



TRINITY GRAMMAR SCHOOL
MATHEMATICS DEPARTMENT



YEAR 10 BRIDGING COURSE FOR
YEAR 11 MATHEMATICS EXTENSION 1

NAME: _____

CLASS: _____

Time Allowed – 30 minutes

WEIGHTING 15% towards final result

OUTCOMES REFERRED TO:

All for Year 10 in PA, N and WM – preparing Year 10 for Year 11.

EQUIPMENT: Calculators and geometrical instruments will not be loaned. It is your responsibility to be fully prepared for this task. The only calculators permitted are those approved by the Board of Studies.

INSTRUCTIONS:

1. Attempt ALL questions.
2. Start each question on a new sheet of paper.
3. Write your name and your teacher's name on each sheet.
4. Show all necessary working.
5. Silent Board of Studies approved calculators are permitted.

Start each question on a new sheet of paper.

Marks

Question 1

- a) The cost of a football jersey is now \$95 after an increase of $35\frac{1}{2}\%$. What was the old price? (2)
- b) Express $2.1\overline{34}$ as a fraction in simplest form. (2)
- c) Solve $16^{2-x} = 2^{-x}$. (2)
- d) Factorise $2a^2 - ab - 21b^2$. (2)

Start each question on a new sheet of paper.

Question 2

- a) Solve $|2x - 1| \leq 7$. (2)
- b) Factorise fully $(a + 2)^2 - (2a + 1)^2$. (2)
- c) Factorise $1 - \frac{a^3}{27}$. (2)
- d) Solve $\frac{3}{y} - \frac{y-3}{7} = 1$. (3)

PTO for questions 3 and 4.

Start each question on a new sheet of paper.

Marks

8

Thomas Ting
Mr Yaraq

Question 3

a) Simplify $\frac{1}{x^2-4} - \frac{1}{x^2+3x+2}$. (3)

b) Find the exact value of x and y if $\frac{\sqrt{3}-4}{2+3\sqrt{3}} = x + y\sqrt{3}$. (3)

c) Simplify $a^{-1} + (a+a^{-1})^{-1}$. (3)

Q1) a) $1.355 = 1355/1000$
 $a = 170/11$ 2

3) let $x = 2.13434$
 $10x = 21.3434$ ①
 $1000x = 2134.3434$ ②

② - ① $990x = 2113$
 $x = \frac{2113}{990}$
 $x = 2\frac{133}{990}$ 2

c) $16^{2-x} = 2^{-x}$
 $(2^4)^{2-x} = 2^{-x}$
 $2^{8-4x} = 2^{-x}$
 $8-4x = -x$
 $-4x+x = -8$
 $-3x = -8$
 $x = \frac{8}{3}$
 $x = 2\frac{2}{3}$ 2

Start each question on a new sheet of paper.

Question 4

a) Solve: $5x^2 - x = 6$. (2)

b) Solve: $|3x+2| = |1-x|$ (2)

c) Solve $x^2 - 6x + 8 = 0$ by completing the square. (2)

End of test.

$$\begin{aligned}
 d) \quad & 2a^2 - ab - 2b^2 \quad P = -42b^2a^2 \\
 & = 2a^2 + 6ab - 7ab - 2b^2 \quad S = -ab \\
 & = 2a(a+3b) - 7b(a+3b) \quad P = -7, 6 \\
 & = (2a-7b)(a+3b)
 \end{aligned}$$

1) 1/2

$$Q2) A) |2x-1| \leq 7$$

$$\begin{aligned}
 2x-1 & \leq 7 \\
 2x & \leq 8 \\
 x & \leq 4
 \end{aligned}$$

$$\begin{aligned}
 \text{or } -2x+1 & \leq 7 \\
 -2x & \leq 6 \\
 x & \geq -3
 \end{aligned}$$

$$x \geq -3$$

1) 1/2

$$\begin{aligned}
 B) \quad & (a+2)^2 - (2a+1)^2 \\
 & = a^2 + 4a + 4 - (4a^2 + 4a + 1) \\
 & = a^2 + 4a + 4 - 4a^2 - 4a - 1 \\
 & = -3a^2 + 3 \\
 & = 3(a^2 - 1) \\
 & = 3(a-1)(a+1)
 \end{aligned}$$

2) 1/2

$$\begin{aligned}
 c) \quad & 1 - \frac{a^3}{3^3} \\
 & = \left(1 - \frac{a}{3}\right) \left(1 + \frac{a}{3} + \frac{a^2}{9}\right)
 \end{aligned}$$

P.T.O
L

~~Handwritten scribbles~~

4

$$D) \frac{3}{y} - \frac{y-3}{7} = 1 \quad x=y$$

~~$$\frac{21-y^2-3y}{7y} = 1$$~~

~~$$21 - y^2 - 3y = 7y$$~~

~~$$21 - y^2 - 2y - 7y = 0$$~~

~~$$21 - y^2 - 28y = 0$$~~

~~$$-y^2 - 28y + 21 = 0$$~~

~~$$-y^2 + 21y$$~~

~~$$P = 147$$~~

~~$$S = -28$$~~

~~$$P = -21, 7$$~~

1

$$D) 21 - (y^2 - 3y) = 7y$$

$$21 - y^2 + 3y = 7y$$

$$21 - y^2 - 4y = 0$$

$$-y^2 - 4y + 21 = 0$$

$$-(y-3)(y+7) = 0$$

$$\rightarrow y = 3, y = -7$$

$$Q3) A) \frac{1}{x^2-4} - \frac{1}{x^2-3x+2}$$

$$P = 147$$

$$S = -28$$

$$T = -21$$

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

$$= \frac{x-1 - (x+2)}{(x-2)(x+2)(x-1)} \sqrt{2}$$

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

$$= \frac{-3}{(x^2-4)(x-1)}$$

$$B) \frac{\sqrt{5}-4}{2+3\sqrt{5}} \times \frac{2+3\sqrt{5}}{2+3\sqrt{5}}$$

$$= \frac{2\sqrt{5} - 9 - 8 + 12\sqrt{5}}{4 - 27}$$

$$= \frac{14\sqrt{5} - 17}{-23}$$

$$= \frac{14\sqrt{5}}{-23} - \frac{17}{-23}$$

2.

$$y = 1.54 \quad x = -1.353$$

3/6

a) $a^{-1} \div (a+a^{-1})^{-1}$
 $= \frac{1}{a} \times \frac{1}{\frac{1}{a} + a}$
 $= \frac{1}{a} \times \frac{1}{\frac{1+a^2}{a}}$
 $= \frac{1}{a} \times \frac{a}{1+a^2}$
 $= \frac{1}{1+a^2}$

$\frac{1}{a} \div (a + \frac{1}{a})^{-1}$
 $= \frac{1}{a} \div (\frac{a^2+1}{a})^{-1}$
 $= \frac{1}{a} \times \frac{a}{a^2+1}$
 $= \frac{1}{a^2+1}$

Q4) A) $5x^2 - x = 6$ $P=30$
 $5x^2 - x - 6 = 0$ $S=-1$
 $5x^2 + 5x - 6x - 6 = 0$ $P=-6, 5$
 $5x(x+1) - 6(x+1) = 0$ ✓
 $(5x-6)(x+1) = 0$
 $x = \frac{6}{5}$ or $x = -1$
 $x = \frac{6}{5}$ or $x = -1$
Correct ✗

B) $|3x+2| = |1-x|$

$-3x+2 = -1+x$ or $3x+2 = 1-x$
 $-3x-x = -1+2$ $5x+2 = 1-x$
 $-4x = 1$ $5x+x = 1-2$
 $x = -\frac{1}{4}$ ✓ $6x = -1$
 ~~$x = -\frac{1}{6}$~~

or
 $3x+2 = -1+x$
 $3x-x = -1-2$ } careful
 $2x = -3$
 ~~$x = -\frac{3}{2}$~~ $x = -\frac{3}{2} = -1\frac{1}{2}$

careful

c) $x^2 - 6x + 8 = 0$

$$x^2 - 6x + \left(\frac{6}{2}\right)^2 - \left(\frac{6}{2}\right)^2 + 8 = 0$$

$$(x-3)^2 = -8 + 9$$

$$(x-3)^2 = 1$$

mi

$$x-3 = \pm 1$$

$$x = 4 \text{ or } 2$$

$$x = 1.123 \text{ (3 d.p.)}$$

X

$$(x-3)^2 = -8 + 9$$

$$= 1$$

$$\therefore (x-3) = \pm 1$$

$$x = 3 \pm 1$$

$$= 4 \text{ or } 2$$