

Source: CBSE Board

Mathematics (Basic)

2019-2020

Time Allowed : 3 hours

Maximum Marks : 80

General Instructions:

Read the following instructions very carefully and strictly follow them:

- (i) This question paper comprises **four** sections – A, B, C and D. This question paper carries **40** questions. All questions are compulsory.
- (ii) Section A: Question Numbers **1** to **20** comprises of **20** questions of **one** mark each.
- (iii) Section B: Question Numbers **21** to **26** comprises of **6** questions of **two** marks each.
- (iv) Section C: Question Numbers **27** to **34** comprises of **8** questions of **three** marks each.
- (v) Section D: Question Numbers **35** to **40** comprises of **6** questions of **four** marks each.
- (vi) There is no overall choice in the question paper. However, an internal choice has been provided in 2 questions of one mark, **2** questions of two marks, 3 questions of three marks and 3 questions of four marks. You have to attempt **only one of the choices** in such questions.
- (vii) In addition to this, separate instructions are given with each section and question, wherever necessary.
- (viii) Use of calculators is **not** permitted

Section A

Question numbers 1 to 20 carry 1 mark each.

Choose the correct option in question numbers 1 to 10.

1. If a pair of linear equations is consistent, then the lines represented by them are
 - (A) parallel
 - (B) intersecting or coincident
 - (C) always coincident
 - (D) always intersecting

2. The distance between the points $(3, -2)$ and $(-3, 2)$ is
 - (A) $\sqrt{52}$ units
 - (B) $4\sqrt{10}$ units
 - (C) $2\sqrt{10}$ units

- (D) 40 units
3. $8\cot^2 A - 8\operatorname{cosec}^2 A$ is equal to
- (A) 8
(B) $\frac{1}{8}$
(C) -8
(D) $-\frac{1}{8}$
4. The total surface area of a frustum-shaped glass tumbler is ($r_1 > r_2$)
- (A) $\pi r_1 l + \pi r_2 l$
(B) $\pi l(r_1 + r_2) + \pi r_2^2$
(C) $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$
(D) $\sqrt{h^2 + (r_1 - r_2)^2}$
5. 120 can be expressed as a product of its prime factors as
- (A) $5 \times 8 \times 3$
(B) 15×2^3
(C) $10 \times 2^2 \times 3$
(D) $5 \times 2^3 \times 3$
6. The discriminant of the quadratic equation $4x^2 - 6x + 3 = 0$ is
- (A) 12
(B) 84
(C) $2\sqrt{3}$
(D) -12
7. If $(3, -6)$ is the mid-point of the line segment joining $(0, 0)$ and (x, y) , then the point (x, y) is
- (A) $(-3, 6)$
(B) $(6, -6)$
(C) $(6, -12)$
(D) $\left(\frac{3}{2}, -3\right)$

8. In the given circle in Figure-1, number of tangents parallel to tangent PQ is

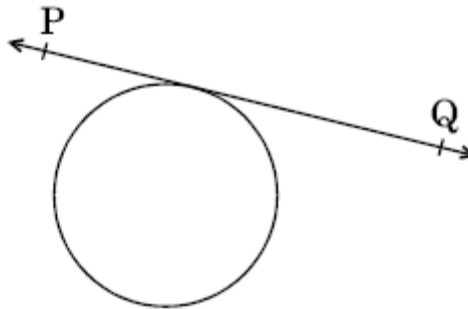


Figure-1

- (A) 0
- (B) Many
- (C) 2
- (D) 1

9. For the following frequency distribution:

Class:	0–5	5–10	10–15	15–20	20–25
Frequency	8	10	19	25	8

The upper limit of median class is

- (A) 15
 - (B) 10
 - (C) 20
 - (D) 25
10. The probability of an impossible event is
- (A) 1
 - (B) $\frac{1}{2}$
 - (C) not defined
 - (D) 0

Fill in the blanks in question numbers 11 to 15.

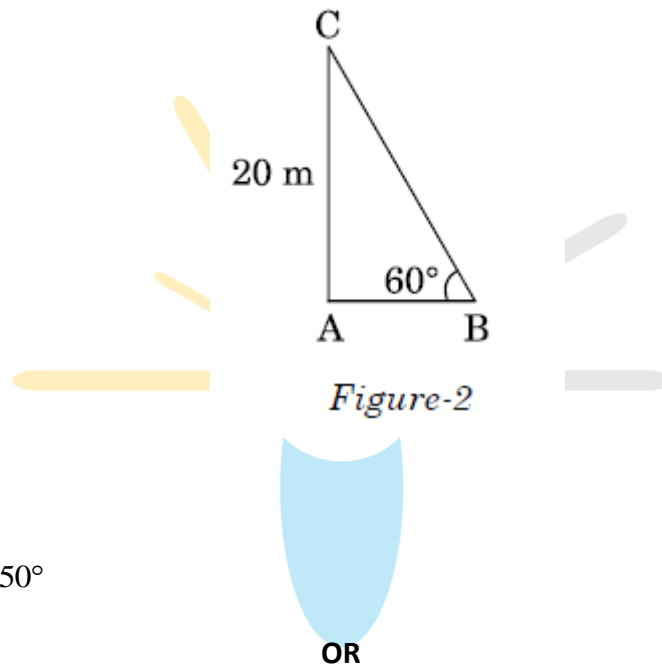
11. A line intersecting a circle in two points is called a _____.

12. If 2 is a zero of the polynomial $ax^2 - 2x$, then the value of 'a' is _____.

13. All squares are _____. (congruent/similar)
14. If the radii of two spheres are in the ratio 2 : 3, then the ratio of their respective volumes is _____.
15. If $\text{ar}(\Delta PQR)$ is zero, then the points P, Q and R are _____

Answer the following question numbers 16 to 20:

16. In Figure-2, the angle of elevation of the top of a tower AC from a point B on the ground is 60° . If the height of the tower is 20 m, find the distance of the point from the foot of the tower.



17. Evaluate:

$$\tan 40^\circ \times \tan 50^\circ$$

OR

If $\cos A = \sin 42^\circ$, then find the value of A .

18. A coin is tossed twice. Find the probability of getting head both the times.
19. Find the height of a cone of radius 5 cm and slant height 13 cm.
20. Find the value of x so that $-6, x, 8$ are in A.P.

OR

Find the 11th term of the A.P. $-27, -22, -17, -12, \dots$

Section B

Question numbers 21 to 26 carry 2 marks each.

21. Find the roots of the quadratic equation

$$3x^2 - 4\sqrt{3}x + 4 = 0$$

22. Check whether 6^n can end with the digit '0' (zero) for any natural number n .

OR

Find the LCM of 150 and 200.

23. If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$, $0 < A+B \leq 90^\circ$, $A > B$, then find the values of A and B .

24. In Figure-3, $\triangle ABC$ and $\triangle XYZ$ are shown. If $AB = 3\text{ cm}$, $BC = 6\text{ cm}$, $AC = 2\sqrt{3}\text{ cm}$, $\angle A = 80^\circ$, $XY = 4\sqrt{3}\text{ cm}$, $YZ = 12\text{ cm}$ and $XZ = 6\text{ cm}$, then find the value of $\angle Y$.

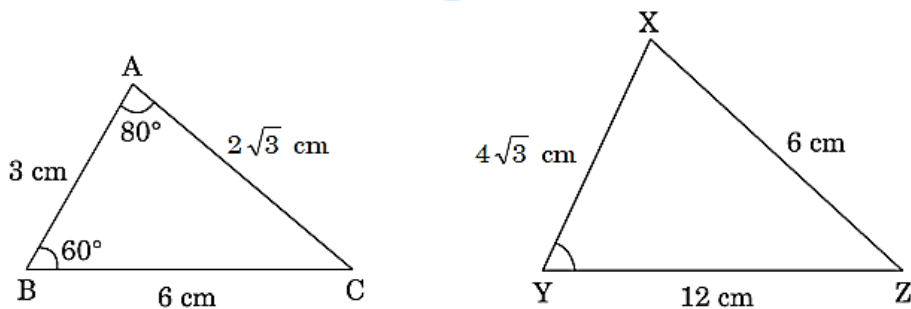


Figure-3

25. 14 defective bulbs are accidentally mixed with 98 good ones. It is not possible to just look at the bulb and tell whether it is defective or not. One bulb is taken out at random from this lot. Determine the probability that the bulb taken out is a good one.

26. Find the mean for the following distribution:

Classes:	5–15	15–25	25–35	35–45
Frequency:	2	4	3	1

OR

The following distribution shows the transport expenditure of 100 employees:

Expenditure (in ₹):	200 – 400	400 – 600	600 – 800	800 – 1000	1000 – 1200
Number of employees:	21	25	19	23	12

Find the mode of the distribution.

Section C

Question numbers 27 to 34 carry 3 marks each.

27. A quadrilateral $ABCD$ is drawn to circumscribe a circle. Prove that

$$AB + CD = AD + BC$$

28. The difference between two numbers is 26 and the larger number exceeds thrice of the smaller number by 4. Find the numbers.

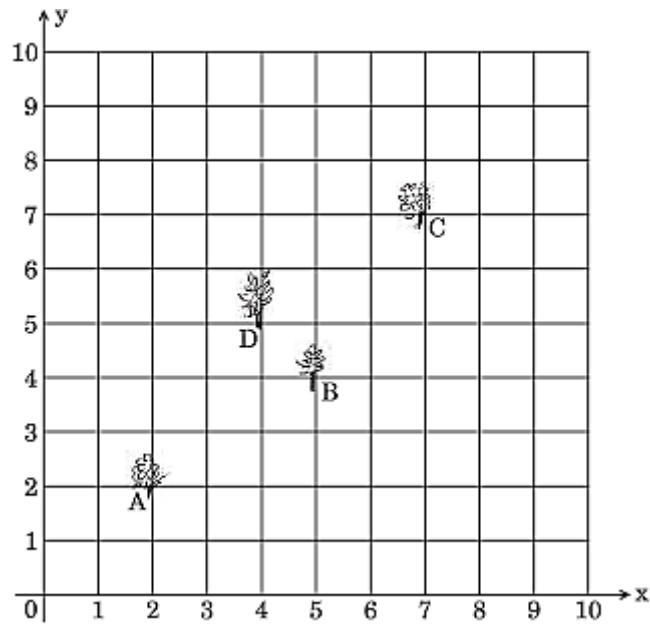
OR

Solve for x and y :

$$\frac{2}{x} + \frac{3}{y} = 13 \text{ and } \frac{5}{x} - \frac{4}{y} = -2$$

29. Prove that $\sqrt{3}$ is an irrational number.

30. Krishna has an apple orchard which has a $10\text{m} \times 10\text{m}$ sized kitchen garden attached to it. She divides it into a 10×10 grid and puts soil and manure into it. She grows a lemon plant at A , a coriander plant at B , an onion plant at C and a tomato plant at D . Her husband Ram praised her kitchen garden and points out that on joining A, B, C and D they may form a parallelogram. Look at the below figure carefully and answer the following questions:



- (i) Write the coordinates of the points A, B, C and D , using the 10×10 grid as coordinate axes.
- (ii) Find whether $ABCD$ is a parallelogram or not.

31. If the sum of the first 14 terms of an A.P. is 1050 and its first term is 10, then find the 21st term of the A.P.

32. Construct a triangle with its sides 4 cm, 5 cm and 6 cm. Then construct a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

OR

Draw a circle of radius 2.5 cm. Take a point P at a distance of 8 cm from its centre. Construct a pair of tangents from the point P to the circle.

33. Prove that:

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

34. In Figure-4, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If $OA = 7$ cm, then find the area of the shaded region.

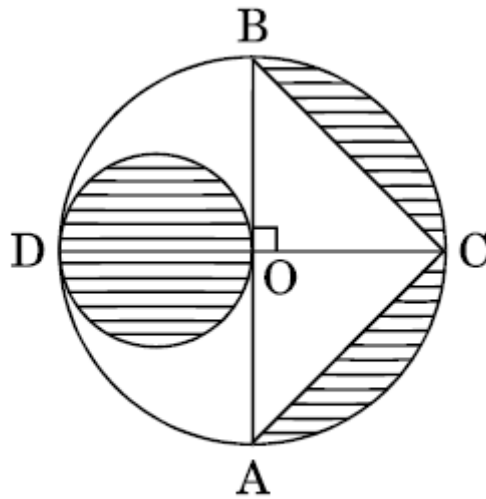


Figure-4

In Figure-5, $ABCD$ is a square with side 7 cm. A circle is drawn circumscribing the square. Find the area of the shaded region.

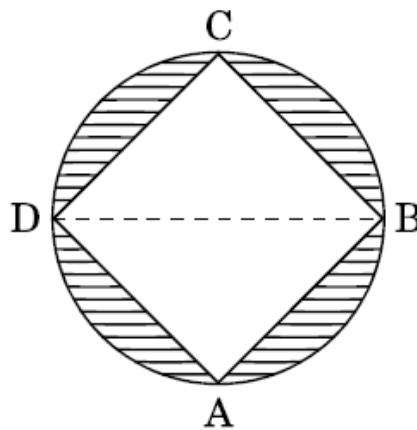


Figure-5

Section D

Question numbers 35 to 40 carry 4 marks each.

35. Find other zeroes of the polynomial

$$p(x) = 3x^4 - 4x^3 - 10x^2 + 8x + 8,$$

if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

OR

Divide the polynomial $g(x) = x^3 - 3x^2 + x + 2$ by the polynomial $x^2 - 2x + 1$ and verify the division algorithm.

36. From the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships are 30° and 45° . If the ships are on the opposite sides of the lighthouse, then find the distance between the two ships.

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

OR

In Figure-6, in an equilateral triangle ABC , $AD \perp BC$, $BE \perp AC$ and $CF \perp AB$.

Prove that $4(AD^2 + BE^2 + CF^2) = 9AB^2$

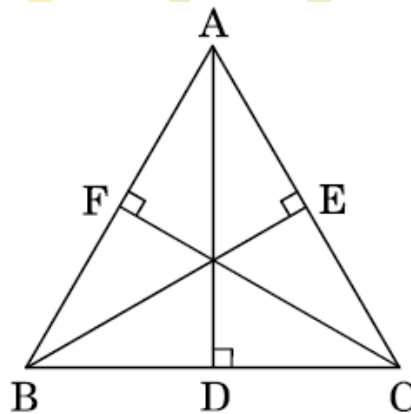


Figure-6

38. A container open at the top and made up of a metal sheet, is in the form of a frustum of a cone of height 14 cm with radii of its lower and upper circular ends as 8 cm and 20 cm, respectively. Find the capacity of the container.

39. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

OR

A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find the length and breadth of the park.

40. Draw a 'less than' ogive for the following frequency distribution

Classes:	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
Frequency :	7	14	13	12	20	11	15	8

