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- Multiple Choice Questions
- Case Study Questions
- Assertion-Reason Questions
- Subjective Type Questions

SURE SHOT QUESTIONS FOR 2027 BOARD EXAMS

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UMANG TEST SERIES

For CBSE 2027 Board Exams - Class 10 (Standard & Basic)

MATHEMATICS (UTS-20)

SAMPLE PAPER

SURE SHOT QUESTIONS

a compilation by O.P. GUPTA (INDIRA AWARD WINNER)

General Instructions : Same as given in UTS-01.

SECTION A

*(Question numbers 01 to 20 carry **1 mark** each.)*

*Followings are **multiple choice questions**. Select the correct option in each one of them.*

01. If the sum of the zeroes of a quadratic polynomial $kx^2+4x+3k$ is equal to their product, then the value of $(-k)$ is

(a) $-\frac{4}{3}$ (b) $\frac{3}{4}$ (c) $\frac{4}{3}$ (d) $-\frac{3}{4}$

02. The zeroes of the quadratic polynomial $x^2+4\sqrt{3}x+12$ are

(a) both positive and repeated (b) both negative and repeated

(c) one positive and one negative (d) both negative and distinct

03. For what value of p, do the pair of linear equations $-3x+5y=7$ and $2px-3y=1$ represent intersecting lines?

(a) all real values of p except $\frac{9}{10}$ (b) all real values of p except $-\frac{9}{10}$

(c) all real values of p except $\frac{10}{9}$ (d) all real values of p

04. If the point (x, y) is equidistant from the points $(2, 1)$ and $(1, -2)$, then

(a) $x+3y=0$ (b) $3x+y=0$ (c) $x+2y=0$ (d) $3x+2y=0$

05. Area of the triangle (in sq. units) formed by the points $(0, 0)$, $(3, 0)$ and $(0, -4)$, is

(a) 6 (b) 12 (c) 3 (d) 24

06. The value of $(1-\tan\theta+\sec\theta)(1-\cot\theta+\operatorname{cosec}\theta)$ is

(a) 1 (b) -1 (c) -2 (d) 2

07. If $\sin\theta=\sqrt{3}\cos\theta$, $0°<\theta<90°$, then $\frac{\theta}{2}=$

(a) $60°$ (b) $45°$ (c) $30°$ (d) $90°$

08. Tamanna goes to Dussehra mela which is being organized in the nearby community centre. She decides to buy some lottery tickets to grab the prize. If the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?

(a) 40 (b) 240 (c) 480 (d) 680

09. In a family of 3 children, the probability of having at least one boy is

(a) $\frac{7}{8}$ (b) $\frac{1}{8}$ (c) $\frac{5}{8}$ (d) $\frac{3}{8}$

10. If every term of the statistical data consisting of n terms is decreased by 3, then mean of the data

(a) remains unchanged (b) decreases by 3n

(c) decreases by 1 (d) decreases by 3

11. If mean of the mode of a distribution are 15 and 18 respectively, the median of the distribution is
(a) 17 (b) 15 (c) 16 (d) 18

12. The volume of a right circular cone whose area of the base is $156\ cm^2$ and the vertical height is $8\ cm$, is given by
(a) $2496\ cm^3$ (b) $1248\ cm^3$ (c) $1664\ cm^3$ (d) $416\ cm^3$

13. A solid metallic hemisphere of radius 7 cm is to be painted on its outer surface only. Which of the following correctly represents the area to be painted?
(a) πr^2 (b) $2\pi r^2$ (c) $3\pi r^2$ (d) $4\pi r^2$

14. Consider the following statements.
I. In similar triangles, the corresponding angles are equal.
II. In similar triangles, the corresponding sides are in the same ratio.
III. If two triangles have all sides equal, they are similar.
IV. Triangles with equal area are always similar.
Which of the above statements are true?
(a) I and II only (b) I, II and III only (c) I, II and IV only (d) All I, II, III and IV

15. Which of the following statements about a circle is true?
(a) The circumference of a circle is equal to its area.
(b) The diameter of a circle is always shorter than any chord.
(c) A tangent to a circle can intersect the circle at two points.
(d) All radii of a circle are equal in length.

16. From an external point Q, the length of the tangent to a circle is $5\ cm$ and the distance of Q from the centre is $8\ cm$. The radius (in cm) of the circle is
(a) 39 (b) 3 (c) $\sqrt{39}$ (d) 7

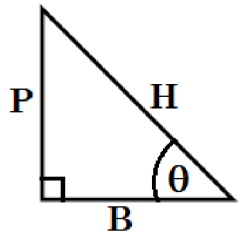
17. The sum and product of the roots of the equation $x^2+3x-10=0$ are respectively denoted by S and P. Then $(S-P)=$
(a) -7 (b) 7 (c) 30 (d) -30

18. A number of the form 8^n (where n is a natural number and $n>1$) cannot be divisible by
(a) 1 (b) 40 (c) 64 (d) 2^{2n}

*Followings are **Assertion-Reason based questions.***
In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

19. **Assertion (A) :** $\sin^2\theta+\cos^2\theta=1$, only when $\theta\neq 0°$.

Reason (R) : In the adjacent diagram shown, $\tan\theta=\frac{P}{B}$.



20. **Assertion (A) :** Area of the sector of a circle of radius 14 cm and central angle 90° is 154 cm^2.

Reason (R) : Area of circle $= 2\pi \times (\text{radius})^2$.

SECTION B

*(Question numbers 21 to 25 carry **2 marks** each.)*

21. (A) Find the greatest number which divides 230, 1314 and 1331 leaving remainder 5 in each case.

OR

(B) Two numbers are in the ratio 2 : 3 and their LCM is 180. Write both the numbers. Also find the HCF of these numbers?

22. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.

23. (A) Prove that $\sqrt{\dfrac{1+\sin A}{1-\sin A}} = \sec A + \tan A$.

OR

(B) If $\sin\theta = \cos\theta$, then find $\sin^4\theta - \cos^4\theta + \tan^4\theta$.

24. If A(5, 1), B(1, 5) and C(–3, –1) are the vertices of triangle ABC, then find the length (in units) of median passing through vertex A.

Assume that l denotes the median-length obtained, then write whether l^2 is a prime number.

25. Find the ratio in which the line segment joining A(1, –5) and B(–4, 5) is divided by the x-axis.

SECTION C

*(Question numbers 26 to 31 carry **3 marks** each.)*

26. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.

27. (A) Solve $p^2x^2 + (p^2 - q^2)x - q^2 = 0$, using quadratic formula.

OR

(B) If the roots of the quadratic equation $ax^2 + bx + c = 0$; $(a \neq 0)$ are given to be α and β, then prove that $\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2} = \dfrac{b^2 - 2ac}{c^2}$.

28. Prove that $21 + \sqrt{31}$ is an irrational, given that $\sqrt{31}$ is an irrational number.

29. Prove that : $\sin^2\theta\tan\theta + \cos^2\theta\cot\theta + 2\sin\theta\cos\theta = \tan\theta + \cot\theta$.

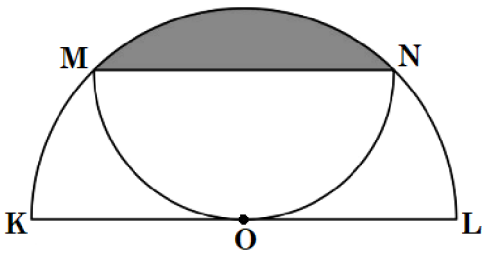
30. (A) Namisha found the area (A) of the minor segment of a circle of radius 14 cm, when the angle of the corresponding sector is 60°, as $\left(\dfrac{308}{m} - k\sqrt{3}\right)$ cm^2.

Determine the value of $m + \sqrt{k}$. Use $\pi = \dfrac{22}{7}$.

OR

(B) A semicircle MON is inscribed in another semicircle. Radius OL of the larger semicircle is 6 cm.

Find the area of the shaded segment in terms of π.



31. If α and β are the zeroes of a quadratic polynomial given as $f(t) = t^2 - p(t+1) - c$, then show that $(\alpha + 1)(\beta + 1) = 1 - c$.

SECTION D

*(Question numbers 32 to 35 carry **5 marks** each.)*

32. (A) A train covered a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time and if the train were slower by 6 km/h, it would have taken 6 hours more than the scheduled time. Find the length of the journey.

OR

(B) An alloy of iron contains 42% iron and another 28% iron. How many kilograms of each should be used to make 140 kg of 35% iron alloy?

33. If there are $(2n+1)$ terms in an A.P., prove that the sum of terms at odd places and the sum of terms at even places are in the ratio of $(n+1):n$.

34. (A) The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smaller circle touching it at D. Find the length of AD.

OR

(B) Prove that the line segment joining the points of contact of two parallel tangents passes through the centre.

35. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarized it in the table given below.

No. of cars	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency (periods)	7	14	13	12	20	11	15	8

Find the mean and median of the following data.

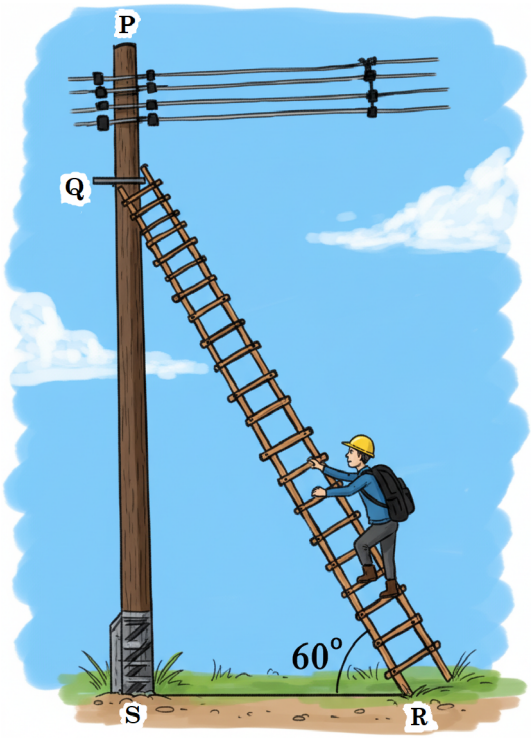
SECTION E

*(Question numbers 36 to 38 carry **4 marks** each.)*

*This section contains **three Case-study / Passage based questions**.*

*Each question has **three sub-parts** (i), (ii) and (iii). Two sub-parts are of **1 mark each** while the remaining third sub-part (with internal choice) is of **2 marks**.*

36. **CASE STUDY I :** An electrician Somnath has to repair an electric fault on the pole of height 5 m. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work.



Based on the above information, answer the following questions.

(i) What is the length of QS?

(ii) Find the length of ladder, when it is inclined at an angle of $60°$ to the horizontal.

(iii) (A) How far from the foot of the pole should he place the foot of the ladder?

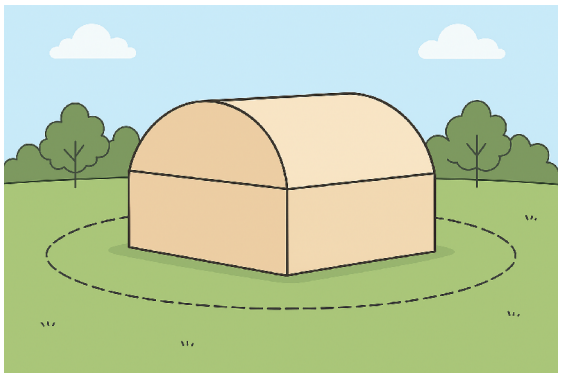
OR

(iii) (B) Suppose the length of ladder is 7.4 m and it is inclined at the horizontal angle of θ.
Find θ.

[Use $\sqrt{3}=1.73$, if needed in any sub-parts.]

37. **CASE STUDY II :** A committee has decided to celebrate Durga Puja in a circular park of radius 35 m. The committee has given the contract to a tent house to set up the tent.





The architect has designed a canvas tent in the shape of a semi-cylindrical roof surmounting an open cuboidal shape as shown in the figure. The dimensions of the rectangular base are $50\text{ m} \times 21\text{ m}$ and the total height of the tent is 19 m.

Based on the above information, answer the following questions.

(i) Find the height of the cuboidal part of the tent.

(ii) Find the area of the park outside the tent.

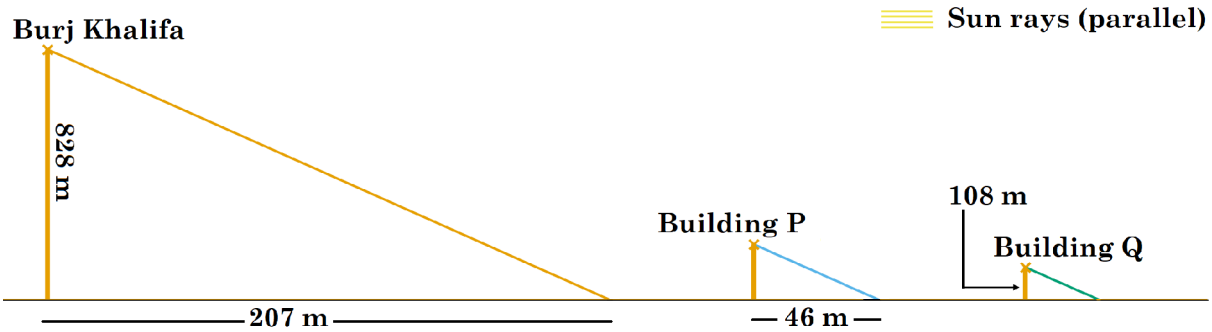
(iii) (A) Find the total cost of canvas if it is purchased at the rate of ₹4 per square metre.

OR

(iii) (B) Find the volume of air present in the tent.

38. **CASE STUDY III :** Burj Khalifa is the tallest tower in the world which is located in Dubai, United Arab Emirates. The height of Burj Khalifa is about 828 m. It has the highest observation deck open to the public in the world.





Ground (meters, not to scale horizontally vs vertically)

A person walking on the deck observed the shadows of Burj Khalifa and the buildings in the proximity. At an instance, he found the length of shadow of Burj Khalifa and that of a building 'P' as 207 m and 46 m respectively.

Based on the above information, answer the following questions.

(i) Name the property which can be used to find out the length of the building 'P'. Justify.

(ii) At the same instance when the length of the shadow of Burj Khalifa was 207 m, what will be the length of the shadow of building 'Q' of height 108 m?

(iii) (A) Calculate the height of building 'P'.

OR

(iii) (B) What is the length of shadow of Burj Khalifa when the length of shadow of building 'Q' is 81 metres (at a different instance)?

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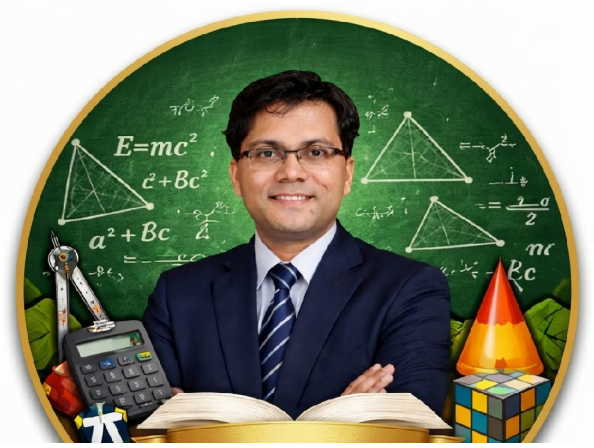
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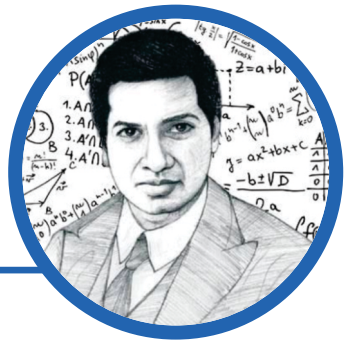


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“

An equation means nothing to me
unless it expresses a thought of God.

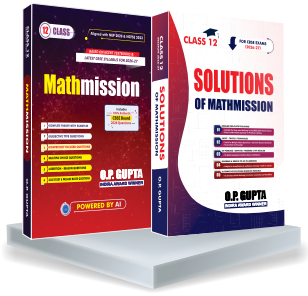
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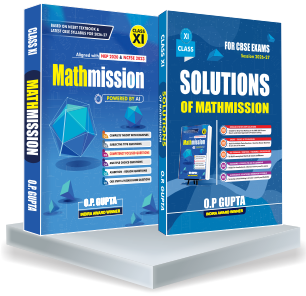
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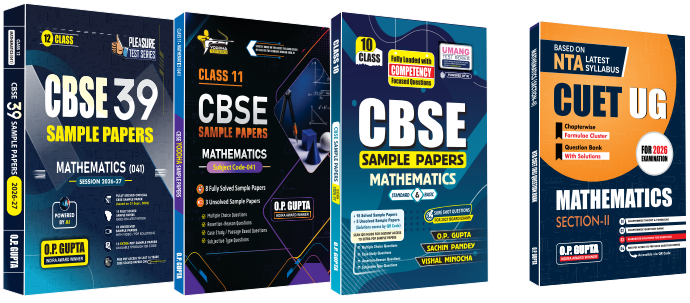


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