MATHS

BOOKS - AGRAWAL PUBLICATION

Sample paper 6

Exercise

1. $\dfrac{\cot A + \tan B}{\cot B + \tan A}$ is :

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2. For any two positive integers 'a' and b, what is the value of HCF (a, b), LCM (a, b)?

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3. Using prime factorisation method, find the HCF and LCM of 210 and 175

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4. Find the mean of first 10 odd natural numbers.

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5. If $2x$, $x + 10$, $3x + 2$ are in A.P., find the value of x.

6. By taking $A = 90°$ and $B = 30°$, show that sin (A - B) = sin A cos B-cos A sin B.

7. The value of

$$(\cos 0° + \sin 45° + \sin 30°)(\sin 90° - \cos 45° + \cos 60°)$$

is

8. The degree of the polynomial $(x+1)\left(x^2 - x - x^4 + 1\right)$ is:

9. Find the ratio of the volume of a right circular cone to that of the volume of right circular cylinder, of equal diameter and height.

10. Write a quadratic polynomial sum of whose zeros is 3 and product is -6.

11. The value of c for which the pair of equations $cx - y = 2$ and $6x - 2y = 3$ will have infinitely many solutions is

12. Determine the probability of getting a number which is neither prime nor composite in single throw of a fair dice.

13. Find the mean of the following data:

1,7,9,3,4,5,6.

14. If P(E) = 0.001, then find the value of $P\left(\overrightarrow{E}\right)$.

15. One card is drawn at random from a well shuffled deck of 52 cards. What is the probability to get a face card ?

16. A die is thrown once. What is the probability of getting a prime number?

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17. The ratio of the length of a rod and its shadow is $1:\sqrt{3}$.The angle of elevationn of the sun is :

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18. What is the sum of the roots of the quadratic equation $x^2 - 2x - 15 = 0$?

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19. Form cubic polynomial in x with the sum, sum of the products of its zeros taken two at a time, and product of its zeros are 8, 0 and 9 respectively.
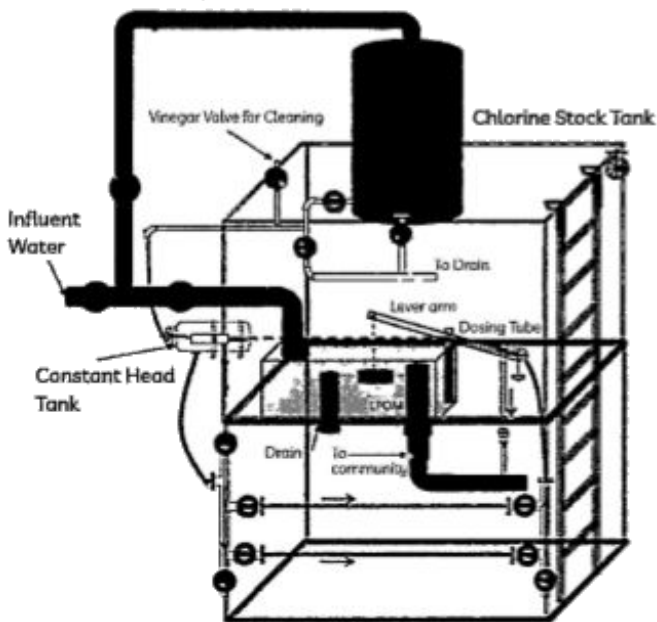
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20. What is the value of 'p' for which the quadratic equation $2px^2 + 6x + 5 = 0$ has equal roots.

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21. Selvi is setting up a water purifier system in her house which includes setting up an overhead tank in the shape of a right circular cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid.

The underground water tank (sump) is a sturdy single moulded piece built to with stand underground pressure and is available in the storage capacity of 2000 L.

Vinegar Valve for Cleaning — Chlorine Stock Tank

Influent Water

Constant Head Tank

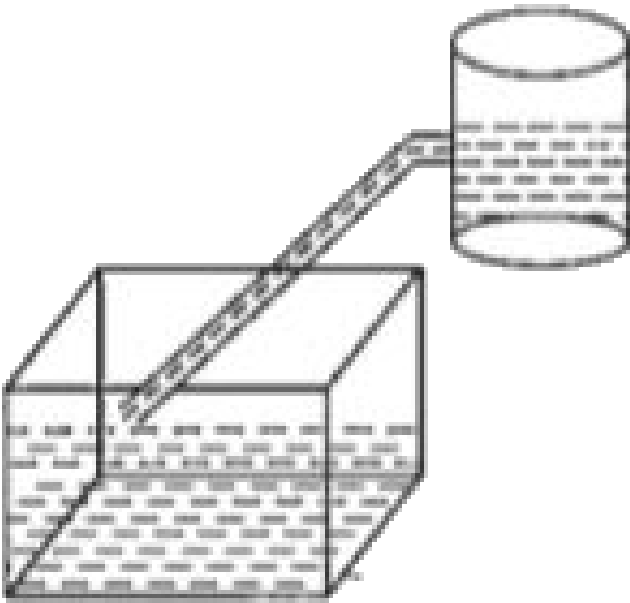To Drain

Lever arm

Dosing Tube

Drain

To community

These, along with hassle-free installation and minimum maintenance needs make it the ideal water storage solution.

Dimensions (sump): 1.57 m × 1.44 m × 95 cm.

Dimensions (overhead tank):

Radius 60 cm and Height 95 cm

Water flow conditions at the required overload capacity should be checked for critical pressure drop to ensure that valves are adequately sized.

On the basis of the above information, answer the following qeuestions:

The ratio of the capacity of the sump to the capacity of the overhead tank is
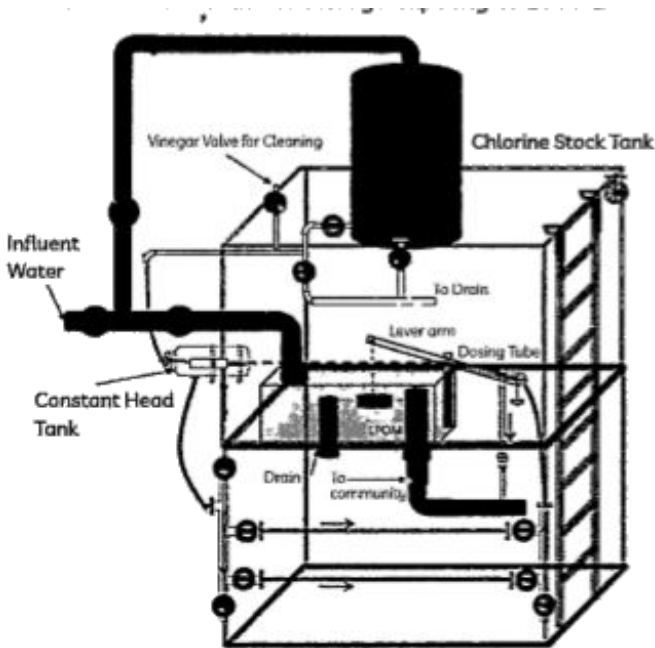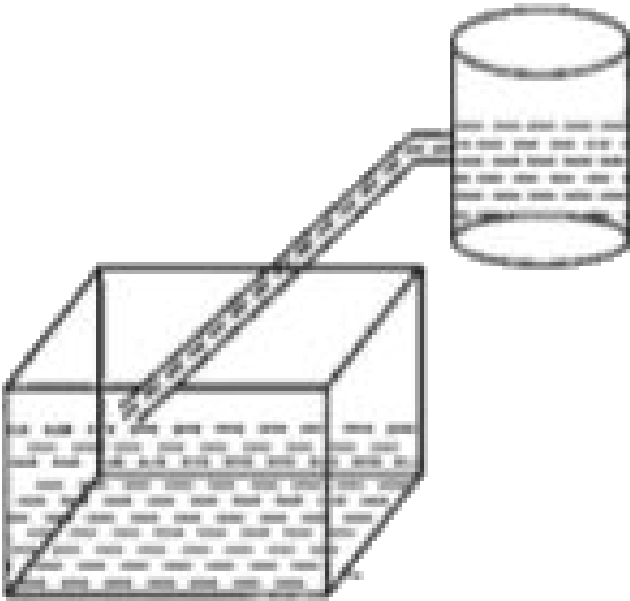
A. $1:2$

B. $2:1$

C. $1:4$

D. $4:1$

Answer:

22. Selvi is setting up a water purifier system in her house which includes setting up an overhead tank in the shape of a right circular cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid.

The underground water tank (sump) is a sturdy single moulded piece built to with stand underground pressure and is available in the storage capacity of 2000 L.

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Dimensions (sump): 1.57 m × 1.44 m × 95 cm.

Dimensions (overhead tank):

Radius 60 cm and Height 95 cm

Water flow conditions at the required overload capacity should be checked for critical pressure drop to ensure that valves are adequately sized.

On the basis of the above information, answer the following qeuestions:

If overhead tank need to be painted to save it from corrosion, how much area need to be painted?

A. 2.92 sq m
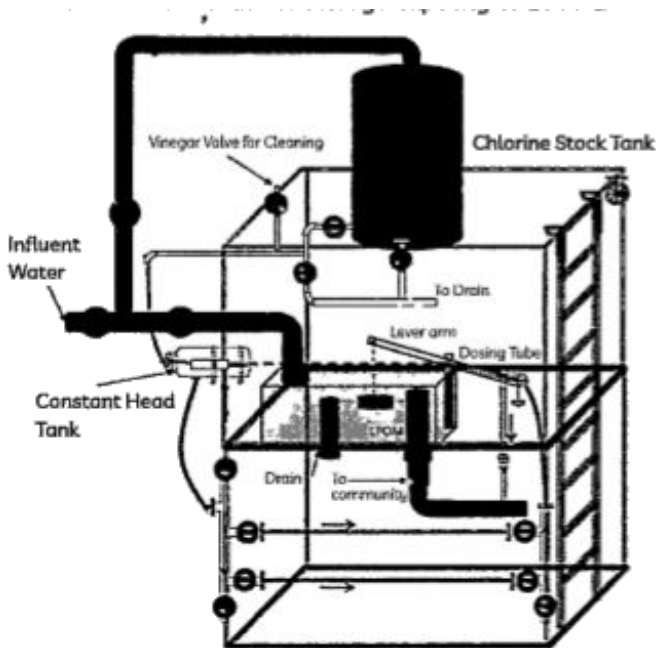
B. 1.13 sq m

C. 4.71 sq m

D. 3.58 sq m

Answer:

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23. Selvi is setting up a water purifier system in her house which includes setting up an overhead tank in

the shape of a right circular cylinder. This is filled by

pumping water from a sump (underground tank) which

is in the shape of a cuboid.

The underground water tank (sump) is a sturdy single

moulded piece built to with stand underground

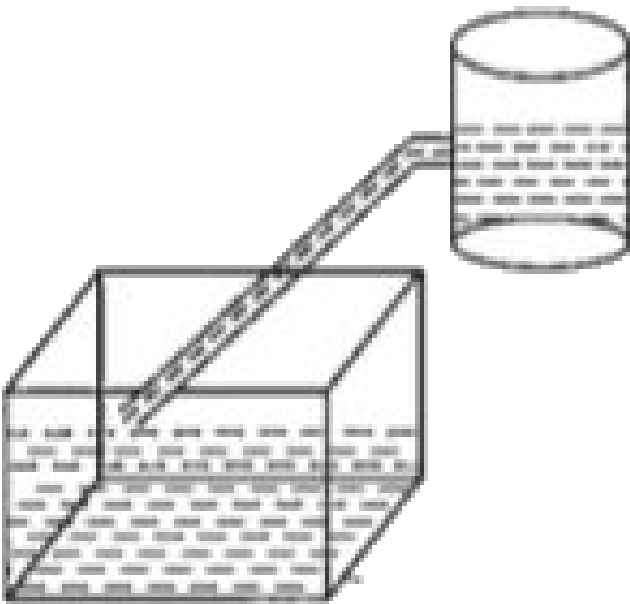pressure and is available in the storage capacity of 2000

L.

Vinegar Valve for Cleaning

Chlorine Stock Tank

Influent
Water

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These, along with hassle-free installation and minimum

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Dimensions (sump): 1.57 m × 1.44 m × 95 cm.

Dimensions (overhead tank):

Radius 60 cm and Height 95 cm

Water flow conditions at the required overload capacity should be checked for critical pressure drop to ensure that valves are adequately sized.

The capacity (in litres) of the overhead tank is

    A. 1047 litres

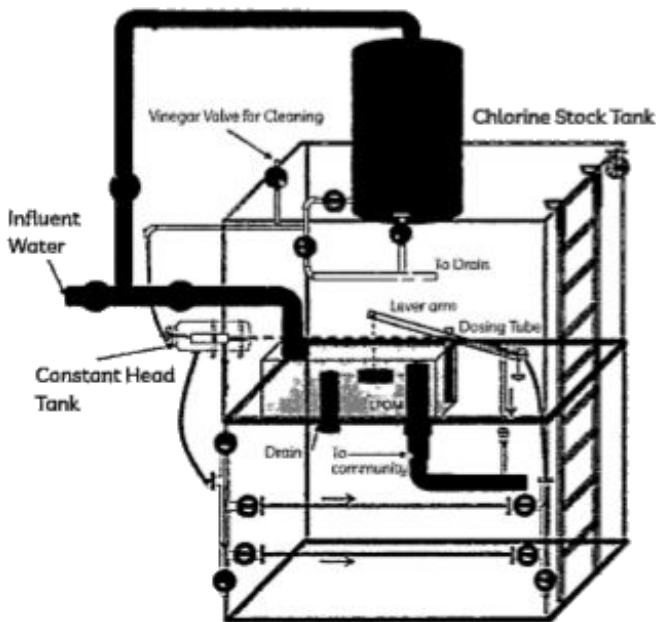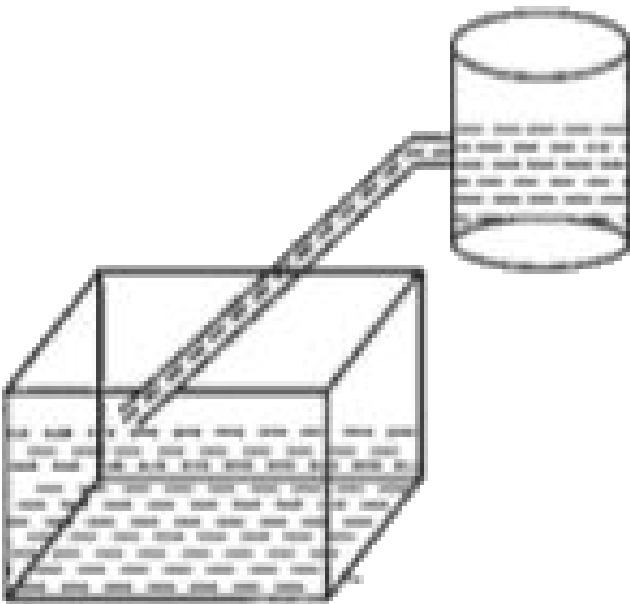   B. 1074 litres

    C. 1205 litres

    D. 1207 litres

Answer:

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24. Selvi is setting up a water purifier system in her house which includes setting up an overhead tank in

the shape of a right circular cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid.

The underground water tank (sump) is a sturdy single moulded piece built to with stand underground pressure and is available in the storage capacity of 2000 L.

These, along with hassle-free installation and minimum

maintenance needs make it the ideal water storage solution.

Dimensions (sump): 1.57 m $\times$ 1.44 m $\times$ 95 cm.

Dimensions (overhead tank):

Radius 60 cm and Height 95 cm

Water flow conditions at the required overload capacity should be checked for critical pressure drop to ensure that valves are adequately sized.

On the basis of the above information, answer the following qeuestions:

If the amount of water in the sump, at an instant, is 1500 litres, then the water level in the sump at that instant is

A. 66.3 cm

B. 69.3 cm

C. 72.4 cm

D. 60.9 cm

Answer:

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25. Rishu is riding in a hot air balloon. After reaching a point P, he spots a car parked at Bon the ground at an angle of depression of $30°$. The balloon rises further by 50 metres and now he spots the same car at an angle of depression of 45o and a lorry parked at B' at an angle of depression of $30°$. (Use $\sqrt{3} = 1.73$)
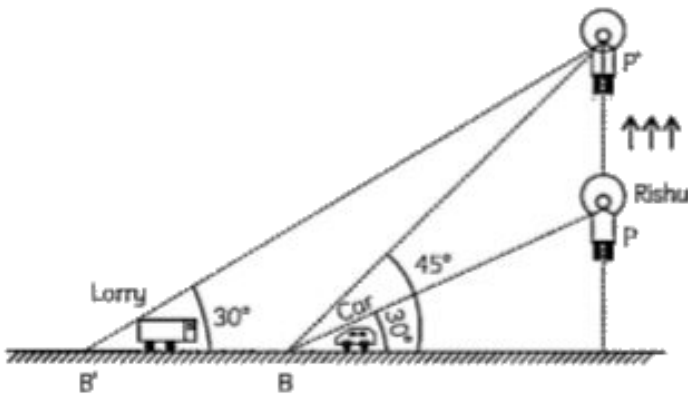
The measurement of Rishu facing vertically is the height. Distance is defined as the measurement of car/lorry from a point in a horizontal direction. If an imaginary line is drawn from the observation point to

the top edge of the car/lorry, a triangle is formed by the vertical, horizontal and imaginary line.

If the height of the balloon at point P is 'h' m and distance AB is 'x' m, then 'x' and 'h' are related as:

    A. h = 3x

    B. x = 3h

    C. $h = \sqrt{3x}$
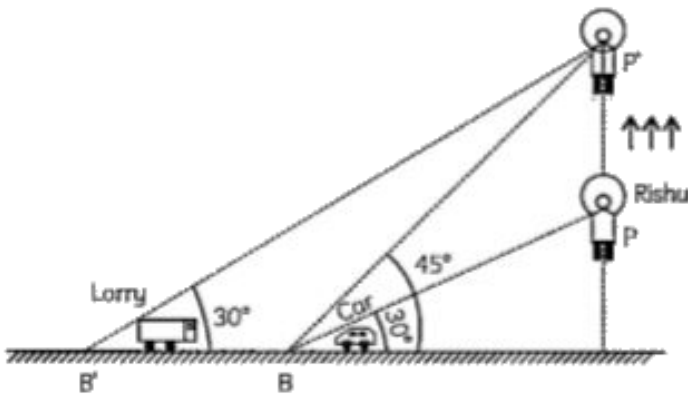
    D. $x = \sqrt{3}h$

Answer:

26. Rishu is riding in a hot air balloon. After reaching a point P, he spots a car parked at Bon the ground at an angle of depression of $30°$. The balloon rises further by 50 metres and now he spots the same car at an angle of depression of $45°$ and a lorry parked at B' at an angle of depression of $30°$. (Use $\sqrt{3} = 1.73$)

The measurement of Rishu facing vertically is the height. Distance is defined as the measurement of car/lorry from a point in a horizontal direction. If an imaginary line is drawn from the observation point to

the top edge of the car/lorry, a triangle is formed by the vertical, horizontal and imaginary line.

The height of the balloon at point P' and distance AB are related as:

A. h = x+50

B. x = h+50

C. h = 50-x

D. x= 50h

Answer:

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27. Rishu is riding in a hot air balloon. After reaching a point P, he spots a car parked at Bon the ground at an angle of depression of $30°$. The balloon rises further by 50 metres and now he spots the same car at an angle of depression of $45°$ and a lorry parked at B' at an angle of depression of $30°$. (Use $\sqrt{3} = 1.73$)
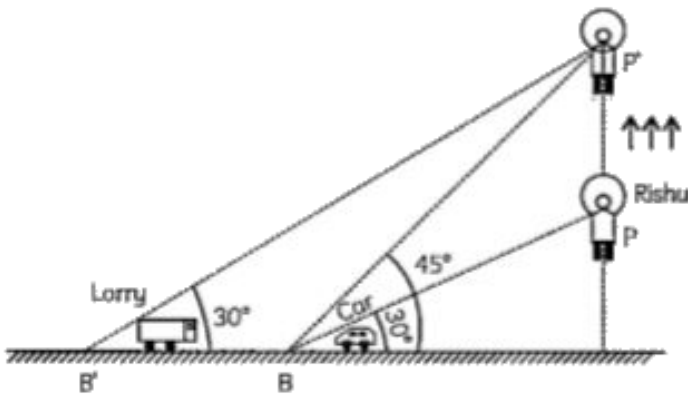
The measurement of Rishu facing vertically is the height. Distance is defined as the measurement of car/lorry from a point in a horizontal direction. If an imaginary line is drawn from the observation point to

the top edge of the car/lorry, a triangle is formed by the vertical, horizontal and imaginary line.

The height of the balloon at point P, then

    A. 68.25 m

    B. 86.5 m

    C. 73.2 m

    D. 70.8 m

Answer:

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28. Rishu is riding in a hot air balloon. After reaching a

point P, he spots a car parked at Bon the ground at an

angle of depression of $30°$. The balloon rises further by

50 metres and now he spots the same car at an angle of

depression of 45o and a lorry parked at B' at an angle of

depression of $30°$. (Use $\sqrt{3}$ = 1.73)
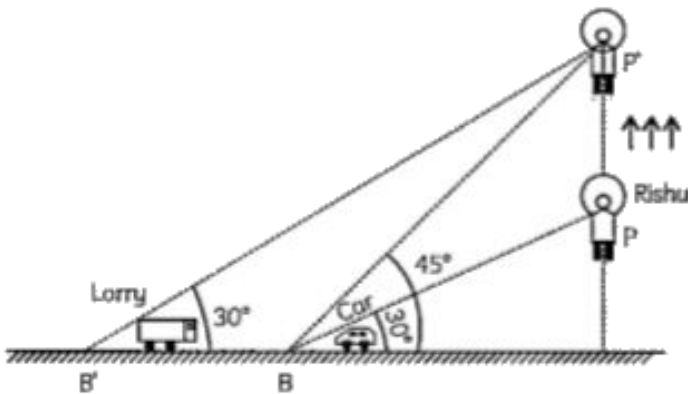
The distance AB on the ground is
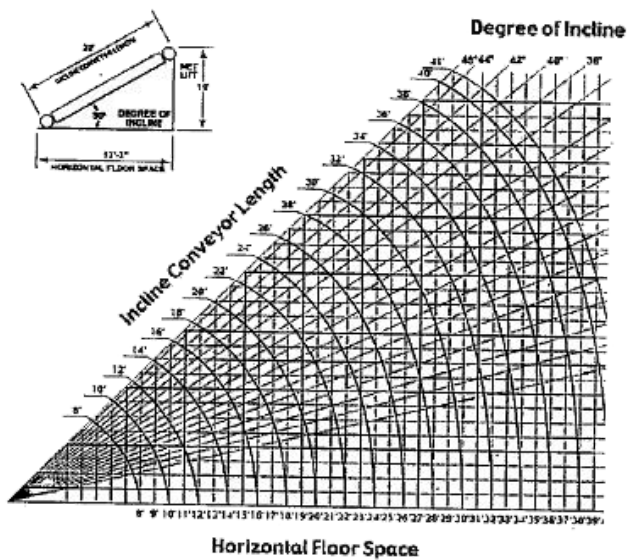
A. 124.2 m

B. 118 m

C. 171.4 m

D. 142.6 m

Answer:

29. A factory is using an inclined conveyor belt to transport its product from level 1 to 2 which is 3 m above level - 1 as shown in the figure below. The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.

Degree of Incline

Degree of Incline

Incline Conveyor Length

Horizontal Floor Space

Level 3

Level 2

9 m

3 m

Level 1

8 m
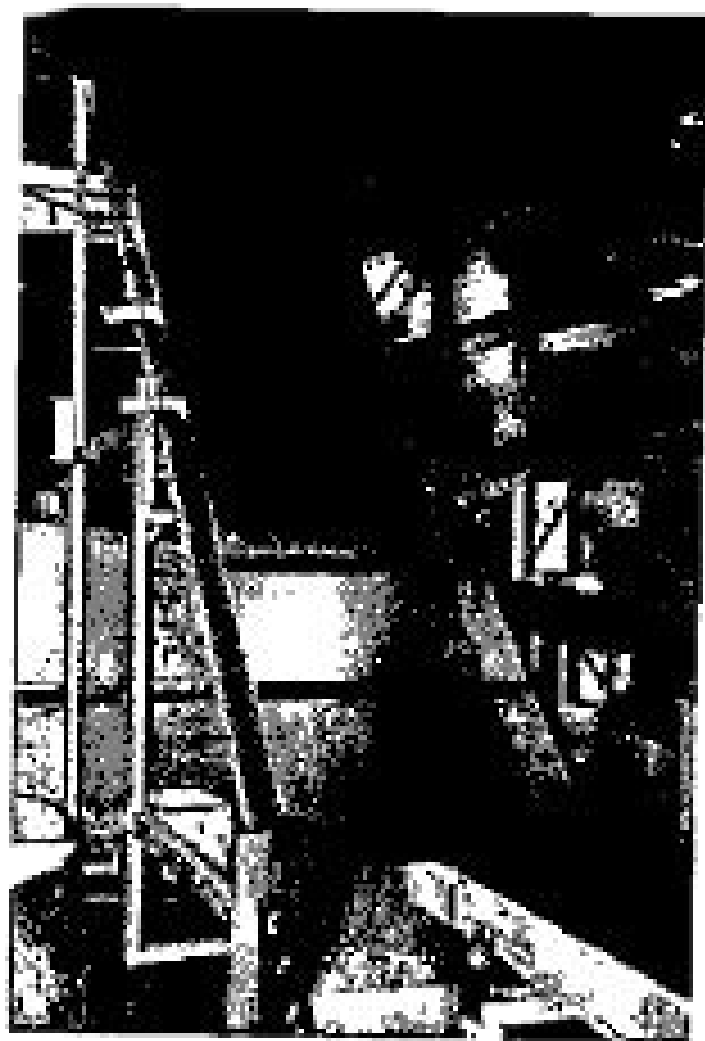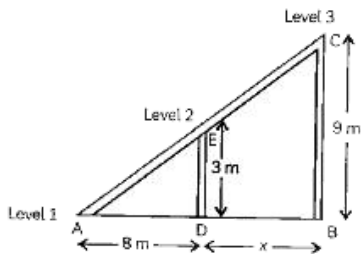
The factory wants to extend the conveyor belt to reach at a new level 3 which is 9 m above level 1 while maintaining the inclination angle.

Which concept of geometry helps in determining the distance at which level 3 should be placed?

A. Area of sector

B. Congruency of triangles
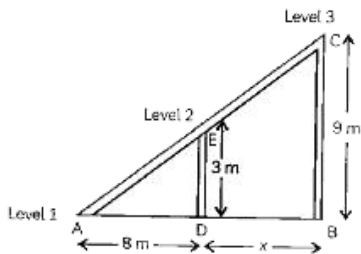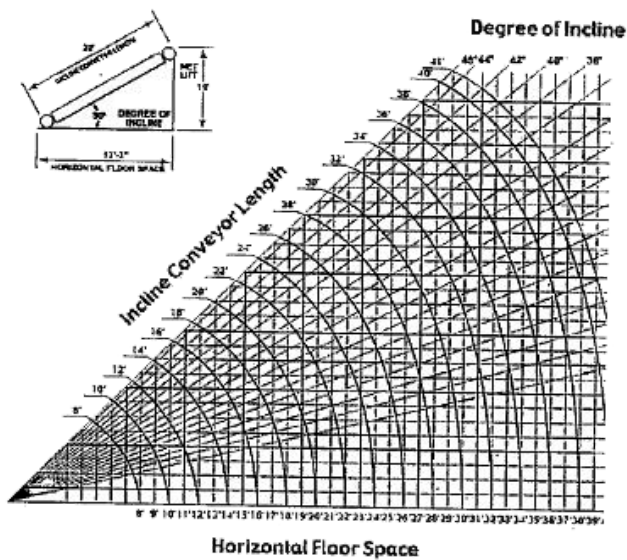
C. Similarity of traingles

D. Pythagoras Theorem

Answer:

30. A factory is using an inclined conveyor belt to transport its product from level 1 to 2 which is 3 m above level - 1 as shown in the figure below. The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.

Degree of Incline

Degree of Incline

Incline Conveyor Length

Horizontal Floor Space

Level 3

Level 2

9 m

3 m

Level 1

8 m — x
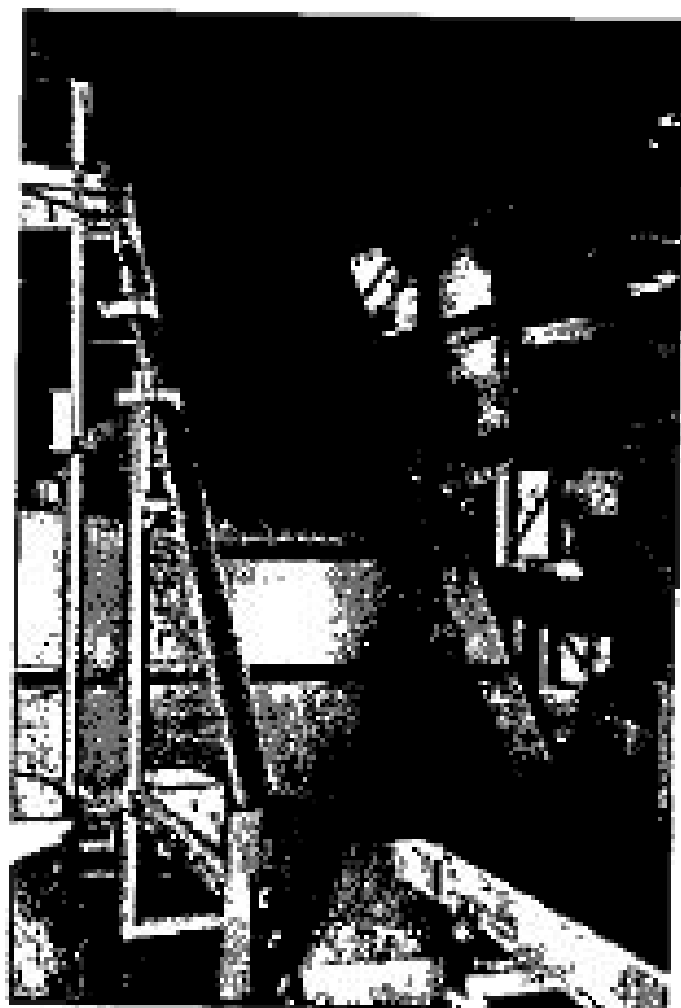
The factory wants to extend the conveyor belt to reach at a new level 3 which is 9 m above level 1 while maintaining the inclination angle.

The distance at which a new post is to be installed to support the conveyor belt at level 3, is
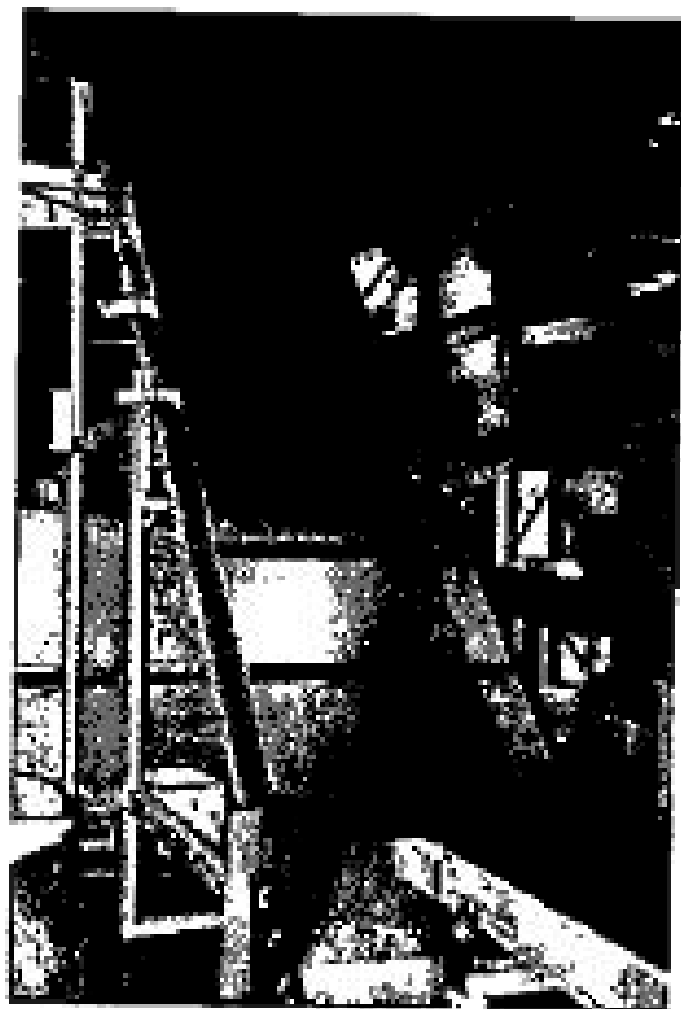
A. 11 m

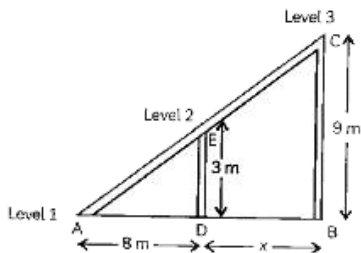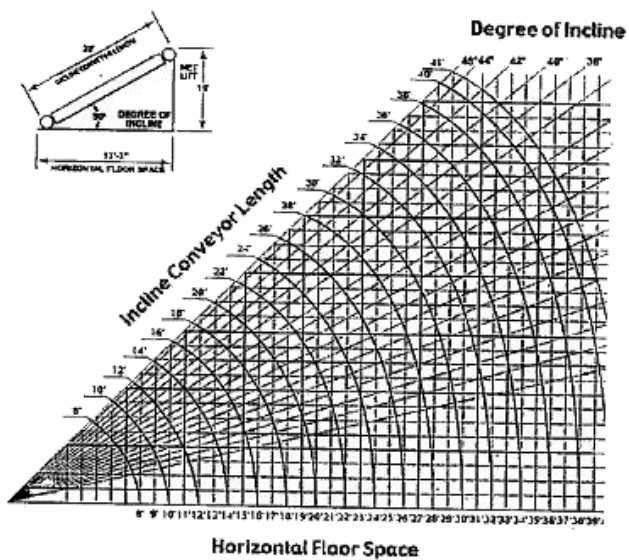B. 14 m

C. 20 m

D. 24 m

Answer:

31. A factory is using an inclined conveyor belt to transport its product from level 1 to 2 which is 3 m above level - 1 as shown in the figure below. The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.

Degree of Incline

Degree of Incline

Incline Conveyor Length

Horizontal Floor Space

Level 3

Level 2

Level 1

9 m

3 m

8 m

The factory wants to extend the conveyor belt to reach at a new level 3 which is 9 m above level 1 while maintaining the inclination angle.

How much distance is extended from D to B?
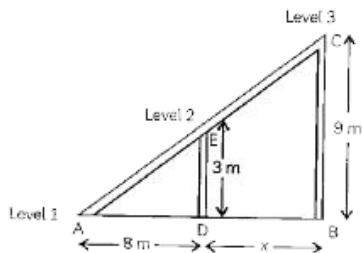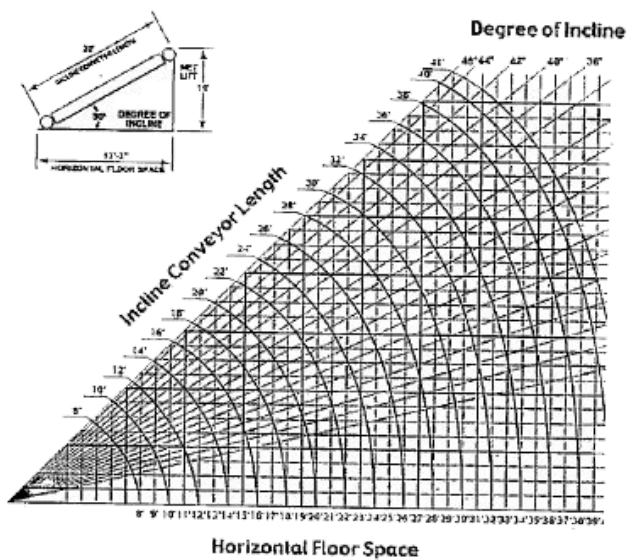
A. 12 m

B. 16 m

C. 6 m

D. 3 m

Answer:

32. A factory is using an inclined conveyor belt to transport its product from level 1 to 2 which is 3 m above level - 1 as shown in the figure below The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.

Degree of Incline

Degree of Incline

Incline Conveyor Length

Horizontal Floor Space

Level 3

Level 2

Level 1

9 m

3 m

8 m

The factory wants to extend the conveyor belt to reach at a new level 3 which is 9 m above level 1 while maintaining the inclination angle.

The length of the conveyor belt up to level 3 is

A. 22.8 m

B. 26 m

C. 25.6 m

D. 33 m

Answer:

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33. A factory is using an inclined conveyor belt to transport its product from level 1 to 2 which is 3 m above level - 1 as shown in the figure below The inclined conveyor is supported from one end to level 1 and from the other end to a post located 8 m away from level 1 supporting point.

Degree of Incline

Degree of Incline

Incline Conveyor Length

Horizontal Floor Space

Level 3

Level 2

9 m

3 m

Level 1

8 m
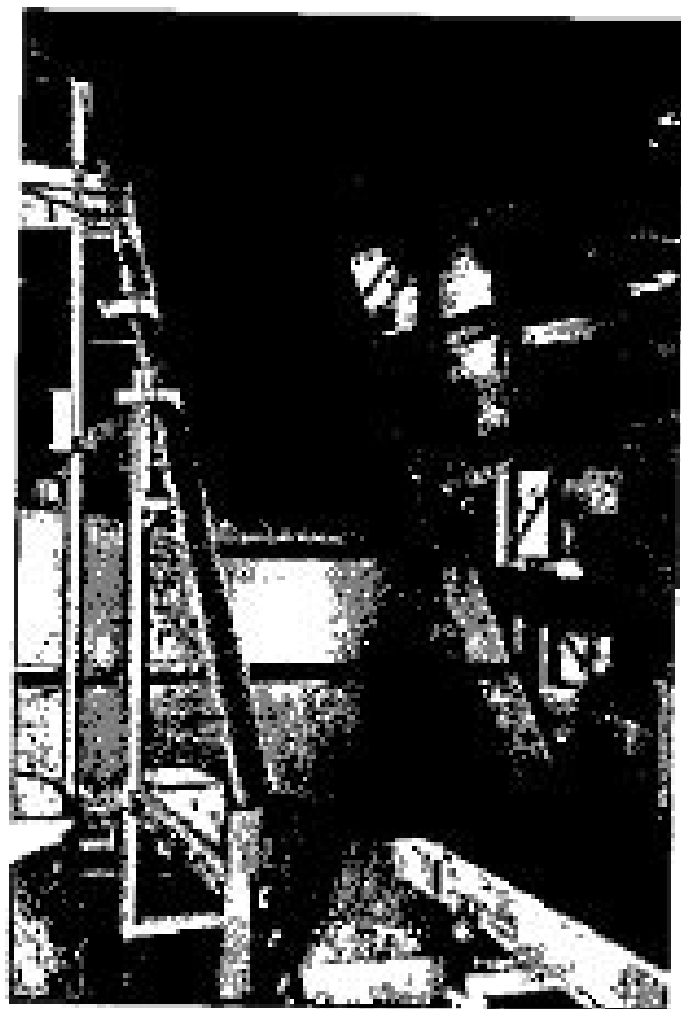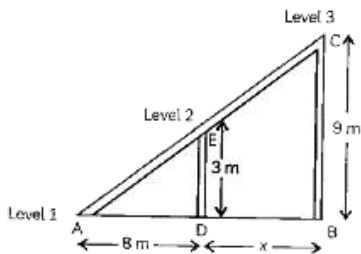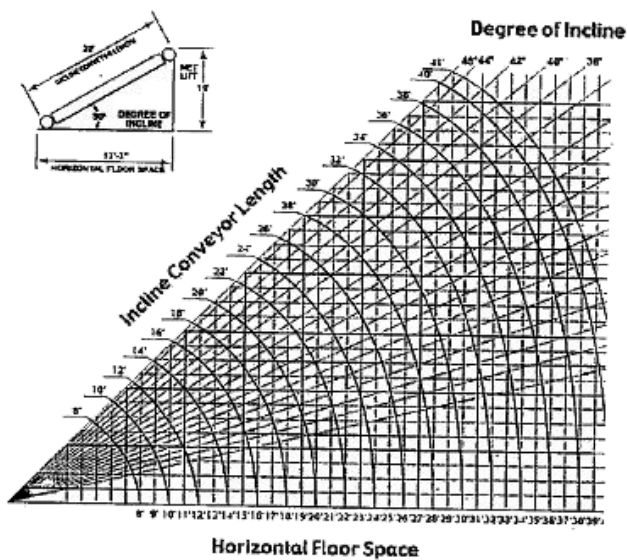
The factory wants to extend the conveyor belt to reach

at a new level 3 which is 9 m above level 1 while

maintaining the inclination angle.

The length of the conveyor belt up to level 2 is

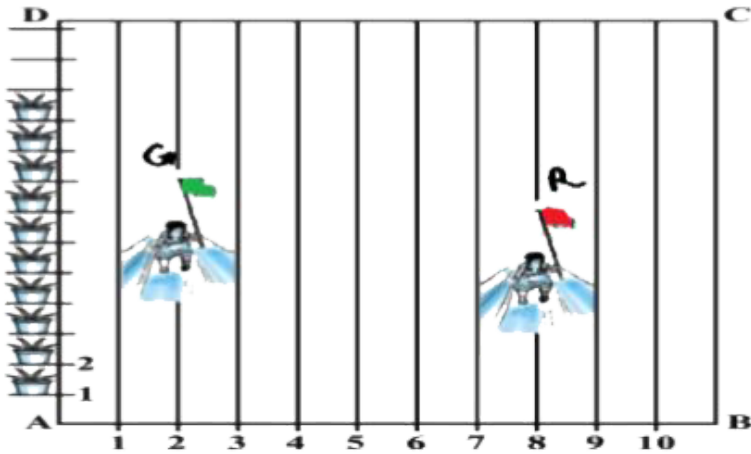A. 12.1 m

B. 7.2 m

C. 6.9 m

D. 8.5 m

Answer:

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34. In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs 1/4 th the distance AD on the 2nd

line and posts a green flag. Preet runs 1/5 th distance

AD on the eighth line and posts a red flag.

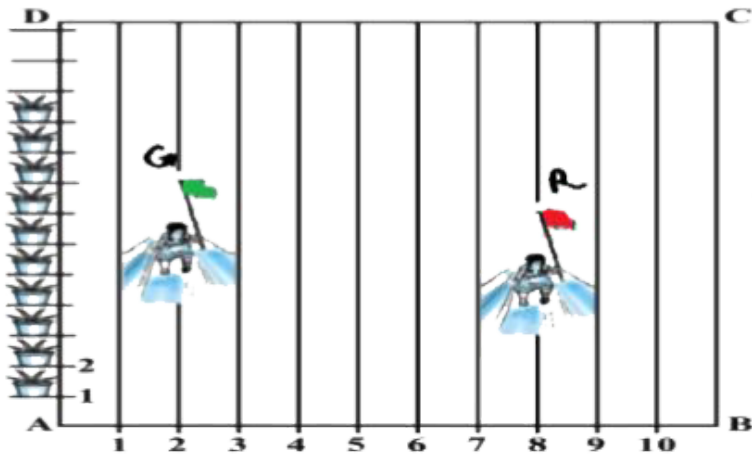Find the position of green flag

A. (2,50)

B. (2,25)

C. (5,5)

D. (5,20)

Answer:

35. In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs 1/4 th the distance AD on the 2nd line and posts a green flag. Preet runs 1/5 th distance AD on the eighth line and posts a red flag.

Find the position of red flag

A. (10,40)

B. (6,25)

C. (5,20)

D. (8,20)
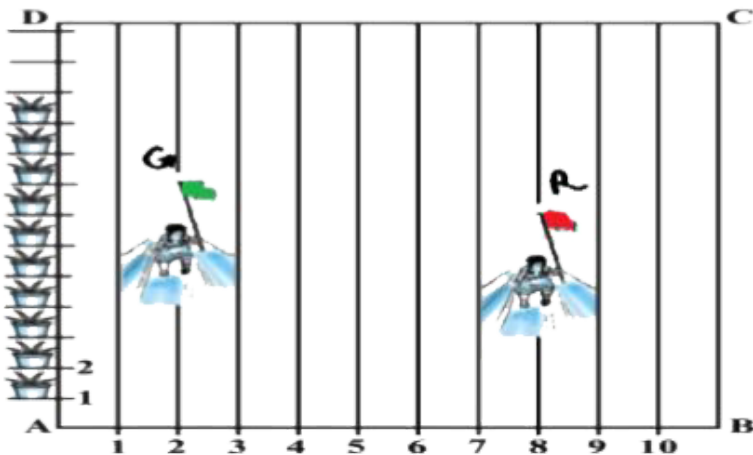
Answer:

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36. In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs 1/4 th the distance AD on the 2nd line and posts a green flag. Preet runs 1/5 th distance AD on the eighth line and posts a red flag.

What is the distance between both the flags?

A. 10 m

B. 9 m

C. 8m

D. 7 m

Answer:

37. Determine the AP whose 3rd term is 5 and the 7th

term is 9 .

38. The zeroes of $3x^2 - 4 - x$ are :

39. Find the coordinates of the point which divides the line Joining (1,-2) and (4,7) internally in the ratio 1:2.

40. Find the third vertex of a triangle, if two of its vertices are at $(-3, 1)$ and $(0, -2)$ and the centroid is at the origin.

41. Two dice are thrown simultaneously and the outcomes are noted. Find the probability that:

sum of numbers on the two dice is 5.

42. If 0.3528 is expressed in the form of $\dfrac{p}{2^m 5^n}$ find the simallest values of m, n and p.

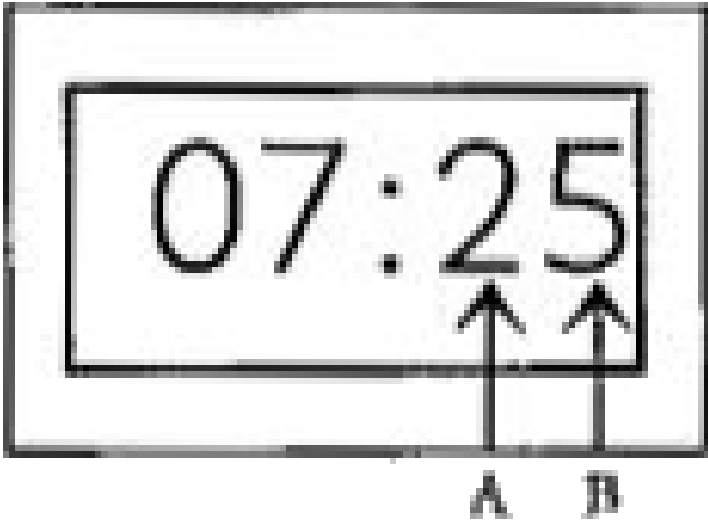**43.** Amrish wakes up in the morning and notices that his digital cock recde 07: 25 am. After noon, he looks at the
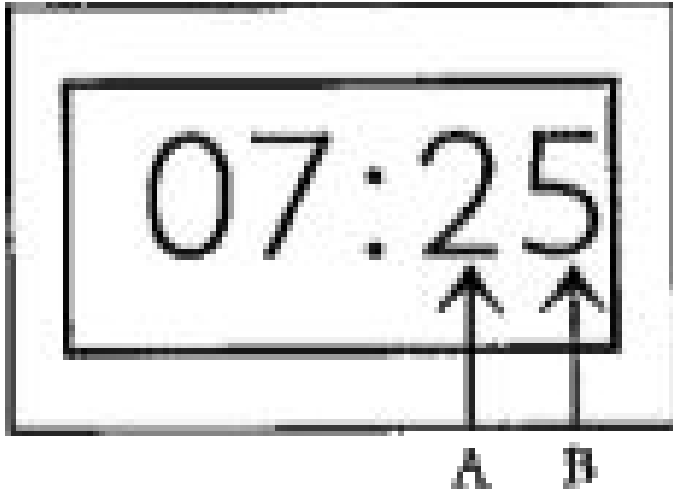
clock again.

What is the probability that

the number in column A is 4 ?

44. Amrish wakes up in the morning and notices that

his digital cock recde 07: 25 am. After noon, he looks at

the clock again.

What is the probability that

the number in column B is 8 ?

07:25
A   B

45. The persons start walking together and their steps

measure 40 cm, 42 cm and 45 cm respectively. What is

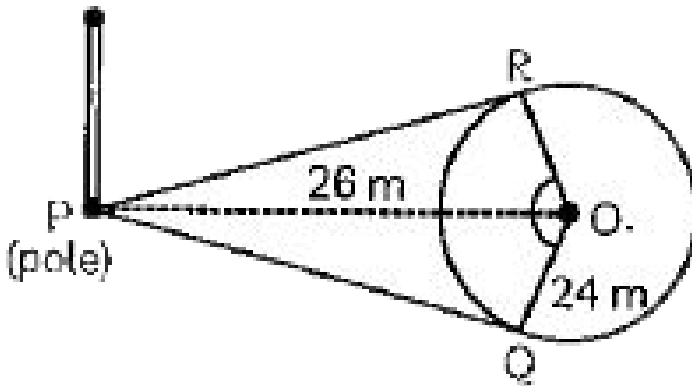the minimum distance each should walk so that each can cover the same distance in complete steps?

46. There is a circular park of radius 24 m and there is a pole at a distance of 26 m from the centre of the park os shown in the figure. It is planned to enclose the park by planting trees along line segments PO and PR tangential to the park.
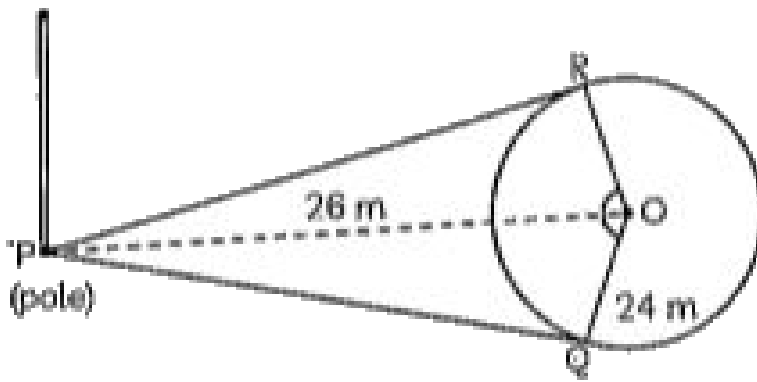
Find the length of PQ and PR.

47.

If six trees are to be planted along each tangential line

segments at equal distances, find the distance between any two consecutive trees.

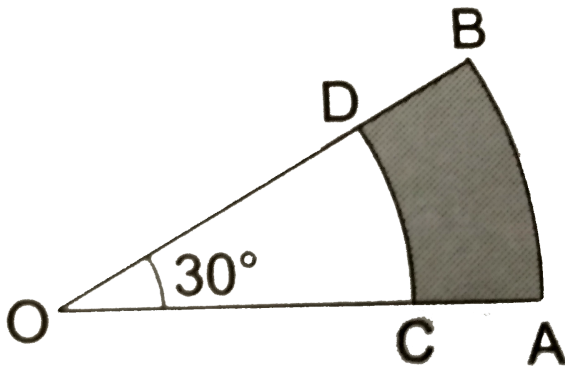**48.** The perpendicular from A on side BC of a $\triangle ABC$ meets BC at D such that DB = 3CD. Prove that $2AB^2 = 2AC^2 + BC^2$

49. Draw a line segment of length 8 cm and divide it internally in the ratio 4:5.

50. In the give figure, the sectors of two concentric circles of radii 7 cm and 3.5 cm are shown. Find the area of the shaded region.

51. The mean of the following frequency distribution is 62.8 and the sum of all frequencies is 50. Compute the

missing frequencies f_1 and f_2:

52. Solve for x and y :

$$7x - 4y = 49, \ 5x - 6y = 57$$

53. The sum of the reciprocals of Meena's ages (in years) 3 years ago and 5 year hence is $\dfrac{1}{3}$. Find her present age.

54. A natural number when increased by 12, equals 160 times its reciprocal. Find number.

55. A number consists of two digits. When it id divided by the sum of its digits, the quotient is 6 with no remainder. When the number is diminished by 9, the digits are reversed. Find the number.

56. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m

wide. From a point between them on the road, the angles of elevation of the top of the poles are 60$o$and 30o, respectively. Find the hei

57. Prove that:

$$\left(\frac{\tan\theta}{1-\tan\theta}\right) - \left(\frac{\cot\theta}{1-\cot\theta}\right) = \frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}$$

58. State and prove Basic Proportionality Theoram (Thales Theoram)

59. Write the denominator of the rational number $\dfrac{771}{3000}$ in the form $2^p 5^q$, where p and q are non - negative integers

60. If two positive integers m and n are expressible as as $m = ab^2$ and $n = a^3 b$, where a and b are prime numbers, then find LCM (m, n)

61. Find the value of the remainder, when $x^2 + (a + b)x + ab$ is divided by (x + a)

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62. If the sum of a positive number and its square is 240 , then find the number

> ▶ **Watch Video Solution**

63. If x, x - 2 and 3x are in AP, then find the value of x

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64. Determine the 12th term of the AP, 5, 8, 11, 14, ...

65. The sum and the product of the roots of the quadratic equations $2x^2 + 14x + 24 = 0$

66. Find the ratio in which x-axis divides the join of (2,-3) and (5,6).

67. The distance between the points $(a\cos\theta + b\sin\theta, 0)$ and $(0, a\sin\theta - b\cos\theta)$.

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68. Plotting the points A (- 4, 6) and B (- 4, -6) on the coordinate axes check if P (- 4, 2) lies on the line segment AB

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69. Check if the three sides of lengths 3 cm 6 cm and 8 cm can form a right triangle

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70. Find the length of a altitude in on equilateral triangle of side 'a' cm

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71. State and prove the Pythagoras theorem.

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72. From the external point P tangents PA and PB are drawn to a circle with centre O. If $\angle PAB = 50°$, then find $\angle AOB$.

73. Simplify $\left(1 + \tan^2 \theta\right)(1 + \sin \theta)(1 - \sin \theta)$

74. If $3 \sec \theta = 5$, then find the value of $\cot \theta$

75. The total surface area of a cylinder of base radius r

and height h is_____.

**76.** If the area of a circle is $154cm^2$, then find its circumference.

77. Two unbiased coins are tossed simultaneously, then the probability then the probability of getting no head is $\dfrac{p}{q}$. Find the value of $(p + q)^2$

78. A playgroup school is looking to refurnish the playground area that is in almost a triangular shape

(ABC) .There is a small tree ,almost a vertical line in shape lets say AD, at the corner of the playground area
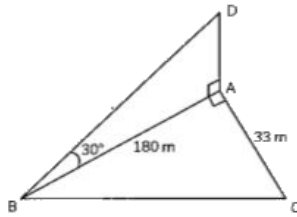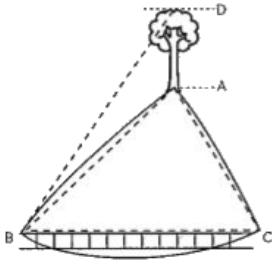
A path runs along the edge BC of the field .As part of material purchase planning ,the playgroup manager needs to scope out the surrounding area including the dimensions of the tree.

The height of the tree AD is :

A. $29\sqrt{3}m$

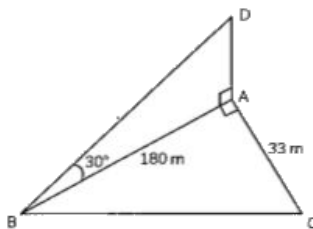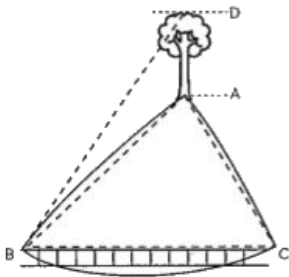B. $38\sqrt{3}m$

C. $43\sqrt{3}m$

D. $60\sqrt{3}m$

Answer:

79. A playgroup school is looking to refurnish the playground area that is in almost a triangular shape (ABC) .There is a small tree ,almost a vertical line in shape lets say AD, at the corner of the playground area

A path runs along the edge BC of the field .As part of

material purchase planning ,the playgroup manager needs to scope out the surrounding area including the dimensions of the tree.

On the basis of the above information , answer any four of the following questions :

The length of the path BC is :
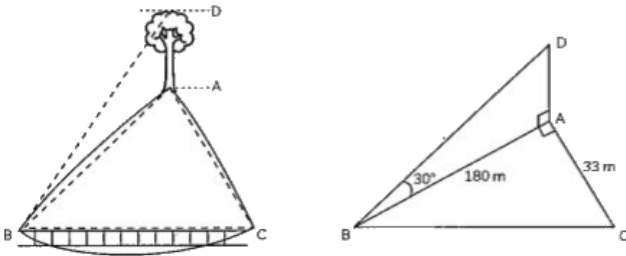
A. 193 m

B. 189m

C. 188m

D. 183 m

Answer:

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80. A playgroup school is looking to refurnish the playground area that is in almost a triangular shape (ABC) .There is a small tree ,almost a vertical line in shape lets say AD, at the corner of the playground area

A path runs along the edge BC of the field .As part of material purchase planning ,the playgroup manager needs to scope out the surrounding area including the dimensions of the tree.

On the basis of the above information , answer any four of the following questions :

The area (in sq m) of the field ABC is :
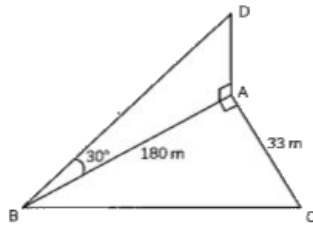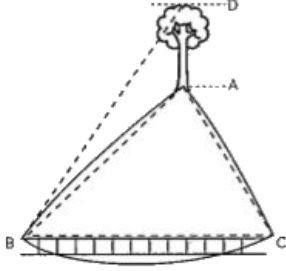
A. 2790 sq.m

B. 2970 sq. m

C. 3102 sq. m

D. 3210 sq. m

Answer:

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81. A playgroup school is looking to refurnish the playground area that is in almost a triangular shape (ABC) .There is a small tree ,almost a vertical line in shape lets say AD, at the corner of the playground area

A path runs along the edge BC of the field .As part of material purchase planning ,the playgroup manager needs to scope out the surrounding area including the dimensions of the tree.
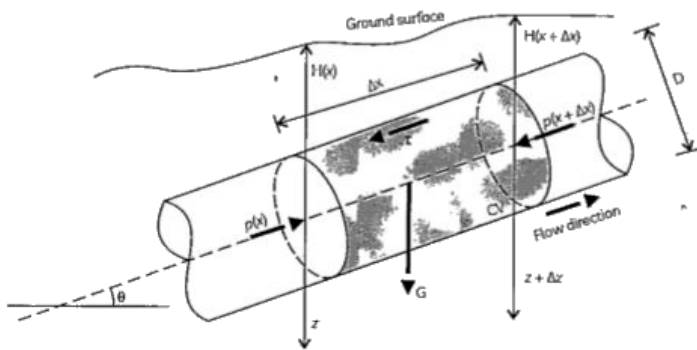
The length BD is :

A. 198m

B. 208m

C. 228m

D. 243m

Answer:

82. In CERN , some work is carried out for developing an accurate and fast numerical method that can calculate natural gas flow in a pipeline under non isothermal steady -state conditions .

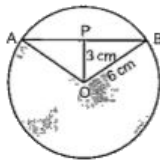The cross section of the pipeline is shown below:
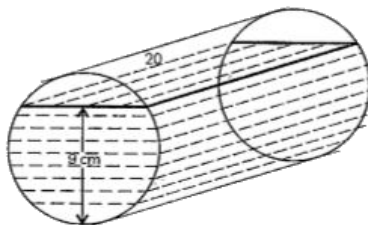

Diagram 1

Diagram 2

In Diagram 1, O is the centre of the circle of radius 6 cm

and P is the mid -point of the chord AB .The length OP is

3 cm.

The measure of $\angle AOB$ is :

A. 60°

B. 75°

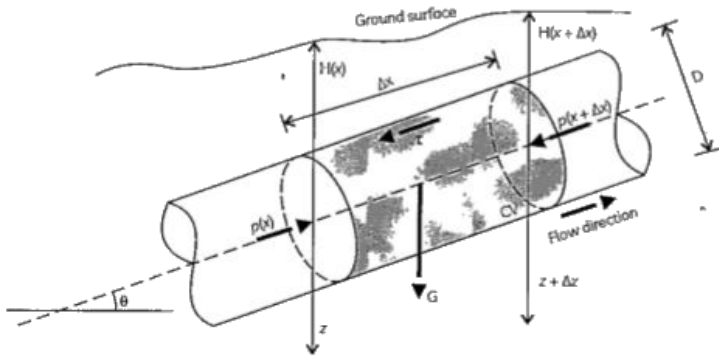C. 120°

D. 135°

Answer:

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83. In CERN , some work is carried out for developing an accurate and fast numerical method that can calculate natural gas flow in a pipeline under non isothermal steady -state conditions .

The cross section of the pipeline is shown below:
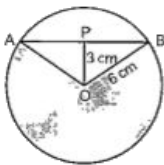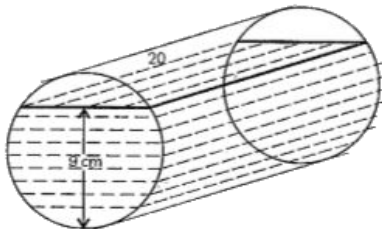

Diagram 1   Diagram 2

In Diagram 1, O is the centre of the circle of radius 6 cm and P is the mid -point of the chord AB .The length OP is 3 cm.

The area (in sq cm) of $\triangle AOB$ is :

A. 5.2

B. 10.4

C. 15.6

D. 20.8

Answer:

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84. Resident Welfare Association (RWA) of a M2 K Society in Azadpur have put up three electric poles A,B

and C in a society 's common park near Tower A .

Despite these poles ,some parts of the park are still in

dark. So , RWA decides to have one more electron pole D

in the park.

The position of the pole C is :

A. (5,4)

B. (2,7)

C. (8,9)

D. (9,8)

Answer:
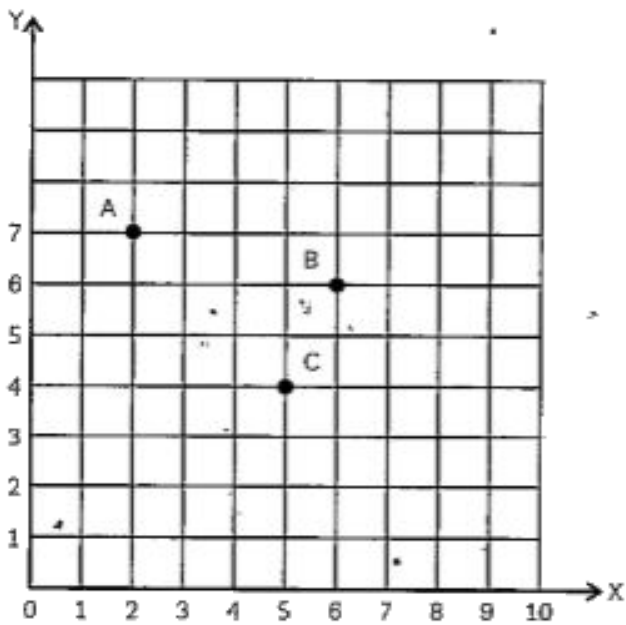
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85. Resident Welfare Association (RWA) of a M2 K Society in Azadpur have put up three electric poles A,B and C in a society 's common park near Tower A . Despite these poles ,some parts of the park are still in dark. So , RWA decides to have one more electron pole D in the park.

The distance of the pole B from the corner O of the park

is :

A. $\sqrt{53}units$

B. $\sqrt{41}units$
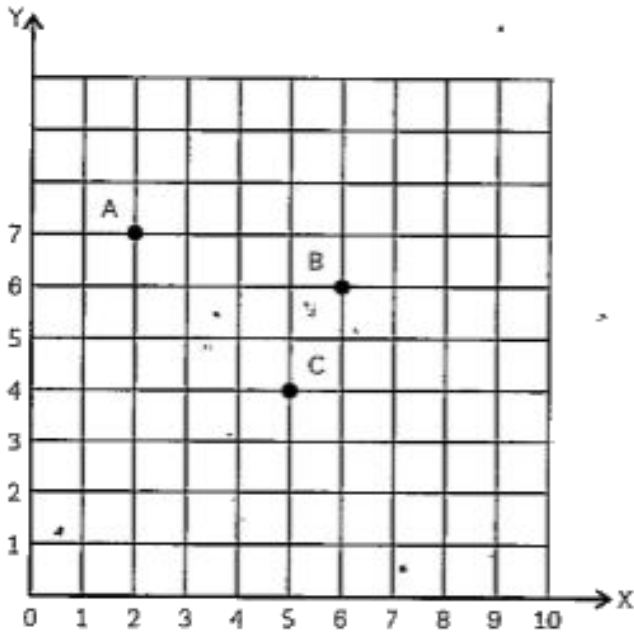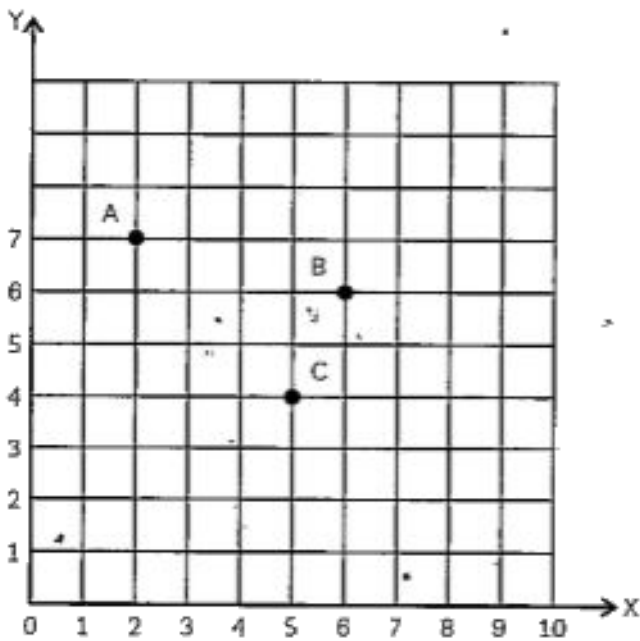
C. $\sqrt{72}units$

D. $\sqrt{145}units$

Answer:

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86. Resident Welfare Association (RWA) of a M2 K Society in Azadpur have put up three electric poles A,B and C in a society 's common park near Tower A . Despite these poles ,some parts of the park are still in dark. So , RWA decides to have one more electron pole D in the park.

The position of the fourth pole D so that four points

A,B,C and D form a parallelogram is :

A. (1,4)

B. (1,5)

C. (2,3)

D. (5,1)

Answer:

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87. Resident Welfare Association (RWA) of a M2 K Society in Azadpur have put up three electric poles A,B and C in a society 's common park near Tower A . Despite these poles ,some parts of the park are still in dark. So , RWA decides to have one more electron pole D

in the park.

On the basis of the above information ,answer any four

of the following questions :

The distance between poles A and C is :

A. $\sqrt{18} units$

B. $\sqrt{17} units$
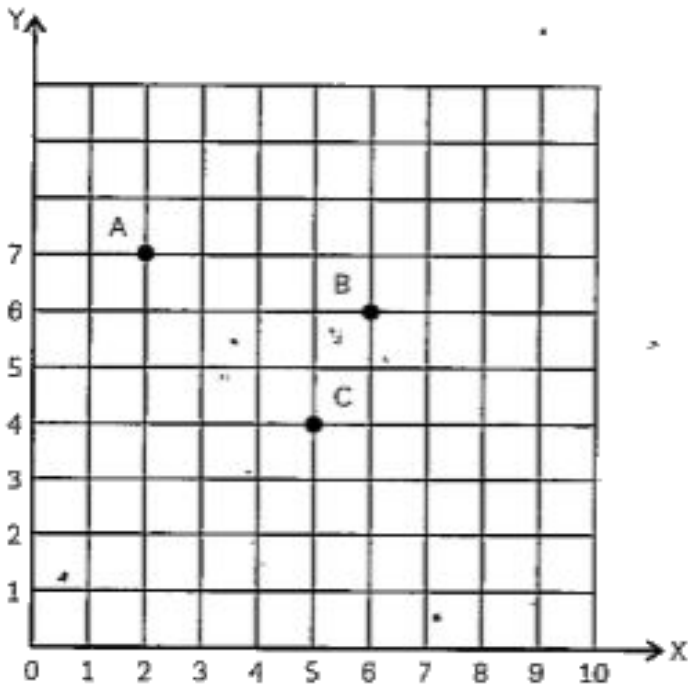
C. $\sqrt{5} units$

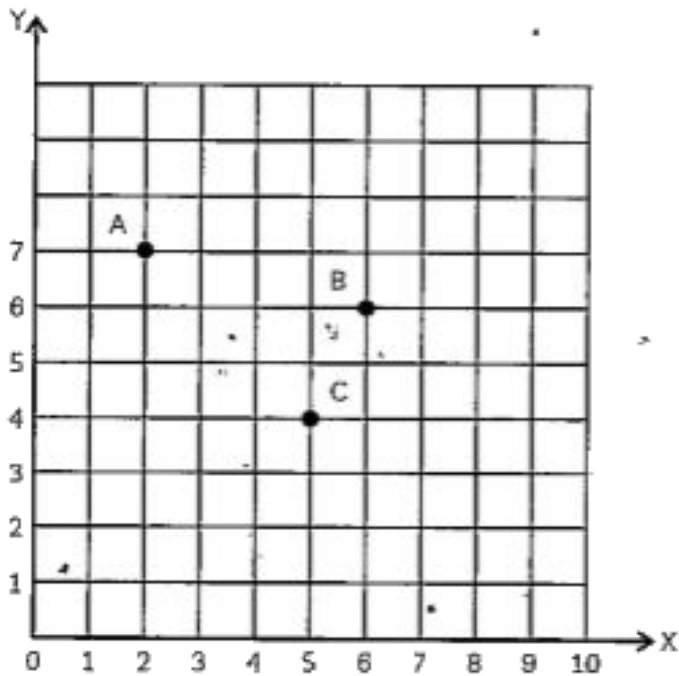D. $\sqrt{34} units$

Answer:

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88. Resident Welfare Association (RWA) of a M2 K

Society in Azadpur have put up three electric poles A,B

and C in a society 's common park near Tower A .

Despite these poles ,some parts of the park are still in

dark. So , RWA decides to have one more electron pole D

in the park.

Plot a point D so that ABCD becomes parallelogram .The

distance between poles B and D is :

A. $\sqrt{24} units$

B. $\sqrt{17} units$

C. $\sqrt{5} units$

D. $\sqrt{26} units$

Answer:

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89. Find the greatest positive integer that will divide 434 and 539 leaving remainders 9 and 12 respectively .

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90. For any positive real number x, prove that there exists an irrational number y such that \`0

91. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a\ \backslash\ \backslash\ b, \backslash\ a, \backslash\ a\ \backslash\ +\ \backslash\ b$, find a and b.

92. The nth terms of an A.P. $\dfrac{1}{m}, \dfrac{m+1}{m}, \dfrac{2m+1}{m}, \dots$ is:

93. If $x = r \sin A \cos C, \; y = r \sin A \sin C$ and $z = r \cos A$, prove that $r^2 = x^2 + y^2 + z^2$

94. $\dfrac{\tan^2 \theta}{(\sec \theta - 1)^2} = \dfrac{1 + \cos \theta}{1 - \cos \theta}$

95. The diameter of a cycle wheel is 21 cm. How many revolutions will it make in moving 66 m ?

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

97. Show that the sum of an A.P. whose first term is a, the second term is b and the last term is c, is equal to `((a+c)(b+c−2a))/(2(b−a))

98. A person on tour has Rs. 4200 for his expenses. If he expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by Rs. 70. Find the original duration of the tour.

99. Theorem 8.10 : The line drawn through the mid-point of one side of a triangle, parallel to another side bisects the third side.

100. Sixteen glass spheres each of radius 2 cm are packed into a cuboidal box of internal dimensions 20 cm $\times$ 10 cm $\times$ 10 cm and then the box is filled with water. Find the volume of water filled in the box.

101. If S is a point on side PQ of a $\triangle PQR$ such that PS = QS = RS, then $PR^2 + QR^2$ = ...

102. If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

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