GCSE Maths

Mixed Algebra Practice *2nd Edition*

Simplifying
Expanding and Factorising
Laws of Indices
Solving Equations
Algebraic Fractions
Surds
Inequalities

Mark Scheme Available here:

www.addvancemaths.com/gcse-maths/**mixed-algebra-practice**/

Name:	
Score:	
Time:	

Instructions

- Use black or blue ball-point pen.
- Answer all the questions in the spaces provided.

Information

- The marks for each question are shown in the circles.
- You are allowed a calculator for this test. We recommend the Casio Classwiz model.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Q	Score
1	/6
2	/6
3	/7
4	/7
5	/9
6	/8
7	/8
8	/6
9	/8
10	/7
Challenge Questions	
11	/4
12	/4

Mixed Algebra Practice

1. a) Expand and Simplify:

$5(3x-1)+4(2-5x)=$

$15x-5+8-20x$ ✓

$=3-5x$ ✓

2

b) i) Factorise: $x^2+9x+20$

$(x+4)(x+5)$ ✓

ii) Hence solve: $x^2+9x+21=1$

$x^2+9x+20=0$

$(x+4)(x+5)=0$ ✓

$x=-4 \quad x=-5$ ✓

3

c) Simplify fully: $\frac{a^9\times a^3}{a}$ $=\frac{a^{12}}{a^1}=a^{11}$ ✓

1

Mixed Algebra Practice

2. a) Evaluate:

$$\pi^0 = 1 \checkmark$$

$$\sqrt{\frac{64}{9}} = \frac{8}{3} \checkmark$$

2

b) Factorise fully:

$$24a^7b - 40a^2b^8 =$$

$$8a^2b(3a^5 - 5b^7)$$

2

c) Simplify fully $(3x^3y^2z)^4 =$

$$81x^{12}y^8z^4$$

2

Mixed Algebra Practice

3. a) Expand:

$(5x + 3y^4)(2y^2 - 3x^3) =$

$10xy^2 - 15x^4 + 6y^6 - 9x^3y^4$

3

b) Factorise: $c^2 - 36 =$ $(c-6)(c+6)$

1

c) Simplify fully: $(5a - 3b)^0 =$ 1

1

d) Solve $\frac{4x+2}{5} < 10$

$4x + 2 < 50$

$4x < 48$

$x < 12$

2

Mixed Algebra Practice

4. a) Expand and Simplify:

$9x(x-2)-2x(5-3x)=$

$9x^2-18x-10x+6x^2$ ✓

$=15x^2-28x$ ✓ ✓

2

b) i) Factorise: x^2+x-6

$(x+3)(x-2)$ ✓

ii) Hence solve: $x^2+x=6$

$x^2+x-6=0$ ✓

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

$x=-3 \quad x=2$ ✓

3

c) Simplify fully: $\frac{(c^6)^5}{c^3\times c^1}$ $=\frac{c^{30}}{c^4}$ ✓ $=c^{26}$ ✓

2

Mixed Algebra Practice

5. a) Expand:

$(4x - 5y^2)(x^3 - 10y^2) =$

$4x^4 - 40xy^2 - 5x^3y^2 + 50y^4$

3

b) Factorise: $144 - e^2 =$ $(12-e)(12+e)$

2

c) Simplify fully: $\sqrt{25a^8b^{120}} =$ $5a^4b^{60}$

2

d) Solve: $\frac{x}{4} + \frac{x}{6} = 200$

$\frac{3x}{12} + \frac{2x}{12} = \frac{5x}{12} = 200$

$\frac{x}{12} = 40$

$x = 480$

2

Mixed Algebra Practice

6. a) Simplify fully:

$$\sqrt{\frac{80y^{11}}{5x^8y^5}} = \sqrt{\frac{16y^6}{x^8}} = \frac{4y^3}{x^4}$$

2

b) Expand fully: $7x(10-3x)(x-8) =$

$7x[10x-80-3x^2+24x]$

$7x[34x-3x^2-80]$

$238x^2-21x^3-560x$

3

c) Simplify fully: $(4m^7y)^2 =$ $16m^{14}y^2$

1

d) Solve: $9-(5-2x) = -6$

$9-5+2x = -6$

$4+2x = -6$

$2x = -10$

$x = -5$

2

Mixed Algebra Practice

7. a) Expand and Simplify:

$(b-5)^3 = b^3 - 15b^2 + 75b - 125$

3

b) i) Factorise: $y^2 + 7y + 10 = (y+2)(y+5)$

ii) Hence, simplify fully: $\dfrac{y^3 + 7y^2 + 10y}{2y+4} = \dfrac{y(y+2)(y+5)}{2(y+2)}$

$= \dfrac{y(y+5)}{2}$

3

c) Look at the following equation:

$$\frac{2^4 \times 16}{\sqrt{2}} = 4^{x-1}$$

What is the value of n ?

$\dfrac{2^4 \times 2^4}{2^{1/2}} = (2^2)^{x-1}$

$2^{7.5} = 2^{2x-1}$

$7.5 = 2x - 1$

$8.5 = 2x$

$4.25 = x$

2

Mixed Algebra Practice

8. a) Expand and Simplify:

$6b(7b^2 - 5x) - 2x(b - 2) =$

$42b^3 - 30bx - 2bx + 4x$

$= 42b^3 - 32bx + 4x$

2

b) i) Factorise: $m^2 - \frac{16}{9} =$

$(m - \frac{4}{3})(m + \frac{4}{3})$

2

c) List the positive integers which satisfy:

$$\frac{8 - 3x}{7} > -3$$

$8 - 3x > -21$

$-3x > -29$

$x < \frac{29}{3}$ (9.6)

1, 2, 3, 4, 5, 6, 7, 8, 9

2

Mixed Algebra Practice

9. a) Solve: $\frac{3x-5}{8} - \frac{x}{3} = 10$

$\frac{9x-15}{24} - \frac{8x}{24} = 10$

$\frac{x-15}{24} = 10$

$x - 15 = 240$

$x = 255$

3

b) i) Factorise: $10x^2 - 13x - 3 =$

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

ii) Hence, simplify fully: $\frac{15x+3}{10x^2-13x-3} = \frac{3(5x+1)}{(5x+1)(2x-3)}$

$= \frac{3}{2x-3}$

3

c) Look at the following equation:

$$\frac{3^{20} \times 27^2}{3\sqrt{3}} = 9^n$$

What is the value of n ?

$\frac{3^{20} \times 3^6}{3^{1.5}} = 3^{2n}$

$3^{24.5} = 3^{2n}$

$24.5 = 2n$

$12.25 = n$

2

Mixed Algebra Practice

10. a) Simplify: $\frac{50x^3y^5}{2x^8y} = \frac{25y^4}{x^5}$

2

b) i) Factorise: $16y^2 - 100 = (4y-10)(4y+10)$

$= 2(2y-5)2(2y+5)$

$= 4(2y-5)(2y+5)$

ii) Hence, simplify fully: $\frac{16y^2 - 100}{8y + 20} = \frac{(4y-10)(4y+10)}{2(4y+10)}$

$= \frac{4y-10}{2} = 2y-5$

3

c) The even numbers between 6 to 31 are raised to the power zero and added together.

What is the value of the sum?

$6^0 + 8^0 + 10^0 + \cdots + 30^0 =$

$\underbrace{1 + 1 + 1 + \ldots + 1}_{13 \text{ numbers}} = 13$

2

Mixed Algebra Practice

Challenge Questions!

11. Simplify fully:

$$\frac{x^3 - 9x}{x^2 + 3x} \times \frac{x}{x^2 - 6x + 9} =$$

$$\frac{x(x-3)(x+3)}{x(x+3)} \times \frac{x}{(x-3)(x-3)}$$

$$= \frac{x}{x-3}$$

4

12. Expand and simplify:

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

$$(x-9)(x^2-10x+25) - [4x^2-12x+9]$$

$$x^3-10x^2+25x-9x^2+90x-225-4x^2+12x-9$$

$$= x^3-23x^2+127x-234$$

4

End of Sheet