



AMBIENCE  
PUBLIC SCHOOL

AMBIENCE PUBLIC SCHOOL, GURUGRAM  
HALF YEARLY EXAMINATION, 2024-25  
SUBJECT: MATHEMATICS  
GRADE X  
DATE: 09.09.2024

M.M.:80

Time: 3hr

**General Instructions:**

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's 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 sources based/case-based questions of 4 marks each with sub-parts.

**Section -A**  
**(Multiple Choice Questions)**  
Each question carries 1 mark

- Q1. The ratio of LCM and HCF of the least composite and the least prime numbers is 1  
(a) 1:2 (b) 2:1 (c) 1:1 (d) 1:3
- Q2. The value of k for which the lines  $5x+7y=3$  and  $15x + 21y = k$  coincide is 1  
(a) 9 (b) 5 (c) 7 (d) 18
- Q3. The  $n^{\text{th}}$  term of the A.P.  $a, 3a, 5a, \dots$  is: 1  
(a)  $na$  (b)  $(2n - 1)a$  (c)  $(2n + 1)n$  (d)  $2na$
- Q4. If  $2\sin^2\beta - \cos^2\beta = 2$ , then  $\beta$  is 1  
(a)  $0^\circ$  (b)  $90^\circ$  (c)  $45^\circ$  (d)  $30^\circ$
- Q5. If a pole 6m high casts a shadow  $2\sqrt{3}$ m long ground, then sun's elevation is: 1  
(a)  $60^\circ$  (b)  $45^\circ$  (c)  $30^\circ$  (d)  $90^\circ$
- Q6. If  $a^2 = \frac{23}{25}$ , then a is 1  
(a) rational (b) irrational (c) whole number (d) integer
- Q7. If  $\text{LCM}(x, 18) = 36$  and  $\text{HCF}(x, 18) = 2$ , then x is: 1  
(a) 2 (b) 3 (c) 4 (d) 5
- Q8. For what value of 'k', the roots of the equation  $x^2 + 4x + k = 0$  are real? 1  
(a)  $k \geq 4$  (b)  $k \leq 4$  (c)  $k \leq 0$  (d) none of these

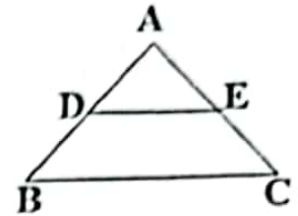
Q9.  $\Delta ABC$  is such that  $AB=3$  cm,  $BC= 2$ cm,  $CA= 2.5$  cm. If  $\Delta ABC \sim \Delta DEF$  and  $EF = 4$ cm, then perimeter of  $\Delta DEF$  is

- (a) 7.5 cm                      (b) 15 cm                      (c) 22.5 cm                      (d) 30 cm

Q10. In  $\Delta ABC$  right angled at B, if  $\tan A = \sqrt{3}$ , then  $\cos A \cos C - \sin A \sin C =$

- (a) -1                      (b) 0                      (c) 1                      (d)  $\sqrt{3}/2$

Q11. In the figure, if  $DE \parallel BC$ ,  $AD = 3$ cm,  $BD = 4$ cm and  $BC = 14$  cm, then  $DE$  equals

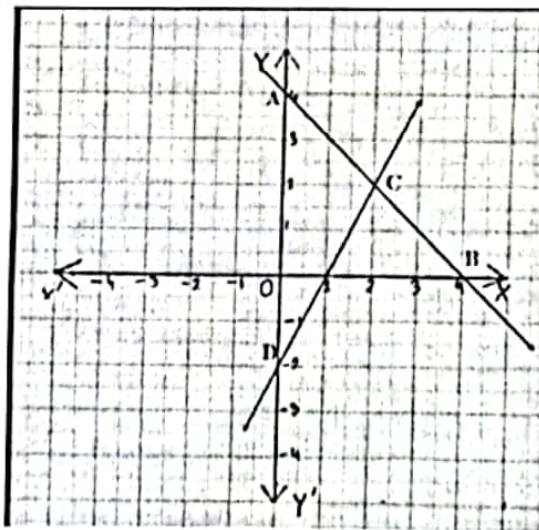


- (a) 7cm                      (b) 6cm                      (c) 4cm                      (d) 3cm

Q12. A kite is flying at a height of 80 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with ground is  $30^\circ$ , then the length of the string is:

- (a) 160 m                      (b) 40 m                      (c) 100 m                      (d) 115 m

Q13. Given below is the graph representing two linear equations by lines AB and CD respectively. What is the area of the triangle formed by these two lines and the line  $x=0$ ?



- (a) 3sq. units                      (b) 4sq. units                      (c) 6sq. units                      (d) 8sq. units

Q14. Which of the following is a quadratic equation?

- (a)  $(x - 2)^2 + 1 = 2x - 3$                       (b)  $x(x+1) + 8 = (x+2)(x-2)$   
 (c)  $x(2x+3) = x^2 + 1$                       (d)  $(x + 2)^3 = x^3 - 4$

Q15. If 2 and  $\frac{1}{2}$  are the zeros of  $px^2+5x+r$ , then:

- (a)  $p = r = 2$                       (b)  $p = r = -2$                       (c)  $p = 2, r = -2$                       (d)  $p = -2, r = 2$

- Q16. If  $\alpha$  and  $\beta$  are the zeros of a polynomial  $f(x) = px^2 - 2x + 3p$  and  $\alpha + \beta = \alpha\beta$ , then  $p$  is: 1  
 (a)  $-2/3$  (b)  $2/3$  (c)  $1/3$  (d)  $-1/3$
- Q17. If the system of equations  $3x+y=1$  and  $(2k-1)x+(k-1)y=2k+1$  is inconsistent, then  $k =$  1  
 (a)  $-1$  (b)  $0$  (c)  $1$  (d)  $2$
- Q18. The next term of the AP:  $\sqrt{6}, \sqrt{24}, \sqrt{54}$  is: 1  
 (a)  $\sqrt{60}$  (b)  $\sqrt{96}$  (c)  $\sqrt{72}$  (d)  $\sqrt{216}$

### 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 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 and 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.

- Q19. a Assertion(A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340 1

Reason(R): HCF is always a factor of LCM

- Q20. c Assertion (A): If  $\triangle ABC$  and  $\triangle PQR$  are congruent triangles, then they are also similar triangles. 1

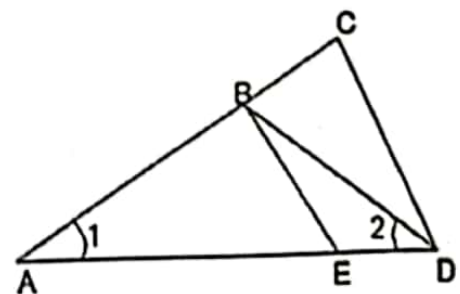
Reason (R): All congruent triangles are similar but the similar triangles need not be congruent.

### SECTION B

Section B consists of 5 questions of 2 marks each

- Q21. In the given figure below,  $\frac{AD}{AE} = \frac{AC}{BD}$  and  $\angle 1 = \angle 2$ . 2

Show that  $\triangle BAE \sim \triangle CAD$ .



- Q22. If one zero of the polynomial  $p(x) = 6x^2 + 37x - (k-2)$  is reciprocal of the other, then find the value of 'k'? 2

OR

→ Form a quadratic polynomial whose zeroes are  $3 + \sqrt{2}$  and  $3 - \sqrt{2}$ .

Q23. A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is  $30^\circ$

Q24. If  $49x + 51y = 499$ ,  $51x + 49y = 501$ , then find the value of  $x$  and  $y$

Q25. Evaluate:

$$\rightarrow 2\sec^2\theta + 3\operatorname{cosec}^2\theta - 2\sin\theta \cos\theta, \text{ if } \theta = 45^\circ$$

OR

$$\frac{5}{\cot^2 30^\circ} + \frac{1}{\sin^2 60^\circ} - \cot^2 45^\circ + 2\sin^2 90^\circ$$

### SECTION C

Section C consists of 6 questions of 3 marks each.

Q26. Prove that  $5 + 2\sqrt{3}$  is irrational. 3

Q27. If  $a$  and  $b$  are the zeroes of the quadratic polynomial  $2x^2 - 13x + 6$ , then find the values of:  
(i)  $a - b$  3  
(ii)  $a^3 + b^3$

Q28.  $\rightarrow$  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/hr; it would have taken 6 hours more than the scheduled time. Find the length of the journey. 3

OR

Anuj had some chocolates, and he divided them into two lots A and B. He sold the first lot at the rate of ₹2 for 3 chocolates and the second lot at the rate of ₹1 per chocolate, and got a total of ₹400. If he had sold the first lot at the rate of ₹1 per chocolate, and the second lot at the rate of ₹4 for 5 chocolates, his total collection would have been ₹460. Find the total number of chocolates he had.

Q29. Prove the following trigonometric identity: 3

$$\rightarrow \sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$$

OR

$$\left(\frac{1 - \tan A}{1 - \cot A}\right)^2 = \tan^2 A$$

Q30.  $\rightarrow$  How many terms are there in an A.P. whose first and fifth terms are -14 and 2, respectively and the last term is 62. 3

OR

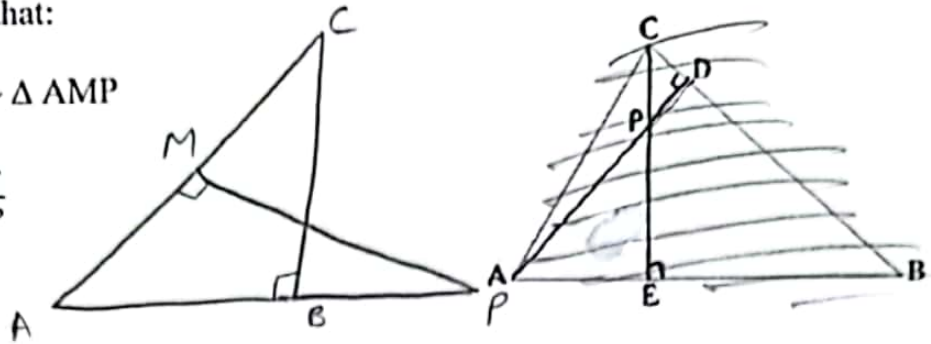
Which term of the AP: 65, 61, 57, 53... is the first negative term?

Q31. In the given figure ABC and AMP are two right triangles, right angled at B and M respectively. Prove that:

3

(i)  $\Delta ABC \sim \Delta AMP$

(ii)  $\frac{CA}{PA} = \frac{BC}{MP}$



**SECTION D**

Section D consists of 4 questions of 5 marks each

Q31. Two taps running together can fill a tank in  $3\frac{1}{13}$  hours. If one tap takes 3 hours more than the other to fill the tank, then how much time will each tap take to fill the tank? 5

OR

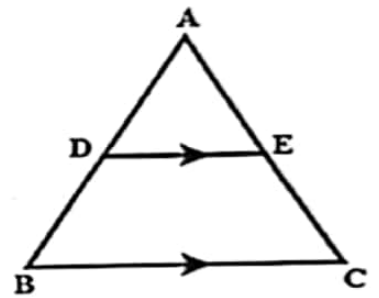
A train travels 360 km at a uniform speed. If the speed has been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Q32. State and prove Basic Proportionality Theorem. 5

In the given figure, in  $\Delta ABC$ ,  $DE \parallel BC$  so that:

$AD = (4x - 3)$  cm,  $AE = (8x - 7)$  cm,  $BD = (3x - 1)$  cm and

$CE = (5x - 3)$  cm. Find the value of  $x$ .



Q33. Prove that:  $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cot \theta$  5

Q34. Draw the graphs of the equations  $x - y + 1 = 0$  and  $3x + 2y - 12 = 0$ . 5

Q35. → The first and the last terms of an AP are 17 and 350 respectively. If the common difference is 9, how many terms are there and what is their sum? 5

OR

Find the sum of:

(i) first 15 multiples of 8

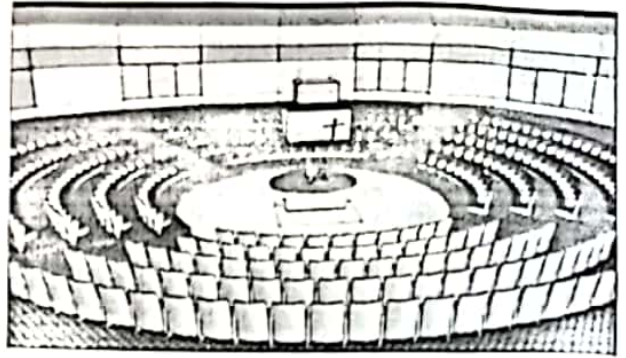
(ii)  $34 + 32 + \dots + 10$

**SECTION E**

Case study-based questions

Q36. Case Study - 1

The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.



- (i) If the first circular row has 30 seats, how many seats will be there in the 10th row?
- (ii) → For 1500 seats in the auditorium, how many rows need to be there?

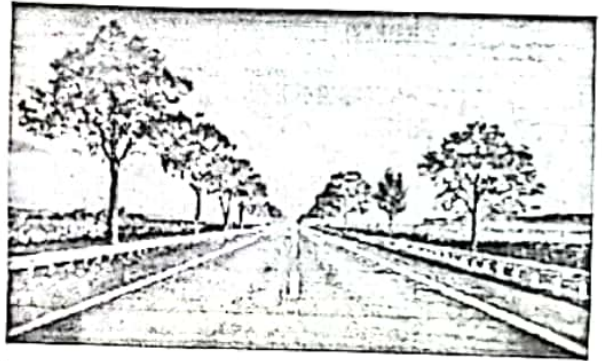
OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?

- (iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

Q37. Case Study - 2

Raj and Ajay are very close friends. Both the families decided to go to Ranikhet by their own cars. Raj's car travels at a speed of  $x$  km/hr while Ajay's car travels 5 km/hr faster than Raj's car. Raj took 4 hours more than Ajay to complete the journey of 400 km.



- (i) What will be the distance covered by Ajay's car in two hours? (in terms of  $x$ )
- (ii) Write a quadratic equation which describes the speed of Raj's car?
- (iii) What is the speed of Raj's car?

OR

(iv) How much time Ajay took to travel 400 km?

Q38. Case Study - 3

Radha went to see a balloon festival with her father.

If her height is 1.2 m and if she spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is  $60^\circ$ . After some time, the angle of elevation reduces to  $30^\circ$ .



- (i) Draw a figure to represent the above situation.
- (ii) Find the distance travelled by the balloon during the interval.

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