MATHS

BOOKS - UNITED BOOK HOUSE

MISCELLANEOUS EXERCISE

Exercise

1. Solve : $42x^2 - 41x - 20 = 0.$

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2. Solve: $(x-2)(x-4)=\frac{45}{22^2}$

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3. Solve:

$$\frac{x^2-ax}{b}+\frac{x^2-bx}{a}+\frac{x^2-3ax-3bx}{a+b}=0]$$

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4. When a group of soldiers are arranged in 4 ddep hollow squares the number of soldiers in the front row is 16 more than the number of soldiers in the

front row when they are arranged in a perfect square. Find the number of soldiers.

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5. The present age of father is the squre of present age of son. After some yearts when the age fo son is half the present age of fater, then age of father will be 8 times the present age of son. Find the present age of Father.

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6. If the roots of the equation

$a(b-c)x^2+b(c-a)x+c(a-b)=0$ are

equal,then a,b,c are in

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7. If the difference of the roots of the equation $x^2-px+q=0$ is 1, then show that $p^2+4q^2=(1+2q)^2$.

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8. If the roots of the equation $ax^2 + bx + c = 0$ are α and β then show that $\frac{1}{a\alpha + b} + \frac{1}{a\beta + b} = \frac{b}{ac}$.

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9. If (a+b+c)p=(b+c-a)q=(c+a-b)r=(a+b-c)s, then show that qrs= p(qr+rs+qs).

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10. If $a + \frac{1}{b} = 1, b + \frac{1}{c} = 1$, then show that abc+1 = 0

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11. If $\frac{x^2-yz}{a}=\frac{y^2-zx}{b}=\frac{z^2-xy}{c}$, show that (a+b+c)(x+y+z)=(ax+by+cz).

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12. If $ax^2+bxy+cy^2=0$, find x:y.

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13. 6 is the mean proportional between two numbers x ad y and 48 is the third proportional of x and y. Find

the numbers.

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14. If $\frac{x^3+3xy^2}{y^3+3x^2y}=\frac{63}{62}$ show that x:y = 3:2.

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15. If (a+c):(b+c) = $\left(\frac{a}{b}+2\right):\left(\frac{b}{a}+2\right)$ then show that (a-c):(b-c) = $a^2:b^2$.

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16. If $\frac{5a-3b}{a}=\frac{4a+b-2c}{a+4b-2c}=\frac{a+2b-3c}{4a-4c}$, then show that 6a=4b=3c.

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17. If $(x+y+z)(y+z-x)(z+x-y)(x+y-z) \propto x^2y^2$ then show that either $x^2+y^2=z^2$ or $x^2+y^2-z^2 \propto xy$.

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18. If $\frac{1}{x}-\frac{1}{y} \propto \frac{1}{y-x}$ then show that $\frac{x}{y}$ is constant.

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19. Simplify:

$$\frac{1}{\sqrt{11-2\sqrt{30}}}-\frac{3}{\sqrt{7}-2\sqrt{10}}-\frac{4}{\sqrt{8+4\sqrt{3}}}$$

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20. Find the square roots of-

$8+2\sqrt{2}-2\sqrt{5}-2\sqrt{10}$

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21. Find the square roots of-

$1 + x^2 + \sqrt{1 + x^2 + x^4}$

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22. If $2x = \sqrt{a} + \frac{1}{\sqrt{a}}$. Show that

$\frac{\sqrt{x^2 - 1}}{x - \sqrt{x^2 - 1}}(a - 1)$

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23. If

$$\left(x+\sqrt{x^2-bc}\right)\left(y+\sqrt{y^2-ca}\right)\left(z+\sqrt{z^2-ab}\right)$$

=

$$\left(x-\sqrt{x^2-bc}\right)\left(y-\sqrt{y^2-ca}\right)\left(z-\sqrt{z^2-ab}\right)$$

prove that the values of both sides are equal to $\pm$ abc.

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24. If $x=\frac{\sqrt{a^2+b^2}+\sqrt{a^2-b^2}}{\sqrt{a^2+b^2}-\sqrt{a^2-b^2}}$ show that $b^2x^2-2a^2x+b^2=0.$

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25. If x>y prove that

$$\sqrt{y+\sqrt{2xy-x^2}}+\sqrt{y-\sqrt{2xy-x^2}}=\sqrt{2x}.$$

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26. Solve for x, when

$$\sqrt{2x^2+9}+\sqrt{2x^2-9}=9+3\sqrt{7}$$

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27. Solve:

$$(a+x)^{2/3}+2(a-x)^{2/3}=3\left(a^2-x^2\right)^{1/3}$$

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28. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°.

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29. If $x \propto y+z, y \propto z+x$ and $z \propto x+y$, and the constant of variation are 1,m,n respectively, then prove that, $\frac{l}{l+1}+\frac{m}{m+1}+\frac{n}{n+1}=1$

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30. If x,y,z be variable quantities such that (x+y+z) is constant and $(z+x-2y)(x+y-2z) \propto yz$ then show that $[2(y+z)-x] \propto yz$.

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31. If $\frac{x}{y}\alpha x + y$ and $\frac{y}{x}\alpha x - y$, then show that $x^2 - y^2$= constant.

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32. The radii of two circles are 8 cm and 6 cm respectively. Find the diameter of the circle having

area equal to the sum of the areas of the two circles.

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33. If $ax + by \propto \sqrt{xy}$, then show that $(ax)^2 + (by)^2 \propto xy$,

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34. If $y \propto \frac{1}{x}$ then show that x+y will be minimum when x=y.

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35. If $a^2 + b^2 + c^2 = 16, x^2 + y^2 + z^2 = 25$ and $ax + by + cz = 20,$ then show that $(a + b + c) \propto (x + y + z)$

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36. At the starting of the year two friends Bhaskar and Indrajit starts a joint business with capital Rs. 20,000 and Rs, 25,000. After some months Bhaskar invests Rs. 10,000 more in the business. At the end of the year they make a profit of Rs. 3100 and Bhaskar gets Rs. 1600 as profit. After how many months of startind the business Bhasker invests the capital of Rs. 10,000?

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37. Samiran and Monojit start a business with a capital of Rs. 60,000 and Rs 75,000. After 4 months when kumarjit invests Rs. 40,500 in he business samiran and Monojit withdraws that money in the ratio of their capitals. If the total profit at the end of the year be 19,575, how much they will get?

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38. At the starting of the year two friends Bhaskar and Indrajit starts a joint business with capital Rs.

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39. The value of a machine depreciates at the rate of 10% every year.It was purchased 3 years ago . If its present value is Rs. 8748, then its purchase price was?

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40. The value of a plot of land increase by 3% every year. If the value of the plot is 45,00,000. Now, find the price after 2 years.

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41. By compound interest, the interest of a sum in the 2nd year is Rs. 880 and the interest in the 3rd year is Rs. 968. Find the rate of interest and the sum.

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42. If the compound interest of Rs.6400 in 18 months be Rs. 1008.80. Find the rate of interest, interest is added to the principal at the end of every six months.

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43. Rs, 16820 is divided among two brothers aged 27 years and 25 years. They invest their money at 5% compound interest in such a way that each of them will get equal amount of money at the age of 40 years. What are the share of each of them out of Rs. 16,820?

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44. The simple interest in 3 years and compound interest in 2 years on a certain sum of money at the same rate are Rs.1200 and Rs.832 respectively. The principal is

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45. In $\triangle ABC$, $anglaBAC = 90^\circ$, if CD is a median of $\triangle ABC$, then prove that $BC^2 = CD^2 + 3AD^2$.

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46. The side BC of a triangle ABC is bisected at D; O is any point in AD. BO and CO produced meet AC and AB in E and F 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 FE||BC.

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47. Two tangents AB and AC drawn from an external point A of a circle touch the circle at the point B and C. A tangent drawn to a point X lies on minor arc BC intersects AB and AC at the points D and E

respectively. Prove that peremeter of $\triangle ADE = 2AB.$

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48. Does the point (–2.5, 3.5) lie inside, outside or on the circle $x^2 + y^2 = 25$?

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49. O is a point inside the $\triangle PQR$ and frm O,OA,OB,OC are perpendicular one QR,RP and PQ. Prove that $PC^2 + QA^2 + RB^2 = PB^2 + RA^2 + QC^2.$

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50. ABCD is a cyclic quadrilaterla. Extended AB and DC intersect at P. Prove that PA.PB = PC.PD.

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51. A straight line L interesect the sides BC, CA and BA of $\triangle ABC$ at P,Q and R resp. Prove that $\frac{PR}{PQ} \cdot \frac{CQ}{AC} \cdot \frac{AB}{RB} = 1.$

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52. In a right angled traingle PQR ,$\angle P$ is right angle and PS is perpendicular to the hypetnuse QR. Prove that $\frac{1}{PS^2} - \frac{1}{PQ^2} = \frac{1}{PR^2}$

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53. The radii of the two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has a circumference equal to the sum of the circumferences of the two circles.

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54. Two parallel planes which are parallel to the base of a right circular, cone cut the height of the cone are equally. Show that the ratio of the volume of three parts of the cone is 1:17:19.

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55. Two make a right circular conical tent 22 metre broad canvas is required. It is height of the tent is 28 metre and the area of the base is 1386 sq. metre then how long convas is required to make the tant?

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56. In a right angled triangle the length of the sides containing the righ angle are 3 cm and 4 cm. If the triangle is rotated about its hypotenuse, then two cones will be formed on the opposite side of the same base. Find their total volume.

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57. The lower part of a tent is in the form of a right circular cylinder whose height is 3.25metre. The upper part of the tent is in the form of a right circular cone. The total height of the tent is 9.25

metre and diameter of the base is 5 metre. How much tripol is required to make the tent?

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58. In a cuboid, the volume, total surface area and the length of one of its diagonal are 144 cm, 192 sq.cm and 13 cu.cm resp. Find the length of its edges.

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59. In a Cuboid, the volume, length and the length of its one diagonal are 2160 c.c., 20cm and 25 cm resp. Find its breadth and height.

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60. A cylindrical vessel of radius 4 cm contains water. A solid sphere of radius 3 cm is lowered into the water, until it is completely immersed. Find the rise in the water level (in cm) in the vessel.

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61. By melting a solid iron sphere, 32 conical paper weights of equal volume is formed. If the height of Each paper weight is 4cm and the diameter of base is 1 cm, find the diameter of the sphere.

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62. The ratio of the volumes of a right circular cylinder and a sphere is 3:2. If the radius of the sphere is double the radius of the cylinder, then find the ratio of area of whole surface of the sphere and the cylinder

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63. If the half total surface area of the cuboid is equal to the square of the length of its diagonal, then prove that the cuboid is cube.

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64. If $5\cos\theta + 12\sin\theta = 13$ show that $\tan\theta = \frac{12}{5}$.

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65. Solve:

$4\sqrt{3}\cos^2\theta - 4\sin\theta + \sqrt{3} = 0[0^\circ \leq \theta \leq 90^\circ]$

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66. Solve:

$2\cos\theta + 2\sqrt{2} = 3\sec\theta$

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67. Solve:

$4\cos\theta + 3\sec\theta = 4\sqrt{3}$

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68. Show that $-1 \leq \cos\theta \leq 1$.

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69. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then show $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

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70. If $a \sin x = b \cos x = \dfrac{2c \tan x}{1 - \tan^2 x}$ then show that $(a^2 - b^2) = 4c^2(a^2 + b^2)$.

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71. If $\cos^2\theta - \sin^2\theta = \tan^2\alpha$, then show that $\cos^2\alpha - \sin^2\alpha = \tan^2\theta$.

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72. If $a\cos\theta + b\sin\theta = c$ then show that $a\sin\theta - b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

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73. If $\tan P\theta = P\tan\theta$, then show that $\frac{\sin^2 P\theta}{\sin^2\theta} = \frac{P^2}{1 + (P^2 - 1)\sin^2\theta}$.

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74. If $\left(a^2 - b^2\right)\sin\theta + 2ab\cos\theta = a^2 + b^2$ then find the value of $\tan\theta$.

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75. If $\sec\alpha = \sec\beta\sec\gamma + \tan\beta\tan\gamma$, then show that $\sec\beta = \sec\gamma\sec\alpha \pm \tan\gamma\tan\alpha$.

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76. if $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta - y\cos\theta = 0$ prove that $x^2 + y^2 = 1$

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77.

$(1+\sec 20^2+\cot 70^\circ)(1-\cos ec20^\circ+\tan 70^\circ)$

equals____

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78. If $(\sec\alpha-\tan\alpha)(\sec\beta-\tan\beta)(\sec\gamma-\tan\gamma)$ =

$(\sec\alpha+\tan\alpha)(\sec\beta+\tan\beta)(\sec\gamma+\tan\gamma)$ then

show that each side is equal to 1 or -1.

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79. Find the value of $\sin^2\left(\frac{\pi}{16}\right)+\sin^2\left(\frac{3\pi}{16}\right)+\sin^2\left(\frac{5\pi}{16}\right)+\sin^2\left(\frac{7\pi}{16}\right)$.

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80. It $\frac{\cos^4 A}{\cos^2 B}+\frac{\sin^4 A}{\sin^2 B}=1$ then show that $\frac{\cos^4 B}{\cos^2 A}+\frac{\sin^4 B}{\sin^2 A}=1$

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81. Show that the relation $\sec^2\theta = \frac{4xy}{(x+y)^2}$ is possible, only when x=y.

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82. Find the value and $\tan\left(\frac{\pi}{16}\right)\tan\left(\frac{3\pi}{16}\right)\tan\left(\frac{5\pi}{16}\right)\tan\left(\frac{7\pi}{16}\right)$.

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83. A spherical ballon of radius r while floating in the sky, makes an angle α in the eye of viewer. If the

angle of elevation of the centre of the ballon in the eye of the viewer be β, show that the altitude of the centre of the ballon from the ground is $r \cos ec \frac{\alpha}{2} \sin \beta$.

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84. If $7 \cos \theta + 5 \sin \theta = 5$, then find the value of $5 \cos \theta - 7 \sin \theta$.

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85. From the bottom of a 'tila' the angle of elevation of its unreachable top is 45°. After moving 100 metre

along the 'tila' the angle of elevation becomes 60°.

Find the height of the tila? $[\sqrt{3} = 1.732]$

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86. An incomplete frequency distribution table is given below:

No. of accidents	0	1	2	3	4	5	total frequency
Frequency no. of days	45	f_1	f_2	25	10	5	200

If the mean of the frequency distribution is 1.46 find the value of f_1 & f_2.

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87. The step frequency distribution table of the marks obtained by female students is given below. Calculate the mean marks.

Class limit (Marks)	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50
No. of female Students	5	9	17	29	45

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88. Find the mean of the marks from the frequency table.

Class interval	1-4	4-9	9-16	16-27
Frequency	6	12	26	20

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89. An incomplete frequency distribution table is given below:

Height (cm)	51-61	61-71	71-81	81-91	91-101	101-111	111-121
Frequency	3	8	27	f	17	11	9

If the mean of the frequency distribution is 85cm find the missing frequency 'f'.

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90. From the data given below, if the meadian is 32 find the value of f_1 and f_2 when total frequency is

100

Flass boundary	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	10	f_1	25	30	f_2	10

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91. Find the median of the following data.

Mid value	15	25	35	44	55	65	75	85	95
Frequency	6	8	10	2	4	7	9	4	6

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92. The frequency distribution of marks in Mathematics obtained by 50 students in an

examination is given below. Find mode.

Marks	46-50	41-45	36-40	31-35	26-30	21-25
Frequency	5	10	15	10	8	2

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93. From the following data given below, the mode is 24, find the value of 'f'.

Score	0-10	10-20	20-30	30-40	40-50
frequency	3	5	9	f	2

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94. From the data given below draw a more than ogive and find the median.

Measurement	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	8	12	21	30	22	7

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95. From the frequency distibution table given below draw a less than ogive.

Marks obtained	50-60	60-70	70-80	80-90	90-100
Frequency	4	8	12	6	10

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