Higher Mathematics – Revision(Answers)

1. $2y = -3x + 5$

2. $2y = x - 12$

3. $a = 116.6^0$

4. $y = 2x - 12$

5. (a) $y = 2x - 15$
   (b) $3y = -4x + 25$
   (c) $(7,-1)$

6. (a) Graph
   (b) Graph

7. (a) $g(f(x)) = x$
   (b) inverse functions

8. (a) $f(g(x)) = 9x^2 + 3x - 12$
   (b) $x = -\frac{4}{3}, 1$
   (c) $x \in R : x \neq -\frac{4}{3}, 1$

9. (a) $n = 5$ (49.2224)
   (b) limit = 50

10. $a = 0.75, b = 80$

11. $u_1 = 60$

12. $p = \frac{3}{2}q$

13. (a) $u_{n+1} = 0.7u_n + 20 \quad u_o = 60$
    (b) 65.88 mg

14. $\frac{49}{16}$

15. 19

16. $y = 10x - 16$

17. $y = -6x - 3$

18. $f'(x) = 3(x - 2)^2$. Proof

19. $x < -2$ and $x > 4$

20. $(0,5)$ falling point of inflexion
    $(3,-22)$ minimum

21. Max. = 7, Min. = -45

22. Graph

23. (a) $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$
    (b) $75^0, 135^0, 255^0, 315^0$
    (c) $19.5^0, 90^0, 160.5^0, 270^0$

24. (a) $p = 2, q = 2, r = 3, t = 4$
    (b) $A(138.6^0, 3.25)$ $B(221.4^0, 3.25)$

25. (a) $5\sin(x + 36.9)^0$
    (b) $0^0, 106.2^0$
    (c) Minimum = -5 when $x = 233.1^0$
    (d) Graph

26. (a) $\frac{4}{5}$
    (b) $\frac{3}{5}$
    (c) $\frac{4}{3}$

27. $\frac{16}{65}$

28. Proof. $(2x - 3)(x + 1)$

29. $-3, 2$

30. $y = 2x(x - 4)^2$

31. $p = -17.$ $x = \frac{5}{2}, 2$

32. $p = 16$ and $q = 32$

33. (a) $(x - 4)^2 - 15$
    (b) Graph. Turning point $(4,-15)$

34. (a) $3(x + 2)^2 - 14$
    (b) Minimum at $(-2,-14)$

35. (a) roots real and unequal
    (b) roots are unreal

36. $k = 5,-3$

37. $k \le -6$ or $k \ge 2$

38. Proof. $b^2 - 4ac = -212$

39. (a) $\dfrac{x^2}{2} + \dfrac{1}{x} + c$

    (b) $-\frac{49}{10}$

40. $y = x^3 - 2x^2 + x + 6$

41. 108

42. $x = 4, -1$ Area $= \frac{125}{6}$

43. $x = -2, 1$ Area $= 9$

44. $y = 2x + 8$

45. $(x - 2)^2 + y - 6)^2 = 32$

46. (a) A(-2,-6)   B(8,4)

    (b) $(x - 3)^2 + (y + 1)^2 = 50$

47. Proof. Point is (-2,2)

48. (-2,-4) and (5,3)

49. $(x - 8)^2 + (y - 1)^2 = 49$

50. (a) $\begin{pmatrix} 9 \\ -9 \\ 7 \end{pmatrix}$ (b) 5   (c) $\begin{pmatrix} \frac{4}{5} \\ \frac{3}{5} \\ 0 \end{pmatrix}$

51. Proof. AB:BC

        2 : 3

52. $u = -1$ and $v = = -6$

53. (a) T(1,-1,2)

    (b) Proof

54. Proof. $\mathbf{u}.\mathbf{v} = 0$

55. Proof. $\overrightarrow{BA}.\overrightarrow{BC} = 0$

56. 70.9^0

57. 105^0

58. (i) $\mathbf{u} + \mathbf{v}$

    (ii) $2\mathbf{v} - \mathbf{u}$

    (iii) $\frac{4}{3}\mathbf{v} - \frac{2}{3}\mathbf{u}$

    (iv) $\frac{2}{3}\mathbf{v} + \frac{2}{3}\mathbf{u}$