NAME :

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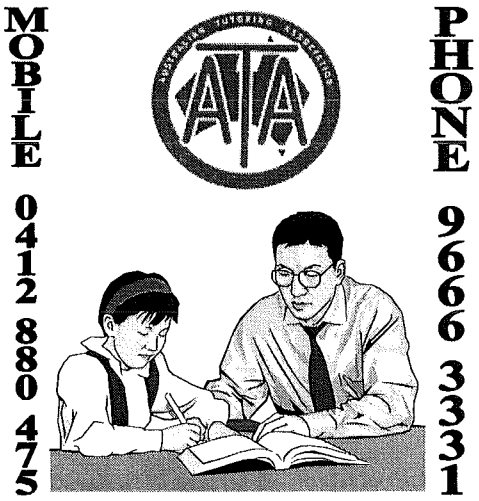

YEAR 9 – ADVANCED MATHS EXERCISES & QUIZ

TOPIC 1: ALGEBRA

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Topic 1.1: Algebraic Expressions

Write algebraic expressions for the following:

1. The sum of a and b =	**2.** The difference between m and n =
3. The product of nine and y =	**4.** The square of c =
5. The number d divided by z =	**6.** Three times the sum of w and 6 =
7. Square root of the product of f and g =	**8.** Half of the number p minus q =
9. x times the square of y =	**10.** Square root of p times qr =

Ans: 1. $a+b$ **2.** $m-n$ **3.** $9y$ **4.** c^2 **5.** $\frac{d}{z}$ **6.** $3(w+6)$ **7.** $\sqrt{fg}$ **8.** $\frac{p}{2}-q$ **9.** xy^2 **10.** $\sqrt{pqr}$

Topic 1.1: Algebraic Expressions (continued)

Write algebraic expressions for the following:

11. If b is an even number, the next odd number after b =	**12.** If a is an odd number, the next odd number after a =
13. In a right-angled triangle, one of the acute angles is z°. The size of the other angle =	**14.** The cost of x ice creams at \$$y$ each =
15. The distance travelled by a car at D km/h in t hours =	**16.** Triple k and divide the result by 6:
17. Multiply r and $4s$ and to this result add 10:	**18.** Add 5 to q and multiply the result by 3:
19. x is divided by y and z is added to the result:	**20.** Subtract j from k and divide the result by l:

Ans: 11. $b+1$ **12.** $a+2$ **13.** $(90-z)^\circ$ **14.** \$$xy$ **15.** Dt km **16.** $\frac{k}{2}$ **17.** $4rs+10$ **18.** $3(5+q)$ **19.** $\frac{x}{y}+z$ **20.** $\frac{k-j}{l}$

Topic 1.2: Substitution

Evaluate the following expressions if $x = 2$, $y = -3$, and $z = 7$.

1. $xy + z =$	**2.** $xy \div z =$
3. $x - y - z =$	**4.** $(x + y + z)^2 =$
5. $x(y + z) =$	**6.** $x + 3y + z =$
7. $x^3 y =$	**8.** $4z \div x =$
9. $\frac{1}{x} + \frac{1}{z} =$	**10.** $\frac{x}{y} + \frac{y}{z} =$

Ans: 1. 1 **2.** $-\frac{6}{7}$ **3.** -2 **4.** 36 **5.** 8 **6.** 0 **7.** -24 **8.** 14 **9.** $\frac{9}{14}$ **10.** $-1\frac{2}{21}$

Topic 1.2: Substitution(continued)

If $m=\frac{1}{5}$ and $n=-\frac{1}{4}$, find the exact value of the following.

11.
$m+n=$

12.
$m-n=$

13.
$\frac{m+n}{m-n}=$

14.
$\frac{m-n}{m+n}=$

15.
$\frac{m-n}{m+n}+\frac{m+n}{m-n}=$

16.
$m^2+n^2=$

17.
$m^2-n^2=$

18.
$\frac{mn}{m+n}=$

Ans: 11. $-\frac{1}{20}$ **12.** $\frac{9}{20}$ **13.** $-\frac{1}{9}$ **14.** -9 **15.** $-9\frac{1}{9}$ **16.** $\frac{41}{400}$ **17.** $-\frac{9}{400}$ **18.** 1

19.
Find the value of $2\pi\sqrt{\frac{l}{g}}$ when $l=1.9$ and $g=9.8$. Give your answer correct to three decimal places.

20.
Evaluate $2x^2+\sqrt{x}$ when $x=2.3$. Write your answer correct to 3 significant figures.

Ans: 19. 2.767 **20.** 12.1

Topic 1.3: Simplifying algebraic expressions

Simplify the following:

1.
$x^2 + 3xy - 5xy =$

2.
$5b + 3b^2 - 7b =$

3.
$8pr \times 3pr =$

4.
$-6uv \times -\left(\frac{1}{3}vu\right) =$

5.
$-lmn \div -lm =$

6.
$(-32c) \div (-4c) =$

7.
$-7k \times -5k =$

8.
$(-4g) \times (-9h) =$

9.
$(14z - 9z) \times 5y =$

10.
$20q - 4 \times 3q =$

Ans: 1. $x^2 - 2xy$ **2.** $3b^2 - 2b$ **3.** $24p^2r^2$ **4.** $2u^2v^2$ **5.** n **6.** 8 **7.** $35k^2$ **8.** $36gh$ **9.** $25yz$ **10.** $8q$

Topic 1.4: Algebraic fractions

Simplify the following:

1.
$\frac{3b}{7}+\frac{2b}{5}=$

2.
$\frac{3x}{2y}+\frac{x}{6y}=$

3.
$\frac{4p}{5}-\frac{p}{15}=$

4.
$\frac{5b}{2c}-\frac{b}{6c}=$

5.
$\frac{j}{k}\times\frac{y}{z}=$

6.
$\frac{8w}{3v}\times\frac{12v}{16w}=$

7.
$\frac{3s}{2r}\times\frac{5r}{2s}=$

8.
$\frac{d}{4}\div\frac{6d}{8}=$

9.
$\frac{2m}{n}\div\frac{6m}{n}=$

10.
$\frac{12y}{z}\div\frac{5y}{7z}=$

Ans: 1. $\frac{29b}{35}$ **2.** $\frac{5x}{3y}$ **3.** $\frac{11p}{15}$ **4.** $\frac{7b}{3c}$ **5.** $\frac{jy}{kz}$ **6.** 2 **7.** $\frac{15}{4}$ **8.** $\frac{1}{3}$ **9.** $\frac{1}{3}$ **10.** $\frac{84}{5}$

Topic 1.5: Algebraic expressions with grouping symbols

Expand and simplify the following:

1. $7(8a+7)=$	**2.** $8(2x-6)=$
3. $-n(4n+8)=$	**4.** $4(5s-2)-14s+7=$
5. $8k+11-4(k-6)=$	**6.** $2m-(m+5)+7m=$
7. $8(a-5)+6(a-3)=$	**8.** $f(f-4)-4(f-2)=$
9. $5(2z+6)+4(2z-2)=$	**10.** $q(q+5)+q(q-3)=$

Ans: 1. $56a+49$ **2.** $16x-48$ **3.** $-4n^2-8n$ **4.** $6s-1$ **5.** $4k+35$ **6.** $8m-5$ **7.** $14a-58$ **8.** f^2-8f+8 **9.** $18z+22$ **10.** $2q^2+2q$

Topic 1.6: Binomial products

Expand and simplify the following:

1. $(x+4)(x+8)=$	**2.** $(2b+1)(3b+6)=$
3. $(2z+1)(3z+5)=$	**4.** $(m-1)(2m+7)=$
5. $(2c-3)(2c+3)=$	**6.** $(y-3)(y-4)=$
7. $(3x+5)(1-x)=$	**8.** $(a+b)(a-b)=$
9. $(p-q)(p+q)=$	**10.** $(m-n)(m-n)=$

Ans: 1. $x^2+12x+32$ **2.** $6b^2+15b+6$ **3.** $6z^2+13z+5$ **4.** $2m^2+5m-7$ **5.** $4c^2-9$
6. $y^2-7y+12$ **7.** $-3x^2-2x+5$ **8.** a^2-b^2 **9.** p^2-q^2 **10.** $m^2-2mn+n^2$

Topic 1.7: Special products – difference of two squares

Expand and simplify the following:

1. $(x+6)(x-6)=$	**2.** $(a+b)(a-b)=$
3. $(r+s)(r-s)=$	**4.** $(m+9n)(m-9n)=$
5. $(5j+k)(5j-k)=$	**6.** $(3y+8z)(3y-8z)=$
7. $(2d-9)(2d+9)=$	**8.** $(2f-g)(2f+g)=$
9. $(5w-11)(5w+11)=$	**10.** $(3j+7k)(3j-7k)=$

Ans: 1. x^2-36 **2.** a^2-b^2 **3.** r^2-s^2 **4.** m^2-81n^2 **5.** $25j^2-k^2$ **6.** $9y^2-64z^2$
7. $4d^2-81$ **8.** $4f^2-g^2$ **9.** $25w^2-121$ **10.** $9j^2-49k^2$

Topic 1.8: Special products – perfect squares

Expand and simplify the following:

1. $(z-5)^2 =$	**2.** $(a+b)^2 =$
3. $(x-y)^2 =$	**4.** $(2m+3)^2 =$
5. $(3m+n)^2 =$	**6.** $(p-4q)^2 =$
7. $(2k-1)^2-4(k-3)=$	**8.** $(x+y)^2-(x+y)(x-y)=$
9. $(c+3d)(c-3d)+(c+d)^2 =$	**10.** $(r+1)^2+(r+2)^2 =$

Ans: 1. $z^2-10z+25$ **2.** $a^2+2ab+b^2$ **3.** $x^2-2xy+y^2$ **4.** $4m^2+12m+9$
5. $9m^2+6mn+n^2$ **6.** $p^2-8pq+16q^2$ **7.** $4k^2-8k+13$ **8.** $2xy+2y^2$
9. $2c^2+2cd-8d^2$ **10.** $2r^2+6r+5$

Topic 1 Revision

Write an expression for the following:

1.
A fare of $\$M$ increased by \$3 =

2.
The area of a square of side $(y-5)$ metres =

Simplify the following:

3.
$\dfrac{24wxy}{16yz} =$

4.
$6 \div 15x =$

5.
$\dfrac{10b}{6a^3} \div \dfrac{15b^2}{24a} =$

6.
$\dfrac{5}{2k} - \dfrac{7}{5k^2} =$

Expand and simplify where possible:

7.
$(4r-s)(4r+s) =$

8.
$2(x^2-5x+6)-(x+3)(x+4) =$

9.
$4(a+2)(a-2)-2(3-a)(3+a) =$

10.
$(7m-3n)^2-49m^2-(3n+m)^2 =$

Ans: 1. $\$(M+3)$ **2.** $(y-5)^2$ m **3.** $\dfrac{3wx}{2z}$ **4.** $\dfrac{2}{5x}$ **5.** $\dfrac{8}{3a^2b}$ **6.** $\dfrac{25k-14}{10k^2}$ **7.** $16r^2-s^2$
8. x^2-17x **9.** $6a^2-34$ **10.** $-m^2-48mn$