



MATHS

BOOKS - SELINA MATHS (ENGLISH)

MATHEMATICS-2019

Section A

1. Solve the following inequation and write down the solution set:

$$11x - 4 < 15x + 4 \leq 13x + 14, x \in W.$$



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2. A man invests Rs. 4,500 in shares of a company which is paying 7.5% dividend. If Rs. 100 shares are available at a discount of 10%

Find :

(i) number of shares he purchases. (ii) his annual income.



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3. In a class of 40 students, marks obtained by the students in a class test (out of 10) are given below :

Marks	1	2	3	4	5	6	7	8	9	10
Number of Students	1	2	3	3	6	10	5	4	3	3

Calculate the following for the given distribution :

(i) Median

(ii) Mode



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4. Using the factor theorem, show that $(x - 2)$ is a factor of $x^3 + x^2 - 4x - 4$.

Hence factorise the polynomial completely.



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5. Prove that :

$$(\operatorname{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$$



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6. In an Arithmetic Progression (A.P.) the fourth and sixth terms are 8 and 14 respectively. Find the :

(i) first term

(ii) common difference

(iii) sum of the first 20 terms



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7. Simplify :

$$\sin A \begin{vmatrix} \sin A & -\cos A \\ \cos A & \sin A \end{vmatrix} + \cos A \begin{vmatrix} \cos A & \sin A \\ -\sin A & \cos A \end{vmatrix}$$



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8. M and N are two points on the X-axis and Y-axis respectively. $P(3, 2)$ divides the line segment MN in the ratio 2:3.

Find :

(i) the coordinates of M and N



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9. M and N are two points on the X-axis and Y-axis respectively. $P(3, 2)$ divides the line

segment MN in the ratio 2: 3.

Find :

slope of the line MN.



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10. A solid metallic sphere of radius 6 cm is melted and made into a solid cylinder of height 32 cm. Find the :

(i) radius of the cylinder

(ii) curved surface area of the cylinder

(Take $\pi = 3.1$)



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11. The following numbers, $K + 3$, $K + 2$, $3K - 7$ and $2K - 3$ are in proportion. Find K .



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12. Solve for x the quadratic equation $x^2 - 4x - 8 = 0$. Give your answer correct to three significant figures.



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13. Draw a circle of radius 4 cm. From the point 7 cm away from its centre, construct the pair of tangents to the circle.



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Section B

1. There are 25 disc numbered 1 to 25. They are put in a closed box and shaken thoroughly. A disc is drawn at random from the box.

Find the probability that the number on the disc is :

(i) an odd number

(ii) divisible by 2 and 3 both

(iii) a number less than 16.



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2. Rekha opened a recurring deposit account for 20 months. The rate of interest is 9% per annum and Rekha receives Rs 441 as interest

at the time of maturity.

Find the amount Rekha deposited each month.



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3. Use a graph sheet for this question. Take 1 cm = 1 unit along both x and y axes.

(i) Plot the points : A (0, 5), B(3, 0), C(1, 0) and D(1, -5).

(ii) Reflect the point B, C and D on the y-axis and name them as B', C' and D' respectively.

(iii) Write down the co-ordinates of B', C' and

D'.

(iv) Join the points A, B, C, D, D', C', B', A in order and give a name to the closed figure ABCDD'C'B'.



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4. Use graph paper for this question.

(Take 2 cm = 1 unit along both x-axis and y-axis.)

Plot the points $O(0, 0)$, $A(-4, 4)$, $B(-3, 0)$ and $C(0, -3)$.



5. Use a graph sheet for this question. Take 1 cm = 1 unit along both x and y axes.

(i) Plot the points : A (0, 5), B(3, 0), C(1, 0) and D(1, -5).

(ii) Reflect the point B, C and D on the y-axis and name them as B', C' and D' respectively.

(iii) Write down the co-ordinates of B', C' and D'.

(iv) Join the points A, B, C, D, D', C', B', A in order

and give a name to the closed figure
ABCDD'C'B'.



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(i) Plot the points : A (0, 5), B(3, 0), C(1, 0) and
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(ii) Reflect the point B, C and D on the y-axis
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(iii) Write down the co-ordinates of B', C' and

D'.

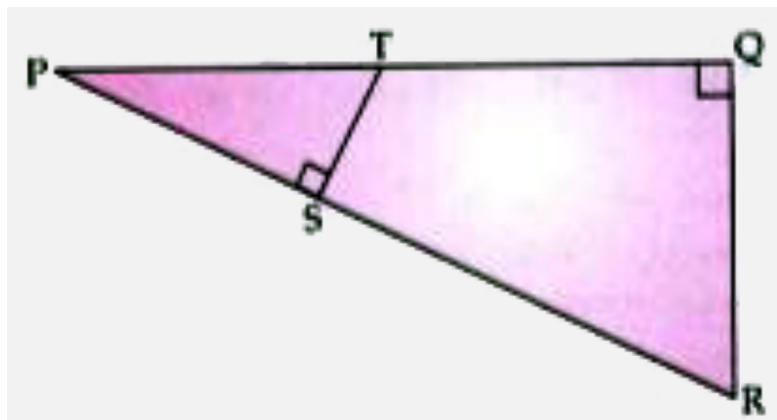
(iv) Join the points A, B, C, D, D', C', B', A in order and give a name to the closed figure ABCDD'C'B'.



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7. In the given figure, $\angle PQR = \angle PST = 90^\circ$,
PQ = 5cm and PS = 2 cm.

(i) Prove that $\Delta PQR \sim \Delta PST$.

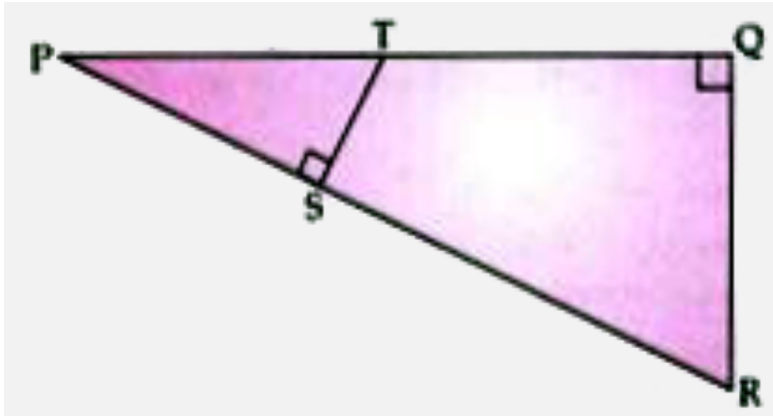


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8. In the given figure, $\angle PQR = \angle PST = 90^\circ$

, $PQ = 5\text{cm}$ and $PS = 2\text{ cm}$.

Prove that $\triangle PQR \sim \triangle PST$



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9. The first and last term of a geometrical Progression (G.P.) are 3 and 96 respectively. If the common ratio is 2, find :

(i) 'n' the number of terms of the G.P.

(ii) Sum of the n terms.



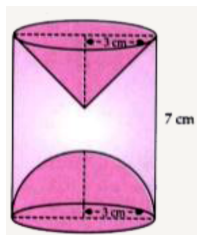
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10. A hemispherical and a conical hole is scooped out of a solid wooden cylinder. Find the volume of the remaining solid where the measurements are as follows :

The height of the solid cylinder is 7 cm, radius of each of hemisphere, cone and cylinder is 3 cm. height of cone is 3 cm.

Give your answer correct to the nearest whole number.

(Take $\pi = \frac{22}{7}$)

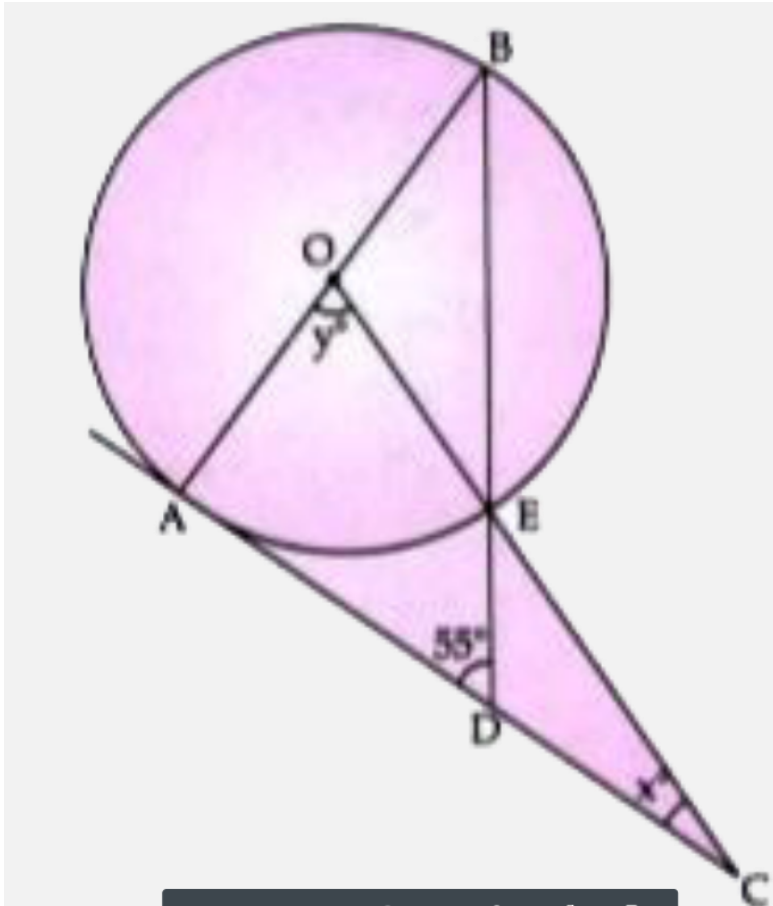


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11. In the given figure AC is a tangent to the circle with centre O.

If $\angle ADB = 55^\circ$, find x and y. Give reason for

your answer.



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12. The model of a building is constructed with the scale factor 1 : 30.

(i) If the height of the model is 80 cm, find the actual height of the building in metres.



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13. The model of a building is constructed with the scale factor 1 : 30.

If the actual volume of a tank at the top of the

building is $27m^3$, find the volume of the tank on the top of the model.



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14. Given $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix} M = 6I$, where M is a matrix and I is the unit matrix or order 2×2 .

(i) State the order of matrix M .



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15. Given $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix} M = 6 I$, where M is a matrix

and I is the unit matrix or order 2×2 .

(ii) Find the matrix M .



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16. The sum of the first three terms of an Arithmetic Progression (A.P.) is 42 and the product of the first and third term is 52. Find the first term and the common difference.



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17. The vertices of a $\triangle ABC$ are A (3, 8), B (-1, 2) and C (6, -6). Find :

(i) Slope of BC.



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18. The vertices of a $\triangle ABC$ are A(3, 8), B(-1, 2) and C(6, 6). Find :

(i) Slope of BC.

(ii) Equation of a line perpendicular to BC and passing through A.



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19. Show that the SHM is projection of uniform circular motion on the diameter of a circle.



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20. The data on the number of patient attending a hospital in a month are given below. Find the average (mean) number of patients attending the hospital in a month by

using the shortcut method.

Take the assumed mean as 45. Give your answer correct to 2 decimal places.

<i>Number of patients</i>	10-20	20-30	30-40	40-50	50-60	60-70
<i>Number of Days</i>	5	2	7	9	2	5



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21. Using properties of proportion solve for x,

given

$$\frac{\sqrt{5x} + \sqrt{2x - 6}}{\sqrt{5x} - \sqrt{2x - 6}} = 4.$$



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22. Sachin invests Rs. 8,500 in 10%, Rs. 100 shares at Rs. 170. He sells the shares when the price of each share rises by Rs. 30. He invests the proceeds in 12% Rs. 100 shares at 125. Find :

(i) the scale proceeds.

(ii) the number of Rs. 125 shares he buys.

(iii) the change in his annual income.



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23. Sachin invests Rs. 8,500 in 10%, Rs. 100 shares at Rs. 170. He sells the shares when the price of each share rises by Rs. 30. He invests the proceeds in 12% Rs. 100 shares at 125. Find :

(i) the sale proceeds.

(ii) the number of Rs. 125 shares he buys.

(iii) the change in his annual income.



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24. Sachin invests Rs. 8,500 in 10%, Rs. 100 shares at Rs. 170. He sells the shares when the price of each share rises by Rs. 30. He invests the proceeds in 12% Rs. 100 shares at 125. Find :

(i) the sale proceeds.

(ii) the number of Rs. 125 shares he buys.

(iii) the change in his annual income.



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25. Use graph paper for this question.

The marks obtained by 120 students in an English test are given below :

Marks	Number of students
0 - 10	5
10 - 20	9
20 - 30	16
30 - 40	22
40 - 50	26
50 - 60	18
60 - 70	11
70 - 80	6

80 - 90	4
90 - 100	3

Draw the ogive and hence, estimate :
the median marks.

26. Use graph paper for this question.

The marks obtained by 120 students in an English test are given below :

Marks	Number of students
0 - 10	5
10 - 20	9
20 - 30	16
30 - 40	22
40 - 50	26
50 - 60	18
60 - 70	11
70 - 80	6

80 - 90	4
90 - 100	3

Draw the ogive and hence, estimate :

the number of students who did not pass test
if the pass percentage was 50.



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27. Use graph paper for this question.

The marks obtained by 120 students in an
English test are given below :

Marks	Number of students
0 – 10	5
10 – 20	9
20 – 30	16
30 – 40	22
40 – 50	26
50 – 60	18
60 – 70	11
70 – 80	6

80 – 90	4
90 – 100	3

Draw the ogive and hence, estimate :
the upper quartile marks.



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28. A man observes the angle of elevation of the top of the tower to be 45° . He walks towards it in a horizontal line through its base. On covering 20 m the angle of elevation change to 60° . Find the height of the tower correct to 2 significant figures.



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29. Using the Remainder Theorem find the
remainders obtained when

$x^3 + (kx + 8)x + k$ is divided by $x - 1$ and $x - 2$.

Hence find k if the sum of the remainders is 1.



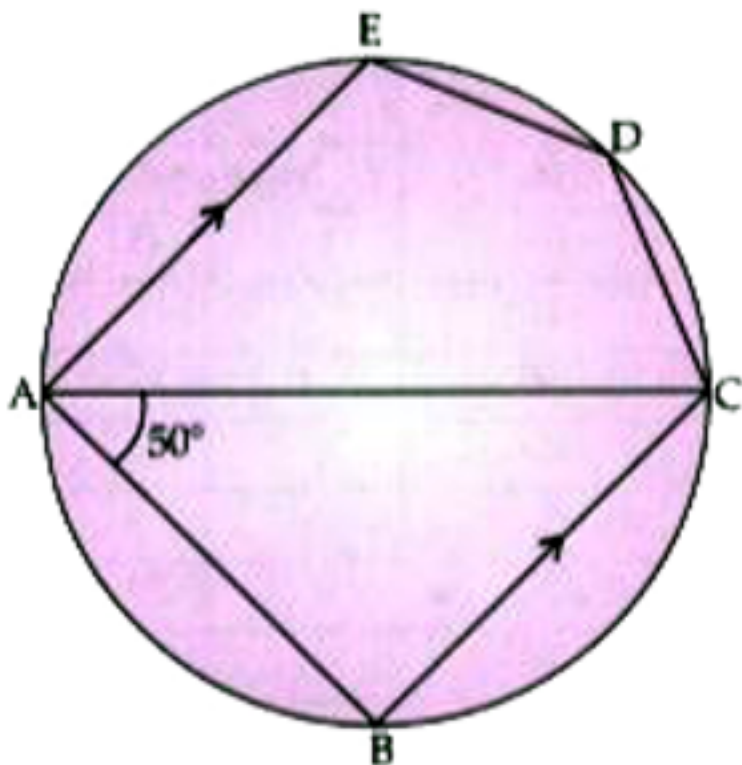
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30. The product of two consecutive natural numbers which are multiples of 3 is equal to 810. Find the two numbers.



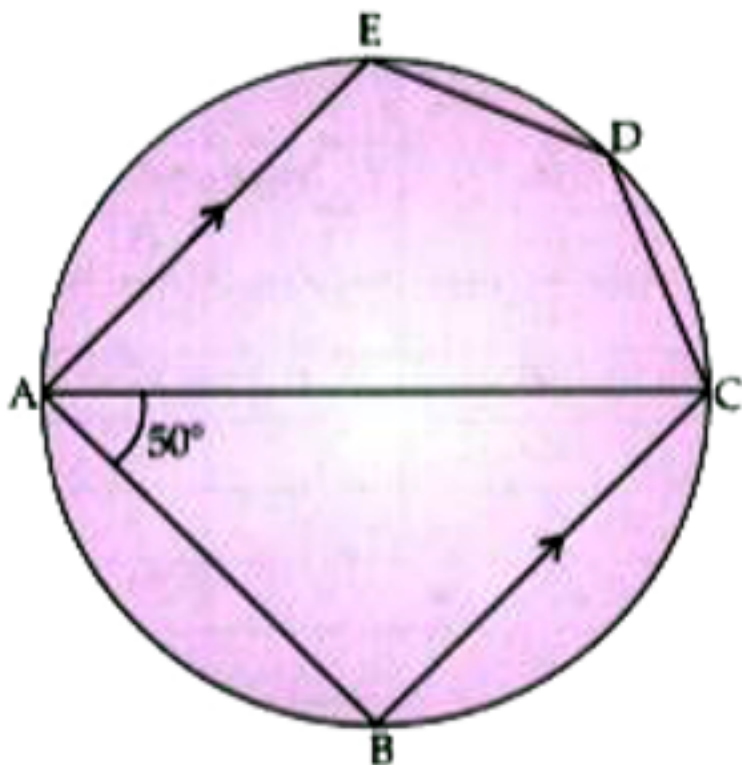
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31. In the given figure, ABCDE is a pentagon inscribed in a circle such that AC is a diameter and side $BC \parallel AE$. If $\angle BAC = 50^\circ$, Find angle BCA



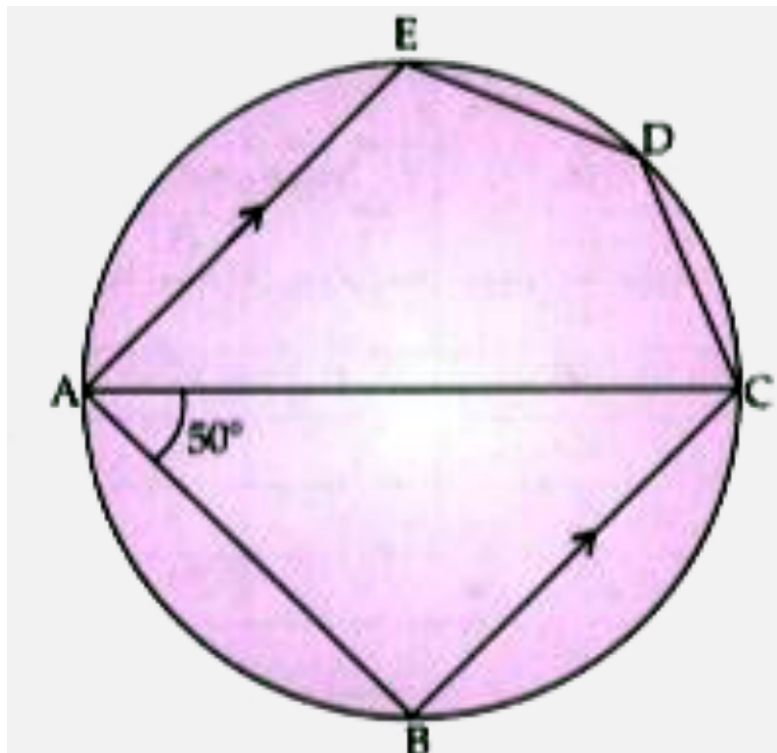
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33. In the given figure, ABCDE is a pentagon inscribed in a circle such that AC is a diameter and side $BC \parallel AE$. If $\angle BAC = 50^\circ$, find $\angle BCE$,



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