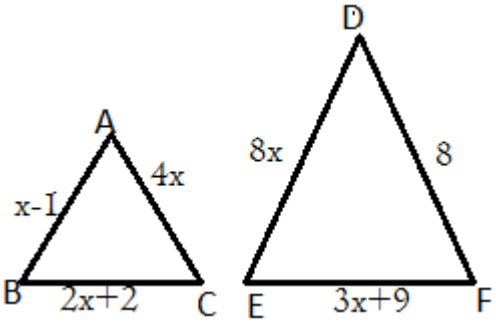
CLASS X
SAMPLE PAPER
MATHS

Section A

1. Solve for x : $\frac{1}{(x-1)(x-2)}+\frac{1}{(x-2)(x-3)}+\frac{1}{(x-3)(x-4)}=\frac{1}{6}$
2. Two sets of Maths & science books containing 1680 & 1056 books respectively in a library have to be stacked in such a way that all the books are stored subject wise & the height of each stack is the same. Assuming that the books are of the same thickness, determine the number of stacks.
3. If the point R(x, y) is equidistant from the points P(a+b, a-b) & Q(b-a, a+b) then prove that xa=yb.
4. Find the sum of all two digit numbers greater than 50 which which when divided by 7 leaves remainder 4.
5. (i)Solve for x & y : $7^{x}+5^{y}=74;\ 7^{x+1}-5^{y+1}=218.$
   (ii) Triangle ABC ~ DEF. Find the length of the sides of each triangle.



6. If p, q, r are in AP, then prove that (p+2q-r)(2q+r-p)(r+p-q)=4pqr

Section B

7. Find the HCF if 135 & 225. Also express the HCF in the form 135a+225b for some integers a &b.
8. AB || CD || EF. If AB=6cm, CD=xcm EF=10cm, BD=4cm & DE=y cm, Calculate the values of x & y.

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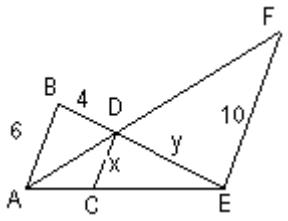


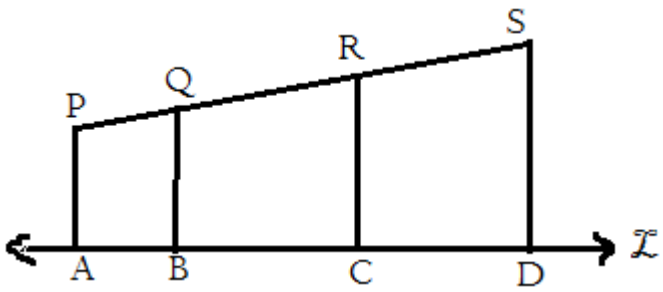
9. A man is employed to count ₹ 10,710. He counts @ ₹ 180 per min. for half an hour. After this he counts @ ₹ 3 less every min. than the preceding min. Find the time needed to count the entire amount.
10. If P & Q are two points whose coordinates are $(at^2, 2at)$ & $\left(\frac{a}{t^2}, -\frac{2a}{t}\right)$, respectively & S is the point (a,0)

    Show that $\frac{1}{SP} + \frac{1}{SQ}$ is independent of t.
11. Find the value of k for which a-3b is a factor of $a^4 - 7a^2b^2 + kb^4$. Hence, for this value of k factorise $a^4 - 7a^2b^2 + kb^4$ completely.
12. (a) A numbers x is choosen from the numbers -4, -3, -2, -1, 0, 1, 2, 3, 4. Find the probability that $|x| < 3$.

    (b) A child's game has 8 Δ's of which 3 are blue & rest are red, & 10 squares of which 6 are blue & rest are red. One piece is lost at random. Find the probability that it is a (i) triangle. (ii) square (iii) square of blue color (iv) triangle of red color.

Section C

13. A rectangular field is 150m x 60m. Two cyclists A & R start together & can cycle at speed of 21m/min. & 28 m/min, respectively. They cycle along the rectangular track, around the field from the same point & at the same movement. After how many minutes will they meet again at the starting point?
14. Prove that one & only one out of n, n+2 & n+4 is divisible by 3. Where n belongs to a +ve integer.
15. PA, QB, RC & SD are all perpendiculars to a line l. If AB= 6cm, BC= 9cm, CD=15cm & SP=40cm. Find PQ, QR, RS.



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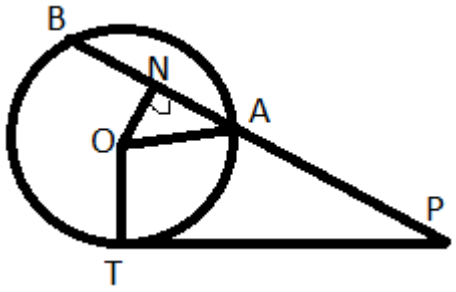
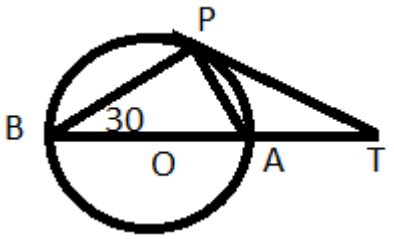
16. PT is a tangent & PAB is a secant to a circle with centre O. ON is perpendicular to the chord AB. Prove that (i) $PA.\ PB = PN^2 - AN^2$ (ii) $PN^2 - AN^2 = OP^2 - OT^2$.



(ii) O is the centre of the circle & TP is the tangent to the circle from an external point T. If $\angle PBT = 30^0$, prove that BA : AT = 2 : 1.



17. PQRS is a rectangle in which PQ= 20cm & QR=10cm. A semicircle is drawn with centre O & radius $10\sqrt{2}$ cm. It passes through A & B as shown in fig. Find the area of the shaded region. (π=3.14)
18. If a, b, c are the sides of a right triangle, where c is the hypotenuse, then prove that the radius r of the circle which touches the sides of the triangle is given by $r = \dfrac{a+b-c}{2}$
19. BL & CM are the medians of Δ ABC rt. Angled at A. Prove that $4\left(BL^2 + CM^2\right) = 5BC^2$.
20. A cone is divided into 3 parts by planes drawn parallel to base through the points of trisection of axis of cone. Prove that CSA of all 3 parts are in the ratio 1:3:5.
21. If $a\cos^3\theta + 3a\sin^2\theta\cos\theta = m$ & $a\sin^3\theta + 3a\sin\theta\cos^2\theta = n$, Prove that $(m+n)^{2/3} + (m-n)^{2/3} = 2a^{2/3}$.

Section D

22. Solve for x, $9\left(x^2 + \dfrac{1}{x^2}\right) - 9\left(x + \dfrac{1}{x}\right) - 52 = 0$

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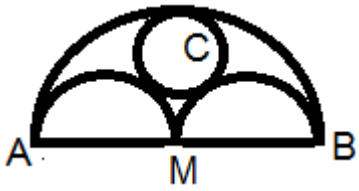
23. If the roots of the equation $(b-c)x^2+(c-a)x+(a-b)=0$ are equal show that a, b, c are in AP.
24. AB=36cm & M is the mid-point of AB. Three semi-circles are drawn on AB, AM & MB as diameters. A circle with centre C touches all the three circles. Find the area of the shaded region.



25. AD is the median of Δ ABC & AE $\perp$ BC If BC=a, CA=b, AB=c, AD=p, AE=h & DE=x Prove that (i) $b^2=p^2+ax+\frac{a^2}{4}$ (ii) $c^2=p^2-ax+\frac{a^2}{4}$ (iii) $b^2+c^2=2p^2+\frac{1}{2}a^2$.
26. The interior angles of a polygon are in AP. The smallest angle is 120^0. & the common difference is 5^0. Find the number of sides of polygon

OR

A *spherical balloon of radius r subtends an angle θ at the eye of the observer. If the angle of elevation of its centre is Φ, find the height of the centre of the balloon*

27. The height of cone is 30cm A small cone is cut off at the top by the plane parallel to the base if its volume is 1/27 of the volume of given cone. At what height above the base the section is cut.
28. A sphere of diameter 12 cm is dropped in a right circular cylindrical vessel partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $3\frac{5}{9}cm$. Find the diameter of the cylindrical vessel.

OR

29. If the angle of elevation of the tower from two points at distance a & b (a>b) from its foot & in the same straight line with it are 30^0 & 60^0, Find the height of the tower.
30. (a) If a variable takes discrete values $x+4, x-\frac{7}{2}, x-\frac{5}{2}, x-3, x-2, x+\frac{1}{2}, x-\frac{1}{2}, x+5$ then median is

(b) The median of the data is 525. Find f_1 & f_2 if the sum of frequencies is 100.

Class	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	f_1	12	17	20	f_2	9	7	4

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