

Change of Subjects

1. If $\frac{1}{p} = \frac{1}{q} - \frac{1}{\sqrt{r}}$, then r is equal to

- A. $\left(\frac{pq}{p+q}\right)^2$
 B. $\left(\frac{pq}{p-q}\right)^2$
 C. $\left(\frac{p-q}{pq}\right)^2$
 D. $\sqrt{\frac{q-p}{pq}}$
 E. $\sqrt{\frac{pq}{p-q}}$

[1972-CE-MATHS B1-14]

2. If $\frac{p}{mc} = \frac{v}{\sqrt{c^2 - v^2}}$, then $v =$

- A. $\pm \frac{pc}{mc+p}$
 B. $\pm \frac{pc}{mc-p}$
 C. $\pm \frac{pc}{\sqrt{m^2c^2 - p^2}}$
 D. $\pm \frac{pc}{\sqrt{m^2c^2 + p^2}}$
 E. $\pm \frac{p^2c^2}{m^2c^2 + p^2}$

[1977-CE-MATHS 2-10]

3. If $y = \frac{a \pm \sqrt{bx-c}}{2}$, then $x =$

- A. $\frac{4y^2 - a^2}{b} + c$
 B. $\frac{4y^2 - a^2 + c}{b}$
 C. $\frac{4(y-a)^2 + c}{b}$
 D. $\frac{(2y-a)^2 - c}{b}$
 E. $\frac{(2y-a)^2 + c}{b}$

[SP-CE-MATHS 2-9]

4. If $d = \frac{-1 \pm \sqrt{1-4ac}}{2a}$, then $c =$

- A. $4a^2d^2$
 B. $-ad^2$
 C. $ad^2 - d$
 D. $-ad^2 + d$
 E. $-ad^2 - d$

[1978-CE-MATHS 2-17]

5. If $x = \frac{ab}{a-b}$, then $a =$

- A. $\frac{x-b}{bx}$
 B. $\frac{bx}{x-b}$
 C. $\frac{bx}{b-x}$
 D. $\frac{bx}{b+x}$
 E. $\frac{b}{x-b}$

[1979-CE-MATHS 2-4]

6. If $P(1+k)^n = Q$, then $k =$

- A. $\left(\frac{Q}{P}\right)^{\frac{1}{n}} - 1$
 B. $\left(\frac{P}{Q}\right)^n - 1$
 C. $\left(\frac{Q}{P}\right)^n - 1$
 D. $1 - \left(\frac{Q}{P}\right)^n$
 E. $1 - \left(\frac{Q}{P}\right)^{\frac{1}{n}}$

[1979-CE-MATHS 2-25]

7. If $x = \frac{y + (n-1)z}{n+1}$, then $n =$

- A. $\frac{x-y+z}{z}$
 B. $\frac{x+y-z}{z}$
 C. $\frac{y-x-z}{x+z}$
 D. $\frac{y-x-z}{x-z}$
 E. $\frac{y+x-z}{x-z}$

[1980-CE-MATHS 2-7]

8. If $x = \frac{-bx + ay - c}{a + by}$, then $y =$

- A. $\frac{ax + bx + c}{a - bx}$
 B. $-\frac{ax + bx + c}{a - bx}$
 C. $\frac{ax + bx + c}{a + bx}$
 D. $-\frac{ax + bx + c}{a + bx}$
 E. $\frac{ax - bx - c}{a - bx}$

[1981-CE-MATHS 2-3]

9. If $H = K + \frac{M}{4\pi(r^2 + \ell^2)^n}$ and $r > 0$, then $r =$

- A. $\left\{ \left[\frac{M}{4\pi(H-K)} \right]^{-n} - \ell^2 \right\}^{\frac{1}{2}}$
 B. $\left[\frac{M}{4\pi(H-K)} \right]^{-\frac{n}{2}} - \ell$
 C. $\left\{ \left[\frac{M}{4\pi(H-K)} \right]^{\frac{1}{n}} - \ell^2 \right\}^{\frac{1}{2}}$
 D. $\left[\frac{M}{4\pi(H-K)} \right]^{\frac{1}{2n}} - \ell$
 E. $\left\{ \left[\frac{4\pi}{M(H-K)} \right]^{\frac{1}{n}} - \ell^2 \right\}^{\frac{1}{2}}$

[1981-CE-MATHS 2-6]

10. If $x = \frac{1}{\frac{1}{y} + \frac{2}{z}}$, then $y =$

- A. $\frac{2x}{z}$
 B. $\frac{z}{xz - z}$
 C. $\frac{z - 2x}{xz}$
 D. $\frac{xz}{2x + z}$
 E. $\frac{xz}{z - 2x}$

[1982-CE-MATHS 2-4]

11. If $10^{kx+a} = P$, then $x =$

- A. $\frac{1}{k}(10^{P-a})$
 B. $\log_{10} \frac{P-a}{k}$
 C. $\frac{1}{k} \log_{10} P - a$
 D. $\frac{1}{k} (\log_{10} P - a)$
 E. $\frac{1}{k} (\log_{10} P + a)$

[1982-CE-MATHS 2-5]

12. If $x = \frac{y^2}{\sqrt{a^2 + bz}}$, then $z =$

- A. $\frac{1}{b} \left(\frac{y^4}{x^2} - a^2 \right)$
 B. $\frac{1}{b} \left(\frac{x^2}{y^4} - a^2 \right)$
 C. $\frac{1}{b} \left(a^2 - \frac{x^2}{y^4} \right)$

- D. $\frac{1}{b} \left(a^2 - \frac{y^4}{x^2} \right)$
 E. $\frac{1}{b} \left(a^2 - \frac{x^2}{y^2} \right)$

[1983-CE-MATHS 2-3]

13. If $a = \frac{2b(2y-x)}{x-3y}$, then $y =$

- A. $\frac{a+2b}{3a+4b}x$
 B. $\frac{a-2b}{-3a+4b}x$
 C. $-\frac{a+2b}{3a+4b}x$
 D. $\frac{3a+4b}{a+2b}x$
 E. $\frac{-3a+4b}{a-2b}x$

[1984-CE-MATHS 2-2]

14. If $\frac{ab}{ka+b} = \frac{1}{k}$, then $b =$

- A. $\frac{a}{a-k}$
 B. $\frac{ka}{ka-1}$
 C. $\frac{ka}{1-ka}$
 D. $\frac{k^2a}{a-k}$
 E. $\frac{k^2a}{k-a}$

[1985-CE-MATHS 2-3]

15. If $a - \sqrt{b^2 + c^2} = d$, then $c =$

- A. $d - a + b$
 B. $a - d - b$
 C. $\pm \sqrt{d^2 - a^2 + b^2}$
 D. $\pm \sqrt{a^2 - d^2 - b^2}$
 E. $\pm \sqrt{(a-d)^2 - b^2}$

[1985-CE-MATHS 2-5]

16. If $1 - \frac{x+y}{y-x} = a$ ($a \neq 0$), then $y =$

- A. x
 B. $\frac{x}{a}(a-2)$
 C. $\frac{x}{a}(a-1)$
 D. $\frac{x}{a}(2-a)$
 E. $\frac{x}{a}(1-a)$

[1986-CE-MATHS 2-3]

17. If $a = \frac{b + 3cd}{b - 3cd}$, then $c =$

- A. $\frac{a}{6d}$.
 B. $\frac{b}{3d}$.
 C. $\frac{b(a-1)}{6d}$.
 D. $\frac{b(a+1)}{a-1}$.
 E. $\frac{b(a-1)}{3d(a+1)}$.

[1987-CE-MATHS 2-3]

18. If $x = \frac{1+y}{1-y}$, then $y =$

- A. $\frac{x-1}{x}$.
 B. $\frac{1+x}{1-x}$.
 C. $\frac{x+1}{x-1}$.
 D. $\frac{x-1}{x+1}$.
 E. $\frac{1-x}{1+x}$.

[1988-CE-MATHS 2-2]

19. If $x = \frac{ab+1}{a-b}$, then $b =$

- A. $\frac{ax-1}{a+x}$.
 B. $\frac{ax-1}{a-x}$.
 C. $\frac{1-ax}{a+x}$.
 D. $\frac{1-ax}{a-x}$.
 E. $\frac{ax+1}{a-x}$.

[1990-CE-MATHS 2-3]

20. If $y = \sqrt{\frac{1+mx}{1-mx}}$, then $x =$

- A. $\frac{m(y-1)}{y+1}$.
 B. $\frac{y-1}{m(y+1)}$.
 C. $\frac{1-y^2}{m(1+y^2)}$.
 D. $\frac{m(y^2-1)}{y^2+1}$.
 E. $\frac{y^2-1}{m(y^2+1)}$.

[1991-CE-MATHS 2-4]

21. If $a = 1 - \frac{1}{1-b}$, then $b =$

- A. $1 - \frac{1}{1-a}$.
 B. $1 - \frac{1}{1+a}$.
 C. $1 + \frac{1}{1-a}$.
 D. $1 + \frac{1}{1+a}$.
 E. $-1 + \frac{1}{1-a}$.

[1992-CE-MATHS 2-2]

22. If $s = \frac{n}{2}[2a + (n-1)d]$, then $d =$

- A. $\frac{2(s-an)}{n(n-1)}$.
 B. $\frac{2(s-an)}{n-1}$.
 C. $\frac{s}{n(n-1)}$.
 D. $\frac{as-n}{a(n-1)}$.
 E. $\frac{4(s-an)}{n(n-1)}$.

[1993-CE-MATHS 2-2]

23. If $y = \frac{2x-1}{x+2}$, then $x =$

- A. $\frac{1+3y}{2}$.
 B. $\frac{1+2y}{2+y}$.
 C. $\frac{1+2y}{2-y}$.
 D. $\frac{1-2y}{2+y}$.
 E. $\frac{1-2y}{2-y}$.

[1994-CE-MATHS 2-2]

24. If $\frac{x+y}{xy} = 1$, then $y =$

- A. $\frac{1-x}{x}$.
 B. $\frac{x-1}{x}$.
 C. $\frac{x}{1-x}$.
 D. $\frac{x}{x-1}$.
 E. $\frac{1-x}{1+x}$.

[1995-CE-MATHS 2-2]

25. If $A = 2\pi r^2 + 2\pi rh$, then $h =$

- A. $A - r$.
- B. $\frac{A}{r}$.
- C. $\frac{A}{2\pi r} - r$.
- D. $r - \frac{A}{2\pi r}$.
- E. $\frac{A}{2\pi r} - 2\pi r^2$.

[1996-CE-MATHS 2-4]

26. If $\frac{a+x}{b+x} = \frac{c}{d}$ ($c \neq d$), then $x =$

- A. $\frac{c}{d} - \frac{a}{b}$.
- B. $\frac{a-b}{c-d}$.
- C. $\frac{b-a}{c-d}$.
- D. $\frac{ad-bc}{c-d}$.
- E. $\frac{bc-ad}{c-d}$.

[1997-CE-MATHS 2-3]

27. If $x = \frac{y(z-3)}{3z}$, then $z =$

- A. $\frac{3}{3x-y}$.
- B. $\frac{-3}{3x-y}$.
- C. $\frac{3y}{3x-y}$.
- D. $\frac{-3y}{3x-y}$.
- E. $\frac{3x-y}{3y}$.

[1998-CE-MATHS 2-1]

28. If $a = \frac{1+b}{1-b}$, then $b =$

- A. $\frac{a-1}{2}$.
- B. $\frac{a-1}{2a}$.
- C. $\frac{a+1}{a-1}$.
- D. $\frac{a-1}{a+1}$.
- E. $\frac{1-a}{a+1}$.

[1999-CE-MATHS 2-3]

29. If $A = \frac{h}{2}(a+b)$, then $b =$

- A. $2A - ah$.
- B. $\frac{2}{h}(A-a)$.
- C. $\frac{2A-a}{h}$.
- D. $a - \frac{2A}{h}$.
- E. $\frac{2A}{h} - a$.

[2000-CE-MATHS 2-1]

30. If $a = 2 - \frac{1}{1+b}$, then $b =$

- A. $\frac{1-a}{a-2}$.
- B. $\frac{a-1}{a-2}$.
- C. $\frac{a+1}{a-2}$.
- D. $\frac{-a-3}{a-2}$.
- E. $\frac{1-a}{a}$.

[2001-CE-MATHS 2-1]

31. If $\frac{x}{1+x} = \frac{a}{1-a}$, then $x =$

- A. a .
- B. $\frac{2a}{1-a}$.
- C. $\frac{a}{1+2a}$.
- D. $\frac{a}{1-2a}$.

[2002-CE-MATHS 2-1]

32. If $a = \frac{b-1}{b-2}$, then $b =$

- A. $\frac{2a-1}{a-1}$.
- B. $\frac{2a-1}{a+1}$.
- C. $\frac{1}{a-1}$.
- D. $\frac{1}{a+1}$.

[2003-CE-MATHS 2-3]

33. If $x = \frac{y-2x}{2y}$, then $y =$

- A. $\frac{2x}{1-2x}$.
 B. $\frac{2x}{2x-1}$.
 C. $\frac{1-2x}{2x}$.
 D. $\frac{2x-1}{2x}$.

[2004-CE-MATHS 2-2]

34. If $a = 1 - 2b$, then $b =$

- A. $\frac{a-1}{2}$.
 B. $\frac{a+1}{2}$.
 C. $\frac{-1-a}{2}$.
 D. $\frac{1-a}{2}$.

[2005-CE-MATHS 2-2]

35. If $2x - 5y = 7$, then $y =$

- A. $\frac{5}{2x-7}$.
 B. $\frac{5}{2x+7}$.
 C. $\frac{2x-7}{5}$.
 D. $\frac{2x+7}{5}$.

[2006-CE-MATHS 2-2]

36. If $m = 7 - 3n$, then $n =$

- A. $\frac{7-m}{3}$.
 B. $\frac{7+m}{3}$.
 C. $\frac{3}{7-m}$.
 D. $\frac{3}{7+m}$.

[2008-CE-MATHS 2-2]

37. If $P = \frac{VT}{R} - 2$, then $T =$

- A. $\frac{P}{V} + 2R$.
 B. $\frac{RP+2}{V}$.
 C. $R\left(\frac{P}{V} + 2\right)$.
 D. $\frac{R(P+2)}{V}$.

[2009-CE-MATHS 2-2]

38. If $x = \frac{3a}{a+2b}$, then $a =$

- A. $\frac{2b}{3-x}$.
 B. $\frac{2b}{x-3}$.
 C. $\frac{2bx}{3-x}$.
 D. $\frac{2bx}{x-3}$.

[2010-CE-MATHS 2-1]

39. If $\frac{2+a}{a} = \frac{2-x}{x}$, then $x =$

- A. $\frac{a}{1+a}$.
 B. $\frac{2a}{1+a}$.
 C. $\frac{a}{2+a}$.
 D. $\frac{2a}{2+a}$.

[2011-CE-MATHS 2-2]

Manipulation of Formula

40. If $x^2 + y^2 = m$ and $x - y = n$, then $xy =$

- A. $\frac{1}{2}(m - n^2)$.
 B. $m - n^2$.
 C. $\frac{1}{2}(n^2 - m)$.
 D. $n^2 - \frac{m}{2}$.
 E. $m - \frac{n}{2}$.

[1977-CE-MATHS 2-16]

41. If $x^2 + x + 1 = 4$, then $-x^2 - x + 1 =$

- A. 0.
 B. -2.
 C. -3.
 D. -4.
 E. -5.

[SP-CE-MATHS 2-1]

42. If $2a = 3b$, then $\frac{2a^2}{3b^2} =$

- A. $\frac{9}{4}$.
 B. $\frac{3}{2}$.
 C. 1.
 D. $\frac{2}{3}$.
 E. $\frac{8}{27}$.

[SP-CE-MATHS 2-3]

43. If $x + y = a$ and $xy = b$, then $(x - y)^2 =$

- A. $a^2 - 4b$.
 B. $a^2 - 2b$.
 C. $a^2 - b$.
 D. $a^2 + 2b$.
 E. $a^2 + b^2$.

[SP-CE-MATHS 2-11]

44. If $x + y = 2a$ and $x - y = 2b$, then $x^2 + y^2 =$

- A. $4ab$.
 B. $a^2 - b^2$.
 C. $2(a^2 - b^2)$.
 D. $2(a^2 + b^2)$.
 E. $4(a^2 + b^2)$.

[1978-CE-MATHS 2-18]

45. If $4p = 9q$, then $\frac{4p^2}{9q^2} =$

- A. 1.
 B. $\frac{4}{9}$.
 C. $\frac{9}{4}$.
 D. $\left(\frac{9}{4}\right)^2$.
 E. $\left(\frac{4}{9}\right)^3$.

[1980-CE-MATHS 2-3]

46. If $\frac{1}{x} = a + b$ and $\frac{1}{y} = a - b$, then $x + y =$

- A. $\frac{2}{a}$.
 B. $\frac{a^2 - b^2}{a}$.
 C. $-\frac{a^2 - b^2}{b}$.
 D. $\frac{2a}{a^2 - b^2}$.
 E. $\frac{-2b}{a^2 - b^2}$.

[1980-CE-MATHS 2-6]

47. If the value of $y^2 + 3y + 7$ is 2, what is the value of $2y^2 + 6y - 3$?

- A. -13
 B. -7
 C. 7
 D. 14
 E. it cannot be found from the information given

[1980-CE-MATHS 2-29]

48. If $\frac{1}{x} - \frac{1}{y} = \frac{1}{z}$, and $x = \frac{1}{2}$, $z = \frac{1}{3}$, then $y =$

- A. -1.
 B. 1.
 C. 5.
 D. 6.
 E. $\frac{1}{6}$.

[1987-CE-MATHS 2-2]

49. If $x^2 + y^2 = 5$ and $x + y = 3$, then $x - y =$

- A. 1.
 B. -1.
 C. 1 or -1.
 D. 1 or -5.
 E. -1 to 5.

[1987-CE-MATHS 2-38]

50. If $\frac{x + 3y}{2x + y} = 2$, find $\frac{3x + y}{x + 2y}$.

- A. 2
 B. 3
 C. $\frac{1}{2}$
 D. $\frac{1}{3}$
 E. $\frac{6}{7}$

[1989-CE-MATHS 2-40]

51. If $9a^2 - b^2 = 0$ and $ab < 0$, then $\frac{a - b}{a + b} =$

- A. -2.
 B. $-\frac{1}{2}$.
 C. 0.
 D. $\frac{1}{2}$.
 E. 2.

[2000-CE-MATHS 2-34]

52. If $\frac{x+3y}{2x-y} = \frac{2}{3}$, then $\frac{x-y}{x+y} =$

- A. $-\frac{5}{6}$.
 B. $-\frac{3}{5}$.
 C. $\frac{3}{5}$.
 D. $\frac{3}{4}$.
 E. $\frac{5}{6}$.

[2001-CE-MATHS 2-28]

53. If $2x = 3y = 4z$, then $\frac{x+y-z}{x-y+z} =$

- A. $\frac{1}{5}$.
 B. $\frac{1}{3}$.
 C. $\frac{5}{3}$.
 D. $\frac{7}{5}$.

[2002-CE-MATHS 2-13]

HKDSE Problems

54. If $5 - 3m = 2n$, then $m =$

- A. n .
 B. $\frac{2n-5}{3}$.
 C. $\frac{-2n+5}{3}$.
 D. $\frac{-2n+15}{3}$.

[SP-DSE-MATHS 2-2]

55. If $3a + 1 = 3(b - 2)$, then $b =$

- A. $a + 1$.
 B. $a + 3$.
 C. $a + \frac{7}{3}$.
 D. $a - \frac{5}{3}$.

[PP-DSE-MATHS 2-2]

56. If $\frac{y-1}{c} = \frac{y+1}{d}$, then $y =$

- A. $\frac{c-d}{c+d}$.
 B. $\frac{d-c}{c+d}$.
 C. $\frac{c+d}{c-d}$.
 D. $\frac{c+d}{d-c}$.

[2013-DSE-MATHS 2-2]

57. If $\frac{a}{x} + \frac{b}{y} = 3$, then $x =$

- A. $\frac{ay}{3y-b}$.
 B. $\frac{ay}{b-3y}$.
 C. $\frac{by}{3y-a}$.
 D. $\frac{by}{a-3y}$.

[2016-DSE-MATHS 2-2]

58. If $\frac{a+4b}{2a} = 2 + \frac{b}{a}$, then $a =$

- A. $\frac{2b}{3}$.
 B. $\frac{3b}{2}$.
 C. $\frac{5b}{6}$.
 D. $\frac{6b}{5}$.

[2017-DSE-MATHS 2-3]

59. If $\frac{\alpha}{1-x} = \frac{\beta}{x}$, then $x =$

- A. $\frac{\alpha}{\alpha-\beta}$.
 B. $\frac{\alpha}{\alpha+\beta}$.
 C. $\frac{\beta}{\alpha-\beta}$.
 D. $\frac{\beta}{\alpha+\beta}$.

[2018-DSE-MATHS 2-2]

60. If $h = 3 - \frac{5}{k+4}$, then $k =$

- A. $\frac{4h-7}{3-h}$
- B. $\frac{4h-17}{3-h}$
- C. $\frac{4h-7}{3+h}$
- D. $\frac{4h-17}{3+h}$

[2019-DSE-MATHS 2-5]

61. If $a(a + b) = 2(b - a)$, then $b =$

- A. $\frac{a^2+a}{2+a}$
- B. $\frac{a^2-2a}{2+a}$
- C. $\frac{a^2+2a}{2+a}$
- D. $\frac{a^2-a}{2+a}$

[2020-DSE-MATHS 2-2]

Basic Concepts

1. Which of the following is an identity / are identities?

(1) $(x+1)(x-1) = x^2 + 1$
 (2) $x^2 - 2x + 1 = 0$
 (3) $(x-2)^2 = (2-x)^2$

- A. (1) only
 B. (2) only
 C. (3) only
 D. (1) and (2) only
 E. (1) and (3) only

[1986-CE-MATHS 2-4]

2. Which of the following is an identity / are identities?

(1) $\frac{1}{x} - 1 = \frac{1-x}{x}$
 (2) $(ax+b)(x-b) = ax^2 - b^2$
 (3) $2x^2 - 3x + 1 = 0$

- A. (1) only
 B. (2) only
 C. (3) only
 D. (1) and (2) only
 E. (1), (2) and (3)

[1988-CE-MATHS 2-7]

3. Which of the following is / are an identity / identities?

(1) $(x+2)(x-2) = x^2 - 4$
 (2) $(x+2)(x-2) = 0$
 (3) $(x+2)^3 = x^3 + 8$

- A. (1) only
 B. (2) only
 C. (3) only
 D. (1) and (3) only
 E. (2) and (3) only

[1994-CE-MATHS 2-7]

4. Which of the following is / are an identity / identities?

(1) $x^2 = 4$
 (2) $(2x+3)^2 = 4x^2 + 12x + 9$
 (3) $(x+1)^2 = x^2 + 1$

- A. (1) only
 B. (2) only
 C. (3) only
 D. (1) and (2) only
 E. (2) and (3) only

[1997-CE-MATHS 2-7]

5. Which of the following is an identity / are identities?

(1) $x^2 + 2x + 1 = 0$
 (2) $x^2 + 2x + 1 = (x+1)^2$
 (3) $x^2 + 1 > 0$

- A. (1) only
 B. (2) only
 C. (3) only
 D. (1) and (3) only
 E. (2) and (3) only

[2001-CE-MATHS 2-11]

6. Which of the following is an identity / are identities?

(1) $x^2 - 4 = 0$
 (2) $x^2 - 4 = (x-2)^2$
 (3) $x^2 - 4 = (x+2)(x-2)$

- A. (2) only
 B. (3) only
 C. (1) and (2) only
 D. (1) and (3) only

[2006-CE-MATHS 2-6]

Determination of Values

7. $-3x^2 - 3x \equiv -3(x+a)^2 + b$ is an identity in x . What are the values of the constants a and b ?

- A. $a = 1, b = 0$
 B. $a = \frac{1}{2}, b = \frac{3}{4}$
 C. $a = \frac{1}{2}, b = -\frac{3}{4}$
 D. $a = -\frac{1}{2}, b = \frac{3}{4}$
 E. $a = -\frac{1}{2}, b = -\frac{3}{4}$

[1981-CE-MATHS 2-32]

8. Given the identity $\frac{2}{x-1} + \frac{x+1}{(x-1)^2} + \frac{a}{(1-x)^2} \equiv \frac{bx-2}{(x-1)^2}$, find the values of the constants a and b .

- A. $a = 1, b = 3$
 B. $a = 3, b = 1$
 C. $a = 1, b = -3$
 D. $a = 3, b = -1$
 E. $a = -1, b = 3$

[1986-CE-MATHS 2-5]

9. If $p(x^2 - x) + q(x^2 + x) \equiv 4x^2 + 8x$, find p and q .

- A. $p = 4, q = 8$
 B. $p = -8, q = 4$
 C. $p = -2, q = 6$
 D. $p = 2, q = 6$
 E. $p = 6, q = -2$

[1991-CE-MATHS 2-36]

10. If $3x^2 + ax - 5 \equiv (bx - 1)(2 - x) - 3$, then

- A. $a = -5, b = -3$.
 B. $a = -5, b = 3$.
 C. $a = -3, b = -5$.
 D. $a = 5, b = -3$.
 E. $a = 3, b = 5$.

[1993-CE-MATHS 2-5]

11. If $3x^2 + 6x + 1 \equiv 3(x + b)^2 + c$, then $c =$

- A. -8 .
 B. -2 .
 C. 0 .
 D. $\frac{1}{3}$.
 E. 1 .

[1995-CE-MATHS 2-10]

12. If $\frac{2}{x^2 - 1} \equiv \frac{a}{x + 1} + \frac{b}{x - 1}$, find a and b .

- A. $a = 2, b = 1$
 B. $a = 1, b = 2$
 C. $a = 1, b = 1$
 D. $a = 1, b = -1$
 E. $a = -1, b = 1$

[1996-CE-MATHS 2-8]

13. If $(x + 3)^2 - (x + 1)(x - 3) \equiv P(x + 1) + Q$, find P and Q .

- A. $P = 2, Q = 4$
 B. $P = 2, Q = 10$
 C. $P = 4, Q = 2$
 D. $P = 4, Q = 8$
 E. $P = 8, Q = 4$

[1998-CE-MATHS 2-5]

14. If $(3x - 1)(x - a) \equiv 3x^2 + bx - 2$, then

- A. $a = 2, b = -1$.
 B. $a = 2, b = -7$.
 C. $a = -2, b = 5$.
 D. $a = -2, b = -5$.
 E. $a = -2, b = -7$.

[1999-CE-MATHS 2-6]

15. If $3x^2 + ax + 7 \equiv 3(x - 2)^2 + b$, then

- A. $a = -12, b = -5$.
 B. $a = -12, b = 7$.
 C. $a = -4, b = 3$.
 D. $a = 0, b = -5$.
 E. $a = 0, b = 19$.

[2000-CE-MATHS 2-10]

16. If $(x + 1)^2 + P(x + 1) \equiv x^2 + Q$, then

- A. $P = -2, Q = -1$.
 B. $P = -2, Q = 1$.
 C. $P = 2, Q = -1$.
 D. $P = 2, Q = 1$.

[2002-CE-MATHS 2-6]

17. If $(2x + 3)(x - a) \equiv 2x^2 + b(x + 1)$, then

- A. $a = -3$ and $b = 9$.
 B. $a = \frac{-1}{3}$ and $b = \frac{11}{3}$.
 C. $a = \frac{1}{3}$ and $b = \frac{7}{3}$.
 D. $a = 3$ and $b = -9$.

[2003-CE-MATHS 2-6]

18. If $a(2x - x^2) + b(2x^2 - x) \equiv -5x^2 + 4x$, then $a =$

- A. -1 .
 B. 1 .
 C. -2 .
 D. 2 .

[2004-CE-MATHS 2-10]

19. If $x^2 + 2ax + 8 \equiv (x + a)^2 + b$, then $b =$

- A. 8 .
 B. $a^2 + 8$.
 C. $a^2 - 8$.
 D. $8 - a^2$.

[2005-CE-MATHS 2-10]

20. If a and b are constants such that $a(x^2 - x) + b(x^2 + x) \equiv 2x^2 + 4x$, then $a =$

- A. -1 .
 B. 1 .
 C. 2 .
 D. 3 .

[2009-CE-MATHS 2-5]

21. If h and k are constants such that $hx + (x - 3)^2 \equiv x^2 + 10x + k$, then

- A. $h = 10$ and $k = -9$.
 B. $h = 10$ and $k = 9$.
 C. $h = 16$ and $k = -9$.
 D. $h = 16$ and $k = 9$.

[2010-CE-MATHS 2-5]

HKDSE Problems

22. Let p and q be constants. If $x^2 + p(x+5) + q \equiv (x-2)(x+5)$, then $q =$
- A. -25.
B. -10.
C. 3.
D. 5.
- [SP-DSE-MATHS 2-4]
23. Let m and n be constants. If $m(x-3)^2 + n(x+1)^2 \equiv x^2 - 38x + 41$, then $m =$
- A. -4.
B. -1.
C. 3.
D. 5.
- [PP-DSE-MATHS 2-4]
24. If p and q are constants such that $x^2 + p \equiv (x+2)(x+q) + 10$, then $p =$
- A. -4.
B. -2.
C. 6.
D. 10.
- [2012-DSE-MATHS 2-3]
25. If a , b and c are non-zero constants such that $x(x+3a) + a \equiv x^2 + 2(bx+c)$, then $a:b:c =$
- A. 2:3:1.
B. 2:3:4.
C. 3:2:6.
D. 6:4:3.
- [2013-DSE-MATHS 2-8]
26. If p and q are constants such that $px(x-1) + x^2 \equiv qx(x-2) + 4x$, then $p =$
- A. 1.
B. 2.
C. 3.
D. 4.
- [2014-DSE-MATHS 2-3]
27. If m and n are constants such that $x^2 + mx + n \equiv (x+4)(x-m) + 6$, then $n =$
- A. -8.
B. -2.
C. 2.
D. 6.
- [2015-DSE-MATHS 2-5]
28. If m and n are constants such that $4x^2 + m(x+1) + 28 = mx(x+3) + n(x-4)$, then $n =$
- A. -8.
B. -7.
C. 4.
D. 16.
- [2017-DSE-MATHS 2-8]
29. If α and β are constants such that $(x-8)(x+\alpha) - 6 \equiv (x-9)^2 + \beta$, then $\beta =$
- A. -26
B. -10
C. -7
D. -6
- [2019-DSE-MATHS 2-4]
30. If h and k are constants such that $(x+h)(x+6) \equiv (x+4)^2 + k$, then $k =$
- A. -28
B. -16
C. -4
D. 2
- [2020-DSE-MATHS 2-7]

Expansion

1. $(x-1)^2 - (x+1)^2 =$

- A. 2.
 B. -2.
 C. 4x.
 D. -4x.
 E. $2(x^2+1)$.

[1977-CE-MATHS 2-2]

2. $(x - \frac{1}{x})^2 - (x + \frac{1}{x})^2 =$

- A. -4.
 B. 0.
 C. 4.
 D. $-\frac{2}{x^2}$.
 E. $2(x^2 + \frac{1}{x^2})$.

[SP-CE-MATHS 2-5]

3. $(-x + x^2)^2 =$

- A. $-x^2 + x^4$.
 B. $x^2 + x^4$.
 C. $-x^2 + 2x^3 + x^4$.
 D. $-x^2 + 2x^3 - x^4$.
 E. $x^2 - 2x^3 + x^4$.

[SP-CE-MATHS A2-33]

4. Simplify $(x^2 - \sqrt{3}x + 1)(x^2 + \sqrt{3}x + 1)$.

- A. $x^4 + 1$
 B. $x^4 - x^2 + 1$
 C. $x^4 + x^2 + 1$
 D. $x^4 - 3x^2 - 2\sqrt{3}x - 1$
 E. $x^4 + \sqrt{3}x^3 - 2\sqrt{3}x^2 + \sqrt{3}x + 1$

[1993-CE-MATHS 2-3]

5. $(2x^2 - 3x + 1)(2 - 3x) =$

- A. $6x^3 - 5x^2 - 3x + 2$.
 B. $6x^3 - 13x^2 - 9x - 2$.
 C. $-6x^3 + 13x^2 - 9x + 2$.
 D. $-6x^3 - 5x^2 - 3x + 2$.
 E. $-6x^3 - 5x^2 - 9x + 2$.

[2001-CE-MATHS 2-2]

6. $(2x-3)(x^2+3x-2) =$

- A. $2x^3 + 3x^2 + 5x - 6$.
 B. $2x^3 + 3x^2 + 5x + 6$.
 C. $2x^3 + 3x^2 - 13x - 6$.
 D. $2x^3 + 3x^2 - 13x + 6$.

[2005-CE-MATHS 2-4]

7. $(x+x)(y+y+y) =$

- A. 6xy.
 B. $2x + 3y$.
 C. x^2y^3 .
 D. $6x^2y^3$.

[2007-CE-MATHS 2-3]

8. $(2x^2 - 3x + 1) - 2(x^2 + 2x - 1) =$

- A. $x - 1$.
 B. $-7x + 3$.
 C. $4x^2 + x - 1$.
 D. $4x^2 - 7x + 3$.

[2008-CE-MATHS 2-4]

9. $(3x-5)(2x^2+5x-3) =$

- A. $6x^3 + 5x^2 - 34x + 15$.
 B. $6x^3 - 5x^2 + 34x + 15$.
 C. $6x^3 + 25x^2 + 16x + 15$.
 D. $6x^3 - 25x^2 - 16x + 15$.

[2009-CE-MATHS 2-4]

10. $(x-2y)(x+2y-2) =$

- A. $x^2 + 2y^2 + 2x + 4y$.
 B. $x^2 + 2y^2 - 2x + 4y$.
 C. $x^2 - 4y^2 + 2x + 4y$.
 D. $x^2 - 4y^2 - 2x + 4y$.

[2011-CE-MATHS 2-3]

Factorisation

11. If $x^2 + 5x - 6 = (x - \alpha)(x - \beta)$ and $\alpha > \beta$, then $\alpha =$

- A. -1.
 B. 1.
 C. 2.
 D. 3.
 E. 6.

[SP-CE-MATHS 2-4]

12. Which one of the following is a factor of $8a^3 + b^3$?

- A. $2a - b$
 B. $4a^2 + b^2$
 C. $4a^2 - 2ab + b^2$
 D. $4a^2 + 2ab + b^2$
 E. $4a^2 + 4ab + b^2$

[SP-CE-MATHS A2-34]

13. $a^2 - b^2 - c^2 + 2bc =$

- A. $(a - b - c)^2$.
 B. $(a + b - c)^2$.
 C. $(a + b + c)(a - b - c)$.
 D. $(a + b - c)(a - b + c)$.
 E. $(a + b - c)(a - b + c)$.

[1978-CE-MATHS 2-15]

14. $2ab - a^2 - b^2 =$

- A. $(a - b)^2$.
 B. $(-a - b)^2$.
 C. $(-a + b)^2$.
 D. $-(a + b)^2$.
 E. $-(a - b)^2$.

[1980-CE-MATHS 2-1]

15. Which of the following expressions **cannot** be factorized?

- A. $x^3 - 125$
 B. $4x^2 - 9y^2$
 C. $x^3 + 125$
 D. $4x^2 + 9y^2$
 E. $3x^2 + 6xy + 3y^2$

[1988-CE-MATHS 2-33]

16. $a^3 + 8a^{-3} =$

- A. $(a - \frac{2}{a})(a^2 + 2 + \frac{4}{a^2})$.
 B. $(a - \frac{1}{2a})(a^2 + 1 + \frac{1}{4a^2})$.
 C. $(a + \frac{1}{2a})(a^2 - \frac{1}{2} + \frac{1}{4a^2})$.
 D. $(a + \frac{2}{a})(a^2 - 4 + \frac{4}{a^2})$.
 E. $(a + \frac{2}{a})(a^2 - 2 + \frac{4}{a^2})$.

[1990-CE-MATHS 2-7]

17. Which of the following is a factor of $4(a + b)^2 - 9(a - b)^2$?

- A. $5b - a$
 B. $5a + b$
 C. $-a - b$
 D. $13b - 5a$
 E. $13a - 5b$

[1992-CE-MATHS 2-6]

18. In factorizing the expression $a^4 + a^2b^2 + b^4$, we find that

- A. $(a^2 - b^2)$ is a factor.
 B. $(a^2 + b^2)$ is a factor.
 C. $(a^2 - ab - b^2)$ is a factor.
 D. $(a^2 - ab + b^2)$ is a factor.
 E. it cannot be factorized.

[1993-CE-MATHS 2-39]

19. Factorize $a^2 - 2ab + b^2 - a + b$.

- A. $(a - b)(a - b - 1)$
 B. $(a - b)(a - b + 1)$
 C. $(a - b)(a + b - 1)$
 D. $(a + b)(a - b + 1)$
 E. $(a - b - 1)^2$

[1994-CE-MATHS 2-35]

20. Factorize $2a^{n+1} - 7a^n - 30a^{n-1}$.

- A. $(a^n - 6)(2a + 5)$
 B. $a^n(a + 6)(2a - 5)$
 C. $a^n(a - 6)(2a + 5)$
 D. $a^{n-1}(a + 6)(2a - 5)$
 E. $a^{n-1}(a - 6)(2a + 5)$

[1995-CE-MATHS 2-36]

21. Which of the following expressions has/have $b - c$ as a factor?

- (1) $ab - ac$
 (2) $a(b - c) - b + c$
 (3) $a(b - c) - b - c$

- A. (1) only
 B. (1) and (2) only
 C. (1) and (3) only
 D. (2) and (3) only
 E. (1), (2) and (3)

[1996-CE-MATHS 2-6]

22. $9 - a^2 - b^2 + 2ab =$

- A. $(3 - a - b)(3 - a + b)$.
 B. $(3 - a - b)(3 + a - b)$.
 C. $(3 - a - b)(3 + a + b)$.
 D. $(3 - a + b)(3 + a - b)$.
 E. $(3 - a + b)(3 + a + b)$.

[1997-CE-MATHS 2-4]

23. Factorize $x^2 - y^2 + 2x + 1$.

- A. $(x + y + 1)(x + y - 1)$
 B. $(x + y + 1)(x - y + 1)$
 C. $(x + y - 1)(x - y + 1)$
 D. $(x + y - 1)(x - y - 1)$
 E. $(x - y + 1)(x - y - 1)$

[1998-CE-MATHS 2-8]

24. $x^2 - y^2 - x + y =$

- A. $(x - y)(x - y - 1)$.
- B. $(x - y)(x + y - 1)$.
- C. $(x - y)(x + y + 1)$.
- D. $(x + y)(x - y - 1)$.
- E. $(x + y)(x - y + 1)$.

[1999-CE-MATHS 2-2]

25. Factorize $x^2 - x - xy + y$.

- A. $(x - y)(x - 1)$
- B. $(x - y)(x + 1)$
- C. $(x + y)(x - 1)$
- D. $(1 - x)(x + y)$
- E. $(1 + x)(y - x)$

[2000-CE-MATHS 2-2]

26. Which of the following is a factor of $2(a - b)^2 - a^2 + b^2$?

- A. $a - 3b$
- B. $a - 2b$
- C. $a + b$
- D. $a + 3b$
- E. $3a - b$

[2001-CE-MATHS 2-22]

27. $x^3 - \frac{27}{x^3} =$

- A. $(x + \frac{3}{x})(x^2 - 6 + \frac{9}{x^2})$.
- B. $(x + \frac{3}{x})(x^2 - 3 + \frac{9}{x^2})$.
- C. $(x - \frac{3}{x})(x^2 + 6 + \frac{9}{x^2})$.
- D. $(x - \frac{3}{x})(x^2 + 3 + \frac{9}{x^2})$.

[2003-CE-MATHS 2-39]

28. $pr + qr - ps - qs =$

- A. $(p + q)(r - s)$.
- B. $(p + q)(s - r)$.
- C. $(p - q)(r - s)$.
- D. $(p - q)(s - r)$.

[2006-CE-MATHS 2-4]

29. Which of the following must have $x + y$ as a factor?

- (1) $x^2 - y^2$
- (2) $x^2 + y^2$
- (3) $x(x + y) - x - y$

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

[2008-CE-MATHS 2-5]

30. $ab + ac - a^2 - bc =$

- A. $(a - b)(b + c)$.
- B. $(a - b)(c - a)$.
- C. $(a - c)(b + c)$.
- D. $(a + b)(c - a)$.

[2010-CE-MATHS 2-4]

HKDSE Problems

31. $a^2 - b^2 + 2b - 1 =$

- A. $(a - b - 1)(a + b - 1)$.
- B. $(a - b - 1)(a + b + 1)$.
- C. $(a - b + 1)(a + b - 1)$.
- D. $(a - b + 1)(a - b - 1)$.

[SP-DSE-MATHS 2-3]

32. $x^3(2x + x) =$

- A. $3x^4$.
- B. $2x^5$.
- C. $3x^5$.
- D. $2x^6$.

[PP-DSE-MATHS 2-1]

33. $p^2 - q^2 - p - q =$

- A. $(p + q)(p - q - 1)$.
- B. $(p + q)(p + q - 1)$.
- C. $(p - q)(p - q + 1)$.
- D. $(p - q)(p + q - 1)$.

[PP-DSE-MATHS 2-3]

34. $(4x + y)^2 - (4x - y)^2 =$

- A. 0.
- B. $2y^2$.
- C. $8xy$.
- D. $16xy$.

[2012-DSE-MATHS 2-2]

35. $hl - kl + hm - km - hn + kn =$

- A. $(h + k)(l - m + n)$.
- B. $(h + k)(l + m - n)$.
- C. $(h - k)(l - m + n)$.
- D. $(h - k)(l + m - n)$.

[2013-DSE-MATHS 2-3]

36. $u^2 - v^2 - 5u + 5v =$

- A. $(u - v)(u + v - 5)$.
- B. $(u - v)(u + v + 5)$.
- C. $(u + v)(u - v - 5)$.
- D. $(u + v)(u - v + 5)$.

[2014-DSE-MATHS 2-2]

37. $(x + 1)(x^2 + x + 1) =$

- A. $x^3 + 1$.
- B. $(x + 1)^3$.
- C. $x^3 + x^2 + x + 1$.
- D. $x^3 + 2x^2 + 2x + 1$.

[2015-DSE-MATHS 2-1]

38. $16 - (2x - 3y)^2 =$

- A. $(4 - 2x - 3y)(4 + 2x + 3y)$.
- B. $(4 - 2x - 3y)(4 + 2x - 3y)$.
- C. $(4 - 2x + 3y)(4 + 2x + 3y)$.
- D. $(4 - 2x + 3y)(4 + 2x - 3y)$.

[2016-DSE-MATHS 2-3]

39. $3m^2 - 5mn + 2n^2 + m - n =$

- A. $(m - n)(3m - 2n + 1)$.
- B. $(m - n)(3m + 2n + 1)$.
- C. $(m + n)(3m - 2n - 1)$.
- D. $(m + n)(3m + 2n - 1)$.

[2017-DSE-MATHS 2-1]

40. $h^2 - 6h - 4k^2 - 12k =$

- A. $(h - 2k)(h - 2k + 6)$
- B. $(h - 2k)(h + 2k + 6)$
- C. $(h + 2k)(h - 2k - 6)$
- D. $(h + 2k)(h + 2k - 6)$

[2018-DSE-MATHS 2-3]

41. $(a - b)(a^2 + ab - b^2) =$

- A. $(a - b)^3$
- B. $a^3 - b^3$
- C. $a^3 - 2ab^2 + b^3$
- D. $a^3 - 2a^2b + 2ab^2 + b^3$

[2019-DSE-MATHS 2-1]

42. $(3a + 2b)(4a - 5b) - a(6a + 4b) =$

- A. $(3a + 2b)(2a - 5b)$
- B. $(3a + 2b)(6a - 5b)$
- C. $(3a - 2b)(2a + 5b)$
- D. $(3a - 2b)(6a + 5b)$

[2020-DSE-MATHS 2-4]

Remainder Theorem

1. What is the remainder if $ax^{25} - x^2 + x + 7$ is divided by $x + 1$?
- A. $a + 5$
 B. $a + 7$
 C. $5 - a$
 D. $7 - a$
 E. $9 - a$

[SP-CE-MATHS A2-39]

2. When $f(x)$ is divided by $(2x + 1)$, the remainder is
- A. $f(2)$.
 B. $f(1)$.
 C. $f(-1)$.
 D. $f(\frac{1}{2})$.
 E. $f(-\frac{1}{2})$.

[1983-CE-MATHS 2-6]

3. When the expression $x^2 + px + q$ is divided by $x + 1$, the remainder is 4. Find the value of $2p - 2q + 1$.
- A. -3
 B. -5
 C. -7
 D. -9
 E. It cannot be determined.

[1987-CE-MATHS 2-8]

4. Let $f(x) = ax^2 + bx + c$. When $f(x)$ is divided by $(x - 1)$, the remainder is 10. When $f(x)$ is divided by $(x + 1)$, the remainder is 6. Find the value of b .
- A. -4
 B. -2
 C. 2
 D. 4
 E. It cannot be found.

[1988-CE-MATHS 2-5]

5. Let $f(x) = ax^2 - 5$ and $g(x) = 27x^3 - 18x + 4$. If both expressions leave the same remainder when divided by $3x + 1$, then $a =$
- A. -74 .
 B. 0 .
 C. 36 .
 D. 76 .
 E. 126 .

[1989-CE-MATHS 2-6]

6. $P(x)$ is a polynomial. When $P(x)$ is divided by $(5x - 2)$, the remainder is R . When $P(x)$ is divided by $(2 - 5x)$, then the remainder is
- A. R .
 B. $-R$.
 C. $\frac{2}{5}R$.
 D. $\frac{2}{5}$.
 E. $-\frac{2}{5}$.

[1994-CE-MATHS 2-37]

7. Find the remainder when $x^3 - x^2 + 1$ is divided by $2x + 1$.
- A. -11
 B. $\frac{5}{8}$
 C. $\frac{7}{8}$
 D. $\frac{9}{8}$
 E. 5 .

[1996-CE-MATHS 2-5]

8. Let $f(x) = (2x - 1)(x + 1) + 2x + 1$. Find the remainder when $f(x)$ is divided by $2x + 1$.
- A. -1
 B. $-\frac{1}{2}$
 C. 0
 D. 1
 E. 2

[2001-CE-MATHS 2-3]

9. The remainder when $x^2 + ax + b$ is divided by $x + 2$ is -4 . The remainder when $ax^2 + bx + 1$ is divided by $x - 2$ is 9. The value of a is
- A. -3 .
 B. -1 .
 C. 1 .
 D. 3 .

[2002-CE-MATHS 2-38]

10. Let k be a positive integer. When $x^{2k+1} + kx + k$ is divided by $x + 1$, the remainder is
- A. -1 .
 B. 1 .
 C. $2k - 1$.
 D. $2k + 1$.

[2005-CE-MATHS 2-40]

11. Let k be a non-zero constant. When $x^3 + kx^2 + 2kx + 3k$ is divided by $x + k$, the remainder is k . Find k .

A. -1
 B. 1
 C. -2
 D. 2

[2006-CE-MATHS 2-40]

12. When $x^{2009} + x^{2008} + x^{2007} + \dots + x$ is divided by $x + 1$, the remainder is

A. -1 .
 B. 0 .
 C. 1 .
 D. 2009 .

[2009-CE-MATHS 2-41]

Factor Theorem

13. If $f(x) = ax^2 + bx + c$ and $f\left(\frac{-3}{5}\right) = 0$, then which of the following is a factor of $ax^2 + bx + c$?

A. $x + 3$
 B. $3x + 5$
 C. $3x - 5$
 D. $5x + 3$
 E. $5x - 3$

[1978-CE-MATHS A2-49]

14. If $x + 2$ is a factor of $x^2 + ax + b$, then $2a - b + 3 =$

A. -7 .
 B. -1 .
 C. 0 .
 D. 1 .
 E. 7 .

[1984-CE-MATHS 2-4]

15. Let a and b be constants. If $3x^3 - ax^2 + 5x - 3b$ is divisible by $x + 3$, then $3a + b = ?$

A. -32
 B. -22
 C. 22
 D. 32
 E. it cannot be determined

[1985-CE-MATHS 2-7]

16. Let $F(x) = 2x^3 + 3x^2 - 11x - 6$. Given that $F(2) = 0$ and $F(-3) = 0$, then $F(x)$ can be factorized as

A. $(x + 2)(x - 3)(2x + 1)$.
 B. $(x + 2)(x - 3)(2x - 1)$.
 C. $(x - 2)(x + 3)(2x + 1)$.
 D. $(x - 2)(x - 3)(2x + 1)$.
 E. $(x - 2)(x + 3)(2x - 1)$.

[1986-CE-MATHS 2-34]

17. Which one of the following is a factor of $x^3 - 4x^2 + x + 6$?

A. $(x + 1)(x - 2)$
 B. $(x + 1)(x + 2)$
 C. $(x - 1)(x + 2)$
 D. $(x - 1)(x - 3)$
 E. $(x - 1)(x + 3)$

[1991-CE-MATHS 2-3]

18. If a polynomial $f(x)$ is divisible by $x - 1$, then $f(x - 1)$ is divisible by

A. $x - 2$.
 B. $x + 2$.
 C. $x - 1$.
 D. $x + 1$.
 E. x .

[1992-CE-MATHS 2-41]

19. If $f(x) = x^{99} + 99x + k$ is divisible by $x + 1$, then $k =$

A. -100 .
 B. -98 .
 C. 98 .
 D. 100 .
 E. 198 .

[1995-CE-MATHS 2-3]

20. If $2x^2 + x + m$ is divisible by $x - 2$, then it is also divisible by

A. $x + 3$.
 B. $2x - 3$.
 C. $2x + 3$.
 D. $2x - 5$.
 E. $2x + 5$.

[1997-CE-MATHS 2-6]

21. Let $f(x) = 2x^3 - x^2 - 7x + 6$. It is known that $f(-2) = 0$ and $f(1) = 0$. $f(x)$ can be factorized as

A. $(x + 1)(x + 2)(2x - 3)$.
 B. $(x + 1)(x - 2)(2x + 3)$.
 C. $(x - 1)(x + 2)(2x + 3)$.
 D. $(x - 1)(x + 2)(2x - 3)$.
 E. $(x - 1)(x - 2)(2x + 3)$.

[1998-CE-MATHS 2-6]

22. Let $f(x) = x^3 - 2x^2 - 5x + 6$. It is known that $f(1) = 0$. $f(x)$ can be factorized as

- A. $(x-1)^2(x+6)$.
- B. $(x-1)(x+1)(x+6)$.
- C. $(x-1)(x-2)(x+3)$.
- D. $(x-1)(x+2)(x-3)$.
- E. $(x+1)(x-2)(x-3)$.

[2000-CE-MATHS 2-9]

23. Let $f(x) = x^3 + 2x^2 + ax + b$. If $f(x)$ is divisible by $x+1$ and $x-2$, $f(x)$ can be factorized as

- A. $(x-1)(x+1)(x-2)$.
- B. $(x+1)^2(x-2)$.
- C. $(x-3)(x+1)(x-2)$.
- D. $(x+3)(x+1)(x-2)$.
- E. $x(x+1)(x-2)$.

[2001-CE-MATHS 2-48]

24. If $f(x) = x^3 - 7x + 6$ is divisible by $x^2 - 3x + k$, then $k =$

- A. -2 .
- B. 2 .
- C. -3 .
- D. 3 .

[2004-CE-MATHS 2-40]

25. Let $f(x)$ be a polynomial. If $f(x)$ is divisible by $x-1$, which of the following must be a factor of $f(2x+1)$?

- A. x
- B. $x-3$
- C. $2x-1$
- D. $2x+1$

[2007-CE-MATHS 2-40]

26. Let k be a constant. If $x^3 + 5x^2 + 3kx - k$ is divisible by $x-1$, find the value of k .

- A. -3
- B. -1
- C. 0
- D. 1

[2010-CE-MATHS 2-41]

Miscellaneous

27. Let $f(x) = 3x^3 - 4x + k$. If $f(x)$ is divisible by $x-k$, find the remainder when $f(x)$ is divided by $x+k$.

- A. $2k$
- B. k
- C. 0
- D. $-k$
- E. $-k-1$

[1990-CE-MATHS 2-34]

28. The expression $x^2 - 2x + k$ is divisible by $(x+1)$. Find the remainder when it is divided by $(x+3)$.

- A. 1
- B. 4
- C. 12
- D. 16
- E. 18

[1993-CE-MATHS 2-9]

29. It is given that $F(x) = x^3 - 4x^2 + ax + b$. $F(x)$ is divisible by $x-1$. When it is divided by $x+1$, the remainder is 12. Find a and b .

- A. $a = 5, b = 10$
- B. $a = 1, b = 2$
- C. $a = -3, b = 6$
- D. $a = -4, b = 7$
- E. $a = -7, b = 10$

[1999-CE-MATHS 2-38]

30. Let $f(x) = x^3 + 2x^2 + k$, where k is a constant. If $f(-1) = 0$, find the remainder when $f(x)$ is divided by $x-1$.

- A. -1
- B. 0
- C. 2
- D. 6

[2003-CE-MATHS 2-2]

31. Let $f(x) = 2x^2 + ax - 3$, where a is a constant. If $f(x)$ is divisible by $2x+1$, find the remainder when $f(x)$ is divided by $x-a$.

- A. -52
- B. 22
- C. 46
- D. 72

[2011-CE-MATHS 2-40]

HKDSE Problems

32. Let $f(x) = x^3 + 2x^2 - 7x + 3$. When $f(x)$ is divided by $x + 2$, the remainder is
- A. 3.
B. 5.
C. 17.
D. 33.
- [SP-DSE-MATHS 2-5]
33. Let $f(x) = x^4 - x^3 + x^2 - x + 1$. When $f(x)$ is divided by $x + 2$, the remainder is
- A. -2.
B. 0.
C. 11.
D. 31.
- [PP-DSE-MATHS 2-5]
34. If k is a constant such that $x^3 + 4x^2 + kx - 12$ is divisible by $x + 3$, then $k =$
- A. -25.
B. -1.
C. 1.
D. 17.
- [2012-DSE-MATHS 2-4]
35. Let $f(x) = x^{13} - 2x + k$, where k is a constant. If $f(x)$ is divisible by $x + 1$, find the remainder when $f(x)$ is divided by $x - 1$.
- A. 0
B. -1
C. 2
D. -2
- [2013-DSE-MATHS 2-9]
36. Let $f(x) = 4x^3 + kx + 3$, where k is a constant. If $f(x)$ is divisible by $2x + 1$, find the remainder when $f(x)$ is divided by $x + 1$.
- A. -7
B. -6
C. 0
D. 5
- [2016-DSE-MATHS 2-6]
37. Let $p(x) = 2x^2 - 11x + c$, where c is a constant. If $p(x)$ is divisible by $x - 7$, find the remainder when $p(x)$ is divided by $2x + 1$.
- A. -26
B. -15
C. 15
D. 26
- [2017-DSE-MATHS 2-7]
38. Let $g(x) = x^6 + ax^7 + b$, where a and b are constants. If $g(x)$ is divisible by $x - 1$, find the remainder when $g(x)$ is divided by $x + 1$.
- A. 0
B. $2a$
C. $-2a$
D. $-2a + 2$
- [2018-DSE-MATHS 2-8]
39. Let k be a constant such that $2x^4 + kx^3 - 4x - 16$ is divisible by $2x + k$. Find k .
- A. -2
B. 2
C. 4
D. 8
- [2019-DSE-MATHS 2-9]
40. Let $g(x) = ax^5 + 4ax^2 - 24$, where a is a constant. If $x + 2$ is a factor of $g(x)$, then $g(2) =$
- A. -96
B. 0
C. 3
D. 48
- [2020-DSE-MATHS 2-6]

H.C.F. & L.C.M.

1. $8abc^3$ is the H.C.F. of $24ab^2c^3$ and
- $12a^2bc^4$.
 - $30a^2bc^3$.
 - $32a^2bc^5$.
 - $40ab^2c^3$.
 - $48a^3bc^5$.
- [1978-CE-MATHS 2-11]
2. The H.C.F. and L.C.M. of three expressions are a^2b^2c and $a^4b^6c^4$ respectively. Two of the expressions are $a^2b^3c^4$ and $a^3b^2c^2$. The third expression is
- a^3b^3c .
 - $a^3b^6c^4$.
 - a^4b^2c .
 - a^4b^6c .
 - $a^4b^6c^2$.
- [1981-CE-MATHS 2-33]
3. The L.C.M. of $12a^2b$ and $18ab^3c$ is
- $6ab$.
 - $6a^2b^3c$.
 - $36ab$.
 - $36a^2b^3c$.
 - $216a^3b^4c$.
- [1986-CE-MATHS 2-31]
4. $8abc^3$ is the H.C.F. of $24ab^2c^3$ and
- $12a^2bc^4$.
 - $30a^2bc^3$.
 - $32a^2bc^5$.
 - $40ab^2c^3$.
 - $48a^3bc^5$.
- [1988-CE-MATHS 2-40]
5. The H.C.F. and L.C.M. of three expressions are xyz^2 and $x^3y^5z^4$ respectively. If two of the expressions are $x^2y^3z^3$ and x^3yz^2 , find the third expression.
- $x^2y^3z^3$
 - $x^2y^5z^3$
 - xy^3z^3
 - xy^5z^4
 - xy^3z^4
- [1990-CE-MATHS 2-37]

6. The L.C.M. of x , $2x^2$, $3x^3$, $4x^4$, $5x^5$ is

- x .
- $5x^5$.
- $60x^5$.
- $120x^5$.
- $120x^{15}$.

[1991-CE-MATHS 2-6]

7. The L.C.M. of P and Q is $12ab^3c^2$. The L.C.M. of X , Y and Z is $30a^2b^3c$. What is the L.C.M. of P , Q , X , Y and Z ?

- $360a^3b^6c^3$
- $60a^2b^3c^2$
- $60ab^3c^2$
- $6a^2b^3c$
- $6ab^3c$

[1992-CE-MATHS 2-40]

8. Find the H.C.F. and L.C.M. of ab^2c and abc^3 .

- | | H.C.F. | L.C.M. |
|----|-------------|-------------|
| A. | a | $a^2b^3c^4$ |
| B. | abc | ab^2c^3 |
| C. | abc | $a^2b^3c^4$ |
| D. | ab^2c^3 | abc |
| E. | $a^2b^3c^4$ | abc |

[1993-CE-MATHS 2-11]

9. Find the L.C.M. of $4x^2yz$ and $6xy^3$.

- $2xy$
- $12x^2y^3$
- $12x^2y^3z$
- $24x^2y^3z$
- $24x^3y^4z$

[1996-CE-MATHS 2-3]

10. The L.C.M. of $210xy^2$ and $30x^2yz$ is

- $30xy$.
- $70xyz$.
- $210x^2y^2z$.
- $630x^3y^3z$.

[2003-CE-MATHS 2-38]

H.C.F. & L.C.M. with Factorisation

11. The H.C.F. of $a^3 - 1$ and $a^4 - 1$ is

- 1 .
- $a + 1$.
- $a - 1$.
- $a^2 + 1$.
- $a^2 - 1$.

[1983-CE-MATHS 2-5]

12. The L.C.M. of $2a^2 - 2b^2$ and $a^3 - 2a^2b + ab^2$ is

- A. $a - b$.
- B. $a(a - b)(a + b)$.
- C. $2a(a - b)(a + b)$.
- D. $2a(a - b)^2(a + b)$.
- E. $2a(a - b)^3(a + b)$.

[1985-CE-MATHS 2-6]

13. Find the H.C.F. of $(2x - 1)(x^2 - 6x + 9)$ and $(x^2 - 3x)(4x^2 - 1)$.

- A. $(x - 3)$
- B. $(2x - 1)$
- C. $(x - 3)(2x - 1)$
- D. $x(x - 3)^2(2x - 1)(2x + 1)$
- E. there is no H.C.F.

[1987-CE-MATHS 2-40]

14. The L.C.M. of $(x - 1)^2$, $x^2 - 1$ and $x^3 - 1$ is

- A. $x - 1$.
- B. $(x - 1)^4(x + 1)(x^2 + x + 1)$.
- C. $(x - 1)^2(x + 1)(x^2 + x + 1)$.
- D. $(x - 1)^2(x + 1)(x^2 - x + 1)$.
- E. $(x - 1)(x + 1)(x^2 + x + 1)$.

[1994-CE-MATHS 2-3]

15. The L.C.M. of $x^3 - x$ and $x^4 - 1$ is

- A. $x - 1$.
- B. $(x - 1)(x + 1)$.
- C. $x(x - 1)(x + 1)(x^2 + 1)$.
- D. $(x - 1)(x + 1)(x^2 + 1)(x^2 + x + 1)$.
- E. $x(x - 1)^2(x + 1)^2(x^2 + 1)$.

[1995-CE-MATHS 2-6]

16. The L.C.M. of $2 - b$, $4 - b^2$ and $8 - b^3$ is

- A. $(2 - b)(2 + b)(4 - 4b + b^2)$.
- B. $(2 - b)(2 + b)(4 + 4b + b^2)$.
- C. $(2 - b)(2 + b)(4 - 2b + b^2)$.
- D. $(2 - b)(2 + b)(4 + 2b + b^2)$.

[2004-CE-MATHS 2-38]

17. The H.C.F. of $x^2(x + 1)(x + 2)$ and $x(x + 1)^3$ is

- A. $x(x + 1)$.
- B. $x(x + 1)(x + 2)$.
- C. $x^2(x + 1)^3$.
- D. $x^2(x + 1)^3(x + 2)$.

[2005-CE-MATHS 2-38]

HKDSE Problems

18. The H.C.F. and the L.C.M. of three expressions are ab^2 and $4a^4b^5c^6$ respectively. If the first expression and the second expression are $2a^2b^4c$ and $4a^4b^2c^6$ respectively, then the third expression is

- A. ab^2 .
- B. ab^5 .
- C. $2ab^2c$.
- D. $2ab^5c$.

[2012-DSE-MATHS 2-31]

19. The L.C.M. of $a^2 + 4a + 4$, $a^2 - 4$ and $a^3 + 8$ is

- A. $a + 2$.
- B. $(a - 2)(a + 2)^2(a^2 - 2a + 4)$.
- C. $(a - 2)(a + 2)^2(a^2 + 2a + 4)$.
- D. $(a - 2)(a + 2)^4(a^2 - 2a + 4)$.

[2013-DSE-MATHS 2-31]

20. The H.C.F. of $3x^4y^2z$, $4xy^5z$ and $6x^2y^3$ is

- A. xy^2 .
- B. xy^2z .
- C. $12x^4y^5z$.
- D. $12x^7y^9z^2$.

[2014-DSE-MATHS 2-31]

21. The L.C.M. of $9a^2b$, $12a^4b^3$ and $15a^6$ is

- A. $3a^2$.
- B. $3a^2b$.
- C. $180a^6b^3$.
- D. $180a^{12}b^4$.

[2016-DSE-MATHS 2-31]

Algebraic Fractions

1. $\frac{2}{x^2 - 1} - \frac{1}{x + 1} + \frac{1}{1 - x} =$

- A. $\frac{2}{x - 1}$
- B. $\frac{2}{x + 1}$
- C. $\frac{-2}{x - 1}$
- D. $\frac{-2}{x + 1}$
- E. $\frac{4}{x^2 - 1}$

[1977-CE-MATHS 2-1]

2. $\frac{a + b}{a - b} - \frac{a - b}{a + b} =$

- A. $4ab$
- B. $\frac{2ab}{a^2 - b^2}$
- C. $\frac{4ab}{a^2 - b^2}$
- D. $\frac{2b^2}{a^2 - b^2}$
- E. $\frac{2(a^2 + b^2)}{a^2 - b^2}$

[1979-CE-MATHS 2-24]

3. $\frac{x^{-2} - y^{-2}}{x^{-1} - y^{-1}} =$

- A. $x^{-1} + y^{-1}$
- B. $x^{-1} - y^{-1}$
- C. $x^{-3} - y^{-3}$
- D. $\frac{1}{x - y}$
- E. $\frac{1}{x + y}$

[1980-CE-MATHS 2-5]

4. $\frac{1}{x + 1} + \frac{1}{x - 1} + \frac{x + \frac{1}{x}}{x - \frac{1}{x}} =$

- A. $\frac{1}{x + 1}$
- B. $\frac{1}{x - 1}$
- C. $\frac{x + 1}{x - 1}$
- D. $\frac{1}{(x + 1)(x - 1)}$
- E. $\frac{x^2 + 4x + 1}{(x + 1)(x - 1)}$

[1981-CE-MATHS 2-2]

5. $\left(\frac{\frac{x}{y} + \frac{y}{x} + 2}{\frac{x}{y} - \frac{y}{x}} \right)^{-1} =$

- A. $\frac{x - y}{x + y}$
- B. $\frac{x + y}{x - y}$
- C. $-\frac{x + y}{x - y}$
- D. $\frac{x^2 + y^2}{x^2 - y^2}$
- E. $\frac{x^2 - y^2}{x^2 + y^2}$

[1981-CE-MATHS 2-5]

6. $\frac{2a}{a^2 - 4b^2} + \frac{1}{2b - a} =$

- A. $\frac{1}{a + 2b}$
- B. $\frac{2a - 1}{(a + 2b)(a - 2b)}$
- C. $\frac{2a + 1}{(a + 2b)(a - 2b)}$
- D. $\frac{3a + 2b}{(a + 2b)(a - 2b)}$
- E. $\frac{a + 2b}{(a + 2b)(a - 2b)}$

[1982-CE-MATHS 2-1]

7. $(a^{-2} - 3b^{-1})^{-1} =$

- A. $\frac{3a^2 + b}{a^2b}$
- B. $\frac{3a^2 - b}{a^2b}$
- C. $\frac{3b - a^2}{a^2b}$
- D. $\frac{a^2b}{b - 3a^2}$
- E. $\frac{3a^2b}{3b - a^2}$

[1982-CE-MATHS 2-3]

8. $\frac{6}{x^2 - 9} - \frac{5}{x^2 + x - 6} =$

- A. $\frac{1}{(x - 2)(x - 3)}$
- B. $\frac{1}{(x + 2)(x + 3)}$
- C. $\frac{1}{(x + 2)(x - 3)}$
- D. $\frac{1}{(x - 2)(x + 3)}$
- E. $\frac{x - 27}{(x - 2)(x + 3)(x - 3)}$

[1983-CE-MATHS 2-1]

$$9. \frac{\frac{1}{a^3} + \frac{1}{b^3}}{\frac{1}{a} + \frac{1}{b}} =$$

- A. $\frac{1}{a^2} + \frac{1}{b^2}$.
 B. $\frac{1}{a^2} + \frac{1}{ab} + \frac{1}{b^2}$.
 C. $\frac{1}{a^2} - \frac{1}{ab} + \frac{1}{b^2}$.
 D. $a^2 - ab + b^2$.
 E. $a^2 + ab + b^2$.

[1983-CE-MATHS 2-2]

$$10. \frac{4}{(x-2)(x+1)} - \frac{3}{x^2-1} =$$

- A. $\frac{1}{(x-1)^2(x+1)}$.
 B. $\frac{x+2}{(x-2)(x+1)(x-1)}$.
 C. $\frac{x+10}{(x-2)(x+1)(x-1)}$.
 D. $\frac{x-10}{(x-2)(x+1)(x-1)}$.
 E. $\frac{x^2-3x-10}{(x-2)(x+1)(x-1)^2}$.

[1984-CE-MATHS 2-1]

$$11. \frac{2}{1+x} - \frac{1}{1-x} - \frac{4x}{x^2-1} =$$

- A. $\frac{1}{1-x}$.
 B. $\frac{1}{x-1}$.
 C. $\frac{1-7x}{x^2-1}$.
 D. $\frac{1-7x}{1-x^2}$.
 E. $\frac{3x+1}{1-x^2}$.

[1985-CE-MATHS 2-1]

$$12. \frac{\frac{b}{a} - \frac{a}{b}}{\frac{1}{a} - \frac{1}{b}} =$$

- A. $a+b$.
 B. $a-b$.
 C. $-a+b$.
 D. $-a-b$.
 E. $\frac{1}{a} + \frac{1}{b}$.

[1985-CE-MATHS 2-2]

$$13. (x+y)^{-1}(x^2-y^2) =$$

- A. $\frac{1}{x^3} - \frac{1}{y^3}$.
 B. $\frac{1}{x^2y} - \frac{1}{xy^2}$.
 C. $\frac{1}{xy^2} - \frac{1}{x^2y}$.
 D. $\frac{1}{x^2} - \frac{1}{y^2}$.
 E. $\frac{1}{x^2y} + \frac{1}{xy^2}$.

[1985-CE-MATHS 2-4]

$$14. \frac{\frac{x^2}{3} - 3y^2}{\frac{3}{2}(x-3y)} =$$

- A. $\frac{1}{2}(x-3y)$.
 B. $\frac{2}{9}(x-3y)$.
 C. $2(x+3y)$.
 D. $\frac{1}{2}(x+3y)$.
 E. $\frac{2}{9}(x+3y)$.

[1986-CE-MATHS 2-2]

$$15. \left(\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}}\right)^2 =$$

- A. $\frac{(x+y)^2}{xy}$.
 B. $\frac{x^2+y^2}{xy}$.
 C. $\frac{x+y+2}{xy}$.
 D. $\frac{x+y}{xy}$.
 E. 1.

[1986-CE-MATHS 2-30]

$$16. \left(\frac{x+1}{x}\right)^2 - \left(\frac{x-1}{x}\right)^2 =$$

- A. $\frac{2}{x}$.
 B. $\frac{4}{x}$.
 C. $\frac{2}{x^2}$.
 D. $\frac{4}{x^2}$.
 E. 0.

[1987-CE-MATHS 2-1]

$$17. \frac{x^2 - 2x}{x^3 - 25x} \times \frac{x^2 - 2x - 15}{x^2 + x - 6} =$$

- A. $\frac{1}{x-5}$
 B. $\frac{x-2}{(x+2)(x-5)}$
 C. $\frac{1}{x+5}$
 D. $\frac{1}{x}$
 E. $\frac{x-3}{(x+3)(x-5)}$

[1988-CE-MATHS 2-3]

$$18. \frac{1}{2x-x^2} + \frac{1}{x^2+x-6} =$$

- A. $\frac{3}{x(2-x)(x+3)}$
 B. $\frac{-3}{x(x+2)(x-3)}$
 C. $\frac{6-x}{x(2-x)(x+2)(x-3)}$
 D. $\frac{x-6}{x(2-x)(x+2)(x-3)}$
 E. $\frac{2x+3}{x(2-x)(x+3)}$

[1988-CE-MATHS 2-6]

$$19. \frac{27x^3 - 8}{3x - 2} =$$

- A. $(3x-2)^2$
 B. $9x^2 - 4$
 C. $9x^2 + 4$
 D. $9x^2 - 6x + 4$
 E. $9x^2 + 6x + 4$

[1989-CE-MATHS 2-2]

$$20. \frac{(1-x^2)^n + (1-x)^n}{(1-x)^{2n}} =$$

- A. $\frac{(1+x)^n + 1}{(1-x)^n}$
 B. $\frac{2-x-x^2}{(1-x)^2}$
 C. $\frac{(1+x)^n + 1}{(1-x)^2}$
 D. $\frac{(1-x)^n + 1}{(1+x)^n}$
 E. $\frac{2-x^n-x^{2n}}{1-x^{2n}}$

[1989-CE-MATHS 2-41]

$$21. \frac{1 - \frac{x-y}{x+y}}{1 - \frac{x+y}{x-y}} =$$

- A. $\frac{y-x}{x+y}$
 B. $\frac{x-y}{x+y}$
 C. $\frac{x}{y}$
 D. $x+y$
 E. $x-y$

[1990-CE-MATHS 2-2]

$$22. \frac{1}{1-x^2} - \frac{1}{(1+x)^2} =$$

- A. $\frac{2}{(1-x^2)(1+x^2)}$
 B. $\frac{2x^2}{(1-x^2)(1+x^2)}$
 C. $\frac{2x^2}{(1-x^2)(1+x)^2}$
 D. $\frac{2}{(1-x)(1+x)^2}$
 E. $\frac{2x}{(1-x)(1+x)^2}$

[1991-CE-MATHS 2-2]

$$23. \frac{\frac{1}{x^3} + \frac{1}{y^3}}{\frac{1}{x} + \frac{1}{y}} =$$

- A. $\frac{1}{x^2} + \frac{1}{y^2}$
 B. $\frac{1}{x^2} + \frac{1}{xy} + \frac{1}{y^2}$
 C. $\frac{1}{x^2} + \frac{2}{xy} + \frac{1}{y^2}$
 D. $\frac{1}{x^2} - \frac{2}{xy} + \frac{1}{y^2}$
 E. $\frac{1}{x^2} - \frac{1}{xy} + \frac{1}{y^2}$

[1991-CE-MATHS 2-5]

$$24. \frac{1}{a} + \frac{1}{b} =$$

- A. $\frac{a+b}{ab}$
 B. $\frac{ab}{a+b}$
 C. $\frac{1}{ab}$
 D. $\frac{2}{a+b}$
 E. $\frac{1}{a+b}$

[1992-CE-MATHS 2-1]

25. $\frac{\frac{2}{x} - \frac{1}{y}}{\frac{4y}{x} - \frac{x}{y}} =$

A. $2y - x$.
 B. $2y + x$.
 C. $\frac{1}{2y - x}$.
 D. $\frac{1}{2y + x}$.
 E. $\frac{1}{4y - x}$.

[1994-CE-MATHS 2-36]

26. Simplify $\frac{(\frac{y}{x} - 1)(1 - \frac{x}{y})}{\frac{x}{y} - \frac{y}{x}}$.

A. $\frac{x - y}{x + y}$
 B. $-\frac{x - y}{x + y}$
 C. $\frac{x + y}{x - y}$
 D. $-\frac{x + y}{x - y}$
 E. -1

[1995-CE-MATHS 2-37]

27. Simplify $\frac{1}{x-1} + \frac{1}{x+1} + \frac{3x-1}{1-x^2}$.

A. $\frac{1}{1-x}$
 B. $\frac{1}{1+x}$
 C. $-\frac{1}{1+x}$
 D. $\frac{3x+1}{1-x^2}$
 E. $\frac{1-5x}{1-x^2}$

[1996-CE-MATHS 2-36]

28. Simplify $\frac{4}{x^2-4} - \frac{3}{x^2-x-2}$.

A. $\frac{1}{(x+1)(x+2)}$
 B. $\frac{1}{(x+1)(x-2)}$
 C. $\frac{1}{(x-1)(x-2)}$
 D. $\frac{x+10}{(x+1)(x-2)(x+2)}$
 E. $\frac{x-10}{(x-1)(x-2)(x+2)}$

[1997-CE-MATHS 2-28]

29. $\frac{2}{x^2-1} - \frac{3}{x^2-x-2} =$

A. $\frac{-1}{(x-1)(x-2)}$.
 B. $\frac{-1}{(x+1)(x-2)}$.
 C. $\frac{-1}{(x+1)(x+2)}$.
 D. $\frac{-1}{(x-1)(x+1)(x-2)}$.
 E. $\frac{-x-7}{(x-1)(x+1)(x-2)}$.

[1998-CE-MATHS 2-39]

30. $\frac{2}{x^2-1} - \frac{x-1}{x^2-2x-3} =$

A. $\frac{-x^2+2x+5}{(x-1)(x+1)(x+3)}$.
 B. $\frac{-x^2+2x+7}{(x-1)(x+1)(x+3)}$.
 C. $\frac{-x^2-5}{(x-3)(x-1)(x+1)}$.
 D. $\frac{x^2-5}{(x-3)(x-1)(x+1)}$.
 E. $\frac{-x^2+4x-7}{(x-3)(x-1)(x+1)}$.

[1999-CE-MATHS 2-40]

31. Simplify $\frac{a}{a+b} + \frac{b}{b-a} + \frac{2ab}{a^2-b^2}$.

A. $\frac{a+b}{a-b}$
 B. $-\frac{a-b}{a+b}$
 C. $\frac{-a^2+b^2+4ab}{a^2-b^2}$
 D. $\frac{a^2+b^2}{a^2-b^2}$
 E. 1

[2000-CE-MATHS 2-37]

32. $\frac{1-x}{x^2+4x-5} + \frac{x-1}{x+1} =$

A. $\frac{x^2+3x-6}{(x+1)(x+5)}$.
 B. $\frac{x^2+5x-4}{(x+1)(x+5)}$.
 C. $\frac{(x+4)(x-1)}{(x+1)(x+5)}$.
 D. $\frac{(x-1)(x-4)}{(x+1)(x-5)}$.
 E. $\frac{(x-1)(x-6)}{(x+1)(x-5)}$.

[2001-CE-MATHS 2-47]

$$33. 1 - \frac{2x}{x - \frac{1}{x}} =$$

- A. $\frac{x-3}{x-1}$
 B. $\frac{x^2-3}{x^2-1}$
 C. $\frac{x^2+1}{x^2-1}$
 D. $-\frac{x^2+1}{x^2-1}$

[2002-CE-MATHS 2-37]

$$34. \frac{10}{x^2+x-6} - \frac{2}{x-2} =$$

- A. $\frac{2}{x+3}$
 B. $\frac{-2}{x+3}$
 C. $\frac{13-2x}{(x+3)(x-2)}$
 D. $\frac{16-2x}{(x+3)(x-2)}$

[2003-CE-MATHS 2-37]

$$35. \frac{\frac{3}{x} - \frac{2}{y}}{\frac{4x}{y} - \frac{9y}{x}} =$$

- A. $\frac{1}{2x-3y}$
 B. $\frac{1}{2x+3y}$
 C. $\frac{-1}{2x-3y}$
 D. $\frac{-1}{2x+3y}$

[2004-CE-MATHS 2-37]

$$36. \frac{1}{x+1} - \frac{1}{x-1} =$$

- A. $\frac{2}{1-x^2}$
 B. $\frac{2}{x^2-1}$
 C. $\frac{2x}{1-x^2}$
 D. $\frac{2x}{x^2-1}$

[2006-CE-MATHS 2-3]

$$37. \frac{1}{n+3} - \frac{1}{3-n} =$$

- A. $\frac{6}{9-n^2}$
 B. $\frac{6}{n^2-9}$
 C. $\frac{2n}{9-n^2}$
 D. $\frac{2n}{n^2-9}$

[2007-CE-MATHS 2-2]

$$38. \frac{-k}{1-k} - \frac{1}{k-1} =$$

- A. 1
 B. $\frac{k+1}{k-1}$
 C. $\frac{k+1}{1-k}$
 D. $\frac{k^2+1}{k^2-1}$

[2008-CE-MATHS 2-3]

$$39. \frac{1}{a-2} - \frac{2}{1-a} =$$

- A. $\frac{3}{(a-1)(a-2)}$
 B. $\frac{a-3}{(a-1)(a-2)}$
 C. $\frac{3a-1}{(a-1)(a-2)}$
 D. $\frac{3a-5}{(a-1)(a-2)}$

[2009-CE-MATHS 2-3]

$$40. \frac{1}{2x-3} + \frac{1}{2x+3} =$$

- A. $\frac{6}{2x^2-3}$
 B. $\frac{4x}{2x^2-3}$
 C. $\frac{6}{4x^2-9}$
 D. $\frac{4x}{4x^2-9}$

[2010-CE-MATHS 2-3]

HKDSE Problems

41. $\frac{1}{2-x} + \frac{x-1}{(x-2)^2} =$

- A. $\frac{-3}{(2-x)^2}$
 B. $\frac{1}{(2-x)^2}$
 C. $\frac{-2x+3}{(2-x)^2}$
 D. $\frac{2x-3}{(2-x)^2}$

[SP-DSE-MATHS 2-31]

42. $\frac{1}{x^2-2x+1} - \frac{1}{x^2+x-2} =$

- A. $\frac{1}{(x-1)(x+2)}$
 B. $\frac{1}{(x-1)^2(x+2)}$
 C. $\frac{3}{(x-1)^2(x+2)}$
 D. $\frac{2x+1}{(x-1)^2(x+2)}$

[2015-DSE-MATHS 2-31]

43. $\frac{1}{3x+7} - \frac{1}{3x-7} =$

- A. $\frac{14}{49-9x^2}$
 B. $\frac{14}{9x^2-49}$
 C. $\frac{6x}{49-9x^2}$
 D. $\frac{6x}{9x^2-49}$

[2018-DSE-MATHS 2-4]

44. $\frac{5}{4k+3} - \frac{2}{4k-3} =$

- A. $\frac{12k-21}{16k^2-9}$
 B. $\frac{12k+9}{16k^2-9}$
 C. $\frac{14k-21}{16k^2-9}$
 D. $\frac{14k+9}{16k^2-9}$

[2020-DSE-MATHS 2-3]