Student's Name: .....

Teacher's Name: .....

Barker College

ARM
BHC
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ALY

185 copies

YEAR 9 5.3
MATHEMATICS
ASSESSMENT 1

Friday 5th March 2021
Period 3 or 4
Time Allowed: 55 minutes

Algebra
Products and Factors

INSTRUCTIONS TO STUDENTS

* **Write ALL answers in the space provided.**
* **ALL NECESSARY working for each question must be shown to gain full marks.**
* **Marks may not be awarded for careless or badly arranged working.**
* **DIAGRAMS ARE NOT TO SCALE**
* **Write in blue or black pen**
* **Board-approved, non-programmable calculators may be used.**

Part	Marks
Part A – Simplifying Expressions	**/18**
Part B – Expanding Brackets	**/20**
Part C – Factorising	**/15**
Part D – Mixed Questions	**/15**
Total	**/68**

Part A – Simplifying Expressions

1. Simplify fully

   a. $8x - 9x + x - 4x$ 1

   b. $-2y^2 - 4xy + y^2 - 4xy$ 2

   c. $10zy \times 3z \times -y$ 2

   d. $\frac{9ab^2}{3a^2b}$ 2

2. Simplify fully

   a. $\frac{3x}{2} + \frac{2x}{2}$ 1

b. $\frac{5}{4x} + \frac{x-4}{x^2}$ 2

c. $\frac{2a+1}{7} - \frac{4a-2}{4}$ 3

d. $\frac{2x^3y}{3y^3} \times \frac{9xy}{8xy^2}$ 2

e. $\frac{7xy}{5x^2} \div \frac{21xy^3}{10x}$ 3

Part A /18

Part B – Expanding Brackets

1. Expand and simplify fully

   a. $-4(2x + 7)$ 1

   b. $(p + 3)(p + 4)$ 2

   c. $(5x - 5)(2x - 1)$ 2

   d. $(3m + 7)(3m - 7)$ 2

2. Subtract $3x^2 - 5x + 6$ from $2x^2 + 2x - 3$ 2

3. Expand and simplify fully

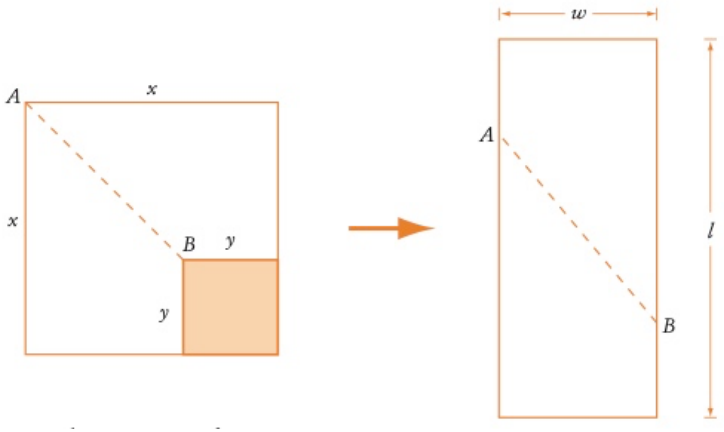
a. $4x^3 + 5 - 3x^2(2x + 6)$ 2

b. $(h - 6)^2$ 2

c. $-5x(x + 3) - 7x(2x - 4)$ 2

d. $\left(\frac{2w}{3} + \frac{1}{2}\right)^2$ 2

4. A square sheet of paper with length x cm has a smaller length y cm **cut from one corner and removed.** It is then **cut on the diagonal AB** and **rearranged to form a rectangle** as shown.



i. Find an expression for the length (l) of the rectangle **in terms of x and y** 1

ii. Find an expression for the width (w) of the rectangle **in terms of x and y** 1

iii. Using the above, find an expression for the area of the rectangle **in expanded form** 1

Part B /20

Part C - Factorising

2. Factorise fully

a. $36x + 12$ 1

b. $14xy^2z - 8yx^2$ 2

c. $x(7 - z) - (7 - z)$ 2

d. $11y - 22 - xy + 2x$ 2

e. $4y^2 - x^2$ 2

3. Factorise fully

a. $x^2 - 12x - 45$ 2

b. $k^2 + 10k + 25$ 2

c. $3x^2 - x - 30$ 2

Part C /15

Part D – Mixed Questions

1. **Factorise** fully

   a. $16(x+1)^2 - 25$ 2

   b. $18ab - 63ac - 28bc + 8b^2$ 3

2. The difference between the squares of two consecutive multiples of 3 is 81. 2
   What are the two numbers?

3. Factorise and **simplify fully**.

   a. $\frac{3x^2+17x-28}{6x-8}$ 3

   b. $\frac{10x+16}{x^2-4} - \frac{9x+18}{x^2+x-6} \div \frac{x^2-2x-8}{x^2-x-12}$ 3

4. 2

A group of tourists were offered seats in a number of buses so that there were the same number of tourists in each bus. First, the organisers tried to seat 22 tourists in each bus. However, it turned out that one of the tourists was left unseated. Then one of the buses departed empty and the tourists occupied seats in the remaining buses so that there were the same number of tourists in each of the remaining buses. **Find the original number of buses and the number of tourists,** if each bus cannot carry more than 44 people.

Part D /15

END OF PAPER

Yr 9 5.3 Assessment 1

2021 Student Solutions

Part A

1a) $8x - 9x + x - 4x$
$= -4x$

b) $-2y^2 - 4xy + y^2 - 4xy$
$= -y^2 - 8xy$

c) $10zy \times 3zx - y$
$= -30z^2y^2$

d) $\frac{9ab^2}{3a^2b}$

$= \frac{3b}{a}$

2a) $\frac{3x}{2} + \frac{2x}{2}$

$= \frac{5x}{2}$

b) $\frac{5x + 4x - 16}{4x^2}$

$= \frac{9x - 16}{4x^2}$

c) $\frac{2a+1}{7} - \frac{4a-2}{4}$

$\frac{4(2a+1) - 7(4a-2)}{28}$

$\frac{8a + 4 - 28a + 14}{28}$

$\frac{-20a + 14}{28} = \frac{-10a + 7}{14}$

d) $\frac{2x^3y}{3y^3} \times \frac{9xy}{8xy^2}$

$\frac{3x^3}{4y^3}$

e) $\frac{4xy}{8x^3} \times \frac{10x}{21xy^3}$

$= \frac{2}{3xy^2}$

Part B

1a) $-4(2x + 7)$
$= -8x - 28$

b) $(p+3)(p+4)$
$= p^2 + 7p + 12$

c) $(5x - 5)(2x - 1)$
$= 10x^2 - 5x - 10x + 5$
$= 10x^2 - 15x + 5$

d) $(3m + 7)(3m - 7)$
$9m^2 - 49$

2) $2x^2 + 2x - 3 - (3x^2 - 5x + 6)$
$= -x^2 + 7x - 9$

3a) $4x^3 + 5 - 3x^2(2x + 6)$
$= 4x^3 + 5 - 6x^3 - 18x^2$
$= -2x^3 - 18x^2 + 5$

b) $(h - 6)^2$
$h^2 - 12h + 36$

c) $-5x(x+3) - 7x(2x - 4)$
$-5x^2 - 15x - 14x^2 + 28x$
$-19x^2 + 13x$

d) $\left(\frac{2w}{3} + \frac{1}{2}\right)^2$

$\frac{4w^2}{9} + \frac{2w}{3} + \frac{1}{4}$ or $\frac{16w^2 + 24w + 9}{36}$

4 i) $x+y$

ii) $x-y$

iii) $(x+y)(x-y)$

x^2-y^2

Part C

2 a) $12(3x+1)$

b) $2xy(7yz-4x)$

c) $(7-z)(x-1)$

d) $11(y-2)-x(y-2)$

$(y-2)(11-x)$

e) $4y^2-x^2$

$(2y+x)(2y-x)$

3 a) $x^2-12x-45$

$(x-15)(x+3)$

b) $k^2+10k+25$

$(k+5)^2$

c) $3x^2-x-30$ $P=-90$

$3x^2+9x-10x-30$ $S=-1$

$3x(x+3)-10(x+3)$ $F=-10,9$

$(3x-10)(x+3)$

Part D

1a) $16(x+1)^2-25$

$=[4(x+1)+5][4(x+1)-5]$

$=(4x+4+5)(4x+4-5)$

$=(4x+9)(4x-1)$

b) $18ab+8b^2-63ac-28bc$

$2b(9a+4b)-7c(9a+4b)$

$(9a+4b)(2b-7c)$

2) $(3x+3)^2-(3x)^2=81$

$9x^2+18x+9-9x^2=81$

$18x=72$

$x=4$

$\therefore$ numbers are 12, 15

3a) $\frac{3x^2+17x-28}{6x-8}$ $P=-84$ $S=+17$ $F=21,-4$

$\frac{3x^2+21x-4x-28}{2(3x-4)}$

$\frac{3x(x+7)-4(x+7)}{2(3x-4)}$

$\frac{(3x-4)(x+7)}{2(3x-4)}$

$\frac{x+7}{2}$

b) $\frac{2(5x+8)}{(x+2)(x-2)}-\frac{9(x+2)}{(x+3)(x-2)}+\frac{(x-4)(x+3)}{(x-4)(x+2)}$

$\frac{2(5x+8)}{(x+2)(x-2)}-\frac{9}{(x-2)}$

$\frac{10x+16-9x-18}{(x+2)(x-2)}=\frac{x-2}{(x+2)(x-2)}$

$=\frac{1}{x+2}$

4) B = buses T = tourists

$T=22B+1$

$T=k(B-1)$ k = no. on each bus

$22B+1=k(B-1)$

$B=\frac{1+k}{k-22}$

$B=\frac{1}{k-22}+\frac{k}{k-22}$ since B and k are integers

$k-22=1$

$\therefore k=23$ $B=24$ $T=529$