J.M.J.CH

MARCELLIN COLLEGE RANDWICK

YEAR 9
Mathematics Stage 5.3

HALF YEARLY EXAM
Task 2
2014

Weighting: 30% of Assessment Mark.

STUDENT NAME: _____

TEACHER NAME: _____

MARK: / 100

TIME ALLOWED: 75 minutes.

DIRECTIONS:

- Answer all questions.
- Show all necessary working where more than one mark is allocated to a question.
- Full marks will not be awarded for answers only.
- Marks may not be awarded for badly arranged work.
- Calculators are allowed

Section A

Multiple Choice - 10 marks

Answer all questions on the sheet provided

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1. Expand and simplify $10y+8-4(3y+5)$

   (A) $-2y-52$ (B) $-2y-12$ (C) $-2y+12$ (D) $-2y+28$

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2. Solve $5a-2=a+6$

   (A) $a=1$ (B) $a=1\frac{2}{3}$ (C) $a=2$ (D) $a=4$

---

3. Jason buys software costing $104.50 including a 10% GST. He is entitled to claim the GST back from the taxation office. How much GST can he claim?

   (A) $9.50 (B) $10.45 (C) $94.05 (D) $95.00

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4. What is abx^2-a^3b fully factorised

   (A) $ab(x^2-a^2)$ (B) $a^2(x^2-b^2)$

   (C) $ab(x+a)(x-a)$ (D) $a^2(x+b)(x-b)$

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5. What is the value of $3x^2+6x-8$ *if* $x=-3$

   (A) - 44 (B) - 17 (C) 1 (D) 37

---

6. Which of the following statements is correct?

(A) $8y-11y=3y$ (B) $9x^2-x^2=9$

(C) $5a\times 3a=15a$ (D) $cd+5cd=6cd$

7. What is 0.0407093 written with two significant figures?

(A) 0.041 (B) 0.407 (C) 0.040 (D) 0.04

8. What is 0.000,000,124 mm expressed in scientific notation?

(A) 0.124×10^{-6} mm (B) 1.24×10^{-7} mm

(C) 0.124×10^{6} mm (D) 1.24×10^{7} mm

9. John planted apple and peach trees in the ratio 3 : 2. If there are 30 trees altogether, how many peach trees are there?

(A) 6 (B) 12 (C) 18 (D) 20

10. Given $\sqrt{x}-8=17$ what is the value of x

(A) 3 (B) 5 (C) 81 (D) 625

Section B

Number and Measurement - (10 Marks)

Marks

1. Find, correct to two significant figures, the value of 2

$$\frac{3.24^2}{6.71-3.82}$$

2. Complete the following conversions: 2

(a) 26.34 km = _____ m (b) 45600 kB = _____ MB

3. The cost of a television increased by 20%. Find the new price if it was originally priced at $640. 2

4. John bought a new camera from a shop offering a 15% discount. If he paid $850 for the camera, what was his savings? 2

5. Express $0.5\dot{6}$ in simplest fraction form. 2

Algebra - (14 Marks) Marks

1. Expand then simplify each of the following

(a) $7+2(m-3)$ 2

(b) $2(x+4)-(x-3)$ 2

(c) $5x^2+3x(x^2-2x)$ 2

(d) $4(a-b)+4b-a$ 2

(e) $5(3x-2)-2(5x+3)$ 2

(f) $(3y-2)(4y+5)$ 2

(g) $(11+x)(9-x)$ 2

Indices - (22 Marks) Marks

1. Simplify

(a) $18a^8 \div 3a^3$ 2

(b) $5x^3y^4 \times 2x^2y^2$ 2

(c) $(6x)^0$ 1

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

(e) $8y^0 \times 4y^3$ 1

(f) $5^2 \times 5^3$ (Leave in index form) 1

2. Simplify

Marks

(a) $3x^{-3} \times 4x^{9}$ — 2

(b) $(4x^{3})^{2}$ — 2

(c) $\dfrac{10a^{2}c^{3} \times 3b^{5}c^{11}}{5a^{3} \times 3b^{3}c^{2}}$ — 3

(d) $5y^{\frac{1}{2}} \times 3y^{\frac{1}{3}}$ — 2

(e) $(3x)^{-2}$ (Simplify, writing your answer without a negative indice) — 2

(f) $\sqrt{y}$ (Write using a fractional indice) — 1

(g) $\sqrt[3]{x^{2}}$ (Write using a fractional indice) — 1

Factorising Algebraic Expressions - (12 Marks)

Marks

1. Factorise completely

(a) $3x - 6y$ — 1

(b) $20x^{2} + 12x$ — 1

(c) $x^{2} - 49$ — 1

(d) $9a^{2} - b^{2} + 3a - b$ — 2

(e) $x^{2} + 8x + 15$ — 2

(f) $x^{2} + x - 12$ — 2

(g) $2a^{2} + 7a - 15$ — 3

Equations, Inequalities and Formulas - (24 Marks) Marks

1. Solve the following equations

(a) $3m+6=19$ **2**

(b) $6(a+3)=7(10-a)$ **3**

(c) $\frac{5x+1}{3}=7$ **2**

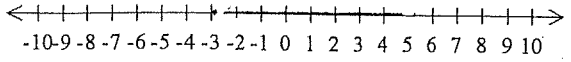
(d) $\frac{2b}{3}-\frac{b}{5}=1$ **3**

(e) $\frac{2x+3}{3}-\frac{x}{4}=3$ **3**

(f) $\frac{13y-7}{6}=2y$ **2**

2. Solve the following inequality and graph the solution on the number line

$4-2x \geq -3$ **3**



1

3. In the formula $T=\frac{kA}{70}$ find the value of T when $k = 21$ and $A = 7$ **2**

4. Given the formula $V=\pi r^2 h$ where $V = 1800$ and $h = 16$ what is the value of r? **3**
(Give your answer correct to 2 decimal places)

Simultaneous Equations - (8 Marks) Marks

1. Solve the simultaneous equations

(a) $x + y = 12$
$x - y = 6$ **2**

(b) $x - 2y = 1$
$2x + y = 7$ **3**

(c) $2x + 3y = 21$
$4x - 5y = -13$ **3**

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STUDENT NAME: MASTER COPY - SOLUTIONS

TEACHER NAME: ...

MARK: / 100

TIME ALLOWED: 75 minutes.

DIRECTIONS:

- Answer all questions.
- Show all necessary working where more than one mark is allocated to a question.
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Section A

Multiple Choice - 10 marks

Answer all questions on the sheet provided

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1. Expand and simplify $10y+8-4(3y+5)$ $10y+8-12y-20$ $-2y-12$

(A) $-2y-52$ (B) $-2y-12$ (C) $-2y+12$ (D) $-2y+28$

---

2. Solve $5a-2=\frac{a}{4}+6$ $4a-\frac{1}{4}=6+2$ $\frac{15}{4}=\frac{8}{4}$ $a=2$

(A) $a=1$ (B) $a=1\frac{2}{3}$ (C) $a=2$ (D) $a=4$

---

3. Jason buys software costing \$104.50 including a 10% GST. He is entitled to claim the GST back from the taxation office. How much GST can he claim?

$110\% = 104.50$
$1\% = 0.95$
$10\% = 9.5$

(A) \$9.50 (B) \$10.45 (C) \$94.05 (D) \$95.00

---

4. What is abx^2-a^3b fully factorised $a(bx^2-a^2)$ $ab(x^2-a^2)$ $ab(x+a)(x-a)$

(A) $ab(x^2-a^2)$ (B) $a^2(x^2-b^2)$

(C) $ab(x+a)(x-a)$ (D) $a^2(x+b)(x-b)$

---

5. What is the value of $3x^2+6x-8$ *if* $x=-3$ $3(-3)$ $27-18-8$

(A) -44 (B) -17 (C) 1 (D) 37

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6. Which of the following statements is correct?

(A) $8y-11y=3y$ (B) $9x^2-x^2=9$

(C) $5a\times 3a=15a$ (D) $cd+5cd=6cd$

7. What is 0.0407093 written with two significant figures?

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8. What is 0.000,000,124 mm expressed in scientific notation?

(A) 0.124×10^{-6} mm (B) 1.24×10^{-7} mm

(C) 0.124×10^{6} mm (D) 1.24×10^{7} mm

9. John planted apple and peach trees in the ratio 3 : 2. If there are 30 trees altogether, how many peach trees are there?

5 parts = 30
1 part = 6

(A) 6 (B) 12 (C) 18 (D) 20

10. Given $\sqrt{x}-8=17$ what is the value of x

$\sqrt{x}-8=17$
$+8$
$\sqrt{x}=25^2$
x

(A) 3 (B) 5 (C) 81 (D) 625

Section B

Number and Measurement - (10 Marks)

Marks

1. Find, correct to two significant figures, the value of 2

$$\frac{3.24^2}{6.71-3.82}$$

$=3.632387543$
2 significant figures $=3.6$

2. Complete the following conversions: 2

(a) 26.34 km = 26340 m (b) 45600 kB = 45.6 MB

3. The cost of a television increased by 20%. Find the new price if it was originally priced at $640. 2

640 = 100%
6.4 = 1%
768 = 120%
New price = $768

4. John bought a new camera from a shop offering a 15% discount. If he paid $850 for the camera, what was his savings? 2

85% = 850
1% = 10
100% = 1000
he saved $150

5. Express $0.5\dot{6}$ in simplest fraction form. 2

$x=0.5\dot{6}$
$10x=5.\dot{6}$
$100x=56.\dot{6}$
$100x-10x=90x$
$56.\dot{6}-5.\dot{6}=51$

$\frac{90x}{90}=\frac{51}{90}$

$x=\frac{17}{30}$

Algebra - (14 Marks) Marks

1. Expand then simplify each of the following

(a) $7+2(m-3)$ 2

$= 7+2m-6$

$= 1+2m$

(b) $2(x+4)-(x-3)$ 2

$= 2x+8-x+3$

$= x+11$

(c) $5x^2+3x(x^2-2x)$ 2

$= 5x^2+3x^3-6x^2$

$= -x^2+3x^3$

(d) $4(a-b)+4b-a$ 2

$= 4a-4b+4b-a$

$= 3a$

(e) $5(3x-2)-2(5x+3)$ 2

$= 15x-10-10x-6$

$= 5x-16$

(f) $(3y-2)(4y+5)$ 2

$= 12y^2+15y-8y-10$

$= 12y^2+7y-10$

(g) $(11+x)(9-x)$ 2

$= 99-11x+9x-x^2$

$= 99-2x-x^2$

(13)

Indices - (22 Marks) Marks

1. Simplify

(a) $18a^9 \div 3a^3$ 2

$6a^6$

(b) $5x^3y^4 \times 2x^2y^2$ 2

$10x^5y^6$

(c) $(6x)^0$ 1

$= 1$

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

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

(e) $8y^0 \times 4y^3$ 1

$8 \times 4y^3 = 32y^3$

(f) $5^2 \times 5^3$ (Leave in index form) 1

5^5

(9)

2. Simplify

Marks

(a) $3x^{-3} \times 4x^9$ $= \frac{3}{x^3} \times \frac{4x^9}{1} = \frac{12x^{9}}{x^3} = 12x^6$ — 2

(b) $(4x^3)^2$ $= 16x^6$ — 2

(c) $\frac{10a^2c^3 \times 3b^5c^{11}}{5a^3 \times 3b^3c^2} = \frac{30a^2c^{14}b^{12}}{15a^3c^2b^3} = \frac{2c^{12}b^2}{a}$ — 3

(d) $5y^{\frac{1}{2}} \times 3y^{\frac{1}{3}} = 15y^{\frac{1}{6}}$ — 2

(e) $(3x)^{-2}$ (Simplify, writing your answer without a negative indice) $= \frac{1}{(3x)^2} = \frac{1}{9x^2}$ — 2

(f) $\sqrt{y}$ (Write using a fractional indice) $= y^{\frac{1}{2}}$ — 1

(g) $\sqrt[3]{x^2}$ (Write using a fractional indice) $x^{\frac{2}{3}}$ — 1

12

Factorising Algebraic Expressions - (12 Marks)

Marks

1. Factorise completely

(a) $3x - 6y$ $3(x-2y)$ — 1 1

(b) $20x^2 + 12x$ $4x(5x+3)$ — 1 1

(c) $x^2 - 49$ $(x+7)(x-7)$ — 1 1

(d) $9a^2 - b^2 + 3a - b$ $(3a+b)(3a-b) + 3a - b$ $= 3a-b[(3a+b)+1]$ $= (3a-b)(3a+b+1)$ — 2 2

(e) $x^2 + 8x + 15$ $x^2 + 5x + 3x + 15$ $x(x+5)+3(x+5)$ $= (x+3)(x+5)$ — 2 2

(f) $x^2 + x - 12$ $x^2 - 3x + 4x - 12$ $x(x-3)+4(x-3)$ $= (x+4)(x-3)$ — 2 2

(g) $2a^2 + 7a - 15$ $2a^2 + 10a - 3a - 15$ $2a(a+5) - 3(a+5)$ $= (2a-3)(a+5)$ — 3 3

12

Equations, Inequalities and Formulas - (24 Marks) Marks

1. Solve the following equations

(a) $3m+6=19$ 2

$-6 \quad -6$

$\frac{3m}{3}=\frac{13}{3}$

$m=4\frac{1}{3}$ ✓

(b) $6(a+3)=7(10-a)$ 3

$6a+18=70-7a$

$+7a \quad +7a$

$13a+18=70$

$-18 \quad -18$

$\frac{13a}{13}=\frac{52}{13}$

$a=4$ ✓

(c) $\frac{5x+1}{3}=7$ ×3 2

$5x+1=21$

$-1 \quad -1$

$\frac{5x}{5}=\frac{20}{5}$

$x=4$ ✓

(d) $\left(\frac{2b}{3}\right)-\left(\frac{b}{5}\right)=1$ ×15 3

$10b-3b=15$

$\frac{7b}{7}=\frac{15}{7}$

$b=2\frac{1}{7}$ ✓

(e) $\left(\frac{2x+3}{3}\right)-\left(\frac{x}{4}\right)=3$ ×20 3

$4(2x+3)-5x=60$

$8x+12-5x=60$

$3x+12=60$

$-12 \quad -12$

$\frac{3x}{3}=\frac{48}{3}$

$x=16$ ✓

(f) $\frac{13y-7}{6}=2y$ ×6 2

$13y-7=12y$

$-13y \quad -13y$

$\frac{-7}{-1}=\frac{-y}{-1}$

$y=7$ ✓

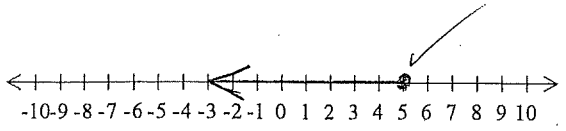
15

2. Solve the following inequality and graph the solution on the number line 3

$-2x \geq -3-7$

$\frac{-2x}{-2} \geq \frac{-10}{-2}$

$x \leq 5$ ✓



✓ 1

3. In the formula $T=\frac{kA}{70}$ find the value of T when $k = 21$ and $A = 7$ 2

$T=\frac{21\times7}{70}$

$T=\frac{147}{70}$

$T=2.1$ ✓

2

4. Given the formula $V=\pi r^2 h$ where $V = 1800$ and $h = 16$ what is the value of r? 3
(Give your answer correct to 2 decimal places)

$V=\pi r^2 h$

$1800=\pi \times r^2 \times 16$

$\frac{1800}{16\pi}=\frac{16\pi r^2}{16\pi}$

$r^2=35.80986622$

$r=\sqrt{35.80986622}$

$r=5.98$ ✓

3

9

Simultaneous Equations - (8 Marks) Marks

1. Solve the simultaneous equations

(a) $x + y = 12$ — ①
$x - y = 6$ — ②

Eqn ① + eqn ②

$= \frac{2x}{2} = \frac{18}{2}$

$x = 9$ ✓

Sub x into eqn ①

$x + y = 12$

$9 + y = 12 - 9$

$y = 3$ ✓ 2 2

(b) $x - 2y = 1$ — ①
$2x + y = 7$ $\times 2$ — ②

$x - 2y = 1$

$4x + 2y = 14$

Eqn ① + Eqn ②

$= \frac{5x}{5} = \frac{15}{5}$

$x = 3$ ✓

Sub x into eqn ①

$x - 2y = 1$

$3 - 2y = 1 - 3$

$\frac{-2y}{-2} = \frac{-2}{-2}$

$y = 1$ ✓ 3 3

(c) $5 \times 2x + 3y = 21$ — ①
$3 \times 4x - 5y = -13$ — ②

$10x + 15y = 105$

$12x - 15y = -39$

Eqn ① + eqn ②

$\frac{22x}{22} = \frac{66}{22}$

$x = 3$ ✓

Sub x into eqn ①

$2x + 3y = 21$

$2(3) + 3y = 21$

$6 + 3y = 21 - 6$

$\frac{3y}{3} = \frac{15}{3}$

$y = 5$ ✓ 3 3

8