MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

SAMPLE PAPER I

Section A

1. What is the distance between the points $A(\sin\theta - \cos\theta,\ 0)$ and $B(0, \sin\theta + \cos\theta)$?

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2. The angle of depression of a car standing on the ground from the top of a 66 m tower, is 30°. Find the distance of the car from the base of the tower.

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3. A rational number in its decimal expansion is 554.6023. What can you say about the prime factors of q, when this number is expressed in the form $\frac{p}{q}$?

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4. If $\sin\theta = \frac{1}{3}$ then find the value of $2\cot^2\theta + 2$.

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5. In a family of 3 children, the probability of having at least one boy is $\frac{7}{8}$ (b) $\frac{1}{8}$ (c) $\frac{5}{8}$ (d) $\frac{3}{4}$

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6. If α and β are the zeros of the quadratic polynomial $f(x) = 5x^2 - 7x + 1$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.

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7. Evaluate: $\sin 35^\circ \cdot \sin 55^\circ - \cos 35^\circ \cdot \cos 55^\circ$.

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8. The decimal expansion of the rational number $\frac{83}{2^3 \times 5^4}$ will terminate after how many places of decimals?

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9. If the point P(x, y) is equidistant from A(5, 1) and B(-1, 5) then find the relation between x and y.

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10. If $\alpha and \beta$ ar the zeros of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1,$ find the value of k.

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11. The tops of two towers of height x and y , standing on level ground, subtend angles of $30o$ and $60o$ respectively at the centre of the line joining their feet, then find $x : y$.

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12. A die is rolled twice. Find the probability that 4 will come up exactly one time.

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Section B

1. The length of the minute hand of a clock is 5cm. Find the area swept by the miute hand during the time period $6:05$ am and $6:40$ am.

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2. Prove that three times the square of any side of an equilateral-triangle is equal to four times the square of the altitude.

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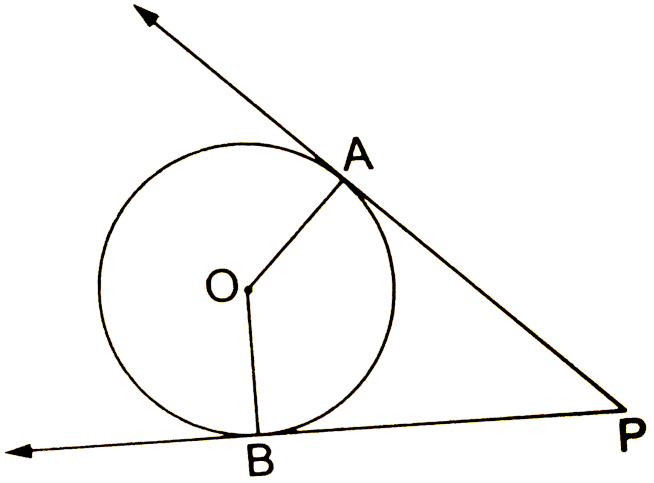
3. In the given figure, O is the centre of the circle. PA and PB are tangent segments. Show that the quadrilateral AOBP is cyclic.



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4. Find the lengths of the medians of a ABC whose vertices are $A(7, -3)$, $B(5, 3)$ and $C(3, -1)$.

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5. If p, q are prime positive integers, prove that $\sqrt{p}+\sqrt{q}$ is an irrational number.

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6. Determine the value of k so that the following linear equations have no solution:

$(3k+1)x+3y-2=0$, $(k^2+1)x+(k-2)y-5=0$

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7. For which values of a and b will the following pair of linear equations has infinitely many solutions ?

$x + 2y = 1$

$(a - b)x + (a + b)y = a + b = -2$

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8. Use Euclid division algorithm to find the HCF of $441, 567$ and $693.$

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9. Find k so that the point $P(-4, 6)$ lies on the line segment joining $A(k, 10)$ and $B(3, -8)$. Also, find the ratio in which P divides AB

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10. Prove that the segment joining the point of contact of two parallel tangents passes through the centre.

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11. The perimeter of a right angled triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle.

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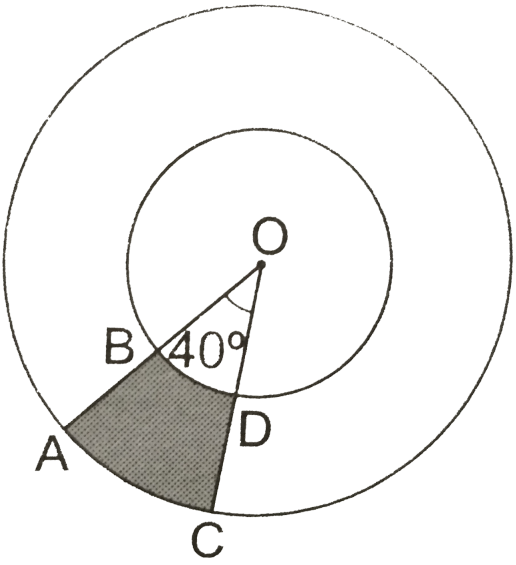
12. Find the area of the shaded region in the figure given below where radii of the two concentric circles with centre O are 7 cm

and 14 cm respectively and $\angle AOC = 40^\circ$.



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Section C

1. Show that the square of any positive integer cannot of the form $5q + 2$ or $5q + 3$ for some integer q.

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2.

$$\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+\tan A+\cot A=1+\sec A\cos ecA$$

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3. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of $30o$, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depres

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4. If the points $A(1,\ -2),\ B(2,\ 3),\ C(-3,\ 2)$ and $D(-4,\ -3)$ are the vertices of parallelogram $ABCD$, then

taking AB as the base, find the height of the parallelogram.

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5. A plane left 30 minutes late than its scheduled time and in order to reach the destination1500 km away in time, it had to increase the speed by 250 km/h from the usual speed.Find its usual speed.

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6. Obtain all the zeros of the polynomial $f(x) = 3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeros are $\sqrt{and} - \sqrt{\frac{5}{3}}$

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7. Find the mean, median and mode of the following data:

Classes	0–20	20–40	40–60	60–80	80–100	100–120	120–140
Frequency	6	8	10	12	6	5	3

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8. Two customers are visiting a particular shop in the same week (Monday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on (i) the same day (ii) different days (iii) consecutive day ?

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9. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.

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10. Solve the following system of equations in x and y

$(a-b)x+(a+b)y=a^2-2ab-b^2,$

$(a+b)(x+y)=a^2+b^2$

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11. Three unbiased coins are tossed simultaneously. Find the probability of getting

(i) exactly two heads, (ii) at least two heads, (iii) at most 2 heads.

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12. Prove that the angle between two tangents drawn from an external point to a circle is supplementary to the angle

subtended by the line segments joining the points of contact at the centre.

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13. Solve the following system of equations: $ax + by = c, x + ay = 1 + c$

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14. Use Euclids division Lemma to show that the cube of any positive integer is either of the form $9m$, $9m + 1$ or, $9m + 8$ for some integer m .

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15. If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, then prove that $\tan\theta = 1$ or $\tan\theta = \frac{1}{2}$

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16. From the top of a building 100 m high, the angles of depression of the top and bottom ofa tower are observed to be 45° and 60° respectively. Find the height of the tower. Also find the distance between the foot of the building and bottom of the tower.

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17. Find the area of a parallelogram $ABCD$ if three of its vertices are $A(2,\ 4)$, $B\left(2+\sqrt{3},\ 5\right)$ and $C(2,\ 6)$.

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18. A train, travelling at a uniform speed for 360 km, would have taken 48 minutes less to travel the same distance if its speed were 5 km/h more. Find the original speed of the train.

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19. If two zeros of the polynomial $f(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$, find other zeros.

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20. The following table shows the marks obtained by 100 students of a class in a school during a particular academic

session. Find the modal marks.

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70	Less than 80
Number of students	7	21	34	46	66	77	92	100

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Section D

1. An open metal bucket is in the shape of a frustum of a cone, mounted on a hollow cylindrical base made of the same metallic sheet. The diameters of the two circular ends of the bucket are 45 cm and 25 cm, the total vertical height of the bucket i

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2. It takes 12 hours to fill a swimming pool using two pipes . If the pipes of larger diameter is used for 4 hours and the pipe of smaller diameter is used for 9 hours , only half of the pool is filled. How long would it take for each pipe to fill the pool separately?

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3. If the angle of elevation of a cloud from a point h metres above lake is α and the angle of depression of its reflection in the lake be β, prove that the distance of the cloud from the point of observation is $\frac{2h\sec\alpha}{\tan\beta-\tan\alpha}$

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4. The following table gives production yield per hectare of wheat of 100 farms of a village. Change the distribution to a more than type distribution, and draw its ogive.

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5. Sides of a triangular fiald are 15 m, 16m and 17m. With the three cormers of the field a cow, a buffalo and a horse are tied separately with ropes of length 7m each to graze in the field. Find the area of the field which cannot be grazed by the three animals.

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6. The radius of the incircle of a triangle is 4 cm and the segments into which one side is divided by the point of contact

are 6 cm and 8 cm. Determine the other two sides of the triangle.

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7. 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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8. In the centre of a rectangular lawn of dimensioms $50m \times 40m$ a rectangular pond has to be constructed so that the area of the grass surroundng the pond would be $1184m^2$ Find the length and breadth of the pond

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9. There is a square field whose side is 44 m. A square flower bed is prepared in its centre leaving a gravel path all round the flower bed. The total cost of laying the flower bed and gravelling the path at Rs 2.75 and Rs 1.50 per square metre, respectively, is Rs 4904. Find the width of the gravel path.

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10. The ratio of the the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides/altitudes.

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11. In the given figure, from an external point P, a tangent PT and a line segment PAB is drawn to a circle with centre O. ON is

perpendicular on the chord AB. Prove that (i) $PA.PB = PN^2 - AN^2$ (ii) $PN^2 - AN^2 = OP^2 - OT^2$

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12. Combination of quadrilateral and circle : In Figure; ABCD is a trapezium with AB||DC ; AB = 18cm; DC = 32cm and the distance between AB and DC is 14 cm. Circles of Equal radii 7 cm with centres A;B;C and D have been drawn. Then; find the area of the shaded region of the figure.

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13. The table given below shows the frequency distribution of the scores obtained by 200 candidates in an entrance examination:

Scores	200–250	250–300	300–350	350–400	400–450	450–500	500–550	550–600
No. of candidates	30	15	45	20	25	40	10	15

Draw cumulative frequency curve using 'less than series'.

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14. A window of a house is h metres above the ground. From the window, the angles of elevation and depression of the top and bottom of another house situated on the opposite side of the lane are found to be α and β respectively. Prove that the height of the house is $h(1+\tan\alpha\cdot\tan\beta)$ metres.

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15. 8 men and 12 boys can finish a work in 10 days while 6 men and 8 boys can finish it in 14 days. Find the time taken by one

man alone and that by one boy alone to finish the work.

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16. From a solid cylinder whose height is 15 cm and diameter 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid. $[Use \pi = 3.14.]$

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