CBSE Class 10 Maths Question Paper Solution 2020
Set 430/4/1

QUESTION PAPER CODE 430/4/1
EXPECTED ANSWER/VALUE POINTS
SECTION A

Question numbers 1 to 20 carry 1 mark each.

Choose the correct option in question numbers 1 to 10.

1. Given that HCF (156, 78) = 78, LCM (156, 78) is

(A) 156 (B) 78 (C) 156 × 78 (D) 156 × 2

Sol. (A) 156 1

---

2. Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio

(A) 4 : 9 (B) 2 : 3 (C) 81 : 16 (D) 16 : 81

Sol. (D) 16 : 81 1

---

3. The distance between the points (– 1, – 3) and (5, – 2) is

(A) $\sqrt{61}$ units (B) $\sqrt{37}$ units (C) 5 units (D) $\sqrt{17}$ units

Sol. (B) $\sqrt{37}$ units 1

---

4. The discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$ is

(A) – 8 (B) 10 (C) 8 (D) $2\sqrt{2}$

Sol. (A) –8 1

OR

Roots of the quadratic equation $2x^2 - 4x + 3 = 0$ are

(A) real and equal (B) real and distinct (C) not real (D) real

Sol. (C) Not Real 1

---

5. Number of zeroes of the polynomial p(x) shown in Figure-1, are

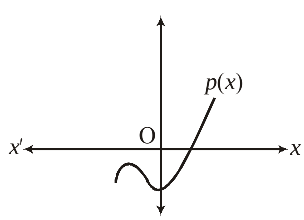


Figure 1

(A) 3 (B) 2 (C) 1 (D) 0

Sol. (C) 1 1

---

6. A dice is thrown once. The probability of getting an odd number is

(A) 1 **(B) $\frac{1}{2}$** **(C) $\frac{4}{6}$** **(D) $\frac{2}{6}$**

Sol. (B) $\frac{1}{2}$ 1

---

7. The value of k for which the equations $3x - y + 8 = 0$ and $6x + ky = -16$ represent coincident lines, is

(A) $-\frac{1}{2}$ **(B) $\frac{1}{2}$** **(C) 2** **(D) – 2**

Sol. (D) –2 1

---

8. If $\sin A = \cos A$, $0 \le A \le 90°$, then the angle A is equal to

(A) 30° **(B) 60°** **(C) 0°** **(D) 45°**

Sol. (D) 45° 1

---

9. The second term from the end of the A.P. 5, 8, 11, ..., 47 is

(A) 50 **(B) 45** **(C) 44** **(D) 41**

Sol. (C) 44 1

---

10. Total surface area of a solid hemisphere is

(A) $3\pi r^2$ **(B) $2\pi r^2$** **(C) $4\pi r^2$** **(D) $\frac{2}{3}\pi r^3$**

Sol. (A) $3\pi r^2$ 1

Fill in the blanks in question numbers 11 to 15.

11. The roots of the equation, $x^2 + bx + c = 0$ are equal if _______.

Sol. $b^2 = 4c$ 1

---

12. The mid-point of the line segment joining the points (– 3, – 3) and (– 3, 3) is _______.

Sol. (–3, 0) 1

---

13. The lengths of the tangents drawn from an external point to a circle are _______.

Sol. Equal 1

---

14. For a given distribution with 100 observations, the 'less than' ogive and 'more than' ogive intersect at (58, 50). The median of the distribution is _______.

Sol. 58 1

---

https://byjus.com

15. In the quadratic polynomial $t^2 - 16$, sum of the zeroes is _______.

Sol. 0 — 1

Answer the following question numbers 16 to 20.

16. Write the 26th term of the A.P. 7,4,1, –2, ...

Sol. $d = -3$ — $\frac{1}{2}$

$a_{26} = -68$ — $\frac{1}{2}$

---

17. Find the coordinates of the point on x-axis which divides the line segment joining the points (2, 3) and (5, – 6) in the ratio 1 : 2.

Sol. Let the point on x-axis be (x, 0) — $\frac{1}{2}$

$\therefore$ Required point is (3, 0) — $\frac{1}{2}$

---

18. If cosec $\theta = \frac{5}{4}$, find the value of cot θ.

Sol. $\cot^2\theta = \frac{25}{16} - 1 = \frac{9}{16}$ — $\frac{1}{2}$

$\cot\theta = \frac{3}{4}$ — $\frac{1}{2}$

OR

Find the value of sin 42° – cos 48°.

Sol. $\sin 42° = \cos(90° - 42°) = \cos 48°$ — $\frac{1}{2}$

$\therefore \sin 42° - \cos 48° = 0$ — $\frac{1}{2}$

---

19. The angle of elevation of the top of the tower AB from a point C on the ground, which is 60 m away from the foot of the tower, is 30°, as shown in Figure-2. Find the height of the tower.

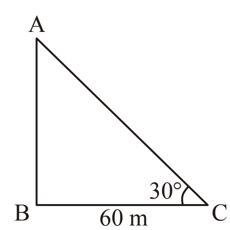


Figure 2

https://byjus.com

Sol. $\tan 30° = \dfrac{AB}{60°}$ $\frac{1}{2}$

$\Rightarrow AB = \dfrac{60}{\sqrt{3}}$ or $20\sqrt{3}$ m $\frac{1}{2}$

20. **In Figure-3, find the length of the tangent PQ drawn from the point P to a circle with centre at O, given that OP = 12 cm and OQ = 5 cm.**

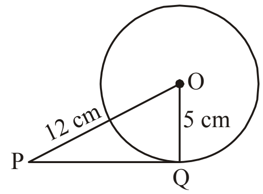


Figure 3

Sol. $PQ^2 = 144 - 25 = 119$ $\frac{1}{2}$

$\therefore PQ = \sqrt{119}$ units $\frac{1}{2}$

SECTION B

Question numbers 21 to 26 carry 2 marks each.

21. **A cylindrical bucket, 32 cm high and with radius of base 14 cm, is filled completely with sand. Find the volume of the and. (Use $\pi = \dfrac{22}{7}$)**

Sol. Volume of sand $= \dfrac{22}{7} \times 14 \times 14 \times 32$ 1

$= 19712 \text{ cm}^3$ 1

22. **In Figure-4, ΔABC and ΔXYZ are shown. If AB = 3.8 cm, AC = $3\sqrt{3}$ cm, BC = 6 cm, XY = $6\sqrt{3}$ cm, XZ = 7.6 cm, YZ = 12 cm and ∠A = 65°, ∠B = 70°, then find the value of ∠Y.**

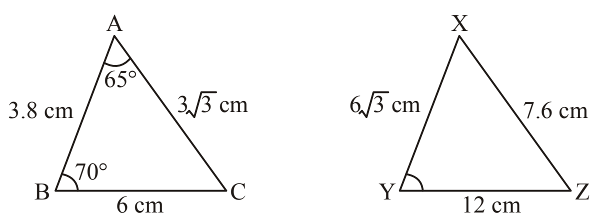


Figure 4

Sol. $\Delta ABC \sim \Delta XZY$ 1

$\Rightarrow \angle Y = \angle C = 180° - (\angle A + \angle B)$ $\frac{1}{2}$

$\Rightarrow \angle Y = 45°$ $\frac{1}{2}$

https://byjus.com

OR

If the areas of two similar triangles are equal, show that they are congruent.

Sol. Let $\Delta ABC \sim \Delta PQR$

$$\therefore \frac{ar(ABC)}{ar(PQR)} = 1 = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2}$$ 1

$\Rightarrow AB = PQ,\ BC = QR,\ AC = PR$ $\frac{1}{2}$

$\therefore\ \Delta ABC \cong \Delta PQR$ (SSS congrence rule) $\frac{1}{2}$

---

23. If sec 2A = cosec (A – 30°), 0° < 2A < 90°, then find the value of ∠A.

Sol. sec 2A = cosec (A – 30°)

$\Rightarrow$ cosec (90° – 2A) = A – 30° 1

$\Rightarrow$ 90º – 2A = A – 30° $\frac{1}{2}$

$\Rightarrow \angle A = 40^\circ$ $\frac{1}{2}$

---

24. Show that every positive even integer is of the form 2q and that every positive odd integer is of the form 2q + 1, where q is some integer.

Sol. Let 'a' be any positive integer and b = 2

Using Euclid's Division lemma

$a = 2q + r,\ r = 0,\ 1$ 1

$\therefore\ a = 2q$ or $2q + 1$

Because 2q is an even integer and every positive ineger is either even or odd.

$\therefore\ a = 2q + 1$ is an odd positive integer. 1

---

25. How many two-digit numbers are divisible by 6?

Sol. Two digit numbers divisible by 6 are 12, 18, 24,...96 1

$96 = 12 + (n - 1) \times 6$ $\frac{1}{2}$

$\Rightarrow n = 15$ $\frac{1}{2}$

OR

In an A.P. it is given that common difference is 5 and sum of its first ten terms is 75. Find the first term of the A.P.

Sol. $S_{10} = 75$ and $n = 10$ $\frac{1}{2}$

$\frac{10}{2}(2a + 9 \times 5) = 75$ 1

$\Rightarrow a = -15$ $\frac{1}{2}$

---

26. The following table shows the ages of the patients admitted in a hospital during a year:

Age (in years):	5 – 15	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65
Number of patients:	60	110	210	230	150	50

Find the mode of the distribution.

Sol. Modal class is 35 – 45 $\frac{1}{2}$

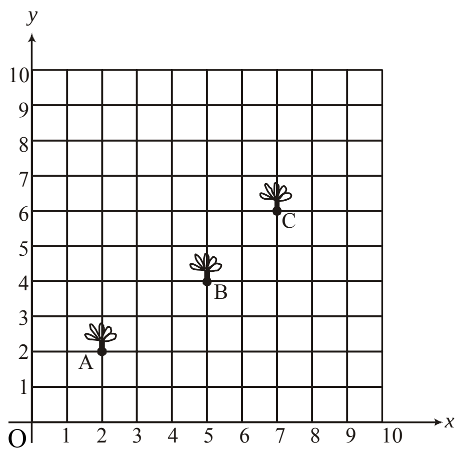
$\therefore$ Mode $= 35 + \frac{230 - 210}{460 - 210 - 150} \times 10$ 1

$= 37$ $\frac{1}{2}$

SECTION C

Question numbers 27 to 34 carry 3 marks each.

27. Seema has a 10 m × 10 m kitchen garden attached to her kitchen. She divides it into a 10 × 10 grid and wants to grow some vegetables and herbs used in the kitchen. She puts some soil and manure in that and sows a green chilly plant at A, a coriander plant at B and a tomato plant at C.
Her friend Kusum visited the garden and praised the plants grown there. She pointed out that they seem to be in a straight line. See the below diagram carefully and answer the following questions:



Figure

https://byjus.com

(i) Write the coordinates of the points A, B and C taking the 10 × 10 grid as coordinate axes.

(ii) By distance formula or some other formula, check whether the points are collinear.

Sol. (i) Coordinates of A, B and C are

(2, 2), (5, 4), (7, 6) $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$

(ii) Area of triangle $= \frac{1}{2}\left[2(4-6)+5(6-2)+7(2-4)\right]$ $\frac{1}{2}$

$= 1 \neq 0$ $\frac{1}{2}$

$\therefore$ Points are not collinear $\frac{1}{2}$

---

28. In Figure-5, a circle is inscribed in a ΔABC touching BC, CA and AB at P, Q and R respectively. If AB = 10 cm, AQ = 7 cm, CQ = 5 cm, find the length of BC.

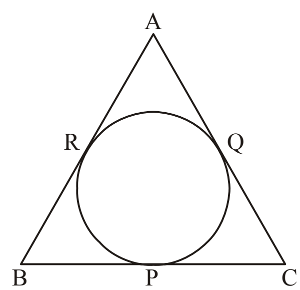


Figure 5

Sol. AR = AQ = 7 cm 1

BR = AB – AR = 10 – 7 = 3 cm $\frac{1}{2}$

BC = BP + PC

= BR + CQ 1

= 3 + 5 = 8 cm $\frac{1}{2}$

OR

In Figure-6, two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2 ∠OPQ.

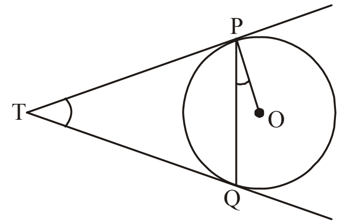


Figure 6

https://byjus.com

Sol. Let $\angle PTQ = \theta$

$\because$ $TP = TQ$

$\therefore$ $\angle TPQ = \angle TQP = \frac{1}{2}(180° - \theta)$ 1

$= 90° - \frac{1}{2}\theta$ $\frac{1}{2}$

$\because$ $\angle TPO = 90°$

$\therefore$ $\angle OPQ = 90° - \left(90° - \frac{1}{2}\theta\right)$ 1

$= \frac{1}{2}\theta = \frac{1}{2}\angle PTQ$

$\Rightarrow$ $\angle PTQ = 2\ \angle OPQ$ $\frac{1}{2}$

---

29. Prove that $\sqrt{2}$ is an irrational number.

Sol. Let us assume $\sqrt{2}$ is a rational number.

$\therefore$ $\sqrt{2} = \frac{p}{q}$, $q \neq 0$, HCF(p, q) = 1, p & q are integers $\frac{1}{2}$

Squaring both sides

$2 = \frac{p^2}{q^2} \Rightarrow p^2 = 2q^2$ (i)

$\Rightarrow p = 2m$ (ii) 1

Using equations (i) and (ii)

$4m^2 = 2q^2$

$\Rightarrow q = 2m$ (iii) 1

Using equation (ii) and (iii) we get p and q both are multiples of 2 which contradicts the assumption.

Hence $\sqrt{2}$ is an irrational number. $\frac{1}{2}$

---

30. **Prove that:**

$$(\text{cosec}\ \theta - \cot\ \theta)^2 = \frac{1-\cos\theta}{1+\cos\theta}$$

Sol. LHS = $(\text{cosec}\ \theta - \cot\ \theta)^2$

$$= \left(\frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}\right)^2 \qquad 1$$

$$= \frac{(1-\cos\theta)^2}{\sin^2\theta} \qquad \frac{1}{2}$$

$$= \frac{(1-\cos\theta)^2}{(1-\cos\theta)\,(1+\cos\theta)} \qquad 1$$

$$= \frac{1-\cos\theta}{1+\cos\theta} = \text{R.H.S.} \qquad \frac{1}{2}$$

---

31. **5 pencils and 7 pens together cost ₹ 250 whereas 7 pencils and 5 pens together cost ₹ 302. Find the cost of one pencil and that of a pen.**

Sol. Let the cost of 1 pencil be ₹ x and cost of 1 pen be ₹ y.

$5x + 7y = 250$ ...(i) 1

$7x + 5y = 302$ ...(ii) 1

Solving (i) and (ii)

$x = 36$ and $y = 10$ 1

Hence, cost of 1 pencil = ₹ 36

cost of 1 pen = ₹ 10

OR

Solve the following pair of equations using cross-multiplication method:

$x - 3y - 7 = 0$

$3x - 5y - 15 = 0$

Sol.

$$\frac{x}{(-3)(-15)-(-5)(-7)} = \frac{y}{(-7)3-(-15)} = \frac{1}{-5-3(-3)} \qquad 1\frac{1}{2}$$

$$\Rightarrow \frac{x}{10} = \frac{y}{-6} = \frac{1}{4} \qquad \frac{1}{2}$$

$$\Rightarrow x = \frac{5}{2} \qquad \frac{1}{2}$$

$$\Rightarrow y = \frac{-3}{2} \qquad \frac{1}{2}$$

---

https://byjus.com

32. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour.

(ii) the queen of diamonds.

(iii) an ace.

Sol. Toal number of possible outcomes = 52

(i) P(Card is a king of Red colour) = $\frac{2}{52}$ or $\frac{1}{26}$ 1

(ii) P(card is a queen of diamonds) = $\frac{1}{52}$ 1

(iii) P(Card is an ace) = $\frac{4}{52}$ or $\frac{1}{13}$ 1

OR

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

(i) a two-digit number.

(ii) a perfect square number.

(iii) a prime, number less than 15.

Sol. Total number of possible outcomes = 90

(i) P(a two digit number) = $\frac{81}{90}$ or $\frac{9}{10}$ 1

(ii) P(a perfect square number) = $\frac{9}{90}$ or $\frac{1}{10}$ 1

(iii) P(a prime number less than 15) = $\frac{6}{90}$ or $\frac{1}{15}$ 1

https://byjus.com

33. **In Figure-7, ABCD is a square of side 14 cm. From each corner of the square, a quadrant of a circle of radius 3.5 cm is cut and also a circle of radius 4 cm is cut as shown in the figure. Find the area of the remaining (shaded) portion of the square.**

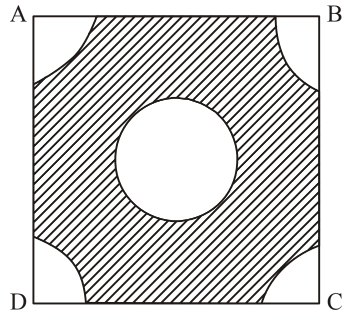


Figure 7

Sol. Area of the square = 14 × 14 = 196 cm^2 $\frac{1}{2}$

Area of middle circle = $\frac{22}{7} \times 4 \times 4 = 50.28$ cm^2 1

Area of four quadrants = $4 \times \frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5$

= 38.5 cm^2 1

Hence, Area of Remaining part of square.

= 196 – (50.28 + 38.5)

= 107.22 cm^2 $\frac{1}{2}$

---

34. **Draw a circle of radius 3 cm. Take a point P outside the circle at a distance of 7 cm from the centre O of the circle and draw two tangents to the circle.**

Sol. Drawing a circle and locating point P. 1

Constructing tangents from P. 2

SECTION D

Question numbers 35 to 40 marks each.

35. **In a right-angled triangle, prove that the square of the hypotenuse is equal to the sum of the squares of the remaining two sides.**

Sol. For correct given, to prove, figure and construction. $4\times\frac{1}{2}=2$

Correct proof 2

---

https://byjus.com

36. Divide polynomial – x^3 + $3x^2$ – 3x – 3x + 5 by the polynomial x^2 + x – 1 and verify the division algorithm.

Sol. On dividing $-x^3 + 3x^2 - 3x + 5$ by $x^2 + x - 1$

We get quotient $= -x + 4$

and Remainder $= -8x + 9$ 2

Verification

$(x^2 + x - 1)(-x + 4) + (9 - 8x)$ 1

$= -x^3 - x^2 + x + 4x^2 + 4x - 4 + 9 - 8x$ $\frac{1}{2}$

$= -x^3 + 3x^2 - 3x + 5$ $\frac{1}{2}$

OR

Find other zeroes of the polynomial

$p(x) = 2x^4 - 3x^3 - 3x^2 + 6x - 2$

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

Sol. Two factors of p(x) are $\left(x - \sqrt{2}\right)$ and $\left(x + \sqrt{2}\right)$ $\frac{1}{2}$

$g(x) = \left(x + \sqrt{2}\right)$ and $\left(x - \sqrt{2}\right)$

$= x^2 - 2$ $\frac{1}{2}$

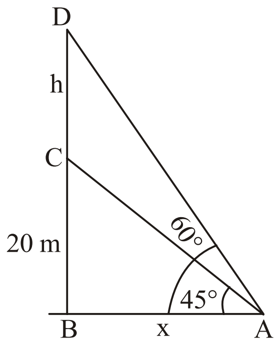
Now, $\dfrac{2x^4 - 3x^3 - 3x^2 + 6x - 2}{x^2 - 2} = 2x^2 - 3x + 1$ 2

Also, $2x^2 - 3x + 1 = (2x - 1)(x - 1)$ $\frac{1}{2}$

Other zeroes are $\frac{1}{2}, 1$ $\frac{1}{2}$

37. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower, fixed at the top of a 20 m high building, are 45° and 60° respectively. Find the height of the tower. (Use $\sqrt{3}$ = 1.73)

Sol. Correct figure 1



$\tan 45° = \dfrac{20}{x}$

$\Rightarrow x = 20$ m 1

Now, $\tan 60° = \dfrac{20+h}{x}$

$\Rightarrow \quad 20\sqrt{3} - 20 = h$ 1

$\Rightarrow \quad h = 20\left(\sqrt{3}-1\right)$

$= 20 \times 0.73$

$= 14.6$ m 1

---

38. A bucket is in the form of a frustum of a cone of height 30 cm with the radii of its lower and upper circular ends as 10 cm and 20 cm respectively. Find the capacity of the bucket. (Use π = 3.14)

Sol. Capacity of bucket $= \dfrac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$

$= \dfrac{1}{3} \times 3.14 \times 30(100 + 400 + 200)$ 2

$= 21980 \text{ cm}^3$ 2

OR

Water in a canal 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/hr. How much area will it irrigate in 30 minutes if 4 cm of standing water is needed?

Sol. Length of canal covered by water in 30 min. = 5000 m 1

Volume of water flown in 30 min. = $6 \times 1.5 \times 5000 \text{ m}^3$ 1

Hence, $6 \times 1.5 \times 5000 = (\text{Area of field}) \times \dfrac{4}{100}$ 1

$\therefore$ Area of field = 1125000 m^2 1

---

https://byjus.com

39. Draw a 'more than' ogive for the following distribution:

Weigth (in kg):	**40 – 44**	**44 – 48**	**48 – 52**	**52 – 56**	**56 – 60**	**60 – 64**	**64 – 68**
Number of Students:	**4**	**10**	**30**	**24**	**18**	**12**	**2**

Sol. Points to be plotted for more than type ogive

(40, 100), (44, 96), (48, 86), (52, 56), (56, 32), (60, 14), (64, 2) 2

For drawing correct ogive 2

---

40. A train travels 360 km at a uniform speed. If the speed had been 5 km/hr more, it would have taken 1 hour less for the same journey. Find the original speed of the train.

Sol. Let original speed of the train be x km/h.

$\therefore \frac{360}{x} - \frac{360}{x+5} = 1$ 2

$\Rightarrow x^2 + 5x - 1800 = 0$ 1

$\Rightarrow (x + 45) \quad (x - 40) = 0$

$\Rightarrow x = 40$

$\therefore$ Speed of the train is 40 km/h 1

OR

Sum of the areas of two squares is 468 m^2. If the difference of their parameters is 24 m, find the sides of the two squares.

Sol. Let the side of squares be x m, y m (x > y)

$\therefore x^2 + y^2 = 468$ ...(i) 1

and $4(x - y) = 24$ ...(ii) 1

Simplify (i) and (ii) to get

$x^2 - 6x - 216 = 0$ 1

$\Rightarrow (x - 18)(x + 12) = 0$

$\Rightarrow x = 18$ $\frac{1}{2}$

and $y = 12$ $\frac{1}{2}$

$\therefore$ Sides of square are 18 m and 12 m.

---

https://byjus.com