MATHS

BOOKS - CBSE MODEL PAPER

SAMPLE PAPER 2022

Section A

1. A box contains cards numbered 6 to 50. card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square is

    A. $1/45$

    B. $2/15$

C. $4/45$

D. $1/9$

Answer:

2. In a circle of diameter 42cm,if an arc subtends an angle of $60°$ at the centre where $\prod$ =22/7, then what will be the length of arc.

A. $22/7 cm$

B. $11 cm$

C. $22 cm$

D. $44 cm$

Answer:

3. If $\sin\theta = x$ and $\sec\theta = y,$ then $\cot\theta$ is

A. xy

B. x/y

C. y/x

D. $1/xy$

Answer:

4. The pair of linear equations y = 0 and y =-5 has

A. One solution

B. Two solutions

C. Infinitely many solutions

D. No solution

Answer:

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5. A fair die is thrown once. The probability of even composite number is

A. 0

B. $1/3$

C. $3/4$

D. 1

Answer:

6. 8 chairs and 5 tables cost Rs.10500, while 5 chairs and 3 tables cost Rs.6450. The cost of each chair will be

A. Rs. 750

B. Rs. 600

C. Rs. 850

D. Rs. 900

Answer:

7. If $\cos\theta + \cos^2\theta = 1$, then find the value of $\sin^4\theta + \sin^2\theta$.

A. -1

B. 0

C. 1

D. 2

Answer:

8. The decimal representation of $\dfrac{23}{2^3 \times 5^2}$ will be

A. Terminating

B. Non-terminating

C. Non-terminating and repeating

D. Non-terminating and non-repeating

Answer:

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9. The LCM of $2^3 \times 3^2$ and $2^2 \times 3^3$ is

A. 2^3

B. 3^3

C. $2^3 X 3^3$

D. $2^2 X 3^2$

Answer:

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10. The HCF of two numbers is 18 and their product is 12960. find their LCM.
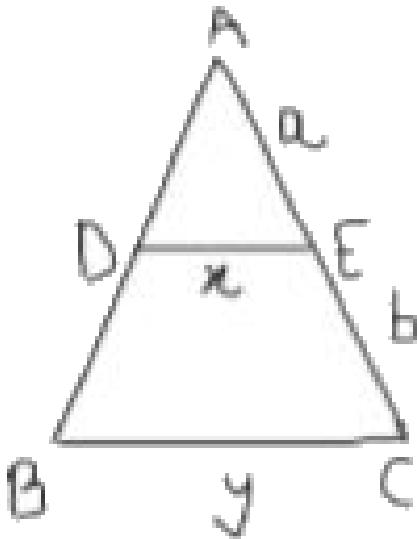
A. 420

B. 600

C. 720

D. 800

Answer:

11. n the given figure, DE II BC. Which of the following is true?

A. $x = \dfrac{a+b}{ay}$

B. $y = \dfrac{ax}{a+b}$

C. $x = \dfrac{ay}{a+b}$

D. $\dfrac{x}{y} = \dfrac{a}{b}$

Answer:

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12. The coordinates of the point P dividing the line segment joining the points A(1, 3) and B(4, 6) in the ratio 2:1 is

A. $(2, 4)$

B. $(4, 6)$

C. $(4, 2)$

D. $(3, 5)$

Answer:

13. The prime factorisation of 3825 is

A. $3 \times 5^2 \times 21$

B. $3^2 \times 5^2 \times 35$

C. $3^2 \times 5^2 \times 17$

D. $3^2 \times 25 \times 17$
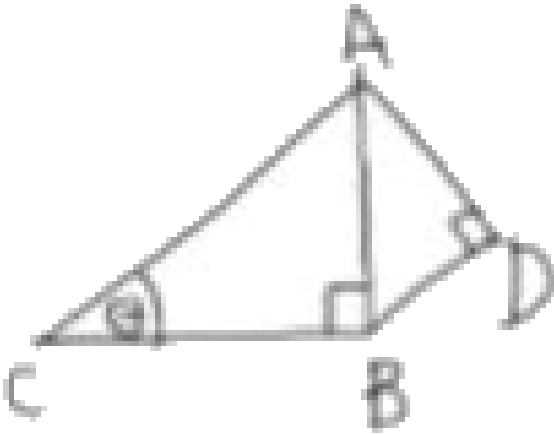
Answer:

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14. In the figure given below, AD=4cm,BD=3cm and CB=12 cm, then cotϴ equals
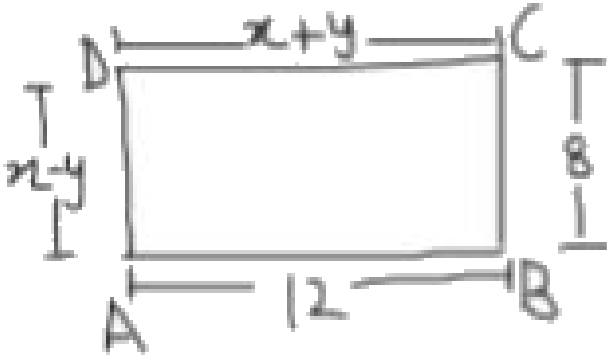
A. $3/4$

B. $5/12$

C. $4/3$

D. $12/5$

Answer:

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15. If ABCD is a rectangle , find the values of x and y

A. $X = 10, y = 2$

B. $X = 12, y = 8$

C. $X = 2, y = 10$

D. $X = 20, y = 0$

Answer:

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16. In an isosceles $\triangle ABC$, if $AC = BC$ and $AB^2 = 2AC^2$ then $\angle C = ?$

A. $30°$

B. $45°$

C. $60°$

D. $90°$

Answer:

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17. If -1 is zero of the polynomial $p(x) = x^2 - 7x - 8$, then the other zero is

A. -8

B. -7

C. 1

D. 8

Answer:

18. In a throw of a pair of dice, the probability of the same number on each die is

A. $1/6$

B. $1/3$

C. $1/2$

D. $5/6$

Answer:

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19. The mid-point of (3p,4) and (-2,2q) is (2,6) . Find the value of p+q

    A. 5

    B. 6

    C. 7

    D. 8

Answer:

20. The decimal expansion of $\dfrac{147}{120}$ will terminate after how many places of decimals?

A. 1

B. 2

C. 3

D. 4

Answer:

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21. The ratio of LCM and HCF of the least composite and the least prime numbers is

A. $1:2$

B. $2 : 1$

C. $1 : 1$

D. $1 : 3$

Answer:

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22. The value of k for which the lines $5x + 7y = 3$ and $15x + 21y = k$ coincide is

A. 9

B. 5

C. 7

D. 18

Answer:

23. A girl walks 200m towards East and then 150m towards North. The distance of the girl from the starting point is

A. 350m

B. 250m

C. 300m

D. 225

Answer:

24. The lengths of the diagonals of a rhombus are 24cm and 32cm, then the length of the altitude of the rhombus is

    A. 12cm

    B. 12.8cm

    C. 19 cm

    D. 19.2cm

Answer:

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25. Two fair coins are tossed. What is the probability of getting at the most one head?

    A. $3/4$

B. $1/4$

C. $1/2$

D. $3/8$

Answer:

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26. $\triangle ABC \sim \triangle PQR.$ If AM and PN are altitudes of $\triangle ABC$ and $\triangle PQR$ respectively and AB^2:

$PQ^2 = 4:9$ then $AM:PN =$

A. $16:81$

B. $4:9$

C. $3:2$

D. $2 : 3$

Answer:

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27. If $2\sin^2\beta - \cos^2\beta = 2$, then β is

A. $0°$

B. $90°$

C. $45°$

D. $30°$

Answer:

28. Prime factors of the denominator of a rational number with the decimal expansion 44.123 are

    A. 2,3

    B. 2,3,5

    C. 2,5

    D. 3,5

Answer:

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29. The lines x = a and y = b, are

    A. intersecting

    B. parallel

C. overlapping

D. (None of these)

Answer:

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30. The distance of point A(-5, 6) from the origin is

A. 11 units

B. 61 units

C. $\sqrt{11}$ units

D. $\sqrt{61}$ units

Answer:

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31. If $a^2 = 23/25$, then a is

    A. rational

    B. irrational

    C. whole number

    D. integer

Answer:

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32. If LCM(x, 18) =36 and HCF(x, 18) =2, then x is

    A. 2

B. 3

C. 4

D. 5

Answer:

33. In $\triangle ABC$ right angled at B, if tan $A = \sqrt{3}$, then cos A cos

C- sin A sin C =

A. -1

B. 0

C. 1

D. $\sqrt{3}/2$

Answer:

34. If the angles of $\triangle ABC$ are in ratio 1:1:2, respectively (the largest angle being angle C), then the value of $\dfrac{\sec A}{\csc B} - \dfrac{\tan A}{\cot B}$ is

A. 0

B. $1/2$

C. 1

D. $\sqrt{3}/2$

Answer:

35. The number of revolutions made by a circular wheel of radius 0.7m in rolling a distance of 176m is

    A. 22

    B. 24

    C. 75

    D. 40

Answer:

36. $\triangle ABC$ is such that AB=3 cm, BC= 2cm, CA= 2.5 cm. If $\triangle ABC \sim \triangle DEF$ and EF = 4cm, then perimeter of $\triangle DEF$ is

    A. 7.5 cm

B. 15 cm

C. 22.5 cm

D. 30 cm

Answer:

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37. In the figure, if DE || BC, AD = 3cm, BD = 4cm and BC= 14 cm, then DE equals
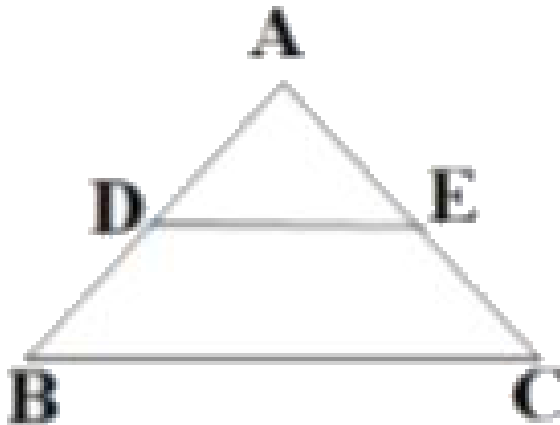
A. 7 cm

B. 6 cm

C. 4 cm

D. 3 cm

Answer:

38. If $4\tan\beta = 3$, then $\dfrac{4\sin\beta - 3\cos\beta}{4\sin\beta + 3\cos\beta} =$

A. 0

B. $1/3$

C. $2/3$

D. $3/4$

Answer:

39. One equation of a pair of dependent linear equations is

$-5x + 7y - 2 = 0$. The second equation can be

A. $10x + 14y + 4 = 0$

B. $-10x - 14y + 4 = 0$

C. $-10x + 14y + 4 = 0$

D. $10x - 14y = -4$

Answer:

40. A letter of English alphabet is chosen at random. What is the probability that it is a letter of the word 'MATHEMATICS'?

A. $4/13$

B. $9/26$

C. $5/13$

D. $11/26$

Answer:

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41. Find the roots of the quadratic equation $3x^2 - 7x - 6 = 0$.

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42. Find the values of k for which the quadratic equation $3x^2 + kx + 3 = 0$ has real and equal roots.

A. 3 and 2

B.

C.

D.

Answer:

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43. Three cubes each of volume $64cm^3$ are joined end to end to form a cuboid. Find the total surface area of the cuboid so formed?

A. $125cm^2$

B. $115cm^2$

C. $225cm^2$

D. $224cm^2$

Answer: D

44. An inter house cricket match was organized by a school. Distribution of runs made by the students is given below. Find the median runs scored.

Runs scored	0-20	20-40	40-60	60-80	80-100
Number of students	4	6	5	3	4

45. Find the common difference of the AP 4,9,14,... If the first term changes to 6 and the common difference remains the same then write the new AP.
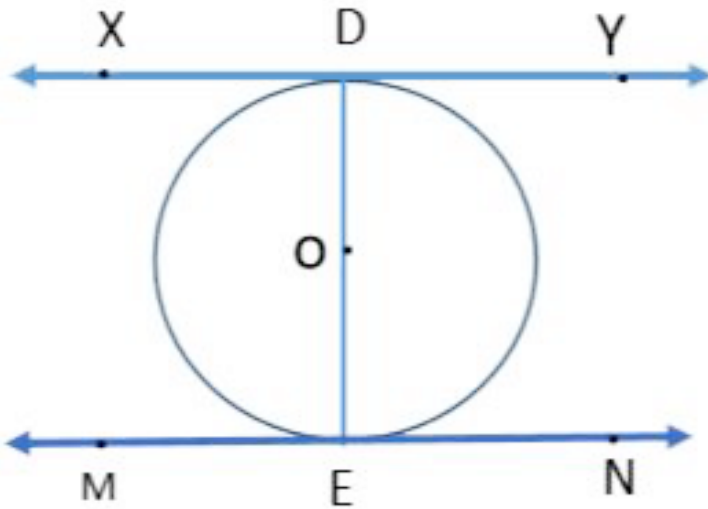
46. The mode of the following frequency distribution is 38. Find the value of x.

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	7	9	12	16	x	6	11

47. XY and MN are the tangents drawn at the end points of the diameter DE of the circle with centre O. Prove that XY ∥ MN.

48. In the given figure, a circle is inscribed in the quadrilateral ABCD. Given AB=6cm, BC=7cm and CD=4cm. Find AD.
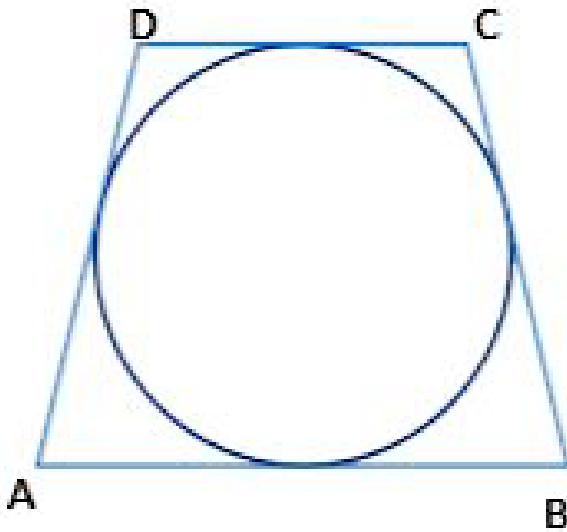
49. Find the value of $a_{25} - a_{15}$ for the AP: 6, 9, 12, 15, ...

50. If 7 times the seventh term of the AP is equal to 5 times the fifth term, then find the value of its 12th term.

A. 4

B. 2

C. 0

D. None

Answer: C

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51. Find the value of m so that the quadratic equation $mx(5x - 6) = 0$ has two equal roots.
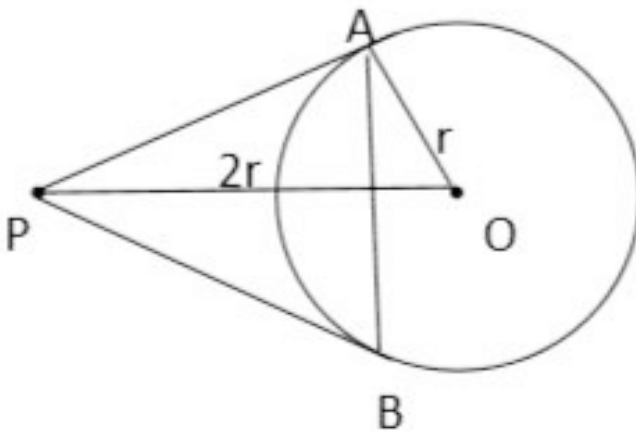
A. 1

B. -1

C. 0

D. None

Answer: C

52. From a point P, two tangents PA and PB are drawn to a circle C(0, r). If OP = 2r, then find $\angle APB$. What type of triangle is APB?

A. scalene

B. equilateral

C. isosceles

D. None

Answer: B

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53. The curved surface area of a right circular cone is $12320cm^2$. If the radius of its base is 56cm, then find its height.

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54. Mrs. Garg recorded the marks obtained by her students in the following table. She calculated the modal marks of the

students of the class as 45. While printing the data, a blank was left. Find the missing frequency in the table given below

Marks Obtained	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100

Number of Students	5	10	---	6	3

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55. If Ritu were younger by 5 years than what she really is, then the square of her age would have been 11 more than five times her present age. What is her present age?

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56. Solve for x: $9x^2 - 6px + (p^2 - q^2) = 0$

Section B

1. The perimeter of a semicircular protractor whose radius is 'r'

is

    A. $\pi + 2r$

    B. $\pi + r$

    C. πr

    D. $\pi r + 2r$

Answer:

2. If P(E) denotes the probability of an event E, then E is called certain event if :

A. $0 < P(E) \leq 1$

B. $0 < P(E) < 1$

C. $0 \leq P(E) \leq 1$

D. $0 \leq P(E) < 1$

Answer:

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3. In $\triangle ABC, \angle B = 90°$ and $BD \perp AC. If AC = 9cm$ and $AD = 3$ cm then BD is equal to

A. $2\sqrt{2}$ cm

B. $3\sqrt{2}$ cm

C. $2\sqrt{3}$ cm

D. $3\sqrt{3}$ cm

Answer:

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4. The pair of linear equations 3x+5y=3 and 6x+ky=8 do not have a solution if

A. $K = 5$

B. $K = 10$

C. $K \neq 10$

D. $K \neq 5$

Answer:

5. If the circumference of a circle increases from $2\prod$ to $4\prod$ then its area _____ the original area

    A. Half

    B. Double

    C. Three times

    D. Four times

Answer:

6. Fiven that $\sin\theta a / b$, then $\tan\theta$ is equal to

A. $\dfrac{b}{\sqrt{a^2 + b^2}}$

B. $\dfrac{b}{\sqrt{b^2 - a^2}}$

C. $\dfrac{a}{\sqrt{a^2 - b^2}}$

D. $\dfrac{a}{\sqrt{b^2 - a^2}}$

Answer:

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7. If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$ then x + y is

A. 3

B. 2

C. 1

D. $1/2$

Answer:

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8. If the difference between the circumference and the radius of a circle is 37cm , $\prod = 22/7,$ the circumference (in cm) of the circle is

A. 154

B. 44

C. 14

D. 7

Answer:

9. The least number that is divisible by all the numbers from 1 to 10 (both inclusive)

    A. 100

    B. 1000

    C. 2520

    D. 5040

Answer:

10. Three bells ring at intervals of 4,7 and 14 minutes. All three range at 6am am. When will they ring together again ?

A. 6 : 07 AM

B. 6 : 14 AM

C. 6 : 28 AM

D. 6 : 25 AM

Answer:

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11. What is the age of father, if the sum of the ages of a father and his son in years is 65 and twice the difference of their ages in years is 50?

A. 40 years

B. 45 year

C. 55 years

D. 65 years

Answer:

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12. What is the value of $(\tan\theta\operatorname{cosec}\theta)^2 - (\sin\theta\sec\theta)^2$

A. -1

B. 0

C. 1

D. 2

Answer:

13. The perimeters of two similar triangles are 26 cm and 39 cm.The ratio of their areas will be

A. $2:3$

B. $6:9$

C. $4:6$

D. $4:9$

Answer:

14. There are 20 vehicles-cars and motorcycles in a parking area. If there are 56 wheels together, how many cars are there?

A. 8

B. 10

C. 12

D. 20

Answer:

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15. A man goes 15 m due west and then 8 m due north. How far is he from the starting point?

A. 7 m

B. 10 m

C. 17 m

D. 23 m

Answer:

16. What is the length of an altitude of an equilateral triangle of side 8cm?

A. $2\sqrt{3}cm$

B. $3\sqrt{3}cm$

C. $4\sqrt{3}cm$

D. $5\sqrt{3}cm$

Answer:

17. If the letters of the word RAMANUJAN are put in a box and one letter is drawn at random. The probability that the letter is A is

A. $3/5$

B. $1/2$

C. $3/7$

D. $1/3$

Answer:

18. Area of a sector of a circle is 1/6 to the area of circle. Find the degree measure of its minor arc.

A. $90°$

B. $60°$

C. $45°$

D. $30°$

Answer:

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19. A vertical stick 20 m long casts a shadow 10m long on the ground. At the same time, a tower casts a shadow 50m long on

the ground. The height of the tower is (a) 100m (b) 120m (c) 25m (d) 200m

A. 30 m

B. 50 m

C. 80 m

D. 100 m

Answer:

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20. What is the solution of the pair of linear equations 37x+43y=123, 43x+37y=117?

A. $x = 2, y = 1$

B. $x = -1, y = 2$

C. $x = -2, y = 1$

D. $x = 1, y = 2$

Answer:

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21. The sum of two numbers is 1215 and their HCF is 81. How many such pairs of numbers can be formed ?

A. 2

B. 3

C. 4

D. 5

Answer:

22. Given below is the graph representing two linear equations

by lines AB and CD respectively. What is the area of the triangle

formed by these two lines and the line x=0?
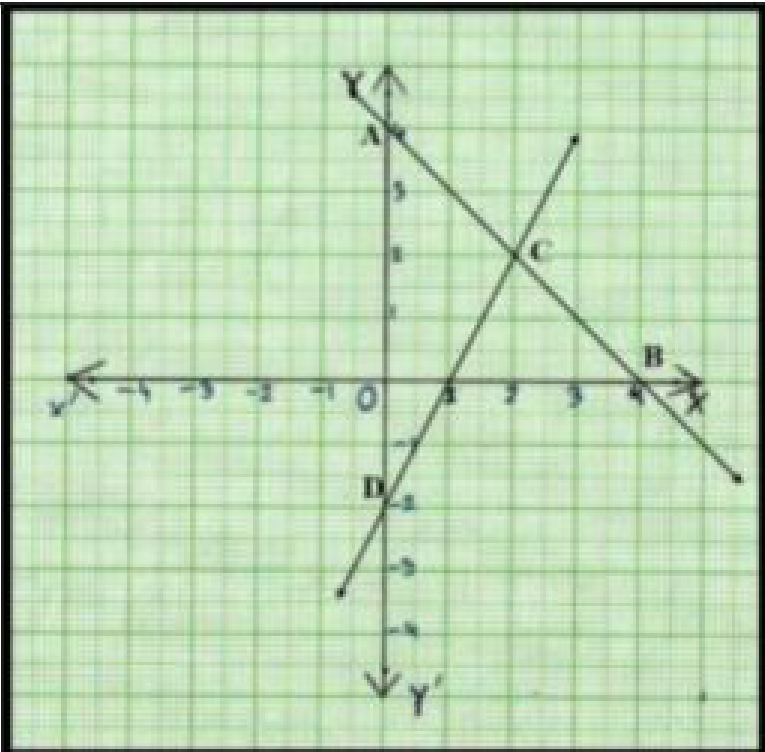
A. 3sq. units

B. 4sq. units

C. 6sq. units

D. 8sq. units

Answer:

23. If $\tan\alpha + \cot\alpha = 2$, then $\tan^{20}\alpha + \cot^{20}\alpha =$

A. 0

B. 2

C. 20

D. 2^{20}

Answer:

24. If 217x + 131y = 913, 131x + 217y = 827, then x + y is

A. 5

B. 6

C. 7

D. 8

Answer:

25. The LCM of two prime numbers p and q (p $>$ q) is 221. Find the value of 3p - q.

A. 4

B. 28

C. 38

D. 48

Answer:

26. A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is neither a king nor a queen

A. $11/13$

B. $12/13$

C. $11/26$

D. $11/52$

Answer:

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27. Two fair dice are rolled simultaneously. The probability that

5 will come up at least once is

A. $5/36$

B. $11/36$

C. $12/36$

D. $23/36$

Answer:

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28. If $1 + \sin^2 \alpha = 3 \sin \alpha \cos \alpha$, then values of $\cot \alpha$ are

A. $-1, 1$

B. $0, 1$

C. $1, 2$

D. $-1, -1$

Answer:

29. The vertices of a parallelogram in order are A(1,2), B(4, y), C(x, 6) and D(3,5). Then (x, y) is

A. (6, 3)

B. (3, 6)

C. (5, 6)

D. (1, 4)

Answer:

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30. In the given figure, $\angle ACB = \angle CDA, AC = 8cm, AD = 3cm,$ then BD is
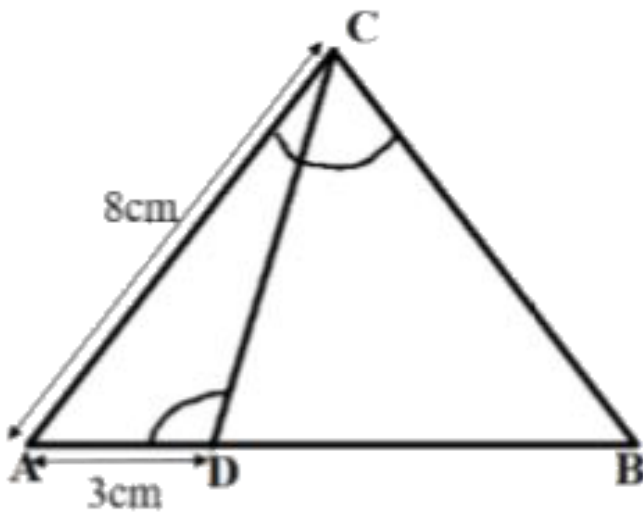
A. $22/3$ cm

B. $26/3$ cm

C. $55/3$ cm

D. $64/3$ cm

Answer:

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31. The equation of the perpendicular bisector of line segment joining points A(4,5) and B(-2,3) is

    A. $2x - y + 7 = 0$

    B. $3x + 2y - 7 = 0$

    C. $3x - y - 7 = 0$

    D. $3x + y - 7 = 0$

Answer:

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32. In the given figure, D is the mid-point of BC, then the value of $\dfrac{\cot y^\circ}{\cot x^\circ}$ is
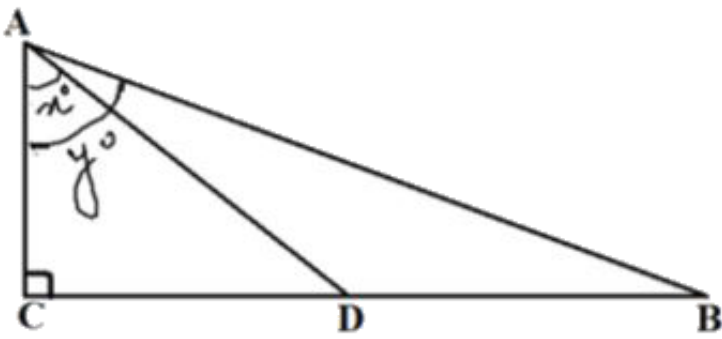
A. 2

B. $1/2$

C. $1/3$

D. $1/4$

Answer:

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33. The smallest number by which 1/13 should be multiplied so

that its decimal expansion terminates after two decimal places

is

A. $13/100$

B. $13/10$

C. $10/13$

D. $100/13$

Answer:

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34. Sides AB and BE of a right triangle, right angled at B are of lengths 16 cm and 8 cm respectively. The length of the side of

largest square FDGB that can be inscribed in the triangle ABE is
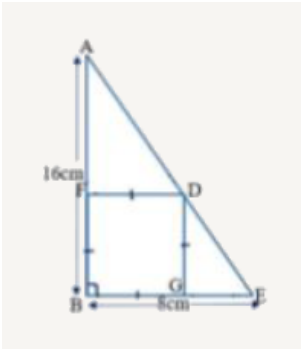
A. $32/3$ cm

B. $16/3$ cm

C. $8/3$ cm

D. $4/3$ cm

Answer:

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35. Point P divides the line segment joining R(-1, 3) and S(9,8) in ratio k:1. If P lies on the line x − y +2=0, then value of k is

A. $2/3$

B. $1/2$

C. $1/3$

D. $1/4$

Answer:

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36. In the figure given below, ABCD is a square of side 14 cm with E, F, G and H as the mid points of sides AB, BC, CD and DA

respectively. The area of the shaded portion is
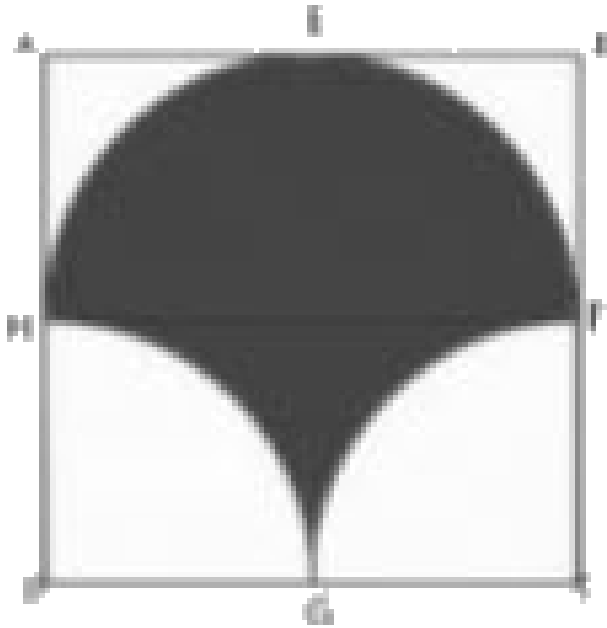
A. $44cm^2$

B. $49cm^2$

C. $98cm^2$

D. $49\pi / 2cm^2$

Answer:

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37. Given below is the picture of the Olympic rings made by taking five congruent circles of radius 1cm each, intersecting in such a way that the chord formed by joining the point of intersection of two circles is also of length 1cm. Total area of all the dotted regions assuming the thickness of the rings to be negligible is

A. $4\left(\pi/12 - \sqrt{3}/4\right)cm^2$

B. $\left(\pi/6 - \sqrt{3}/4\right)cm^2$

C. $4\left(\pi/6 - \sqrt{3}/4\right)cm^2$

D. $8\left(\pi/6 - \sqrt{3}/4\right)cm^2$

Answer:

38. If 2 and $1/2$ are the zeros of $px^2 + 5x + r$, then

    A. p = r = 2

    B. p = r = - 2

    C. p = 2, r= -2

    D. p = -2, r= 2

Answer:

39. The circumference of a circle is 100 cm. The side of a square inscribed in the circle is

A. $50\sqrt{2}cm$

B. $100/\pi cm$

C. $50\sqrt{2}/\pi cm$

D. $100\sqrt{2}/\pi cm$

Answer:

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40. The number of solutions of $3^{x+y} = 243$ and $243^{x-y} = 3$

is

A. 0

B. 1

C. 2

D. infinite

Answer:

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41. An AP 5, 8, 11...has 40 terms. Find the last term. Also find the sum of the last 10 terms.

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42. A tree is broken due to the storm in such a way that the top of the tree touches the ground and makes an angle of $30°$ with the ground. Length of the broken upper part of the tree is 8 meters. Find the height of the tree before it was broken.

43. Two poles of equal height are standing opposite each other on either side of the road 80m wide. From a point between them on the road the angles of elevation of the top of the two poles are respectively $60°$ and $30°$. Find the distance of the point from the two poles.

44. PA and PB are the tangents drawn to a circle with centre O. If PA= 6 cm and $\angle APB = 60°$, then find the length of the

chord AB.
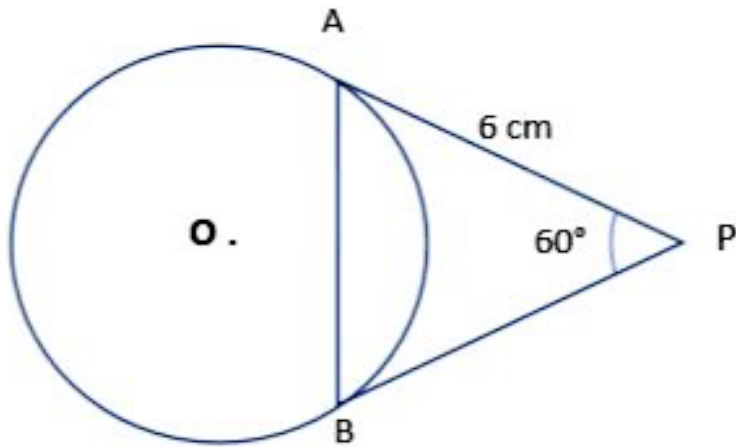
A. 6 cm

B. 2 cm

C. 5 cm

D. 3 cm

Answer: A

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45. The sum of the squares of three positive numbers that are consecutive multiples of 5 is 725. Find the three numbers.

46. Following is the distribution of the long jump competition in which 250 students participated. Find the median distance jumped by the students. Interpret the median

Distance (in m)	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5
Number of Students	40	80	62	38	30

47. Construct a pair of tangents to a circle of radius 4cm, which are inclined to each other at an angle of $60°$.

48. The distribution given below shows the runs scored by batsmen in one-day cricket matches. Find the mean number of runs.

Runs scored	0 - 40	40 - 80	80 - 120	120 - 160	160 - 200
Number of batsmen	12	20	35	30	23

49. Two vertical poles of different heights are standing 20m away from each other on the level ground. The angle of elevation of the top of the first pole from the foot of the second pole is $60°$ and angle of elevation of the top of the

second pole from the foot of the first pole is $30°$. Find the difference between the heights of two poles. (Take $\sqrt{3} = 1.73$)

A. 23.06

B. 26

C. 24

D. None

Answer: A

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50. A boy 1.7 m tall is standing on a horizontal ground, 50 m away from a building. The angle of elevation of the top of the building from his eye is $60°$. Calculate the height of the building. (Take $\sqrt{3} = 1.73$)
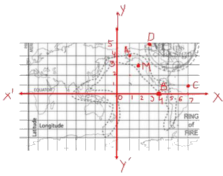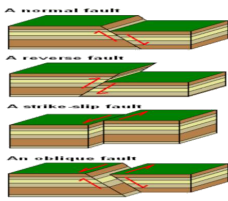
Section C Case Study Based Questions

1. The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.

Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid movement on active faults is the cause of most earthquakes.

A normal fault

A reverse fault

A strike-slip fault

An oblique fault

Positions of some countries in the Pacific ring of fire is shown in the square grid below.
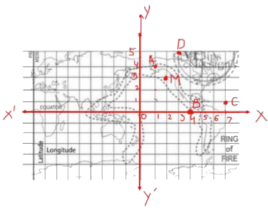
Based on the given information, answer the questions

The distance between the point Country A and Country B is

A. 4 units
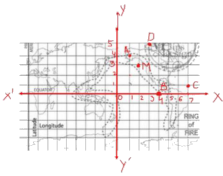
B. 5 units

C. 6 units

D. 7 units

Answer:

2. The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.

Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid movement on active faults is the cause of most earthquakes.

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Positions of some countries in the Pacific ring of fire is shown in the square grid below.

Based on the given information, answer the questions

Find a relation between x and y such that the point (x,y) is equidistant from the Country C and Country D

A. $x - y = 2$

B. $x + y = 2$

C. $2x - y = 0$

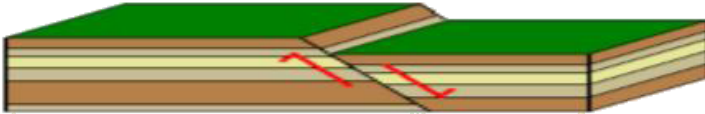D. $2x + y = 2$

Answer:

3. The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.
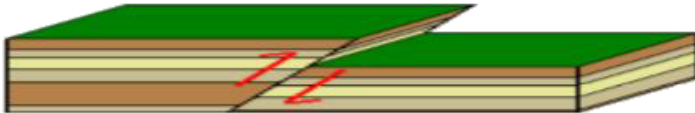

Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid movement on active faults is the cause of most earthquakes.
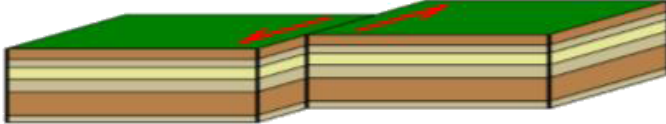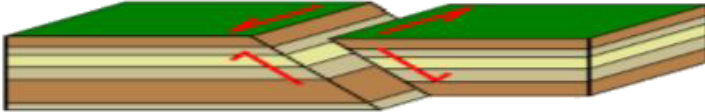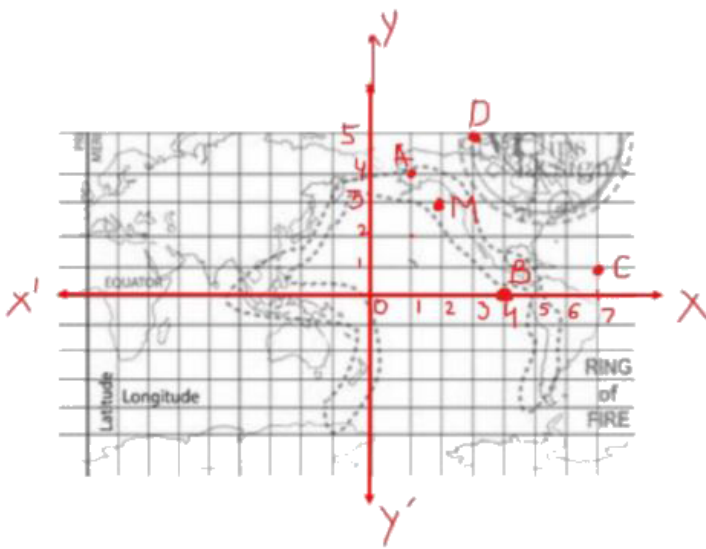
A normal fault

A reverse fault

A strike-slip fault

An oblique fault

Positions of some countries in the Pacific ring of fire is shown in the square grid below.

Based on the given information, answer the questions

The fault line 3x + y − 9 = 0 divides the line joining the Country P(1, 3) and Country Q(2, 7) internally in the ratio

A. 3 : 4

B. 3 : 2

C. 2 : 3

D. 4 : 3

Answer:

4. The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.

Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid movement on active faults is the cause of most earthquakes.

Fault Lines

Positions of some countries in the Pacific ring of fire is shown in the square grid below.

Based on the given information, answer the questions

The distance of the Country M from the x-axis is

A. 1 units

B. 2 units

C. 3 units

D. 5 units

Answer:

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5. The Pacific Ring of Fire is a major area in the basin of the Pacific Ocean where many earthquakes and volcanic eruptions occur. In a large horseshoe shape, it is associated with a nearly continuous series of oceanic trenches, volcanic arcs, and volcanic belts and plate movements.
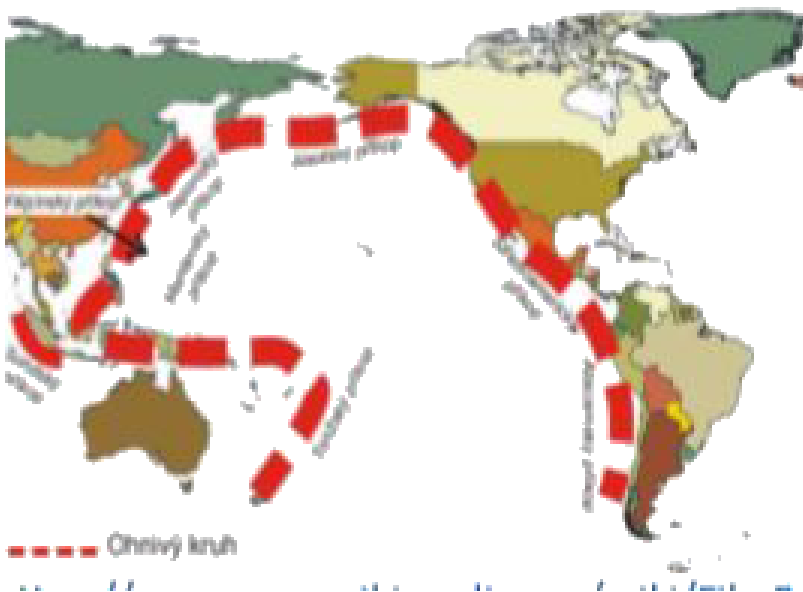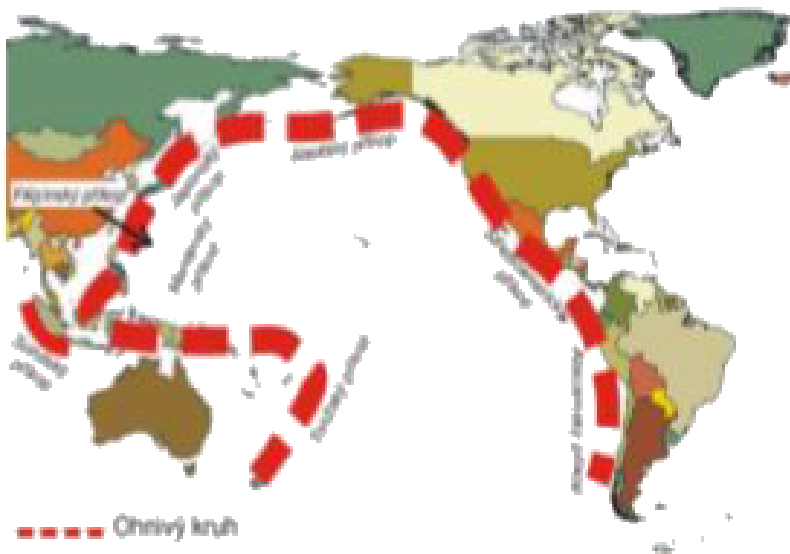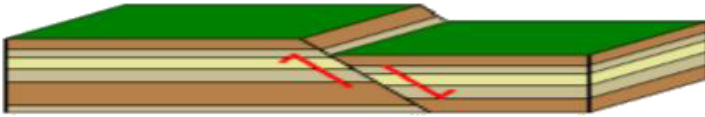

Large faults within the Earth's crust result from the action of plate tectonic forces, with the largest forming the boundaries between the plates. Energy release associated with rapid
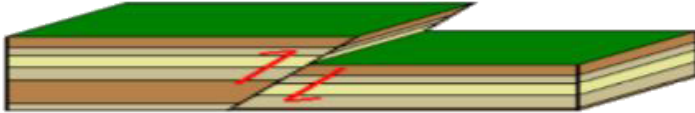
movement on active faults is the cause of most earthquakes.
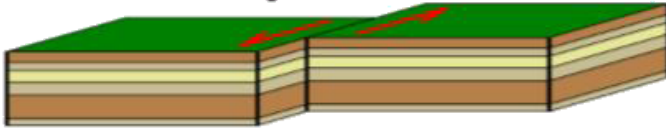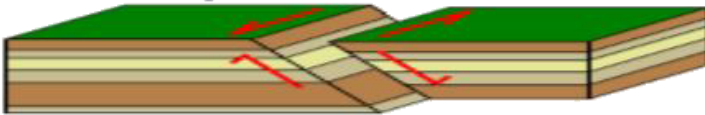
Fault Lines

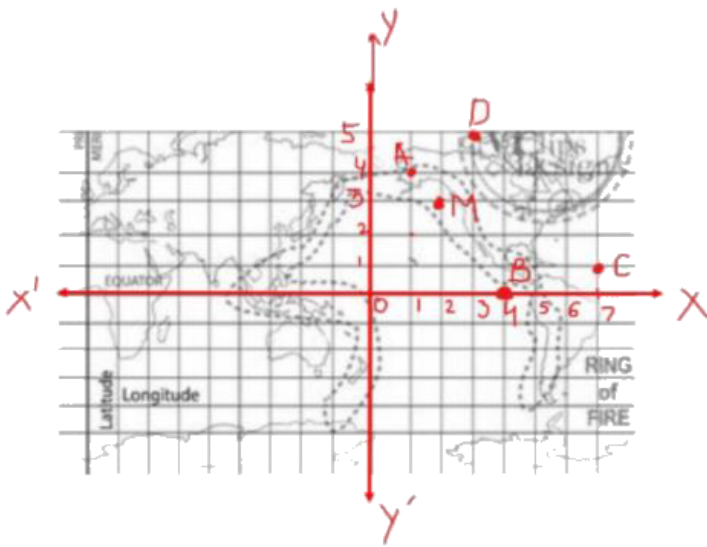A normal fault

A reverse fault

A strike-slip fault

An oblique fault

Positions of some countries in the Pacific ring of fire is shown in the square grid below.

Based on the given information, answer the questions

What are the co-ordinates of the Country lying on the mid-point of Country A and Country D?

A. $(1, 3)$
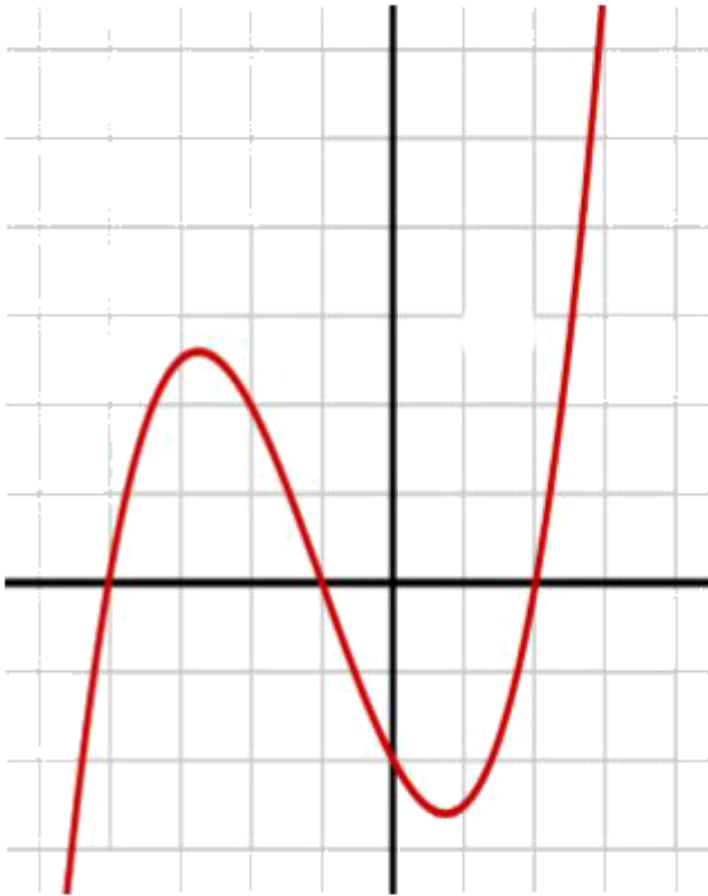
B. $(2, 9/2)$

C. $(4, 5/2)$

D. $(9/2, 2)$

Answer:

6. Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.

If the Roller Coaster is represented by the following graph

y=p(x) , then name the type of the polynomial it traces.

(a) Linear

A. Linear

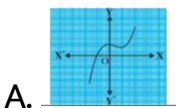B. Quadratic

C. Cubic

D. Bi-quadratic

Answer:

7. Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.

The Roller Coasters are represented by the following graphs y=p(x). Which Roller Coaster has more than three distinct zeroes?

A.

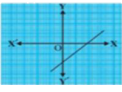B.

C.

D.

Answer:

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8. Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.
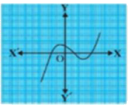
If the Roller Coaster is represented by the cubic polynomial $t(x) = px^3 + qx^2 + rx + s$, then which of the following is always true

    A. $s \neq 0$

    B. $p \neq 0$

    C. $q \neq 0$

    D. $p \neq 0$

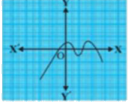**Answer:**

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9. Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.

If the path traced by the Roller Coaster is represented by the above graph y=p(x), find the number of zeroes?
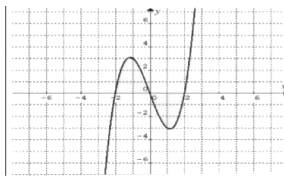
A. 0

B. 1

C. 2

D. 3

Answer:

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10. Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involving them. Since, polynomials are used to describe curves of various types engineers use polynomials to graph the curves of roller coasters.
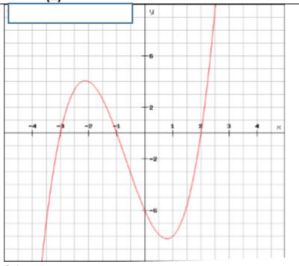
A. $-3, \ -6, \ -1$

B. $2, \ -6, \ -1$

C. $-3, \ -1, 2$

D. $3, 1, \ -2$

Answer:

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Section C

1. Construct two concentric circles of radii 3cm and 7cm. Draw two tangents to the smaller circle from a point P which lies on the bigger circle.

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2. Draw a pair of tangents to a circle of radius 6cm which are inclined to each other at an angle of $60°$. Also find the length of the tangent.

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3. The following age wise chart of 300 passengers flying from Delhi to Pune is prepared by the Airlines staff.

Age	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 passengers	14	44	82	134	184	245	287	300

Find the mean age of the passengers.

A. 45

B. 42

C. 41.7

D. 25

Answer: C

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4. A lighthouse is a tall tower with light near the top. These are often built on islands, coasts or on cliffs. Lighthouses on water

surface act as a navigational aid to the mariners and send warning to boats and ships for dangers. Initially wood, coal would be used as illuminators. Gradually it was replaced by candles, lanterns, electric lights. Nowadays they are run by machines and remote monitoring.

Prongs Reef lighthouse of Mumbai was constructed in 1874-75. It is approximately 40 meters high and its beam can be seen at a distance of 30 kilometres. A ship and a boat are coming towards the lighthouse from opposite directions. Angles of depression of flash light from the lighthouse to the boat and the ship are $30°$ and $60°$ respectively.
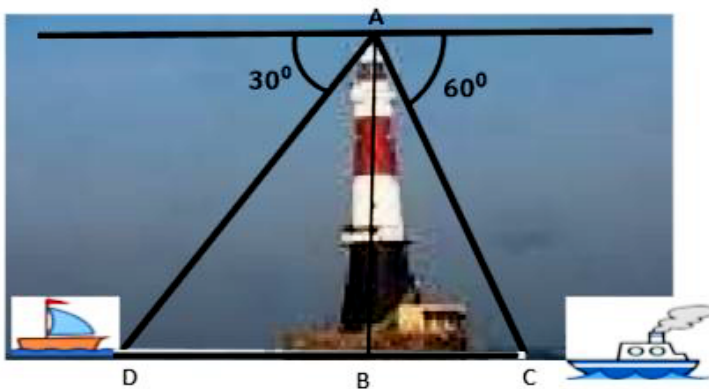
Find the mean age of the passengers.

i) Which of the two, boat or the ship is nearer to the light house. Find its distance from the lighthouse?

ii) Find the time taken by the boat to reach the light house if it is moving at the rate of 20 km per hour.

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5. Krishnanagar is a small town in Nadia District of West Bengal. Krishnanagar clay dolls are unique in their realism and quality of their finish. They are created by modelling coils of clay over a metal frame. The figures are painted in natural colours and their hair is made either by sheep's wool or jute. Artisans make models starting from fruits, animals, God, goddess, farmer, fisherman, weavers to Donald Duck and present comic characters. These creations are displayed in different national and international museums.

Doll-1 Doll-2 Doll-3 Doll-4

The ratio of diameters of red spherical apples in Doll-1 to that of spherical oranges in Doll-2 is 2:3. In Doll-3, male doll of blue colour has cylindrical body and a spherical head. The spherical head touches the cylindrical body. The radius of both the spherical head and the cylindrical body is 3cm and the height of the cylindrical body is 8cm. Based on the above information answer the following questions:

i) What is the ratio of the surface areas of red spherical apples in Doll-1 to that of spherical oranges in Doll-2.?

ii) The blue doll of Doll-3 is melted and its clay is used to make the cylindrical drum of Doll-4. If the radius of the drum is also 3cm, find the height of the drum.

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6. The internal and external radii of a spherical shell are 3cm and 5cm respectively. It is melted and recast into a solid cylinder of diameter 14cm, find the height of the cylinder. Also find the total surface area of the cylinder.
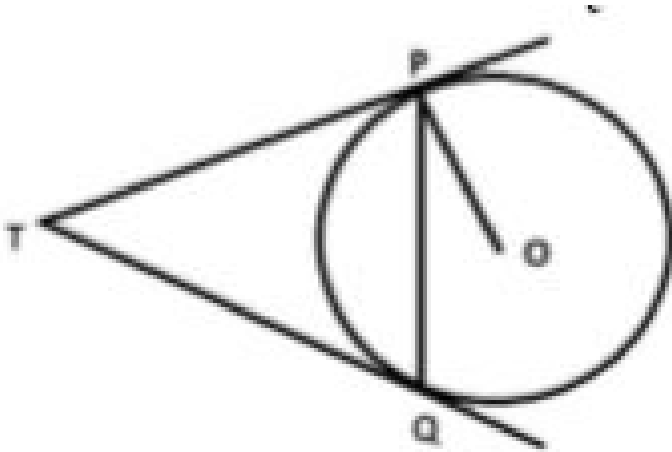
(Take $\pi = \dfrac{22}{7}$)

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7. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact to the centre.

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

9. Case Study-1

Trigonometry in the form of triangulation forms the basis of navigation, whether it is by land, sea or air. GPS a radio navigation system helps to locate our position on earth with the help of satellites.

A guard, stationed at the top of a 240m tower, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes(tilt). The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be $30°$.

(Lighthouse of Mumbai Harbour. Picture credits - Times of India Travel)

i) Make a labelled figure on the basis of the given information and calculate the distance of the boat from the foot of the observation tower.

ii) After 10 minutes, the guard observed that the boat was approaching the tower and its distance from tower is reduced by $240(\sqrt{3} - 1)$m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the observation tower?

10. Case Study-2

Push-ups are a fast and effective exercise for building strength. These are helpful in almost all sports including athletics. While the push-up primarily targets the muscles of the chest, arms, and shoulders, support required from other muscles helps in toning up the whole body.
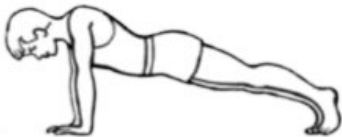
Nitesh wants to participate in the push-up challenge. He can currently make 3000 push-ups in one hour. But he wants to achieve a target of 3900 push-ups in 1 hour for which he practices regularly. With each day of practice, he is able to make 5 more push-ups in one hour as compared to the previous day. If on first day of practice he makes 3000 push-ups and continues to practice regularly till his target is achieved. Keeping the above situation in mind answer the following questions:

i) Form an A.P representing the number of push-ups per day and hence find the minimum number of days he needs to practice before the day his goal is accomplished?

ii) Find the total number of push-ups performed by Nitesh up to the day his goal is achieved.