Unit-16: Algebraic Representation and Formulae

1. M/J 17/P11/Q16

(a) Given that $a = 3$ and $b = -7$, evaluate

(i) $2a - b$, [1]

(ii) $a^2 + b^2$. [1]

(b) $A = 2r^2 + 5$

Rearrange the formula to make r the subject. [2]

2. M/J 16/P12/Q26

(a) Make p the subject of the formula $t = \frac{p+3}{p-4}$. [3]

(b) Simplify fully $\frac{4x^2 - 1}{2x^2 - 9x - 5}$. [3]

3. O/N 15/P12/Q16

(a) Factorise

(i) $4p^2 - 9q^2$, [1]

(ii) $2n^2 + 5n - 3$. [1]

(b) Express $\frac{3}{4x} + \frac{2}{3y}$ as a single fraction. [1]

4. O/N 15/P11/Q15

$4 = \sqrt{\frac{cx+1}{dx-1}}$

Find x in terms of c and d. [3]

5. O/N 15/P11/Q22

(a) Expand and simplify $10 - 3(3x - 2)$. [1]

(b) Simplify fully $\frac{3x^2 + 16x + 5}{9x^2 - 1}$. [3]

6. M/J 15/P12/Q18

(a) Factorise completely $p^2q - pq$. [1]

(b) **(i)** Factorise $5x^2 + x - 4$. [1]

(ii) Hence solve $5x^2 + x - 4 = 0$. [1]

7. O/N 14/P11/Q12

$s = \frac{n}{2}(a + b)$

(a) Evaluate s when $n = 200$, $a = 3.6$ and $b = 5.7$. [1]

(b) Rearrange the formula to make b the subject. [2]

8. O/N 14/P11/Q13

When the speed of a car is v m/s, its braking distance is d m.
d is directly proportional to the **square** of v.
When the speed of the car is 8 m/s the braking distance is 5 m.

Find the formula for d in terms of v and hence find the braking distance when the speed of the car is 40 m/s. [3]

9. M/J 14/P11/Q9

Make a the subject of the formula $y = \frac{a-4}{3-a}$. **[3]**

10. M/J 13/P11/Q10

$b \quad m(a-c)$

(a) Evaluate b when $m = 5$, $a \quad 8$ and $c = -3$. **[1]**

(b) Rearrange the formula to make c the subject. **[2]**

11. M/J 12/P11/Q4

Factorise completely

(a) $12x^2 - 15x^3$, **[1]**

(b) $x^2 - x - 6$. **[1]**

12. O/N 11/P12/Q23/a

(a) Factorise $9x^2 - 1$. **[1]**

13. O/N 10/P12/Q6

Factorise

(a) $4t^2 - 9$, **[1]**

(b) $3x^2 + 5x - 2$. **[1]**

14. M/J 10/P12/Q6/b, M/J 10/P13/Q6/b

(a) Given that $p = 2t - r$, express t in terms of p and r. **[1]**

15. M/J 10/P12/Q21, M/J 10/P13/Q21

(a) Factorise completely

(i) $3x^2 - 12x$, **[1]**

(ii) $x^2 - xy - 2y^2$. **[1]**

(b) Simplify $\frac{x^2 + 4x}{x^2 - 16}$. **[2]**

16. O/N 09/P01/Q9/b

(a) Rearrange the formula to make m the subject. **[2]**

17. M/J 09/P01/Q4

(a) Factorise $x^2 - y^2$. **[1]**

(b) Evaluate $102^2 - 98^2$. **[1]**

18. M/J 09/P01/Q7

(a) Simplify $4a^3 \times a^2$. **[1]**

(b) Simplify fully $3x(x + 5) - 2(x - 3)$. **[2]**

19. M/J 09/P01/Q17/a

(a) Solve $\frac{3x - 2}{5} = \frac{x}{3}$. **[2]**

20. M/J 08/P01/Q21/b

(a) Evaluate $x^2 - 6xy + 2y^2$ when $x = 2$ and $y = -3$. **[2]**

Answers Section

1. M/J 17/P11/Q16

(a) **(i)** 13 **1**

(ii) 58 **1**

(b) $[\,r\,] = [\pm]\sqrt{\dfrac{A-5}{2}}$ **2**

2. M/J 16/P12/Q26

(a) $\dfrac{3+4t}{t-1}$ oe **3**

(b) $\dfrac{2x-1}{x-5}$ final answer **3**

3. O/N 15/P12/Q16

(a) **(i)** $(\,2p-3q\,)(\,2p+3q$ **1**

(ii) $5(\,2n-1\,)(\,n+3\,)$ **1**

(b) $\dfrac{9y+8x}{12xy}$ **1**

4. O/N 15/P11/Q15

$\dfrac{17}{16d-c}$ **3**

5. O/N 15/P11/Q22

(a) $16-9x$ **1**

(b) $\dfrac{x+5}{3x-1}$ **3**

6. M/J 15/P12/Q18

(a) $pq(p-1)$ **1**

(b) **(i)** $(5x-4)(x+1)$ **1**

(ii) 0.8 oe , –1 **1**

7. O/N 14/P11/Q12

(a) 930 **1**

(b) $\dfrac{2s-an}{n}$ oe **2**

8. O/N 14/P11/Q13

$d = \dfrac{5v^2}{64}$

125 **3**

9. M/J 14/P11/Q9

$\dfrac{3y+4}{y+1}$ **3**

10. M/J 13/P11/Q10

(a) 55 **1**

(b) $\dfrac{ma-b}{m}$ oe **2**

11. M/J 12/P11/Q4

(a) $3x^2(4-5x)$ **1**

(b) $(x-3)(x+2)$ oe Final ans. **1**

12. O/N 11/P12/Q23/a

(a) $(3x-1)(3x+1)$ **1**

13. O/N 10/P12/Q6

(a) $(2t-3)(2t+3)$ **1**

(b) $(3x-1)(x+2)$ **1**

14. M/J 10/P12/Q6/b, M/J 10/P13/Q6/b

(a) $\dfrac{p+r}{2}$ **1**

15. M/J 10/P12/Q21, M/J 10/P13/Q21

(a) **(i)** $3x(x-4)$ **1**

(ii) $(x+y)(x-2y)$ **1**

(b) $\dfrac{x}{x-4}$ **2**

16. O/N 09/P01/Q9/b

(a) $(m=)\ \dfrac{Ft}{v-u}$, $Ft/(v-u)$ **2**

17. M/J 09/P01/Q4

(a) $(x-y)(x+y)$ **1**

(b) 800 **1**

18. M/J 09/P01/Q7

(a) $4a^5$ **1**

(b) $3x^2+13x+6$ **2**

19. M/J 09/P01/Q17/a

(a) 1.5 oe **2**

20. M/J 08/P01/Q21/b

(a) 58 **2**