SAMPLE PAPER –3 (SA II) **MRS.KIRAN WANGNOO**

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 questions 1-8, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

Q.1. Which of the following equations has the sum of its roots as 3?

(A) $x^2 + 3x – 5 = 0$ **(B) $-x^2 + 3x + 3 = 0$**

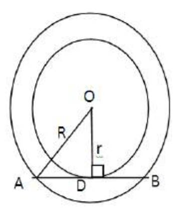
(C) $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x$ **(D) $3x^2 - 3x – 3 = 0$**

Q.2. The sum of first five multiples of 3 is:

(A) 45 **(B) 65**

(C) 75 **(D) 90**

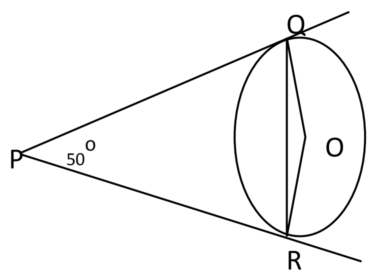
Q.3. If radii of the two concentric circles are 15 cm and 17 cm, then the length of each chord of one circle which is tangent to other is



(A) 8 cm (B) 16 cm

(C) 30 cm (D) 17 cm

Q.4. In given fig. PQ and PR are tangents to the circle with centre O such that ∠QPR = 50^0, then ∠OQR is equal to:



(A) 25° (B) 30°

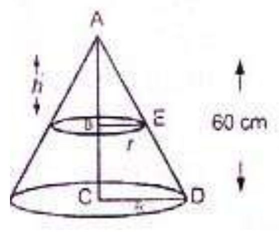
(C) 40° (D) 50°

Q.5. To draw a pair of tangents to a circle which are inclined to each other at an angle of 100^0, it is required to draw tangents at end points of those two radii of the circle, the angle between tangents should be:

(A) 100° **(B) 50°**

(C) 80^0 **(D) 200°**

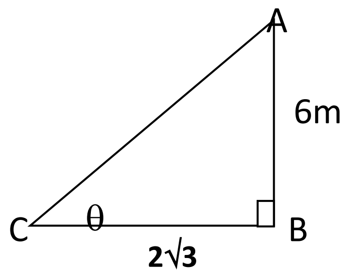
Q.6. The height of a cone is 60 cm. A small cone is cut off at the top' by a plane parallel to the base and its volume is $\frac{1}{64}$ the volume of original cone. The height from the base at which the section is made is:



(A) 15 cm **(B) 30 cm**

(C) 45 cm **(D) 20 cm**

Q.7. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the sun's elevation is:



(A)60° **(B) 45^0**

(C) 30^0 **(D) 90°**

Q.8. Which of the following cannot be the probability of an event?

(A) 1/5 **(B) 0.3**

(C) 4% **(D) 5/4**

SECTION- B

Question numbers 9 to 14 carry 2 marks each.

Q.9. Two tangents making an angle of 120° with each other, are drawn to a circle of radius 6 cm, then find the length of each tangent .

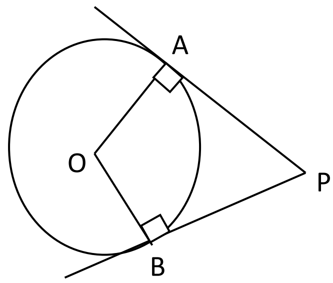
Q.10. If the circumference of a circle is equal to the perimeter of a square then taking $\pi = \frac{22}{7}$ find the ratio of their areas .

Q.11. Find the roots of the following quadratic equation:

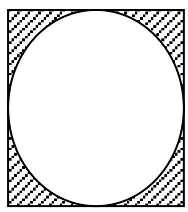
$$\frac{2}{5}x^2 - x - \frac{3}{5} = 0$$

Q.12 If the numbers x-2, 4x-1 and 5x+ 2 are in A.P. Find the value of x.

Q.13. The tangents PA and PB are drawn from an external point P to a circle with centre O. Prove that AOBP is a cyclic quadrilateral.



Q.14. In given fig., a circle of radius 7 cm is inscribed in a square Find the area of the shaded region



SECTION—C

Question numbers 15 to 24 carry 3 marks each.

Q.15. How many spherical lead shots each having diameter 3 cm can be made from a cuboidal lead solid of dimensions 9 cm x 11 cm x 12 cm?

Q.16. Point P (5, 3) is one of the two points of trisection of the line segment joining the points A(7,- 2) and B (1, - 5) near to A. Find the coordinates of the other point of trisection.

Q.17 Show that the point P (- 4, 2) lies on the line segment joining the points A (-4, 6) and B(-4,-6).

Q.18. Two dice are thrown at the same time Find the probability of getting Indifferent numbers on both dice.

Or

A coin is tossed two times. Find the probability of getting atmost One head.

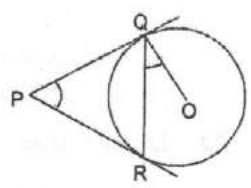
Q.19. Find the roots of the equation $\frac{1}{2x-3} + \frac{1}{x-5} = \frac{1}{2} \quad x \neq \frac{3}{2}, 5$

Or

A natural number, when increased by 12, becomes 160 of its reciprocal. Find the number.

Q.20. Find the sum of integers between 100 and 200 that are divisible by 9.

Q.21. In given figure two tangents PQ and PR are drawn to a circle with centre O from an external point P. Prove that ∠QPR = 2∠OQR.

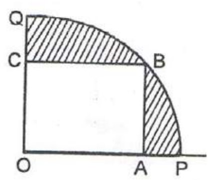


Or

Prove that the parallelogram circumscribing a circle is a rhombus .

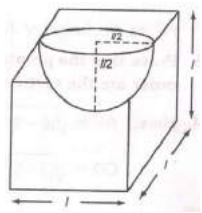
Q.22. Draw a triangle ABC with side BC = 6 cm, AB = 5 cm and ∠ABC = 60°.

Then construct a triangle whose sides are ¾ time the corresponding sides of ΔABC.



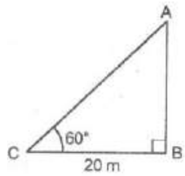
Q.23. In given fig., OABC is a square inscribed in a quadrant OPBQ. If OA = 20 cm, find the area of shaded region. [Use $\pi = 3.14$]

Q.24. A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter l of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.



Or

A copper rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 m of uniform thickness. Find the thickness of the wire.



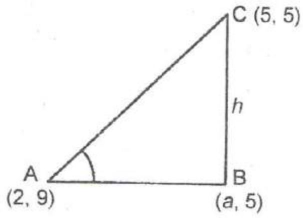
SECTION—D

Question numbers 25 to 34 carry 4 marks each.

Q.25. A tower stands vertically on the ground. From a point on the ground which is 20 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 600 Find the height of the tower.

Q.26. Prove that the points A (4, 3), B (6,4), C (5, -6) and D (3, -7) in that order are the vertices of a parallelogram.

Q.27. The points A2, 9), B(a, 5), C(5, 5) are the vertices of a triangle ABC right-angled at B. Find the value of 'a' and hence the area of ΔABC.



Q.28. Cards with numbers 2 to 101 are placed in a box. A card is selected at random from the box. Find the probability that the card which is selected has a number which is a perfect square

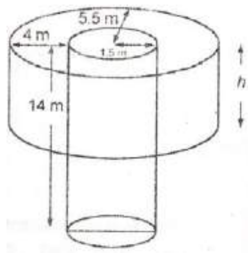
Q.29. A train travels at a certain average, speed for a distance àf 63 km and then travels a distance of 72 km at an average speed. of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its .original average speed?

Or

Find two consecutive odd positive integers, sum of whose squares is 290.

Q.30. A sum of Rs 400 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is Rs 40 less than the preceding price, find the value of each of the prize.

Q.31. Prove that the lengths of tangents drawn from an external point to a circle are equal.

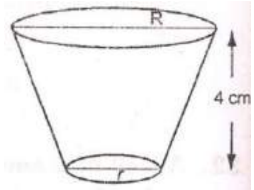


Q.32. A well of diameter 3 m and 14 m deep is dug. The earth, taken out of it, has been evenly spread all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment. Comment on the importance of water in our daily life.

Or

21 glass spheres each of radius 2 cm are packed in a cuboidal box of internal dimensions 16 cm x 8 cm x 8 cm and then the box is filled with water. Find the volume of water filled in the box.

Q.33. The slant height of the frustum of a cone is 4 cm and the circumferences of its circular ends are 18 cm and 6 cm. Find curved surface area the frustum.



Q.34. From a point on the ground, the angles of elevation of the bottom and top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find height of the tower..how transmission towers are harmful to us?

SOLUTIONS SAMPLE PAPER –2 (SA II)

ANSWERS

SECTION -A

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

Ans.1

Sol. (B)3

[$\therefore$ Sum of the roots $= \frac{-b}{a} = \frac{-3}{-1} = 3$

Ans.2

Sol. (A) 45 [$\because$ Required sum = 3 + 6+ 9 + 12 + 15 = 45]

Ans.3

Sol. (B) 16 cm

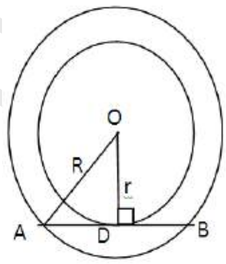
[$\because$ $OA^2 = AD^2 + OD^2$

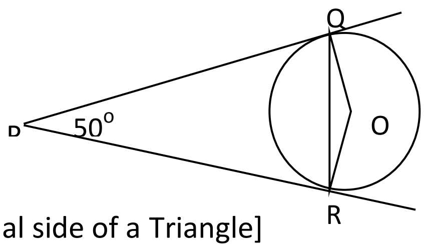
$17^2 = AD^2 + 15^2$

$289-225$ $AD^2 = AD^2 = 64$

⇨ AD=8cm

$\therefore$ AB = 2AD = 16 cm]





Ans.4

Sol. (A) 25°

[$\therefore$ $\angle QOR = 180^o - 50^o = 130^o$

$\angle OQR = \angle ORQ$ [$\because$ Angle opposite to equal side of a Triangle]

$2\angle OQR = 180^o - 130^o = 50°$

$\angle OQR = 25^0$]

Ans.5

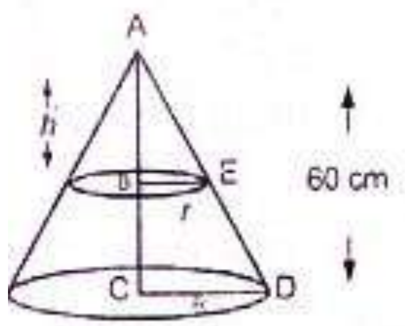
Sol. (C) 80^0 [$\because$Angle between the radii 180° - 100° = 80]

Ans.6

Sol. (C) 45 cm

[$\because$ Δ ABE $\sim \Delta$ ACD .

$\therefore$ $\frac{h}{60} = \frac{r}{R}$



$$\frac{1}{3}\pi r^2 h = \frac{1}{64} \times \pi R^2 \times 60$$

$$r^2 h = \frac{1}{64} \times 60 \times R^2$$

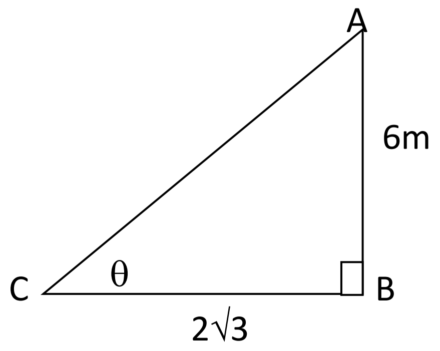
$$h = \frac{60}{64} \times \frac{R^2}{r}$$

$$h = \frac{60}{64} \times \frac{60^2}{h^2}$$

$$h^3 = \frac{60^3}{4^3} = 15^3$$

H = l5cm

Thus, height from the base = 60 - 15 = 45 cm]



Ans.7 Sol. (A) 60^0

[∵ $\tan\theta = \frac{6}{2\sqrt{3}} = \frac{3}{\sqrt{3}} = \sqrt{3}$

$\tan\theta = \tan 60°$

$\theta = 60°$]

Ans8

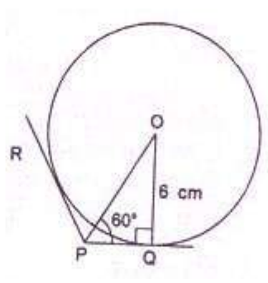
Sol. (D) 5/4 [∵ Probability of an event > 1 in any case]

SECTION-B

Ans.9

Sol. (D) $2\sqrt{3}$ cm

[∵ In rt. ΔPQO



$$\frac{PQ}{OQ} = \text{Cot } 60^0 = \frac{1}{\sqrt{3}}$$

$$PQ = OQ \frac{1}{\sqrt{3}} = \frac{6}{\sqrt{3}}$$

$$= \frac{6}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 2\sqrt{3} \text{ cm}$$

Ans.10 Sol

∵ $2\pi r = 4 \times \text{Side}$

$$\frac{\pi r}{2} = \text{Side}$$

Area of circle : Area of square = $\pi r^2 : \left(\frac{\pi r}{2}\right)^2$

$= 4:\pi$

$= 4 : \frac{22}{7}$

$= 14:11$

Ans.11

Sol. Given equation is $\frac{2}{5}x^2 - x - \frac{3}{5} = 0$

⇨ $2x^2 - 5x - 3 = 0$

$2x^2 - 6x + x - 3 = 0$

$2x(x-3) + 1(x-3) = 0$

$(2x+1)(x-3)=0$

⇨ $X = 3, \quad X = -½$

Ans.12

Sol. x-2, 4x-l and 5x+2 are in A.P.

⇨ (4x-1)- (x-2) = (5x+2) - (4x-1)

⇨ 4x-1-x+2 = 5x+2- 4x+ 1

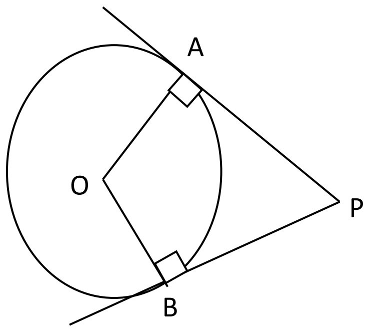
⇨2x=2

⇨x=1

Ans.13

Sol. Since angle between the radius and the tangents at the

Point of contact is 90^o



$\angle PAO + \angle PBO = 90° + 90° = 180°$

or $\angle APB + \angle AOB = 180°$

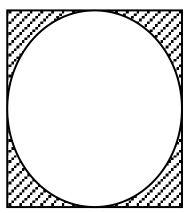
= AOBP is a cyclic quadrilateral

Opposite angles of a quadrilateral are supplementary

Ans.14

Sol. Here, Side of the square = Diameter of the circle

= 2 x 7 = 14 cm



∴ Area of the shaded region = Area of the square - Area of the circle

$= (14)^2 - (22/7)$

$= 196 - 154$

$= 42 cm^2$

SECTION-C

Ans.15

Sol. Let number of spherical lead shots be n

$$n \times \frac{4}{3} \pi r^3 = L \times B \times H$$

$$\Rightarrow \quad n \times \frac{4}{3} \times \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times \frac{3}{2} = 9 \times 11 \times 12$$

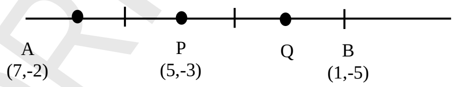
$$\Rightarrow \quad \frac{9 \times 11 \times 12 \times 3 \times 7 \times 2 \times 2 \times 2}{4 \times 22 \times 3 \times 3 \times 3}$$

$$\Rightarrow \quad n = 84$$

Hence, the required spherical lead shots is 84.

Ans.16

Sol. AP = PQ = QB



$\Rightarrow$ Q is the mid-point of PB.

$\therefore$ Coordinates of Q are

$$Q\left(\frac{5+1}{2}, \frac{-3-5}{2}\right)$$

Q (3,-4)

Ans.17

Sol. The abscissa (x-coordinate) of the points P, A and B is -4

$\Rightarrow$ Points P, A and B lie on the line x = 4

Hence, P A and B are collinear.

Ans.18

Sol. Number of outcomes of the sample space when two dice are thrown = 6x 6=36

Number of outcomes of getting same number on both

dice = 6 [(1, 1), (2, 2), (3, 3),(4, 4), (5, 5), (6, 6)]

Number of favorable outcomes (different numbers on both dice) = 36 -6 = 30

Required probability =. $\frac{-36}{36} = \frac{5}{6}$

Or

All possible outcomes when a coin is tossed twice = HH, HT, TH, UF

Favourable outcomes (atmost one head) TT, HT, TH

Required probability = $\frac{3}{4}$

.

Ans.19.

Sol. The given equation is $\frac{1}{2x-3} + \frac{1}{x-5} = 1$

$\Rightarrow \frac{x-5+2x-3}{(2x-3)(x-5)} = 1$

$\Rightarrow$ 3x-8 = (2x-3)(x-5)

$\Rightarrow$ $3x - 8 = 2x^2 - 13x + 15$

$\Rightarrow$ $2x^2 - 16x + 23 = 0$

$$x = \frac{16 \pm \sqrt{(-16)2 - 4 \, x \, 2 \, x \, 23}}{2 \text{ x } 2}$$

$$x = \frac{16 \pm \sqrt{256 - 184}}{4}$$

$$x = \frac{16 \pm \sqrt{72}}{4} = \frac{16 \pm 6\sqrt{2}}{4} = \frac{4 \pm 3\sqrt{2}}{2}$$

OR

Let the number be x

According to the statement of the question

$x + 12 = 160\left(\frac{1}{x}\right)$

$x^2 + 12x - 160 = 0$

$x^2 + 20x - 8x - 160 = 0$

$(x-8)(x+20) = 0$

= x = 8 or x = -20

(Rejecting - ve value since x is the natural number) Hence, the number is 8.

Ans.20.

Sol. Integers divisible by 9 between 100 and 200 are 108, 117, 126, 135, ...198

$a_n = 198$

$a + (n-1) d = 198$

$108 + (n-1)9 = 198$

$(n-1)9 = 90$

$(n-1) = 10$

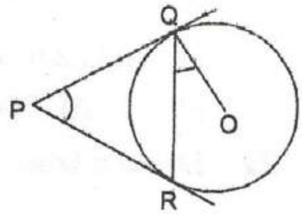
$n = 11$

Now $S_n = \frac{n}{2}(a + a_n)$

$S_{11} = \frac{11}{2}(108 + 198) = \frac{11}{2} \times 306 = 1683$

Ans.21.

Sol. Join 'OR'

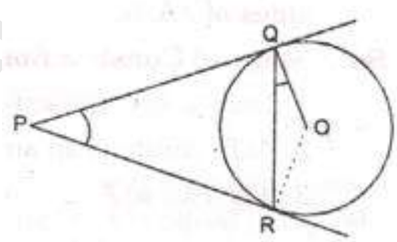


Now. $\angle QOR + \angle QPR = 180^o$

$\angle QOR = 180^o - \angle QPR$ ... (i)

Also. $\angle OQR = \angle ORQ$ ....(ii)

[$\angle$s opposite to equal sides of a Triangle]



$\angle OQR + \angle ORQ + \angle QOR = 180^o$

$\angle QOR = 180° - \angle OQR - \angle ORQ$

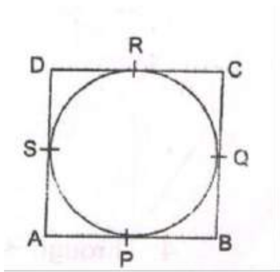
$= 180^o - 2\angle OQR$ .... (iii) [using (ii)]

Now, from (i) and (iii), we have

$180^o - \angle QPR\ 180^o - 2\angle OQR$

$\Rightarrow \angle QPR = 2\angle OQR$

Or



Given: A parallelogram ABCD, circumscribes a circle.

To prove: ABCD is a rhombus i.e.,

AB = BC = CD = DA.

Proof: Since ABCD is a parallelogram.

AB = DC and BC = AD ... (i)

AP and AS are two tangents from an external point A to the circle.

AP = AS ... (ii)

[$\because$ Tangents drawn from an external point to the circle are equal]

Similarly, we have

BP=BQ

CR=CQ ...(iv)

and DR = DS ...(v)

Adding (ii), (iii), (iv) and (v), we have

(AP + BP) + (CR + DR) = (AS + DS) ± (BQ + CQ)

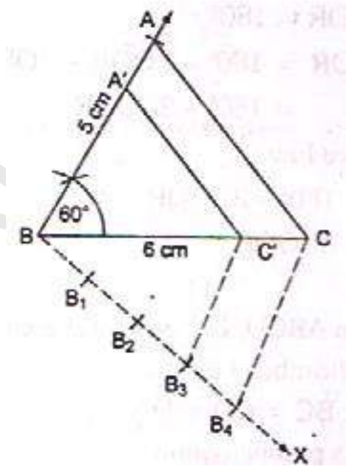
AB+CD =AD+BC

AB + AB = AD + AD   [using (i)]
2AB=2AD

$\Rightarrow$ AB = AD

i.e., adjacent sides of the parallelogram are equal. Thus, all the sides are equal.
Hence, ABCD is a rhombus.

Ans.22. Sol. Steps of Construction:



1 Draw a line segment BC = 6 cm

2. At B, construct an angle 60° such that BA = 5 cm..

3. Join AC, so ABC is the given triangle.

4. Through B, construct an acute angle $\angle$CBX, ($<90^o$).

5. Mark four points B1, B2, B3 and B4, such that
$BB_1=B_1B_2=B_2B_3=B_3B_4$

6. Join B_4C.

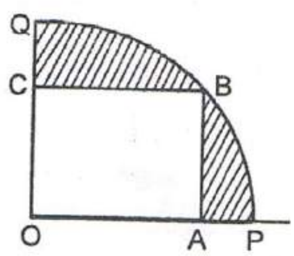
7. Through B_3, draw $B_3C' \parallel B_4C$, intersecting BC in C'.

8. Through C', draw $C'A' \parallel CA$, intersecting BA in A'.

9. Hence, ΔA'BC' is the required triangle.

Ans.23.

Sol. Here, OA = 20 cm and OABC is a square,



$\Rightarrow$ OA =AB = BC = CO =20 cm

$\therefore$ $OB = \sqrt{OA^2 + AB^2}$ [by Pythagoras Theorem]

$= \sqrt{20^2 + 20^2} =$

$= 20\sqrt{2}$ cm

Now, area of the shaded region

= Area of quadrant OPBQ - Area of square OABC

$= \frac{90^o}{360^o} \times 3.14 \times 20\sqrt{2} \times 20\sqrt{2} - 20 \times 20$

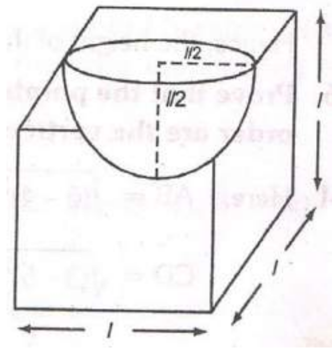
[$\because$ OB=r=$20\sqrt{2}$ cm]

$= \frac{1}{4} \times 3.14 \times 400 \times 2 - 400$

$= 628 - 400$

$= 228 cm^2$

Ans.24.



Sol. Edge of the cube = l

Radius of the hemisphere = $l/2$

$\therefore$ Surface area of the remaining solid

= S.A. of cube - S.A. of the top of hemisphere

+ C.S.A. of hemisphere

$= 6l^2 - \pi \times l/2 \times l/2 + 2\pi \times l/2 \times l/2$

$= 6l^2 + \frac{\pi}{4} 1^2$

$= \frac{1}{4} l^2 (24+\pi)$ sq. units

Or

Volume of the wire = Volume of the copper rod

$\pi r^2 \times 1800 = \pi \times ½ \times ½ \times 8$

$\Rightarrow \quad r^2 = \frac{8}{4 \times 1800} = \frac{1}{900}$

$\Rightarrow \quad r = 1/30$ cm

$\therefore$ Thickness of the wire = Diameter of wire

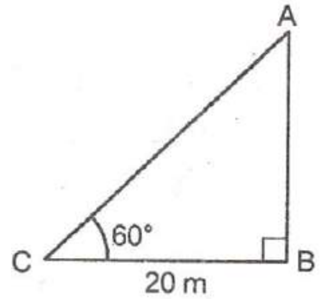
$= 2 \times \frac{1}{30} = \frac{1}{15}$ cm

SECTION-D

Ans.25.

Sol. Let us assume the AB be the tower and C is a point 20 m away from the ground Angle of elevation of the top of the tower is 60^o

In rt.ΔCBA,



$\frac{AB}{CB} = \tan 60^o$

$\frac{AB}{20} = \sqrt{3}$

$AB = 20\sqrt{3}$ m

Hence, the height of the tower is $20\sqrt{3}$ m.

Ans.26.

Sol. Here, AB = $\sqrt{(6-4)^2 + (4-3)^2} = \sqrt{4+1} = \sqrt{5}$ units

CD = $\sqrt{(3-5)^2 + (-7-6)^2} = \sqrt{4+1} = \sqrt{5}$ units

$\Rightarrow$ AB = CD

Again, BC = $\sqrt{(5-6)^2 + (-6-4)^2} = \sqrt{1+100} = \sqrt{101}$ units

AD = $\sqrt{(3-5)^2 + (-7-6)^2} = \sqrt{1+100} = \sqrt{101}$ units

$\Rightarrow$ BC = AD

Now, in quadrilateral of ABCD both pair of opposite sides are equal.

Hence, it is a parallelogram.

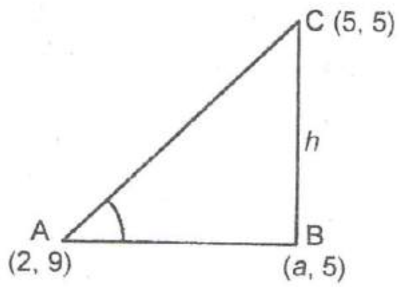
Ans.27.Sol.

Given ΔABC is right-angled at B.

$\therefore$ By Pythagoras theorem, we have

$$AB^2 + BC^2 = AC^2$$

$(a - 2)^2 + (5- 9)^2 + (5-a)^2 + (5- 5)^2 - (5-2)^2 + (5-9)^2$



$a^2 + 4 - 4a + 16 + 25 + a^2 - 10a = 9 + 16$

$2a^2 - 14a - 20 = 0$

$a^2 - 7a - 10 = 0$

$(a-5)(a-2) = 0$

$\Rightarrow$ a = 5 or a = 2

Rejecting a = 5, $\because$ BC reduces to zero.

Thus, a = 2

Area of ΔABC = ½ × AB × BC

= ½ × 4 × 3

= 6 sq. units

Ans.28.

Sol. Total number of cards in the box = 100

Favorable outcomes (perfect squares) are 4, 9,16,25,36,49,64,81,100

∴ Required probability = $\frac{9}{100}$

SECTION—D

Question numbers 29 to 34 carry 4 marks each.

Ans.29.

Sol. Let the average speed be x km/h;

According to the statement of the question

$$\frac{63}{x} + \frac{72}{x+6} = 3$$

$$\frac{63(x+6)+72x}{x(x+6)} = 3$$

$$\frac{63x+378+72x}{x^2 + 6x} = 3$$

$135x + 378 = 3x^2 + 18x$

$3x^2-117x-378=0$

$x^2-39x-126 = 0$

⇒ $(x-42)(x+3) = 0$

⇒ x = 42 or x = -3 (rejecting -ve value because speed cannot be -ve)

Hence, original average speed is 42 km/h.

Or

Let two consecutive odd positive integers be x, x + 2.

According to the statement of the question

$x^2 + (x + 2)^2 = 290$

$x^2+x^2+4+4x = 290$

$2x^2+4x – 286 = 0$

⇒ $x^2 + 2x - 143 = 0$

$x^2 + 13x-11x - 143 = 0$

⇒ $(x+13)(x-11) = 0$

⇒ x = -13 or x = 11

(rejecting –ve value because x is an odd +ve integer)

$\therefore$ Numbers are 11 and 13.

Ans.30.

Sol. Total amount of seven prizes = ₹1400

Let the value of first prize be ₹ x

According to given statement, the seven prizes are

x, x - 40, x - 80, x - 120, ..., x -240

Now, x-40-x = -40

x - 80 - x + 40= - 40, which is constant.

Thus, it is an A.P. with first term (a) as x and common difference (d) as - 40.

$\therefore \quad S_n = \frac{n}{2}\left\{2a + (n-1)\,d\right\}$

$\Rightarrow \quad 1400 = \frac{7}{2}\{2x+(7-1)(-40)\}$

$\Rightarrow \quad 400 = \{2x - 240\}$

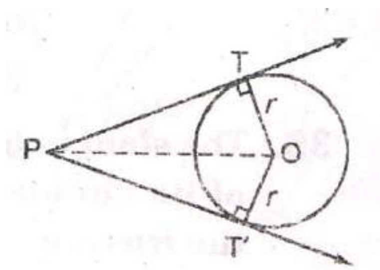
$\Rightarrow \quad 2x = 640$

$\Rightarrow \quad x = 320$

Hence, the amount of each prize (in₹) is 320, 320 - 40, 320 - 80, 320 -120, 320- 160, 320-200, 320-240 i.e., 320, 280, 240, 200. 160, 120, 80.

Ans.31.

Sol. Given: A circle C (O, r) with centre O. Through the external point P tangents PT and PT' are drawn.



To prove: PT = PT' T

Const.: Join PO, TO and T'O

Proof: In ΔPTO and ΔPT'O, we have

TO =T'O = r

hypt. PO = hypt. PO [common]

$\angle PTO = \angle PT'O = 90^o$

$\therefore \quad \Delta PTO \cong \Delta PT'O$ [by RHS cong. rule]

$\Rightarrow$ PT = PT'. .. [c.p.c.t.]

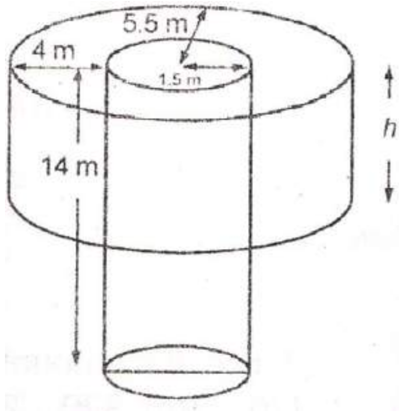
Ans.32.

Sol. Here, Radius of the well = 3/2 m

Depth of the well = 14 m

Width of the embankment = 4 m

$\therefore$ Radius of the embankment = 1.5 + 4 = 5.5 m



Let 'h' be the height of the embankment.

$\therefore$ Volume of the embankment = Volume of the well (cylinder)

$\Rightarrow \quad \pi(5.5^2 - 1.5^2) \times h = \pi(1.5)^2 \times 14$

$\Rightarrow \quad (30.25 - 2.25) \times h = (2.25 \times 14)$ 4 m

$\Rightarrow \quad 28 \times h = 31.5$

$\Rightarrow \quad h = \dfrac{31.5}{28}$

$h = 1.125$m

Or

Radius of sphere = 2 cm

Volume of 21 spheres = $21 \times \dfrac{4}{3} \times \dfrac{22}{7} \times 2 \times 2 \times 2$

= 704cm3

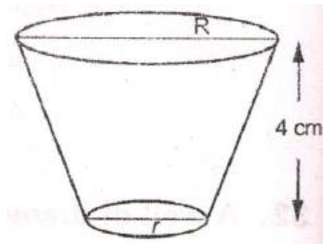
Volume of cuboid = 16 x 8 x 8 = 1024 cm^3

Volume of water = 1024 - 704 = 320 cm^3

Ans.33.

Sol. Slant height of the frustum of a cone (l) = 4 cm

Circumference of top end = 18 cm



$2\pi R = 18$

$2 \times \dfrac{22}{7} \times R = 18$

$R = \dfrac{18 \times 7}{2 \times 22} = \dfrac{63}{22}$ cm

and circumference of bottom end = 6 cm

$2\pi r = 6$

$2 \times \dfrac{22}{7} \times r = 6$

$r = \dfrac{6 \times 7}{2 \times 22} = \dfrac{21}{22}$ cm

Curved surface area = $\pi l (R + r)$

$= \dfrac{22}{7} \times 4 \left(\dfrac{63}{22} + \dfrac{21}{22}\right)$

$= \dfrac{22}{7} \times 4 \times \dfrac{84}{22} = 48 \text{ cm}^2$

Ans.34.

Sol. Let AB be the transmission to fixed on the top of the building of height 20 m. Let AB = h m and .P be a point on ground, such that ∠BPC = 45°, ∠APC = 60°.

In rt. ΔPCB, ∠C = 90° A

∴ $\frac{BC}{PC}$ = tan 45°

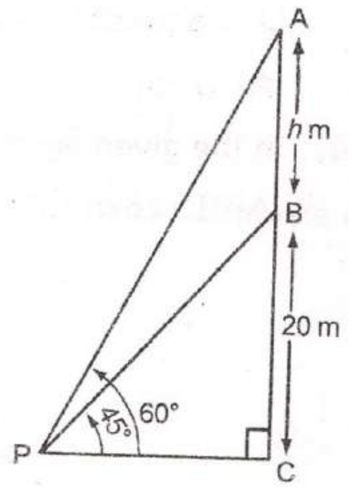
⇒ 20 = 1 ⇒ PC = 20m

In rt. ΔPCA, ∠C = 90°

∴ $\frac{AC}{PC}$ = tan 60°

⇒ $\frac{h+20}{20}$ = √3 ⇒ h+20 = 20 √3

⇒ h = 20 √3 -20 = 20 (√3 -1)



Hence, the height of the tower is 20 (√3 -1)m.