SAMPLE PAPER –1 (SA II) MRS.NALNI SARAF KV BANTALAB

Mathematics

CLASS : X

Time: 3hrs　　　　　　　　　　　　　　　　Max. Marks: 90

General Instruction:-

1. All questions are Compulsory.

1. The question paper consists of 34 questions divided into 4 sections, A,B,C and D. Section – A comprises of 8 questions of 1 mark each. Section-B comprises of 6 questions of 2 marks each and Section- D comprises of 10 questions of 4 marks each.
2. Question numbers 1 to 8 in Section –A multiple choice questions where you are to select one correct option out of the given four.
3. There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.
4. Use of calculator is not permitted.

SECTION –A

Question numbers 1 to 8 carry 1 mark each. For each of the question numbers 1 to 8, four alternative choices have been provided, of which only one is correct. Select the correct choice.

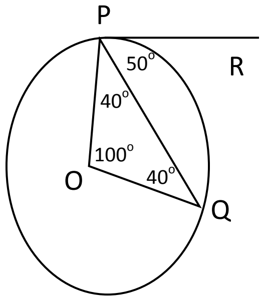
Q1. If the numbers n - 2, 4n - 1 and 5n + 2 are in A.P., then the value of n is :

(A) 1　　(B) 2　　(C) 3　　(D) 0

Q2.To divide a line segment PQ in the ratio 3 : 4, first a ray PX is drawn so that ∠QPX an acute angle and then at equal distances points are marked on the ray PX such that the minimum number of these points is :

(A) 7　　(B) 4　　(C) 5　　(0) 3

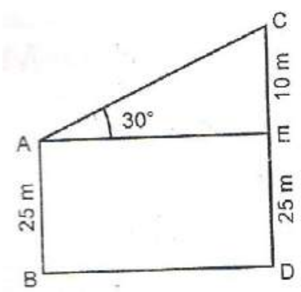
Q3. In the given figure, if O is the centre of a circle, PQ is a chord and the tangent PR at P makes an angle of 50° with PQ, then ∠POQ is equal to:



(A) 100°　　(B) 80°
(C) 90°　　(D) 75°

Q4.The tops of two poles with heights 25 m and 35 m are connected by a wire, which makes an angle of elevation of 30° at the top of 25 m pole. Then the length of the wire is:

(A)26m　　(B)35m　　(C)15m(D)20m



Q5. One coin is tossed thrice. The probability of getting neither 3 heads nor 3 tails, is:

(A) 1/3 (B) ¾ (C) ½ (D) 2/3

Q6.Value of p so that the point (3, p) lies on the line 2x – 3y = 5 is :

(A) 12 (B)√3 (C) 1/3 (D) ½

Q.7 For a race of 1540 m, number of rounds one have to take on a circular track of radius 35m:

(A) 5 (B) 6 7 (C) 7 (D) 10

Q8. Twelve solid spheres of the same size are made by melting a solid metallic cylinder of base diameter 2 cm and height 16 cm. The diameter of each sphere is:

(A) 4 cm (B) 3 cm (C) 2 cm (D) 6 cm

SECTION-B

Question numbers 9 to 14 carry 2 marks each.

Q9. **Solve the following quadratic equation by factorisation:**

$\frac{2}{x^2} - \frac{5}{x} + 2 = 0; \ (x \neq 0)$

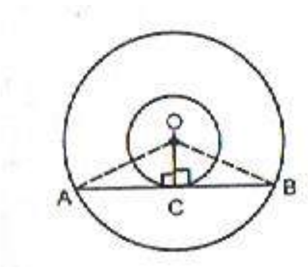
Or

Find the roots of the following quadratic equation : $(x+3)(x-1) = 3\left(x - \frac{1}{3}\right)$

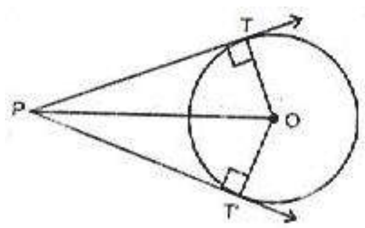
Q10. Find the value of m for which the point with coordinates (3, 5), (m, 6) and $\left(\frac{1}{2}, \frac{15}{2}\right)$ are collinear.

Q11. A horse is tethered to one corner of rectangular grass field 40m by 24 m, by a rope 14m long. Over how much area of the field can it graze?

Q12. In two concentric circles, prove that a chord of a larger circle which is tangent to smaller circle is bisected at the point of contact.



Q13. Find the common difference of an A.P. whose first term is ½ and the 8^{th} term is $\frac{17}{6}$. Also write its 4^{th} term.



Q14. Prove that the lengths of the tangents drawn from an external point to a circle are equal.

SECTION-C

Q15. Onkar gets pocket money, from his father every week and saves ₹ 15 in and on each successive week he increases his saving by ₹ 5 .

(1) Find the amount saved by Omkar in One month

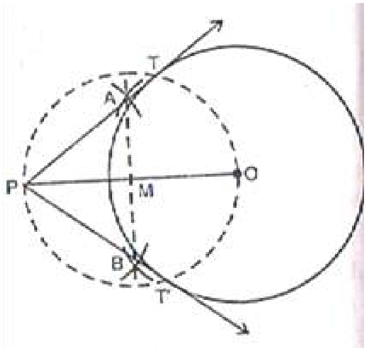
(2) Find the amount saved in one year.

(3) Which quality of Onkar is referred in the given question?

Q16. Find the root of the equation $\frac{4}{x} - 3 = \frac{5}{(2x+3)}$, $x \neq 0, \frac{-3}{2}$

Or

Find two consecutive positive even integers, the sum of whose squares, the sum of whose squares is 340.



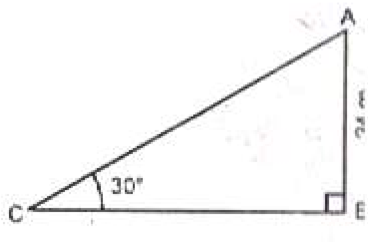
Q17. Draw a circle of radius 3 cm. From a point 5 cm away from its center. Construct the pair of tangents of the circle and measure their length.

Q18. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting:

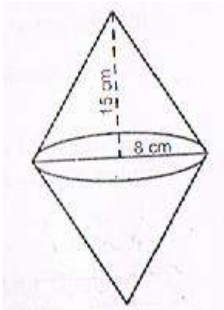
(i) a king (ii) a king of red suit

Or

Two dice are thrown at the same time. Determine the probability that the Difference of the number on the two dice is 2.



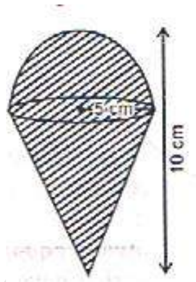
Q19. On seeing a child in first floor of a burning house, a man climbed from the ground along the rope stretched from the top of a vertical tower and tied at the ground. The height of the tower is 24 m and the angle made by the rope to the ground is 30°. Calculate the distance covered by the man to reach the top of the pole. What do you consider the act done by the man to save the child?



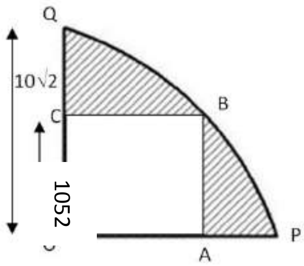
Q20. Two cones with same base radius 8 cm and height 15 cm are joined together along their bases. Find the surface area of the shape

Or

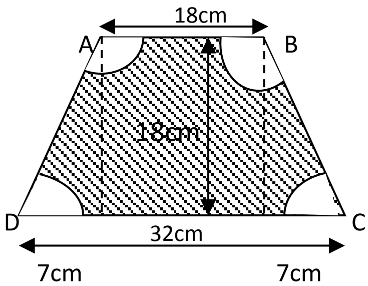
An ice-cream cone having radius 5 cm and height 10 cm as shown in figure. Calculate the volume of ice-cream, provided that its $\frac{1}{6}$ part is left unfiled with ice-cream.



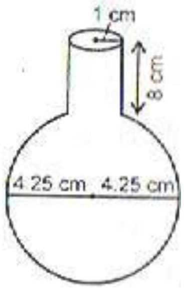
Q21. A square OABC is inscribed in the quadrant OPBQ. If OA = 10 cm, then find the area of the shaded region.



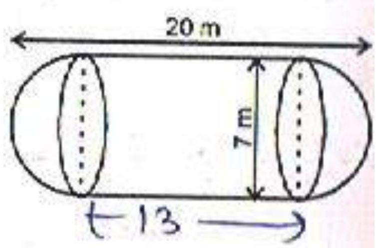
Q22. In the given fig., ABCD is a trapezium with AB||DC, AB=18 cm, DC = 32 cm and distance between AB and DC = 14 cm. If arcs of equal radii 7 cm with centres A,B,C and D have been drawn, then find the area of the shaded region of the figure.



Q23. A spherical glass vessel has a cylindrical neck 8cm long, 2cm in diameter, the diameter of the spherical part is 8.5cm. By measuring the amount of water it holds, a child finds its volume to be 345 cm^3. Check whether she is correct, taking the above as the inside measurements, and π = 3.14.

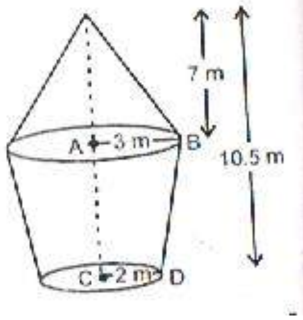


Q24. A storage oil tanker consists of a cylindrical portion 7 m in diameter with two hemispherical ends of the same diameter. The oil tanker lying horizontally. If the total length of the tanker is 20m, then find the capacity of the container.



SECTION-D

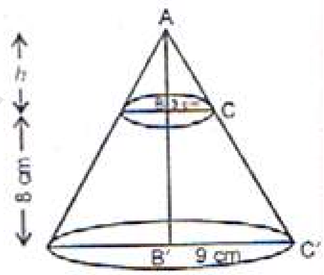
Question numbers 25 to 34 carry 4 marks each.



Q25. **The lower portion of a haystack is an inverted cone frustum and upper part is a cone. Find the total volume of the haystack, If AB = 3 m and CD = 2 m.**

Or

A bucket of height 8 cm is made up of copper sheet is in the form of frustum of cone with radii of its lower and upper ends as 3 cm and 9 cm respectively. Calculate:



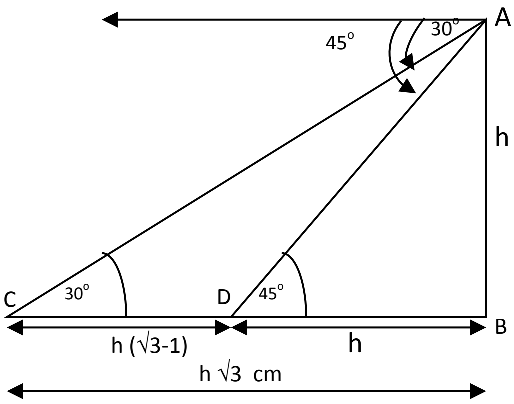
(i) The height of the cone of which the bucket is a part.

(ii) The volume of the water which can be filled in the bucket.

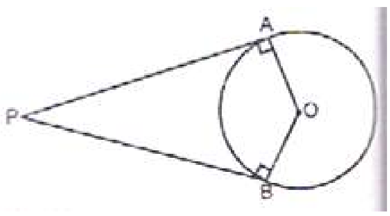
(iii) The area of the copper sheet required to make the bucket.

Q26. **Find four terms in an A.P., whose sum is 20 and the sum of whose squares is 120.**

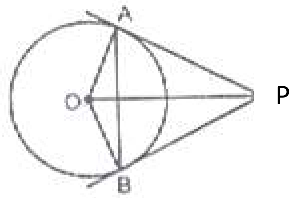
Q27. **A man on the top of a vertical tower observes a car moving at a uniform speed coming directly towards him. If it takes 12 minutes for the angle of depression to change from 30^o to 45°, how soon after this, will the car reach the tower? Give your answer to the nearest second.**



Q28. **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 at the centre.**

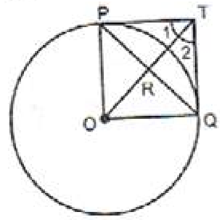


Q29. In the figure, OP is equal to the diameter of the circle. Prove that ABP is an equilateral triangle.



Or

In the figure, PO ⊥ QO. The tangents to the circle with centre O at P and Q intersect at a point T. Prove That PQ and OT are right bisectors of each other.



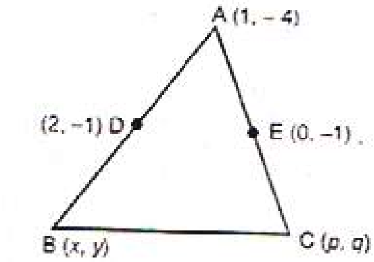
Q30. Swati can row her boat at a speed of 5 km/h in still water. If it takes her 1 hour more to row the boat 5.25 km upstream, then to return downstream, find the speed of the stream.

Q31. A child's game has 8 triangles of which 5 are blue and rest are red and ,10 squares of which 6 are blue and rest are red. One piece is low at random. Find the probability that it is a:

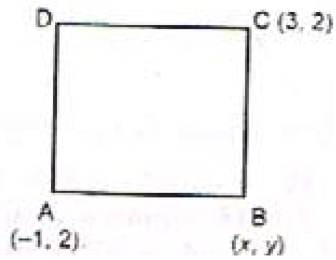
(i) triangle (ii) square

(iii) square of blue colour (iv) triangle of red colour.

Q32. Find the area of the triangle ABC With A(1, -4) and the mid-points of sides through A being (2, -1) and (0, -1)



Q33. The two opposite vertices of a square are (-1, 2) and (3, 2). Find the coordinates of the other two vertices.



Q34. Amar and Gugu together have 45 marbles, Both of them lost 5 marbles each and the product of the number of marbles they now have is 124. We would like to find out how many marbles they had to start with. While playing in the ground you found a purse containing money and some documents what will you do ?

SOLUTION SAMPLE PAPER 1

SECTION –A

Question numbers 1 to 8 carry 1 mark each. For each of the question numbers 1 to 8, four alternative choices have been provided, of which only one is correct. Select the correct choice.

Sol.1 (A) 1

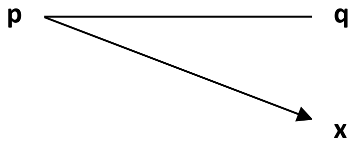
[Since Here, n - 2, 4n - 1 and 5n + 2 are in A.P.

=> 4n - 1 - (n - 2) = 5n + 2 - (4n - 1)

=> 4n - 1 - n + 2 = 5n + 2 - 4n + 1

=> 3n-n = 3-1

=> 2n = 2 => n = 1]



Sol.2 (A) 7

Sol.3 (A) 100°

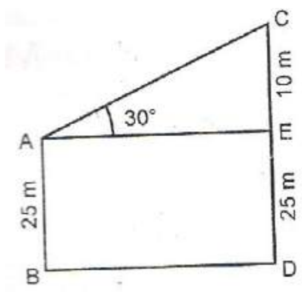
[∵ Here, $\angle OPR\ 90^{o}$ and $\angle RPQ = 50°$

∴ $\angle OPQ = 90^{o} – 50^{o} = 40^{o}$

$\angle OPQ = \angle OQP\ 40^{o}$

Now, $\angle POQ = 180^{o} - 40^{o} - 40^{o} = 100^{o}$]

Sol.4 (D)20m



[∴ Here, CE = 35 – 25 = 10m

and $\angle CAE = 30^{o}$

Now, $\frac{AC}{CE} = \text{cosec } 30^{o}$

AC = CE × 2

= 10 × 2 = 20m

Sol.5 (B) ¾

[Here, sample space = {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}

Now, neither 3 heads nor 3 tails = { HHT, HTH, THH, HTT, THT, TTH}

∴ Required probability = $\frac{6}{8} = \frac{3}{4}$]

Sol.6 (C) $\frac{1}{3}$

[Since (3, p) lies on the line 2x – 3y = 5

⇒ 2(3) – 3p = 5

$\Rightarrow \quad -3p = 5-6$

$\Rightarrow \quad p = \frac{-1}{-3} = \frac{1}{3}$]

Sol.7 (C) 7

[Distance covered in one round = $2 \times \frac{22}{7} \times 35 = 220$ m

Now, number of rounds = $\frac{1540}{220} = 7$]

Sol.8 (C) 2 cm

[Here, Volume of cylinder = $\pi \times 1 \times 1 \times 16 = 16\pi$ cm^3

Now, $12 \times \frac{4}{3}\pi r^3 = 16\pi \Rightarrow r^3 = \frac{16\pi \times 3}{12\pi \times 4} = 1$

$\Rightarrow \quad r = 1$ cm

Thus, radius of the solid sphere is 1cm and diameter of the sphere is 2cm]

SECTION-B

Question numbers 9 to 14 carry 2 marks each.

Sol.9 $\frac{2}{x^2} - \frac{5}{x} + 2 = 0$

$\Rightarrow \quad \frac{2}{x^2} - \frac{4}{x} + \frac{1}{x} + 2 = 0 \quad \Rightarrow \quad \frac{2}{x}\left(\frac{1}{x} - 2\right) - 1\left(\frac{1}{x} - 2\right) = 0$

$\Rightarrow \quad \left(\frac{1}{x} - 2\right)\left(\frac{2}{x} - 1\right) = 0 \quad \Rightarrow \quad \frac{1}{x} - 2 = 0$ or $\frac{2}{x} - 1 = 0$

Or

$(x+3)(x-1) = 3\left(x - \frac{1}{3}\right)$

$x^2+2x-3 = 3x-1 \Rightarrow \quad x^2 - x - 2 = 0$

$x^2 - 2x + x - 2 = 0 \quad \Rightarrow \quad x(x-2) + 1(x-2) = 0$

$(x-2)(x+1) = 0 \Rightarrow \quad x-2=0$ or $x+1=0$

$\Rightarrow \quad x = 2$ or $x = -1$

Sol.10 Let the given points be A(3, 5), B(m, 6) and C$\left(\frac{1}{2}, \frac{15}{2}\right)$ are collinear.

Since given points are collinear.

$\therefore$ Area of triangle ABC formed by these points is zero.

$\Rightarrow \quad \frac{1}{2}\left|3\left(6-\frac{15}{2}\right)+m\left(\frac{15}{2}-5\right)+\frac{1}{2}(5-6)\right| = 0$

$\Rightarrow \quad \left|18-\frac{45}{2}+\frac{15m}{2}-5m+\frac{5}{2}-3\right| = 0 \quad \Rightarrow \quad \left|\frac{36-45+5-6}{2}+\frac{15m-10m}{2}\right| = 0$

$\Rightarrow \quad \left|-5+\frac{5m}{2}\right| = 0 \Rightarrow \frac{5m}{2} = 5$

$\Rightarrow \quad m = 2$

Sol.11 Here, radius (r) = 14 m and $\theta = 90°$

$\therefore$ Area of the field in which horse can graze

$$= \frac{\theta}{360^o} \times \pi r^2 = \frac{90^o}{360^o} \times \frac{22}{7} \times 14 \times 14$$

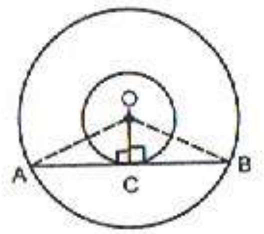
$$= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14 = 154 \text{ m}^2$$

Sol.12 AB is a tangent to the inner circle at point C.

OC is the radius drawn at the point of contact.

$\therefore$ OC $\perp$ AB $\Rightarrow \angle$OCA = $\angle$OCB = 90°

Now, in rt. $\angle$ed ΔAOC and ΔBOC



OA = OB = r

OC = OC [common]

$\angle$OCA = $\angle$OCB [proved above]

$\therefore$ ΔAOC $\cong$ ΔBOC [by RHS congruency rule]

$\Rightarrow$ AC = BC [c.p.c.t]

Hence, chord of a larger circle which is tangent to smaller circle is bisected at the point of contact.

Sol.13 Here, first term (a) = $\frac{1}{2}$

and eighth term a_8 = $\frac{17}{6}$

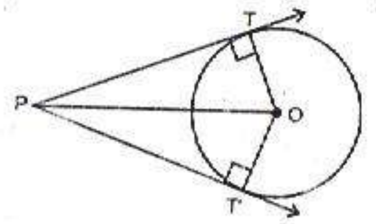
$\Rightarrow$ a + 7d = $\frac{17}{6}$ $\Rightarrow$ $\frac{1}{2} + 7d = \frac{17}{6}$

$\Rightarrow$ 7d = $\frac{17}{6} - \frac{1}{2} = \frac{14}{6}$ $\Rightarrow$ $d = \frac{1}{3}$

Now, $a4 = a + 3d = \frac{1}{2} + 3 \times \frac{1}{3} = \frac{1}{2} + 1 = \frac{3}{2}$

Sol.14 Join PO. TO and TO

In Δ PTO and Δ PTO



TO = T'O = r

OP = PO (common)

$\angle PTO = \angle PTO = 90^o$

$\Delta PTO \cong \Delta PT'O$

(By RHS congruencey axiom)

PT = PT' (C.P.C.T)

SECTION-C

Sol.15 Here, saving after one week₹s 15 and it increases every week₹by 5

So, given savings is an A.P. with firs₹ term 15 and common diff₹rence 5

(i) In one month, we have four weeks

a4=a+3d

= 15 + 3 x 5 = 15 + 15 = 30

Now, S4 = 4/3 (15+30) = ₹90

[Since Sn = n/2[a + 1 or a_n]

(ii) In one year, we have 52 weeks

$\therefore S_{52} = \frac{-52}{2}[2a + (n-1)d] = 26[30 + 51 \times 5]$

= 26 x 285 = 7410

(iii) Savings for future makes individual self dependent.

Sol.16 $\frac{4}{X} - 3 = \frac{5}{(2x+3)}$.

$\frac{4-3x}{X} = \frac{5}{(2x+3)}$. $\Rightarrow (4-3x)(2x+3) = 5x$

$-6x^2 - x + 12 = 5x$

Or $x^2 + x - 2 = 0$

$\Rightarrow x(x+2) - 1(x+2 = 0$

$\Rightarrow x - 1 = 0$ or $x + 2 = 0$

$\Rightarrow x = 1$ or $x = -2$

or

$\Rightarrow 6x^2 + 6x - 12 = 0$

$\Rightarrow x^2 + 2x - x - 2 = 0$

$\Rightarrow (X-1)(x+2) = 0$

Let the two consecutive positive even integers be x and x + 2 according to statement of the question, we have

$X^2 + (X+2)^2 = 340$

$X^2 + X^2 + 4x + 4 - 340 = 0$

$2x^2 + 4x - 336 = 0$

$X^2 + 14x - 12x - 168 = 0$

$\Rightarrow (x-12)(X+14) = 0$

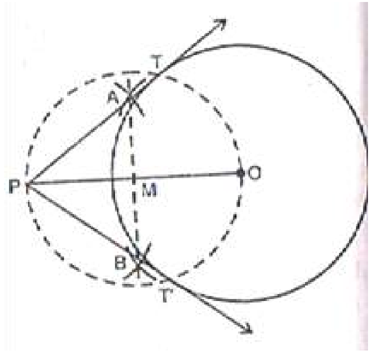
$\Rightarrow X - 12 = 0$ or $x + 14 = 0$

$\Rightarrow X=12$ or $X=-14$ (rejecting , $\because$ given number are positive)

Hence, the required integers are 12 and 14.

Sol.17 **Given:** A circle of radius 3 cm and a points P is 5 cm away from its centre.

Required: A pair of tangents.



Steps of construction:

1. Draw a circle C (0, r) with center O and Radius 3 cm.
2. Take a point P, such that OP = 5 cm,
3. Draw AB, the perpendicular bisector of OP and left it intersects OP in M.
4. With M as centre and PM or MO as radius, draw another circle intersecting the given circle in T and T.
5. Join PT and PT.

Thus, PT and PT are the required tangents from point P to the circle C(0, r).

Sol.18 (i) Number of kings = 4

$\therefore$ Probability (a king) = $\frac{4}{52} = \frac{1}{13}$

(ii) Number of kings of red suit = 2

$\therefore$ Probability (a king) = $\frac{2}{52} = \frac{1}{26}$

Or

Total number of elementary events when two dice are thrown = 6 x 6 = 36

Number of favourable outcomes (difference of the numbers on the two dice is 2)

={(1,3), (2,4), (3,1), (3,5), (4,2), (4,6), (5,3), (6,4)}

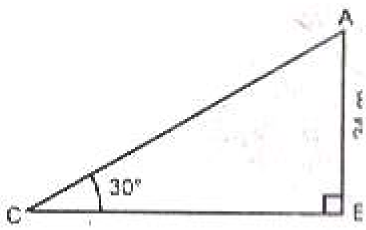
=8

$\therefore$ Required probability = $\frac{8}{36} = \frac{2}{9}$

Sol.19 Let AB be the tower of height 24 m and $\angle ACB = 30^o$

Distance covered by the man along the rope is CA.

Now, in rt. $\angle$ed ΔCBA



$\frac{CA}{AB} = \text{cosec } 30^o$

$CA = AB \text{ cosec } 30^o$

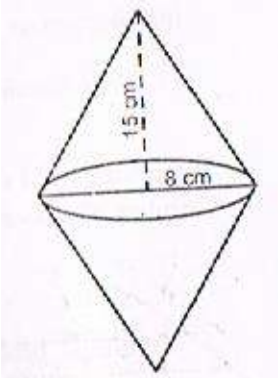
$= 24 \times 2$

$= 48$ m

Thus, distance covered by the man is 48 m.

Sol.20 Radius of two cones (r) =8 cm

Height of two cones (h) =15 cm



Slant height (l) = $\sqrt{r^2 + h^2}$ = $\sqrt{64+225}$

= $\sqrt{289}$ = 17cm

Now, surface area of the shape so obtained

$= 2(\pi rl) = 2 \times \frac{22}{7} \times 8 \times 17$

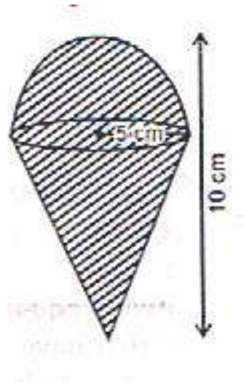
$= 854.86 \text{ cm}^2$

Or

Radius of the conical and spherical portion (r) = 5 cm

$\therefore$ Height of the conical portion (h) = 10- 5 = 5 cm

Now, volume of the ice-cream cone



= Vol. of conical portion

+ Vol. of hemispherical portion

$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3 = \frac{1}{3}\pi r^2 (h+2r)$

$= \frac{1}{3} \times \frac{22}{7} \times 5 \times 5(5+10) = 392.86 \text{ cm}^3$

Volume of the ice-cream $= \left(1 - \frac{1}{6}\right) \times 392.86 = \frac{5}{6} \times 392.86 = 327.38 \text{ cm}^3$

Sol.21 Here, side (OA) of the square = 10 cm

$\therefore$ Diagonal of the square $= 10\sqrt{2}$ cm

Now, area of the shaded region = Area of quadrant OPBQ – Area of square

$= \frac{90^\circ}{360^\circ} \times \frac{22}{7} \times 10\sqrt{2} \times 10\sqrt{2} - 10 \times 10$

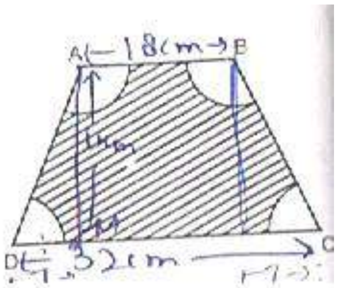
$= \frac{1}{4} \times \frac{22}{7} \times 200 - 100 = 157.14 - 100$

$= 57.14 \text{ cm}^2$

Sol.22 Here, radii of the arcs with centres A, B, C and D = 7 cm.

AB = 18 cm, DC = 32 cm and distance between AB and

DC = 14 cm



Now, area of the shaded region = Area of trapezium ABCD

- Area of circle with radius 7 cm

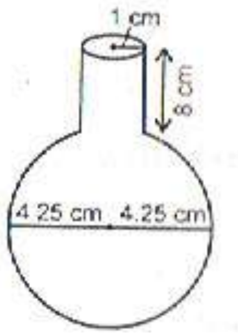
$= \frac{1}{2}(18+32)14 - \frac{22}{7} \times 7 \times 7$

$= 350 - 154 = 196 \text{ cm}^2$

Sol.23 Radius of cylindrical neck = $\frac{2}{2}$ = 1 cm

Height of cylindrical neck = 8 cm

Radius of spherical part = 4.25 cm



$\therefore$ Total volume of water = Volume of spherical part

+ Volume of cylindrical neck

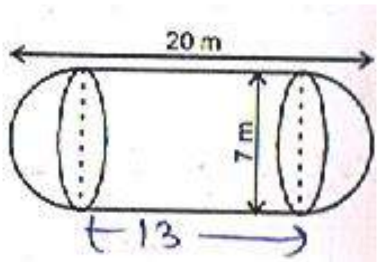
$= \frac{4}{3}\pi r^3 + \pi r^2 h = \frac{4}{3} \times 3.14 \times (4.25)^3 + 3.$

= 321.39 + 25.12 = 346.51 cm3 = 347 cm3 (approx.)

Sol.24 Radius of hemispherical portion = Radius of cylindrical portion = $\frac{7}{2}$ m

Total length of the tanker = 20 m

$\therefore$ Length of cylindrical portion = 20 - 7 = 13 m



Now, Capacity (volume) of the oil tanker

= Volume of cylinder

+ 2 × Volume of hemisphere

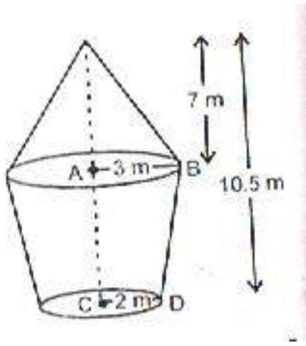
$= \pi r^2 h + 2 \times \frac{2}{3}\pi r^3 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 13 + 2 \times \frac{2}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2}$

= 500.5 + 179.67

$= 680.17 \text{ m}^3$

SECTION-D

Question numbers 25 to 34 carry 4 marks each.



Sol.25 Here, radius of cone (r) = 3 m

Height of cone (h) = 7 m

$\therefore$ Volume of cone = $\frac{1}{3}\pi r2h = \frac{1}{3} \times \frac{22}{7} \times 3 \times 3 \times 7 = 66 \text{ m}^3$

Height of the frustum = 10.5 – 7 = 3.5 m

Now, Volume of the lower portion (frustum of cone) = $\frac{1}{3} \times \frac{22}{7} \times 3.5(3^2+2^2+3\times2)$

$= \frac{11}{3}(9+4+6) = \frac{11}{3} \times 19$

$= 69.67 \text{ m}^3$

Thus, Volume of the haystack= 66 + 69.67 = 135.67 m^3

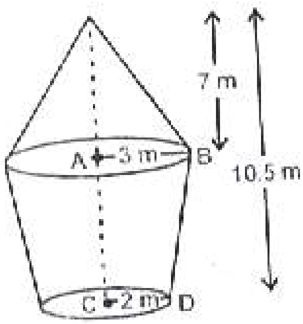
Here, r = 3 cm, R = 9 cm and height of the bucket (h) = 8 cm

Now, slant height (l) = $\sqrt{h^2 + (R-r)^2} = \sqrt{82 + 62} = \sqrt{64 + 36} = \sqrt{100} = 10$ cm

(i) Since $\Delta ABC \sim \Delta AB'C'$

$\Rightarrow \frac{AB}{AB'} = \frac{BC}{B'C'}$

$\Rightarrow \frac{h}{h+8} = \frac{3}{9}$



$\Rightarrow 3h = h + 8$

$\Rightarrow 2h = 8 \Rightarrow h = 4$

Thus, height of the cone is 8 + 4 i.e., 12 cm.

(ii) Volume of the bucket $= \frac{1}{3}\pi h(R^2+r^2+Rr)$

$= \frac{1}{3} \times \frac{22}{7} \times 8(9^2+3^2+9 \times 3)$

$= \frac{1}{3} \times \frac{22}{7} \times 8 \times 117 = 980.57 \text{ cm}^3$

(iii). Surface area of copper sheet= $\pi r^2 + \pi(r + R)l$

$= \frac{22}{7} \times 9 \times \frac{22}{7}(3+9)10$

$= \frac{198}{7} + \frac{2640}{7} = \frac{2838}{7} = 405.43 \text{ cm}^2$

Sol.26 Let the four terms in an A.P., be a-3d, a-d, a+d, a+3d

According to the statement of the question, we have

a-3d+ a-d + a + d + a + 3d = 20

$\Rightarrow$ 4a = 20 $\Rightarrow$ a=5

Also, $(a-3d)^2+(a-d)^2+(a+d)^2+(\ddot{a}+3d)^2 = 120$

$\Rightarrow (5-3d)^2+(5-d)^2+(5+d)^2+(5+3d)^2=120$

$\Rightarrow 25+9d^2-30d+25+d^2-10d+25+d^2+10d+25+9d^2+30d = 120$

$\Rightarrow$ $100 +20d^2= 120$

$\Rightarrow$ $20d^2 = 20 \Rightarrow d = \pm1$

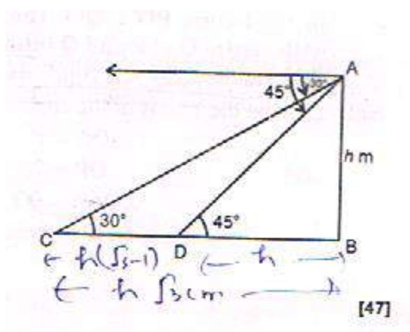
Hence, the four terms are

5-3, 5-1, 5+1, 5+3 i.ë., 2,4,6,8

Or 5+3, 5+1, 5-1, 5-3 i.e., 8, 6, 4, 2

Sol.27 Let AB be the tower of height *h* m.

$\angle ACB = 30°$ and. $\angle ADB = 45^o$



Now, in rt.$\angle$ed ΔADB, we have

$\frac{AB}{DB} = \tan 45^o \Rightarrow \frac{AB}{DB} = 1$

$\Rightarrow$ AB = DB = *h* m

In rt. $\angle$ed ΔCBA, we have

$\frac{AB}{CB} = \tan 30^o$

$\Rightarrow$ AB = CB tan 30^o $\Rightarrow$ $h = (CD + DB)\frac{1}{\sqrt{3}}$

$\Rightarrow$ $\sqrt{3}h = CD + h$ $\Rightarrow$ $CD = (\sqrt{3} - 1)h$

$\therefore$ Speed of the card = $\frac{(\sqrt{3}-1)h}{12}$ m/min

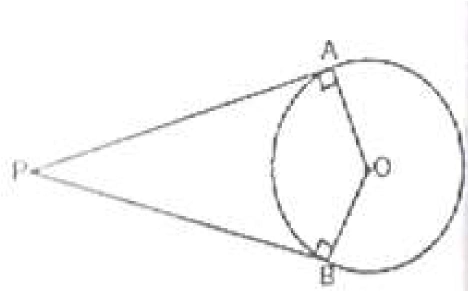
Time taken by the car to reach the tower after point D

$= \frac{h}{\frac{(\sqrt{3}-1)h}{12}} = \frac{12}{\sqrt{3}-1} = \frac{12(\sqrt{3}+1)}{2} = 6 \times 2.732$ min

= 16 minutes 24 secs.

Sol.28 **Given:** Let PA and PB be two tangents drawn from an external point P to the circle with centre O.

To prove: $\angle APB + \angle AOB = 180^\circ$



Proof: Because tangent is perpendicular to the Radius of the circle at point of contact.

$\therefore$ OA $\perp$AP and OB $\perp$BP

$\therefore$ $\angle OAP = \angle OBP = 90^\circ$

Now, $\angle OAP + \angle APB + \angle OBP + \angle AOB = 360^\circ$

$\Rightarrow$ $90^\circ + \angle APB + 90^\circ + \angle AOB = 360^\circ$

$\Rightarrow$ $\angle APB + \angle AOB = 360^\circ - 180^\circ = 180^\circ$

Sol.29 Let r be the radius of the circle.

$\therefore$ OA = r

and OP = 2r [given]

[tangent is perpendicular to the radius through the point of contact]

In right ΔOPA, we have

Sin ($\angle$OPA+ = $\frac{OA}{OP} = \frac{r}{2r} = \frac{1}{2} \Rightarrow \angle OPA = 30^\circ$

Similarly, $\angle OPB = 30^\circ$

$\therefore$ $\angle APB = 30^\circ + 30^\circ = 60^\circ$

Since PA = PB [lengths of tangents from an external point are equal]

$\Rightarrow$ $\angle PAB = \angle PBA$

In ΔAPB, we have

$\angle APB + \angle PAB + \angle PBA = 180^\circ$

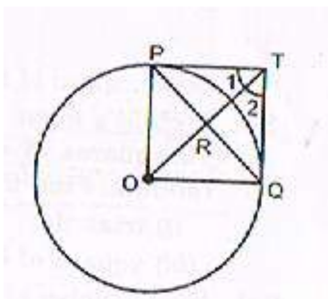
$\Rightarrow$ $60^\circ + 2\angle PAB = 180^\circ$

$\Rightarrow$ $\angle PAB = 60^\circ$

$\angle PAB = 60^\circ$

Since all angle are 60° $\therefore$ ΔABP is equilateral

Or



Since Tangent to any circle is perpendicular to circle at point of contact.

$\angle TPO = \angle TQO = 90^\circ$

In $\angle TPO$ and ΔTQO, we have

$OP = OQ$ [radii of a circle]

$OT = OT$ [common side]

$\therefore$ By RHS congruency, we have

$\Delta TPO = \Delta TQO$

$\angle 1 = \angle 2$ [c.p.c.t.]

Again, in ΔPTR and ΔQTR

$\angle 1 = \angle 2$ [proved above]

$PT = QT$ [tangents from external point]

$TR = TR$ [common]

By SAS congruency, we have

$\Delta PTR = \Delta QTR$

$\angle PRT = \angle QRT$ [c.p.c.t.]

But $\angle PRT + \angle QRT = 180^{o}$ [linear pair]

Thus, $\angle PRT = \angle QRT .= 90^{\circ}$

Also, . $PR = QR$ [c.p.c.t.]

$\therefore$ PQ and OT are right bisectors of each other.

Sol.30 Let Speed of be x km/h.

$\therefore$ Speed of the boat upstream = (5-x) km/h

Speed of the boat downstream =)5+x) km/h

Time taken to go upstream = $\frac{5.25}{5-x}$

Time taken to go upstream = $\frac{5.25}{5-x}$

As per question, we have

$$\frac{5.25}{5-x} - \frac{5.25}{5+x} = 1$$

$$5.25\left(\frac{5+x-5+x}{(5-x)(5+x)}\right) = 1$$

$10.5x = 25 - x^2$

$x^2 + 10.5x - 25 = 0$

or $2x^2 + 21x - 50 = 0$

$2x^2 + 25x - 4x - 50 = 0$

$2(2x+25) - 2(2x+25) = 0$

$\Rightarrow$ $(x-2)(2x+25) = 0$

$\Rightarrow$ $x-2 = 0$ or $2x + 25 = 0$

$\Rightarrow$ $x = 2$ or $x = -12.5$ (speed cannot be negative)

$\therefore$ $x = 2$

Hence, speed of the stream is 2 km/h.

Sol.31 Here, number of triangles are 8 and number of squares are 10.

$\therefore$ Total number of outcomes = 10 + 8 = 18

(i) Probability (lost card is a triangle) = $\frac{8}{18} = \frac{4}{9}$

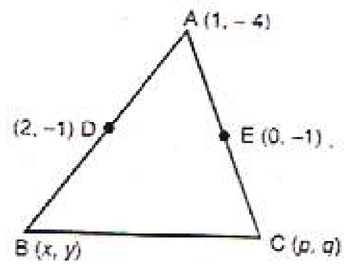
(ii) Probability (lost card is a square) = $\frac{10}{18} = \frac{5}{9}$

(iii) Probability (lost card is a square of blue colour) = $\frac{6}{18} = \frac{1}{3}$

(iv)Probability (lost card is a triangle of red colour) = $\frac{3}{18} = \frac{1}{6}$

Sol.32 Let the coordinates of B and C be B(x, y) and C(p, q)

Now, D(2, -1) is the mid-point of AB



$\Rightarrow$ $\frac{1+x}{2} = 2$ and $\frac{-4+Y}{2} = -1$

$\Rightarrow$ $x = 3$ and $y = 2$

$\Rightarrow$ Thus coordinates of B are B (3, 2)

Also, E(0, - 1) is the mid-point of AC

$\Rightarrow$ $\frac{1+P}{2} = 0$ and $\frac{-4+q}{2} = -1$

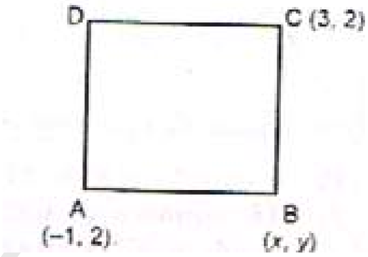
$\Rightarrow$ $p = -1$ and $q = 2$

Thus, the coordinates of C are C (-1, 2)

$\therefore$ Ar(ΔABC) = $\frac{1}{2}$ | 1 (2 - 2) + 3(2 + 4) – 1(-4 – 2)

= $\frac{1}{2}$ | 0 + 18 +6 | = $\frac{1}{2} \times 24$ = 12 sq. units

Sol.33 Let A (-1, 2) and C(3, 2) be the two opposite vertices of a square ABCD and let coordinates of B be B(x, y).



Now, AB = BC

$\Rightarrow$ $|AB|^2 = |BC|^2$

$\Rightarrow$ $(x + 1)^2 + (y-2)^2 = (3-x)^2 + (2-y)^2$

$\Rightarrow$ $X^2 + 1 + 2x + y2 + 4 - 4y = 9 + x^2 - 6x + 4 + y2 - 4y$

$2x + 6x = 9 - 1$

$8x = 8 \Rightarrow x = 1$

Also, $AB^2\ BC^2 = AC^2$

$(x+1)^2 + (y-2)^2 + (3-x)^2 + (2-y)^2 = (3+1)^2 + (2-2)^2$

$x^2 + 1 + 2x + y^2 + 4 - 4y = 9 + x^2 - 6x + 4 + y^2 - 4y = 16$

$2x^2 + 2y^2 - 4x - 8y = 16 - 18$

$x^2 + y^2 - 2x - 4y = -1$

$1 + y^2 - 2 - 4y + 1 = 0$ [Put x = 1]

$y^2 - 4y = 0$

$y(y-4) = 0 \Rightarrow y = 0$ or $y = 4$

Thus, the point (x,y) is (1, 0) or (1,4)

Hence, the coordinates of b and d are b (1,0) and d (1,4).

Sol.34 Let number of marbles Amar had be x

$\therefore$ Number of marbles with Gugu = 45- x

Both of them lost 5 marbles

$\therefore$ Number of marbles left with Amar and Gugu be x – 5 and 45 –x -5 i.e., 40 –x respectively

According to the statement of the question, we have

$(x-5)(40-x) = 124$

$-x^2 + 45x - 200 - 124 = 0$

$x^2 - 36x - 9x + 324 = 0$

$(x-9)(x-36) = 0$

$\Rightarrow$ x-9 = 0 or x-36 = 0

$\Rightarrow$ x=9 or x = 36

Thus, either Amar had 9 marbles and Gugu had 36 marbles or Amar had 36 marbles and Gugu had 9 months.

Handover the purse containing money and some documents to the concerned teacher.