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

QUESTION PAPER CODE 430/1/1

EXPECTED ANSWER/VALUE POINTS

SECTION A

1. HCF of 144 and 198 is

(a) 9 **(b) 18** **(c) 6** **(d) 12**

Sol. (b) 18 1

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2. The median and mode respectively of a frequency distribution are 26 and 29. Then its mean is

(a) 27.5 **(b) 24.5** **(c) 28.4** **(d) 25.8**

Sol. (b) 24.5 1

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3. In Fig. 1, on a circle of radius 7 cm, tangent PT is drawn from a point P such that PT = 24 cm. If 0 is the centre of the circle, then the length of PR is

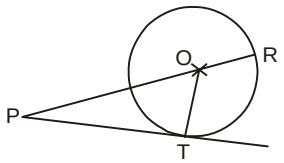

Fig. 1

(a) 30 cm **(b) 28 cm** **(c) 32 cm** **(d) 25 cm**

Sol. (c) 32 cm 1

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4. 225 can be expressed as

(a) 5×3^2 **(b) $5^2 \times 3$** **(c) $5^2 \times 3^2$** **(d) $5^3 \times 3$**

Sol. (d) $5^2 \times 3^2$ 1

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5. The probability that a number selected at random from the numbers 1, 2, 3, ..., 15 is a multiple of 4 is

(a) $\frac{4}{15}$ **(b) $\frac{2}{15}$** **(c) $\frac{1}{15}$** **(d) $\frac{1}{5}$**

Sol. (d) $\frac{1}{5}$ 1

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6. If one zero of a quadratic polynomial ($kx^2 + 3x + k$) is 2, then the value of k is

(a) $\frac{5}{6}$ **(b) $-\frac{5}{6}$** **(c) $\frac{6}{5}$** **(d) $-\frac{6}{5}$**

Sol. (d) $-\frac{6}{5}$ 1

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7. $2.\overline{35}$ **is**

(a) an integer **(b) a rational number**

(c) an irrational number **(d) a natural number**

Sol. (b) a rational number 1

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8. **The graph of a polynomial is shown in Fig. 2, then the number of its zeroes is**

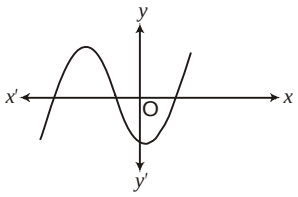

Fig. 2

(a) 3 **(b) 1** **(c) 2** **(d) 4**

Sol. (a) 3 1

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9. **Distance of point P(3, 4) from x-axis is**

(a) 3 units **(b) 4 units** **(c) 5 units** **(d) 1 unit**

Sol. (b) 4 units 1

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10. **If the distance between the points A(4, p) and B(1, 0) is 5 units, then the value(s) of p is (are)**

(a) 4 only **(b) –4 only** **(c) ±4** **(d) 0**

Sol. (c) ±4 1

Q. Nos. 11 to 15, fill in the blanks.

11. **If the point C(k, 4) divides the line segment joining two points A(2, 6) and B(5, 1) in ratio 2 : 3, the value of k is _____.**

Sol. $\frac{16}{5}$ 1

OR

If points A(–3, 12), B(7, 6) and C(x, 9) are collinear, then the value of x is_____.

Sol. 2 1

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12. **If the equations kx – 2y = 3 and 3x + y = 5 represent two intersecting lines at unique point, then the value of k is _____.**

Sol. $\neq -6$ 1

OR

If quadratic equation $3x - 4x + k = 0$ has equal roots, then the value of k is _____.

Sol. $\frac{4}{3}$ 1

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13. The value of (sin 20° cos 70° + sin 70° cos 20°) is _____.

Sol. 1 1

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14. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, A > B, then the value of A is _____.

Sol. 45° 1

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15. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of second triangle is _____.

Sol. $\frac{27}{6}$ cm or 5.4 cm 1

In Q. Nos. 16 to 20, answer the following.

16. If $5 \tan \theta = 3$, then what is the value of $\left(\frac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}\right)$?

Sol. $\frac{5\tan\theta - 3}{4\tan\theta + 3}$ $\frac{1}{2}$

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

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17. The areas of two circles are in the ratio 9 : 4, then what is the ratio of their circumferences?

Sol. $\frac{r_1^2}{r_2^2} = \frac{9}{4} \Rightarrow \frac{r_1}{r_2} = \frac{3}{2}$ $\frac{1}{2}$

$\therefore \frac{2\pi r_1}{2\pi r_2} = \frac{3}{2}$ or $3:2$ $\frac{1}{2}$

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18. If a pair of dice is thrown once, then what is the probability of getting a sum of 8?

Sol. Favourable outcomes are

(3, 5); (4, 4); (5, 3); (2, 6); (6, 2) i.e., 5 $\frac{1}{2}$

$P(\text{Sum } 8) = \frac{5}{36}$ $\frac{1}{2}$

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19. In Fig. 3, in ΔABC, DE || BC such that AD = 2.4 cm, AB = 3.2 cm and AC = 8 cm, then what is the length of AE?

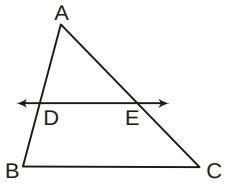

Fig. 3

Sol. $\frac{AD}{AB} = \frac{AE}{AC}$ or $\frac{2.4}{3.2} = \frac{AE}{8}$ $\frac{1}{2}$

AE = 6 cm $\frac{1}{2}$

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20. The n^{th} term of an AP is (7 – 4n), then what is its common difference?

Sol. $T_1 = 3,\ T_2 = -1$ $\frac{1}{2}$

d = –4 $\frac{1}{2}$

SECTION B

Q. Nos, 21 to 26 carry two marks each.

21. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball at random from the bag is three times that of a red ball, find the number of blue balls in the bag.

Sol. Let number of blue balls = x

Total balls = 5 + x $\frac{1}{2}$

$P(\text{blue ball}) = \frac{x}{5+x}$ and $P(\text{Red balls}) = \frac{5}{5+x}$ 1

$\therefore \quad \frac{x}{5+x} = \frac{3(5)}{5+x}$

$\Rightarrow$ x = 15

$\therefore$ Number of blue balls = 15 $\frac{1}{2}$

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

Sol. L.H.S. $= \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} \cdot \sqrt{\frac{1-\sin\theta}{1-\sin\theta}}$ 1

$= \frac{1-\sin\theta}{\cos\theta} = \sec\theta - \tan\theta$ 1

OR

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

L.H.S. $= \frac{\tan^2\theta}{\sec^2\theta} + \frac{\cot^2\theta}{\operatorname{cosec}^2\theta}$ 1

$= \sin^2\theta + \cos^2\theta$

$= 1$ 1

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23. Two different dice are thrown together, find the probability that the sum of the numbers appeared is less than 5.

Sol. Total number of possible outcomes = 36

Favourable outcomes are = (1, 1); (1, 2); (1, 3); (2, 1); (2, 2)

(3, 1) i.e. 6 1

P(sum of numbers less than five) $= \frac{6}{36}$ or $\frac{1}{6}$ 1

OR

Find the probability that 5 Sundays occur in the month of November of a randomly selected year.

Number of days of November = 30

= 4 weeks + 2 days 1

P (5 sudays) $= \frac{2}{7}$ 1

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24. In Fig. 4, a circle touches all the four sides of a quadrilateral ABCD. If AB = 6 cm, BC = 9 cm and CD = 8 cm, then the find length of AD.

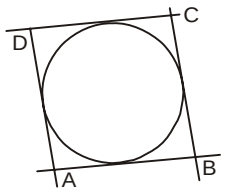

Fig. 4

Sol. The sides of quadrilateral touches a circle

$AB + DC = BC + AD$ 1

$6 + 8 = 9 + AD$

$\Rightarrow AD = 5$ cm 1

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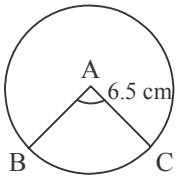
25. The perimeter of a sector of a circle with radius 6.5 cm is 31 cm, then find the area of the sector.

Sol.



$AB + \overset{\frown}{BC} + AC = 31$ cm

$\Rightarrow \overset{\frown}{BC} = (31 - 13)$ cm

$l = 18$ cm $\frac{1}{2}$

$A = \frac{1}{2} lr$

$= \frac{1}{2} \times 18 \times 6.5 \text{ cm}^2$ 1

$= 58.5 \text{ cm}^2$ $\frac{1}{2}$

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26. Divide the polynomial $(4x^2 + 4x + 5)$ by $(2x + 1)$ and write the quotient and the remainder.

Sol.

$$\begin{array}{r} 2x+1 \\ 2x+1\overline{)\,4x^2+4x+5} \\ 4x^2+2x \\ \hline 2x+5 \\ 2x+1 \\ \hline 4 \end{array}$$

1

Quotient = 2x + 1, Remainder = 4 $\frac{1}{2} + \frac{1}{2}$

SECTION C

Q. Nos. 27 to 34 carry 3 marks each.

27. If α and β are the zeroes of the polynomial $f(x) = x^2 - 4x - 5$ then find the value of $\alpha^2 + \beta^2$.

Sol. $\alpha + \beta = \frac{4}{1}; \ \alpha\beta = -5$ 1

$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$

$= 16 + 10$ 1

$= 26$ 1

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28. Draw a circle of radius 4 cm. From a point 7 cm away from the centre of circle. Construct a pair of tangents to the circle.

Sol. Constructing the circle of given radius 1

Constructing the tangents 2

OR

Draw a line segment of 6 cm and divide it in the ratio 3 : 2.

Drawing line segment of length 6 cm. 1

Dividing it in the ratio 3 : 2. 2

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29. A solid metallic cuboid of dimension 24 cm × 11 cm × 7 cm is melted and recast into solid cones of base radius 3.5 cm and height 6 cm. Find the number of cones so formed

Sol. Volume of metallic cuboid = $(24 \times 11 \times 7)$ cm^3 1/2

$\text{Volume of Cone} = \frac{1}{3}\pi \cdot r^2 \cdot h$

$= \frac{1}{3}\pi\left(\frac{7}{2}\right)^2 \cdot 6$ 1/2

$\text{No. of Cones} = \frac{24 \times 11 \times 7}{\frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 6}$ 1

$= 24$ 1

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30. Prove that $(1 + \tan A - \sec A) \times (1 + \tan A + \sec A) = 2 \tan A$

Sol. L.H.S. $= (1 + \tan A)^2 - \sec^2 A$ 1

$= 1 \tan^2 A + 2 \tan A - \sec^2 A$ 1

$= \sec^2 A + 2\tan A - \sec^2 A$

$= 2 \tan A = \text{R.H.S.}$ 1

OR

Prove that $\frac{\text{cosec}\,\theta}{\text{cosec}\,\theta - 1} + \frac{\text{cosec}\,\theta}{\text{cosec}\,\theta + 1} = 2\sec^2\theta$

L.H.S. $= \frac{\cos ec\,\theta(\cos ec\,\theta + 1) + \cos ec\,\theta(\cos ec\,\theta - 1)}{\cos ec^2\,\theta - 1}$ 1

$= \frac{2\cos ec^2\theta}{\cot^2\theta}$ 1

$= 2 \sec^2 \theta = \text{R.H.S.}$ 1

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31. Given that $\sqrt{3}$ is an irrational number, show that $(5 + 2\sqrt{3})$ is an irrational number.

Sol. Let $(5+2\sqrt{3}) = x$, where x is a rational number. $\frac{1}{2}$

$\Rightarrow \sqrt{3} = \frac{x - 5}{2}$ 1

L.H.S. is an irrational and R.H.S. is a rational number. 1

It is a contradiction

$\therefore$ Our assumption is wrong

$\therefore\ 5+2\sqrt{3}$ is a irrational number. $\frac{1}{2}$

OR

An army contingent of 612 members is to march behind an army band of 48 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

$612 = 2^2 \times 3^2 \times 17$ 1

$48 = 2^4 \times 3$ 1

HCF $(612, 48) = 2^2 \times 3$

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

Number of column = 12 $\frac{1}{2}$

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32. Prove that, in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Sol. Correct figure, given, To prove and construction. $1\frac{1}{2}$

Correct Proof $1\frac{1}{2}$

Read the following passage carefully and then answer the questions given at the end.

33. To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in Fig. 5. Niharika runs $\frac{1}{4}$th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$th the distance AD on the eighth line and posts a red flag.

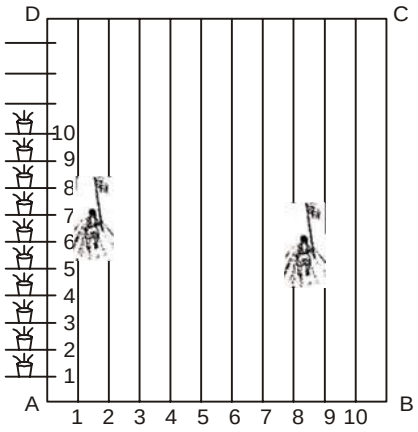

Fig. 5

(i) What is the distance between the two flags?

(ii) If Rashmi has to post a blue flag exactly half way between the line segment joining the two flags, where should she post the blue flag?

Sol. Coordinate of green flag = (2, 25) $\frac{1}{2}$

Coordinate of Red flag = (8, 20) $\frac{1}{2}$

(i) Distance between the flags = $\sqrt{(-6)^2 + (5)^2}$

= $\sqrt{61}$ units 1

(ii) Mid point between = (5, 22.5) 1

green and Red flag

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34. Solve graphically: 2x + 3y = 2, x – 2y = 8

Sol. Correct graph of 2x + 3y = 2 1

Correct graph of x – 2y = 8 1

Point of intersection = (4, –2)

or x = 4, y = – 2 1

SECTION D

Q. Nos. 35 to 40 carry 4 marks each.

35. A two digit number is such that the product of its digits is 14. If 45 is added to the number; the digits interchange their places. Find the number.

Sol. Let unit digit = x

Tens digit = y

$\therefore$ Number = 10y + x $\frac{1}{2}$

10y + x + 45 = 10x + y 1

$\Rightarrow$ x – y = 5 ...(i) $\frac{1}{2}$

and xy = 14 ...(ii) $\frac{1}{2}$

Solving (i) and (ii)

x = 7, y = 2 1

$\therefore$ Number = 27 $\frac{1}{2}$

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36. If 4 times the 4th term of an AP is equal to 18 times the 18th term, then find the 22nd term.

Sol. Let first term be a and common difference = d

$\therefore$ 4(a + 3d) = 18(a + 17d) 1

$\Rightarrow$ a = –21d 1

22nd term = a + 21d 1

= –21d + 21d

= 0 1

OR

How many terms of the AP : 24, 21, 18, ... must be taken so that their sum is 78?

Let the number of terms be n, $d = -3$ $\frac{1}{2}$

$\therefore \frac{n}{2}[48+(n-1)(-3)] = 78$ 1

$\Rightarrow n^2 - 17n + 52 = 0$ 1

$(n - 13)(n - 4) = 0$ 1

$\Rightarrow n = 13$ or 4

$\therefore$ Number of terms = 4 or 13 $\frac{1}{2}$

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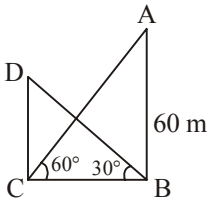
37. The angle of elevation of the top of a building from the foot of a tower is 30°. The angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 60 m high, find the height of the building.

Sol.



$\frac{AB}{BC} = \tan 60°$ Correct figure 1

$\frac{60}{BC} = \sqrt{3}$

$\Rightarrow BC = \frac{60}{\sqrt{3}}$ or $20\sqrt{3}$ m 1

Again, $\frac{DC}{CB} = \tan 30°$ 1

$\frac{DC}{20\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\Rightarrow DC = 20$ m

Height of building = 20 m 1

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38. In Fig. 6, DEFG is a square in a triangle ABC right angled at A.

Prove that

(i) ΔAGF ~ ΔDBG

(ii) ΔAGF ~ ΔEFC

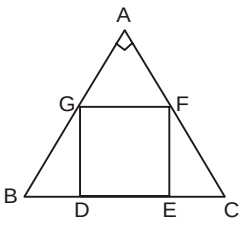
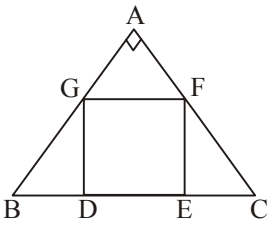


Fig.6

Sol.



GF || DE (DEFG is square)

$\therefore \angle AGF = \angle ABC$ (Corresponding angles) $\frac{1}{2}$

$\therefore \angle A = \angle GDB = 90°$

$\therefore \Delta AGF \sim \Delta DBG$ (By AA similarity) $1\frac{1}{2}$

Again DEFG being a square $\angle AFG = \angle ACB$ (corresponding angles) $\frac{1}{2}$

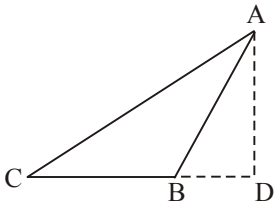
$\therefore \angle A = \angle CEF$ (each 90°)

$\Delta AGF \sim \Delta EFC$ (By AA similarity) $1\frac{1}{2}$

OR

In an obtuse ΔABC (∠B is obtuse), AD is perpendicular to CB produced. Then prove that $AC^2 = AB^2 + BC^2 + 2BC \times BD$.

Sol. In rt ΔADC Correct figure 1



$AC^2 = AD^2 + CD^2$ $\frac{1}{2}$

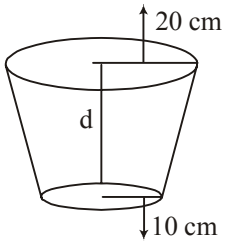
$= AD^2 + (CB + BD)^2$ 1

$= AD^2 + BD^2 + CB^2 + 2CB.BD$ 1

$= AB^2 + CB^2 + 2CB \cdot BD$ $\because \Delta$ ABD is rt angled $\frac{1}{2}$

39. An open metal bucket is in the shape of a frustum of cone of height 21 cm with radii of its lower and upper ends are 10 cm and 20 cm respectively. Find the cost of milk which can completely fill the bucket at the rate of ₹ 40 per litre.

Sol.



$$\text{Volume of Bucket} = \frac{\pi}{3}[400 + 100 + 200] \times 21$$

$$= 4900 \times \frac{22}{7} = 15400 \text{ cm}^3 \quad 2$$

$$\text{Volume of milk} = \frac{15400}{1000} = 15.4 \text{ litres} \quad 1$$

$$\text{Cost of milk} = ₹\ 15.4 \times 40 = ₹\ 616 \quad 1$$

OR

A solid is in the shape of a cone surmounted on a hemisphere. The radius of each of them being 3.5 cm and the total height of the solid is 9.5 cm. Find the volume of the solid.

$$\text{Volume of hemisphere} = \frac{2}{3}\pi r^3$$

$$= \frac{2}{3} \times \frac{22}{7} \times \left(\frac{7}{2}\right)^3$$

$$= \frac{539}{6} \text{ cm}^3 \quad 1\frac{1}{2}$$

$$\text{Height of cone} = (9.5 - 3.5) \text{ cm} = 6 \text{ cm} \quad \frac{1}{2}$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2} \times 6 = 77 \text{ cm}^3 \quad 1$$

Total volume of solid

$$= \frac{539}{6} + \frac{77}{1}$$

$$= \frac{539 + 462}{6} = \frac{1001}{6} \text{ cm}^3 \text{ or } 166.83 \text{ cm}^3 \quad 1$$

40. Find the mean of the following data:

Classes	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120
Frequency	20	35	52	44	38	31

Sol.

x	f	fx
10	20	200
30	35	1050
50	52	2600
70	44	3080
90	38	3420
110	31	3410
	220	13760

Correct Table 2

$\therefore$ Mean $= \frac{\Sigma fx}{\Sigma f} = \frac{13760}{220}$ or 62.54 2