4 | PRACTICE PAPER

[Time Allowed: 3 Hours] [Maximum Marks: 80]

General Instructions: As given in Practice Paper 1.

Part – A

SECTION – I

1. 32760, when expressed in prime factorisation is
   (*a*) $2^3 \times 3^2 \times 5 \times 7 \times 13$
   (*b*) $2^2 \times 3^3 \times 5 \times 7 \times 13$
   (*c*) $2^3 \times 3^3 \times 5 \times 7 \times 13$
   (*d*) $2^2 \times 3^2 \times 5 \times 7 \times 13$

2. If $\sin\theta - \cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is
   (*a*) 1 (*b*) $\frac{3}{4}$ (*c*) $\frac{1}{2}$ (*d*) $\frac{1}{4}$

   OR

   If $\sin 3\theta = \cos(\theta - 6°)$ where 3θ and $(\theta - 6°)$ are both acute angles, then θ is
   (*a*) 46° (*b*) 24° (*c*) 30° (*d*) 64°

3. For an event E, $P(E) + P(\bar{E}) = q$, then the value of $q^3 - 1$ is
   (*a*) 4 (*b*) –1 (*c*) 1 (*d*) 0

   OR

   A ticket is drawn at random from a bag containing tickets numbered from 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is
   (*a*) $\frac{1}{5}$ (*b*) 5 (*c*) $-\frac{1}{5}$ (*d*) $-\frac{2}{5}$

4. The area of the triangle formed by the line $5x - 3y + 15 = 0$ with coordinates axes is
   (*a*) 4 sq units (*b*) 4.5 sq units
   (*c*) 7.5 sq units (*d*) 7 sq units

   OR

   The ratio in which the line segment joining the points (6, 4) and (1, – 7) is divided by the *x*-axis is
   (*a*) 7 : 11 (*b*) 7 : 4 (*c*) 4 : 11 (*d*) 4 : 7

5. Roots of the equation $x^2 - 0.09 = 0$ are
   (*a*) ± 0.3 (*b*) 0.03 (*c*) ± 0.9 (*d*) 0.09

6. If p and q are coprime numbers then $\text{HCF}(p, q) \times \text{LCM}(p, q) =$
   (*a*) $-pq$ (*b*) pq (*c*) $\frac{p}{q}$ (*d*) 0

7. If $\left(\frac{a}{2}, 4\right)$ is the mid-point of the line segment joining the points A (– 6, 5) and B (– 2, 3), then $a =$
   (*a*) 8 (*b*) 16 (*c*) –8 (*d*) 1

8. In ΔABC, right-angled at C, then $\cos(A + B) =$
   (*a*) 1 (*b*) –1 (*c*) 2 (*d*) 0

9. The decimal expansion of rational number $\frac{14587}{2500}$ will terminate after how many decimal places?

10. For the quadratic equation $x^2 - 2x + 1 = 0$, find the value of $x + \frac{1}{x}$.

    OR

    Find the roots of the quadratic equation $x^2 - 3x - 10 = 0$.

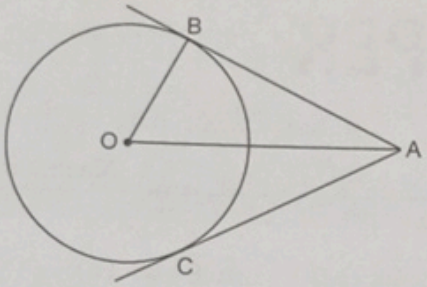
11. Find the sum of the integers between 100 and 200 that are divisible by 3.

12. If $\cot\theta = \frac{7}{8}$, evaluate $\frac{(1 + \sin\theta)(1 - \sin\theta)}{(1 + \cos\theta)(1 - \cos\theta)}$.

13. If the greater than cumulative frequency of a class is 60 and that of the next class is 40, then find the frequency of that class.

14. If for an AP, $t_n = 6n + 5$, then find $t_{n+1} - t_n$.

15. In figure, AB and AC are tangents to a circle with centre O and radius 8 cm. If OA = 17 cm, find the length of AC (in cm).



OR

In ΔABC, D and E are points on sides AB and AC respectively such that DE $\parallel$ BC and AD : DB = 3 : 1. If EA = 6.6 cm, then find AC.

16. If the graph of $y = x^3 - px$ cuts x-axis at $(-2, 0)$, $(0, 0)$ and $(2, 0)$ then find the zeroes of $x^3 - px$.

SECTION – II

17. **Case Study – 1**

JUNK FOODS

Junk foods are processed foods consisting of high calories. These foods are prepared in a way that they look appealing and are enjoyable so you are chemically programmed to ask for more. Frequent consumption of junk food increases the intake of excess fat, sugar which may lead to a higher risk of obesity and cardiovascular diseases among other chronic health problems. In a school a survey of some students was conducting about their eating habits. It is observed that q number of students take healthy food and p number of students take junk food such that $p > q$ and p and q are zeroes of the quadratic polynomial

$p(x) = x^2 - 26x + 120$

(*a*) How many students take junk food?

(*i*) 4 (*ii*) 6

(*iii*) 20 (*iv*) 30

(*b*) How many students take healthy food?

(*i*) 4 (*ii*) 6

(*iii*) 20 (*iv*) 30

(*c*) Name the type of polynomial in the above statement

(*i*) monomial (*ii*) binomial

(*iii*) trinomial (*iv*) cubic

(*d*) Can p and q be the zeroes of polynomial $p(x) = 2x^2 + 8x + 6$

(*i*) No (*ii*) Yes

(*iii*) may or may not be

(*iv*) can not say

(*e*) If one zero of the polynomial $p(x) = 5x^2 - 7x + m$ is $\frac{2}{5}$ then the value of m is

(*i*) 1 (*ii*) 2

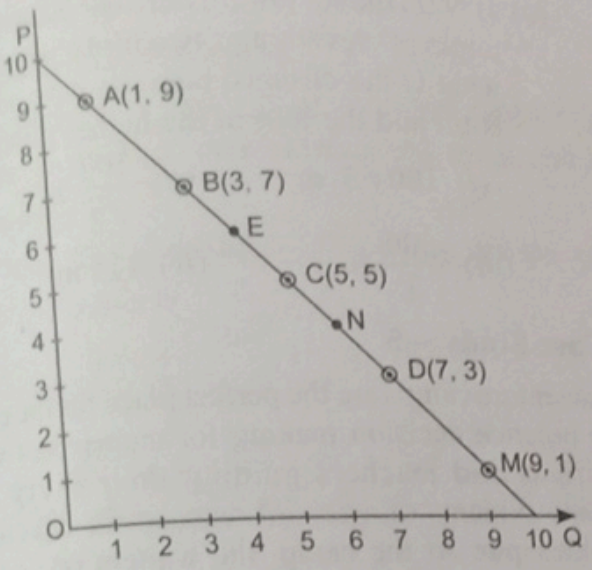
(*iii*) 3 (*iv*) 4

18. **Case Study – 2**

WATER PARK

A water park is an amusement park that features water play areas such as swimming pools, water slides, water playgrounds as well as areas for floating, bathing, etc. A group of class x students goes to waterpark.

Four students go for a water slide. Their respective position in the water slide at an instant is given below



(*a*) What is the ratio of distance of B from A to its distance from D?

(*i*) 1 : 2 (*ii*) 2 : 1

(*iii*) 2 : 3 (*iv*) 3 : 2

(*b*) If E is mid-point of AD then coordinates of E are

(*i*) (4, 5) (*ii*) (6, 4)

(*iii*) (4, 6) (*iv*) (5, 4)

(*c*) If D slides to M then distance covered by D is

(*i*) 8 units (*ii*) 6 units

(*iii*) $4\sqrt{2}$ units (*iv*) $2\sqrt{2}$ units

(*d*) If there is emergency switch at N such that AN : DN = 2 : 3 the coordinates of N are

(*i*) $\left(\frac{17}{4}, \frac{33}{4}\right)$ (*ii*) $\left(\frac{17}{4}, \frac{33}{5}\right)$

(*iii*) $\left(\frac{17}{5}, \frac{33}{5}\right)$ (*iv*) $\left(\frac{17}{5}, \frac{33}{4}\right)$

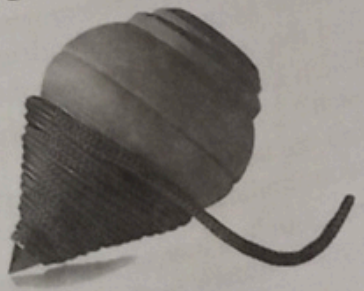
(*e*) Length of side PQ is

(*i*) 100 units (*ii*) 50 units

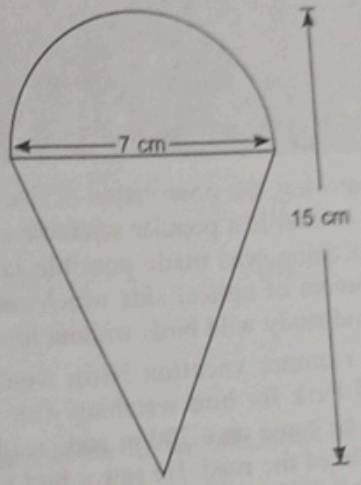
(*iii*) $10\sqrt{2}$ units (*iv*) $5\sqrt{2}$ units

19. Case Study – 3

SPINNING TOP



A spinning top or simply a top is a toy with a squat body designed to be spun on its vertical axis. Tops exists in many variation and material. Saurabh's father is a carpenter. He made a top and gave it to Saurabh as his birthday present. The top is shaped like a cone surmounted by a hemisphere.



(*a*) If x is the slant height, h is the height and r is radius of base of the conical part then x =

(*i*) $\sqrt{h^2 - r^2}$ (*ii*) $\sqrt{h^2 + r^2}$

(*iii*) $h^2 + r^2$ (*iv*) $\sqrt{r^2 - h^2}$

(*b*) The curved surface area of hemispherical part is (take $\pi = \frac{22}{7}$)

(*i*) 66 cm^2 (*ii*) 70 cm^2

(*iii*) 77 cm^2 (*iv*) 80 cm^2

(*c*) The slant height of conical part is

(*i*) $\sqrt{160.5}$ cm (*ii*) $\sqrt{155.5}$ cm

(*iii*) $\sqrt{154.5}$ cm (*iv*) None of these

(*d*) The height of conical part is

(*i*) 13 cm (*ii*) 12 cm

(*iii*) 11.5 cm (*iv*) 8 cm

(*e*) If cost to paint 10 cm^2 is ₹ 10 then find the cost to paint the hemispherical part of the toy

(*i*) ₹ 770 (*ii*) ₹ 7.7

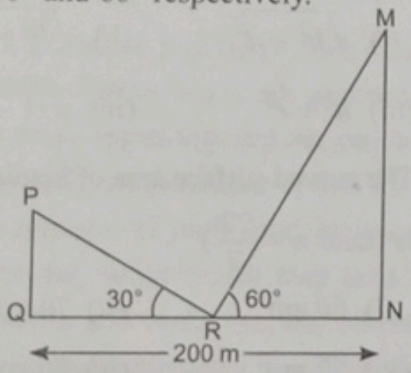
(*iii*) ₹ 77 (*iv*) ₹ 7700

20. Case Study – 4

BIRD WATCHING

Bird watching, the observation of live birds in their natural habitat is a popular scientific sport. Modern bird watching was made possible largely by the development of optical aids which enabled people to see and study wild birds without harming them.

During summer vacation Nitin went to Corbett National Park for bird watching. One day, during his stay, he came on a 200 m wide road. He was in the middle of the road. He saw a bird on the top of a pillar on one side of the road. He saw another bird on top of another pillar on other side of the road. He noticed that angle of elevation of top of two pillars to be 30° and 60° respectively.



(*a*) Find the height of pillar PQ.

(*i*) 100 m (*ii*) $100\sqrt{3}$ m

(*iii*) $\frac{100\sqrt{3}}{3}$ m (*iv*) $50\sqrt{3}$ m

(*b*) Find the height of pillar MN

(*i*) $\frac{100}{\sqrt{3}}$ m (*ii*) $100\sqrt{3}$ m

(*iii*) 100 m (*iv*) $50\sqrt{3}$ m

(*c*) Distance RM

(*i*) 200 m (*ii*) 100 m

(*iii*) 150 m (*iv*) $100\sqrt{3}$ m

(*d*) Distance RP =

(*i*) $100\sqrt{3}$ m (*ii*) $\frac{200}{\sqrt{3}}$ m

(*iii*) $\frac{100}{\sqrt{3}}$ m (*iv*) $50\sqrt{3}$ m

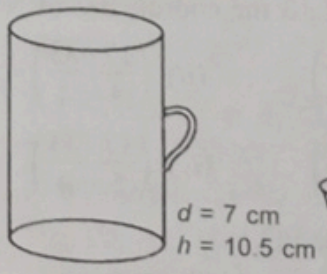
(*e*) If Nitin moves towards smaller pillar so that the angle of elevation of two birds become equal, what is the distance between new position of Nitin and the foot of the higher pillar

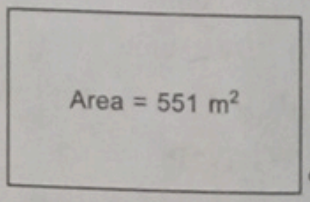
(*i*) $100\sqrt{3}$ m (*ii*) $\frac{100}{\sqrt{3}}$ m

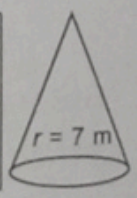
(*iii*) $\frac{500}{3}$ m (*iv*) 125 m

21. Case Study – 5

Adventure camps are the perfect place for the children to practice decision making for themselves without parents and teachers guiding their every move. Some students of a school reached for adventure at Sakleshpur. At the camp, the waiters served some students with a welcome drink in a cylindrical glass and some students in a hemispherical cup whose dimensions are shown below. After that they went for a jungle trek. The jungle trek was enjoyable but tiring. As dusk fell, it was time to take shelter. Each group of four students was given a canvas of area 551 m^2. Each group had to make a conical tent to accommodate all the four students. Assuming that all the stitching and wasting incurred while cutting, would amount to 1 m^2, the students put the tents. The radius of the tent is 7 m.







(*a*) Find the volume of cylindrical cup.

(*b*) Find the volume of hemispherical cup.

(*c*) Which container had more juice and by how much?

(*d*) Find the height of the conical tent prepared to accommodate four students.

(*e*) How much space on the ground is occupied by each student in the conical tent?

22. **Case Study – 6**

COLOURED CARDS

Ravinder has pack of 20 coloured cards. He has 7 orange cards, 5 blue cards, 6 red cards and 2 black cards.

(*a*) The probability of getting orange and blue cards is

(*i*) $\frac{2}{5}$ (*ii*) $\frac{3}{5}$

(*iii*) $\frac{4}{5}$ (*iv*) $\frac{1}{5}$

(*b*) The probability of getting yellow coloured card is

(*i*) 3 (*ii*) 2

(*iii*) 1 (*iv*) 0

(*c*) The probability of getting red and black card is

(*i*) $\frac{2}{5}$ (*ii*) $\frac{1}{5}$

(*iii*) $\frac{4}{5}$ (*iv*) $\frac{3}{5}$

(*d*) The probability of getting blue and red card is

(*i*) more than probability of getting orange card

(*ii*) less than the probability of getting black card

(*iii*) equal to probability of drawing orange and black cards

(*iv*) none of these

(*d*) $P(E) + P(\bar{E}) =$

(*i*) 0 (*ii*) 2

(*iii*) 1 (*iv*) –1

Part – B

SECTION – III

23. There are 1000 sealed envelopes in a box, 10 of them contain a cash prize of ₹ 100 each, 100 of them contain a cash prize of ₹ 50 each and 200 of them contain a cash prize of ₹ 10 each and rest do not contain any cash prize. If they are well shuffled and an envelope is picked up out, what is the probability that it contains no cash prize?

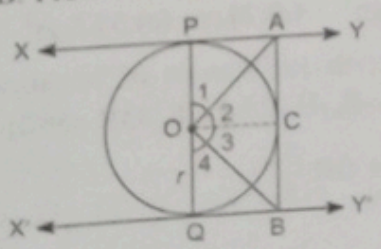
24. The shadow of a tower is 30 m long, when the Sun's angle of elevation is 30°. What is the length of the shadow, when Sun's elevation is 60°?

OR

Prove that $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} = \sec\theta + \tan\theta$

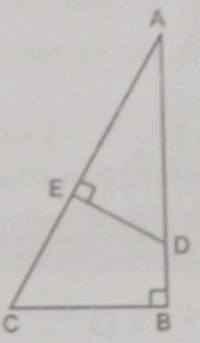
25. A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface areas of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part.

26. In the figure given below, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90°$.



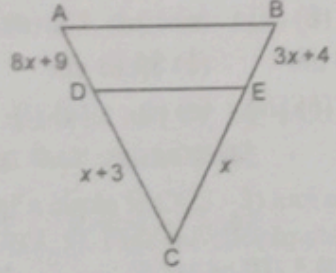
27. The sum of the 4th and 8th terms of an AP is 24 and the sum of the 6th and 10th terms is 44. Find the first three terms of the AP.

28. In the given figure, AB ⊥ BC and DE ⊥ AC. Prove that $\Delta ABC \sim \Delta AED$.



OR

What value (s) of x will make DE ∥ AB in the given figure?



29. The following is the distribution of the long jump competition organised for 50 students. Find median distance.

Distance (in m)	Number of students
0 – 20	6
20 – 40	11
40 – 60	17
60 – 80	12
80 – 100	4

30. If α and β are zeroes of a polynomial $x^2 + 6x + 9$, then form a polynomial whose zeroes are $-\alpha$ and $-\beta$.

31. Prove the following identity, where the angles involved are acute angles for which the expressions are defined.

$$(\text{cosec } A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}.$$

32. Prove that $\frac{2+\sqrt{3}}{5}$ is an irrational number, given that $\sqrt{3}$ is an irrational number.

33. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row,18 in the next row next to it and so on. In how many rows are the 200 logs placed and how many logs are in the top row?

OR

The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and the denominator, the fraction becomes $\frac{3}{4}$. Find the fraction.

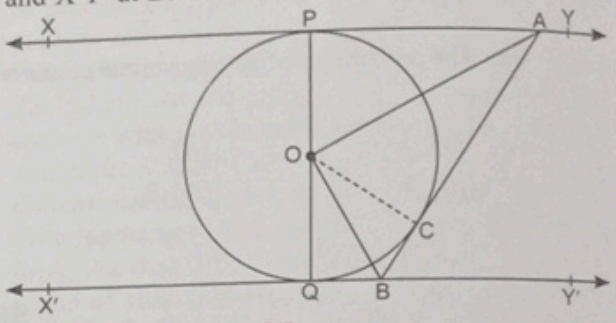
34. If the equations $2x^2 - 7x + 3 = 0$ and $4x^2 + ax - 3 = 0$ have a common root, then what is the value of a?

OR

The sum of two numbers is 15 and the sum of their reciprocals is $\frac{3}{10}$. Find the numbers.

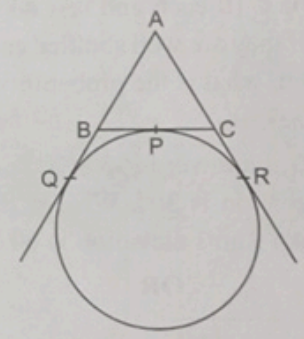
35. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Prove it.

36. In the given figure, XY and X′Y′ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, is intersecting XY at A and X′Y′ at B. Prove that $\angle AOB = 90°$.



OR

In figure, a circle touches the side BC of A ΔABC at P and touches AB and AC produced at Q and R. If AQ = 2.5 cm, then find perimeter of ΔABC.



ANSWERS

1. (*a*) $2^3 \times 3^2 \times 5 \times 7 \times 13$ 2. (*c*) $\frac{1}{2}$ OR (*b*) 24° 3. (*d*) 0 OR (*a*) $\frac{1}{5}$ 4. (*c*) 7.5 sq units OR (*d*) 4 : 7
5. (*a*) ± 0.3 6. (*b*) *pq* 7. (*c*) $a = -8$ 8. (*d*) 0 9. 4 decimal places
10. 2 OR – 2, 5 11. 4950 12. $\frac{49}{64}$ 13. 20 14. 6
15. 15 cm 16. –2, 0, 2 17. (*a*) (*iii*) (*b*) (*ii*) (*c*) (*iii*) (*d*) (*i*) (*e*) (*ii*)
18. (*a*) (*i*) (*b*) (*i*) (*c*) (*iv*) (*d*) (*iii*) (*e*) (*iii*) 19. (*a*) (*ii*) (*b*) (*iii*) (*c*) (*iv*) (*d*) (*iii*) (*e*) (*iii*)
20. (*a*) (*iii*) (*b*) (*ii*) (*c*) (*i*) (*d*) (*ii*) (*e*) (*iii*)
21. (*a*) 404.25 cm^3 (*b*) 89.83 cm^3 (*c*) cylindrical glass, 314.42 cm^3 (*d*) 24 cm (*e*) 38.5 m^2
22. (*a*) (*ii*) (*b*) (*iv*) (*c*) (*i*) (*d*) (*i*) (*e*) (*iii*)
23. 0.69 24. 10 m 25. $1:\sqrt{3}$ 27. –13, –8, –3 28. OR $x = 2$
29. 49.41 m 30. $x^2 - 6x + 9$ 33. Rows = 16, Top row = 5 logs OR $\frac{3}{5}$
34. $a = -11$ OR 5, 10 or 10, 5 36. OR 5 cm