

YEAR 10 ACC, YEAR 11 EXTENSION 1 TEST 10-03-05

Name: _____ Teacher: _____

Instructions: Show all necessary working throughout the test on A4 paper.

Time allowed: 50 minutes

1. **Marked by JJA (13marks)**

- (a) 100 donkeys were sold at a loss of 18%. If their selling price was \$25010, what was their cost price? (2m)
- (b) Evaluate correct to 2 decimal places: $\sqrt[4]{\frac{1.23^2 + 6.13^3}{6.13^3 - 1.23^2}}$ (2m)
- (c) Simplify: $8^{2x+1} \div 16^{3x}$ (2m)
- (d) Write $3.2\dot{6}\dot{7}$ as a mixed numeral. (Include all working steps.) (3m)
- (e) If $\sqrt{1200} = x\sqrt{3}$ find the value of x . (2m)
- (f) Expand and simplify: $5(2t - 3) - 4(3 - 7t)$ (2m)

Begin a new page.

2. **Marked by DGK [12 marks]**

- (a) Expand and simplify: $(3x - 2y)^2$ (2m)
- (b) Factorise: $mp + 35 + 7m + 5p$ (2m)
- (c) Factorise: $x^2 - x - 12$ (1m)
- (d) Factorise: $12y^2 + 16y - 3$ (2m)
- (e) Factorise: $343x^3 - y^3$ (2m)
- (f) Simplify: $\frac{3}{y-3} - \frac{1}{y-1} + \frac{5}{y+5}$ (3m)

PTO

Begin a new page.

Marked by CJL (13 marks)

3.

(a) If $x = 2 + \sqrt{3}$ write $x - \frac{5}{x}$ with a rational denominator. (2m)

(b) Solve for x : $\frac{x-3}{4} - \frac{5x-2}{3} = 2$ (2m)

(c) Solve for x : $|2x-3| = x-7$ (3m)

(d) Solve for x : $\frac{x}{2x-1} \geq 5$ (3m)

(e) Solve, correct to 2 decimal places: $5x^2 - 11x + 3 = 0$ (3m)

Begin a new page.

4.

Marked by GC (12 marks)

(a) Solve the simultaneous equations: $x + y = 6$
 $3x - 4y = 67$ (2m)

(b) Solve for x : $125^{x-3} = 5^{4x}$ (2m)

(c) If $y = x^2 - 4$ state its domain and range. (2m)

(d) If $y = \frac{1}{\sqrt{x^2 - 4}}$ state its domain and range. (2m)

(e) Solve graphically $|2x - 3| \geq 7$ (2m)

(f) Sketch $y = -3^{-x} + 3$ showing any intercepts and asymptotes. (2m)

10/11 EXT 1 TEST 10-3-05

1 (a) Let cost price = $\$x$
 $\therefore 82\% x = \$25010$ ✓
 $\therefore x = \frac{25010}{0.82}$ ✓
 $= 30500$ ✓
 \therefore Cost Price was $\$30500$

(b) $\sqrt[4]{\frac{1 \cdot 23^2 + 6 \cdot 13^3}{6 \cdot 13^3 - 1 \cdot 23^2}}$
 $= 1.003289413 \dots$
 $= 1.00$ (2 d.p.) ✓✓

(c) $8^{2x+1} \div 16^{3x}$
 $= 2^{3(2x+1)} \div 2^{4(3x)}$ ✓
 $= 2^{6x+3} \div 2^{12x}$ ✓
 $= 2^{3-6x}$ ✓

(d) Let $x = 3.2676767 \dots$ (1)
 (1) $\times 100 \Rightarrow 100x = 326.76767 \dots$ (2)
 (2) - (1): $99x = 323.5$
 $\therefore x = \frac{323.5}{99} \times \frac{10}{10}$ ✓
 $= \frac{3235}{990}$
 $= 3 \frac{53}{99}$ ✓
 $\therefore 3.2\dot{6}\dot{7} = 3 \frac{53}{99}$ ✓

(e) $\sqrt{1200} = x\sqrt{3}$
 \therefore LHS = $\sqrt{1200}$
 $= 10\sqrt{12}$ ✓
 $= 20\sqrt{3}$
 $=$ RHS if $x=20$ ✓

(f) $5(2t-3) - 4(3-7t)$
 $= 10t - 15 - 12 + 28t$ ✓
 $= 38t - 27$ ✓

2 (a) $(3x-2y)^2$
 $= 9x^2 - 12xy + 4y^2$ ✓✓

(b) $mp + 3s + 7m + 5p$
 $= mp + 5p + 3s + 7m$
 $= p(m+5) + 7(m+s)$ ✓
 $= (m+s)(p+7)$ ✓

(c) $x^2 - x - 12 = (x-4)(x+3)$ ✓

(d) $12y^2 + 16y - 3$
 $= \frac{(12y+18)(12y-2)}{12}$ S=16
P=36
Nos 18, -2
 $= (2y+3)(6y-1)$ ✓✓

(e) $343x^3 - y^3$
 $= (7x)^3 - y^3$
 $= (7x-y)(49x^2 + 7xy + y^2)$ ✓✓

(f) $\frac{3}{y-3} - \frac{1}{y-1} + \frac{5}{y+5}$
 $= \frac{3(y-1)(y+5) - (y-3)(y+5) + 5(y-3)(y-1)}{(y-3)(y-1)(y+5)}$ ✓
 $= \frac{3(y^2+4y-5) - (y^2+2y-15) + 5(y^2-4y+3)}{(y-3)(y-1)(y+5)}$ ✓
 $= \frac{7y^2 - 10y + 15}{(y-3)(y-1)(y+5)}$ ✓

$$3(a) \quad x - \frac{5}{x} = 2 + \sqrt{3} - \frac{5}{2 + \sqrt{3}} \cdot \frac{2 - \sqrt{3}}{2 - \sqrt{3}}$$

$$= 2 + \sqrt{3} - \frac{(10 - 5\sqrt{3})}{4 - 3}$$

$$= 2 + \sqrt{3} - 10 + 5\sqrt{3}$$

$$= 6\sqrt{3} - 8 \quad \checkmark$$

$$(b) \quad \frac{x-3}{4} - \frac{5x-2}{3} = 2$$

$$\therefore 12\left(\frac{x-3}{4}\right) - 12\left(\frac{5x-2}{3}\right) = 12(2)$$

$$\therefore 3(x-3) - 4(5x-2) = 24 \quad \checkmark$$

$$3x - 9 - 20x + 8 = 24$$

$$-17x = 25$$

$$\therefore x = \frac{-25}{17} \text{ or } -1\frac{8}{17} \quad \checkmark$$

$$(c) \quad |2x-3| = x-7$$

Case 1: $2x-3 = x-7$

$$\therefore x = -4$$

checking: LHS = $| -11 | = 11$ \checkmark

$$\text{RHS} = -11 \neq \text{LHS} \therefore \text{No sol'n}$$

Case 2: $-(2x-3) = x-7$

$$\therefore -2x+3 = x-7$$

$$\therefore 10 = 3x \quad \therefore x = 3\frac{1}{3}$$

checking: LHS = $|6\frac{2}{3}-3| = 3\frac{2}{3}$ \checkmark

$$\text{RHS} = 3\frac{1}{3} - 7 = -3\frac{2}{3} \neq \text{LHS}$$

$$\therefore \text{No sol'n}$$

$$\therefore \text{overall sol'n: No sol'n.} \quad \checkmark$$

$$(d) \quad \frac{x}{2x-1} \geq 5, \quad x \neq \frac{1}{2}$$

$$\therefore (2x-1)^2 \left(\frac{x}{2x-1}\right) \geq 5(2x-1)^2$$

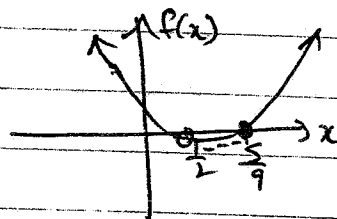
$$\therefore x(2x-1) \geq 5(2x-1)^2 \quad \checkmark$$

$$\therefore 0 \geq 5(2x-1)^2 - x(2x-1)$$

$$\therefore 0 \geq (2x-1)[5(2x-1) - x]$$

$$0 \geq (2x-1)(9x-5) \quad \checkmark$$

$$\therefore (2x-1)(9x-5) \leq 0$$



$$\therefore \frac{1}{2} < x \leq \frac{5}{9} \quad \checkmark$$

$$(e) \quad 5x^2 - 11x + 3 = 0$$

$$\left. \begin{array}{l} a=5 \\ b=-11 \\ c=3 \end{array} \right\} \therefore x = \frac{-11 \pm \sqrt{(-11)^2 - 4 \cdot 5 \cdot 3}}{10}$$

$$= \frac{11 \pm \sqrt{121 - 60}}{10}$$

$$= \frac{11 \pm \sqrt{61}}{10}$$

$$\checkmark = \frac{11 + \sqrt{61}}{10} \text{ or } \frac{11 - \sqrt{61}}{10}$$

$$\checkmark = 1.88 \text{ or } 0.32 \text{ (2d.p.)}$$

4 (a) $x+y=6$ — (1)

$3x-4y=67$ — (2)

(1) $\times 3$: $3x+3y=18$ — (1A)

(2) - (1A): $-7y=49$ ✓

$\therefore y=-7$ sub. into (1)

$\therefore x-7=6 \therefore x=13$ ✓

$\therefore (x,y) = (13,-7)$ ✓

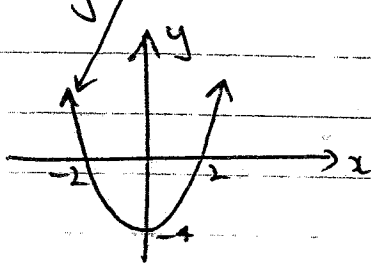
(b) $125^{x-3} = 5^{4x}$

$\therefore 5^{3(x-3)} = 5^{4x}$ ✓

$\therefore 3x-9 = 4x$ ✓

$\therefore -9 = x$ ✓

(c) $y = x^2 - 4$

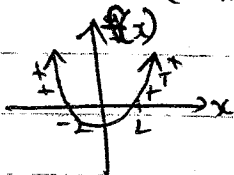


Domain: all real x ✓

Range: $y \geq -4$ ✓

(d) For domain: $x^2 - 4 > 0$ ($x \neq 0$)

$\therefore (x-2)(x+2) > 0$

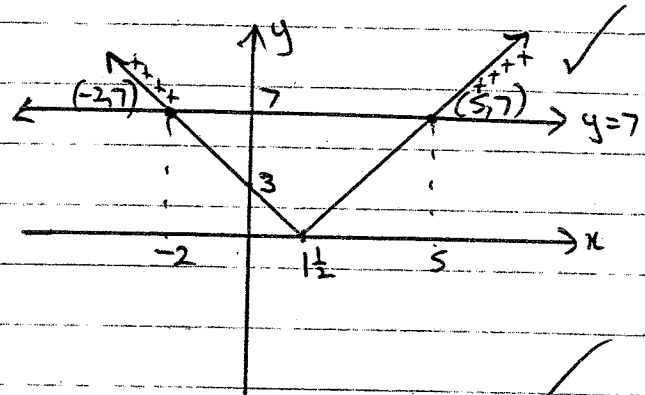


Domain is: $x < -2$ or $x > 2$ ✓

Range: $y > 0$ ✓

(e) $|2x-3| \geq 7$

i.e. graph $y = |2x-3|$ against $y=7$



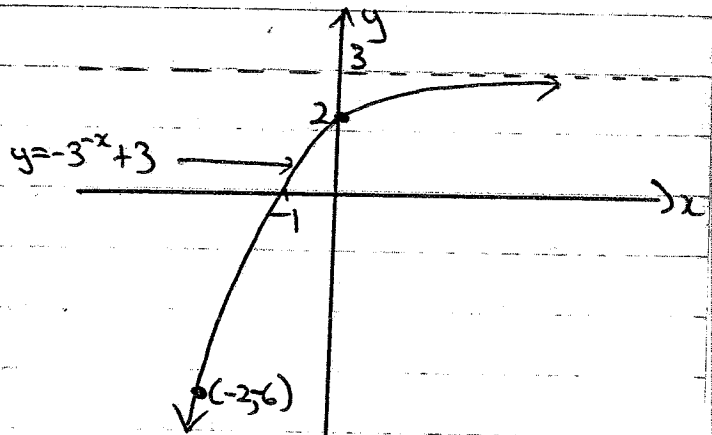
$\therefore x \leq -2$ or $x \geq 5$ ✓

(f) $y = -3^{-x} + 3$

As $x \rightarrow \infty$ $y \rightarrow 3$ \therefore horiz. asymptote at $y=3$

when $x=0$ $y=2$

when $y=0$ $3^{-x}=3 \therefore x=-1$



[showing intercept ✓
showing asymptote/shape ✓]