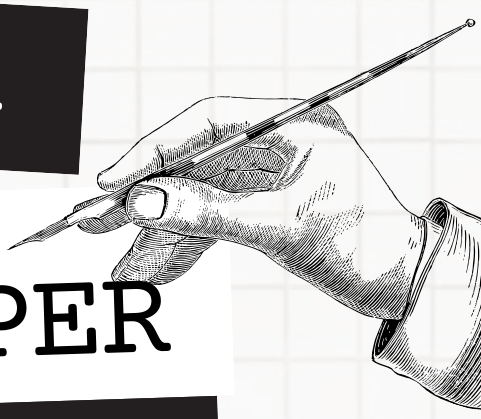
2024

Pre-Board



QUESTION PAPER

CBSE BOARD / STATE BOARDS

NCERT Based Syllabus



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Pre-Board Exam 2024 Question Paper

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Pre Board - 1 (2023-24)

CLASS-X

SUBJECT-MATHEMATICS STANDARD (CODE-041)

Time allowed: 3 hours **Maximum Marks: 80**

General Instructions :

1. This Question paper contains five sections A , B , C , D , E

2.Section A has 18 MCQs and 02 Assertion – Reason based questions of 1 mark each.

3. Section B has 5 Very Short Answer (VSA) type questions of 2 marks each.

4. Section C has 6 Short Answer (SA) type questions of 3 marks each.

5. Section D has 4 Long Answer (LA) type questions of 5 marks each.

6. Section E has 3 Case study type questions of 4 marks each with sub parts.

7. All questions are compulsory. However, an internal choice in 2 questions of 5 marks. 2 Qs os 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in the 2 marks Qs of Section E.

SECTION A

(This section comprises of MULTIPLE CHOICE QUESTIONs type questions (MCQ) of 1 marks each)

1. The LCM of smallest two-digit composite number and smallest composite number is :
   a) 12 b) 4 c) 20 d) 44
2. The total number of factors of a prime number is
   a) 1 b) 2 c) 3 d) 4

3 . The LCM of two prime numbers p and q (p > q) is 221.Find the value of 3p – q

a) 4 b) 28 c) 38 d) 48

3. The graph of a polynomial P(x) cuts the X- axis at 3 points and touches it at 2 other points. The number of zeroes of P(x) is :
   a) 4 b) 2 c) 3 d) 5

5 . If 5 is a zero of the quadratic polynomial , $x^2 – kx -15$, then the value of k is

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

6. If α and β are the roots of $4x^2 + 3x + 7 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is

a) 3/7 b) - 3/7 c) 7/ 3 d) -7/ 3

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7. The value of k for which the lines 5x + 7y = 3 and 15x + 21y = k coincide is :

a) 9 b) 5 c) 7 d) 18

8. The common difference of an AP, whose n^{th} term is $a_n = 3n+7$ is

a) 3 b) 2 c) 0 d) 4

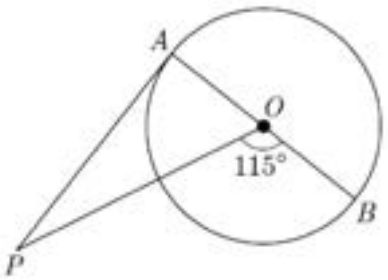
9. In a ΔABC, D and E are points on the sides AB and AC respectively such that DE II BC If AD=6cm, DB= 9cm and AE=8cm, find AC

a) 12 b) 8 c) 10 d) 20

10. Two concentric circles are of radii 10 cm and 8 cm, then the length of the chord of the larger circle which touches the smaller circle is

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

11. In the given figure, PA is a tangent from an external point P to a circle with centre O. If ∠POB = 115°, then value of∠ APO is



(a) 25° (b) 20° (c) 30° (d) 65°

12. The value of θ for which cos (10° + θ) = sin 30° , is

(a) 50° (b) 90° (c) 30° (d) 45°

13. The two side AB and BC of right triangle ABC are in the ratio 1 : 3 . What will be the value of sin C ?

(a) $\frac{3}{10}$ (b) $\frac{1}{\sqrt{10}}$ (c) $\frac{1}{3}$ (d) 1

14. The area of the square that can be inscribed in a circle in a circle of radius 8cm is :

a) 256cm^2 b) 64 cm^2 c) 128 cm^2 d) 32 cm^2

15. Two right circular cones have their heights in the ratio 1 : 3 and radii in the ratio 3 : 1 . What is the ratio of their volumes ?

a) 9 : 1 b) 1:3 c) 2 ; 3 d) 3 : 1

16 . For a frequency distribution, mean, median and mode are connected by the relation

(a) Mode = 3 Mean – 2 median (b) Mode = 2 median - 3 Mean

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(c) Mode = 3median -2 Mean (d) Mode = 3 median + 2 Mean

17. If P(E) = 0.007, then what is the probability of 'not E'?

(a) 0.93 (b) 0.095 (c) 0.890 (d) 0.993

18. If two dice are thrown, the probability of getting sum as 3 will be

(a) $\frac{1}{18}$ (b)$\frac{2}{3}$ (c)$\frac{5}{36}$ (d)$\frac{1}{36}$

Assertion reason based questions

Instructions for answering assertion and reason based questions. You have to choose option

19. **Assertion:** D and E are points on sides AB and AC of triangle ABC such that AD=(7x-4) cm , AE=(5x-2) cm, DB=(3x+4) cm and EC= 3x cm. if DE || BC, then x=4

Reason: 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.

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true

20. **Assertion :** If Sn is the sum of the first n terms of an A.P., then its nth term an is given by an = Sn – Sn_{-1} .

Reason : The 10th term of the A.P. 5, 8, 11, 14, ……. is 35

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true

Section B

(This section comprises of very short answer type questions (VSA) of 2 marks each)

21. Find the value of k such that the polynomials x^2 – (k + 6) x+ 2(2k -1) has sum of its zeros equal to half of their product.

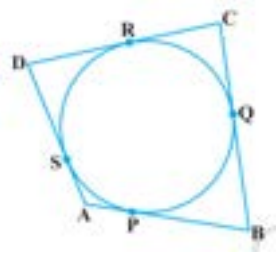
22. In what ratio does the point ($\frac{24}{11}$, y) divide the line segment joining the point P (2, -2) and Q (3, 7) ? Also find the value of y.

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23. D is a point on the side BC of a triangle ABC such that ∠ADC= ∠BAC. Show that CA^2 =CB.CD

24. A quadrilateral ABCD is drawn to circumscribe a circle as in figure.



Prove that AB + CD = AD + BC.

OR

Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

25. If sin θ + cos θ = √2 , then prove that tan θ + cot θ = 2.

OR

Prove that : (1 + cot A – cosecA) (1 + tan A + sec A) = 2.

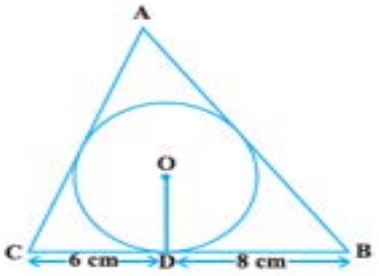
Section C

(This section comprises of very short answer type questions (SA) of 3 marks each)

26. Prove that √5 is an irrational number.

27.Sum of the areas of two squares is 157 m^2. If the sum of their perimeters is 68 m. Find the sides of two squares.

28. A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6cm respectively .



Find the sides AB and AC

29. Show that: θ + θ = θ − θ

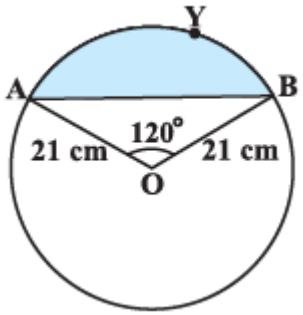
30. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre.
Find: (i) the length of the arc (ii) area of the segment formed by the corresponding chord

OR

Find the area of the segment AYB shown in below figure, if radius of the circle is 21 cm and

∠AOB = 120°.

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31. One card is drawn from a well-shuffled pack of 52 playing cards. Find the probability of getting

i) A king of black colour
ii) Either a red card or a Jack
iii) Not a face card

OR

Two dice are thrown at the same time. Find the probability of getting

(i) Even number on both dice
(ii) The sum of the two numbers appearing on the top of the dice is 7.
(iii) The sum of the two numbers appearing on the top of the dice is prime number.

Section D

(This section comprises of long answer type questions (LA) of 5 marks each)

32. 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 journey.

OR

Draw the graph of 2x + y = 6 and 2x – y +2 = 0. Shade the region bounded by these lines and x- axis. Find the area of the shaded region.

33. A solid toy is in the form of a hemisphere surmounted by a right circular cone of same radius. The height of the cone is 10cm and the radius of the base is 7cm. Determine the volume of the toy. Also find the area of the coloured sheet required to cover the toy.(Use $\pi = \frac{22}{7}$ and $\sqrt{149} = 12.2$)

34. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multistoried building are 30°and 45°, respectively. Find the height of the multistory building and the distance between the
two buildings.

OR

From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.

35. The median of the following data is 525. Find the values of *x* and *y*, if the total frequency is 100.

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Class Interval	Frequency
0 - 100	2
100 - 200	5
200 - 300	x
300 - 400	12
400 - 500	17
500 - 600	20
600 - 700	y
700 - 800	9
800 - 900	7
900 - 1000	4

SECTION E

(This section comprises of 3 case – study / passage based questions of 4 marks each with two sub sections.

First two case study questions have three sub questions of marks 1 , 1 , 2 respectively. The third case study question has two sub questions of 2 marks each.)

36. In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.



above information answer the following questions.

Based on the above information answer the following questions.

(i) Find the production in the 1st year. (1 mark)

(ii) Find the production in the 12th year. (1 mark)

(iii) Find the total production in first 10 years. (2 marks)

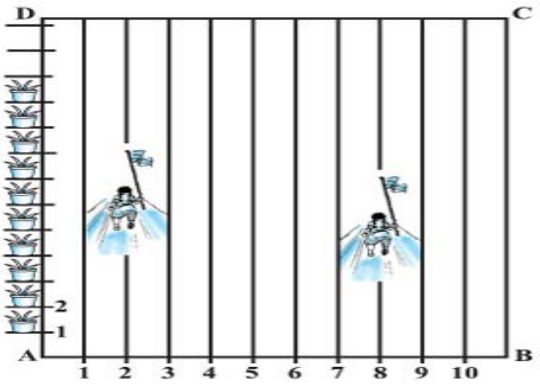
OR

(iii) In how many years will the total production reach 31200 cars? (2 marks)

37. In order to conduct sports day activities in your school, lines have been drawn with chalk powder at a distance of 1 m each in a rectangular shaped ground ABCD. 100 flower pots have been placed at the distance of 1 m from each other along AD, as shown in the following figure. Niharika runs (1 /4)th distance AD on the 2nd line and posts a green Flag. Preet runs (1/ 5) th distance AD on the eighth line and posts are red flags. Taking A as the origin AB along x-axis and AD along y-axis, answer the following questions:

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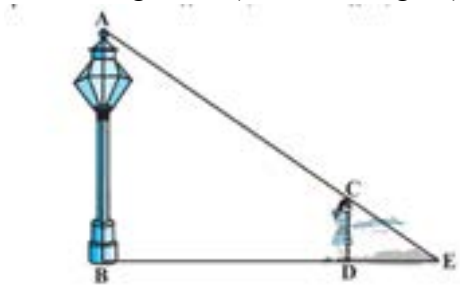


(i) Find the coordinates of the green flag. (1 mark)
(ii) Find the distance between the two flags. (1 mark)
(iii) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag? (2 marks)

OR

(iii) If Joy has to post a flag at one fourth distance from the green flag, in the line segment joining the green and red flags, then where should he post his flag? (2 marks)

38. On one day, a poor girl of height 90 cm is looking for a lamp-post for completing her homework as in her area power is not there and she finds the same at some distance away from her home. After completing the homework, she is walking away from the base of a lamp-post at a speed of 1.2 m/s. The lamp is 3.6 m above the ground (see below figure).



(i) Find her distance from the base of the lamp post after 4 seconds. (2 marks)
(ii) Find the length of her shadow after 4 seconds. (2 marks)
OR
(ii) Find the ratio AC : CE. (2 marks)

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Marking Scheme

PRE BOARD -1

CLASS-X ***SUBJECT- MATHEMATICS(STANDARD)-041*** ***Max. Marks 80***

1	OPTION C (20)
2	OPTION B (2)
3	OPTION C (38)
4	OPTION D (5)
5	OPTION B (2)
6	OPTION B (-3/7)
7	OPTION A (9)
8	OPTION A(3)
9	OPTION D (20)
10	OPTION B (12)
11	OPTION A (25)
12	OPTION A (50)
13	OPTION B (1 /√10)
14	OPTION C (128)
15	OPTION D (3:1)
16	OPTION C
17	OPTION D (0.993)
18	OPTION A (1/18)
19	OPTION A
20	OPTION C

SECTION B

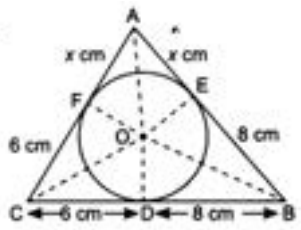
Q.21	CORRECT VALUES SUM OF ZEROES AND PRODUCT OF ZEROES K= 7	1 + 1
Q.22	CORRECT RATIO 2 : 9 Y = -4/ 11	1 + 1
Q.23	CORRECT SIMILARITY OF TRIANGLE CORRECT RELATION	1 + 1
Q.24	CORRECT PROOF AND USING CORRECT THEOREM	1 + 1

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Q.25	$(\sin\theta + \cos\theta)^2 = \sqrt{2} \times \sqrt{2}$ We get $2\sin\theta.\cos\theta = 1$ Now $\tan\theta + \cot\theta = (\sin^2\theta + \cos^2\theta)/ \sin\theta.\cos\theta$ $= 2$ OR $(1 + \cot A - \text{cosec}A)(1 + \tan A + \sec A)$ Using correct identity Correct Proof	1 1

SECTION C

Q.26	Let us assume, to the contrary, that $\sqrt{5}$ is rational. That is, we can find integers a and b ($\neq 0$) such that $\sqrt{5} = \frac{a}{b}$, and assume that a and b are coprime. So, $\sqrt{5}\, b = a$ Squaring on both sides, and rearranging, we get $5b^2 = a^2$. Therefore, a^2 is divisible by 5, and by Theorem 1.3, it follows that a is also divisible by 5. So, we can write a = 5c for some integer c. we get $5b^2 = 25a^2$, that is, $b^2 = 5a^2$. This means that b^2 is divisible by 5, and so b is also divisible by 5 (using Theorem 1.3 with p = 5). Therefore, a and b have at least 5 as a common factor. But this contradicts the fact that a and b are coprime. This contradiction has arisen because of our incorrect assumption that $\sqrt{5}$ is rational. So, we conclude that $\sqrt{5}$ is irrational.	1 1 1
Q.27.	$X^2 + Y^2 = 157$ Equation 1 $4(X + Y) = 68$ $X + Y = 17$, put value of y in equation 1 On solving we get $Y^2 - 17Y + 66 = 0$ THEN Y = 11 ,6 SIDES OF SQUARES ARE 11 AND 6cm.	½ ½ 1 1
Q.28		1+1+1 1 1

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29.

BD = 8 cm and DC = 6 cm

BE = BD = 8 cm

CD = CF = 6 cm

Let AE = AF = x cm

In ΔABC, a = 6 + 8 = 14 cm

b = (x + 6) cm

c = (x + 8) cm

$$s = \frac{a+b+c}{2} = \frac{14+x+6+x+8}{2} = \frac{2x+28}{2} = (x+14)\text{ cm}$$

$$\text{ar}(\Delta ABC) = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{(x+14)\times x\times 8\times 6} = \sqrt{48x\times(x+14)}\text{ cm}^2 \quad ...(i)$$

Again, $$\text{ar}(\Delta ABC) = \text{ar}(\Delta OBC) + \text{ar}(\Delta OCA) + \text{ar}(\Delta OAB)$$

$$= \frac{1}{2}\times 4\times a + \frac{1}{2}\times 4\times b + \frac{1}{2}\times 4\times c$$

$$= 2a + 2b + 2c = 2(a+b+c) = 2\times 2(x+14) \quad ...(ii)$$

From (i) and (ii), we get

$$\sqrt{48x(x+14)} = 4(x+14) \Rightarrow 48x(x+14) = 4^2(x+14)^2$$

$$\Rightarrow 48x(x+14) = 16(x+14)^2 \Rightarrow 3x(x+14) = (x+14)^2$$

$$\Rightarrow 3x = x+14 \Rightarrow 2x = 14 \Rightarrow x = 7$$

AB = x + 8 = 7 + 8 = 15 cm

AC = x + 6 = 7 + 6 = 13 cm

1

1

1+1

1

1

2

30

$\theta + \theta = \theta - \theta$

$\theta + \theta$

$\theta(\theta + 1)\ \theta - 1)(\theta)$

$= \theta - \theta$

Length of arc

Area of the segment

or

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31.

Solution : Area of the segment AYB

= Area of sector OAYB – Area of Δ OAB

Now, area of the sector OAYB = $\frac{120}{360} \times \frac{22}{7} \times 21 \times 21 \text{ cm}^2 = 462 \text{ cm}^2$

For finding the area of Δ OAB, draw OM ⊥ AB as shown in Fig. 11.7.

Note that OA = OB. Therefore, by RHS congruence, Δ AMO ≡ Δ BMO.

So, M is the mid-point of AB and $\angle AOM = \angle BOM = \frac{1}{2} \times 120^\circ = 60^\circ$.

Let $OM = x$ cm

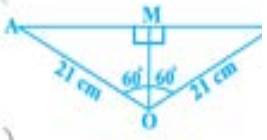


Fig. 11.7

So, from Δ OMA, $\frac{OM}{OA} = \cos 60^\circ$

or, $\frac{x}{21} = \frac{1}{2} \quad \left(\cos 60^\circ = \frac{1}{2}\right)$

or, $x = \frac{21}{2}$

So, $OM = \frac{21}{2}$ cm

Also, $\frac{AM}{OA} = \sin 60^\circ = \frac{\sqrt{3}}{2}$

So, $AM = \frac{21\sqrt{3}}{2}$ cm

So, area of $\Delta OAB = \frac{1}{2} AB \times OM = \frac{1}{2} \times 21\sqrt{3} \times \frac{21}{2} \text{ cm}^2$

$= \frac{441}{4}\sqrt{3} \text{ cm}^2$ (3)

Therefore, area of the segment AYB = $\left(462 - \frac{441}{4}\sqrt{3}\right) \text{cm}^2$ [From (1), (2) and (3)]

$= \frac{21}{4}(88 - 21\sqrt{3}) \text{cm}^2$

Since pack of playing have 52 cards, therefore n(S)=52

i) Let A: getting king of black colour

n(A)=2

P(A)=$\frac{n(A)}{n(S)} = \frac{2}{52} = \frac{1}{26}$

ii) Let B: getting red colour or jack

n(B)=28

P(B)=$\frac{n(B)}{n(S)} = \frac{28}{52} = \frac{7}{13}$

iii) Let C: getting not a face card

n(C)=40

P(C)=$\frac{n(C)}{n(S)} = \frac{40}{52} = \frac{10}{13}$

OR

Total outcomes = 36

(i)1/4

(ii) 1/6

(iii)7/18

SECTION D

Q.32	Let the speed of train be xkm/h and scheduled time of journey be y hours. Distance = Speed x Time = xy km Case 1 : 2x – 3y = -12	1

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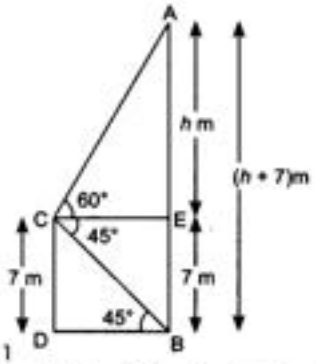
	Case 2 : x – y = 6	1
	By solving case 1 and case 2	2
	We get x = 30km /h , y = 24 hours	1
	Total distance = 30 x 24 = 720 km	
	OR	1.5
		1.5
	For correct line graph for $2x + y = 6$	1
	For correct line graph for $2x - y + 2 = 0$	
	Correct value for x = 1 , y = 4	
	Area of triangle =8 sq.cm	
Q.33	For correct figure	1/2
	Slant height l = 12.2 cm	1
		2
	Volume of toy = volume of cone + volume pf hemisphere= 1232cm^3	
		1.5
34.	Area of coloured sheet = csa of cone + csa of hemisphere	1
	= 576.4 cm^2	
		1
	For correct figure	
	In ΔACD,	
	tan 45^0=$\frac{CD}{AC}$	1
	1=$\frac{h}{x}$ $\Rightarrow x = h$ .....(1)	
	Again in ΔBED,	
	tan 30^0=$\frac{ED}{EB}$	1
	$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h-8}{x}$	
	$\Rightarrow x = h\sqrt{3} - 8\sqrt{3}$	1
	$\Rightarrow h - h\sqrt{3} = -8\sqrt{3}$	
	$\Rightarrow h = \frac{8\sqrt{3}}{\sqrt{3}-1}$	
	$\Rightarrow h = 12 + 4\sqrt{3} = 18.93$ m (using $\sqrt{3} = 1.732$)	
	Hence x=h=$12 + 4\sqrt{3} = 18.93$ m	
	OR	
		1
		1
		1
		1

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35.

Given: CD = 7 m (height of the building),



$\angle ACE = 60°$, and $\angle ECB = 45°$

$\Rightarrow \quad \angle CBD = 45°$

In ΔCDB, $\frac{CD}{DB} = \tan 45° \Rightarrow \frac{7}{DB} = 1$

$\Rightarrow \quad DB = 7\text{ m}$

In ΔAEC, $\frac{AE}{CE} = \tan 60°$

$\Rightarrow \quad \frac{h}{7} = \sqrt{3} \qquad [\because DB = CE = 7\text{m}]$

$\Rightarrow \quad h = 7\sqrt{3}\text{ m}$

Now, $AB = h + 7 = 7\sqrt{3} + 7 = 7(\sqrt{3} + 1)\text{m}$

1 + 1

1

1

1

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Solution :

Class intervals	Frequency	Cumulative frequency
0 - 100	2	2
100 - 200	5	7
200 - 300	x	$7+x$
300 - 400	12	$19+x$
400 - 500	17	$36+x$
500 - 600	20	$56+x$
600 - 700	y	$56+x+y$
700 - 800	9	$65+x+y$
800 - 900	7	$72+x+y$
900 - 1000	4	$76+x+y$

It is given that $n = 100$

So, $76 + x + y = 100$, i.e., $x + y = 24$ (1)

The median is 525, which lies in the class 500 – 600

So, $l = 500$, $f = 20$, $\text{cf} = 36 + x$, $h = 100$

Using the formula : $\text{Median} = l + \left(\frac{\frac{n}{2} - \text{cf}}{f}\right) h$, we get

$$525 = 500 + \left(\frac{50 - 36 - x}{20}\right) \times 100$$

i.e., $525 - 500 = (14 - x) \times 5$

i.e., $25 = 70 - 5x$

i.e., $5x = 70 - 25 = 45$

So, $x = 9$

Therefore, from (1), we get $9 + y = 24$

i.e., $y = 15$

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36. (i)	A + 3d = 1800 , a + 7d = 2600 D = 200 and a = 1200 (ii) a_{12} = a +11d = 3400 (iii)S_{10} = 21000 OR S_n = 31200 , a = 1200 , d= 200 , n= ? On putting value S = n/2{ 2a + (n-1)d} N= 13	
37.	(i) Position of red flag= (2 , ¼ x100)= (2,25) (ii) Distance between two flags =√36 +25 = √61 (iii) Position of the blue flag = (5 , 22.5) OR Ratio between Green and Red Flag is 1 :3 Required pont = (7/2 , 95/4)	
38.	(i) Distance from the base of lamp(BD)= 1.2m x4s= 4.8metre (ii)ΔABE similar ΔCDE BE/DE = AB/CD= 4.8 +X /X = 3.6/0.9 THEN X = 1.6m Or AE/CE = BE/DE (4.8 + 1.6)/ 1.6 = 4 AE = 4CE AC + CE = 4CE AC/CE = 3/1	

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