MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

PROPERTIES OF TRIANGLES

All Questions

1. Take three non-collinear point A, B and C on a page of your notebook. Join AB, BC and CA, what figure do you get? Name the triangle. Also, name The side opposite to $\angle B$ The angle opposite to side AB The

vertex opposite to side BC The side opposite to vertex B.

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2. Take three collinear point A, B and C on a page of your note book. Join AB, BC and CA. is the figure a triangle? If not, why?

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3. Distinguish between a triangle and its triangle region.

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4. In fig.9, D is a point on side BC of a ABC. AD is joined. Name all the triangle that you can observe in the figure. How many are they?

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5. In fig. 10, A, B, C and D are four points, and no three points are collinear. AC and BD intersect at O. there are eight triangle that you can observe. Name all the triangles.

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6. What is the difference between a triangle and triangular region?

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7. Explain the following terms: Triangle (ii) parts or elements of a triangle Scalene triangle (iv) isosceles triangle Equilateral triangle (vi) acute triangle Right triangle (viii) obtuse triangle Interior of a triangle (x) exterior of a triangle.

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8. In fig. 11, the length (in cm) of each side has been indicated along the side. State for each triangle whether it is scalene, isosceles or equilateral:

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9. In fig. 12, there are five triangles. The measures of some of their angles have been indicated. Sates for each triangle whether it is acute, right or obtuse.

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10. Fill in the blanks with the correct word/symbol to make it a true statement: A triangle has.....sides. A

triangle has ..... vertices. A triangle has.....angles A triangle has.....parts. A triangle whose no two sides are equal is known as..... A triangle whose two sides are equal is known as..... A triangle whose all the sides are equal is known as..... A triangle whose one angle is a right angle is known as... A triangle whose all the angles are of measure less than 90^0 is known as..... A triangle whose one angle is more than 90^0 is known as.....

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11. In each of the following, state if the statement is true (T) or false (F). A triangle has three sides A triangle may have four vertices. Any three line-segment make up a triangle The interior of a triangle includes its vertices.

The triangular region includes the vertices of the corresponding triangle. The vertices of a triangle are three collinear points. An equilateral triangle is scalene. Every right triangle is scalene. Each acute triangle is equilateral. No isosceles triangle is obtuse.

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12. Two angles of a triangle are of measures 75^0 and 35^0 find the measure of the third angle.

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13. One of the angles of a triangle has measure 80^0 and the other two angles are equal. Find these two angles.

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

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15. Each of the two equal angles of a triangle is twice the third angle. Find the angles of the triangle.

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16. If the angles of a triangle are in the ratio $2: 3: 4$, determine three angles.

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17. The sum of two angles of a triangle is equal to its third angle. Determine the measure of the third angle.

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18. One of the acute angles of a right triangle is 58^0 , find the other acute angle.

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19. In fig. 14, ABC is right-angled at C, $and\, CD \perp AB$. also $\angle A = 65^0$. Find $\angle ACD$ (ii) $\angle BCD\ \angle CBD$.

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20. In fig. 15, D, E are points on sides AB, AC of ABC such that $DE \mid\mid BC$. if $\angle B = 30^0\ and\ \angle A = 40^0$, find x^0, y^0, z^0.

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21. The fig.16 has been obtained by using two triangles. Find $\angle A + \angle B + \angle C + \angle D + \angle E + \angle F$.

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22. Fig.17 is made up of two triangles. find $\angle DAB + \angle ABC + \angle BCD + \angle CDA$.

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23. In five cornered fig. 18,AD, AC are joined. Find $\angle EAB + \angle BAC + \angle BCD + \angle CDE + \angle DEA$.

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24. The sides AB and AC of ABC are product to P and Q respectively. the bisectors of exterior angles at B and C of ABC meet at O (fig.19) prove that $\angle BOC = 90^0 - \frac{1}{2}\angle A$

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25. Two angles of a triangle are of measures $105^0 \; and \; 30^0$. find the measures of the third angle.

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26. One of the angles of a triangle is 130^0, and the other two angles are equal. What is the measure of each of

these equal angles?

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27. The three angles of a triangle are equal to one another. What is the measure of each of the angles?

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28. If the angles of a triangle are in the ratio $1:2:3$, determine three angles.

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29. The angles of a triangle are $(x-40)^0$, $(x-20)^0$ *and* $\left(\frac{1}{2}x-10\right)^0$. find the value of x.

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30. The angles of a triangle are arranged in ascending order of magnitude. If the difference between two consecutive angles is 10^0, find the three angles.

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31. Two angles of a triangle are equal and the third angle is greater than each of those angles by 30^0 determine all the angles of the triangle.

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32. If one angle of a triangle is equal to the sum of the other two, show that the triangle is a right triangle.

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33. If each angle of a triangle is less than the sum of the other two, show that the triangle is acute angled.

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34. In each of the following, the measures of three angles are given. State in which cases, the angles can possibly be those of a triangle: $63^0, 37^0, 80^0$ (ii) $45^0, 61^0, 73^0$ $59^0, 72^0, 61^0$ (iv) $45^0, 45^0, 90^0$ $30^0, 20^0, 125^0$

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35. The angles of a triangle are in the ratio $3:4:5$. Find the smallest angle.

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36. Two acute angles of a right triangle are equal. Find the two angles.

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37. One angle of a triangle is greater than the sun of the other two. What can you say about the measures of this angle? What type of a triangle is this?

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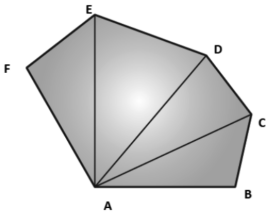
38. In the six cornered figure, (fig.20), AC, AD and AE are joined. Find

$\angle FAB + \angle ABC + \angle BCD + \angle CDE + \angle DEF + \angle EFA$.



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39. Find x, y, z (whichever is required) in the figures (fig.21) given below:

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40. If one angle of a triangle is 60^0 and the other two angles are in the ratio $1:2,$ find the angles.

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41. If one angle of a triangle is 100^0 and the other angles are in the ratio $2:3,$ find the angles.

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42. In a $ABC,$ if $3\triangle A = 4\triangle B = 6\triangle C,$ calculate the angles.

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43. Is it possible to have triangle, in which Two of the angles are right? Two of the angles are obtuse? Two of

the angles are acute? Each angle is less than 60^0? Each angle is greater than 60^0? Each angle is equal to 60^0? Give reason in support of your answer in each case.

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44. In $ABC, \angle A = 100^0$, AD bisects $\angle A$ and $AD \perp BC\dot{f} \in d \angle B$.

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45. In $ABC, \angle A = 50^0, \angle B = 70^0$ and bisector of $\angle C$ meets $AB \in D$. find the angles of the triangle ADC and BDC.

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46. In ABC, $\angle A = 60^0$, $\angle B = 80^0$ and the bisectors of $\angle B \; and \; \angle C$ meet at O . Find : (i) $\angle C$ (ii) $\angle BOC$.

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47. The bisectors of the acute angles of a right triangle meet at O . Find the angle at O between the two bisectors.

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48. In $ABC,\ \angle A = 50^0\ and\ BC$ is produced to a point D. The bisectors of $\angle ABC\ and\ \angle ACD$ meet at E. find $\angle E$.

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49. In $ABC,\ \angle B = 60^0, \angle C = 40^0,\ AL \perp BC\ and\ AD$ bisects $\angle A$ such that L and D lie on side BC. Find $\angle LAD$.

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50. Line segments AB and CD intersect at O such that $AC \mid\mid DB$. If $\angle CAB = 35^0$ and $\angle CDB = 55^0$ find the $\angle BOD$.

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51. In fig.22, ABC is right angled at A. Q and R are points on line BC and P is a point such that $QP \mid\mid AC$ and $RP \mid\mid AB$. Find $\angle P$.

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52. In fig.25,two of the angles are indicated what is the measure of $\angle ACD$?

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53. An exterior angle of a triangle is 110^0 and one of the interior opposite is 30^0 find the other two angles of the triangle.

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54. One of the angles of a triangle has measure 80^0 and the other two angles are equal. Find these two angles.

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55. In fig.28, the measures of some of the angles are indicated. Find the values of x^0 and y^0

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56. In fig. 29, find $\angle ABD$, also, if $\angle C = 3\angle ABC$, find $\angle ABC$.

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57. In fig.30, find (i) $\angle ACD$, (ii) $\angle AED$

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58. The sides BC, CA and AB of a triangle $ABC,$ are produced in order, forming exterior angles $\angle ACD, \angle BAE$ and $\angle CBF$. Show that $\angle ACD + \angle BAE + \angle CBF = 360^0$

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59. The side BC of aABC is produced on both sides. Show that the sum of the exterior angles so formed is greater than $\angle A$ by two right angles.

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60. Sides BC, CA and BA of a triangle ABC are produced to D, Q, P respectively as shown in Figure. If $\angle ACD = 100^0$ and $\angle QAP = 35^0$, find all the angles of the triangle. Figure

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61. In Figure, the side BC of ABC is produced to form ray BD as shown. Ray CE is drawn parallel to BA. Show directly, without using the angle sum property of a triangle that $\angle ACD = \angle A + \angle B$ and deduced that $\angle A + \angle B + \angle C = 180^0$.

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62. In fig .35, $\angle CBX$ is an exterior angle of ABC at B . Name The interior adjacent angle The interior opposite angles to exterior $\angle CBX$ Also, name the interior opposite angles to an exterior angle at A.

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63. In fig.36, two of the angles are indicated. What are the measures of $\angle ACX \; and \; \angle ACB$?

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64. In a triangle, an exterior angle at a vertex is 95^0 and it one of the interior opposite angles is 55^0 find all the

angles of the triangle.

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65. One of the exterior angles of a triangle is 80^0 , and the interior opposite angles are equal to each other. What is the measures of each of these two angles?

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66. The exterior angles, obtained on producing the base of a triangle both ways are 140^0 and 136^0 . Find all the angles of the triangle.

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67. The sides BC, CA and AB of a triangle $ABC,$ are produced in order, forming exterior angles $\angle ACD, \angle BAE$ and $\angle CBF$. Show that $\angle ACD + \angle BAE + \angle CBF = 360^0$

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68. In fig.38, $AC \perp CE$ *and* $\angle A : \angle B : \angle C = 3 : 2 : 1,$ find the value of $\angle ECD$.

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69. A student when asked to measures two exterior angles of ABC observed that the exterior angles at $A\ and\ B$ are of $103^0\ and\ 74^0$ respectively. Is this possible? Why or why not?

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70. In fig.39, $AD\ and\ CF$ are respectively perpendiculars to sides $BC\ and\ AB$ of $ABC\cdot$ if $\angle FCD = 50^0,\ f \in d\ \angle BAD\cdot$

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71. In fig.40, measures of some angles are indicted. Find the value of x.

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72. In fig.41, ABC is a right triangle right angled at A. D lies on BA produced and $DE \perp BC$, intersecting AC at F. if $\angle AFE = 130^0$, find $\angle BDE$ (ii) $\angle BCA$ $\angle ABC$

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73. ABC is a triangle in which $\angle B = \angle C$ and ray AX bisects the exterior angle DAC. If $\angle DAX = 70^0$ find $\angle ACB$.

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74. The sides BC of ABC is product to a point D . The bisector of $\angle A$ meets side BC in L . If $\angle ABC = 30^0$ *and* $\angle ACD = 115^0$, find $\angle ALC$

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75. D is a point on the side BC of ABC. A line PDQ , though D , meets side AC in P *and* AB produced at Q . If $\angle A = 80^0$, $\angle ABC = 60^0$ and $\angle PDC = 15^0$ find (i) $\angle AQD$ (ii) $\angle APD$.

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76. Explain in the concept of interior and exterior angles and in each of the figures given below. Find $x \, and \, y$ (fig.42).

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77. Compute the value of x in each of the following figures.

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78. In each of the following there are three positive numbers. State if these numbers could possibly be the

lengths of the sides of a triangle: $2, 3, 4$ (ii) $4, 5, 3$

$2.\ 5, 1.5, 4$

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79. In fig.45, $ABC, AB = 3cm, BC = 4cm\ and\ AC = 5cm.$ name the smallest and the largest angles of the triangle.

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80. In each of the following, there are three positive numbers. State if these numbers could possibly be the

lengths of the sides of a triangle: $5, 7, 9$ (ii) $2, 10, 15$

$3, 4, 5$ (iv) $2, 5, 7$ $5, 8, 20$

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81. In fig.46, P is the point on the side BC. Complete each of the following statements using symbol $=$, $>$ or $<$ so as to make it true: AP .....$AB + BP$ (ii) AP .....$AC + PC$ $AP\frac{1}{2}(AB + AC + BC)$

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82. P is point in the interior of ABC as shown in fig.47.states which of the following statements are true

(T) or false (F): `A P+P B A CB P+P C=B C`

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83. O is a point in the exterior of ABC. what symbol $>, <$ or $=$ will you use to complete the statement $OA + OB\ddot{A}B$? write two other similar statements and show that $OA + OB + OC > \frac{1}{2}(AB + BC + CA)$

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84. In ABC, $\angle A = 100^0, \angle B = 30^0, \angle C = 50^0$. name the smallest and the largest sides of the triangle.

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85. The hypotenuse of a right triangle is 13cm long. If one of the remaining two sides is of length 5cm, find the length of another side.

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86. The sides of certain triangle are given below. Determine which of them are right triangle: a = 6 cm, b = 8cm and c = 10cm a = 5cm, b = 8cm and c = 11cm.

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87. A ladder is placed in such a way that its foot is at a distance of 5 m from a wall and its top reaches a window 12 m above the ground. Determine the length of the ladder.

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88. A ladder 25 m long reaches a window of a building 20 m above the ground. Determine the distance of the foot of the ladder from the building.

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89. A ladder 15 m long reaches a window which is 9 m above the ground on one side of a street. Keeping its foot at the some point, the ladder is turned to other side of the street to reach a window 12 m high. Find the width of the street.

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90. A man goes 10 m due east and than 24 m due north. Find the distance from the starting point.

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91. ABC is an isosceles right triangle, right-angled at C .

Prove that: $AB^2 = 2AC^2$.

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92. In a ABC, $AD \perp BC$ and $AD^2 = BD \times CD$.

prove that ABC is a right triangle.

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93. A tree broke at a point but did not separate. Its top touched the ground at a distance of 6 dm from its base. If the point where is broke be at a height 2.5 dm from the

ground, what was the total height of the tree before it broke?

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94. State Pythagoras theorem and its converse.

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95. In right $\triangle ABC$, the lengths of the legs are given. Find the length of the hypotenuse.

(i)$a = 6\,cm,\ b = 8\,cm$ (ii) $a = 8\,cm,\ b = 15\,cm$ (iii) $a = 3\,cm,\ b = 4\,cm$ (iv) $a = 2\,cm,\ b = 1.5\,cm$

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96. The hypotenuse of a triangle is 2.5 cm. If one of the sides is 1.5 cm. find the length of the other side.

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97. A ladder 3.7 m long is placed against a wall in such a way that the foot of the ladder is 1.2 m away from the wall. Find the height of the wall to which the ladder reaches.

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98. If the sides of a triangle are 3 cm, 4 cm and 6 cm long, determine whether the triangle is right-angled triangle.

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99. The sides of certain triangles are given below. Determine which of them are right triangles. a = 7 cm, b = 24 cm and c= 25 cm a = 9 cm, b = 16 cm and c= 18cm

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100. Two poles of heights 6 m and 11 m stand on a plane ground. If the distance between their feet is 12 m. Find the distance between their tops.

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101. A man goes 15 m due west and then 8 m due north. How far is he from the starting point?

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102. The foot of a ladder is 6 m away from a wall and its top reaches a window 8 m above the ground. If the ladder is shifted in such a way that its foot is 8 m away from the wall, to what height does its top reach?

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103. A ladder 50 dm long when set against the wall of a house just reaches a window at a height of 48 dm. How far is the lower end of the ladder from the base of the wall?

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104. The two legs of a right triangle are equal and the square of the hypotenuse is 50. Find the length of each leg.

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105. Verity that the following numbers represent Pythagorean triplet: $12,\ 35,\ 37$ (ii) $7,\ 24,\ 25$

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106. Verity that the following numbers represent Pythagorean triplet: $27, 36, 45$ (ii) $15, 36, 39$

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107. In $ABC,\ \angle ABC = 100^0,\ \angle BAC = 35^0\ and\ BD \perp AC$ meets side $AC \in D$. If $BD = 2\,cm$, findC, and length DC.

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108. In a ABC, AD is the altitude from A such that AD = 12 cm. BD = 9 cm and DC = 16 cm. Examine if ABC is right angled at A .

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109. Draw a triangle ABC, with $AC = 4\,cm,\ BC = 3\,cm\ and\ \angle C = 105^0$. Measure AB. Is $(AB)^2 = (AC)^2 + (BC)^2$? If not, which one of the following is true: $(AB)^2 > (AC)^2 + (BC)^2$ or $(AB)^2 < (AC)^2 + (BC)^2$?

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110. Draw a triangle ABC, with $AC = 4\,cm,\ BC = 3\,cm\ and\ \angle C = 80^0$. Measure AB. Is $(AB)^2 = (AC)^2 + (BC)^2$? If not, which one of the following is true: $(AB)^2 > (AC)^2 + (BC)^2$ or $(AB)^2 < (AC)^2 + (BC)^2$?

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111. If the measure of the angle of a triangle are $(2x)^0,\ (3x - 5)^0$ and $(4x - 13)^0$. Then the value of x is

22 (b) 18 20 (d) 30

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112. The angles of a triangle are in the ratio $2:3:7$. The measure of the largest angle is 84^0 (b) 91^0 105^0 (d) 98^0

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113. In a ABC, If $2\angle A = 3\angle B = 6\angle C$, then the measure of the smallest angle is 90^0 (b) 60^0 40^0 (d) 30^0

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114. In a ABC, if $\angle A + \angle B = 150^0$ and $\angle B + \angle C = 75^0$, then $\angle B =$ 35^0 (b) 45^0 55^0 (d) 25^0

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115. In a ABC, if $\angle A - \angle B = 33^0$ and $\angle B - \angle C = 18^0$, then $\angle B =$ 35^0 (b) 45^0 56^0 (d) 55^0

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116. If the measure of the angles of a triangle are $(2x - 5)^0, \left(3x - \frac{1}{2}\right)$ *and* $\left(30 - \frac{x}{2}\right)$, then $x =$ $\frac{311}{9}$ (b) $\frac{309}{11}$ $\frac{310}{9}$ (d) $\frac{301}{9}$

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117. In Fig. 59, the value of x is 84 (b) 74 $\frac{310}{9}$ (d) $\frac{301}{9}$

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118. In Fig.60, the value of $x \; and \; y$ are $x = 20, \; y = 130$

(b) $x = 40, \; y = 140$ $x = 20, \; y = 140$ (d)

$x = 15, \; y = 140$

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119. In Fig.61, the value of x is 72^0 (b) 50 58 (d) 48

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120. In Fig.62, if $ABDE,$ then the value of x is 25 (b) 35

40 (d) 45

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121. In Fig.63, if $ABCD$, the value of x is 25 (b) 35 15 (d) 20

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122. In Fig.64, if $ABCD$, the values of $x \, and \, y$ are $x = 21, \ y = 28$ (b) $x = 21, \ y = 38$ $x = 38, \ y = 21$ (d) $x = 22, \ y = 38$

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123. In Fig.65, if $ABCE$, then the values of $x \, and \, y$ are $x = 26, \ y = 144$ (b) $x = 36, \ y = 154$ $x = 154, \ y = 36$

(d) $x = 144,\ y = 26$

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124. In Fig.66, if $AFDE,$ then $x =$ 37 (b) 57 47 (d) 67

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125. In Fig.67, the value of $x\ and\ y\ are\ x = 130,\ y = 120$

(b) $x = 120,\ y = 130$ $x = 120,\ y = 120$ (d)

$x = 130,\ y = 130$

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126. In Fig.68, the value of x *and* y are $x = 120,\ y = 150$

(b) $x = 110,\ y = 160$ $x = 150,\ y = 120$ (d)

$x = 110,\ y = 160$

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127. In Fig.69, if $ABCD,$ then the value of x *and* y are

$x = 106,\ y = 307$ (b) $x = 307,\ y = 106$

$x = 107,\ y = 306$ (d) $x = 105,\ y = 308$

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128. In Fig.70, if $ABCD,$ then the value of x *and* y are

$x = 24,\ y = 48$ (b) $x = 34,\ y = 68$ $x = 24,\ y = 68$ (d)

$x = 34,\ y = 48$

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129. In Fig.71, if $ABCD$, then the values of $x,\ y\ and\ z$ are

$x = 56,\ y = 47,\ z = 77$ (b)

$x = 47,\ y = 56,\ z = 77$ $x = 77,\ y = 56,\ z = 47$ (d)

$x = 56,\ y = 77,\ z = 47$

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130. In Fig.72, if $AB||CD\ and\ AE||BD$, then the value of x is (a)38 (b) 48 (c)58 (d) 68

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131. If the exterior angles of a triangle are $(2x+10)^0$, $(3x-5)^0$ and $(2x+40)^0$, then $x=$ 25 (b) 35 45 (d) 55

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132. In Fig.73, the value of x is 20 (b) 30 40 (d) 25

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133. In Fig.74, if $ABCD$, $\angle CAB = 49^0$, $\angle CBD = 27^0$ and $\angle BCD = 112^0$, then the values of

x *and* y are $x = 41,\ y = 90,$ (b) $x = 41,\ y = 63,$ $x = 63,\ y = 41,$ (d) $x = 90,\ y = 41,$

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134. Which of the following is the set of measure of the sides of a triangle? 8 cm, 4 cm, 20 cm (b) 9 cm, 17 cm, 25 cm 11cm, 16 cm, 28 cm (d) None of these

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135. In which of the following cases, a right triangle cannot be constructed? 12 cm, 5 cm, 13 cm (b) 8

cm, 6 cm, 10 cm 5 cm, 9 cm 11 cm (d) None of these

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136. Which of the following is/are not Pythagorean triplet (s)? 3,4,5 (b) 8,15,17 7,24,25

(d) 13,26,29

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137. In a right triangle, one of the acute angle is four times the other. Its measure is 68^0 (b) 84^0 80^0 (d) 72^0

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138. In which of the following cases can a right triangle ABC be constructed?

$AB = 5\,cm,\ BC = 7\,cm,\ AC = 10\,cm$

$AB = 7\,cm,\ BC = 8\,cm,\ AC = 12\,cm$

$AB = 8\,cm,\ BC = 17\,cm,\ AC = 15\,cm$ None of these

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139. ABC is a right triangle right angles at A. If $AB = 24\,cm\ and\ AC = 7\,cm,\ then\ BC =$ 31 cm (b) 17 cm 25 cm (d) 28 cm

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140. ABC is an isosceles right-triangle right angled at C such that $AC = 5\,cm$. Then, $AB =$ 2.5 cm (b) $5\sqrt{2}$ cm 10 cm (d) 5 cm

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141. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, the distance between their tops is 13 m

(b) 14 m 15 m

(d) 12.8 m

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142. A ladder is placed in such a way that its foot is 15 m away from the wall and its top teaches a window 20 m above the ground. The length of the ladder is 35 m (b) 25 m 18 m (d) 17.5 m

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143. The hypotenuse of a right triangle is 26 cm long. If one of the remaining two sides is 10 cm long, the length of the other side is 25 cm (b) 23 cm (c) 24 cm (d) 22 cm

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144. A 15 m long ladder is placed against a wall in such away that the foot of the ladder is 9 m away from the wall, Up to what height does the ladder reach the wall?

13 m (b) 10 m (c) 8 m (d) 12 m

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