MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

TRIANGLES

Others

1. ABC is a right triangle right-angled at $C and AC = \sqrt{3}BC$. Prove that

$\angle ABC = 60^0$.

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2. If A be the area of a right triangle and b one of the sides containing the right angle, prove that the length of the altitude on the hypotenuse is $\frac{2AB}{\sqrt{b^4 + 4A^2}}$

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3. In an equilateral triangle ABC if $AD \perp BC$, then AD^2 = (a)CD^2 (b) $2CD^2$ (c) $3CD^2$ (d) $4CD^2$

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4. If a perpendicular is drawn from the vertex containing the right angle of a right triangle to the hypotenuse then prove that the triangle on each side of the perpendicular are similar to each other and to the original

triangle. Also, prove that the square of the perpendicular is equal to the product of the lengths of the two parts of the hypotenuse.

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5. Prove that the line segments joining the mid-points of the sides of a triangle from four triangles, each of which is similar to the original triangle.

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6. If a perpendicular is drawn from the vertex containing the right angle of a right triangle to the hypotenuse then prove that the triangle on each side of the perpendicular are similar to each other and to the original triangle. Also, prove that the square of the perpendicular is equal to the product of the lengths of the two parts of the hypotenuse.

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7. In a right triangle ABC right-angled at B, if $PandQ$ are points on the sides $ABandAC$ respectively, then (a) $AQ^2 + CP^2 = 2\left(AC^2 + PQ^2\right)$ (b) $2\left(AQ^2 + CP^2\right) = AC^2 + PQ^2$ (c) $AQ^2 + CP^2 = AC^2 + PQ^2$ (d) $AQ + CP = \frac{1}{2}(AC + PQ)$.

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8. In trapezium $ABCD, ABDCandDC = 2AB\dot{E}F$ drawn parallel to AB cuts AD in $FandBC$ in E such that $\frac{BE}{EC} = \frac{3}{4}$. Diagonal DB intersects EF at G. Prove that $7fe = 10AB$.

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9. The diagonal BD of a parallelogram $ABCD$ intersects the segment AE at the point F,

where E is any point on the side BC . Prove that $DFxEF = FBxFA$.

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10. ABC is a triangle in which $AB = AC$ and D is a point on AC such that $BC^2 = AC \times CD$.Prove that $BD = BC$.

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11. Two poles of height a metres and b metres are p metres apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by $\frac{ab}{a+b}$ metres.

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12. In a triangle ABC , let $PandQ$ be points on $ABandAC$ respectively such that

$PQ \| \| BC$. Prove that the median AD bisects PQ.

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13. ABC is an isosceles triangle with $AB = AC$ and D is a point on AC such that $BC^2 = ACxCD$. Prove that $BD = BC$

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14. If $ABCD$ is quadrilateral and $EandF$ are the mid-points of $ACandBD$ respectively, prove that $\overrightarrow{A}B + \overrightarrow{A}D + \overrightarrow{C}B + \overrightarrow{C}D = 4\overrightarrow{E}F$.

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15. Through the mid-point M of the side CD of a parallelogram $ABCD$, the line BM is drawn intersecting AC at $LandAD$ produced at E. Prove that $EL = 2BL$.

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16. In a ABC, D and E are points on sides $ABandAC$ respectively such that $BD = CE.$ If $\angle B = \angle C,$ show that $DEBC.$

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17. Let ABC be a triangle and $DandE$ be two points on side AB such that $AD = BE.$ If $DPBC$ and $EQAC,$ THEN PROVE THAT $PQAB.$

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18. The side BC of a triangle ABC is bisected at $D; o$ is any point in $AD, BOandCO$ produced meet $ACandAB$ in $EandF$ respectively and AD is produced to X so that D is the mid-point of OX. Prove that $AO : AX = AF : AB$ and show that $FEBC$.

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19. In Figure, ABC is a triangle in which $AB = AC$. Point $DandE$ are points onthe sides $ABandAC$ respectively such that $AD = AE$. Show that the points $B, C, EandD$ are concyclic.

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20. In the given figure The bisector of interior $\angle A$ of ABC meets BC in D, and the

bisector of exterior $\angle A$ meets BC produced in E. Prove that $\frac{BD}{BE} = \frac{CD}{CE}$.

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21. In three line segments $OA, OBandOC$, point L, M, N respectively are so chosen that $LMABandMNBC$ but neither of L, M, N nor of A, B, C are collinear. Show that $LNAC$.

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22. O is any point inside a triangle ABC . The bisector of $\angle AOB, \angle BOC$ and $\angle COA$ meet the sides AB, BC and CA in point $D, EandF$ respectively. Show that $ADxBExCF = DBxECxFA$

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23. ABCD is a quadrilateral in which AB=AD . The bisector of BAC AND CAD intersect the sides BC and CD at the points E and F respectively. Prove that EF||BD.

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24. In ABC, D is the mid-point of $BCandED$ is the bisector of the $\angle ADBandEF$ is drawn parallel to BC cutting AC in F . Prove that $\angle EDF$ is a right angle.

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25. AD is a median of ΔABC . The bisector of $\angle ADB$ and $\angle ADC$ meet AB and AC in E and F

respectively. Prove that EF||BC

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26. In Figure, ABC is a right triangle right angled at B and points $DandE$ trisect BC. Prove that $8AE^2 = 3AC^2 + 5AD^2$.

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27. In a triangle ABC, the angles at $BandC$ are acute. If $BEandCF$ be drawn

perpendiculars on $ACandAB$ respectively, prove that $BC^2 = AB \cdot BF + AC \cdot CE$.

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28. Prove that in any triangle the sum of squares of any to sides is equal to twice the square of half the third side together with twice the square of themedian

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29. AD is an altitude of an equilateral triangle ABC. On AD as base, another equilateral triangle ADE is constructed. Prove that Area (triangle ADE): Area (triangle ABC)=3:4.

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30. A ladder $15m$ long reaches a window which is 9m above the ground on one side of a street. Keeping its foot at the same point, the ladder is turned to other side of the street to

reach a window 12m high. Find the width of the street.

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31. In Figure, D, E are points on sides AB and AC respectively of ABC, such that $ar(BCE) = ar(BCD)$. Show that $DEBC$.

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32. In the trapezium ABCD,AC and BD intersect at O and also AB=2CD If the area of $AOB = 84cm^2$, find the area of COD.

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33. ABC is an isosceles triangle right-angled at B. Similar triangles ACD and ABE are constructed on side AC and AB. Find the ratio between the areas of triangle ABE and triangle ACD.

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34. ABC is a right triangle right-angled at B. Let D and E be any points on AB and BC respectively. Prove that $AE^2 + CD^2 = AC^2 + DE^2$

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35. P and Q are the mid-points of the CA and CD respectively of a triangle ABC, right angled at C. Prove that: 4A Q 2 =4 A C 2 + B C 2

$4BP^2 = 4BC^2 + AC^2 \quad 4(AQ^2 + BP^2)$

$= 5AB^2$

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36. A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.

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37. Two triangle ABC and DBC lie on the same side of the base BC . From a point P on $BC, PQAB$ AND $PRBD$ ARE DRAWN. They meet AC in Q and DC in R respectively. Prove that $QRAD$.

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38. $ABCD$ is a quadrilateral; $P, Q, RandS$ are the points of trisection of side $AB, BC, CDandDA$ respectively and are

adjacent to $AandC$; prove that $PQRS$ is parallelogram.

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39. $ABCD$ is a parallelogram and APQ is a straight line meeting BC at $PandDC$ produced at Q. prove that the rectangle obtained by $BPandDQ$ is equal to the rectangle contained by $ABandBC$.

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40. ABCD is a quadrilateral in which P, Q, R and S are mid-points of the sides AB, BC, CD and DA. AC is a diagonal. Show that : (i) $SR\ ||\ AC$ and $SR = \frac{1}{2}AC$ (ii) $PQ\ =\ SR$ (iii) PQRS is a parallelogram

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41. Through the mid-point M of the side CD of a parallelogram $ABCD$, the line BM is drawn intersecting AC at $LandAD$ produced at E . Prove that $EL = 2BL$.

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42. D is the mid-point of side BC at a triangle ABC.AD is bisected at the point E and BE produced cuts AC at the point X. Prove that BE:Ex=3:1.

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43. A chord of a circle of radius 10cm subtends a right angle at the centre. The length of the

chord (in cm) is $5\sqrt{2}$ (b) $10\sqrt{2}$ (c) $\frac{5}{\sqrt{2}}$ (d) $10\sqrt{3}$

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