HALF-YEARLY EXAMINATION – 2026–27

MATHEMATICS – STANDARD (041) | CLASS X | ANSWER KEY

Chapters 1–8 | Maximum Marks: 80

SECTION A – Objective Answers

1. **(C) 45**
2. **(B)** $\sqrt{2}$
3. **(B) 2, 3**
4. **(C) Infinitely many solutions**
5. **(B) 3, 4**
6. **(C) 39**
7. **(C) AA**
8. **(C) 5**
9. **(B) 1/2**
10. **(C) 1**
11. **(B) 1**
12. **(B) (3, 5)**
13. **(A) 9696**
14. **(C)** $x - 3$
15. **(B)** $a/a' \neq b/b'$
16. **(C) 6**
17. **(B) 3**
18. **(B) (3, 4)**
19. **(C) 5/4**
20. **(A)** Both A and R are true and R is the correct explanation of A.

SECTION B – 2 Mark Answers

21. HCF(135,225): $225 = 135\times1 + 90$; $135 = 90\times1 + 45$; $90 = 45\times2 + 0$. Hence **HCF = 45**. OR $\sqrt{5}$ is irrational: assume $\sqrt{5} = p/q$ in lowest terms; then $p^2 = 5q^2$, so 5 divides p and hence q, contradicting lowest terms.

22. $2x+y=7$ and $x-y=2$. Adding: $3x=9$, so $\mathbf{x=3, y=1}$.

23. $x^2-7x+10=(x-5)(x-2)$, so zeroes **5,2**; sum=7=−b/a and product=10=c/a. OR for $2x^2-5x-3$, $\boldsymbol{\alpha+\beta=5/2, \alpha\beta=-3/2}$.

24. $79=7+(n-1)4$ gives n=**19**. OR a=12,d=−3, so **15th term = −30**.

25. By BPT, AD/DB=AE/EC. Thus 3/2=4.5/EC, giving **EC=3 cm**.

SECTION C – 3 Mark Answers

26. Distance = $\sqrt{[(4+2)^2+(-5-3)^2]} = \sqrt{(36+64)}$ = **10 units**.

27. $867=255\times3+102$; $255=102\times2+51$; $102=51\times2+0$. Hence HCF=**51**. Also $51=255-2(867-3\times255)=\mathbf{7\times255-2\times867}$.

28. Let notebook=n, pen=p. $3n+2p=130$ and $2n+3p=120$. Solving gives **$n=30$, $p=20$**.

29. $2x^2-5x-3=0 \Rightarrow x=(5\pm\sqrt{49})/4$, so **$x=3, -1/2$**. OR equal roots require D=0: $4(2k+1)=0$, hence **$k=-1/2$**.

30. $a+4d=18$ and $a+11d=46 \Rightarrow 7d=28$, so **$d=4$, $a=2$**. Therefore **20th term=78**.

31. Since $DE \parallel BC$, by BPT $AD/DB=AE/EC$. OR $\tan\theta=5/12$ gives a 5–12–13 triangle: **$\sin\theta=5/13$, $\cos\theta=12/13$, $\sec\theta=13/12$**.

SECTION D – 5 Mark Answers

32. $P=(3B+A)/4=((24-2)/4,(-15+3)/4)=$**$(11/2,-3)$**. Distance from origin = $\sqrt{(121/4+9)}=$**$\sqrt{157}/2$**.

33. $x+y=27$, $x-y=5 \Rightarrow$ **$x=16, y=11$**, product=**176**. OR $10r+f=180$, $16r+f=270 \Rightarrow$ **$r=15$, $f=30$**.

34. $\angle ADB=\angle A=90°$ and $\angle ABD=\angle ABC$, so $\Delta ADB \sim \Delta ABC$; similarly $\Delta ADC \sim \Delta ABC$. From corresponding sides, $AD/BD=CD/AD$, hence **$AD^2=BD\times DC$**. OR area ratio$=(3/5)^2=9/25$, so ΔPQR area=**$54\times25/9=150$ cm²**.

35. Let digits be a,b. $10a+b=4(a+b) \Rightarrow b=2a$. Interchange condition gives $9(b-a)=18 \Rightarrow b-a=2$, hence $a=2, b=4$. Number=**24**. OR $a+3d=10$, $a+8d=25 \Rightarrow d=3, a=1$; $S_{25}=25/2[2+24\times3]=$**925**. 200 is not a term since $1+(n-1)3=200$ gives $n=67\frac{1}{3}$.

SECTION E – Case Study Answers

36. (a) **$d=3$**. (b) $t_{10}=18+9\times3=$**45**. (c) $S_{20}=20/2[36+19\times3]=$**930 seats**. OR $t_{20}=$**75 seats**.

37. (a) $M=((8+5)/2,(1+7)/2)=$**$(13/2,4)$**. (b) AB=**6 units**. (c) $AM=\sqrt{[(9/2)^2+3^2]}=\sqrt{117}/2=3\sqrt{13}/2$; $BC=\sqrt{[(-3)^2+6^2]}=3\sqrt{5}$. Since slopes/product are not perpendicular (or lengths do not establish perpendicularity), **AM is not perpendicular to BC**. OR area$=1/2\times6\times6=$**18 square units**.

38. (a) $\tan30°=h/x \Rightarrow$ **$h=x/\sqrt{3}$**. (b) $\tan60°=h/(x-20) \Rightarrow$ **$h=\sqrt{3}(x-20)$**. Solving gives **$x=30$ m, $h=10\sqrt{3}$ m**. OR directly equating the two expressions gives **$h=10\sqrt{3}$ m**.

Marking note: Award marks for correct mathematical method and logically valid intermediate steps. Equivalent correct methods should receive full credit.