



MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

TRIANGLE AND ITS ANGLES

Others

1. In a Triangle ABC , $\angle B = 105^0$, $\angle C = 50^0$,

Find $\angle A$



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



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5. The sum of two angles of a triangle is 80^0 and their difference is 20^0 . Find all the angles.



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6. In a $\triangle ABC$, if $2\angle A = 3\angle B = 6\angle C$, determine $\angle A$, $\angle B$ and $\angle C$

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7. A, B, C are the three angles of a triangle. If

$$A - B = 15^\circ, \quad B - C = 30^\circ, \quad \text{find}$$

$\angle A, \angle B \text{ and } \angle C$

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8. In Figure $AB \parallel DC$, if $x = \frac{4y}{3}$ and $y = \frac{3z}{8}$, find

$\angle BCD, \angle ABC$ and $\angle BAD$.

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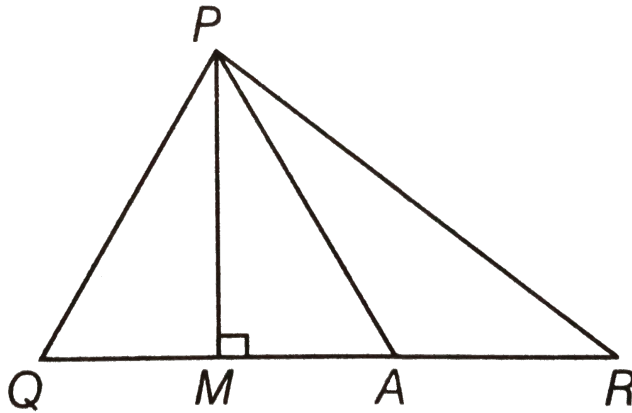
9. A triangle ABC is right angled at A . AL is drawn perpendicular to BC . Prove that $\angle BAL = \angle ACB$



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10. In the given figure, $\angle Q > \angle R$, PA is the bisector of $\angle QPR$ and $PM \perp QR$.

Prove that $\angle APM = \frac{1}{2}(\angle Q - \angle R)$.



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11. If two parallel lines are intersected by a transversal, prove that the bisectors of the interior angles on the same side of transversal intersect each other at right angles.



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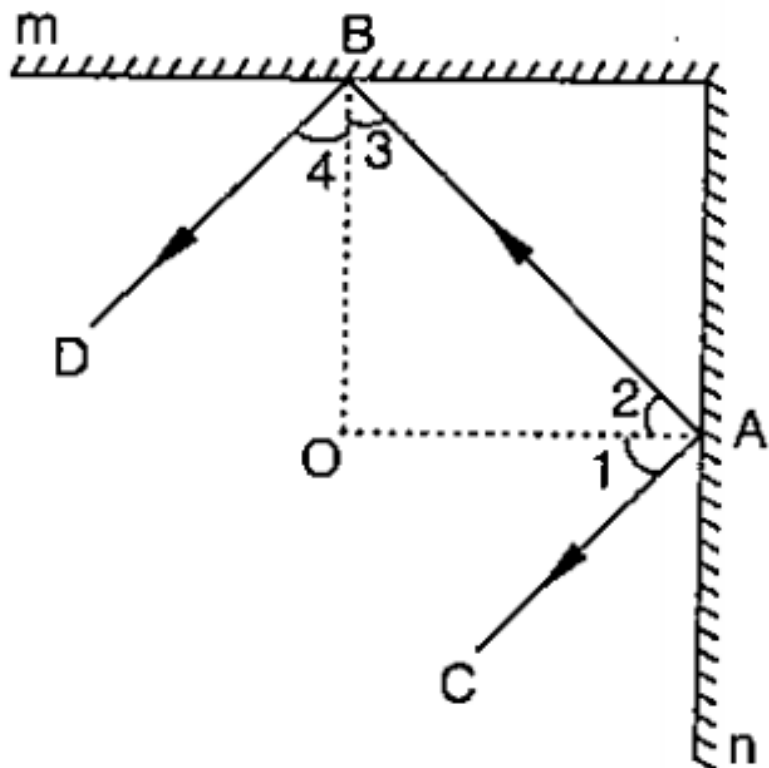
12. In Figure, TQ and TR are the bisectors of $\angle Q$ and $\angle R$ respectively. If $\angle QPR = 80^\circ$ and $\angle PRT = 30^\circ$, determine $\angle TQR$ and $\angle QTR$



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13. In Figure, m and n are two plane mirrors perpendicular to each other. Show that the incident

ray CA is parallel to the reflected ray BD



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14. In $\triangle ABC$, $\angle B = 45^\circ$, $\angle C = 55^\circ$ and bisector of $\angle A$ meets BC at a point D . Find

$\angle ADB$ and $\angle ADC$



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15. In Figure, prove that $PM=PN=\text{root } 3 \times a$



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16. In a Triangle ABC , if $\angle A = 55^0$, $\angle B = 40^0$,
find $\angle C$



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



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



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



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20. Two angles of a triangle are equal and the third angle is greater than each of those angles by 30° . Determine all the angles of the triangle.



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21. 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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22. ABC is a triangle in which $\angle A = 72^\circ$, the internal bisectors of angles B and C meet in O . Find the magnitude of $\angle BOC$



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23. The bisectors of base angles of a triangle cannot enclose a right angle in any case.



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24. If the bisectors of the base angles of a triangle enclose an angle of 135^0 , prove that the triangle is a right triangle.



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25. In a triangle ABC , $\angle ABC = \angle ACB$ and the bisectors of $\angle ABC$ and $\angle ACB$ intersect at O such that $\angle BOC = 120^\circ$. Show that $\angle A = \angle B = \angle C = 60^\circ$.



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26. Can a triangle have: Two right angles? (ii) Two obtuse angles? Two acute angles (iv) All angles more than 60° ? All angles less than 60° ? (vi) All angles equal to 60°



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27. 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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28. An exterior angle of a triangle is 110° , and one of the interior opposite angles is 30° . Find the other two angles of the triangle.



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29. 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 $\angle ACD + \angle BAE + \angle CBF = 360^\circ$



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30. In Figure, if $QT \perp PR$, $\angle TQR = 40^\circ$ and $\angle SPR = 30^\circ$, find x and y .



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31. In Figure, side QP and RQ of PQR are produced to point S and T respectively. If $\angle SPR = 135^\circ$ and $\angle PQT = 110^\circ$, find $\angle PRQ$



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32. In Figure, $\angle X = 62^\circ$, $\angle XYZ = 54^\circ$. If YO and ZO are bisectors of $\angle XYZ$ and $\angle XZY$ respectively of XYZ , find $\angle OZY$ and $\angle YOZ$.



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33. In Figure, if

$AB \parallel DE$, $\angle BAC = 35^\circ$ and $\angle CDE = 53^\circ$,

find $\angle DCE$.



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34. In Figure, if lines PQ and RS intersect at a point T such that

$\angle PRT = 40^\circ$, $\angle RPT = 95^\circ$ and $\angle TSQ = 75^\circ$,

find $\angle SQT$.



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35.

In

Figure,

if

$PQ \perp PS$, $\angle PQR = 28^\circ$ and $\angle QRT = 65^\circ$,

then find the values of x and y



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36. The side BC of a $\triangle ABC$ 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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37. Sides BC , CA and BA of a triangle ABC are produced to D , Q , P respectively as shown in Figure. If $\angle ACD = 100^\circ$ and $\angle QAP = 35^\circ$, find all the angles of the triangle.



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38. In Figure, the side BC of $\triangle ABC$ 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 $\angle A + \angle B + \angle C = 180^\circ$.



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39. Prove that the angle between internal bisector of one base angle and the external bisector of the other base angle of a triangle is equal to one-half of the vertical angle.

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40. The side BC of a ABC is produced, such that D is on ray BC . The bisector of $\angle A$ meets BC in L as shown in Figure. Prove that $\angle ABC + \angle ACD = 2\angle ALC$

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41. The exterior angles, obtained on producing the base of a triangle both ways are 104^0 and 136^0 . Find all the angles of the triangle.

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42. In a triangle ABC , the internal bisectors of $\angle B$ and $\angle C$ meet at P and the external bisectors of $\angle B$ and $\angle C$ meet at Q . Prove that $\angle BPC + \angle BQC = 180^0$

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43. In Figure, the sides BC , CA and AB of a ABC have been produced to D , E and F respectively. If $\angle ACD = 105^0$ and $\angle EAF = 45^0$, find all the angles of the ABC



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44. Compute the value of x in each of the following figures:



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45. In Figure, AB divides $\angle DAC$ in the ratio $1 : 3$ and $AB = DB$. Determine the value of x .



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46. ABC is a triangle. The bisector of the exterior angle at B and the bisector of $\angle C$ intersect each other at D . Prove that $\angle D = \frac{1}{2} \angle A$.



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47. In Figure, $AM \perp BC$ and AN is the bisector of $\angle A$. If $\angle B = 65^\circ$ and $\angle C = 33^\circ$, find $\angle MAN$



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48. In a ABC , AD bisects $\angle A$ and $\angle C > \angle B$.

Prove that $\angle ADB > \angle ADC$.



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49. In Figure, AE bisects $\angle CAD$ and $\angle B = \angle C$.

Prove that $AE \parallel BC$



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50. In Figure, $AB \parallel DE$. Find $\angle ACD$



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51. Which of the following statements are true (T) and which are false (F): Sum of the three angles of a triangle is 180° A triangle can have two right angles. All the angles of a triangle can be less than 60° All the angles of a triangle can be greater than 60° All the angles of a triangle can be equal to 60° A triangle can have two obtuse angles. A triangle can have at most one obtuse angles. In one angle of a triangle is obtuse, then it cannot be a right

angled triangle. An exterior angle of a triangle is less than either of its interior opposite angles. An exterior angle of a triangle is equal to the sum of the two interior opposite angles. An exterior angle of a triangle is greater than the opposite interior angles



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52. Fill in the blanks to make the following statements true: Sum of the angles of a triangle is An exterior angle of a triangle is equal to the two opposite angles. An exterior angle of a triangle is always than either of the interior

opposite angles. A triangle cannot have more than right angles. A triangles cannot have more than obtuse angles.



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53. Define a triangle.



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54. Write the sum of the angles of an obtuse triangle.



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55. In ABC , if $\angle B = 60^0$, $\angle C = 80^0$ and the bisectors of angles $\angle ABC$ and $\angle ACB$ meet at a point O , then find the measure of $\angle BOC$.



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56. If the angle of a triangle are in the ratio $2:1:3$, then find the measure of smallest angle.



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57. If the angles A , B and C of a $\triangle ABC$ satisfy the relation $B - A = C - B$, then find the measure of $\angle B$.



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58. In ABC , if bisectors of $\angle ABC$ and $\angle ACB$ intersect at O at angle of 120^0 , then find the measure of $\angle A$



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59. State exterior angle theorem



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60. If the side BC of ABC is produced on both sides, then write the difference between the sum of the exterior angles so formed and $\angle A$.



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61. In a triangle ABC , if $AB = AC$ and AB is produced to D such that $BD = BC$, find

$\angle ACD : \angle ADC$

A. 1:3

B. 2:1

C. 3:1

D. 1:2

Answer: C



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

angle.



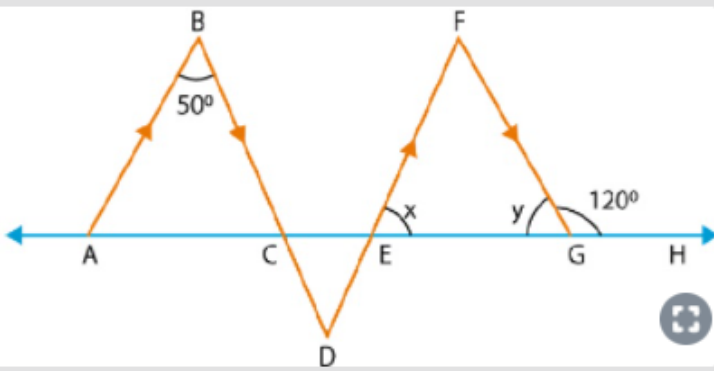
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63. In Figure, if $AB \parallel CD$, $EF \parallel BC$, $\angle BAC = 65^\circ$ and $\angle DHF = 35^\circ$, find $\angle AGH$.



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64. In Figure, if $AB \parallel DF$ and $BD \parallel FG$ such that $\angle FGH = 120^\circ$ and $\angle B = 50^\circ$, find x and y .



A. $x = 70^\circ$, $y = 60^\circ$

B. $x = 60^\circ$, $y = 60^\circ$

C. $x = 75^\circ$, $y = 65^\circ$

D. $x = 80^\circ$, $y = 40^\circ$

Answer: A



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65. In Figure, side BC of ABC is produced to point D such that bisectors of $\angle ABC$ and $\angle ACD$ meet at a point E . If $\angle BAC = 68^\circ$, find $\angle BEC$



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66. If all the three angles of a triangle are equal, then each one of them is equal to: (a) 90° (b) 45° (c) 60° (d) 30°



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67. If two acute angles of a right triangle are equal, then each acute is equal to (a) 30° (b) 45° (c) 60° (d) 90°



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68. An exterior angle of a triangle is equal to 100° and two interior opposite angles are equal. Each of these angles is equal to (a) 75° (b) 80° (c) 40° (d) 50°



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69. If one angle of a triangle is equal to the sum of the other two angles, then the triangle is (a) an isosceles triangle (b) an obtuse triangle (c) an equilateral triangle (d) a right triangle

A. (a) an isosceles

B. (b) an obtuse triangle

C. (c) an equilateral triangle

D. (d) a right triangle

Answer: (d) a right triangle



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70. Side BC of a triangle ABC has been produced to a point D such that $\angle ACD = 120^\circ$. If $\angle B = \frac{1}{2}\angle A$, then $\angle A$ is equal to 80° (b) 75° (c) 60° (d) 90°



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71. In ABC , $\angle B = \angle C$ and ray AX bisects the exterior angle $\angle DAC$. If $\angle DAX = 70^\circ$, then $\angle ACB =$ (a) 35° (b) 90° (c) 70° (d) 55°



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72. In a triangle, an exterior angle at a vertex is 95° and its one of the interior opposite angle is 55° , then the measure of the other interior angle is (a) 55° (b) 85° (c) 40° (d) 90°



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73. If the sides of a triangle are produced in order, then the sum of the three exterior angles so formed is (a) 90° (b) 180° (c) 270° (d) 360°



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74. In $\triangle ABC$, if $\angle A = 100^\circ$, AD bisects $\angle A$ and $AD \perp BC$. Then, $\angle ACD$ (a) 50° (b) 90° (c) 40° (d) 100°



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75. An exterior angle of a triangle is 108° and its interior opposite angles are in the ratio 4:5. The angles of the triangle are (a) $48^\circ, 60^\circ, 72^\circ$ (b) $50^\circ, 60^\circ, 70^\circ$ (c) $52^\circ, 56^\circ, 72^\circ$ (d) $42^\circ, 60^\circ, 76^\circ$



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76. In a ABC , if $\angle A = 60^0$, $\angle B = 80^0$ and the bisectors of $\angle B$ and $\angle C$ meet at O , then $\angle BOC =$ (a) 60^0 (b) 120^0 (c) 150^0 (d) 30^0



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77. If the bisectors of the acute angles of a right triangle meet at O , then the angle at O between the two bisectors is (a) 45^0 (b) 95^0 (c) 135^0 (d) 90^0



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78. Line segments AB and CD intersect at O such that $AC = DB$. If

$\angle CAB = 45^\circ$ and $\angle CDB = 55^\circ$, then $\angle BOD =$

(a) 100° (b) 80° (c) 90° (d) 135°



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79. The bisectors of exterior angles at B and C of triangle ABC meet at O . If $A = x^\circ$, then $\angle BOC =$

(a) $90^\circ + \frac{x^\circ}{2}$

(b) $90^\circ - \frac{x^\circ}{2}$

$$(c) 180^0 + \frac{x^0}{2}$$

$$(d) 180^0 - \frac{x^0}{2}$$



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80. In a ABC , $\angle A = 50^0$ and BC is produced to a point D . If the bisectors of $\angle ABC$ and $\angle ACD$ meet at E , then $\angle E =$ (a) 25^0 (b) 50^0 (c) 100^0 (d) 75^0



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81. The side BC of ABC is produced to a point D .

The bisector of $\angle A$ meets side BC in L . If

$\angle ABC = 30^\circ$ and $\angle ACD = 115^\circ$, then

$\angle ALC = 85^\circ$ (b) $72\frac{1}{2}^\circ$ (c) 145° (d) none of these



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82. In Figure, if

$EC \parallel AB$, $\angle ECD = 70^\circ$ AND $\angle BDO = 20^\circ$,

then $\angle OBD$ is: 20° (b) 50° (c) 60° (d) 70°



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83. In Figure, $x + y = 270$ (b) 230 (c) 210 (d) 190^0



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84. If the measures of angles of a triangle are in the ratio of 3:4:5, what is the measure of the smallest angle of the triangle? (a) 25^0 (b) 30^0 (c) 45^0 (d) 60^0



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85. In Figure, if $AB \perp BC$, then $x = 18$ (b) 22 (c) 25 (d) 32



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86. In Figure, what is z in terms of x and y ?

$x + y + 180$ (b) $x + y - 180$ $180^\circ - (x + y)$ (d)

$x + y + 360^\circ$



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87. In Figure, for which value of x is $l_1 \parallel l_2$? 37 (b) 43

(c) 45 (d) 47



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88. In Figure, what is y in terms of x ? (a) $\frac{3}{2}x$ (b) $\frac{4}{3}x$ (c) x (d) $\frac{3}{4}x$



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89. In Figure, if $l_1 \parallel l_2$, the value of x is

(a) $22\frac{1}{2}$

(b) 30

(c) 45

(d) 60



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90. In Figure, what is the value of x ? (a) 35 (b) 45 (c) 50 (d) 60



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91. In triangle RST , what is the value of x ? (a) 40° (b) 90° (c) 80° (d) 100°



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92. In Figure, the value of x is 65° (b) 80° (c) 95° (d) 120°



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93. In Figure, if $BP \parallel CQ$ and $AC = BC$, then the measure of x is (a) 20° (b) 25° (c) 30° (d) 35°



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94. In Figure, AB and CD are parallel lines and transversal EF intersects them at P and Q respectively. If

$$\angle APR = 25^\circ, \angle RQC = 30^\circ \text{ and } \angle CQF = 65^\circ,$$

then

(a) $x = 55^\circ, y = 40^\circ$

(b) $x = 50^\circ, y = 45^\circ$

(c) $x = 60^0$, $y = 35^0$

(d) $x = 35^0$, $y = 60^0$



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95. The base BC of triangle ABC is produced both ways and the measure of exterior angles formed are 94^0 and 126^0 . Then $\angle BAC$ (a) 94^0 (b) 54^0 (c) 40^0 (d) 44^0



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