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MARCELLIN COLLEGE RANDWICK



YEAR 10
MATHEMATICS
Stage 5.3
ASSESSMENT TASK # 1

2010

Weighting: 15% of Report Mark.

STUDENT NAME: _____ MARK: _____ / 70

Time Allowed: 45 minutes

Directions:

- Answer all questions on the paper.
- Show all necessary working. Where more than one mark is allocated to a question, full marks may not be awarded for answers only.
- Marks may not be awarded for careless or badly arranged work.

1. Simplify the following

13 marks

a) $6a + 4b + 3a - 5b$ (1)

b) $6y \times 4y^3$ (1)

c) $\frac{2p}{3} - \frac{5p}{6}$ (2)

d) $\frac{2x}{3y} \times \frac{15y^2}{6x}$ (2)

e) $\frac{8x^3}{8y} \times \frac{2y^2}{15} + \frac{y^2}{4}$ (2)

f) $24y \div (8y - 2y)$ (2)

g) $3\sqrt{5} - \sqrt{5}$ (1)

h) $7\sqrt{24} + 3\sqrt{54}$ (2)

2. Expand and simplify where possible

12 marks

a) $6 - 4(x + 5)$ (1)

b) $3k - 7(2k - 1)$ (2)

c) $(3y + 4)(2y + 3)$ (2)

d) $(p + 5y)(p - 5y)$ (2)

e) $(2\sqrt{3} + 5)^2$ (2)

f) $(5y - 2)^2 - (3y + 1)(3y - 1)$ (3)

3. Factorise fully

6 marks

a) $a^2 - 25 + ab - 5b$ (2)

b) $x^2 - 14x + 48$ (1)

c) $14y^2 + y - 4$ (2)

d) $9x^2 - 1$ (1)

4. Factorise and simplify where possible

6 marks

a) $\frac{m^2 - 3m}{m^2 - 4} \div \frac{m^2 - 4m}{m^2 - 6m + 8}$ (3)

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

5. Solve the following

4 marks

a) $\frac{2x}{7} + 9 = 5 - 2x$ (2)

b) $11 - 3x \leq -1$ (2)

6. Solve simultaneously: $2x + 3y - 10 = 0$ and $5x - y + 26 = 0$

2 marks

7. Solve 4 marks

a) $x^2 - 9x = -20$ (2)

b) $2x^2 - 13x + 15 = 0$ (2)

8. Solve $x^2 - 12x - 5 = 0$ by completing the square 3 marks

9. Solve $x^2 - 6x - 4 = 0$, leaving answers in simplest surd form. 3 marks

10. Rationalise the denominator in the following 5 marks

a) $\frac{8}{\sqrt{2}}$ (2)

b) $\frac{6}{2\sqrt{2} + \sqrt{5}}$ (3)

11. Write the following correct to 2 significant figures 3 marks

a) 973 210 (1) b) 0.003 185 (1) c) 4049 (1)

12. Write 0.17 as a fraction in its simplest form 2 marks

13. Evaluate $64^{\frac{2}{3}}$ without using a calculator 2 marks

14. At a sale which offered a discount of 15%, John bought a camera for \$640. What was the original price of the camera? 2 marks

15. Increase 36kg by 20%. 1 mark

16. Write 540 000 000 in scientific notation. 1 mark

17. Write 2.33×10^{-4} as a basic numeral. 1 mark

1. Simplify the following

13 marks

a) $\frac{6a+4b+3a-5b}{9a-b}$ (1)

✓ 1

b) $\frac{6y \times 4y^3}{24y^4}$ (1)

✓ 1

c) $\frac{2p}{3} - \frac{5p}{6}$ (2)

$\frac{-p}{6}$ ✓ 2

d) $\frac{2x}{3x} \times \frac{15y^2 y^2}{6x-3}$ (2)

$\frac{5y^2}{3}$ ✓ 2

e) $\frac{1}{4} \frac{3x^3}{8y} \times \frac{1}{15} \frac{y^2}{5} \div \frac{y^2}{4}$ (2)

$\frac{x^3}{5y}$ ✓ 2

f) $24y \div (8y - 2y)$ (2)

4 ✓ 2

g) $3\sqrt{5} - \sqrt{5}$ (1)

2 $\sqrt{5}$ ✓ 1

h) $7\sqrt{24} + 3\sqrt{54}$ (2)

$= 14\sqrt{6} + 9\sqrt{6}$
 $= 23\sqrt{6}$ ✓ 2

13

2. Expand and simplify where possible

12 marks

a) $6 - 4(x+5)$ (1)

$= 6 - 4x - 20$
 $= -4x - 14$ ✓ 1

b) $3k - 7(2k-1)$ (2)

$= 3k - 14k + 7$
 $= -11k + 7$ ✓ 2

c) $(3y+4)(2y+3)$ (2)

$= 6y^2 + 9y + 8y + 12$
 $= 6y^2 + 17y + 12$ ✓ 2

d) $(p+5y)(p-5y)$ (2)

$= p^2 - 25y^2$ ✓ 2

e) $(2\sqrt{3}+5)^2$ (2)

$= 12 + 20\sqrt{3} + 25$
 $= 37 + 20\sqrt{3}$ ✓ 2

f) $(5y-2)^2 - (3y+1)(3y-1)$ (3)

$= 25y^2 - 20y + 4 - 9y^2 + 1$
 $= 16y^2 - 20y + 5$ 3

3. Factorise fully

6 marks

a) $a^2 - 25 + ab - 5b$ (2)

$= (a+5)(a-5) + b(a-5)$
 $= (a-5)(a+5+b)$ ✓ 2

b) $x^2 - 14x + 48$ (1)

$= (x-8)(x-6)$ ✓ 1

c) $14y^2 + y - 4$ (2)

$= \frac{(14y+8)(14y-7)}{14}$
 $= \frac{2(7y+4) \cdot 7(2y-1)}{14}$
 $= (7y+4)(2y-1)$ ✓ 2

d) $9x^2 - 1$ (1)

$= (3x+1)(3x-1)$ ✓ 1

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4. Factorise and simplify where possible

6 marks

$$\begin{aligned} \text{a) } & \frac{m^2 - 3m}{m^2 - 4} \div \frac{m^2 - 4m}{m^2 - 6m + 8} \quad (3) \\ & = \frac{m(m-3)}{(m+2)(m-2)} \times \frac{(m+2)(m-2)}{m(m-4)} \\ & = \frac{m-3}{m+2} \quad \checkmark \quad 3 \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{x+5}{x^2+x} + \frac{x+4}{x^2-x} \quad (3) \\ & = \frac{x+5}{x(x+1)} + \frac{x+4}{x(x-1)} \\ & = \frac{(x+5)(x-1) + (x+4)(x+1)}{x(x+1)(x-1)} \quad 3 \end{aligned}$$

$$\begin{aligned} & = \frac{x^2 + 4x - 5 + x^2 + 5x + 4}{x(x+1)(x-1)} \quad 4 \text{ marks} \\ & = \frac{2x^2 + 9x - 1}{x(x+1)(x-1)} \\ & \text{b) } 11 - 3x \leq -1 \quad (2) \\ & \quad -3x \leq -12 \quad \checkmark \\ & \quad x \geq 4 \quad \checkmark \quad 2 \end{aligned}$$

5. Solve the following

$$\begin{aligned} \text{a) } & \frac{2x}{7} + 9 = 5 - 2x \quad (2) \\ & \frac{2x}{7} = -4 - 2x \quad \checkmark \\ & 2x = -28 - 14x \quad 2 \\ & 16x = -28 \\ & x = -\frac{7}{4} \quad \checkmark \end{aligned}$$

6. Solve simultaneously: $2x + 3y - 10 = 0$ and $5x - y + 26 = 0$

2 marks

$$\begin{aligned} 2x + 3y - 10 &= 0 \quad (1) \\ 5x - y + 26 &= 0 \quad (2) \\ 2x + 3y &= 10 \quad (3) \\ 5x - y &= -26 \quad (4) \\ 5x + 26 &= y \quad (5) \\ \text{sub (5) into (3)} & \\ 2x + 3(5x + 26) &= 10 \\ 2x + 15x + 78 &= 10 \\ 17x &= -68 \\ x &= -4 \quad \checkmark \\ y &= 6 \quad \checkmark \end{aligned}$$

7. Solve

4 marks

$$\begin{aligned} \text{a) } & x^2 - 9x = -20 \quad (2) \\ & x^2 - 9x + 20 = 0 \\ & (x-5)(x-4) = 0 \\ & x = 5/4 \quad \checkmark \quad 2 \end{aligned}$$

$$\begin{aligned} \text{b) } & 2x^2 - 13x + 15 = 0 \quad (2) \\ & (2x-5)(x+3) = 0 \\ & x = \frac{5}{2}, -3 \quad \checkmark \end{aligned}$$

8. Solve $x^2 - 12x - 5 = 0$ by completing the square

3 marks

$$\begin{aligned} & x^2 - 12x + 6^2 = 5 + 36 \quad \checkmark \\ & (x-6)^2 = 41 \quad \checkmark \quad 3 \\ & x-6 = \sqrt{41} \\ & x = 6 \pm \sqrt{41} \quad \checkmark \end{aligned}$$

9. Solve $x^2 - 6x - 4 = 0$, leaving answers in simplest surd form.

3 marks

$$\begin{aligned} & x^2 - 6x + 3^2 = 4 + 9 \quad \checkmark \\ & (x-3)^2 = 13 \quad \checkmark \quad 3 \\ & x-3 = \sqrt{13} \\ & x = 3 \pm \sqrt{13} \quad \checkmark \end{aligned}$$

10. Rationalise the denominator in the following

5 marks

$$\begin{aligned} \text{a) } & \frac{8}{2\sqrt{2}} \quad (2) \\ & \frac{8\sqrt{2}}{2} = 4\sqrt{2} \quad \checkmark \\ & 2 \end{aligned}$$

$$\begin{aligned} \text{b) } & \frac{6}{2\sqrt{2} + \sqrt{5}} \quad (3) \\ & = \frac{6 \times (2\sqrt{2} - \sqrt{5})}{2\sqrt{2} + \sqrt{5} \times (2\sqrt{2} - \sqrt{5})} \\ & = \frac{12\sqrt{2} - 6\sqrt{5}}{8 - 5} \quad \checkmark \quad 3 \\ & = \frac{12\sqrt{2} - 6\sqrt{5}}{3} \\ & = 4\sqrt{2} - 2\sqrt{5} \quad \checkmark \end{aligned}$$

12

13

11. Write the following correct to 2 significant figures 3 marks

a) $973\ 210$ $\xrightarrow{970000}$ (1) b) $0.003\ 185$ $\xrightarrow{0.0032}$ (1) c) 4049 $\xrightarrow{4000}$ (1)

12. Write 0.17 as a fraction in its simplest form 2 marks

$x = 0.1777 \dots$
 $1000x = 177.777$
 $100x - x = 17.6$ ✓
 $99x = 17.6$ ✓
 $x = \frac{17.6}{99}$ ✓
 $= \frac{176}{990}$ ✓

13. Evaluate $64^{\frac{2}{3}}$ without using a calculator 2 marks

$(\sqrt[3]{64})^2$ |
 $= (4)^2$
 $= 16$ X

14. At a sale which offered a discount of 15%, John bought a camera for \$640. What was the original price of the camera? 2 marks

$640 \div 0.85 = 752.94$ ✓
\$ 752.94 ✓
2 ✓

15. Increase 36kg by 20%. 43.2kg 1 mark

16. Write 540 000 000 in scientific notation. 1 mark

5.4×10^8 ✓
1 ✓

17. Write 2.33×10^{-4} as a basic numeral. 1 mark

0.000233 ✓
1 ✓

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