



MATHS

BOOKS - AGRAWAL PUBLICATION

Sample paper 11

Exercise

1. Without performing actual division, check if $\frac{17}{30}$ is a terminating decimal.



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2. Find the value of x so that the distance between the points $(-3,4)$ and $(x,-4)$ is 10 units.



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3. The vertices of an equilateral triangle ABC are $(0,0)$, $(0,y)$ and $(3, \sqrt{3})$, then find the value of y .



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4. Define the mode of a frequency distribution and give the formula used in computing the mode of a grouped frequency distribution.



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5. A right triangle has hypotenuse of length p cm and one side of length q cm . If $p - q = 1$, find the length of the third side of the triangle.

A.

B.

C.

D.

Answer:



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6. If a hexagon ABCDEF circumscribes a circle then show that $AB+CD+EF = BC+DE+FA$,



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7. Three identical cubes each of volume 27 cu cm are joined together end to end. What are the dimensions of the resulting cuboid?



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8. If a chord of a circle of radius 'r' subtends a right angle at the centre of the circle, then determine the area of the corresponding segment?



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9. What is the volume of the material in a spherical shell with inner radius 'r' and outer radius 'R'?



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10. If $\tan \theta = 1$, then calculate the value of $\sec \theta + \operatorname{cosec} \theta$.



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11. If $3\tan^2 x = 1$



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12. What is the positive real root of $64x^2 - 1 = 0$?



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13. The base radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5:3.

The ratio of their volumes is :



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14. If α and β be the zeros of the quadratic polynomial $2x^2 + 5x + 1$ then calculate the value of $\alpha + \beta + \alpha\beta$?



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15. What is middle value of a class interval which lies between true upper limit and true lower limit called?



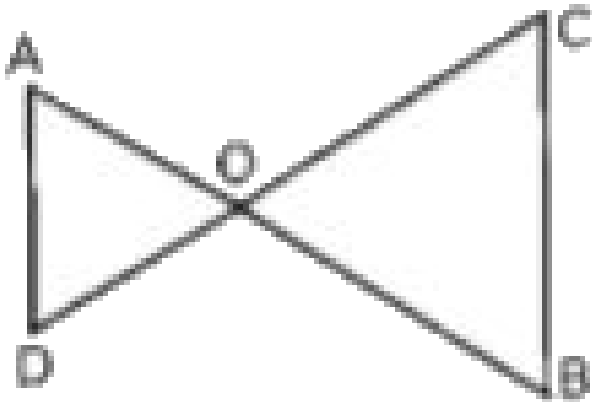
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16. An integer is chosen at random between 1 and 100 . Find the probability that chosen number is divisible by 10.



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17. In the figure. If $\frac{OA}{OD} = \frac{OC}{OB}$, then



which pair of angle are equal?

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18. Check if 0.2 is a root of the equatin

$$x^2 - 0.4 = 0.$$





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19. If 6 times the 6^{th} term of the A.P is equal to 9 times the 9^{th} term, then find its 15^{th} term.



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20. Find the solution of the following pair of equation: $x-3y = 2$, $3x-y = 14$













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21. The chord of a circle of radius 8 cm subtends a right angle at its centre. Find the length of the chord.



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22. Formula one Portugese Grand Prix technical team at the Algarve International Circuit are analysing last year data of drives's performance to provide valuable inference to commentators on how the drives can improve this year.

| | Support staff | Lap errors | | Support staff | Lap errors |
|---------------------------------------------------------------------------------------------------|---------------|------------|----------------------------------------------------------------------------------------------|---------------|------------|
|  Ferrari | 36 | 41 (13%) |  Force India | 36 | 36 (11%) |
|  Mercedes | 36 | 61 (19%) |  Toro Rosso | 36 | 23 (7%) |
|  Red Bull Racing | 36 | 52 (16%) |  Renault | 36 | 16 (5%) |
|  McLaren | 36 | 31 (9%) |  Sauber | 36 | 13 (4%) |
|  Williams | 36 | 33 (10%) |  Haas | | 19 (6%) |

The length of time taken by 80 drivers to complete a journey is given in the table below:

| Times (in minutes) | 70-80 | 80-90 | 90-100 | 100-110 | 110-120 | 120-130 |
|--------------------|-------|-------|--------|---------|---------|---------|
| Number of drivers | 4 | 10 | 14 | 20 | 24 | 8 |

In which interval does the median of the distribution lie?

A. 80-90

B. 90-100

C. 100-110

D. 110-120

Answer:



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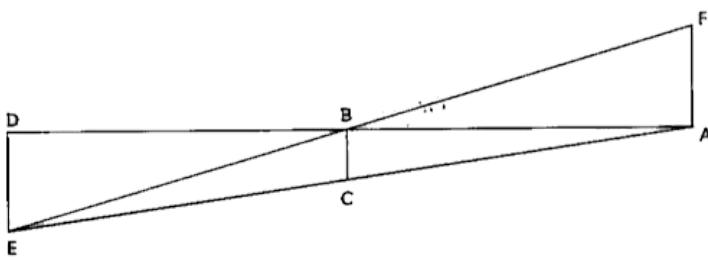
23. Google maps cartography team is working on improving the scalability quality of maps when you use the app on your phones to zoom in using 4 fingers. They are using a proprietary tool called "MapMaker" to figure out scalability factors. A mathematical model

is created for a type of object (below cross-section) to test its scalability on maps app.



In the diagram, $AC = 8cm$, $CE = 4cm$ and the area of the triangle BEC is 4.2 sq cm .

Another enlargement with centre E , maps $\triangle EBC$ onto $\triangle EFA$, $BC = 3.6cm$



The area of $\triangle ABC$ is:

- A. 4.2 sq cm
- B. 6.3 sq cm
- C. 8.4 sq cm
- D. 12.6 sq cm

Answer:

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24. Find the HCF and the LCM of 72 and 120, using prime factorisation method.



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25. Write a pair of equations in variables x and y which is consistent with

(A) unique solution

(B) infinitely many solution



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26. Write a pair of equations in variables x and y which is consistent with

(A) unique solution

(B) infinitely many solution



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27. In an AP, if $a = 1$, $a_n = 20$ and $S_n = 399$, then n is equal to



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28. The vertices of an equilateral triangle ABC are $(0, 0)$, $(0, y)$ and $(3, \sqrt{3})$, then find the value of y



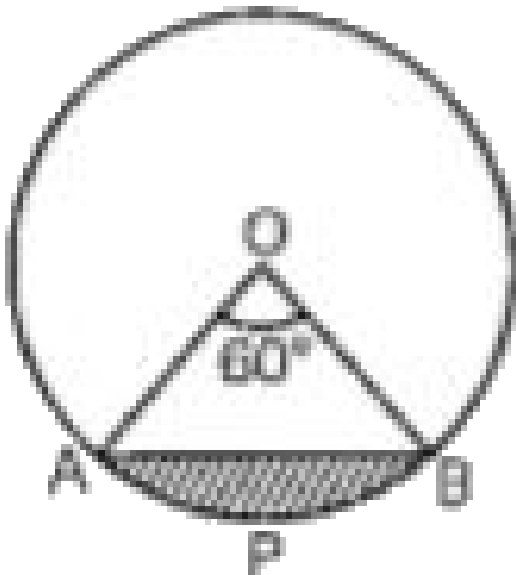
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29. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, then prove that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$



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30. In the figure, chord AB subtends an angle of 60° at the centre of the circle of radius 3.5 cm. Find the (a) length of the arc APB (b) the area of the sector AOB (C) area of the minor segment (Shaded region) (use $\sqrt{3} = 1.73$)



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31. If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then prove that $q(p^2 - 1) = 2p$.



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32.7. Let $A(4, 2)$, $B(6, 5)$ and $C(1, 4)$ be the vertices of $\triangle ABC$. (1) The median from A meets BC at D . Find the coordinates of the point D . (2) the coordinates of the point P on AD such that $AP:PD = 2:1$. (3) Find the coordinates of points Q and R on medians BE

and CF respectively such that $BQ:QE = 2:1$

and $CR:RF = 2:1$.(4) what do yo observe?



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33. One card is drawn from a pack of 52 cards , each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is black .



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34. One card is drawn from a pack of 52 cards , each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is either black or a queen .



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35. One card is drawn from a pack of 52 cards , each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is black and a queen .





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36. In figure ABC and DBC are two triangles on the same base BC . If AD intersects BC at O ,

show that
$$\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}.$$



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



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38. Verify that 2,1,1 are the zeros of the polynomial $x^3 - 4x^2 + 5x - 2$. Also, verify the relationship between the zeroes and the coefficients



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39. If $x = 2^2 \times 3^3 \times 7^2$, $y = 2^3 \times 3^2 \times 5 \times 7$, then find HCF (x,y)



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40. What is the HCF of the smallest prime number and the smallest composite number?



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41. IF α, β are the zeroes of the polynomial $5x^2 - 7x + 2$ then the sum of their reciprocal is:



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42. If the lines represented by $3x + 2py = 2$ and $2x + 5y + 1 = 0$ are parallel, then find the value of p .



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43. Find the 10^{th} term from the end of the A.P .
 $4, 9, 14, \dots, 254$.



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44. Solve for x and y $y, x + y = 3$ and $7x + 6y = 2$.



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45. Find a quadratic polynomial whose zeroes are -3 and 5 .



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46. For what values of 'a' does the quadratic equation $x^2 - ax + 1 = 0$ not have real roots?



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47. If p and q are the roots of the quadratic equation $x^2 + px - q = 0$, then find the values of p and q.



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48. Which term of the AP 21, 42, 63, 84,... Is 210?



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49. Find distance between the points (0, 5) and

(-5, 0)



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50. What is the distance between two parallel

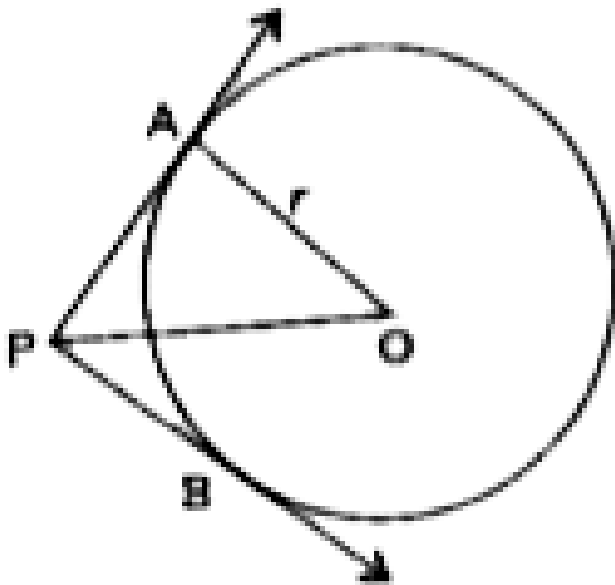
tangents to a circle of radius 5 cm?





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51. In the figure, $\angle APB = 90^\circ$. Find the length of OP .



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52. $\Delta ABC \sim \Delta DEF$ such that $DE = 3$ cm , $EF = 2$ cm , $DF = 2.5$ and $BC = 4$ cm . Find the perimeter of ΔABC .



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53. If $\operatorname{cosec}\theta - \cot\theta = \frac{1}{3}$, then the value of $\operatorname{cosec}\theta + \cot\theta$ is:



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54. If $\triangle ABC$ is right angled at C, then the value of $\cos(A+B)$ is



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55. A wire is in the shape of a circle of radius 21 cm. It is bent to form a square. The side of the square is : $\left(\pi = \frac{22}{7} \right)$



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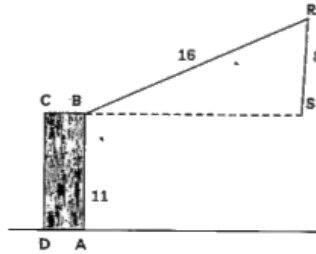
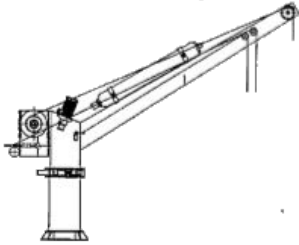
56. If the area of three adjacent faces of a cuboid are X , Y and Z respectively, then find the volume of cuboid.



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57. A crane stands on a level ground. It is represented by a tower $ABCD$, of height 11 m and a jib BR . The jib is of length 20 m and can rotate in a vertical plane about B . A vertical cable, RS , carries a load S . The diagram shows

current position of the jib, cable and load.

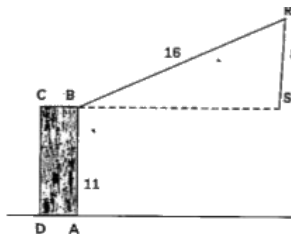
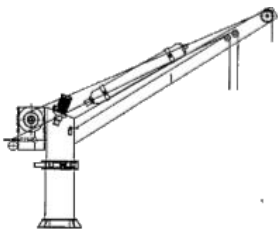


The length BS is

- A. 8m
- B. 12m
- C. 13.9m
- D. 17.9 m

Answer:

58. A crane stands on a level ground. It is represented by a tower $ABCD$ of height 11 m and BR . The jib is of length 20 m and can rotate in a vertical plane about B . A vertical cable, RS , carries a load S . The diagram shows current position of the jib, cable and load.



The angle that the jib, BR, makes with the horizontal, is

A. 45°

B. 30°

C. 60°

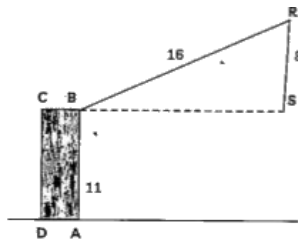
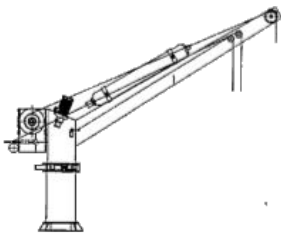
D. 75°

Answer:



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59. A crane stands on a level ground. It is represented by a tower ABCD, of height 11 m and a jib BR. The Jib is of length 20 m and can rotate in a vertical plane about B. A vertical cable, RS, carries a load S. the diagram shows current position of the jib, cable and load.



The measure of the angles BRS, is

A. 60°

B. 75°

C. 30°

D. 45°

Answer:

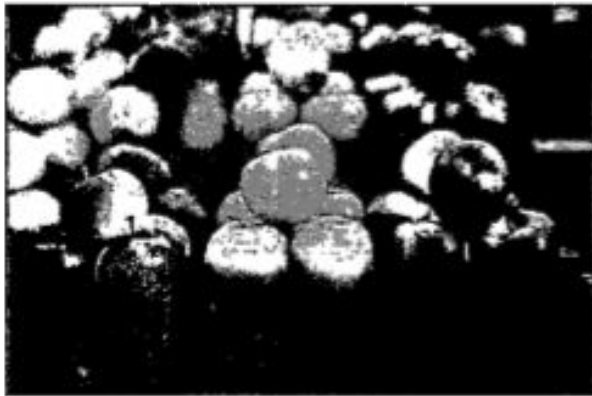


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60. NITI aayog has tasked their statistical officer to create a model for farmers to be able to predict their produce output based on various factors.

To test the model out, the officer picked a local farmer who sells apples to check various factors like weight, bad apples, half-cooked, green vs red etc.

A box containing 250 apples was opened and each apple was weighed.



The distribution of the masses of the apples is given in the following table:

| Mass (in grams) | 80-100 | 100-120 | 120-140 | 140-160 | 160-180 |
|-----------------|--------|---------|---------|---------|---------|
| Frequency | 20 | 60 | 70 | p | 60 |

The value of p is

A. 50

B. 40

C. 35

D. 45

Answer:

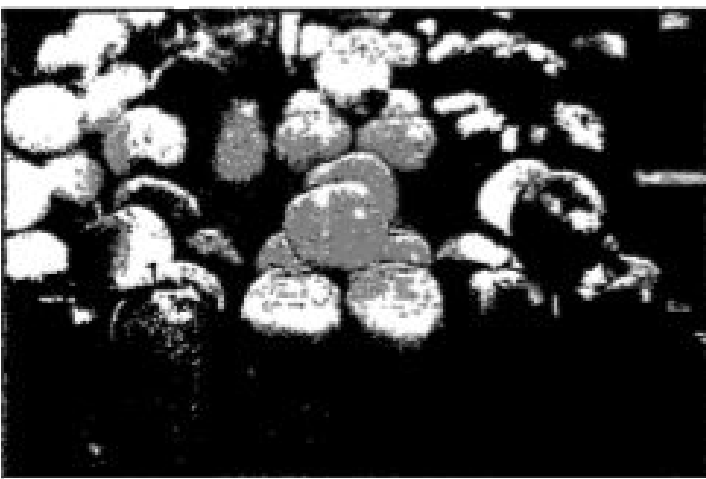


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61. NITI aayog has tasked their statistical officer to create a model for farmers to be able to predict their produce output based on various factors.

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| Mass (in grams) | 80-100 | 100-120 | 120-140 | 140-160 | 160-180 |
| Frequency | 20 | 60 | 70 | p | 60 |

The lower limit of the modal class is

A. 80

B. 100

C. 120

D. 140

Answer:



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62. Show that $3 + \sqrt{5}$ is an irrational number, assuming that $\sqrt{5}$ is an irrational number.



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63. Without actually performing the long division, find if $\frac{987}{10500}$ will have terminating or non-terminating (repeating) decimal expansion. Give reasons for your answer



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64. Prove that the points $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$ are collinear.



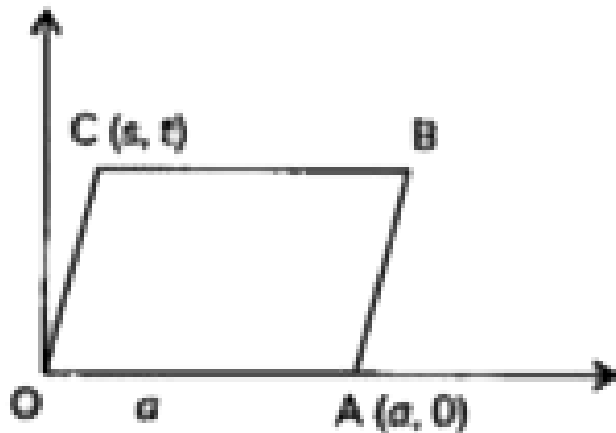
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65. Two opposite vertices of a square are $(-1, 2)$ and $(3, 2)$. Find the coordinates of other two vertices.



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66. In the figure, OABC is a rhombus, where O is the origin.



Write down the coordinates of B in terms of a , s and t .



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67. ABC is an isosceles triangle in which $AB = AC$. Prove that the tangent to the circum-circle at A is parallel to BC.



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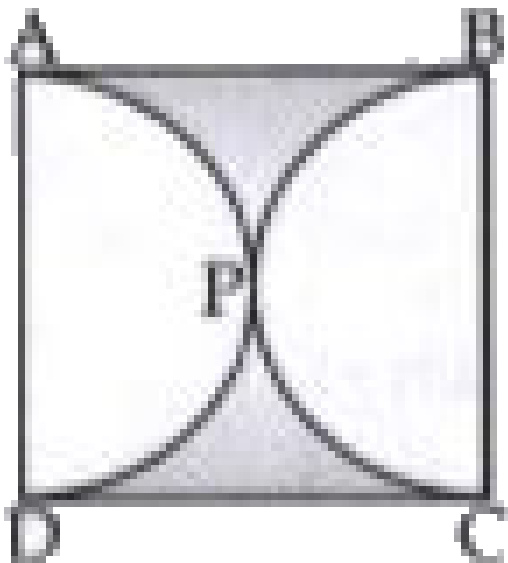
68. In an acute angled ΔABC , $\sec(B + C - A) = 2$ and $\tan(C + A - B) = \frac{1}{\sqrt{3}}$. Find the three angles of ΔABC .



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69. Find the area of the shaded region in the given figure, if ABCD is a square of side 14 cm

and APD and BPC are semicircles.



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70. Show that 12^n cannot end with the digits 0 or 5 for any natural number n

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71. Which term of the AP $-2, -7, -12, \dots$ will be -77 ? Find the sum of this AP upto the term -77 .



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72. 5 books and 7 pens together cost Rs 434, whereas 7 books and 5 pens together cost Rs 550, find the total cost of 1 book and 2 pens.



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73.

$$(\tan A)(1 + \sec A) - \frac{\tan A}{1 - \sec A} = 2 \operatorname{cosec} A$$



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74. If $\sin \theta = \frac{12}{13}$, find the value of

$$\frac{\sin^2 \theta - \cos^2 \theta}{2 \sin \theta \cos \theta} - \frac{1}{\tan^2 \theta}.$$



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75. If the zeros of the polynomial

$f(x) = ax^3 + 3bx^2 + 3cx + d$ are in A.P. then

show that $2b^3 - 3abc + a^2d = 0$



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76. From the top of a tower h m high, angles of depression of two objects, which are in line with the foot of the tower are α and β ($\beta > \alpha$). Find the distance between the two objects.





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77. Two tangents TP and TQ are drawn to a circle with centre O from an external point T .
Prove that $\angle PTQ = 2\angle OPQ$.



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78. Prove that the area of the semicircle drawn on the hypotenuse of a right angled triangle is equal to the sum of the areas of the

semicircles drawn on the other two sides of
the triangle



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