = 108°$

$\Rightarrow \theta = 36°$

$\therefore \angle B = 36°$

37. (a)



$\theta = 2\alpha$ (Exterior angle property) .....(i)

$\Rightarrow \angle ABD = \angle DAB = \theta$ ($\because$ AD = BD)

$\therefore \angle BAC = \theta - \alpha$

Now in ΔABC,

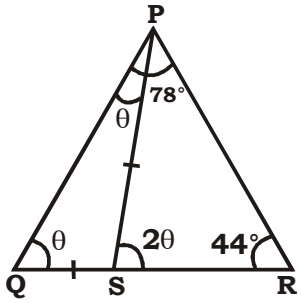
$\theta + \theta + (\theta - \alpha) = 180°$

$\Rightarrow 2\alpha + 2\alpha + \alpha = 180°$ {using eqn (i)}

$\Rightarrow \alpha = 36°$

$\therefore \angle ADB = 36°$

38. (b)



Given,

$\angle QPS = \frac{1}{2}\angle PSR$

$\Rightarrow \frac{\angle QPS}{\angle PSR} = \frac{1}{2} = \frac{\theta}{2\theta}$

So, $\angle PQS = 2\theta - \theta = \theta$ {Exterior angle property}

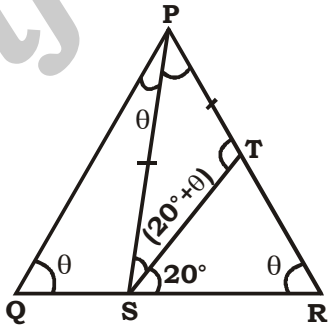
Then in ΔPQR,

$\theta + 78° + 44° = 180°$

$\Rightarrow \theta = 180° - 122° = 58°$

$\therefore \angle PSQ = 180° - 2 \times 58° = 180° - 116° = 64°$

39. (b)



Given,

PQ = PR

$\therefore \angle Q = \angle R = \theta$

$\angle PTS = (20° + \theta)$ ($\because$ exterior angle of ΔRST)

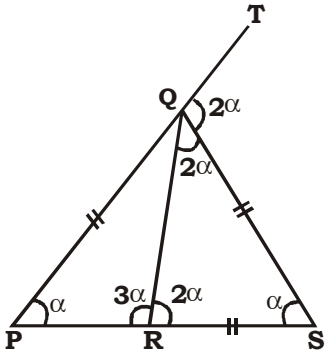
$\because$ PS = PT

So, $\angle PST = \angle PTS = (20° + \theta)$

$\because \angle PQS + \angle QPS = \angle PSR$ {Exterior angle property}

$\therefore \angle QPS = (40° + \theta) - \theta = 40°$

40. (c)



$\angle RQT = \alpha + 3\alpha = 4\alpha$ (Exterior angle property)

$\Rightarrow \angle SQR = \frac{\angle RQT}{2} = 2\alpha$ ($\because$ QS is angle bisector)

$\Rightarrow \angle S = 3\alpha - 2\alpha = \alpha$ (Exterior angle property)

$\because \angle P = \angle S = \alpha$

$\therefore$ PQ = QS

Also, PQ = RS (given)

$\therefore$ QS = RS

So, $\angle QRS = \angle SQR = 2\alpha$

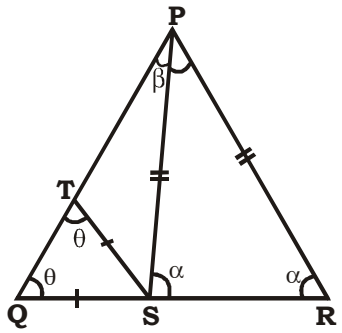
In Δ QRS,

$2\alpha + 2\alpha + \alpha = 180°$

$\Rightarrow 5\alpha = 180°$

$\Rightarrow \alpha = 36°$

41. (b)



Given,

$\angle PRQ - \angle QPS = 44°$

$\Rightarrow \alpha - \beta = 44°$ .....(i)

$\because \angle PSR = \beta + \theta$ (Exterior angle property)

$\Rightarrow \alpha = \beta + \theta$

$\Rightarrow \beta = \alpha - \theta$ .....(ii)

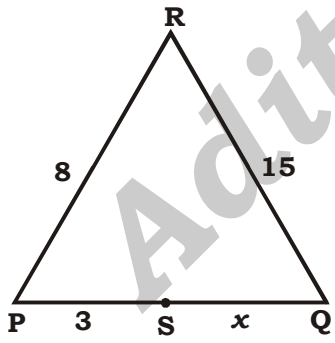
Put eqn (ii) in (i)

$\alpha - (\alpha - \theta) = 44° \Rightarrow \theta = 44°$

In ΔTQS,

$\angle TSQ = 180° - 2\theta = 180° - 88° = 92°$

42. (b)



$\because (15 - 8) < (x + 3) < (15 + 8)$

$\Rightarrow 7 < (x + 3) < 23$

Only option (b) that is, $x = 13$ satisfies this.

43. (a) According to property of triangle,

$(25 - 14) < x < (25 + 14)$

$\Rightarrow 11 < x < 39$

$x = 12, 13, 14, 15 \ldots\ldots\ldots 38$

Sum of perimeter = (12 + 14 + 25) + (13 + 14 + 25) + (14 + 14 + 25) + ... (38 + 14 + 25)

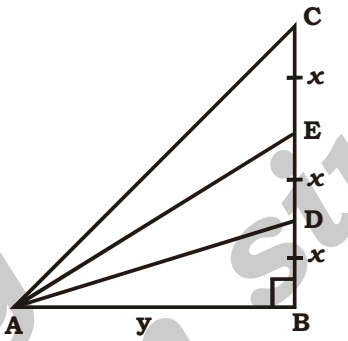
= 51 + 52 + 53 .....+ 77

$\because n = \frac{(77 - 51)}{1} + 1 = 26 + 1 = 27$

$\therefore$ Sum $= \frac{27}{2}(51 + 77)$

$= \frac{27}{2} \times 128 = 27 \times 64 = 1728$

44. (c)



Let, AB = y

By Pythagoras theorem,

$AD^2 = x^2 + y^2$

$AE^2 = y^2 + 4x^2$

$AC^2 = y^2 + 9x^2$

From option (c)

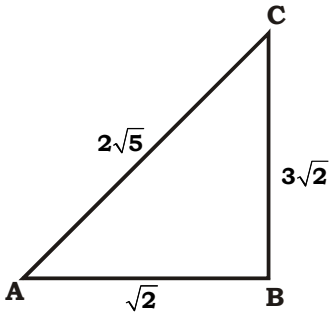
L.H.S. = $8AE^2 = 8y^2 + 32x^2$

R.H.S. = $3AC^2 + 5AD^2 = 3y^2 + 27x^2 + 5x^2 + 5y^2$

$= 8y^2 + 32x^2$

So, L.H.S. = R.H.S.

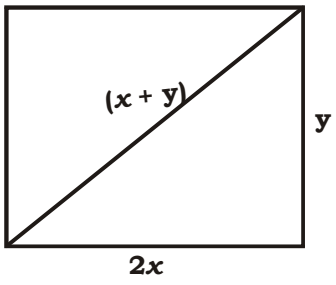
45. (b)



$\sqrt{2}$, $3\sqrt{2}$ & $2\sqrt{5}$ are the sides of a right angle triangle.

$\therefore$ Area $= \frac{1}{2} \times \sqrt{2} \times 3\sqrt{2} = 3$ unit^2

46. (d)



By Pythagoras theorem,

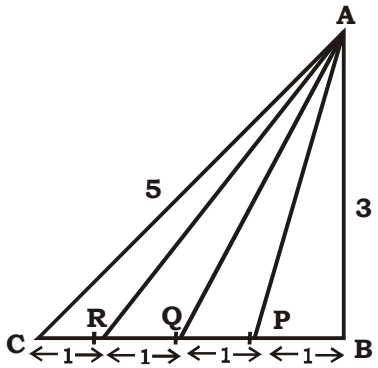
$4x^2 + y^2 = x^2 + y^2 + 2xy$

$\Rightarrow 3x^2 = 2xy$

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

$\therefore \frac{y}{2x} = \frac{3}{4}$

47. (a)



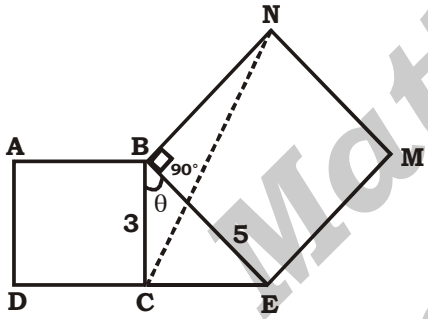
$\because AP^2 + AQ^2 + AR^2 = 3b^2 + 17na^2$

$\Rightarrow 10 + 13 + 18 = 3 \times 25 + 17n \times 16$

$\Rightarrow 41 = 75 + 17n \times 16$

$\Rightarrow n = -\frac{34}{272} = \frac{-1}{8}$

48. (c)



$\because \cos(90° + \theta) = \frac{5^2 + 3^2 - CN^2}{2 \times 5 \times 3}$

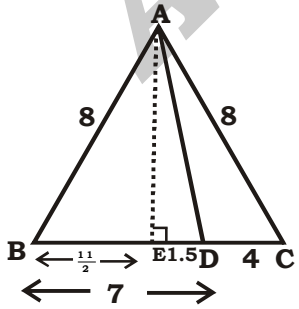
$\Rightarrow -\sin\theta = \frac{34 - CN^2}{30}$

$\Rightarrow -\frac{4}{5} = \frac{34 - CN^2}{30}$

$\Rightarrow CN^2 = 58$

$\Rightarrow CN = \sqrt{58}$ cm

49. (a)



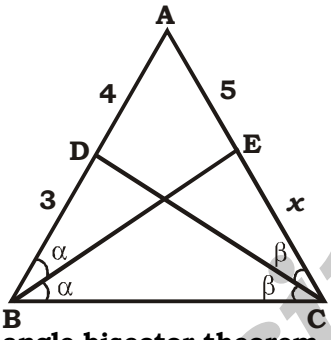
$\because AE = \sqrt{8^2 - \frac{121}{4}} = \sqrt{64 - \frac{121}{4}}$

$= \sqrt{\frac{256 - 121}{4}} = \sqrt{\frac{135}{4}}$

$\because AD = \sqrt{\frac{135}{4} + \frac{9}{4}}$

$\therefore AD = \frac{12}{2} = 6$ cm

50. (a)



By angle bisector theorem,

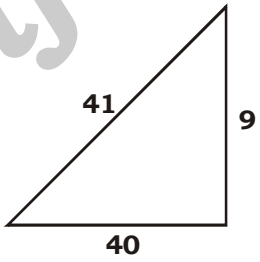
$\frac{7}{BC} = \frac{5}{x}$ .....(i)

& $\frac{5+x}{BC} = \frac{4}{3}$ .....(ii)

From (i) & (ii)

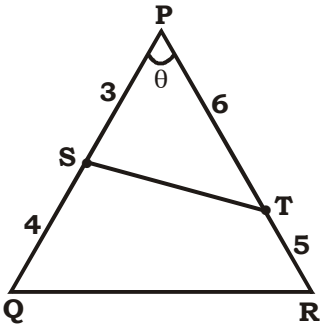
$\Rightarrow \frac{7x}{5} = \frac{15+3x}{4} \Rightarrow x = \frac{75}{13}$

51. (d)



$\therefore$ Area $= \frac{1}{2} \times 40 \times 9 = 180$ cm^2

52. (b)



Area of ΔPST : Area of ΔPQR

$= \frac{1}{2} \times 3 \times 6 \times \sin\theta : \frac{1}{2} \times 7 \times 11 \times \sin\theta$

$= 18 : 77$

$\because$ (77 – 18) unit = 177 cm^2

$\Rightarrow 59$ unit = 177 cm^2

$\Rightarrow 1$ unit = 3 cm^2

$\therefore$ Area of ΔPQR = 77 unit = 231 cm^2