CBSE Board
Class X Mathematics
Sample Paper 10

Time: 3 hrs **Total Marks: 80**

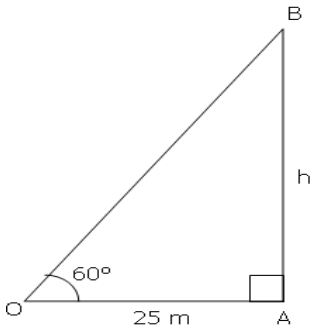
General Instructions:

1. **All** questions are **compulsory.**
2. The question paper consists of **30** questions divided into **four sections** A, B, C, and D. **Section A** comprises of **6** questions of 1 mark each, **Section B** comprises of **6** questions of 2 marks each, **Section C** comprises of **10** questions of 3 marks each and **Section D** comprises of **8** questions of 4 marks each.
3. Use of calculator is **not** permitted.

Section A
(Questions 1 to 6 carry 1 mark each)

1. From a well-shuffled pack of 52 cards, a card is drawn at random. Find the probability that it is a face card.

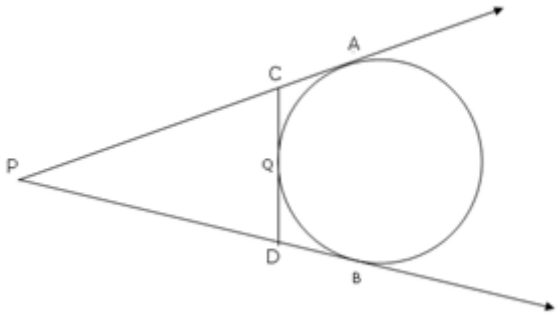
2. From the given figure, find h.



OR

Prove that $\frac{1}{1+\tan^2\theta}+\frac{1}{1+\cot^2\theta}=1$

3. In the given figure, PA and PB are tangents drawn from an external point P to a circle. CD is the third tangent touching the circle at Q. If PB = 10 cm and CQ = 2 cm, then find the length of PC.



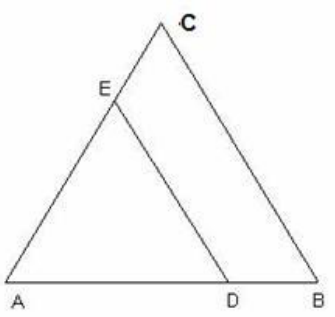
4. If $\frac{4}{5}$, a, and 2 are three consecutive terms of an A.P., then find the value of a.

5. Is 0.101100101010 an irrational number? Justify your answer.

OR

State Euclid's Division Lemma for any two positive integers.

6. In the adjoining figure, DE is parallel to BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, find the value of x.



Section B
(Questions 7 to 12 carry 2 marks each)

7. Show that (a – b), a and (a + b) form consecutive terms of an A.P.

8. Without actually performing division, state whether the number $\frac{29}{343}$ will have a terminating decimal representation or not.

9. In two concentric circles, the radius of the inner circle is 5 cm. A chord of length 24 m of the outer circle becomes a tangent to the inner circle. Find the radius of the larger circle.

10. How many solid spheres of diameter 6 cm are required to be melted to form a solid metal cylinder of height 45 cm and diameter 4 cm?

OR

Three cubes whose edge measures 3 cm, 4 cm and 5 cm respectively to form a single cube. Find its edge.

11. If $\sqrt{3}\tan\theta = 3\sin\theta$, prove that $\sin^2\theta - \cos^2\theta = \frac{1}{3}$.

OR

If $5\tan\theta - 4 = 0$, then find the value of $\frac{5\sin\theta - 4\cos\theta}{5\sin\theta + 4\cos\theta}$

12. If $7\sin^2\theta + 3\cos^2\theta = 4$, then find θ and hence prove that $\sec\theta + \operatorname{cosec}\theta = 2 + \frac{2}{\sqrt{3}}$

Section C
(Questions 13 to 22 carry 3 marks each)

13. As observed from the top of a lighthouse, 100 metres above sea level, the angle of depression of a ship moving directly towards it, changes from 30° to 60°. Determine the distance travelled by the ship during the period of observation.

14. If the co-ordinates of the mid-points of the sides of a triangle are (−1, −3), (2, 1) and (4, 5), find the co-ordinates of its vertices.

OR

Find the ratio in which the line segment joining the points A(3,- 3) and B(- 2, 7) is divided by x-axis. Also find the coordinates of the point of division.

15. For what value(s) of p does the equation $px^2 + (p - 1)x + (p - 1) = 0$ have a repeated root?

OR

If one of the zero of the quadratic polynomial $2x^2 - 3x + p$ is 3, then find its other zero. Also find the value of p.

16. Find the sum: $-5 + (-8) + (-11) + \ldots\ldots\ldots\ldots + (-230)$

17. Show that $6 + \sqrt{3}$ is irrational.

18. The m^{th} term of an A.P. is n and the n^{th} term is m. Find the $(m + n)^{th}$ term of this A.P.

19. The point P divides the join of (2, 1) and (−3, 6) in the ratio 2:3. Does P lie on the line $x - 5y + 15 = 0$?

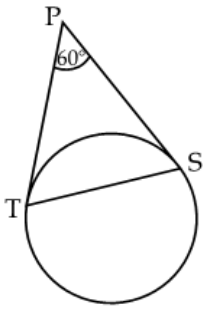
20. 17 cards numbered 1, 2, 3, 4, 16, and 17, are put in a box and mixed thoroughly. A girl draws a card from the box. Find the probability that the number on the card is

i. Prime
ii. Divisible by 3
iii. Divisible by both 2 and 3

OR

A card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (i) a king of red colour (ii) a face card (iii) the queen of diamonds.

21. In the figure, PT and PS are tangents to a circle from a point P such that PT = 5 cm and m∠TPS = 60°. Find the length of chord TS.



22. What is the probability that a number selected from the numbers 4, 5, 25, is a prime number, when each of the given numbers is equally likely to be selected?

OR

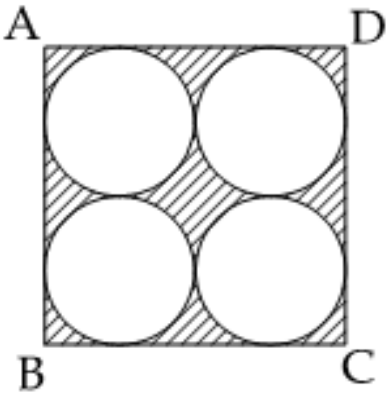
The following table gives production yield per hectare of wheat of 100 farms of a village.

Production yield	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80
Number of farms	2	8	12	24	38	16

Change the distribution to a 'more than' type distribution and draw ogive.

Section D
(Questions 23 to 30 carry 4 marks each)

23. Find the area of the shaded region in figure, where ABCD is a square of side 14 cm and four circles are of same radii each.

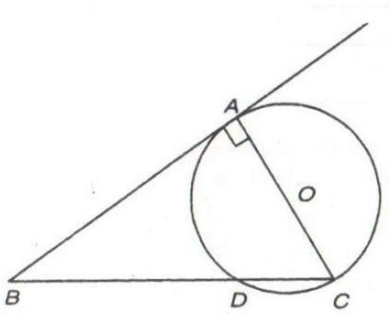


24. A motor boat, whose speed is 15km/ hr in still water, goes 30 km downstream and comes back in a total time of 4hrs 30mins. Find the speed of the stream.

25. A circle is touching the side BC of ΔABC at P and touching AB and AC produced at Q and R respectively. Prove that AQ = $\frac{1}{2}$ (perimeter of ΔABC).

OR

In the given figure angle A of the triangle ABC is a right angle. The circle on AC as diameter cuts BC at D. If BD = 9 and DC = 7, calculate the length of AB. [3]



26. By increasing the list price of a book by Rs. 10, a person can buy 10 less books for Rs. 1200. Find the original list price of the book.

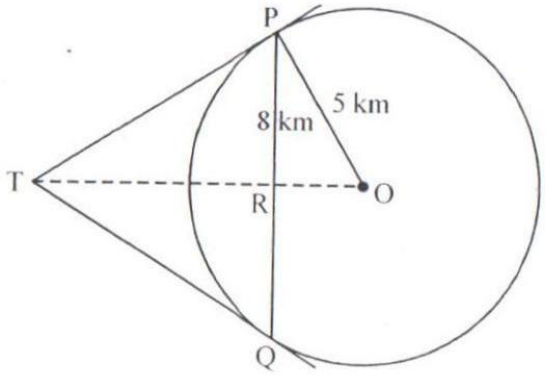
27. A straight highway leads to foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.

28. A sphere of diameter 6 cm is dropped into a cylindrical vessel partly filled with water. The radius of the vessel is 6 cm. If the sphere is completely submerged in water, find by how much the surface level of water will be raised.

OR

A lead pencil consists of a wood cylinder with a solid cylinder of graphite fitted into it. The diameter of the pencil is 7 mm. The diameter of the graphite is 1 mm and length of the pencil is 10 cm. Calculate the weight of whole pencil in grams if the density of the wood is 0.6 gm/ cm^3 and of graphite 2.3 gm/ cm^3.

29. Refer to the given figure. A road 8 km long is constructed along the chord PQ of a circular plot of radius 5 km. Two more roads are to be constructed from an external point T to the circle and tangential to it at P and Q. If expenses are Rs. 12000 per km for constructing the new roads TP and TQ, find the total cost of the roads to be constructed. How can the quality of roads be improved and the cost of construction be controlled?



30. Calculate the mode of the following frequency distribution table.

Marks	No. of Students
Above 25	52
Above 35	47
Above 45	37
Above 55	17
Above 65	8
Above 75	2
Above 85	0

OR

Find the mean of following distribution by the step deviation method.

Daily Expenditure:	100 - 150	150 - 200	200- 250	250 - 300	300- 350
No. of householders:	4	5	12	2	2