LEVEL 1 — ALGEBRA

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LEVEL 2 — ALGEBRA

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Page

Q1. Write the simplest algebraic expressions for each of the following: 1

(a) The perimeter of a square with side x cm.

(b) The perimeter of a rectangle with sides $x + 3$ and $x + 4$.

(c) The area of a square with side $x - 1$.

(d) The area of a rectangle with sides $x + 6$ and $x - 3$.

Q2. If $x = 3$, $y = -4$ and $z = 6$, find: 2

(a) $z^2 - \left(x^2 + y^2\right)$ (b) $(x+y)^2 + (y+z)^2$ (c) $2xy(x - y + z)$

(d) $\dfrac{xy}{z}$ (e) $\dfrac{x}{2} + \dfrac{yz}{3}$ (f) $\sqrt[3]{\dfrac{xy^2}{z}}$

Q3. Simplify: 3, 4

(a) $-2xy + 5y \times 3x + 6x - y$ (b) $-3mn \div 2m + 4n - m$

(c) $2a + 15a^2b \div 3ab - 2ab$ (d) $8x^2 \times (-3xy^2) \div (-6xy)$

Q4. Simplify: 5 – 7

(a) $\dfrac{4y}{3x} + \dfrac{3y}{4x} - \dfrac{y}{x}$ (b) $\dfrac{4n}{5m} + \dfrac{3n}{2m} - \dfrac{2n}{m}$

(c) $\left(\dfrac{3}{8y} + \dfrac{5}{6x}\right) \div \dfrac{5}{12xy}$ (d) $\dfrac{2a}{5b} \times \dfrac{3a}{5b} \div \dfrac{5a}{4b}$

Q5. Expand and simplify: 8, 9

(a) $3x(2x+5) + 4x$ (b) $-x(2-x) + x$ (c) $\dfrac{1}{2}(4x-3) - 5x$

(d) $-\dfrac{3}{4}(3x+2) - 2$ (e) $2x\left(\dfrac{2x+1}{3}\right)$ (f) $-(6x-5) - (2x-3)$

Q6. Expand and simplify: 10, 11

(a) $(2x+3)(x-4)$ (b) $(3x-2)(2x+3)$ (c) $(4x-5)(2x-3)$

(d) $(4-x)(3x+2)$ (e) $2(2x+1)(x-2)$ (f) $\dfrac{1}{2}(2x+6)(x-4)$

Q7. Expand and simplify: 12, 13

(a) $(x+4)^2$ (b) $(x-1)(x+1)$ (c) $(m+n)(n-m)$

(d) $(4x+3)(4x-3)$ (e) $(2x-1)^2$ (f) $(3x+2)^2$

(g) $\left(x^2+4\right)^2$ (h) $5x(6x+1)^2$ (i) $\dfrac{1}{2}x(2x-4)^2$

LEVEL 3 — ALGEBRA

Q1. (a) If x apples cost a total of \$$y$, what is the cost of z apples?

(b) The price of bricks increases from \$$x$/tonne to \$$y$/tonne. Before the price rise, the cost of bricks for an average house was \$$H$. What is the new cost of bricks for an average house?

(c) \$$A$ is divided in the ratio $x : y$. What is the difference, in dollars, between the two amounts if $x > y$?

Q2. If $x = \frac{1}{2}$, $y = \frac{2}{3}$ and $z = \frac{3}{4}$, evaluate:

(a) $\frac{x}{y} + z$ (b) $\sqrt{\frac{xy}{z}}$ (c) $\frac{x^2}{z} \cdot \frac{2}{y}$

Q3. Simplify: (a) $x + \frac{1}{x}$ (b) $\frac{5x}{7} - x$

(c) $\frac{4}{x^2} + \frac{2}{x}$ (d) $\left(\frac{1}{x} + \frac{1}{y}\right) \div (x + y)$

Q4. Expand and simplify:

(a) $x(x+y) + y(x-y)$ (b) $x(x+1)(x+2)$

(c) $(2x-3)^2 - (x-3)^2$ (d) $\frac{1}{2}(x+3) + \frac{1}{3}(x+2)$

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

Q5. Simplify:

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

(b) $(5x-3)^2 - (x+3)^2 + (2x-1)(2x+1)$

(c) $5x^2 - 4x(3x-2) - (4x-1)^2 + (2x+1)^2$

(d) $(x+1)^2 - (x+2)^2 + (x-3)^2 + (x+4)^2 - x^2$

Q6. Simplify: (a) $\frac{(x-3)^2}{(x+3)^2} - \frac{(x+2)^2}{(x+3)^2}$

(b) $\frac{3(x-1)}{x+1} + \frac{2(x+1)}{x-1}$

Level 1 — Algebra

Q1. (a) xy km (b) $(180 - x - y)°$ (c) $\dfrac{\$(x + y + z)}{3}$

Q2. (a) 26 (b) 144 (c) 4 (d) 0 (e) 15 (f) 10

Q3. (a) $3x + 9x^2$ (b) $4p^2 - 4p - 5$ (c) $3xy - 5x + 4y$ (d) $3y + 8xy$

Q4. (a) $15abc$ (b) $12p^2q$ (c) $-15x^2y$ (d) $8m$ (e) $2xy$ (f) $12b$

Q5. (a) $\dfrac{3m}{4}$ (b) $\dfrac{x}{12}$ (c) $\dfrac{9a}{10}$ (d) $\dfrac{a+b}{x}$ (e) $\dfrac{9x-4y}{6}$ (f) $\dfrac{m}{21}$

Q6. (a) $\dfrac{x^2}{8}$ (b) $\dfrac{b}{2a}$ (c) $\dfrac{6}{mn}$ (d) $1\dfrac{1}{3}$ (e) 4 (f) $\dfrac{4}{3n}$

Q7. (a) $5x + 10$ (b) $6a - 3$ (c) $2y^2 + 6y$ (d) $12 - 4x$ (e) $-2m - 2n$ (f) $2b - 3b^2$

Q8. (a) $x^2 + 3x + 2$ (b) $x^2 - 4x + 3$ (c) $m^2 - m - 12$
(d) $ab - 2a + 3b - 6$ (e) $mn + 2m - 9n - 18$ (f) $ab + 2b - 2a - 4$

Level 2 — Algebra

Q1. (a) $4x$ cm (b) $(4x + 14)$ units (c) $(x^2 - 2x + 1)$ units^2 (d) $(x^2 + 3x - 18)$ units^2

Q2. (a) 11 (b) 5 (c) -312 (d) -2 (e) $-6\dfrac{1}{2}$ (f) 2

Q3. (a) $13xy + 6x - y$ (b) $\dfrac{5n}{2} - m$ (c) 7a - 2ab (d) $4x^2y$

Q4. (a) $\dfrac{13y}{12x}$ (b) $\dfrac{3n}{10m}$ (c) $\dfrac{9x + 20y}{10}$ (d) $\dfrac{24a}{125b}$

Q5. (a) $6x^2 + 19x$ (b) $x^2 - x$ (c) $-3x - \dfrac{3}{2}$ (d) $-\dfrac{9x}{4} - \dfrac{7}{2}$ (e) $\dfrac{4x^2}{3} + \dfrac{2x}{3}$ (f) $8 - 8x$

Q6. (a) $2x^2 - 5x - 12$ (b) $6x^2 + 5x - 6$ (c) $8x^2 - 22x + 15$
(d) $-3x^2 + 10x + 8$ (e) $4x^2 - 6x - 4$ (f) $x^2 + 7x + 12$

Q7. (a) $x^2 + 8x + 16$ (b) $x^2 - 1$ (c) $n^2 - m^2$
(d) $16x^2 - 9$ (e) $4x^2 - 4x + 1$ (f) $9x^2 + 12x + 4$
(g) $x^4 + 8x^2 + 16$ (h) $180x^3 + 60x^2 + 5x$ (i) $2x^3 - 8x^2 + 8x$

Level 3 — Algebra

Q1. (a) $\$\left(\dfrac{zy}{x}\right)$ (b) $\$\left(\dfrac{Hy}{x}\right)$ (c) $\dfrac{A(x-y)}{x+y}$

Q2. (a) $1\dfrac{1}{2}$ (b) $\dfrac{2}{3}$ (c) 1

Q3. (a) $\dfrac{x^2+1}{x}$ (b) $-\dfrac{2x}{7}$ (c) $\dfrac{4+2x}{x^2}$ (d) $\dfrac{1}{xy}$

Q4. (a) $x^2 + 2xy - y^2$ (b) $x^3 + 3x^2 + 2x$ (c) $3x^2 - 6x$ (d) $\dfrac{5x+13}{6}$

(e) $4x^2 - 9y^2$ (f) $-4x^2 + 4x - 1$

Q5. (a) $9x^2 - 4x - 4$ (b) $28x^2 - 36x - 1$ (c) $-19x^2 + 20x$ (d) $x^2 + 22$

Q6. (a) $\dfrac{5 - 10x}{(x+3)^2}$ (b) $\dfrac{5x^2 - 2x + 5}{x^2 - 1}$